for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

MITSUBISHI CNC
NC Specification Selection Guide
M800/M80 Series

- **M800W Series**
- **M800S Series**
- **M80W Series**
- **M80 Series**

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems
A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance
Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems
Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems
Maximizing productivity and efficiency with cutting-edge automation technology.

OVERVIEW

CNC LINEUP ····3

SELECTION PROCEDURE ····4

PRODUCT LINES ····5

M800/M80 SERIES LINEUP ····7

CNC SYSTEM ····9

M800/M80 SERIES SPECIFICATIONS LIST ····9
HARDWARE ····33
CONTROL UNIT/DISPLAY UNIT ····34
I/O UNIT AND OTHERS ····35
GENERAL CONNECTION DIAGRAM ····36
LIST OF CABLES ····45

DRIVE SYSTEM ····49

SYSTEM CONFIGURATION ····51
SPECIFICATIONS ····55
TYPE ····57
SERVO MOTOR/DIRECT-DRIVE MOTOR/LINEAR SERVO MOTOR 200V ····62
HG Series ····62 | TM-RB Series ····65 | LM-F Series ····66
SPINDLE MOTOR/ BUILT-IN SPINDLE MOTOR /TOOL SPINDLE MOTOR 200V ····68
SJ-D Series ····68 | SJ-DG Series ····69 | SJ-DJ Series ····70
SJ-DL Series ····71 | SJ-V Series ····73 | SJ-VL Series ····77
SJ-BG Series ····78 | SJ-B Series ····79 | SJ-PMB Series ····85
HG Series ····86 | HG-JR Series ····86 | HG Series ····87
SERVO MOTOR/LINEAR SERVO MOTOR 400V ····88
HG-H Series ····88 | HQ-H Series ····89 | LM-F Series ····90
SPINDLE MOTOR /TOOL SPINDLE MOTOR 400V ····91
SJ-4-V Series ····91 | HG-JR Series ····93 |
DRIVE UNIT ····94
MDS-E Series ····94 | MDS-EH Series ····96 | MDS-EM/EMH Series ····98
MDS-EJ/EJH Series ····99
SELECTION OF THE POWER SUPPLY UNIT ····101
SELECTION OF THE ADDITIONAL AXIS DRIVE UNIT ····108
DEDICATED OPTIONS SERVO OPTIONS ····113
DEDICATED OPTIONS SPINDLE OPTIONS ····118
ENCODER INTERFACE UNIT ····124
DEDICATED OPTIONS DRIVE UNIT OPTION ····126
SELECTION OF CABLES AND CONNECTORS ····132
LIST OF CABLES ····143

SOFTWARE TOOLS ····149

GLOBAL SALES & SERVICE NETWORK ····151

CNC LINEUP

High Performance

M800W

Premium CNC provides expandability and flexibility

- Separated type, a control unit separated from display
- Windows-based display is included in the lineup, which provides excellent expandability
- Four expansion slots are provided as standard specifications, allowing for expansion using option card slot

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

M80W

Standard CNC with expandability and flexibility

- Separated type, a control unit separated from display
- Windows-based display is included in the lineup, which provides excellent expandability
- Packaged type for selecting a machine type easily
- Two expansion slots are provided as standard specifications, allowing for expansion using option cards slot

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 based display provides easy operability

Standard

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**	P7

- 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**	P62

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

STEP 4	**Decide the spindle motor**	P68

- 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**	P94

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

STEP 6	**Decide the power supply unit**	P101

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

STEP 7	**Decide the hardware options**	P33,P45,P132

- 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**	P149

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

NC specification selection completed!

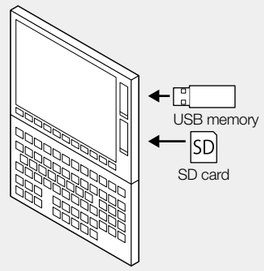
PRODUCT LINES

PRODUCT LINES

3 PRODUCT LINES

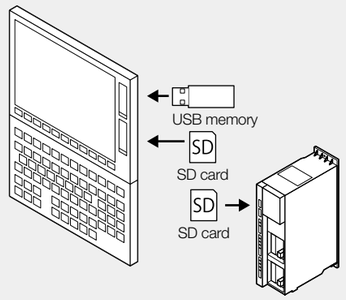
Ethernet

M800S/M80 Series



Display-integrated control unit & Keyboard

M800W/M80W Series



Display & Keyboard

Control unit

Software
- NC Analyzer2
- NC Configurator2

Field Network
- CC-Link
- PROFIBUS-DP

Remote I/O unit

PC server
- Production control system

EcoMonitorLight
* Optional part

Software
- NC Designer2
- NC Trainer2
- NC Trainer2 plus
- NC Explorer
- NC Monitor2
- MITSUBISHI CNC communication software (FCSB1224W000)

Power backup unit

Power supply unit

MC
* Optional part

AC reactor

AC power supply

Drive unit
- MDS-E/EH Series
- MDS-EJ/EJH Series
- MDS-EM/EMH Series

Manual pulse generator

Machine operation panel

Tool spindle motor
- HG Series
- HG-JR Series

Servo motors
- HG Series
- LM-F Series
- TM-RB Series

Spindle motor
- SJ-D Series
- SJ-DG Series
- SJ-DL Series
- SJ-BG Series

User-prepared

* Optional parts are not provided as accessories for NC equipment. Please purchase desired components from a Mitsubishi Electric dealership, etc.

M800/M80 SERIES LINEUP

		Lathe system							
		(Display/Control unit separated-type)		(Display/Control unit integrated-type)		(Display/Control unit separated-type)		(Display/Control unit integrated-type)	
Model name		M800W Series		M800S Series		M80W 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		12	9
	Max. number of NC axes (in total for all the part systems)	32		32		10		10	7
	Max. number of spindles	8		8		4+G/B(*1)		4+G/B(*1)	3
	Max. number of PLC axes	8		8		6		6	
	Max. number of PLC indexing axes	8		8		4		4	
	Number of simultaneous contouring control axes	8	4	8	4	4		4	
	Max. number of NC axes in a part system	12		12		8		8	5
Max. number of part systems (main + sub)		8		8		4		4	2
Max. number of main part systems		8		8		2		2	2
Max. number of sub part systems		8		8		2		2	1
Control unit-side High-speed program server mode		Available		—		Available		—	
Display unit-side High-speed program server mode		Available/— (*2)		Available		Available/— (*2)		Available	
Front-side SD card mode		Available		Available		Available		Available	
Least command increment		1nm		1nm		0.1μm		0.1μm	
Least control increment		1nm		1nm		1nm		1nm	
Number of tool offset sets		999		999		256		256	99
Max. program capacity		2,000kB (5,120m) (1,000)		2,000kB (5,120m) (1,000)		500kB (1,280m) (1,000)		500kB (1,280m) (1,000)	
Max. PLC program capacity [steps]		512,000		512,000		64,000		64,000	32,000
Multi-project [number of PLC projects stored]		6		6		3	3	1	
Interactive cycle insertion		Available							
High-speed machining mode I maximum [kBPM]		33.7		33.7		33.7		33.7	—
High-speed machining mode II maximum [kBPM]		168		168		67.5		67.5	—
High-speed high-accuracy control I maximum [kBPM]		67.5		67.5		33.7		33.7	—
High-speed high-accuracy control II maximum [kBPM]		168		168		67.5		67.5	—
High-speed high-accuracy control III maximum [kBPM]		—		—		—		—	
High-accuracy control		Available							—
SSS control (Super Smooth Surface)		Available							—
Tolerance control		Available							—
CC-Link (Master/Local)		Available							
PROFIBUS-DP (Master)		Available							
MES interface library		Available							
Smart Safety observation		Available							
Display unit(*3)		19-type touchscreen, 19-type horizontal touchscreen, 15-type touchscreen, or 10.4-type touchscreen can be selected		15-type touchscreen or 10.4-type touchscreen can be selected		19-type touchscreen, 19-type horizontal touchscreen, 15-type touchscreen, 10.4-type touchscreen, or 8.4-type can be selected		15-type touchscreen, 10.4-type, touchscreen or 8.4 type can be selected	
Windows®8 selection(*3)		Available/— (*2)		—		Available/— (*2)		—	

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

(*1) G/B: Guide Bush

(*2) Windows-based dispaly unit/Windows-less displpay unit

(*3) For details, refer to "CNC SYSTEM CONTROL UNIT/DISPLAY UNIT" to be described.

		Machining center system							
		(Display/Control unit separated-type)		(Display/Control unit integrated-type)		(Display/Control unit separated-type)		(Display/Control unit integrated-type)	
Model name		M800W Series		M800S Series		M80W Series		M80 Series	
		M850W	M830W	M850S	M830S	—		TypeA	TypeB
Number of control axes	Max. number of axes (NC axes + Spindles + PLC axes)	32		32		11		11	9
	Max. number of NC axes (in total for all the part systems)	16		16		8		8	5
	Max. number of spindles	4		4		2		2	
	Max. number of PLC axes	8		8		6		6	
	Max. number of PLC indexing axes	8		8		4		4	
	Number of simultaneous contouring control axes	8	4	8	4	4		4	
	Max. number of NC axes in a part system	12		12		8		8	5
Max. number of part systems (main + sub)		2		2		2		2	1
Max. number of main part systems		2		2		2		2	1
Max. number of sub part systems		2		2		—		—	—
Control unit-side High-speed program server mode		Available		—		Available		—	
Display unit-side High-speed program server mode		Available/— (*2)		Available		Available/— (*2)		Available	
Front-side SD card mode		Available		Available		Available		Available	
Least command increment		1nm		1nm		0.1μm		0.1μm	
Least control increment		1nm		1nm		1nm		1nm	
Number of tool offset sets		999		999		400		400	400
Max. program capacity		2,000kB (5,120m) (1,000)		2,000kB (5,120m) (1,000)		500kB (1,280m) (1,000)		500kB (1,280m) (1,000)	
Max. PLC program capacity [steps]		512,000		512,000		64,000		64,000	32,000
Multi-project [number of PLC projects stored]		6		6		3		3	1
Interactive cycle insertion		—							
High-speed machining mode I maximum [kBPM]		33.7		33.7		33.7		33.7	16.8
High-speed machining mode II maximum [kBPM]		168		168		67.5		67.5	
High-speed high-accuracy control I maximum [kBPM]		67.5		67.5		33.7		33.7	
High-speed high-accuracy control II maximum [kBPM]		168		168		67.5		67.5	
High-speed high-accuracy control III maximum [kBPM]		270		270		135		135	—
High-accuracy control		Available							
SSS control (Super Smooth Surface)		Available							
Tolerance control		Available							
CC-Link (Master/Local)		Available							
PROFIBUS-DP (Master)		Available							
MES interface library		Available							
Smart Safety observation		Available							
Display unit(*3)		19-type touchscreen, 19-type horizontal touchscreen, 15-type touchscreen, or 10.4-type touchscreen can be selected		15-type touchscreen or 10.4-type touchscreen can be selected		19-type touchscreen, 19-type horizontal touchscreen, 15-type touchscreen, 10.4-type touchscreen, or 8.4-type can be selected		15-type touchscreen, 10.4-type, touchscreen or 8.4 type can be selected	
Windows®8 selection(*3)		Available/— (*2)		—		Available/— (*2)		—	

CNC SYSTEM M800/M80 SERIES SPECIFICATIONS LIST

Specifications of separated-type display are classified with "Windows-based" and "Windows-less"

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

S/W ver.C3

class	Lathe system							Machining center system					General explanation
	M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
	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	○2	○3	○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	12	9	○16 △32	○16 △32	○16 △32	○16 △32	11	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. 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.
Max. number of NC axes (in total for all the part systems)	○16 △32	○16 △32	○16 △32	○16 △32	10	10	7	○16	○16	○16	○16	8	8	5	
Max. number of spindles	8	8	8	8	4+G/B	4+G/B	3	4	4	4	4	2	2	2	
Max. number of PLC axes	8	8	8	8	6	6	6	8	8	8	8	6	6	6	
4 Max. number of PLC indexing axes	8	8	8	8	4	4	4	8	8	8	8	4	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	4	8	4	8	4	4	4	4	Number of axes with which simultaneous interpolation control is possible.
6 Max. number of NC axes in a part system	○8 △12	○8 △12	○8 △12	○8 △12	8	8	5	○8 △12	○8 △12	○8 △12	○8 △12	8	8	5	Max. number of NC axes possible to control in the same part system.
7 Axis name extension	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The axis name (command axis name) to issue the absolute/incremental value command to NC control axis can be expanded to two letters.
2 Control part system															
1 Standard number of part systems	1	1	1	1	1	1	1	1	1	1	1	1	1	1	One part system is the standard.
2 Max. number of part systems (main + sub)	○4 △8	○4 △8	○4 △8	○4 △8	○4	○4	○2	○2	○2	○2	○2	○2	○2	○1	Up to eight part systems for a lathe system, and up to two part systems for a machining center system.
Max. number of main part systems	○4 △8	○4 △8	○4 △8	○4 △8	○2	○2	○2	○2	○2	○2	○2	○2	○2	○1	
Max. number of sub part systems	○4 △8	○4 △8	○4 △8	○4 △8	○2	○2	○1	○2	○2	○2	○2	—	—	—	
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/M80W (Windows-based display unit). 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.
6 Front-side USB memory mode	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The machining program stored in a USB memory can be operated. This USB memory is installed to the front-side USB memory 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)	○	○	○	○	○	○	○	—	—	—	—	—	—	—	
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.
2 Program format switch	△	△	△	△	—	—	—	—	—	—	—	—	—	—	This function is designed to switch the program format (G code list) using G codes or PLC signal. When you run a lathe-based multi-tasking machine, and if you change to the G code list of machining center system, you can use a free-curved surface machining program made with CAM without modifying the program.
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.

M800/M80 SERIES SPECIFICATIONS LIST

5 CNC SYSTEM

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

class			Lathe system							Machining center system	
			M800W		M800S		M80W	M80		M800W	
			M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W
	6	Polar coordinate interpolation	△	△	△	△	○	○	○	△	△
	7	Milling interpolation	△	△	△	△	○	○	○	—	—
	8	Hypothetical axis interpolation	—	—	—	—	—	—	—	△	△
3	Curve interpolation										
	1	Involute 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	1000
	2	Cutting feedrate (m/min)	1000	1000	1000	1000	1000	1000	1000	1000	1000
	3	Manual feedrate (m/min)	1000	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	Thread recutting	△	△	△	△	○	○	—	—	—
	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	○	○	○	○	○	○	○	○	○
	5	Manual feedrate B	○	○	○	○	○	○	○	○	○
	6	Manual feedrate B surface speed control	—	—	—	—	—	—	—	△	△
	8	Manual speed clamp	○	○	○	○	○	○	○	○	○

S/W ver.C3

Machining center system					General explanation
M800S		M80W	M80		
M850S	M830S	—	M80 TypeA	M80 TypeB	
△	△	—	—	—	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.
—	—	—	—	—	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.
△	△	○	○	—	Tools can be moved along the involute curve. This can be used for scroll machining of involute gears or compressors, and smooth accurate machining can be performed without stepping of path from the command by fine segment or without acceleration/deceleration by segment length.
△	△	—	—	—	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	1000	The rapid traverse rate can be set independently for each axis using parameters.
1000	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	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.
					* With digital I/F spindle
○	○	○	○	○	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.
○	○	○	○	○	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.

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

class			Lathe system							Machining center system					General explanation
			M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
			M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	
7 Dwell																	
	1	Dwell (Time-based designation)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The G code command temporarily stops machine movements and sets the machine in the stand-by status for the time designated in the program.
	2	Dwell (Revolution-based designation)	○	○	○	○	○	○	○	—	—	—	—	—	—	—	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.
5 Program memory / editing																	
1 Memory capacity																	
	1	Memory capacity (number of programs stored)															
		500kB [1280m] (1000 programs)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
		1000kB [2560m] (1000 programs)	△	△	△	△	—	—	—	△	△	△	△	—	—	—	
		2000kB [5120m] (1000 programs)	△	△	△	△	—	—	—	△	△	△	△	—	—	—	
2 Editing																	
	1	Program editing	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables program editing such as correction, deletion and addition.
	2	Background editing	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables one machining program to be created or edited while another program is running.
	3	Buffer correction	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
	5	Multi-part system simultaneous program editing	○	○	○	○	○	○	○	○	○	○	○	—	—	—	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.
	6	Special program editing display for synchronization between part systems	△	△	△	△	○	○	○	△	△	△	△	—	—	—	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.
	7	Finish shape view programming	△	△	△	△	○	○	○	△	△	△	△	○	○	○	This function shows the machining shape according to the command at the time the machining program is input. The machining shape can be confirmed easily without performing the automatic operation or the graphic check.
6 Operation and display																	
1 Structure of operation / display panel																	
	1	Color display (8.4-type LCD TFT)	—	—	—	—	—	□	□	—	—	—	—	—	□	□	The setting and display unit consists of the dispaly unit and the keyboard unit. Refer to ""HARDWARE"" described later for the details. (Note) Only software keyboard is available and there is no hardware keyboard for the separated-type color touchscreen display (19-type LCD TFT/ Windows8 or 19-type horizontal LCD TFT/Windows8).
	2	Color touchscreen display (10.4-type LCD TFT)	—	—	□	□	—	□	□	—	—	□	□	—	□	□	
	3	Color touchscreen display (15-type LCD TFT)	—	—	□	□	—	□	□	—	—	□	□	—	□	□	
	4	Separated-type color touchscreen display (8.4-type LCD TFT)	—	—	—	—	□	—	—	—	—	—	—	□	—	—	
	5	Separated-type color touchscreen display (10.4-type LCD TFT)	□	□	—	—	□	—	—	□	□	—	—	□	—	—	
	6	Separated-type color touchscreen display (15-type LCD TFT)	□	□	—	—	□	—	—	□	□	—	—	□	—	—	
	7	Separated-type color touchscreen display (15-type LCD TFT/Windows8)	□	□	—	—	□	—	—	□	□	—	—	□	—	—	
	8	Separated-type color touchscreen display (19-type LCD TFT/Windows8)	□	□	—	—	□	—	—	□	□	—	—	□	—	—	
	9	Separated-type color touchscreen display (19-type Horizontal LCD TFT/Windows8)	□	□	—	—	□	—	—	□	□	—	—	□	—	—	
2 Operation methods and functions																	
	1	Operation input	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
	2	Absolute value / Incremental value setting	○	○	○	○	○	○	○	○	○	○	○	○	○	○	When setting the data, the absolute/incremental setting can be selected from the menu.
	5	Displayed part system switch	○	○	○	○	○	○	○	○	○	○	○	○	○	—	The part system displayed on the screen can be changed.
	6	Menu list	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
	7	Display switch by operation mode	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The screen display changes when the screen mode selection switch is changed.
	8	External signal display switch	○	○	○	○	○	○	—	○	○	○	○	○	○	—	The screen display changes with the signal from PLC.
	9	Screen saver	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The screen saver function protects the display unit by turning the backlight OFF after the length of time specified in a parameter.
	10	Parameter guidance	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function displays the details of the parameters or the operation methods according to the state of the screen currently displayed.
	11	Alarm guidance	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Guidance is displayed for the alarm currently issued.
	12	Machining program input mistake check warning	△	△	△	△	—	—	—	△	△	△	△	—	—	—	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.
	14	Screenshot capture	—/○	—/○	○	○	—/○	○	○	—/○	—/○	○	○	—/○	○	○	This function allows to output a bitmap file of a screen displayed on the setting and display unit.
	15	User selectable menu configuration	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
	16	PC-NC network automatic connection	○/—	○/—	—	—	○/—	—	—	○/—	○/—	—	—	○/—	—	—	This function supports to restore the connection when the network connection fails between the display unit and the control unit.
	17	Device open parameter	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function can set or change the user backed up area of the PLC device from the NC screen.
	18	SRAM open parameter	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function can set or change the SRAM open area for machine tool builders from the NC screen.
	19	MTB selectable menu configuration	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
	20	Remote desktop connection	—/○	—/○	△	△	—/○	○	○	—/○	—/○	△	△	—/○	○	○	This enables the operation of the external personal computer on the screen of NC with UltraVNC Server embedded.
3 Display methods and contents																	
	1	Status display	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The status of the program currently being executed is indicated.
	2	Clock display	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The clock is built in, and the date (year, month, date) and time (hour, minute, second) are displayed.
	3	Monitor screen display	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Various information related to operation, such as the axis counter, speed display and MSTB command are displayed.
	4	Setup screen display	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Tool/workpiece related settings, user parameter settings, MDI editing, counter setting, manual numeric command issuing and pallet program registration (option) can be carried out.
	5	Edit screen display	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Machining program editing (addition, deletion, change) and checking, simple program creation, and machining program input / output can be carried out.
	6	Diagnosis screen display	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
	7	Maintenance screen display	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Parameter setting and display, and NC data input/output, etc., can be carried out.
	8	Home application	○/—	○/—	—	—	○/—	—	—	○/—	○/—	—	—	○/—	—	—	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.
	9	Home screen	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Home screen is able to display the machine status (including spindle loads and positions of linear and rotary axes) which can be monitored by an operator. Also, each application can be called by pressing the application button on the home screen.

S/W ver.C3

M800/M80 SERIES SPECIFICATIONS LIST

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

S/W ver.C3

class	Lathe system							Machining center system		Machining center system					General explanation
	M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	
10 Additional languages															
1 Japanese	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
2 English	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3 German	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
4 Italian	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
5 French	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
6 Spanish	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
7 Chinese															
Traditional Chinese characters	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
Simplified Chinese characters	□	□	□	□	□	□	□	□	□	□	□	□	□	□	Available display languages.
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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Certain kinds of data handled by the NC system can be input and output between the NC system's memory and external devices.
5 History data output	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
7 System configuration data output	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
2 Input / Output I/F															
1 RS-232C I/F	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Port 1 and 2 are available with the RS-232C interface. The connection point for a connector depends on the product model.
2 SD card I/F															
1 Control unit-side SD card I/F [up to 32GB]	○	○	—	—	○	—	—	○	○	—	—	○	—	—	Interface card to use SD card can be attached inside the NC control unit.
2 Front-side SD card I/F [up to 32GB]	○/—	○/—	○	○	○/—	○	○	○/—	○/—	○	○	○/—	○	○	Interface card to use SD card can be attached in front of the display unit.
3 Ethernet I/F	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Ethernet interface card can be attached onto the NC unit.
4 Display unit-side data server I/F	○	○	○	○	○	○	○	○	○	○	○	○	○	○	A built-in disk of display unit can be used.
5 Front-side USB memory I/F [up to 32GB]	○	○	○	○	○	○	○	○	○	○	○	○	○	○	A USB memory can be mounted.
3 Computer link															
1 Computer link B	△	△	△	△	○	○	○	△	△	△	△	○	○	○	Computer link B is a function to receive/send data between the host computer and the CNC.
4 Others															
1 Handy terminal connection	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function controls the serial communication (RS232C) of CNC and handy terminal. Handy terminal is a downsized machine operation panel which enables you to operate the machine including setup at hand.
8 Spindle, Tool and Miscellaneous functions															
1 Spindle functions (S)															
1 Spindle control functions															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.
1 Spindle digital I/F	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This interface is used to connect the digital spindle (AC spindle motor and spindle drive unit).
2 Spindle analog I/F	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Spindle control can be executed using an analog spindle instead of the digital spindle.
3 Coil switch	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
4 Automatic coil switch	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
5 Encoder input I/F	□	□	○	○	□	○	○	□	□	○	○	□	○	○	With this function, arbitrary pulse can be input by parameters set in R register. * Encoder expansion card is required for M800W/M80W.
6 Spindle-mode servo motor control	△	△	△	△	○	○	○	△	△	△	△	○	○	○	This function controls a spindle using the combination of servo motor and servo drive unit (MDS-E Series) which controls NC axis.
7 Spindle-mode rotary axis control	—	—	—	—	—	—	—	△	△	△	△	○	○	—	This function enables a rotary axis driven by a servo motor to be controlled as a spindle. This enables lathe-turning machining, including synchronous feed and thread cutting, to be performed in synchronization with the feedback speed of the rotary axis (spindle-mode rotary axis mode).
8 Turret gear change control	△	△	△	△	○	○	○	—	—	—	—	—	—	—	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.
2 S code output	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 Constant surface speed control	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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).
4 Spindle override	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
5 Multiple-spindle control															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.
1 Multiple-spindle control I	○	○	○	○	○	○	○	—	—	—	—	—	—	—	This function controls the spindles in a machine tool equipped with several spindles.
2 Multiple-spindle control II	○	○	○	○	○	○	○	○	○	○	○	○	○	○	With this function, commands to the spindle are performed with one S command, and a signal from the PLC determines which spindle is selected.
6 Spindle orientation	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function stops the spindle rotation at a certain position.
7 Spindle position control (Spindle / C axis control)															
1 Spindle position control (Spindle / C axis control)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables one spindle drive unit to be also used as the C axis (rotary axis) using an external signal.
2 C axis control during Spindle synchronization	△	△	△	△	○	○	○	△	△	△	△	—	—	—	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.
8 Spindle synchronization															
1 Spindle synchronization I	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Spindle synchronization II	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3 Guide bushing spindle synchronization	△	△	△	△	○	○	—	—	—	—	—	—	—	—	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).
9 Tool spindle synchronization I (Polygon)															
1 Tool spindle synchronization IA (Spindle-Spindle, Polygon)	△	△	△	△	○	○	○	—	—	—	—	—	—	—	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.
2 Tool spindle synchronization IB (Spindle-Spindle, Polygon)	△	△	△	△	○	○	○	—	—	—	—	—	—	—	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.

5 CNC SYSTEM

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

S/W ver.C3

class	Lathe system							Machining center system	
	M800W		M800S		M80W	M80		M800W	
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W
3 Tool spindle synchronization IC (Spindle-NC axis, Polygon)	△	△	△	△	○	○	—	—	—
10 Tool spindle synchronization II (Hobbing)	△	△	△	△	○	○	—	—	—
11 Spindle speed clamp	○	○	○	○	○	○	○	○	○
13 Spindle oscillation	△	△	△	△	—	—	—	△	△
14 Spindle superimposition control	△	△	△	△	○	○	—	—	—
15 Multiple spindle synchronization set control	○	○	○	○	○	○	○	—	—
16 Spindle speed fluctuation detection	△	△	△	△	—	—	—	△	△
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	○	○	○	○	○	○	○	—	—
4 Tool position compensation (G43.7)	—	—	—	—	—	—	—	△	△
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	○	○	○	○	○	○	○	○	○
2 Compensation type selection by parameter	—	—	—	—	—	—	—	○	○
3 Number of tool offset sets allocation to part systems	○	○	○	○	○	○	○	○	○
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									
Workpiece coordinate system selection (6 sets)	○	○	○	○	○	○	○	○	○
Extended workpiece coordinate system selection (48 sets) G54.1P1 to P48	△	△	△	△	○	○	○	△	△
Extended workpiece coordinate system selection (96 sets) G54.1P1 to P96	—	—	—	—	—	—	—	△	△
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	○	○	○	○	○	○	○	○	○
8 Coordinate system for rotary axis	○	○	○	○	○	○	○	○	○

Machining center system					General explanation
M800S	M80W	M80			
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.
—	—	—	—	—	By setting the parameter, spindle synchronization I, tool spindle synchronization IA/IB (spindle-spindle, polygon), tool spindle synchronization II (hobbing) and spindle superimposition control can be executed simultaneously for multiple sets of spindles.
△	△	—	—	—	When this function is valid and the spindle actual speed fluctuates for the commanded speed by the program due to external factors such as load fluctuation, the NC outputs the signal to PLC and the operation error occurs. PLC can take the necessary measure for the fluctuation of the spindle speed using the output signal from the NC.
○	○	○	○	○	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.
△	△	—	—	—	The position compensation of a turning tool is executed when turning is performed in a machine of machining center system. * Option is “turning machining tool compensation”.
○	○	○	○	○	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. *This function is available during program format switch for L system.
△	△	—	—	—	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. * Option for M system is “turning machining tool compensation”.
—	—	—	—	—	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.
○	○	○	○	○	This function switches the tool compensation type to the tool compensation type III with the parameter. This function enables tool compensation for a turning tool by registering the tool compensation amount of the base axes IJK and tool tip point for a machining center system.
○	○	—	—	—	* Variable number of per-part-system tool offset sets 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.
○	○	○	○	○	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.

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

S/W ver.C3

class	Lathe system							Machining center system							General explanation
	M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	
9 Plane selection	○	○	○	○	○	○	○	○	○	○	○	○	○	○	By issuing a G code, it is possible to specify the planes for the arc, tool radius compensation, coordinate rotation and other commands.
10 Origin set / Origin cancel	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
11 Counter set	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The relative position counter can be set to an arbitrary value from the setting and display unit screen.
13 Workpiece coordinate system shift	○	○	○	○	○	○	○	—	—	—	—	—	—	—	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.
2 Return															
1 Manual reference position return	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables the tool to be returned manually to a position specific to the machine (reference position).
2 Automatic 1st reference position return	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 2nd, 3rd, 4th reference position return	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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).
4 Reference position check	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
5 Absolute position detection	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
6 Tool exchange 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.
11 Operation support functions															
1 Program control															
1 Optional block skip	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Optional block skip addition	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 Single block	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The commands for automatic operation can be executed one block at a time (block stop) by turning ON the single block input signal.
2 Program test															
1 Dry run	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Machine lock	○	○	○	○	○	○	○	○	○	○	○	○	○	○	When the machine lock input signal is set to ON, the CNC operations can be executed without actually moving the NC axis.
3 Miscellaneous function lock	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
4 Graphic check															
1 Graphic 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.
2 3D solid program check	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3 Graphic check rotary axis drawing	△	△	△	△	○	○	○	—	—	—	—	—	—	—	
5 Graphic trace															
1 Graphic trace	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Graphic trace rotary axis drawing	△	△	△	△	○	○	○	—	—	—	—	—	—	—	
6 Machining time computation	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function analyzes the machining program without moving the axis and calculates the approximate time required for machining.
7 Manual arbitrary reverse run (Program check operation)	△	△	△	△	○	○	○	△	△	△	△	○	○	○	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.
8 High-speed simple program check	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 Program search / start / stop															
1 Program search	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function specifies the program No. of the program to run automatically and calls the program.
2 Sequence number search	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Blocks can be indexed by setting the program No., sequence No. and block No. of the program to run automatically.
3 Verification stop	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables the single block stop status to be established at any block without having to turn the SINGLE BLOCK switch ON.
4 Program restart	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
5 Automatic operation start	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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).
6 NC reset	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables the controller to be reset.
7 Feed hold	○	○	○	○	○	○	○	○	○	○	○	○	○	○	When the feed hold signal is set to ON during automatic operation, the machine feed is immediately decelerated and stopped.
8 Search & Start	○	○	○	○	○	○	○	○	○	○	○	○	○	○	If the “Search & Start” signal is input when the memory mode is selected, the designated machining program is searched and executed from the beginning.
10 Auto-restart	○	○	○	○	○	○	○	○	○	○	○	○	○	○	A machining program is restarted automatically at the completion of the machining program execution.
4 Interrupt operation															
1 Manual interruption	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Manual interrupt is a function that enables manual operations to be performed during automatic operation.
2 Automatic operation handle interruption	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 Manual absolute switch	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
4 Thread cutting cycle retract	○	○	○	○	○	○	○	—	—	—	—	—	—	—	This function suspends the thread cutting cycle if a feed hold signal has been input during thread cutting cycle.
5 Tapping retract	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
6 Manual numerical value command	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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].
7 Arbitrary reverse run	—	—	—	—	—	—	—	○	○	○	○	○	○	—	This function allows a program to run the executed blocks backward after the block stop in the automatic operation.
8 MDI interruption	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
9 Simultaneous operation of manual and automatic modes	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.)
10 Simultaneous operation of JOG and handle modes	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
11 Reference position retract	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
12 Tool retract and return	—	—	—	—	—	—	—	△	△	△	△	—	—	—	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.
13 Skip retract	—	—	—	—	—	—	—	○	○	○	○	○	○	○	This function is used to return in the direction opposite the travel direction when the skip signal is input during G31 command.
14 PLC interruption	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
12 Program support functions															
1 Machining method support functions															
1 Program															
1 Subprogram control [Layers]	○10	○10	○10	○10	○10	○10	○10	○10	○10	○10	○10	○10	○10	○10	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.
2 Figure rotation	—	—	—	—	—	—	—	△	△	△	△	—	—	—	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.

M800/M80 SERIES SPECIFICATIONS LIST

5 CNC SYSTEM

M800/M80 SERIES SPECIFICATIONS LIST

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

S/W ver.C3

class	Lathe system							Machining center system							General explanation
	M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	
3 Scaling	—	—	—	—	—	—	—	△	△	△	△	○	○	○	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.
4 Axis name switch	○	○	○	○	○	○	○	—	—	—	—	—	—	—	The axis name switch function switches the name of a command axis and a control axis.
2 Macro program															
1 User macro [Layers]	○4	○4	○4	○4	○4	○4	○4	○4	○4	○4	○4	○4	○4	○4	In order to execute one integrated function, a group of control and arithmetic instructions can be used and registered as a macro program.
2 Machine tool builder macro	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 Macro interruption	○	○	○	○	○	○	○	○	○	○	○	○	○	○	By inputting a user macro interrupt signal from the PLC, the program being currently executed is interrupted and other programs can be called instead.
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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Fixed cycle for drilling (Type II)	○	○	○	○	○	○	○	—	—	—	—	—	—	—	
3 Special fixed cycle	—	—	—	—	—	—	—	△	△	△	△	○	○	○	
4 Fixed cycle for turning machining	○	○	○	○	○	○	○	—	—	—	—	—	—	—	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.
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	△	△	△	△	—	—	—	○	○	○	○	○	○	○	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.
4 Mirror image															
1 Mirror image by parameter setting	○	○	○	○	○	○	○	○	○	○	○	○	○	○	A parameter is used to designate the axis for which the mirror image function is to be executed before the machining program is run.
2 Mirror image by external input	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Signals from an external device (PLC) request the mirror image operation either during or before the execution of a machining program.
3 Mirror image by G code	—	—	—	—	—	—	—	○	○	○	○	○	○	○	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.
4 Mirror image for facing tool posts	○	○	○	○	○	○	○	—	—	—	—	—	—	—	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.
5 T code mirror image for facing tool posts	○	○	○	○	○	○	○	—	—	—	—	—	—	—	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.
5 Coordinate system operation															
1 Coordinate rotation by program	△	△	△	△	○	○	—	△	△	△	△	○	○	○	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.
2 Coordinate rotation by parameter	—	—	—	—	—	—	—	△	△	△	△	—	—	—	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.
3 3-dimensional coordinate conversion	—	—	—	—	—	—	—	△	△	△	△	○	○	—	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.
6 Dimension input															
1 Corner chamfering / Corner R	△	△	△	△	○	○	○	△	△	△	△	○	○	○	This function executes corner processing by automatically inserting a straight line or arc in the commanded amount between two consecutive travel blocks.
2 Linear angle command	△	△	△	△	○	○	○	△	△	△	△	○	○	○	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.
3 Geometric command	○	○	○	○	○	○	○	△	△	△	△	○	○	○	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.
4 Polar coordinate command	—	—	—	—	—	—	—	△	△	△	△	○	○	○	With this function, the end point position is commanded with the radius and angle.
7 Axis control															
1 Chopping															
1 Chopping	△	△	△	△	○	○	○	△	△	△	△	○	○	○	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.
2 Normal line control	—	—	—	—	—	—	—	○	○	○	○	○	○	—	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.
3 Circular cutting	—	—	—	—	—	—	—	○	○	○	○	○	○	○	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.
8 Multi-part system control															
1 Timing synchronization between part systems	○	○	○	○	○	○	○	○	○	○	○	○	○	—	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.
2 Start point designation timing synchronization	○	○	○	○	○	○	○	○	○	○	○	○	○	—	The synchronizing point can be placed in the middle of a block by designating the start point.
3 Mixed control															
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 between 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 Multi-part system simultaneous thread cutting															
1 Two-part system simultaneous thread cutting	△	△	△	△	○	○	—	—	—	—	—	—	—	—	This function performs synchronous thread cutting for the same spindle using the 1st and 2nd part systems.
2 Multi-part system simultaneous thread cutting	△	△	△	△	—	—	—	—	—	—	—	—	—	—	This function performs thread cutting for the same spindle in the different part system. This has two commands; the command (G76.1) for simultaneously cutting threads in multiple places, which is known as "multi-part system simultaneous thread cutting cycle I", and the command (G76.2) for simultaneously cutting a thread by two part systems, which is known as “two-part system simultaneous thread cutting cycle II".
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 between part systems															
1 Single block between part systems	△	△	△	△	○	○	○	—	—	—	—	—	—	—	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.

5 CNC SYSTEM

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

class	Lathe system							Machining center system					General explanation
	M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	
3 Synchronization between 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	○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	○67.5	—	△168	△168	△168	△168	○67.5	○67.5	○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	△	△	△	△	—	—	—	△	△	△	△	○	○	—	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. * Up to 2 part systems
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	—	—	—	—	—	—	—	△	△	△	△	—	—	—	This extends the upper limit of cutting feed time constant from 5,000[ms] to 30,000[ms] for acceleration/deceleration before interpolation. * 1st part system only
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	○33.7	—	△67.5	△67.5	△67.5	△67.5	○33.7	○33.7	○33.7	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	○67.5	—	△168	△168	△168	△168	○67.5	○67.5	○67.5	
3 High-speed high-accuracy control III (G05P20000) maximum [kBPM]	—	—	—	—	—	—	—	△270	△270	△270	△270	○135	○135	—	
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.
3 Interactive cycle insertion	△	△	△	△	○	○	○	—	—	—	—	—	—	—	This function enables to interactively insert a cycle to assist in the machining and setup for the program opening on the edit screen. The cycle can easily be inserted by editing data in an interactive window.
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 [sets]	○32	○32	○32	○32	○16	○16	○16	○32	○32	○32	○32	○16	○16	○16	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.

M800/M80 SERIES SPECIFICATIONS LIST

S/W ver.C3

M800/M80 SERIES SPECIFICATIONS LIST

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

S/W ver.C3

class	Lathe system							Machining center system					General explanation
	M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	
11 Spatial error compensation	—	—	—	—	—	—	—	△	△	△	△	—	—	—	This function can compensate for three-dimensional errors of a machine tool due to its linear and rotary axes. This measures the spatial errors with a measuring device, inputs the measurement results to the NC to make an error data file and adds the calculated compensation amount of the linear and rotary axes to the drive command position to perform the compensation.
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 encoder in ranges with high acceleration to enable stable control. In ranges with low acceleration, use position feedback with the machine-side encoder (scale). This will make it possible to increase the position loop gain. A machine-side encoder (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 point in the relative position detection system.
14 Automation support functions															
1 Measurement															
1 Skip															
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.
2 Multiple-step skip	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function realizes skipping by designating a combination of skip signals for each skip command.
4 PLC skip	△	△	△	△	○	○	○	△	△	△	△	○	○	○	This function enables skip operations to be performed by signals which are input from the user PLC.
5 Speed change skip	△	△	△	△	—	—	—	△	△	△	△	—	—	—	This function is used to change the feed rate or to stop the movement by inputting the skip signal during the linear interpolation.
6 Torque limitation 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.
2 Automatic tool length measurement	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 Manual tool length measurement 1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	Simple measurement of the tool length is done without a sensor.
4 Manual tool length measurement 2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	[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.
5 Workpiece coordinate offset measurement	○	○	○	○	○	○	○	—	—	—	—	—	—	—	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.
6 Workpiece position 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.
7 Rotation 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.
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.
2 Number of tool life management sets															
99 sets	—	—	—	—	—	—	○	—	—	—	—	—	—	—	The max. sets of tools available for tool life management
128 sets	○	○	○	○	—	—	—	—	—	—	—	—	—	—	
200 sets	—	—	—	—	—	—	—	○	○	○	○	○	○	○	
256 sets	—	—	—	—	○	○	—	—	—	—	—	—	—	—	
400 sets	△	△	△	△	—	—	—	△	△	△	△	—	—	—	
999 sets	△	△	△	△	—	—	—	△	△	△	△	—	—	—	
3 Tool life management set allocation to part systems	○	○	○	○	○	○	○	○	○	○	○	—	—	—	* Variable number of management tools 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.
3 Others															
1 Programmable current limitation	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Auto power OFF	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
4 Load monitoring I	△	△	△	△	—	—	—	△	△	△	△	—	—	—	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.
5 Power ON / OFF sequence	○/—	○/—	—	—	○/—	—	—	○/—	○/—	—	—	○/—	—	—	This function turns the power supply ON / OFF, synchronizing the NC control unit and the HMI screen.
15 Safety and maintenance															
1 Safety switches															
1 Emergency stop	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Data protection key	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Display for ensuring safety															
1 NC warning	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 NC alarm	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
3 Operation stop cause	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The stop cause of automatic operation is shown on the display.
4 Emergency stop cause	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
5 Thermal detection	○	○	○	○	○	○	○	○	○	○	○	○	○	○	When overheating is detected in the control unit, an overheat signal is output at the same time as the alarm is displayed.
6 Battery alarm / warning	○	○	○	○	○	○	○	○	○	○	○	○	○	○	When it is time to change the batteries, an alarm and warning are displayed.
3 Protection															
1 Stroke end (Over travel)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Stored stroke limit															

5 CNC SYSTEM

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

class	Lathe system							Machining center system	
	M800W		M800S		M80W	M80		M800W	
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W
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	○	○	○	○	○	○	○	○	○
7 Interference check III	△	△	△	△	—	—	—	△	△
8 3D machine interference check	—	—	—	—	—	—	—	△	△
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	△	△	△	△	○	○	○	△	△
17 Interference check between part systems	○	○	○	○	○	○	—	—	—
18 Spindle protection	○	○	○	○	○	○	○	○	○
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	○/—	○/—	—	—	○/—	—	—	○/—	○/—
9 Email notification to operator	△	△	△	△	○	○	○	△	△
10 NC Configurator2 (Note 2)	○	○	○	○	○	○	○	○	○
11 Diagnosis data output	○	○	○	○	○	○	○	○	○
5 Functional safety									
1 Safety observation	△	△	△	△	○	○	○	△	△
2 Smart Safety observation									
1 Safety-related I/O observation	△	△	△	△	○	□	□	△	△
2 Emergency stop observation	△	△	△	△	○	□	□	△	△
3 Drive safety function									
1 SLS (Safely-Limited Speed)	△	△	△	△	○	□	□	△	△
2 SLP (Safely-Limited Position)	△	△	△	△	○	□	□	△	△
3 SOS (Safe Operating Stop)	△	△	△	△	○	□	□	△	△
4 SSM (Safe Speed Monitor)	△	△	△	△	○	□	□	△	△
5 SBC / SBT (Safe Brake Control / Safe Brake Test)	△	△	△	△	○	□	□	△	△
6 SCA (Safe Cam)	△	△	△	△	○	□	□	△	△
7 SS1 / SS2 (Safe Stop)	△	△	△	△	○	□	□	△	△
8 STO (Safe Torque Off)	△	△	△	△	○	□	□	△	△

(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.C3

Machining center system					General explanation
M800S	M80W	M80			
M850S	M830S	—	M80 TypeA	M80 TypeB	
○	○	○	○	○	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.
△	△	—	—	—	By checking the relative relation between interference objects, the interference can be prevented from occurring. One interference object is defined by one to sixteen tridimensional objects. The maximum definable number is 128 for the interference objects and is 256 for the tridimensional objects.
—	—	—	—	—	The machine pre-reads the position to be moved during the operation to check the interference by the 3D model (machine, tool and jig) registered in advance. When an interference is predicted, an alarm will be shown immediately and all the axes will be decelerated to stop.
○	○	○	○	○	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 function checks the relative position of up to six cuboids (referred to as interfering objects) all the time, and if a command which causes the interfering objects to collide with each other is issued, the function stops the axis movement to prevent the interference in advance. Such interference can be prevented by covering the tool post, etc. with cuboids. * Up to 4 part systems
○	○	○	○	○	This function consists of a function of calculating the equivalent load ratio of spindle motor and a function of outputting the equivalent load ratio and temperature of spindle motor to the log file.
○	○	○	○	○	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.
△	△	○	○	○	This function enables NC to transmit emails to network-connected email servers (SMTP servers). With this function, the NC can send emails to PCs and mobile terminals away from machines. You are able to know machining conditions (such as machining completion, stop and failure) even if you are in remote places.
○	○	○	○	○	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.
○	○	○	○	○	With this function, the information indicating the replacement cycle of the service parts used in NC, drive or motor can be output to the ZR registers.
△	△	○	○	○	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.
△	△	○	□	□	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. * Safety card is required for M80.
△	△	○	□	□	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. * Safety card is required for M80.
△	△	○	□	□	Axis speed (command speed, FB speed) is observed doubly to see whether the speed exceeds the safe speed. * Safety card is required for M80.
△	△	○	□	□	Axis absolute position (command position, FB position) is observed doubly to see whether the position exceeds the safe position range. * Safety card is required for M80.
△	△	○	□	□	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. * Safety card is required for M80.
△	△	○	□	□	This function uses the safety signals to inform that the axis speed (command speed, FB speed) is equal to or below the safe speed. * Safety card is required for M80.
△	△	○	□	□	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.). * Safety card is required for M80.
△	△	○	□	□	This function uses the safety signals to inform that the axis absolute position (command position, FB position) is within the range of safe position. *Safety card is required for M80.
△	△	○	□	□	[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. * Safety card is required for M80.
△	△	○	□	□	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. * Safety card is required for M80.

M800/M80 SERIES SPECIFICATIONS LIST

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

S/W ver.C3

class	Lathe system							Machining center system					General explanation
	M800W		M800S		M80W	M80		M800W		M800S		M80W	M80		
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	
16 Drive system															
1 Servo / Spindle															
1 Feed axis															
1 MDS-E-Vx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	CNC-dedicated drive units, spindle motors, and servo motors are used.
2 MDS-EH-Vx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
3 MDS-EJ-Vx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
4 MDS-EJH-Vx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
5 MDS-EM-SPVx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
6 MDS-EMH-SPVx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
2 Spindle															
1 MDS-E-SPx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
2 MDS-EH-SPx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
3 MDS-EJ-SPx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
5 MDS-EM-SPVx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	
6 MDS-EMH-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	○60	○120	○120	○120	○120	○60	○60	○60	
3 Multi-project [number of projects stored]															
Number of PLC projects: 1	○	○	○	○	—	—	○	○	○	○	○	—	—	○	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: 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	△	△	△	△	—	—	—	△	△	△	△	—	—	—	
3 Memory switch (PLC switch) 96 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	○64000	○32000	○128000	○128000	○128000	○128000	○64000	○64000	○32000	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.
2 Large PLC capacity: 256000 steps	△	△	△	△	—	—	—	△	△	△	△	—	—	—	
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 input signals (sink/source) or output signals (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).
2 MELSEC development tool (GX Developer)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables the data of the PLC contained inside the NC system to be developed and debugged using the GX Developer.
8 PLC parameter															
1 PLC constant (150 points)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 PLC constant extension (Up to 755 points)	○	○	○	○	—	—	—	○	○	○	○	—	—	—	
10 Pallet program registration	—	—	—	—	—	—	—	△	△	△	△	—	—	—	Pallet program function assists the machining setups as it allows machining programs to be registered for each pallet of the auto pallet changer.
2 Machine construction															
1 Servo OFF	○	○	○	○	○	○	○	○	○	○	○	○	○	○	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.
2 Axis detachment	○	○	○	○	○	○	○	○	○	○	○	○	○	○	This function enables the control axis to be released from control.
3 Synchronous 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.
4 Inclined axis control	△	△	△	△	○	○	○	—	—	—	—	—	—	—	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.
5 Position switch	○24	○24	○24	○24	○24	○24	○24	○24	○24	○24	○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.
7 Index table indexing	○	○	○	○	○	○	○	○	○	○	○	○	○	○	The indexing of the index table can be performed by setting the index axes.
8 Tool length compensation along the tool axis	△*	△*	△*	△*	—	—	—	△	△	△	△	—	—	—	(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 is available during program format switch for L system.
9 Tool handle feed & interruption	—	—	—	—	—	—	—	△	△	△	△	—	—	—	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.
10 Tool center coordinate display	—	—	—	—	—	—	—	△	△	△	△	—	—	—	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).
11 Tool center point control	—	—	—	—	—	—	—	△	△*	△	△*	○*	○*	—	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. * Restrained to 4-axis simultaneous contouring for M830/M80W/M80A

5 CNC SYSTEM

○Standard △Optional □Selection Specifications of separated-type display are classified with “Windows-based” and “Windows-less”

class	Lathe system							Machining center system	
	M800W		M800S		M80W	M80		M800W	
	M850W	M830W	M850S	M830S	—	M80 TypeA	M80 TypeB	M850W	M830W
12 Inclined surface machining command	—	—	—	—	—	—	—	△	△
13 Simple 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)	△	△	△	△	○	○	—	△	△
2 Real-time tuning 2 (rapid traverse time constant)	△	△	△	△	○	○	—	△	△
21 Constant torque control	△	△	△	△	○	○	—	—	—
22 External encoder position output I/F	○	○	○	○	○	○	○	○	○
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	○	○	○	○	○	○	○	○	○
6 Buzzer sound control	○	○	○	○	○	○	○	○	○
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/Local)	□	□	□	□	□	□	□	□	□
2 PROFIBUS-DP (Master)	□	□	□	□	□	□	□	□	□
7 Installing S/W for machine tools									
1 Customization (NC Designer2) (Note 1)	○	○	○	○	○	○	○	○	○
1 Customization data storage capacity [MB]	□	□	6	6	□	6	6	□	□
2 Customization working memory size [MB]	6	6	6	6	3	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	△	△	△	△	○	○	○	△	△
7 SLMP Server	○	○	○	○	○	○	○	○	○
8 Mitsubishi CNC communication software FCSB1224W000 (Note1)	○	○	○	○	○	○	○	○	○
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.

S/W ver.C3

Machining center system					General explanation
M800S		M80W	M80		
M850S	M830S	—	M80 TypeA	M80 TypeB	
△	△	○	○	—	An arbitrary spatial plane defined with this function can be machined using normal program commands.
—	—	—	—	—	* This includes simple tool center point control. This function is used when a lathe with the orthogonal axes XYZ and the turret with B axis performs the milling on the inclined surface in the end face direction. This allows the operator to perform cutting on an inclined surface with no need for considering the inclination angle.
△	△	—	—	—	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 available during program format switch for L system.
△	—	—	—	—	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. * This function is available during program format switch for L system.
△	△	○	○	—	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.
△	△	○	○	—	This function estimates the inertia (or workpiece weight) of mechanical system and optimizes the acceleration/deceleration time constant automatically according to the estimation results. It achieves the cycle time reduction when the inertia of workpiece to machine changes significantly.
—	—	—	—	—	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 outputs the position (angle) of external encoder to PLC device based on the input pulses from the encoder. This function can be used to monitor the position of angular head which the external encoder is connected to. * Encoder expansion card is required for M800W/M80W
○	○	○	○	○	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.
○	○	○	○	○	PLC axis indexing allows a PLC axis to function as an auxiliary axis with no need for changing the user ladder used conventionally for an auxiliary axis.
○	○	○	○	○	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.
○	○	○	○	○	This function gives a buzzer mounted on the NC keyboard by operating the PLC device. This is effective in applications of sounding a buzzer such as during the alarm occurrence, or for the program operation end notification.
—	—	□/—	—	—	Some types of signals can be input/output from the operation panel I/O unit according to the type and No. of contacts.
—	—	□/—	—	—	
□	□	—/□	□	□	
□	□	□	□	□	The remote I/O unit equipped with the maximum number of DI/DO points is the one with 64 points for DI and 48 points for DO. Multiple remote I/O units can be used as long as the total number of occupied stations is 64 or less. * Safety card is required for M80 when using **DI:32/DO:32+SDI:8/SDO:4** or **SDI:8/SDO:4**.
□	□	□	□	□	
□	□	□	□	□	
□	□	□	□	□	
□	□	□	□	□	
□	□	□	□	□	
□	□	□	□	□	NC unit can be directly connected to the network to serve as the master/local 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.
○	○	○	○	○	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. * Capacity depends on memory space for M800W/M80W
6	6	□	6	6	
6	6	3	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.
○	○	○	○	○	Transfers data using the SLMP between an NC and an external device. This function enables easy connection with external devices and read/write NC data through the Ethernet cable.
○	○	○	○	○	The software designed to help development of an application with Windows interface for Mitsubishi computerized numerical controller. The product can accelerate development by using OLE interface common to computerized numerical controller without knowing internal processing of the machine.
△	△	○	○	○	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 (sold separately)".

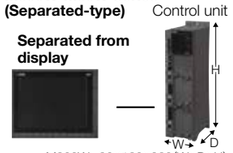
CNC SYSTEM HARDWARE

[mm]

Control unit

M800W/M80W Series (Separated-type)

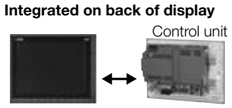
Separated from display



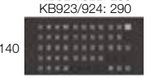
M800W : 90×180×380(W×D×H)
M80W : 60×180×380(W×D×H)

M800S/M80 Series (Integrated-type)

Integrated on back of display



Machine operation panel

FCU8-KB921 **FCU8-KB923**	Key switch: 55 points, LED: 55 points MITSUBISHI standard key layout	KB921/922: 260 KB923/924: 290 140 
FCU8-KB922 **FCU8-KB924**	Key switch: 55 points, LED: 55 points Custom specification key layout	
FCU8-KB931	Rotary switch (Spindle override, cutting override) Selective switch (memory protection) Emergency stop button	140 140

Display	Keyboard	M800W Series	M800S Series	M80W Series	M80 Series
19-type Touchscreen	–	365 440 Windows based	—	365 440 Windows based	—
19-type, horizontal Touchscreen	–	440 365 Windows based	—	440 365 Windows based	—
15-type Touchscreen	**FCU8-KB083 Clear key Full keyboard**	400 320 Windows-based display can be selected 140	400 320 140	400 320 Windows-based display can be selected 140	400 320 140
10.4-type Touchscreen	**FCU8-KB047 Clear key Full keyboard**	290 220 160	290 220 160	290 220 160	290 220 160
10.4-type Touchscreen	**FCU8-KB041 Clear key ONG(XZF) layout for L system** **FCU8-KB046 Clear key ONG(XYZ) layout**	290 140 220	290 140 220	290 140 220	290 140 220
10.4-type Touchscreen	**FCU8-KB048 Clear key ABC layout**	290 230 220	290 230 220	290 230 220	290 230 220
8.4-type	**FCU8-KB026 Clear key ONG(XYZ) layout** **FCU8-KB028 Clear key ONG(XYZ) layout**	—	—	260 140 200	260 140 200
8.4-type	**FCU8-KB029 Clear key ONG layout**	—	—	260 200 140	260 200 140

CNC SYSTEM CONTROL UNIT/DISPLAY UNIT

■Display unit/control unit separated-type

CNC System

Series	Model name	System type	NC control unit
M800W Series	M850W	FCA850U	FCU8-MA041-001
	M830W	FCA830U	FCU8-MU042-001
M80W Series	M80W	FCA80U	FCU8-MU044-001

CNC System

Classification		Type	Remarks	Supported Series M800	Supported Series M80W
Windows-based display unit	19-type vertical color LCD touchscreen	FCU8-DU191-75	Personal computer (FCU8-PC231) and built-in disk unit (FCU8-CF001-001) are prepared at the same time.	○	–
		FCU8-DU191-77		–	○
	19-type horizontal color LCD touchscreen	FCU8-DU192-75		○	–
		FCU8-DU192-77		–	○
	15-type color LCD touchscreen	FCU8-DU181-34		○	–
		FCU8-DU181-36		–	○
Windows-less display unit	15-type color LCD touchscreen	FCU8-DU181-31	Graphic control unit (FCU8-GC211-001) is prepared at the same time.	○	–
		FCU8-DU181-32		–	○
	10.4-type color LCD touchscreen	FCU8-DU141-31		○	–
		FCU8-DU141-32		–	○
	8.4-type color LCD	FCU8-DU121-12		–	○

■Display unit/control unit integrated-type

Series	Model name	System type	NC control unit	Display unit
M800S Series	M850S	FCA850H-8S	FCU8-MA542-001	FCU8-DU181-31 (15-type color LCD touchscreen)
		FCA850H-4S		FCU8-DU141-31 (10.4-type color LCD touchscreen)
	M830S	FCA830H-8S	FCU8-MU542-001	FCU8-DU181-31 (15-type color LCD touchscreen)
		FCA830H-4S		FCU8-DU141-31 (10.4-type color LCD touchscreen)
M80 Series	M80 TypeA	FCA80H-8A	FCU8-MU512-001	FCU8-DU181-32 (15-type color LCD touchscreen)
		FCA80H-4A		FCU8-DU141-32 (10.4-type color LCD touchscreen)
		FCA80P-2A		FCU8-DU121-12 (8.4-type color LCD)
	M80 TypeB	FCA80H-8B	FCU8-MU511-001	FCU8-DU181-32 (15-type color LCD touchscreen)
		FCA80H-4B		FCU8-DU141-32 (10.4-type color LCD touchscreen)
		FCA80P-2B		FCU8-DU121-12 (8.4-type color LCD)

CNC SYSTEM I/O UNIT AND OTHERS

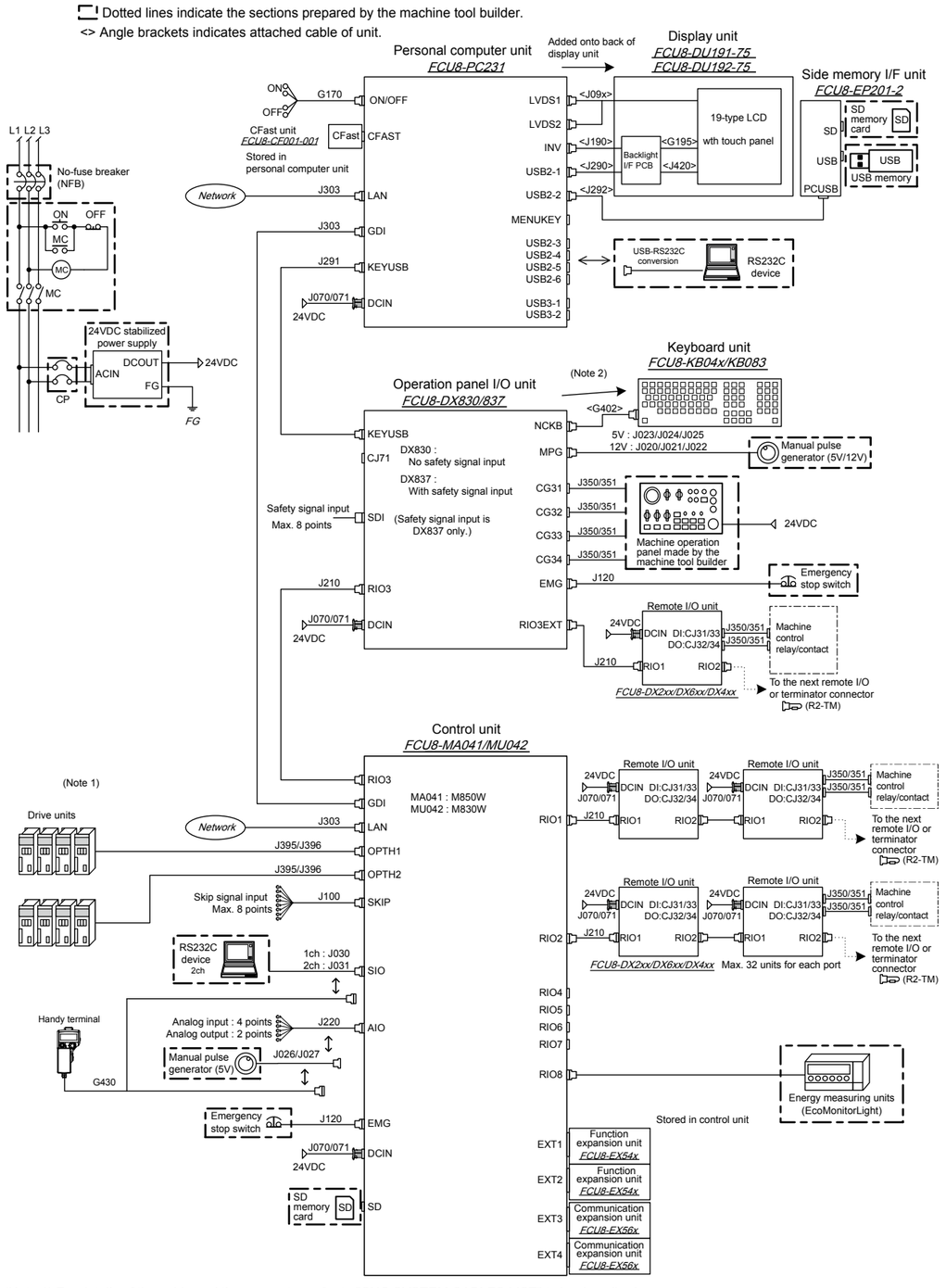
■List of Units

Classification		Type	Remarks	Supported Series			
				M800W	M800S	M80W	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, Manual pulse generator input: 3ch, Remote I/O 2.0 I/F, RIO occupied stations (fixed): 1 to 4 and 7 to 14, RIO extensible stations: 5, 6, 15 to 64 (For Windows-based display unit)	○	–	○	–
		FCU8-DX730	DI: 64-points 24V/0V common type, DO: 64-points source type, Manual pulse generator input: 3ch, Remote I/O 2.0 I/F, RIO occupied stations (fixed): 1, 2 and 7 to 12, RIO extensible stations: 3 to 6 and 15 to 64 (For Windows-less display unit)	○	–	○	–
		FCU8-DX750	DI: 96-points 24V/0V common type, DO: 64-points source type, Manual pulse generator input: 3ch, Remote I/O 2.0 I/F, RIO occupied stations (fixed): 1 to 3 and 7 to 12, RIO extensible stations: 4 to 6 and 13 to 64	–	○	–	○
		FCU8-DX760	DI: 96-points 24V/0V common type, DO: 96-points source type, Manual pulse generator input: 3ch, Remote I/O 2.0 I/F, RIO occupied stations (fixed): 1 to 4 and 7 to 12, RIO extensible stations: 5, 6 and 13 to 64	–	○	–	○
DI 24V/0V common input Safety DI 24V/0V common 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, Manual pulse generator input: 3ch, Remote I/O 2.0 I/F, RIO occupied stations (fixed): 1 to 4 and 7 to 14, RIO extensible stations: 5, 6 and 15 to 64 (For Windows-based display unit)	○	–	○	–
DI 24V/0V common input AI analog input	DO Source output AO Analog output	FCU8-DX761	DI: 96-points 24V/0V common type, DO: 64-points source type, AI: 1 point, AO: 1 point, Manual pulse generator input: 3ch, Remote I/O 2.0 I/F, RIO occupied stations (fixed): 1 to 5 and 7 to 12, RIO extensible stations: 6 and 13 to 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	○	○	○	○
AI analog input	AO Analog output	FCU8-DX202	AI: 4 points, AO: 1 point, Number of occupied stations: 1	○	○	○	○
DI 0V common input	DO Source output (large capacity)	FCU8-DX213	DI: 16-points 0V common type (3mA/point), DO: 8-points source type (2A/point), Number of occupied stations: 1	○	○	○	○
		FCU8-DX213-1	DI: 16-points 0V common type (9mA/point), DO: 8-points source type (2A/point), Number of occupied stations: 1	○	○	○	○
Thermistor input (12 points)		FCU8-DX408	Thermistor input: 12 points Number of occupied stations: 3	○	○	○	○
Safety DI 0V common input	Safety DO Source output (large capacity)	FCU8-DX654	Safety DI: 8-points 0V common type (3mA/point) Safety DO: 4-points source type (2A/point) Number of occupied stations: 2	○	○	○	○
		FCU8-DX654-1	Safety DI: 8-points 0V common type (9mA/point) Safety DO: 4-points source type (2A/point) 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	○	○	○	○
[Function Expansion Unit]							
Encoder (manual pulse generator) I/F expansion unit		FCU8-EX544	Encoder input 1ch 5V manual pulse generator input 2ch	○	–	○	–
Functional safety expansion unit		FCU8-EX133	Smart Safety observation	–	–	–	○
[Communication Expansion Unit]							
CC-Link expansion unit		FCU8-EX561	CC-Link 1ch	○	○	○	○
PROFIBUS-DP master unit		FCU8-EX563	PROFIBUS-DP 1ch	○	○	○	○
EtherNet/IP scanner/adapter unit		FCU8-EX565	EtherNet/IP 1ch (Only LAN1, LAN2 cannot be used)	○	○	○	○
Option relay unit		FCU8-EX702	For communication expansion unit 1ch (*1)	–	○	–	○
		FCU8-EX703	For communication expansion unit 2ch (*1)	–	○	–	○
[Side Memory I/F Unit]							
Side memory I/F Unit		FCU8-EP201-2	SDHC 1ch, USB2.0 1ch USB communication (between side memory I/F PCB 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 5VDC, 100pulse/rev	○	○	○	○
12V Manual pulse generator		HD60C	Input 12VDC, 25 pulse/rev	○	○	○	○
[Encoder]							
Synchronous feed encoder		OSE1024-3-15-68	Input 5VDC, 1024 pulse/rev, 6000r/min, 68-square flange	○	○	○	○
		OSE1024-3-15-68-8	Input 5VDC, 1024 pulse/rev, 8000r/min, 68-square flange	○	○	○	○
		OSE1024-3-15-160	Input 5VDC, 1024 pulse/rev, 6000r/min, 160-square flange	○	○	○	○
[Handy Terminal]							
Handy terminal		HG1T-SB12UH-MK1346-L5		○	○	○	○
[Thermistor Sets]							
Thermistor		PT3C-51F-M2 10P		○	○	○	○
[Genuine Memory Card]							
Exclusive SD cards for MITSUBISHI CNC 1GB		FCU8-SD001G	1GB capacity	○	○	○	○
Exclusive SD cards for MITSUBISHI CNC 4GB		FCU8-SD004G	4GB capacity	○	○	○	○

DI: Digital input signals, DO: Digital output signals, AI: Analog input signals, AO: Analog output signals
(*1) This is required when communication expansion unit is used in M800S/M80 series.

CNC SYSTEM GENERAL CONNECTION DIAGRAM

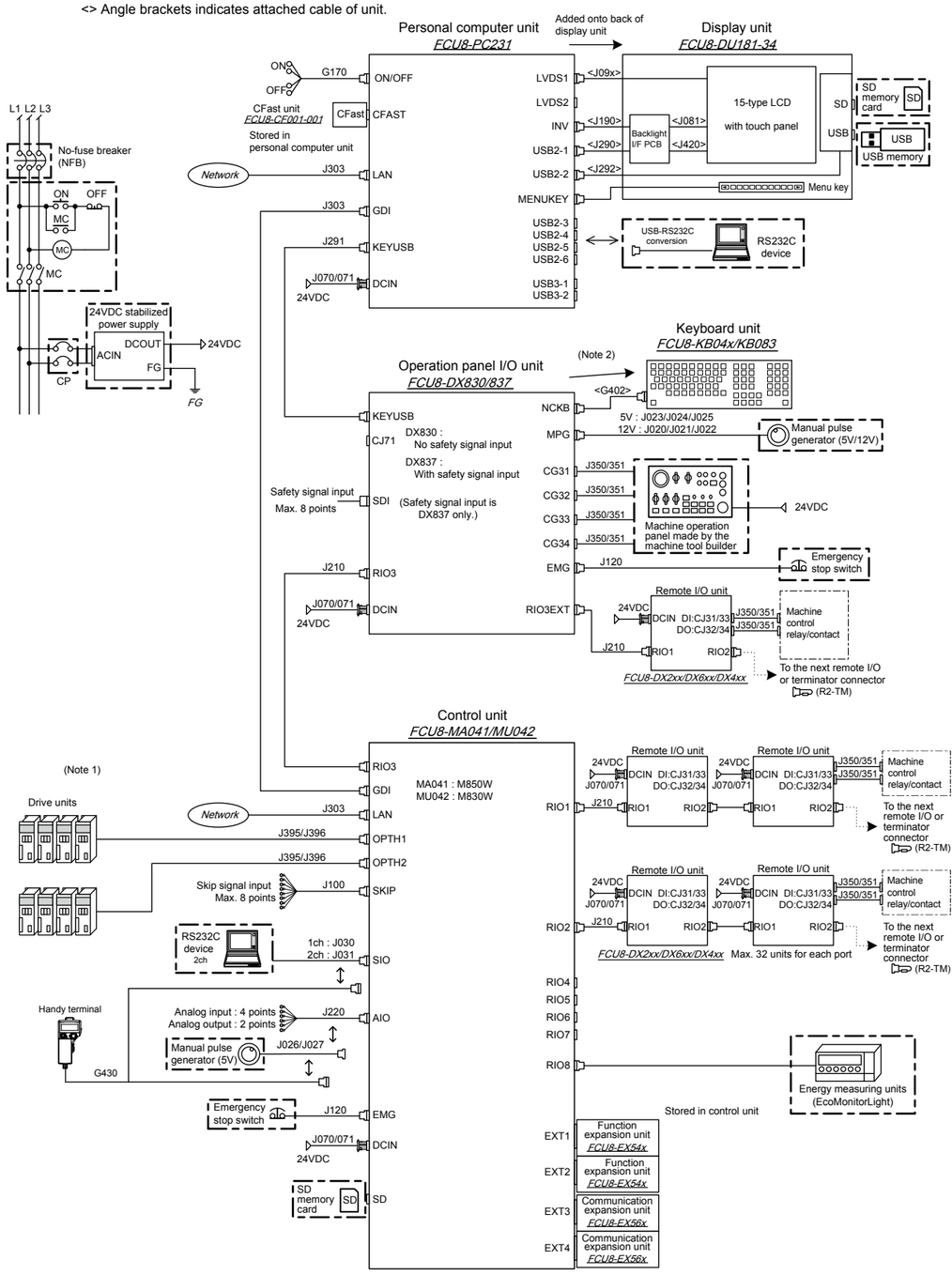
■M800W Series Windows-based display unit (19-type)



(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) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit. When not using a keyboard unit, install the operation panel I/O unit on the back of the display unit.

■M800W Series Windows-based display unit (15-type)

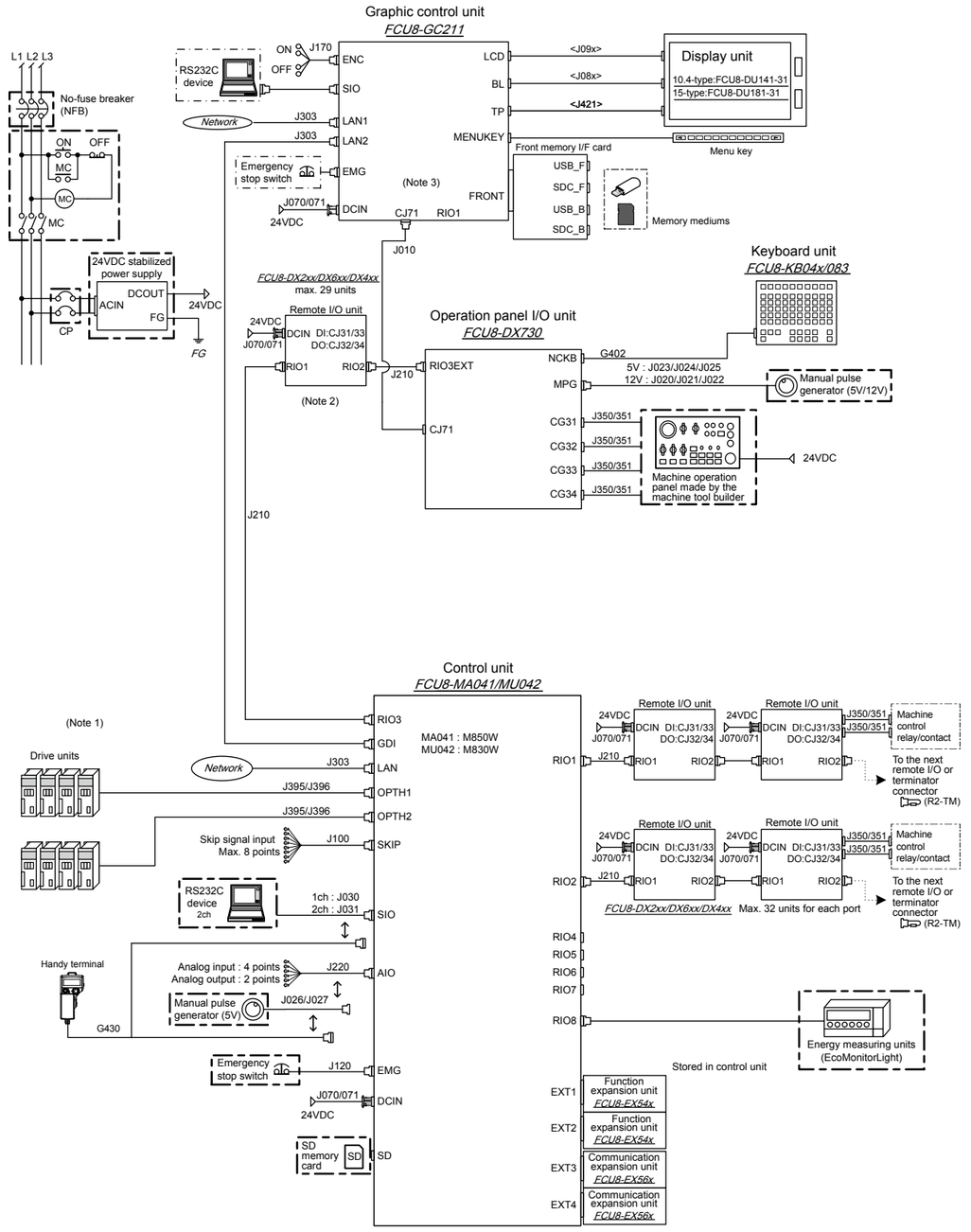
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(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.
(Note 3) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit.

■M800W Series Windows-less display unit (10.4-type/15-type)

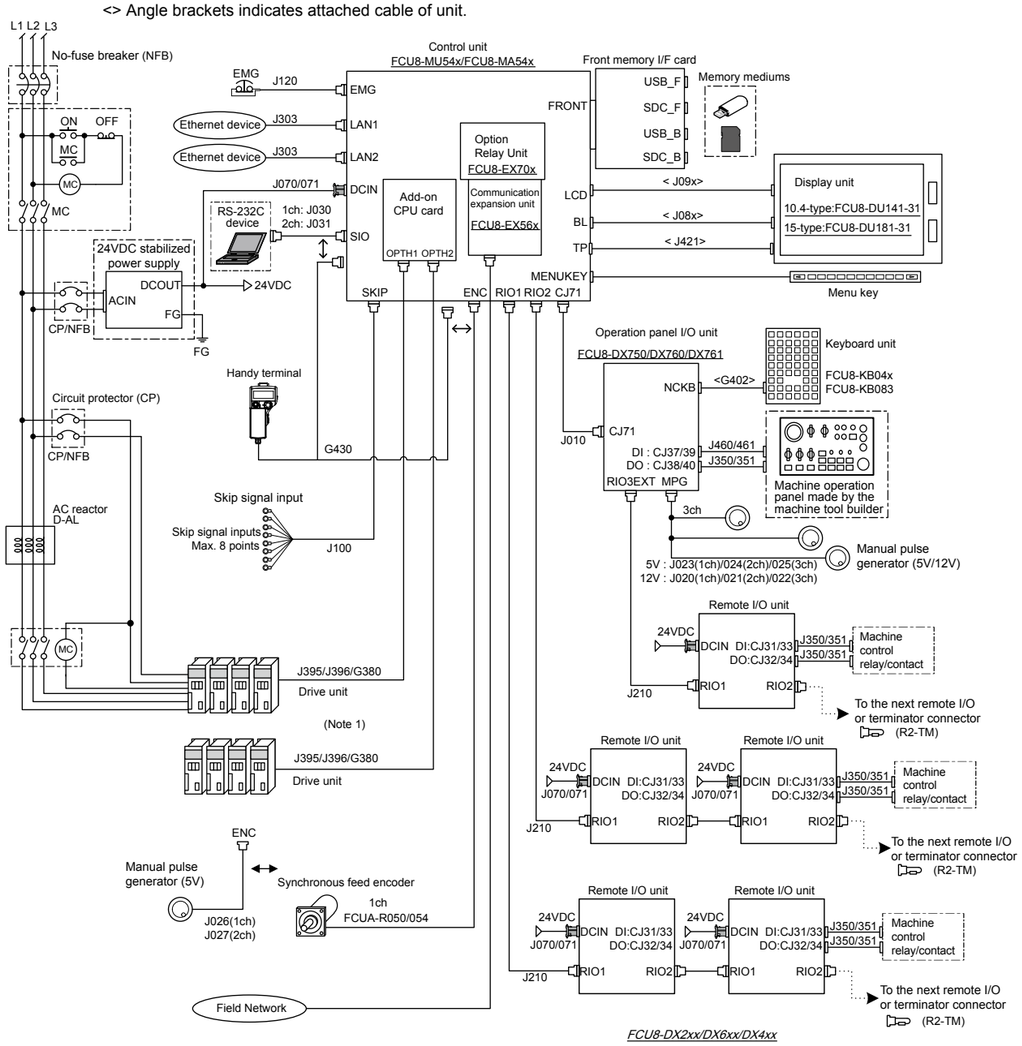
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(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.
(Note 3) When connecting a remote I/O unit to the 3rd RIO channel, insert it between the control unit and operation panel I/O unit.
(Note 4) There is no need to connect a terminator R2-TM to the graphic control unit.

■M800S Series

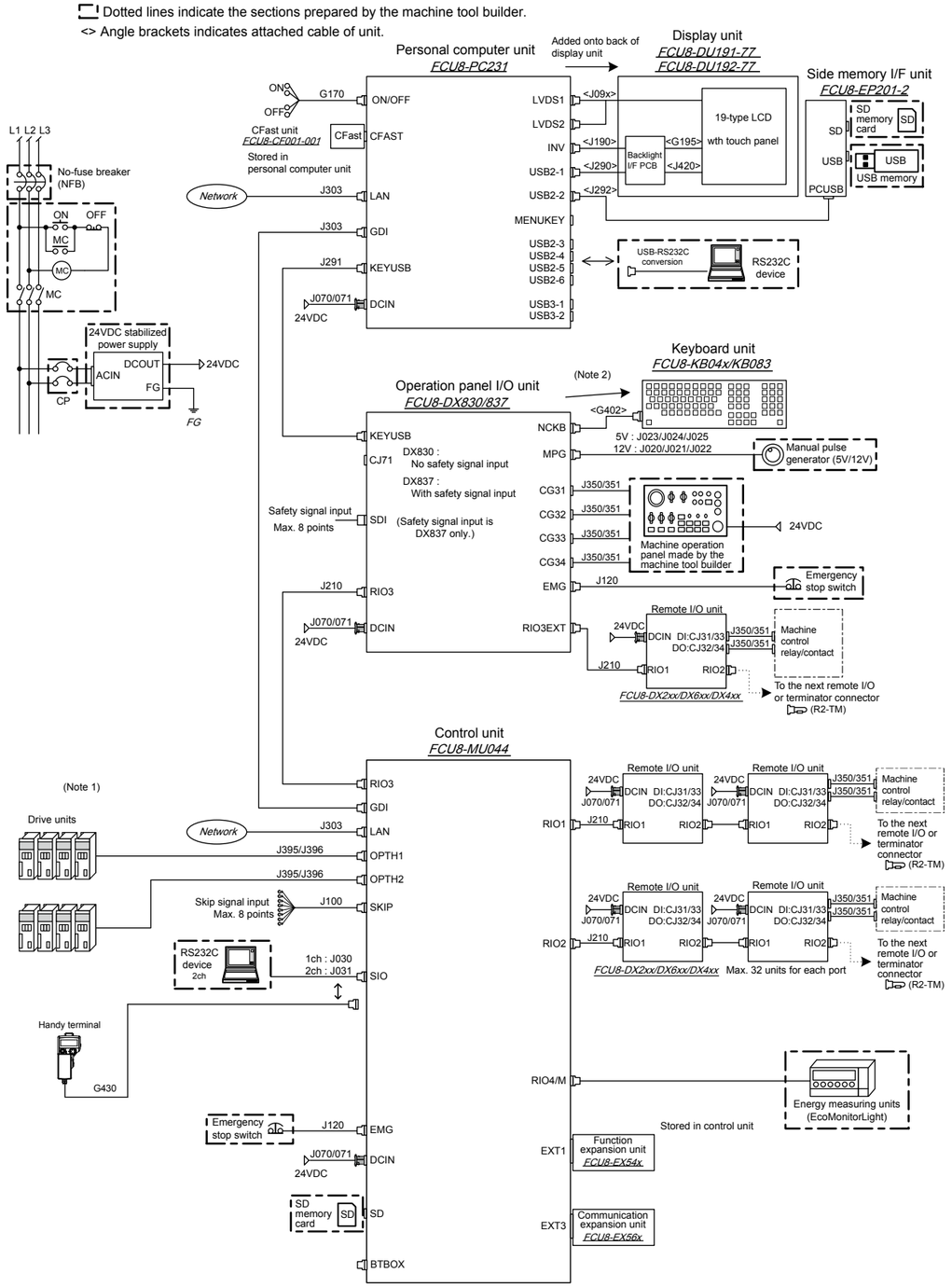
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(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.

■M80W Series Windows-based display unit (19-type)

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

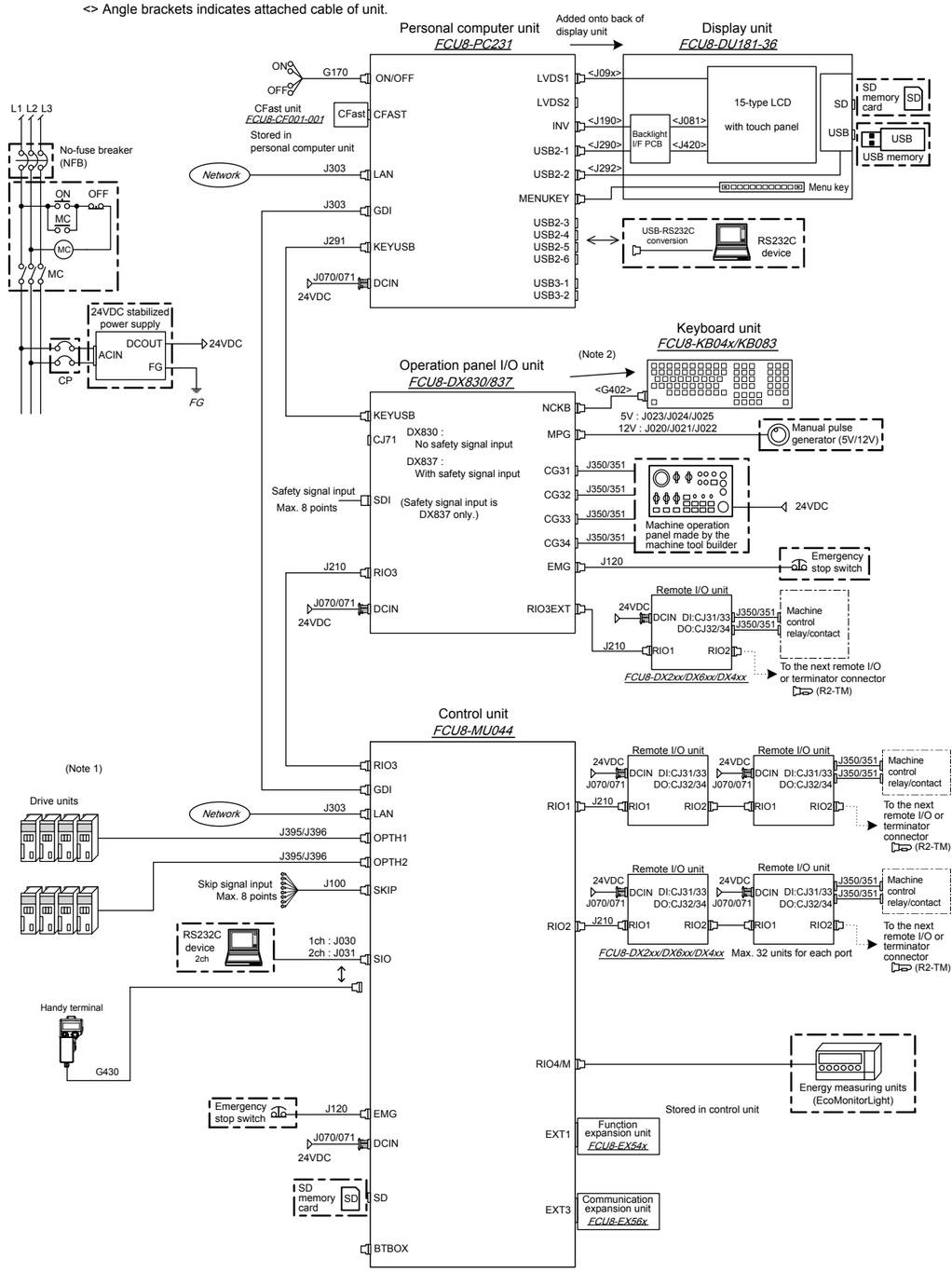


(Note 1) For details of the cable and the connector, refer to "CNC SYSTEM CABLES LIST" to be described.
(Note 2) For connections of the drive units, refer to "DRIVE SYSTEM SYSTEM CONFIGURATION DRAWING" to be described.
(Note 3) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit. When not using a keyboard unit, install the operation panel I/O unit on the back of the display unit.

5 CNC SYSTEM

■M80W Series Windows-based display unit (15-type)

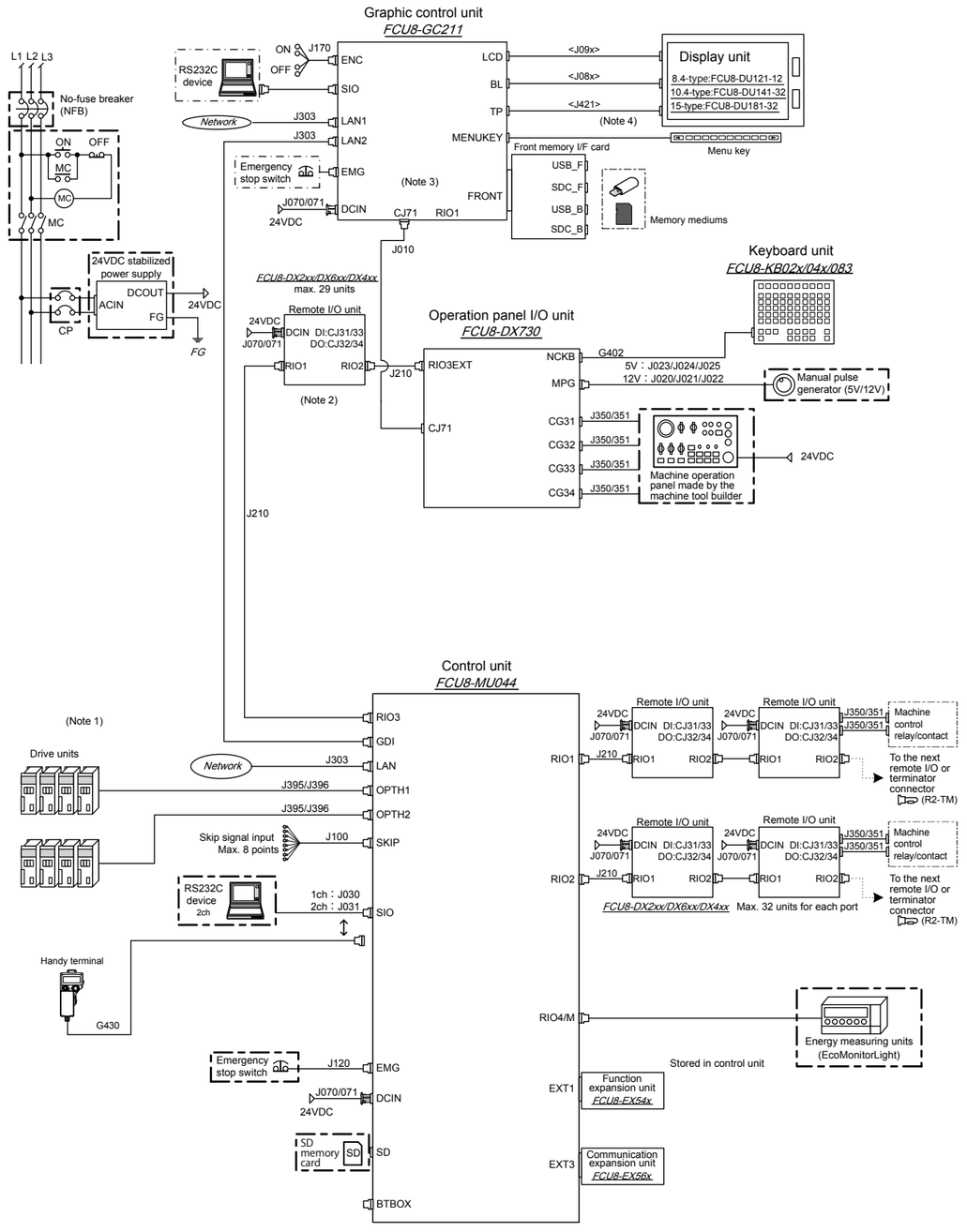
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(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.
(Note 3) When using a keyboard unit, install the operation panel I/O unit on the back of the keyboard unit.

■M80W Series Windows-less display unit (8.4-type/10.4-type/15-type)

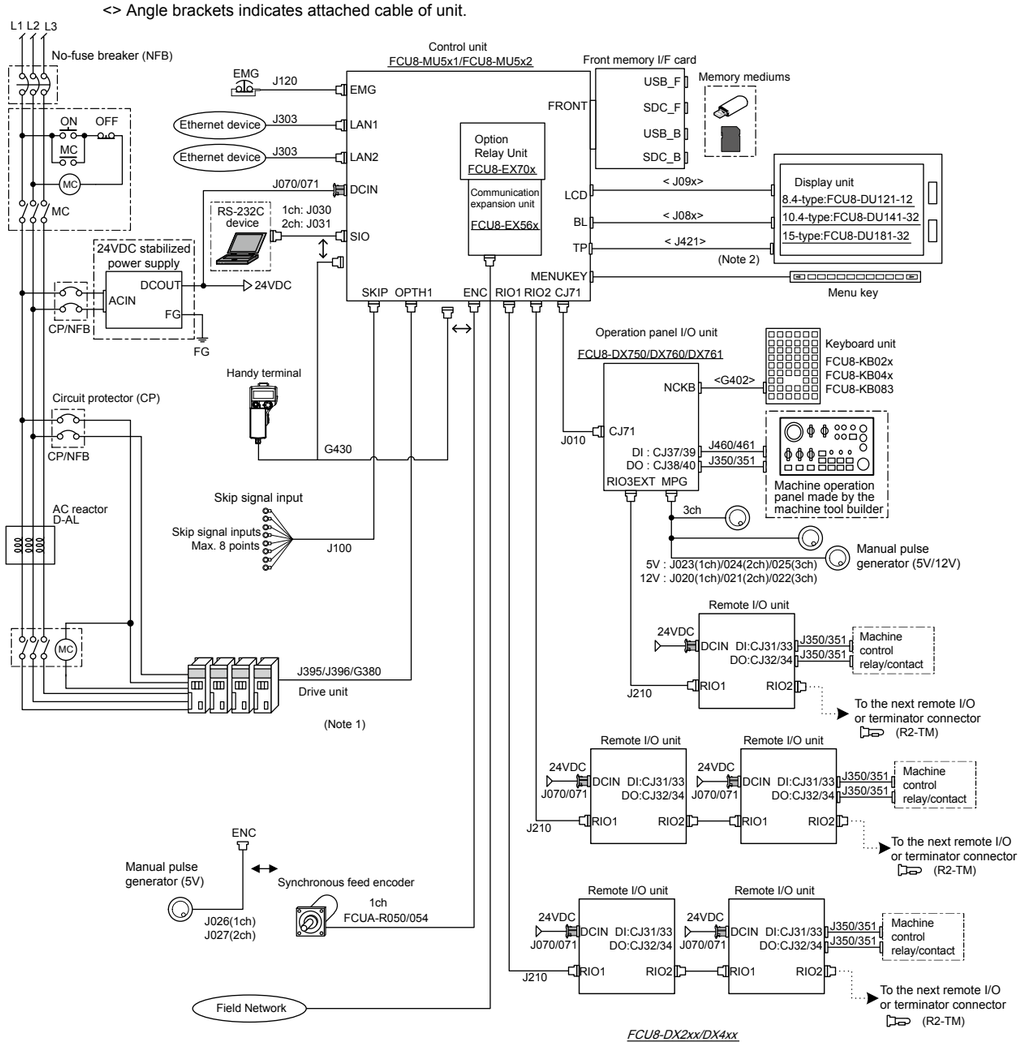
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(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.
(Note 3) When connecting a remote I/O unit to the 3rd RIO channel, insert it between the control unit and operation panel I/O unit.
(Note 4) There is no need to connect a terminator R2-TM to the graphic control unit.
(Note 5) The 8.4-type display unit is incompatible with the touchscreen. TP connector is not used.

■M80 Series without smart safety observation

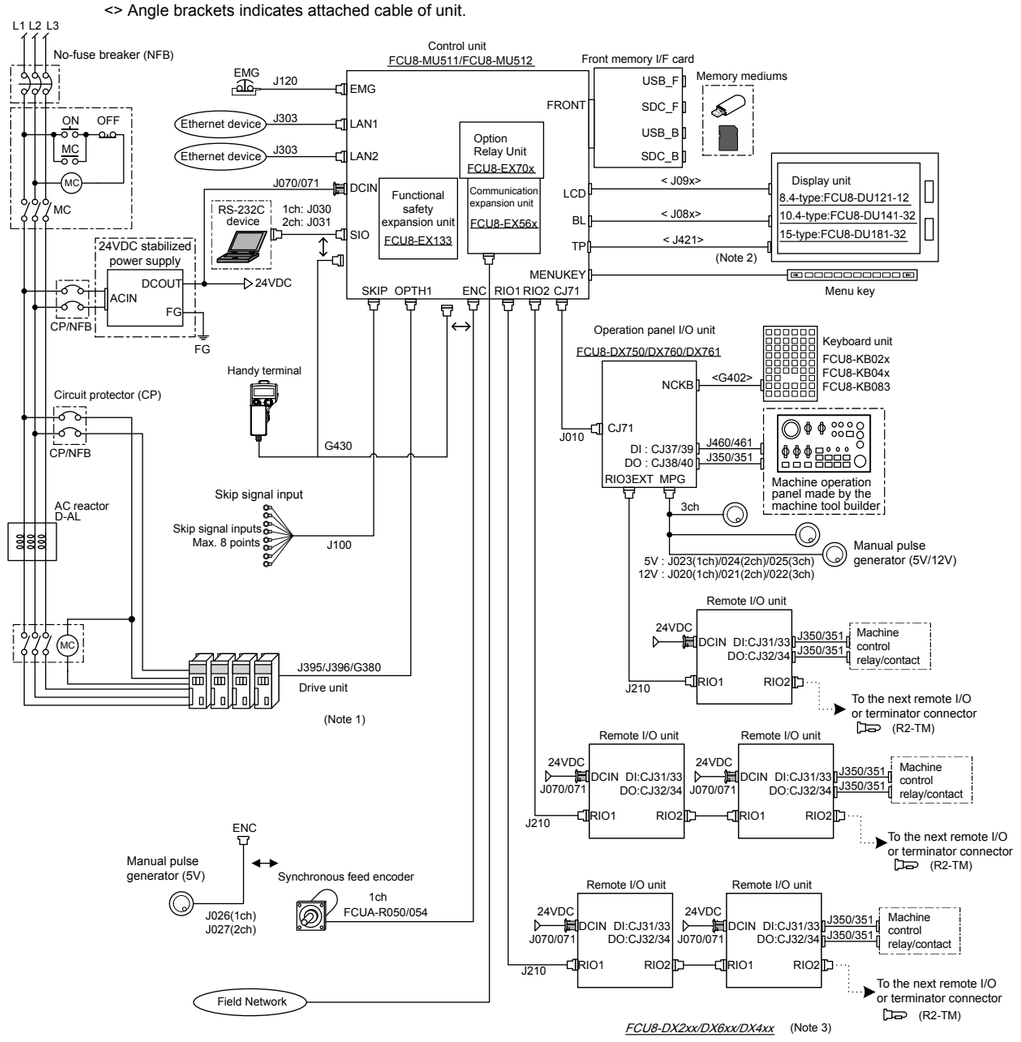
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.



(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. TP connector is not used.

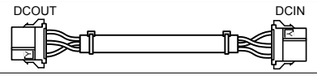
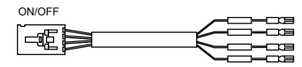
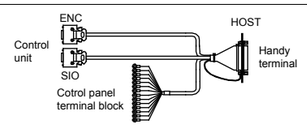
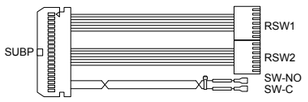
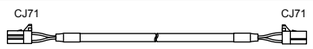
■M80 Series with smart safety observation

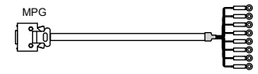
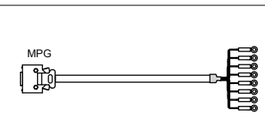
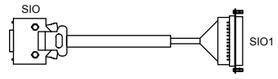
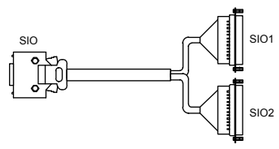
Dotted lines indicate the sections prepared by the machine tool builder.
<> Angle brackets indicates attached cable of unit.

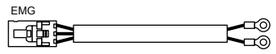
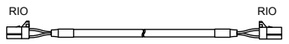
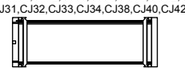
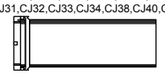
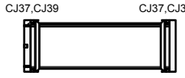
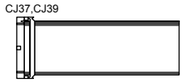
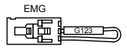
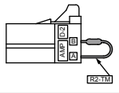


(Note 1) For details of the cable and the connector, refer to "CNC SYSTEM CABLES LIST" to be described.
(Note 2) For connections of the drive units, refer to "DRIVE SYSTEM SYSTEM CONFIGURATION DRAWING" to be described.
(Note 3) The 8.4-type display unit is incompatible with the touchscreen. TP connector is not used.
(Note 4) The safety remote I/O unit is available only when the functional safety expansion unit is mounted.

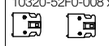
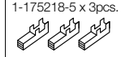
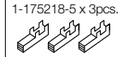
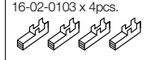
CNC SYSTEM LIST OF CABLES

	Application	Type	Length (m)	Contents	Supported model			
					M800W	M800S	M80W	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)	24VDC relay cable for MITSUBISHI CNC machine operation panel	G071 L0.12M	0.12		○	○	○	○
		G071 L0.5M	0.5					
		G071 L1M	1					
(3)	ON/OFF switch cable (ON/OFF switch - Personal computer unit) (for Windows-based display unit)	G170 L1M	1		○	—	○	—
		G170 L2M	2					
		G170 L3M	3					
		G170 L5M	5					
		G170 L10M	10					
		G170 L15M	15					
(4)	Cable for connection to handy terminal	G430 3M	3		○	○	○	○
		G430 5M	5					
		G430 10M	10					
(5)	Cable for MITSUBISHI CNC machine operation panel (Cable between main panel and sub panel)	G460 0.5M	0.5		○	○	○	○
(6)	ON/OFF switch cable (ON/OFF switch - Graphic control unit) (for Windows-less display uniut)	J170 L1M	1		○	—	○	—
		J170 L2M	2					
		J170 L3M	3					
		J170 L5M	5					
		J170 L10M	10					
		J170 L15M	15					
(7)	Analog output cable	J220 L2M	2		○	—	—	—
		J220 L3M	3					
		J220 L7M	7					
(8)	Analog input/output cable (for remote I/O unit)	J221 L2M	2		○	○	○	○
		J221 L3M	3					
		J221 L7M	7					
(9)	Analog input/output cable (for operation panel I/O unit)	J224 L1M	1		—	○	—	○
		J224 L2M	2					
		J224 L3M	3					
		J224 L5M	5					
		J224 L7M	7					
		J224 L10M	10					
		J224 L15M	15					
		J224 L20M	20					
(10)	Operation panel I/O interface cable (for Windows-less display unit of M800W/M80W)	J010 L0.5M (for 8.4/10.4-type display)	0.5		○	○	○	○
		J010 L1M	1					
(11)	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					
(12)	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					

	Application	Type	Length (m)	Contents	Supported model			
					M800W	M800S	M80W	M80
(13)	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					
(14)	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					
(15)	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					
(16)	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					
(17)	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					
(18)	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					
(19)	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					
(20)	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					
(21)	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					
(22)	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					

	Application	Type	Length (m)	Contents	Supported model M800W	M800S	M80W	M80
(23)	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					
(24)	Emergency stop cable for MITSUBISHI CNC machine operation panel	J121 L1M	1		○	○	○	○
		J121 L2M	2					
		J121 L3M	3					
		J121 L5M	5					
		J121 L7M	7					
		J121 L10M	10					
		J121 L15M	15					
		J121 L20M	20					
		J121 L30M	30					
(25)	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					
(26)	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					
(27)	DI/DO cable (connectors at both ends)	J350 L1M	1	M800W/M80W:CJ31,CJ32,CJ33,CJ34,CG31,CG32,CG33,CG34 M800S/M80:CJ31,CJ32,CJ33,CJ34,CJ38,CJ40,CJ42 	○	○	○	○
		J350 L2M	2					
		J350 L3M	3					
		J350 L5M	5					
(28)	DI/DO cable (connector at one end)	J351	3	M800W/M80W:CJ31,CJ32,CJ33,CJ34,CG31,CG32,CG33,CG34 M800S/M80:CJ31,CJ32,CJ33,CJ34,CJ38,CJ40,CJ42 	○	○	○	○
(29)	DI/DO cable (connectors at both ends) (for operation panel I/O unit)	J460 L1M	1	CJ37,CJ39 CJ37,CJ39 	—	○	—	○
		J460 L2M	2					
		J460 L3M	3					
		J460 L5M	5					
(30)	DI/DO cable (connector at one end) (for operation panel I/O unit)	J461	3	CJ37,CJ39 	—	○	—	○
(31)	Synchronous encoder - control unit (straight, with connector) (for FCU8-EX544 (M800W/M80W))	FCUA-R050-5M	5		○	○	○	○
(32)	Synchronous encoder - control unit (right angle, with connector) (for FCU8-EX544 (M800W/M80W))	FCUA-R054-3M	3		○	○	○	○
		FCUA-R054-5M	5					
		FCUA-R054-10M	10					
		FCUA-R054-15M	15					
		FCUA-R054-20M	20					
(33)	Cable for emergency stop release	G123	—		○	○	○	○
(34)	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 model M800W	M800S	M80W	M80
(1)	General I/O units (for SKIP,SIO,MPG,AIO)	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	Connector (MOLEX) 50-57-9403 x 1pc. 	Gold contact (MOLEX) 16-02-0103 x 3pcs. 	○	○	○	○
(3)	Connector kit for RIO2.0 unit	RIO2 CON	Connector (Tyco Electronics) 1-1318119-3 x 2pcs. 	Contact (Tyco Electronics) 1318107-1 x 8pcs. 	○	○	○	○
			Connector (Tyco Electronics) 2-178288-3 x 1pc. 	Contact (Tyco Electronics) 1-175218-5 x 3pcs. 				
(4)	24VDC power supply connector (for DCIN)	FCUA-CN220	Connector (Tyco Electronics) 2-178288-3 x 1pc. 	Contact (Tyco Electronics) 1-175218-5 x 3pcs. 	○	○	○	○
(5)	DI/DO connector (for operation panel I/O unit (M800W/M80W)) (for remote I/O unit) DO connector (for operation panel I/O unit (M800S/M80))	7940-6500SC 3448-7940	Connector (3M) 7940-6500SC x 4pcs. 	Strain relief (3M) 3448-7940 x 4pcs. 	○	○	○	○
(6)	DI connector (for operation panel I/O unit)	7950-6500SC 3448-7950	Connector (3M) 7950-6500SC x 2pcs. 	Strain relief (3M) 3448-7950 x 2pcs. 	○	—	○	—
(7)	ON/OFF switch connector	50-57-9404 16-02-0103	Connector (MOLEX) 50-57-9404 x 1pc. 	Contact (MOLEX) 16-02-0103 x 4pcs. 	○	—	○	—
(8)	CJ71 connector	2-1318119-4 1318107-1	Connector (Tyco Electronics) 2-1318119-4 x 1pc. 	Contact (Tyco Electronics) 1318107-1 x 8pcs. 	—	○	—	○
(9)	THERMISTOR connector (for thermistor input unit)	37104-2165- 000FL 10P	Connector (3M) 37104-2165-000FL x 10pcs. 		○	○	○	○

DRIVE SYSTEM

Drive unit

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

· The servo control-dedicated core processor realizes improved control speed, leading to enhanced basic performance. When combined with a higher resolution motor sensor and advanced high-speed optical communication, this drive contributes to high-speed, high-accuracy control.
· The motor power connector is equipped with 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 also incorporated as additional safety features.

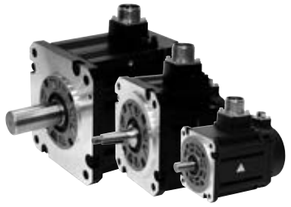
Multi-hybrid Drive Units MDS-EM/EMH Series

· The multi-hybrid drive units are capable of driving a maximum of three servo axes and one spindle. This contributes to the downsizing of machines and offers technical advantages.
· The motor power connector is equipped with an anti-misinsertion mechanism. This helps to eliminate connection errors.
· Safe Torque Off (STO) and Safe Brake Control (SBC) are also incorporated as additional safety features.
· Fan unit contributes to easier fan exchange.
· MDS-EMH 400V system drive unit is available.

All-in-one Compact Drive Units MDS-EJ/EJH Series

· Ultra-compact drive units with built-in power supplies contribute to smaller control panel size.
· The 2-axis type is added for further downsizing.
· 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 also incorporated as additional safety features.
· MDS-EJH 400V system drive unit is available (Note 1).

Servo motors



Medium-inertia, High-accuracy, 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: 0.2 to 9 [kW]
· Maximum rotation 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.
· This can also be used as a tool spindle motor.
· Small-sized connector allows horizontal cable connection, which helps to save space in machines. (Note 2)

Linear Servo Motors 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, quiet operation even at high speeds.
· Range: Maximum thrust: 900 to 18,000 [N·m]

Direct-drive Servo Motors TM-RB Series

· High-torque, direct-drive motors combined with high-gain control provide 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 Motors SJ-D Series

· Motor energy loss has been significantly reduced by optimizing the magnetic circuit.
· High-speed bearings are incorporated as a standard feature, helping to achieve higher speed, lower vibrat ion 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 Motors SJ-DG Series

· Addition of S3 rating (%ED rating) has improved output and torque acceleration/ deceleration characteristics.
· Balance adjustment ring 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 Motors SJ-DL Series

· This series of spindle motors is dedicated to use in tapping machines that require 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 Motors 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.
· Options for mold specification and cooling jacket specification are prepared.

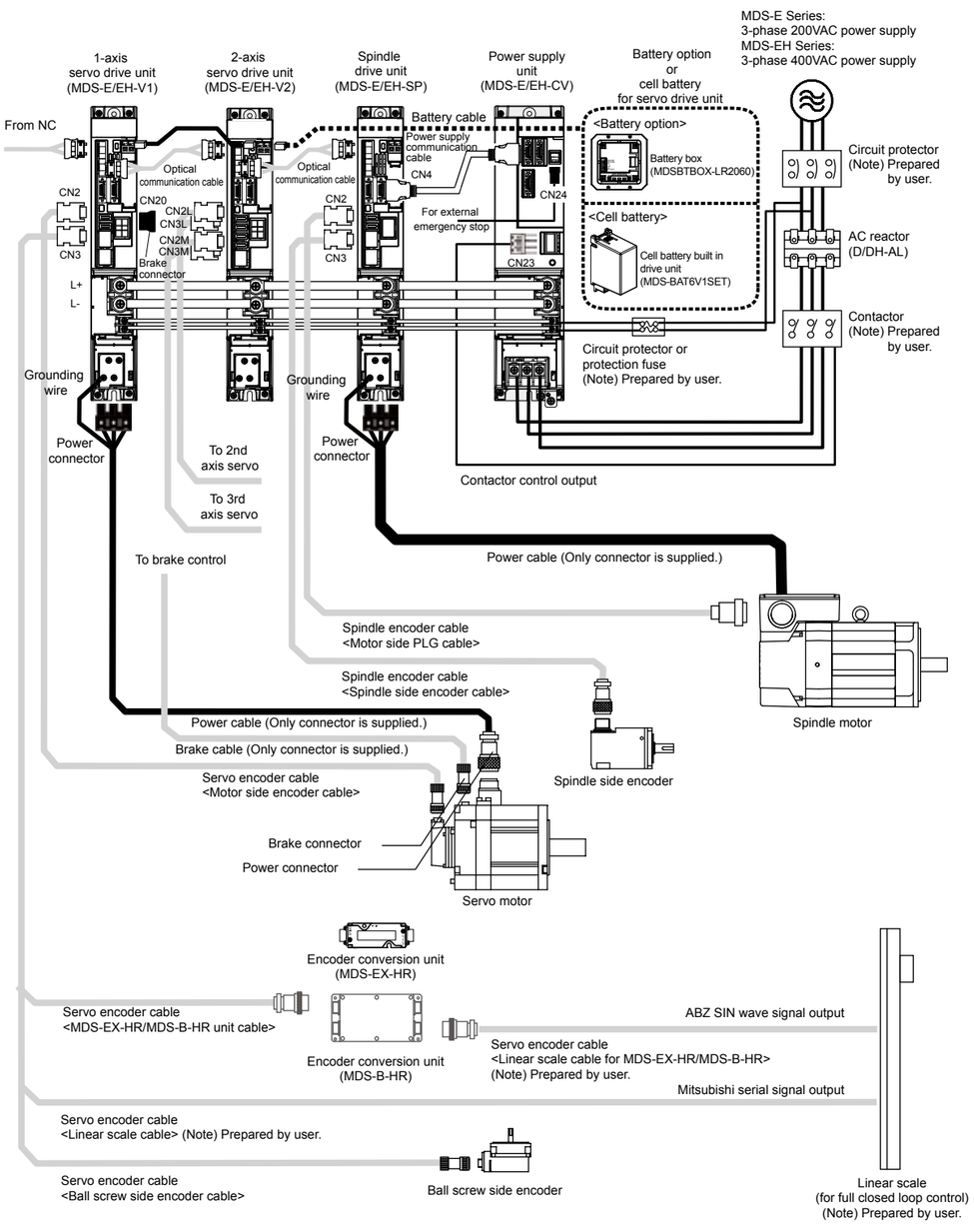
Tool Spindle Motors HG-JR Series

· Compact tool spindle motors are designed to have the small, high-output characteristics of servo motors yet offer high-speed rotation (8,000rpm). These motors contribute to downsizing spindle size, like rotary tool spindles.
· Product line: 0.75 to 1.5 [kW]
· Maximum rotation speed: 8,000 [r/min]
· Small-sized connector allows horizontal cable connection, which helps to save space in machines. (Note 2)

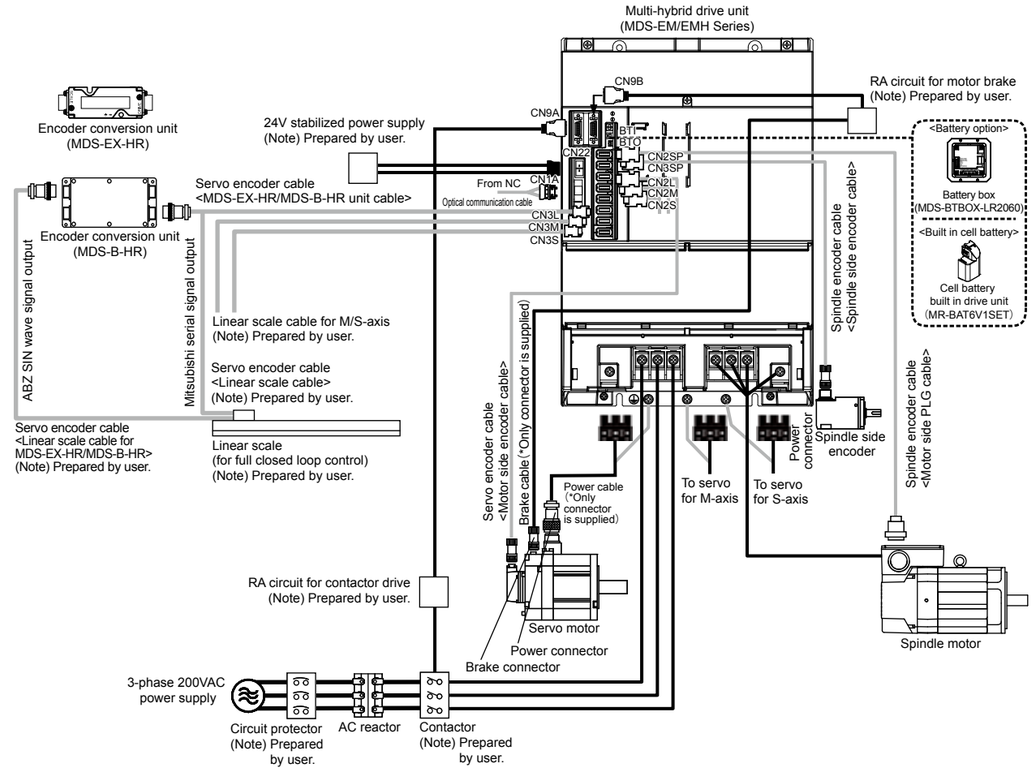
(Note 1) For servo motors only
(Note 2) Options supported. (Flange size 90SQ only)

DRIVE SYSTEM SYSTEM CONFIGURATION

■MDS-E/EH Series



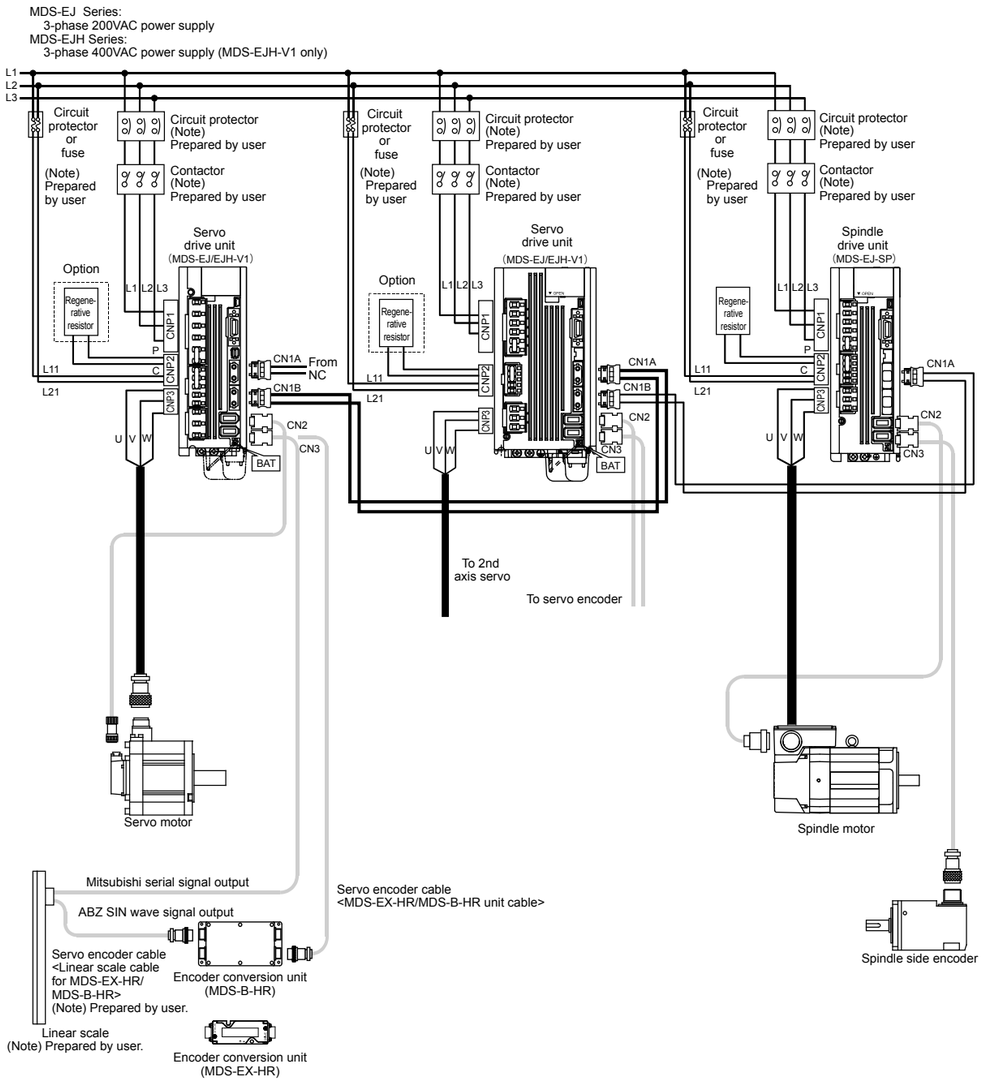
■MDS-EM/EMH Series



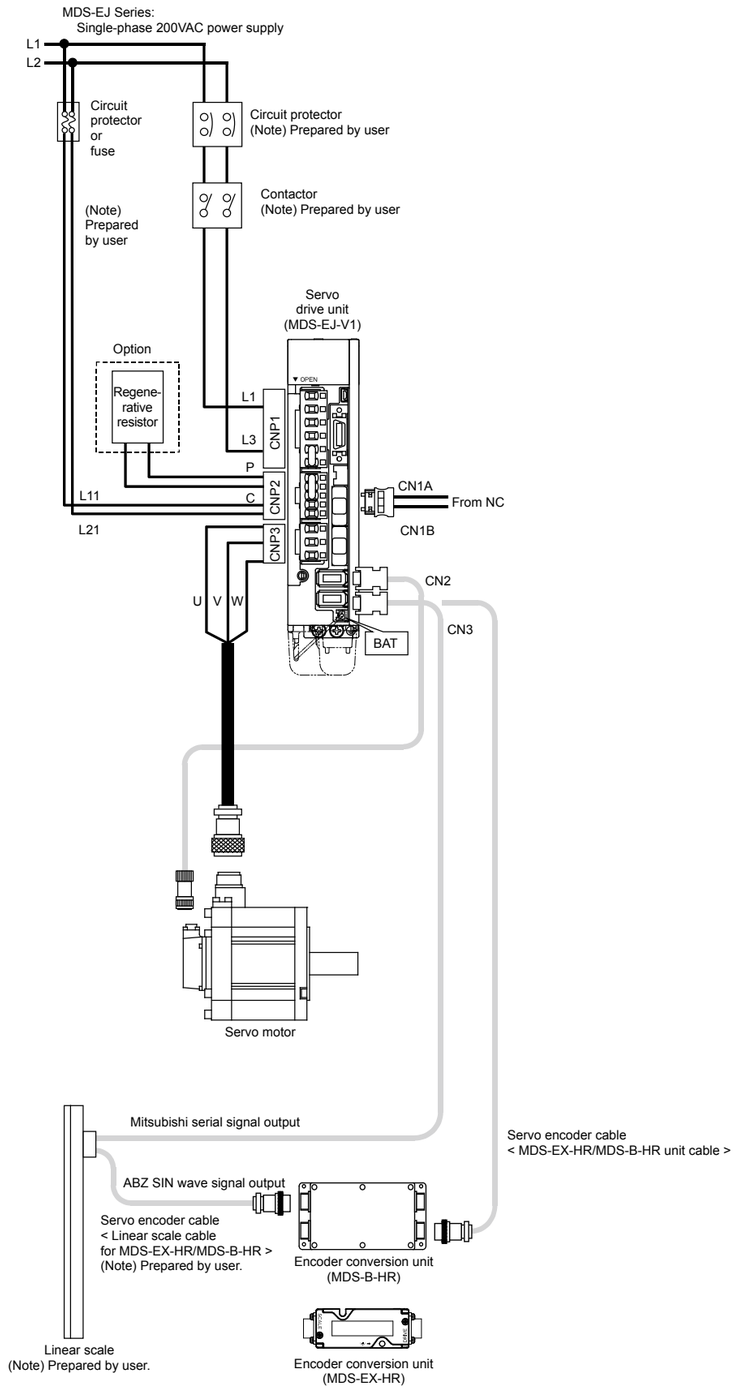
SYSTEM CONFIGURATION

6 DRIVE SYSTEM

■MDS-EJ/EJH Series



<For single-phase power supply>



SYSTEM CONFIGURATION

6 DRIVE SYSTEM

DRIVE SYSTEM SPECIFICATIONS

<Servo specification>

Item		MDS-E-V1/V2/V3	MDS-EH-V1/V2	MDS-EM/EMH-SPV3	MDS-EJ/EJH-V1
1 Base control functions	1.1 Full closed loop control	●	●	●	●
	1.2 Position command synchronous control	●	●	●	●
	1.3 Speed command synchronous control	●(Note 2)	●	–	–
	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.
(Note 2) Always set L-axis as primary axis and M-axis as secondary axis for the speed command synchronous control using MDS-E-V3.
Other settings cause the initial parameter error alarm.

<Spindle specification>

Item		MDS-E-SP	MDS-EH-SP	MDS-E-SP2	MDS-EM/EMH-SPV3	MDS-EJ-SP
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	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	●	●	●	●	●

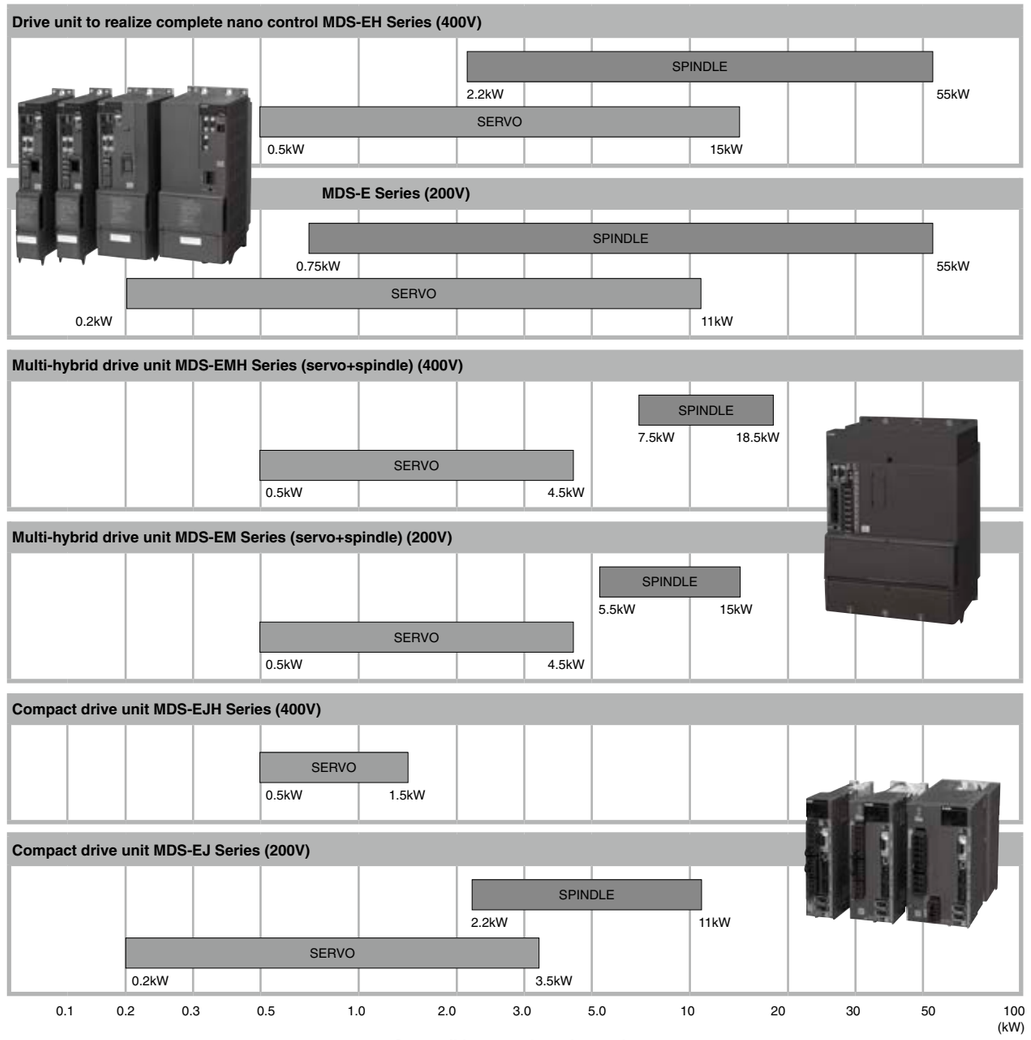
(Note 1) As for 2-axis spindle drive unit, setting is available only for one of the axes.
(Note 2) 4.5 SLS (Safely Limited Speed) function is set on NC side.

<Power Supply>

Item		MDS-E-CV	MDS-EH-CV	MDS-EM/EMH built-in converter	MDS-EJ/EJH-V1 built-in converter	MDS-EJ-SP built-in converter
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 – ⑤

①Rated output and maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size(mm)
46	0.2 kW	6000 r/min	60 SQ.
56	0.4 kW	6000 r/min	60 SQ.
96	0.75 kW	6000 r/min	80 SQ.
75	0.75 kW	5000 r/min	90 SQ.
105	1.0 kW	5000 r/min	90 SQ.
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
K	With keyway (with key)
S	Straight
T	Taper

(Note1) "Taper" is available for the motor whose flange size is 90 SQ. mm or 130 SQ. mm.
(Note 2) "K: With keyway (with key)" is only available for HG46/56/96.

④Power connector

Symbol	Connector
None	Normal
S105010	Compact (horizontal direction)

(Note) S105010 can only be used with HG75/105.

⑤Encoder

Symbol	Type	Detection method	Resolution
D47	OSA24RS-120	Absolute position	1,048,576 p/rev
D48	OSA24RS		1,048,576 p/rev
D51	OSA405S5AS		4,194,304 p/rev
D74	OSA676S5AS		67,108,864 p/rev

(Note) Encoder D47 can only be used with HG46/56/96.

■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

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

■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

②Length

Symbol	Length (nominal)
A	170 mm
B	290 mm
D	530 mm
F	770 mm
H	1010 mm

③Rated thrust

Symbol	Rated thrust
03	300 N
06	600 N
12	1200 N
18	1800 N
24	2400 N
36	3600 N
48	4800 N

Secondary side [magnet side]

LM-FS ① 0- ② -1WW0

①Width

Symbol	Width (nominal)
2	120 mm
4	200 mm

②Length

Symbol	Length (nominal)
384	384 mm
480	480 mm
576	576 mm

(Note) The linear dimension of 384mm is available for LM-FS20 only.

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

■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
A	With leg
C	Shaft 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

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.

■200V Tool spindle motor

<HG Series> HG ① ② – ③ – ④

①Rated output·Maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size(mm)
46	0.4 kW	6000 r/min	60 SQ.
56	0.5 kW	6000 r/min	60 SQ.
96	0.9 kW	6000 r/min	80 SQ.
75	0.75 kW	4000 r/min	90 SQ.
105	1.0 kW	4000 r/min	90 SQ.
54	0.5 kW	3000 r/min	130 SQ.
104	1.0 kW	3000 r/min	130 SQ.
154	1.5 kW	3000 r/min	130 SQ.
224	2.2 kW	3000 r/min	130 SQ.
204	2.0 kW	3000 r/min	176 SQ.
354	3.5 kW	3000 r/min	176 SQ.
453	4.5 kW	3000 r/min	176 SQ.
703	7.0 kW	3000 r/min	176 SQ.
903	9.0 kW	3000 r/min	204 SQ.

②Shaft end structure

Symbol	Shaft end structure
S	Straight
K	With keyway (with key)

(Note) "K: With keyway (with key)" is only available for HG46/56/96.

③Power connector

Symbol	Connector
None	Normal
S105010	Compact (horizontal direction)

(Note) S105010 can only be used with HG75/105.

④Encoder

Symbol	Type	Resolution
D47	OSA24RS-120	1,048,576 p/rev
D48	OSA24RS	1,048,576 p/rev

(Note 1) Encoder D51 and D74 can not be used with the tool spindle motor.
(Note 2) Encoder D47 can only be used with HG46/56/96.

<HG-JR Series> HG-JR ① E1 ② W9C – ③

①Rated output·Maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size (mm)
73	0.75 kW	8000 r/min	90 SQ.
153	1.5 kW	8000 r/min	90 SQ.

②Shaft end structure

Symbol	Shaft end structure
None	Straight
K	With keyway (without key)

③Power connector

Symbol	Connector
S105003	Normal (vertical direction)
S105010	Compact (horizontal direction)

■400V HG-H servo motor

<HG-H Series>

HG-H ① ② ③ – ④ – ⑤

①Rated output·Maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size(mm)
75	0.75 kW	5000r/min	90 SQ.
105	1.0 kW	5000r/min	90 SQ.
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.
1502	15.0kW	2500r/min	250 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.

④Power connector

Symbol	Connector
None	Normal
S105010	Compact (horizontal direction)

(Note) S105010 can only be used with HG-H75/105.

⑤Encoder

Symbol	Type	Detection method	Resolution
D48	OSA24RS	Absolute position	1,048,576 p/rev
D51	OSA405S5AS		4,194,304 p/rev
D74	OSA676S5AS		67,108,864 p/rev

<HQ-H Series>

HQ-H ① ② S – ③

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

③Encoder

Symbol	Type	Detection method	Resolution
D48	OSA24RS	Absolute position	1,048,576 p/rev
D51	OSA405S5AS		4,194,304 p/rev
D74	OSA676S5AS		67,108,864 p/rev

■400V Linear servo motor

<LM-F Series>

Primary side [coil side]

LM-FP ① ② – ③ M-1WW0

①Width

Symbol	Width (nominal)
5	240 mm

②Length

Symbol	Length (nominal)
H	1010 mm

③Rated thrust

Symbol	Rated thrust
60	6000 N

Secondary side [magnet side]

LM-FS ① 0- ② -1WW0

①Width

Symbol	Width (nominal)
5	240 mm

②Length

Symbol	Length (nominal)
480	480 mm
576	576 mm

■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

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
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.

■400V Tool spindle motor

<HG-JR Series>

HG-JR ① E1 ② W9C– ③

①Rated output · Maximum rotation speed

Symbol	Rated output	Max. rotation speed	Flange size (mm)
734	0.75 kW	8000 r/min	90 SQ.
1534	1.5 kW	8000 r/min	90 SQ.

②Shaft end structure

Symbol	Shaft end structure
None	Straight
K	With keyway (without key)

③Power connector

Symbol	Connector
S105003	Normal (vertical direction)
S105010	Compact (horizontal direction)

DRIVE SYSTEM SERVO MOTOR 200V

■HG Series

Motor type			HG46	HG56	HG96
Compatible drive unit	1-axis type	MDS-E-V1-	20	20	20
	2-axis type	MDS-E-V2-	20	20	20 40
	3-axis type	MDS-E-V3-	20	20	20 40
	Multi-hybrid type	MDS-EM-SPV3-	–	–	xxx40*
	Regenerative resistor type	MDS-EJ-V1-	10	15	30
Output Stall torque Max. torque		[N·m]	8 6 4 2 0 2.5 0.64	5.0 1.3	7.2 2.4
Rated output		[kW]	0.2	0.4	0.75
Max. rotation speed		[r/min]	6000		
Motor inertia		[×10⁻⁴kg·m²]	0.234	0.379	1.27
Motor inertia with a brake		[×10⁻⁴kg·m²]	0.261	0.407	1.37
Degree of protection (The shaft-through portion, power connector portion and brake connector portion are excluded.)			IP67		
Outline dimension drawing (Without a brake, Straight shaft)		[mm]	60 SQ. 117.2	60 SQ. 138.9	80 SQ. 147.8
Flange fitting diameter		[mm]	ϕ50	ϕ50	ϕ70
Shaft diameter		[mm]	ϕ14	ϕ14	ϕ19
Mass (with a brake)		[kg]	1.2(1.6)	1.6(2.0)	2.9(3.7)
Absolute position encoder compatible drive unit	1,048,576[p/rev](D47)		E, EJ	E, EJ	E, EM, EJ

Motor type			HG75	HG105	HG54	HG104	HG154	
Compatible drive unit	1-axis type	MDS-E-V1-	20	20	40	40	80	–
	2-axis type	MDS-E-V2-	20 40	20 40	40 80	40 80	80 160	–
	3-axis type	MDS-E-V3-	20 40	20 40	40	40	–	40
	Multi-hybrid type	MDS-EM-SPV3-	xxx40*	xxx40*	xxx40* xxx80*	xxx40* xxx80*	xxx80* 200120	–
	Regenerative resistor type	MDS-EJ-V1-	30	30	30	40	80	
Output Stall torque Max. torque		[N·m]	50 40 30 20 10 0 8.0 2.0	11.0 3.0	13.0 2.9	23.3 5.9	42.0 9.0	23.7 7.0
Rated output		[kW]	0.75	1.0	0.5	1.0	1.5	
Max. rotation speed		[r/min]	5000	5000	4000	4000	4000	
Motor inertia		[×10⁻⁴kg·m²]	2.62	5.12	6.13	11.9	17.8	
Motor inertia with a brake		[×10⁻⁴kg·m²]	2.70	5.20	8.26	14.0	20.0	
Degree of protection (The shaft-through portion is excluded.)			IP67	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 a D51or D74 encoder.		[mm]	90 SQ. 127.5	90 SQ. 163.5	130 SQ. 118.5	130 SQ. 140.5	130 SQ. 162.5	
Flange fitting diameter		[mm]	ϕ80	ϕ80	ϕ110	ϕ110	ϕ110	
Shaft diameter		[mm]	ϕ14	ϕ14	ϕ24	ϕ24	ϕ24	
Mass (with a brake)		[kg]	2.6(3.6)	4.4(5.3)	4.8(6.7)	6.5(8.5)	8.3(11.0)	
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		E	E	E	E	E	
	4,194,304 [p/rev] (D51)		E	E	E	E	E	E
	1,048,576 [p/rev] (D48)		EM, EJ	EM, EJ	EM, EJ	EM, EJ	EM, EJ	

*Refer to "MDS-EM/EMH 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			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
	3-axis type	MDS-E-V3-	–	–	–	–	–	–
	Multi-hybrid 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]	12.0 / 46.5	13.7 / 42.0	13.7 / 47.0	22.5 / 65.0	22.5 / 75.0	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	47.9		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 a 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)							

Motor type			HG123	HG223	HG303	HG453	
Compatible drive unit	1-axis type	MDS-E-V1-	20	40	80	–	160
	2-axis type	MDS-E-V2-	20 40	40 80	80 160	–	160 160W
	3-axis type	MDS-E-V3-	20 40	40	–	–	–
	Multi-hybrid type	MDS-EM-SPV3-	xxx40*	xxx40* xxx80*	xxx80* 200120	200120	–
	Regenerative resistor type	MDS-EJ-V1-	40	40	80	–	–
Output Stall torque Max. torque		[N·m]	7.0 / 17.0	12.0 / 32.0	22.5 / 64.0	37.2 / 90.0	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]	14.0	25.9	84.7	122.0	
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 a 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)	25.0(31.0)	
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		E	E	E	–	E
	4,194,304 [p/rev] (D51)		E EM, EJ	E EM, EJ	E EM, EJ	EM	
	1,048,576 [p/rev] (D48)						

*Refer to "MDS-EM/EMH 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.

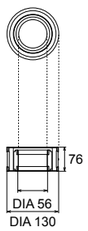
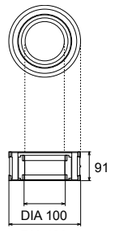
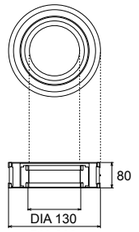
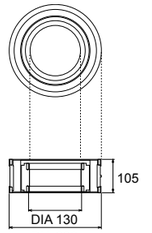
■HG Series

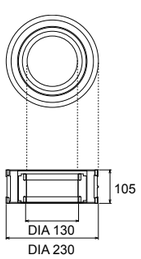
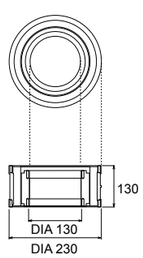
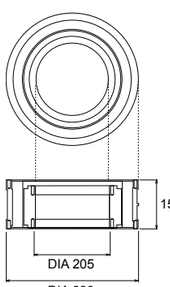
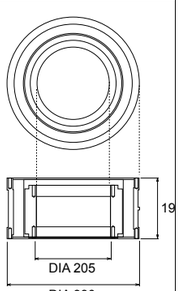
Motor type			HG703	HG903	HG142	HG302
Compatible drive unit	1-axis type	MDS-E-V1-	160W	320	20	40
	2-axis type	MDS-E-V2-	160W	–	20 40	40 80
	3-axis type	MDS-E-V3-	–	–	20 40	40
	Multi-hybrid type	MDS-EM-SPV3-	–	–	xxx40*	xxx40* xxx80*
	Regenerative resistor type	MDS-EJ-V1-	–	–	40	40
Output Stall torque Max. torque		[N·m]	49.0 / 152.0	58.8 / 208.0	11.0 / 26.5	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]	164.0	206.0	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 a 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)	43.0(49.0)	8.3(11.0)	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, EM, EJ	E, EM, EJ
	1,048,576 [p/rev] (D48)					

*Refer to "MDS-EM/EMH 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

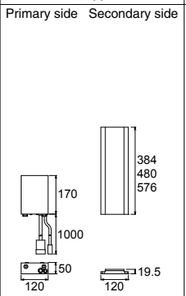
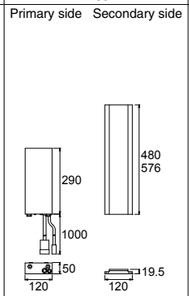
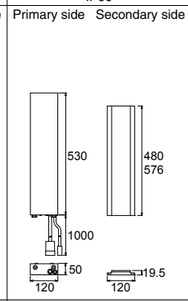
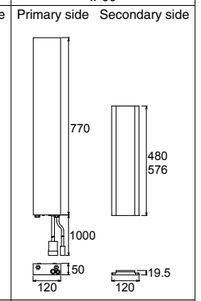
Direct-drive motor type	Primary side type	TM-RBP012C20	TM-RBP036E20	TM-RBP048G20	TM-RBP105G10
	Secondary side type	TM-RBS012C20	TM-RBS036E20	TM-RBS048G20	TM-RBS105G10
Compatible drive unit	1-axis type MDS-E-V1-	40	80	80	160
	2-axis type MDS-E-V2-	40	80	80	160
	Regenerative resistor type MDS-EJ-V1-	40	80	80	100
Output Rated torque (liquid-cooling) Max. torque	[N·m]	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]				
Mass [kg]	Primary side (coil)	3.9	7.1	10	13
	Secondary side (magnet)	1.7	3.7	5	7

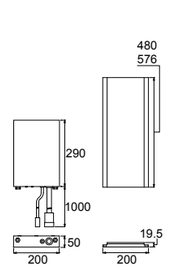
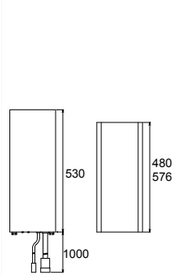
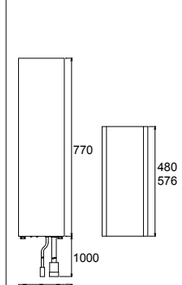
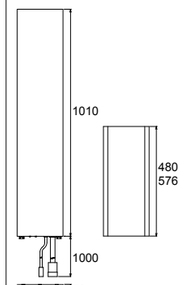
Motor type	Primary side type	TM-RBP105G20	TM-RBP150G20	TM-RBP340J20	TM-RBP500J20
	Secondary side type	TM-RBS105G20	TM-RBS150G20	TM-RBS340J20	TM-RBS500J20
Compatible drive unit	1-axis type MDS-E-V1-	160	160	320	320W
	2-axis type MDS-E-V2-	160	160	–	–
	Regenerative resistor type MDS-EJ-V1-	–	–	–	–
Output Rated torque (liquid-cooling) Max. torque	[N·m]	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]				
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-FP2A-03M-1WW0	LM-FP2B-06M-1WW0	LM-FP2D-12M-1WW0	LM-FP2F-18M-1WW0
	Secondary side type	LM-FS20-□-1WW0	LM-FS20-□-1WW0	LM-FS20-□-1WW0	LM-FS20-□-1WW0
Compatible drive unit	1-axis type MDS-E-V1-	40	40	80	160
	2-axis type MDS-E-V2-	40	40	80	160
	3-axis type MDS-E-V3-	40	40	–	–
	Regenerative resistor type MDS-EJ-V1-	40	40	80	–
Thrust force Continuous (natural-cooling) Continuous (liquid-cooling) Maximum	[N]	150 / 300 / 900	300 / 600 / 1800	600 / 1200 / 3600	900 / 1800 / 5400
Rated thrust	[N]	300	600	1200	1800
Maximum speed (Note 1)	[m/s]	2.0	2.0	2.0	2.0
Magnetic attraction force	[N]	2500	4500	9000	13500
Degree of protection		IP00	IP00	IP00	IP00
Outline dimension drawing	[mm]				
Mass [kg]	Primary side (coil)	5	9	18	27
	Secondary side (magnet)	5.8(384mm) 7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)

Motor type	Primary side type	LM-FP4B-12M-1WW0	LM-FP4D-24M-1WW0	LM-FP4F-36M-1WW0	LM-FP4H-48M-1WW0
	Secondary side type	LM-FS40-□-1WW0	LM-FS40-□-1WW0	LM-FS40-□-1WW0	LM-FS40-□-1WW0
Compatible drive unit	1-axis type MDS-E-V1-	80	160	320	320
	2-axis type MDS-E-V2-	80	160	–	–
	3-axis type MDS-E-V3-	–	–	–	–
	Regenerative resistor type MDS-EJ-V1-	80	–	–	–
Thrust force Continuous (natural-cooling) Continuous (liquid-cooling) Maximum	[N]	600 / 1200 / 3600	1200 / 2400 / 7200	1800 / 3600 / 10800	2400 / 4800 / 14400
Rated thrust	[N]	1200	2400	3600	4800
Maximum speed (Note 1)	[m/s]	2.0	2.0	2.0	2.0
Magnetic attraction force	[N]	9000	18000	27000	36000
Degree of protection		IP00	IP00	IP00	IP00
Outline dimension drawing	[mm]				
Mass [kg]	Primary side (coil)	14	28	42	56
	Secondary side (magnet)	13.5(480mm) 16.0(576mm)	13.5(480mm) 16.0(576mm)	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.

■LM-F Series (Dual-axis drive unit)

Motor type	Primary side type	LM-FP2A-03M-1WW0	LM-FP2B-06M-1WW0	LM-FP2D-12M-1WW0	LM-FP2F-18M-1WW0
	Secondary side type	LM-FS20-□-1WW0	LM-FS20-□-1WW0	LM-FS20-□-1WW0	LM-FS20-□-1WW0
Compatible drive unit	1-axis type MDS-E-V1-	80	80	160	320
	2-axis type MDS-E-V2-	80	80	160	–
	Regenerative resistor type MDS-EJ-V1-	80	80	–	–
Thrust force Continuous (natural-cooling) Continuous (liquid-cooling) Maximum	[N]	300 600 1800	600 1200 3600	1200 2400 7200	1800 3600 10800
Rated thrust	[N]	600	1200	2400	3600
Maximum speed (Note 1)	[m/s]	2.0	2.0	2.0	2.0
Magnetic attraction force (per motor)	[N]	2500	4500	9000	13500
Degree of protection		IP00	IP00	IP00	IP00
Outline dimension drawing	[mm]	Primary side Secondary side 170 384 480 576 1000 50 19.5 120 120	Primary side Secondary side 290 480 576 1000 50 19.5 120 120	Primary side Secondary side 530 480 576 1000 50 19.5 120 120	Primary side Secondary side 770 480 576 1000 50 19.5 120 120
Mass [kg]	Primary side (coil)	5×2	9×2	18×2	27×2
	Secondary side (magnet)	5.8(384mm) 7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)	7.1(480mm) 9.0(576mm)

Motor type	Primary side 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-	160	320
	2-axis type MDS-E-V2-	160	–
	Regenerative resistor type MDS-EJ-V1-	–	–
Thrust force Continuous (natural-cooling) Continuous (liquid-cooling) Maximum	[N]	1200 2400 7200	2400 4800 14400
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 290 480 576 1000 50 19.5 200 200	Primary side Secondary side 530 480 576 1000 50 19.5 200 200
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

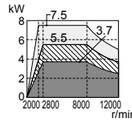
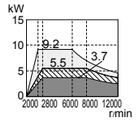
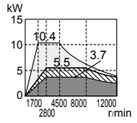
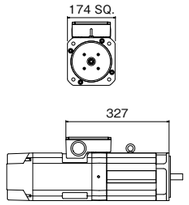
■SJ-D Series (Normal specifications)

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)	160	160
	Multi-hybrid 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		kW 3.7 2.2 1500 6000 10000 r/min Short-time (15min)	kW 5.5 3.7 1500 6000 10000 r/min Short-time (30min)	kW 5.5 3.7 1500 6000 12000 r/min Short-time (30min)	kW 7.5 5.5 1500 6000 10000 r/min Short-time (30min)	kW 7.5 5.5 1500 6000 12000 r/min 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]		4.4	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 [kg·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]	174 SQ. 327	174 SQ. 417	174 SQ. 417	204 SQ. 439	204 SQ. 439
Flange fitting diameter [mm]		ϕ150	ϕ150	ϕ150	ϕ180	ϕ180
Shaft diameter [mm]		ϕ28	ϕ28	ϕ28	ϕ32	ϕ32
Mass [kg]		26	39	39	53	53

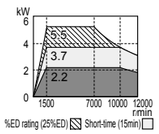
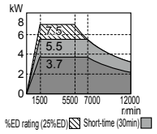
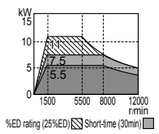
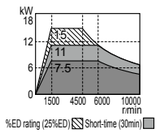
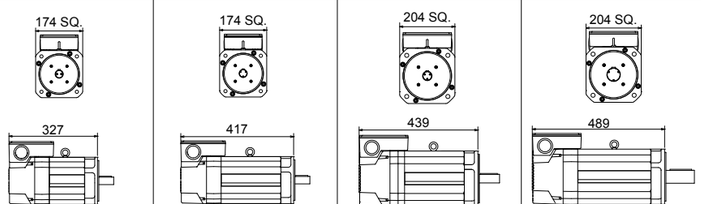
Motor type		SJ-D11/100-01	SJ-D5.5/120-02		
Compatible drive unit	1-axis type MDS-E-SP-	160	–	160	200
	2-axis type MDS-E-SP2-	16080(L)	–	16080(L)	–
	Multi-hybrid type MDS-EM-SPV3-	160xx*	100xx*	160xx*	200xx*
	Regenerative resistor type MDS-EJ-SP-	160	–	–	–
Output Acceleration/Deceleration %ED rating Short-time rating Continuous rating		kW 11 7.5 1500 4500 10000 r/min Short-time (30min)	kW 7.5 5.5 3.7 2000 2800 8000 12000 r/min %ED rating (25%ED)	kW 9.2 5.5 3.7 2000 2800 6000 8000 12000 r/min %ED rating (25%ED)	kW 10.4 5.5 3.7 1700 2800 4500 8000 12000 r/min %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	11.0	12.5
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 [kg·m²]		0.031	0.0074		
Degree of protection (The shaft-through portion is excluded.)		IP54	IP54		
Outline dimension drawing(flange type)	[mm]	204 SQ. 489	174 SQ. 327		
Flange fitting diameter [mm]		ϕ180	ϕ150		
Shaft diameter [mm]		ϕ48	ϕ28		
Mass [kg]		64	26		

* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
(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)

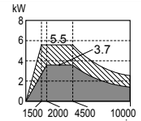
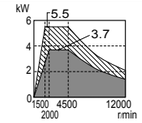
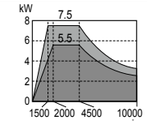
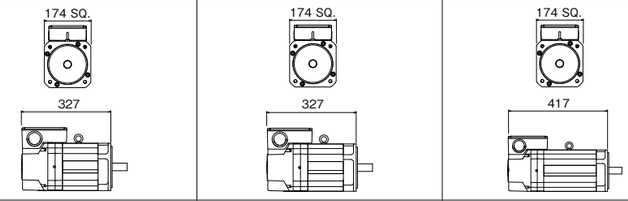
Motor type			SJ-D5.5/120-02T-S		
Compatible drive unit	1-axis type	MDS-E-SP-	–	160	200
	2-axis type	MDS-E-SP2-	–	16080(L)	–
	Multi-hybrid type	MDS-EM-SPV3-	100xx*	160xx*	200xx*
	Regenerative resistor type	MDS-EJ-SP-	–	–	–
Output Acceleration/Deceleration ☐ %ED rating ▨ Short-time rating ☐ Continuous 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	11.0	12.5
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		[kg·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		[mm]	ϕ28		
Mass		[kg]	24		

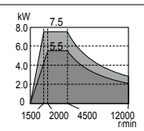
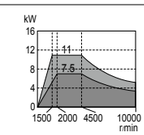
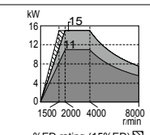
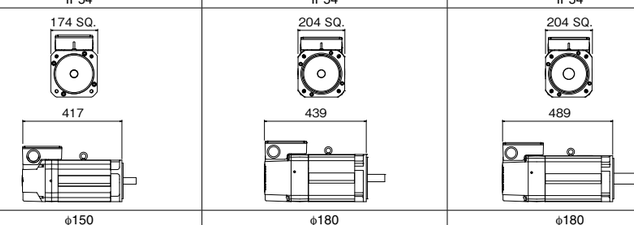
■SJ-DG Series (High-output specifications)

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-hybrid type	MDS-EM-SPV3-	160xx*	160xx*	160xx*	200xx*
	Regenerative resistor type	MDS-EJ-SP-	–	–	–	–
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		[kg·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

* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
(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".

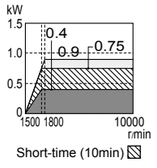
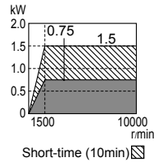
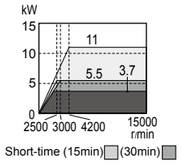
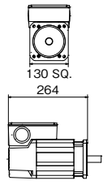
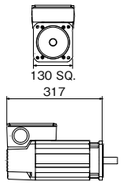
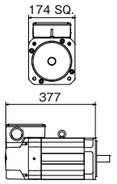
■SJ-DJ Series (Compact & lightweight specifications)

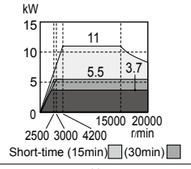
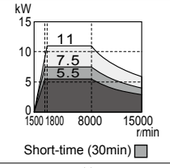
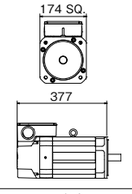
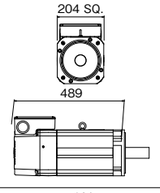
Motor type			SJ-DJ5.5/100-01	SJ-DJ5.5/120-01	SJ-DJ7.5/100-01
Compatible drive unit	1-axis type	MDS-E-SP-	80	80	160
	2-axis type	MDS-E-SP2-	80 16080(M)	80 16080(M)	16080(M)
	Multi-hybrid type	MDS-EM-SPV3-	100xx*	100xx*	100xx*
	Regenerative resistor type	MDS-EJ-SP-	100	100	120
Output %ED rating ▨ Short-time 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-hybrid type	MDS-EM-SPV3-	100xx*	160xx*	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

* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
(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.

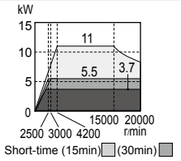
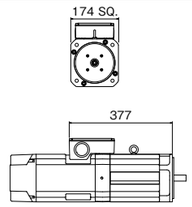
■SJ-DL Series (Low-inertia specification)

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-hybrid type	MDS-EM-SPV3-	–	–	160xx*
	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]			1.1	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-hybrid type	MDS-EM-SPV3-	–	160xx*
	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

* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
(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".

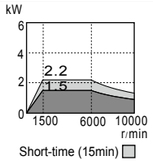
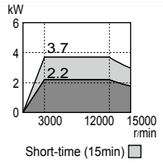
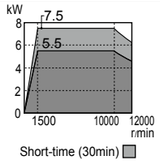
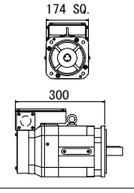
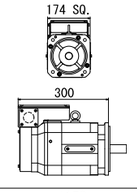
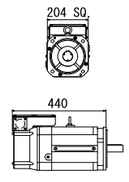
■SJ-DL Series (Hollow shaft specifications)

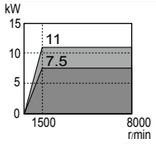
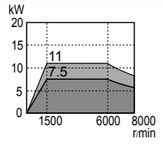
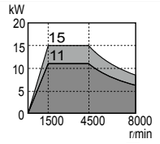
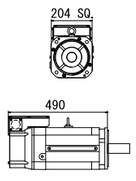
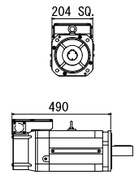
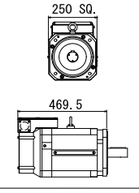
Motor type			SJ-DL5.5/200-01T-S
Compatible drive unit	1-axis type	MDS-E-SP-	160
	2-axis type	MDS-E-SP2-	16080(L)
	Multi-hybrid type	MDS-EM-SPV3-	–
	Regenerative resistor type	MDS-EJ-SP-	–
Output Acceleration/Deceleration □ Short-time rating □□ Continuous rating ■			 Short-time (15min) □ (30min) ■
Standard 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
6 DRIVE SYSTEM

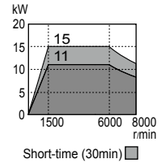
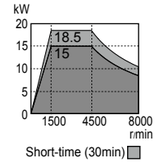
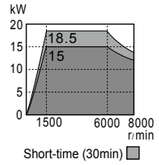
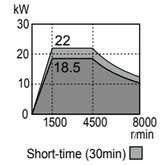
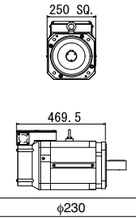
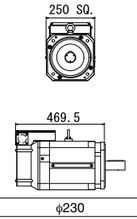
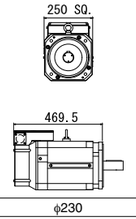
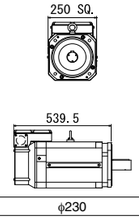
■SJ-V Series (Normal specification)

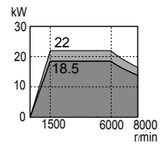
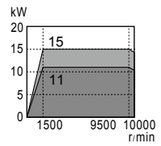
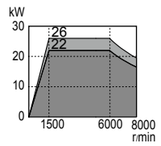
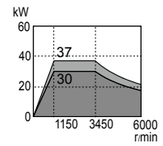
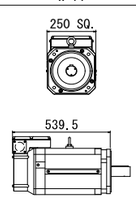
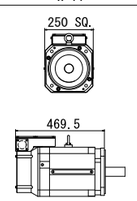
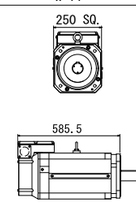
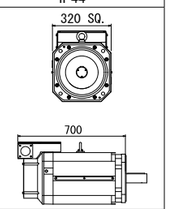
Motor type			SJ-V2.2-01T	SJ-V3.7-02ZT	SJ-V7.5-03ZT
Compatible drive unit	1-axis type	MDS-E-SP-	40	80	160
	2-axis type	MDS-E-SP2-	40	80 16080(M)	16080(L)
	Multi-hybrid type	MDS-EM-SPV3-	–	–	160xx*
Output Short-time rating □□ Continuous rating □			 Short-time (15min) □	 Short-time (15min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]			2.2	3.7	7.5
Actual acceleration/deceleration output (Note 2) [kW]			2.64	4.4	9
Base rotation speed		[r/min]	1500	3000	1500
Max. rotation speed in constant output range [r/min]			6000	12000	10000
Maximum rotation speed		[r/min]	10000	15000	12000
Continuous rated torque		[N·m]	9.5	7.0	35
Motor inertia		[kg·m²]	0.00675	0.00675	0.0245
Degree of protection			IP44	IP44	IP44
Outline dimension drawing (flange type)		[mm]			
Flange fitting diameter		[mm]	ϕ150	ϕ150	ϕ180
Shaft diameter		[mm]	ϕ28	ϕ28	ϕ32
Mass		[kg]	25	25	60

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-hybrid 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

* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
(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".

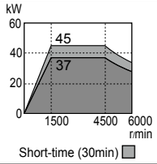
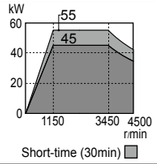
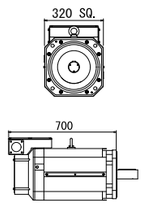
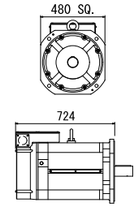
■SJ-V Series (Normal specification)

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-hybrid type	MDS-EM-SPV3-	200xx	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-hybrid 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	9500	6000	3450
Maximum rotation speed		[r/min]	8000	10000	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

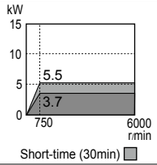
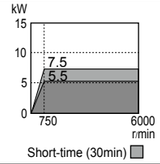
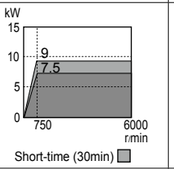
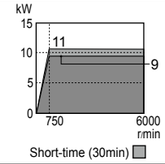
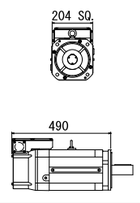
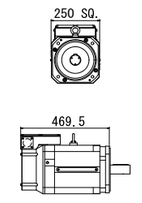
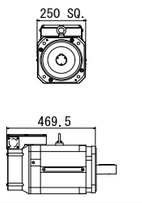
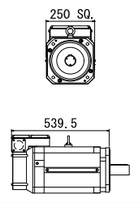
* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
(Note 1) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.
(Note 2) Actual acceleration/deceleration output is 1.2-fold of "Standard output during acceleration/deceleration" or "Short time rated output".

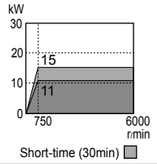
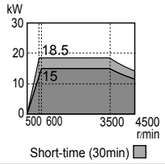
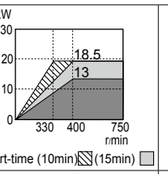
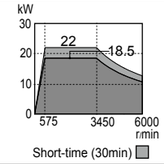
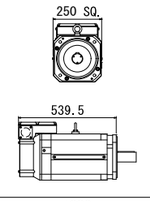
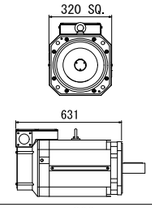
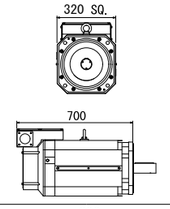
■SJ-V Series (Normal specification)

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-hybrid 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".

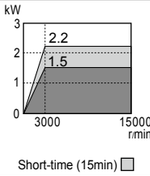
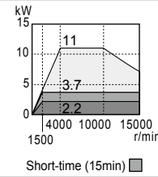
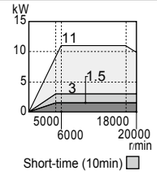
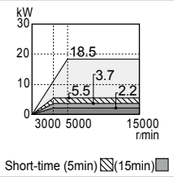
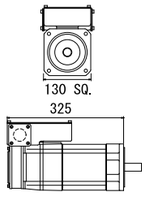
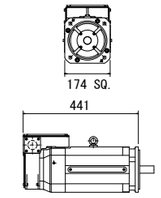
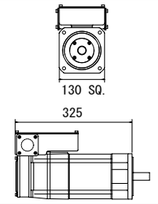
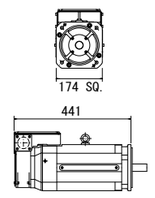
■SJ-V Series (Wide range constant output specification)

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-hybrid type	MDS-EM-SPV3-	160xx*	160xx*	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-hybrid 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
Motor inertia		[kg·m²]	0.08	0.308	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	

* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
(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)

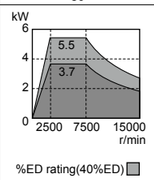
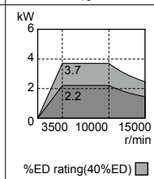
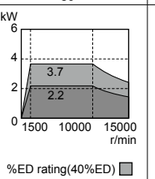
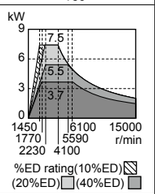
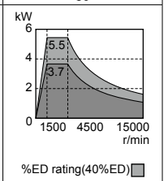
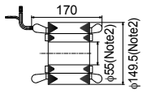
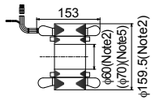
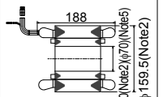
Motor type			SJ-VL2.2-02ZT	SJ-VL11-02FZT	SJ-VL11-05FZT-S01 *1	SJ-VL18.5-05FZT
Compatible drive unit	1-axis type	MDS-E-SP-	40	160	160	240
	2-axis type	MDS-E-SP2-	40	16080(L)	16080(L)	–
	Multi-hybrid type	MDS-EM-SPV3-	–	160xx*	160xx*1*2	–
Output Acceleration/Deceleration □ Short-time rating ▨□□ Continuous rating ■			 Short-time (15min) □	 Short-time (15min) ■	 Short-time (10min) ■	 Short-time (5min) ▨(15min) ■
Standard output during acceleration/deceleration [kW]			2.2	11	11	18.5
Actual acceleration/deceleration output (Note 2) [kW]			2.6	13.2	13.2	22.2
Base rotation speed		[r/min]	3000	1500	5000	3000
Max. rotation speed in constant output range		[r/min]	15000	15000	20000	15000
Maximum rotation speed		[r/min]	15000	15000	20000	15000
Continuous rated torque		[N·m]	4.77	14.0	2.9	7.0
Motor inertia		[kg·m²]	0.0024	0.003	0.0024	0.00525
Degree of protection			IP44	IP44	IP44	IP44
Outline dimension drawing (flange type)		[mm]				
Flange fitting diameter		[mm]	ϕ110	ϕ150	ϕ110	ϕ150
Shaft diameter		[mm]	ϕ22	ϕ28	ϕ22	ϕ28
Mass		[kg]	20	42	20	40

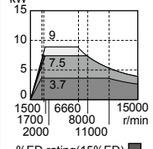
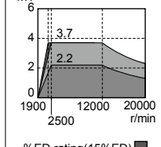
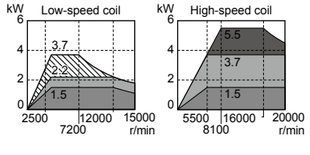
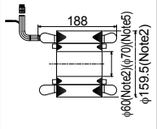
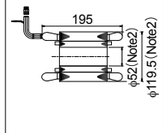
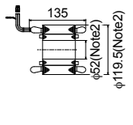
* Refer to "MDS-EM/EMH Series Multi-hybrid drive" in this book for compatible drive unit type.
*1 The acceleration/deceleration frequency is limited by the regenerative resistor.
*2 The maximum rotation speed is 15000r/min.

(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".

DRIVE SYSTEM BUILT-IN SPINDLE MOTOR 200V

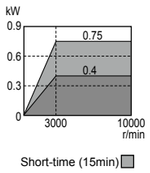
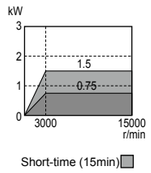
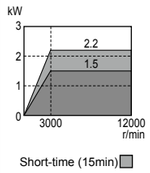
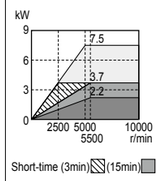
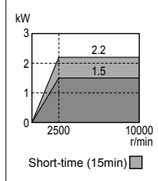
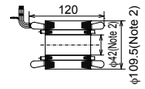
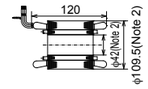
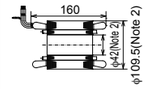
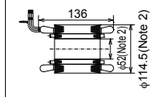
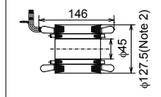
■SJ-BG Series

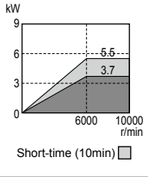
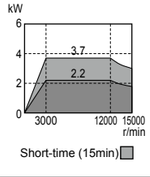
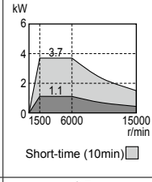
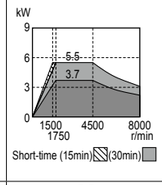
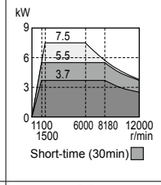
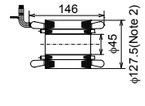
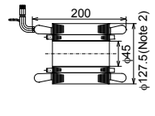
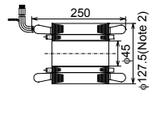
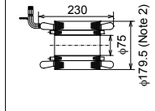
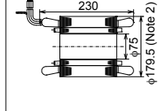
Motor type (Note 1)			SJ-BG150B/150-01□	SJ-BG160B/150-01□(R)			SJ-BG160D/150-01□(R)
Compatible drive unit	MDS-E-SP-		80	40	80	160	80
Output %ED rating □□□ Continuous rating ■			 %ED rating(40%ED) ■	 %ED rating(40%ED) ■	 %ED rating(40%ED) ■	 %ED rating(10%ED) ▨ (20%ED) □ (40%ED) ■	 %ED rating(40%ED) ■
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)	SJ-BG120C/200-011R	SJ-BG120A/200-011KR	
Compatible drive unit	MDS-E-SP-		160	80	80	
Output Acceleration/Deceleration □ %ED rating ▨□■ Continuous rating ■			 %ED rating(15%ED) ■ (40%ED) ■	 %ED rating(15%ED) ■ (40%ED) ■	 %ED rating(10%ED) ▨ (15%ED) ■ (40%ED) ■	
Standard output during acceleration/deceleration [kW]			7.5	3.7	3.7	5.5
Actual acceleration/deceleration output (Note 4) [kW]			9	4.4	4.4	6.6
Continuous base rotation speed		[r/min]	1500	2500	2500	5500
Maximum rotation speed		[r/min]	15000	20000	15000	20000
Continuous rated torque		[N·m]	23.6	8.4	5.7	2.6
Rotor inertia		[kg·m²]	0.0075(0.0061)	0.0027	0.0014	
Outline dimension drawing		[mm]				
Mass	Stator	[kg]	11.0	5.9	3.0	
	Rotor	[kg]	4.3(3.3)	2.5	1.3	

(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.

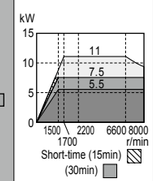
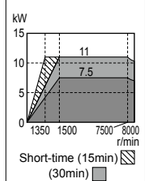
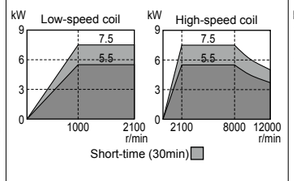
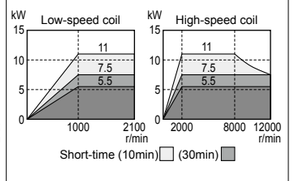
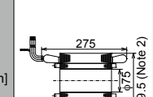
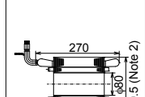
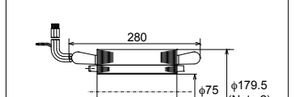
■SJ-B Series

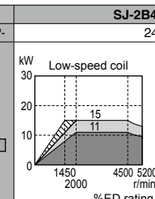
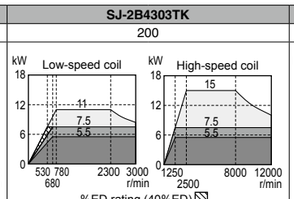
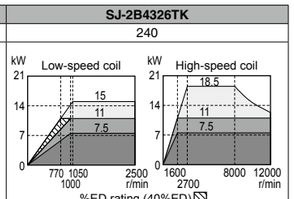
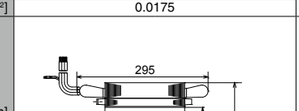
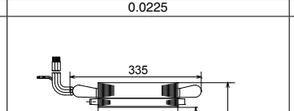
Motor type (Note 1)		SJ-2B4002T	SJ-2B4004T	SJ-2B4003T	SJ-2B4B03T	SJ-2B4112T
Compatible drive unit	MDS-E-SP-	20	40	40	160	40
Output Acceleration/Deceleration □ Short-time rating ▨□□ Continuous rating ■						
Standard output during acceleration/deceleration [kW]		0.75	1.5	2.2	7.5	2.2
Actual acceleration/deceleration 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
Mass Rotor [kg]		0.9	0.9	1.7	1.5	1.7

Motor type (Note 1)		SJ-2B4111T	SJ-2B4105T	SJ-2B4102T	SJ-2B4310T	SJ-2B4301T
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
Mass 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".

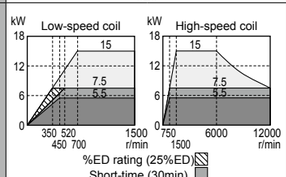
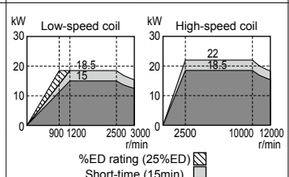
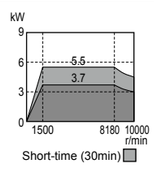
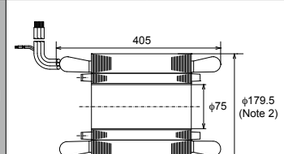
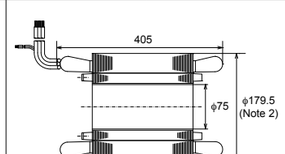
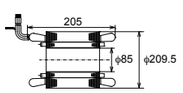
■SJ-B Series

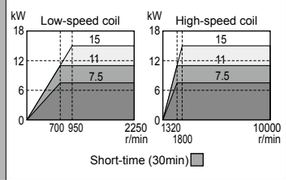
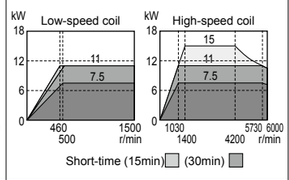
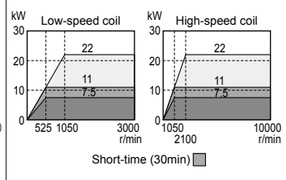
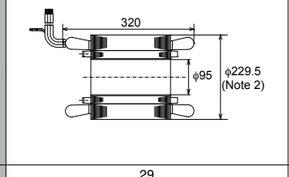
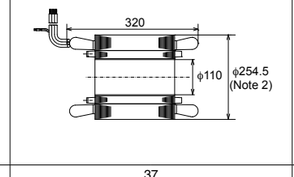
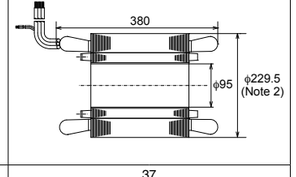
Motor type (Note 1)		SJ-2B4327T	SJ-2B4340T	SJ-2B4313TK		SJ-2B4323TK	
Compatible drive unit	MDS-E-SP-	160	200	160		200	
Output Acceleration/Deceleration □ Short-time rating ▨□ Continuous rating ■							
Standard output during acceleration/deceleration [kW]		11	11	7.5	7.5	11	11
Actual acceleration/deceleration 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	
Mass Rotor [kg]		7.6	7.6	7.6		7.6	

Motor type (Note 1)		SJ-2B4325TK		SJ-2B4303TK		SJ-2B4326TK	
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	
Mass 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".

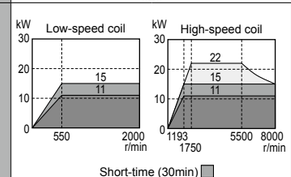
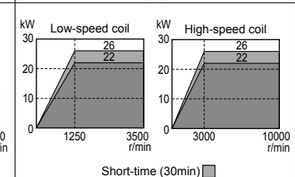
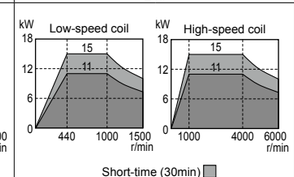
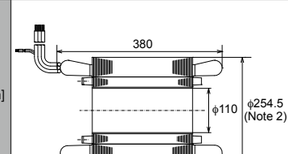
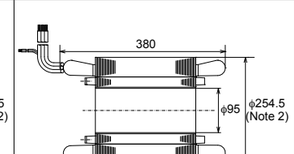
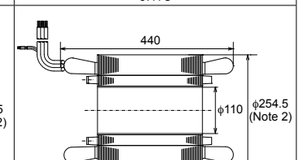
■SJ-B Series

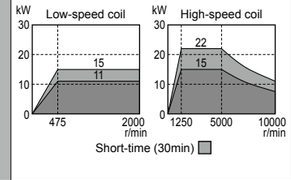
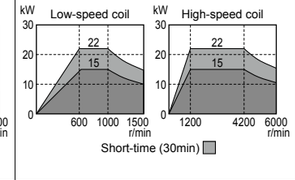
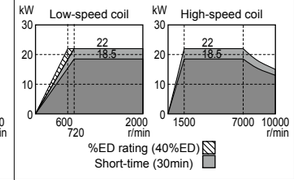
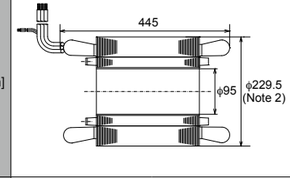
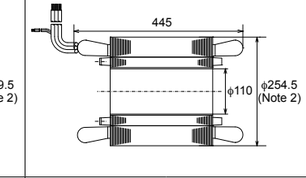
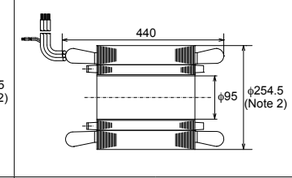
Motor type (Note 1)		SJ-2B4304TK		SJ-2B4318TK		SJ-2B4412T
Compatible drive unit	MDS-E-SP-	320		320		160
Output Acceleration/Deceleration %ED rating Short-time rating Continuous rating					
Standard output during acceleration/deceleration [kW]		15	15	18.5	22	5.5
Actual acceleration/deceleration output (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".

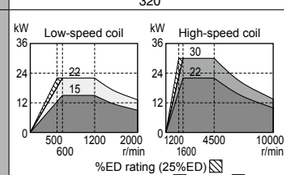
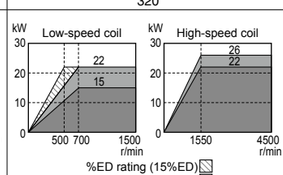
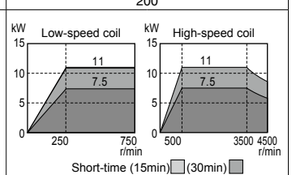
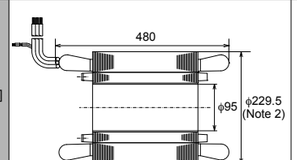
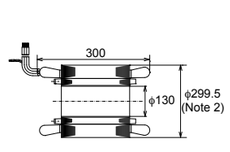
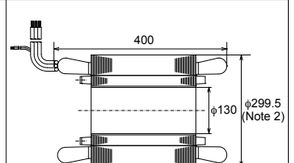
■SJ-B Series

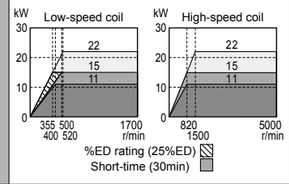
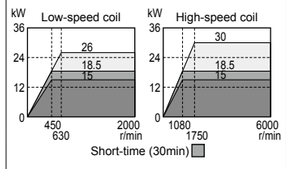
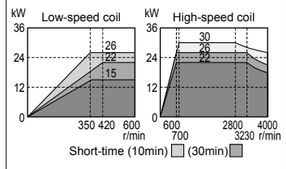
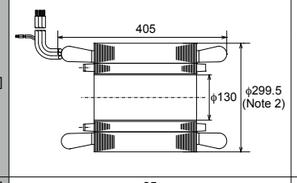
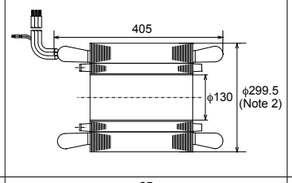
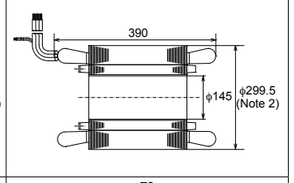
Motor type (Note 1)		SJ-2B6602TK		SJ-2B4601TK		SJ-2B6605TK	
Compatible drive unit	MDS-E-SP-	320		320		240	
Output Acceleration/Deceleration Short-time rating Continuous rating					
Standard output during acceleration/deceleration [kW]		15	22	26	26	15	15
Actual acceleration/deceleration output (Note 4) [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.
(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".

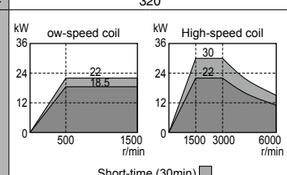
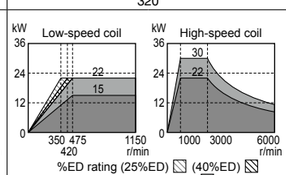
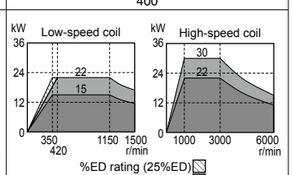
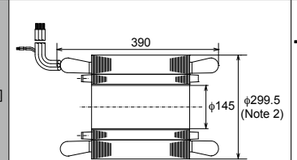
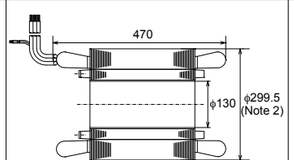
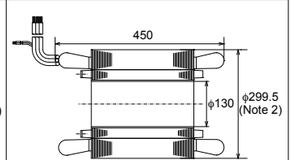
■SJ-B Series

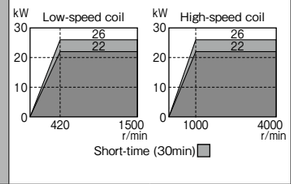
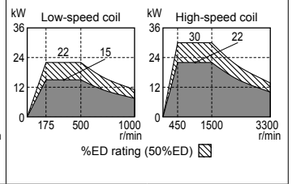
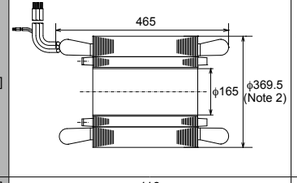
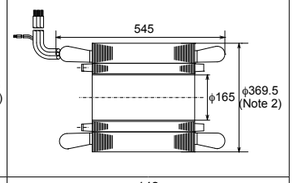
Motor type (Note 1)		SJ-2B4511TK		SJ-2B6720TK		SJ-2B6705TK	
Compatible drive unit	MDS-E-SP-	320		320		200	
Output %ED rating Short-time rating Continuous rating							
Standard output during acceleration/deceleration [kW]		22	30	22	26	11	11
Actual acceleration/deceleration output (Note 4) [kW]		26.4	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".

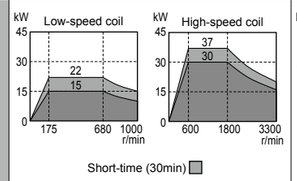
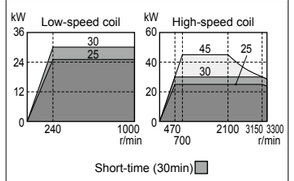
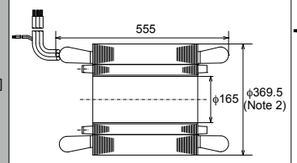
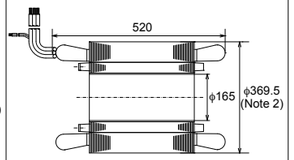
■SJ-B Series

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	

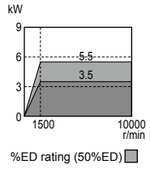
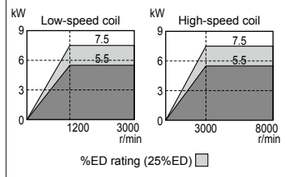
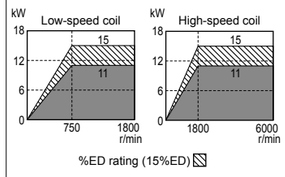
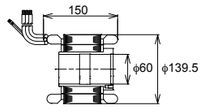
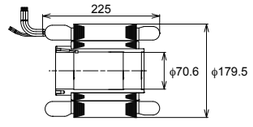
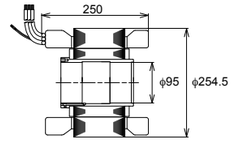
Motor type (Note 1)		SJ-2B6905TK		SJ-2B6908TK	
Compatible drive unit	MDS-E-SP-	320		320	
Output %ED rating Short-time rating Continuous rating					
Standard output during acceleration/deceleration [kW]		26	26	22	30
Actual acceleration/deceleration output (Note 4) [kW]		31.2	31.2	26.4	36
Continuous base 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	

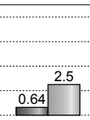
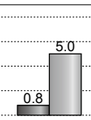
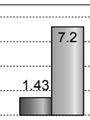
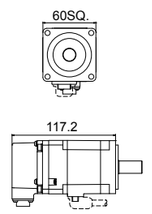
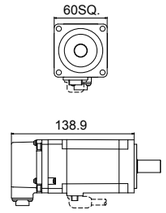
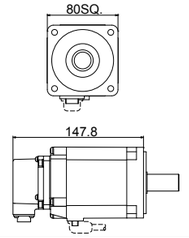
■SJ-PMB Series

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	

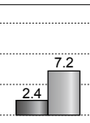
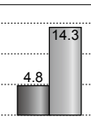
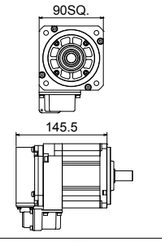
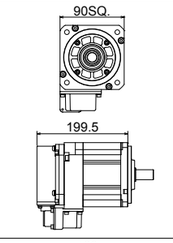
(Note 1) Please contact your Mitsubishi Electric dealer for the special products not listed above.
(Note 2) These dimensions are the dimensions after machine machining.
(Note 3) Only the combination designated in this manual can be used for the motor and drive unit. Always use the designated combination.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

DRIVE SYSTEM TOOL SPINDLE MOTOR 200V

■HG Series

Motor type			HG Series HG□-D47 HG46	HG56	HG96
Compatible drive unit	1-axis type	MDS-E-SP-	20	20	20
	2-axis type	MDS-E-SP2-	20	20	20
	Regenerative resistor type	MDS-EJ-SP-	20	20	20
Output Rated torque ■ Max. torque □	[N·m] 8 6 4 2 0				
Rated output		[kW]	0.4	0.5	0.9
Max. rotation speed		[r/min]	6000	6000	6000
Motor inertia		[×10⁻⁴kg·m²]	0.234	0.379	1.27
Degree of protection (The shaft-through portion, power connector portion and brake connector portion are excluded.)			IP67	IP67	IP67
Outline dimension drawing		[mm]			
Flange fitting diameter		[mm]	ϕ50	ϕ50	ϕ70
Shaft diameter		[mm]	ϕ14	ϕ14	ϕ19
Mass		[kg]	1.2	1.6	2.9

■HG-JR Series

Motor type			HG-JR Series HG-JR73	HG-JR153
Compatible drive unit	1-axis type	MDS-E-SP-	40	80
	2-axis type	MDS-E-SP2-	40	80
	Regenerative resistor type	MDS-EJ-SP-	40	80
Output Rated torque ■ Max. torque □	[N·m] 15 10 5 0			
Rated output		[kW]	0.75	1.5
Max. rotation speed		[r/min]	8000	8000
Motor inertia		[×10⁻⁴kg·m²]	2.09	3.79
Degree of protection (The shaft-through portion is excluded.)			IP67	IP67
Outline dimension drawing		[mm]		
Flange fitting diameter		[mm]	ϕ80	ϕ80
Shaft diameter		[mm]	ϕ16	ϕ16
Mass		[kg]	3.7	5.9

(Note 1) The above characteristics values are representative values. The maximum current and maximum torque are the values when combined with the drive unit.
(Note 2) 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			HG Series HG□-D48					
			HG75	HG105	HG54	HG104	HG154	HG224
Compatible drive unit	1-axis type	MDS-E-SP-	20	20	40	40	80	80
	2-axis type	MDS-E-SP2-	20 40	20 40	40 80	40 80	80 16080	80 16080
	Regenerative resistor type	MDS-EJ-SP-	20	20	20	40	80	80
Output Rated torque Max. torque		[N·m]	1.8 / 8.0	2.4 / 11.0	1.6 / 13.0	3.2 / 23.3	4.8 / 42.0	7.0 / 46.5
Rated output		[kW]	0.75	1.0	0.5	1.0	1.5	2.2
Rated rotation speed		[r/min]	4000		3000			
Max. rotation speed		[r/min]	4000		3000			
Motor inertia		[×10⁻⁴kg·m²]	2.62	5.12	6.13	11.9	17.8	23.7
Degree of protection (The shaft-through portion is excluded.)			IP67					
Outline dimension drawing (flange type)		[mm]	90 SQ. 127.5	90 SQ. 163.5	130 SQ. 118.5	130 SQ. 140.5	130 SQ. 162.5	130 SQ. 184.5
Flange fitting diameter		[mm]	ϕ80	ϕ80	ϕ110	ϕ110	ϕ110	ϕ110
Shaft diameter		[mm]	ϕ14	ϕ14	ϕ24	ϕ24	ϕ24	ϕ24
Mass		[kg]	2.6	4.4	4.8	6.5	8.3	10.0

Motor type			HG Series HG□-D48				
			HG204	HG354	HG453	HG703	HG903
Compatible drive unit	1-axis type	MDS-E-SP-	80	160	160	160	320
	2-axis type	MDS-E-SP2-	80 16080	16080	16080	16080	–
	Regenerative resistor type	MDS-EJ-SP-	80	–	–	–	–
Output Rated torque Max. torque		[N·m]	6.4 / 47.0	11.1 / 90.0	14.3 / 122.0	22.3 / 152.0	28.6 / 208.0
Rated output		[kW]	2.0	3.5	4.5	7.0	9.0
Rated rotation speed		[r/min]	3000				
Max. rotation speed		[r/min]	3000				
Motor inertia		[×10⁻⁴kg·m²]	38.3	75.0	112.0	154.0	196.0
Degree of protection (The shaft-through portion is excluded.)			IP67				
Outline dimension drawing (flange type)		[mm]	176 SQ. 143.5	176 SQ. 183.5	176 SQ. 223.5	176 SQ. 263.5	204 SQ. 330
Flange fitting diameter		[mm]	ϕ114.3	ϕ114.3	ϕ114.3	ϕ114.3	ϕ180
Shaft diameter		[mm]	ϕ35	ϕ35	ϕ35	ϕ35	ϕ42
Mass		[kg]	12.0	19.0	25.0	32.0	43.0

(Note 1) The above characteristics values are representative values. The maximum current and maximum torque are the values when combined with the drive unit.

(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 SERVO MOTOR 400V

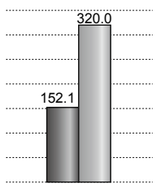
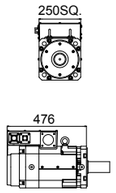
■HG-H Series

Motor type			HG-H75	HG-H105	HG-H54	HG-H104	HG-H154
Compatible drive unit	1-axis type	MDS-EH-V1-	10	10	20	20	40
	2-axis type	MDS-EH-V2-	10 20	10 20	20 40	20 40	40 80
	Multi-hybrid type	MDS-EMH-SPV3-	–	–	xxx40*	xxx40*	xxx40* 10060
	Regenerative resistor type	MDS-EJH-V1	15	20	20	20	40
Output Stall torque Max. torque		[N·m]	2.0 / 8.0	3.0 / 11.0	2.9 / 13.0	5.9 / 23.3	9.0 / 42.0
Rated output		[kW]	0.75	1.0	0.5	1.0	1.5
Max. rotation speed		[r/min]	5000		4000		
Motor inertia		[×10⁻⁴kg·m²]	2.62	5.12	6.13	11.9	17.8
Motor inertia with a brake		[×10⁻⁴kg·m²]	2.70	5.20	8.26	14.0	20.0
Degree of protection (The shaft-through portion is excluded.)			IP67				
Outline dimension drawing (flange type) (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using a D51 or D74 encoder.		[mm]	90 SQ. 127.5	90 SQ. 163.5	130 SQ. 118.5	130 SQ. 140.5	130 SQ. 162.5
Flange fitting diameter		[mm]	ϕ80	ϕ80	ϕ110	ϕ110	ϕ110
Shaft diameter		[mm]	ϕ14	ϕ14	ϕ24	ϕ24	ϕ24
Mass (with a brake)		[kg]	2.62(2.70)	4.4(5.3)	4.8(6.7)	6.5(8.5)	8.3(11.0)
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		EH	EH	EH	EH	EH
	4,194,304 [p/rev] (D51)		EH, EJH	EH, EJH	EH, EJH	EH, EJH	EH, EJH
	1,048,576 [p/rev] (D48)						

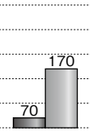
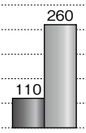
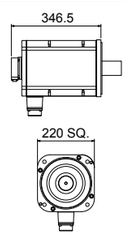
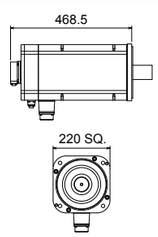
Motor type			HG-H204	HG-H354	HG-H453	HG-H703	HG-H903
Compatible drive unit	1-axis type	MDS-EH-V1-	40	80	80	80W	160
	2-axis type	MDS-EH-V2-	40 80	80 80W	80 80W	80W	–
	Multi-hybrid type	MDS-EMH-SPV3-	xxx40* 10060	10060	10060	–	–
	Regenerative resistor type	MDS-EJH-V1	–	–	–	–	–
Output Stall torque Max. torque		[N·m]	13.7 / 47.0	22.5 / 90.0	37.2 / 122.0	49.0 / 152.0	58.8 / 208.0
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]	47.9	84.7	122.0	164.0	206.0
Degree of protection (The shaft-through portion is excluded.)			IP67				
Outline dimension drawing (flange type) (Without a brake, Straight shaft, D48 encoder) (Note) The total length will be 3.5mm longer when using a D51 or D74 encoder.		[mm]	176 SQ. 143.5	176 SQ. 183.5	176 SQ. 223.5	176 SQ. 263.5	204 SQ. 330
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)	25.0(31.0)	32.0(38.0)	43.0(49.0)
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)						

* Refer to "MDS-EM/EMH 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-H Series

Motor type			HG-H1502
Compatible drive unit	1-axis type	MDS-EH-V1-	200
	2-axis type	MDS-EH-V2-	–
	Multi-hybrid type	MDS-EMH-SPV3-	–
	Regenerative resistor type	MDS-EJH-V1	–
Output Stall torque Max. torque	[N·m] 350 300 250 200 150 100 50 0		
Rated output	[kW]		15.0
Max. rotation speed	[r/min]		2500
Motor inertia	[×10⁻⁴kg·m²]		489.0
Motor inertia with a brake	[×10⁻⁴kg·m²]		–
Degree of protection (The shaft-through portion is excluded.)			IP44
Outline dimension drawing (flange type)	[mm]		
Flange fitting diameter	[mm]		ϕ230
Shaft diameter	[mm]		ϕ65
Mass (with a brake)	[kg]		120
Absolute position encoder compatible drive unit	67,108,864 [p/rev] (D74)		EH
	4,194,304 [p/rev] (D51)		
	1,048,576 [p/rev] (D48)		

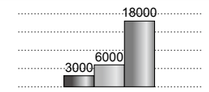
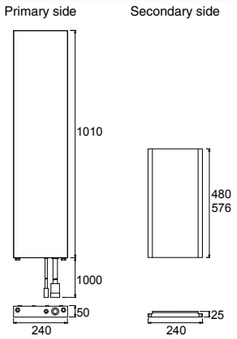
■HQ-H Series

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] 300 250 200 150 100 50			
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 (The shaft-through portion is excluded.)			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 a D51 or D74 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)		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.

DRIVE SYSTEM LINEAR SERVO MOTOR 400V

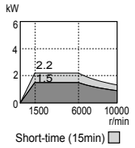
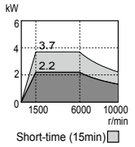
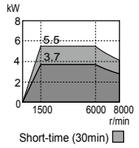
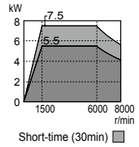
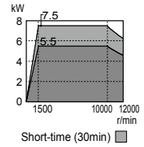
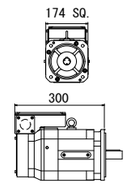
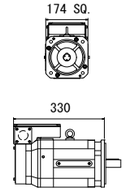
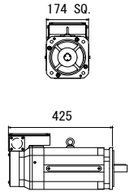
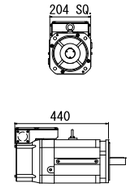
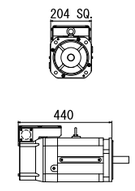
■LM-F Series

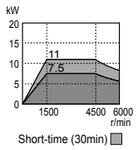
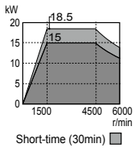
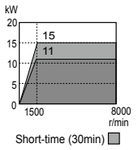
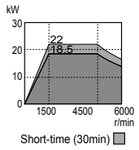
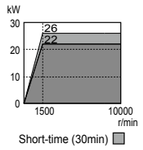
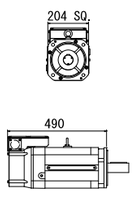
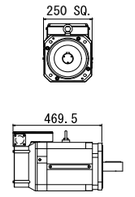
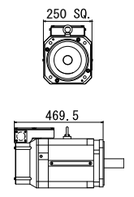
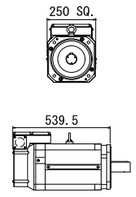
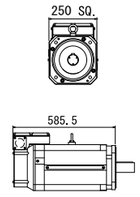
Motor type			LM-FP5H-60M-1WW0
	Secondary side type		LM-FS50-□-1WW0
Compatible drive unit	1-axis type	MDS-EH-V1-	200
	2-axis type	MDS-EH-V2-	–
	Regenerative resistor type	MDS-EJH-V1-	–
Thrust force Continuous (natural-cooling) Continuous (liquid-cooling) Maximum	[N] 20000 15000 10000 5000 0		
Rated thrust	[N]		6000
Maximum speed (Note 1)	[m/s]		2.0
Magnetic attraction force	[N]		45000
Degree of protection			IP00
Outline dimension drawing	[mm]		
Mass	[kg]	Primary side (coil)	67
		Secondary side (magnet)	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) 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 400V

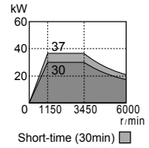
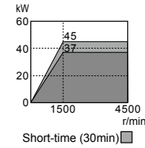
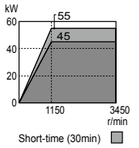
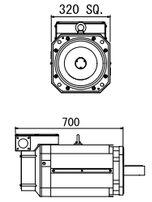
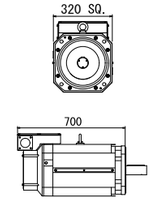
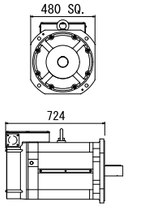
■SJ-4-V Series (Normal)

Motor type		SJ-4-V2.2-03T	SJ-4-V3.7-03T	SJ-4-V5.5-07T	SJ-4-V7.5-12T	SJ-4-V7.5-13ZT
Compatible drive unit	MDS-EH-SP-	20	20	40	40	80
	MDS-EMH-SPV3-	–	–	–	–	80xx
Output Short-time rating □ Continuous rating □		 Short-time (15min) □	 Short-time (15min) □	 Short-time (30min) □	 Short-time (30min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]		2.2	3.7	5.5	7.5	7.5
Actual acceleration/deceleration output (Note 2) [kW]		2.64	4.44	6.6	9	9
Base rotation speed [r/min]		1500		1500		
Maximum rotation speed [r/min]		10000		8000		12000
Continuous rated torque [N·m]		9.5	14.0	23.6	35.0	35.0
Inertia [kg·m²]		0.007	0.009	0.015	0.025	0.025
Degree of protection		IP44	IP44	IP44	IP44	IP44
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]		25	30	49	60	60

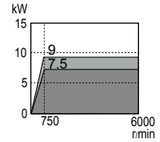
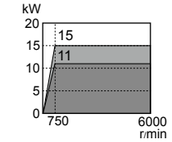
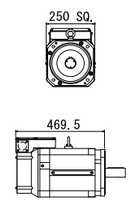
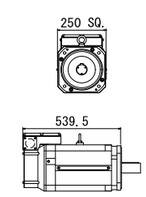
Motor type		SJ-4-V11-18T	SJ-4-V18.5-14T	SJ-4-V22-18ZT	SJ-4-V22-15T	SJ-4-V26-08ZT
Compatible drive unit	MDS-EH-SP-	80	100	160	160	160
	MDS-EMH-SPV3-	80xx	100xx	–	–	–
Output Short-time rating □ Continuous rating □		 Short-time (30min) □	 Short-time (30min) □	 Short-time (30min) □	 Short-time (30min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]		11	18.5	15	22	26
Actual acceleration/deceleration output (Note 2) [kW]		13.2	22.2	18	26.4	31.2
Base rotation speed [r/min]		1500				
Maximum rotation speed [r/min]		6000	6000	8000	6000	10000
Continuous rated torque [N·m]		47.7	95.5	70.0	118	140
Inertia [kg·m²]		0.03	0.06	0.06	0.08	0.10
Degree of protection		IP44	IP44	IP44	IP44	IP44
Outline dimension drawing (flange type) [mm]						
Flange fitting diameter [mm]		ϕ180	ϕ230	ϕ230	ϕ230	ϕ230
Shaft diameter [mm]		ϕ48	ϕ48	ϕ48	ϕ55	ϕ55
Mass [kg]		70	110	110	135	155

(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-V37-04ZT	SJ-4-V45-02T	SJ-4-V55-03T
Compatible drive unit	MDS-EH-SP-	200	320	320
	MDS-EMH-SPV3-	–	–	–
Output Short-time rating □ Continuous rating □		 Short-time (30min) □	 Short-time (30min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]		37	45	55
Actual acceleration/deceleration output (Note 2) [kW]		44.4	54	66
Base rotation speed [r/min]		1150	1500	1150
Maximum rotation speed [r/min]		6000	4500	3450
Continuous rated torque [N·m]		249	236	374
Inertia [kg·m²]		0.34	0.34	0.85
Degree of protection		IP44	IP44	IP44
Outline dimension drawing (flange type) [mm]				
Flange fitting diameter [mm]		ϕ300	ϕ300	ϕ450
Shaft diameter [mm]		ϕ60	ϕ60	ϕ75
Mass [kg]		300	300	450

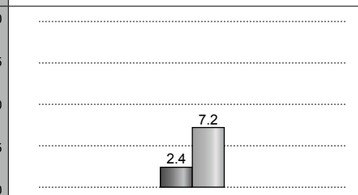
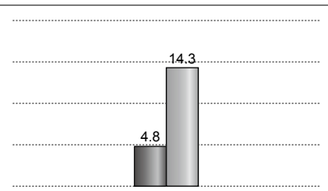
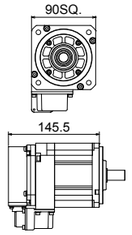
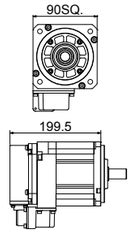
■SJ-4-V Series (Wide range constant output)

Motor type		SJ-4-V15-20T	SJ-4-V22-16T
Compatible drive unit	MDS-EH-SP-	100	160
	MDS-EMH-SPV3-	100xx	–
Output Short-time rating □ Continuous rating □		 Short-time (30min) □	 Short-time (30min) □
Standard output during acceleration/deceleration [kW]		9	15
Actual acceleration/deceleration output (Note 2) [kW]		10.8	18
Base rotation speed [r/min]		750	
Maximum rotation speed [r/min]		6000	
Continuous rated torque [N·m]		95.5	140
Inertia [kg·m²]		0.06	0.08
Degree of protection		IP44	IP44
Outline dimension drawing (flange type) [mm]			
Flange fitting diameter [mm]		ϕ230	ϕ230
Shaft diameter [mm]		ϕ48	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 TOOL SPINDLE MOTOR 400V

■HG-JR Series

Motor type		HG-JR734	HG-JR1534
Compatible drive unit	1-axis type MDS-EH-SP-	20	40
Output Rated torque Max. torque	[N·m] 20 15 10 5 0		
Rated output	[kW]	0.75	1.5
Max. rotation speed	[r/min]	8000	
Motor inertia	[×10^{-4}kg·m^2]	2.09	3.79
Degree of protection (The shaft-through portion is excluded.)		IP67	
Outline dimension drawing	[mm]		
Flange fitting diameter	[mm]	ϕ80	ϕ80
Shaft diameter	[mm]	ϕ16	ϕ16
Mass	[kg]	3.7	5.9

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

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]	7.0	7.0	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	14	28	60	70
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

3-axis servo drive unit

Drive unit type		MDS-E-V3-20	MDS-E-V3-40
Drive unit category		3-axis servo	
Nominal maximum current (peak)	[A]	20/20/20	40/40/40
Power input	Rated voltage [V]	270 to 324DC	
	Rated current [A]	21	21
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 [over all]	
Cooling method		Forced air cooling	
Mass	[kg]	3.8	
Unit outline dimension drawing		A1	

■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]	7.0	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	26	40	61
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	198
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
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		Natural-cooling	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	3.2	5.8	12	16
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		Natural-cooling	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	MDS-EH-SP-600
Drive unit category		1-axis spindle								
Nominal maximum current (peak) [A]		20	40	80	100	160	200	320	480	600
Power input	Rated voltage [V]	513 to 648DC								
	Rated current [A]	10	15	21	38	72	82	119	150	200
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	23.0
Unit outline dimension drawing		A1	A1	B1	C1	D1	E1	E1	F1	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

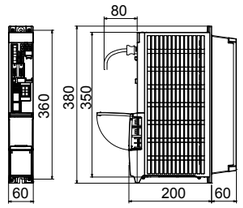
AC reactor

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	105	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

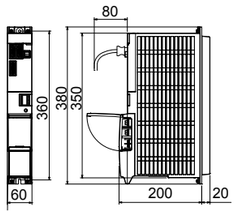
Unit Outline Dimension Drawing

[Unit : mm]

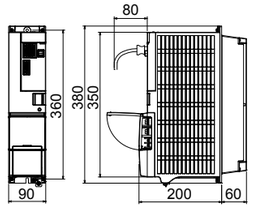
A1



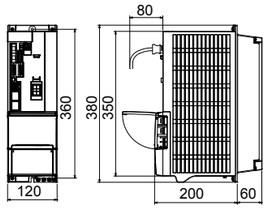
A2



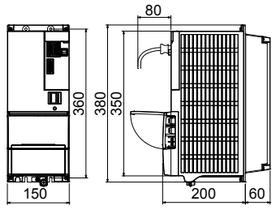
B1



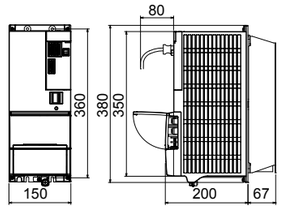
C1



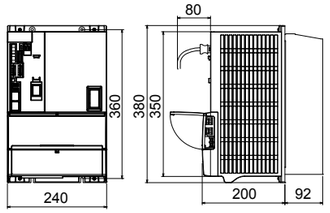
D1



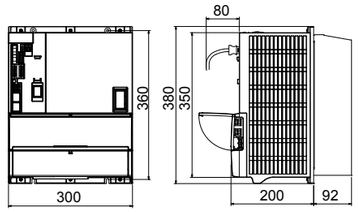
D2



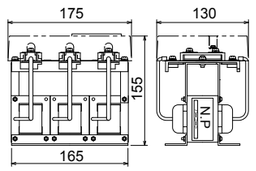
E1



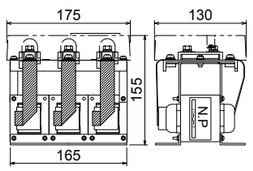
F1



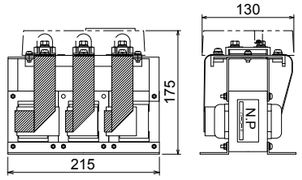
R1



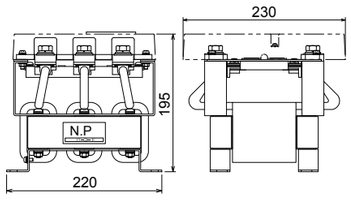
R2



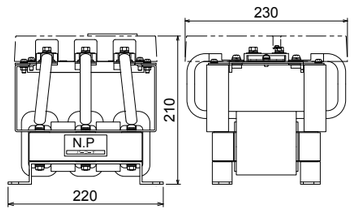
R3



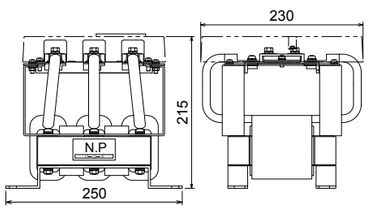
R4



R5



R6



■MDS-EM/EMH Series

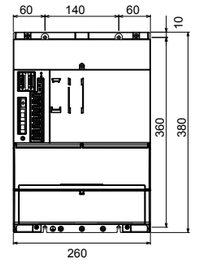
Multi-hybrid drive unit

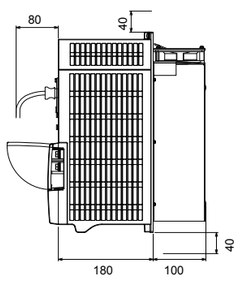
Drive unit type			MDS-EM-SPV3-10040	MDS-EM-SPV3-10080	MDS-EM-SPV3-16040	MDS-EM-SPV3-16080	MDS-EM-SPV3-20080	MDS-EM-SPV3-200120
Drive unit category			3-axis servo, 1-axis spindle (with converter)					
Nominal maximum current (spindle/servo)		[A]	100/40×3	100/80×3	160/40×3	160/80×3	200/80×3	200/120×3
Power input	Rated voltage	[V]	200 to 240AC Tolerable fluctuation: between +10% and -15%					
	Rated current	[A]	36	38	45	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	15

Drive unit type			MDS-EMH-SPV3-8040	MDS-EMH-SPV3-10040	MDS-EMH-SPV3-10060
Drive unit category			3-axis servo, 1-axis spindle (with converter)		
Nominal maximum current (spindle/servo)		[A]	80/40×3	100/40×3	100/60×3
Power input	Rated voltage	[V]	380 to 480AC Tolerable fluctuation: between +10% and -15%		
	Rated current	[A]	27	34	37
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

Unit outline dimension drawing

[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	8.0	10.5	16
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]	1.7	1.7	2.1	3.6
Unit outline dimension drawing			J1b		J4c	J5b

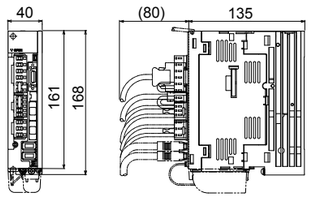
All-in-one compact spindle drive unit

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 fluctuation: between +10% and -15%					
	Rated current	[A]	2.6	9.0	10.5	16	26	35.4
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					
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

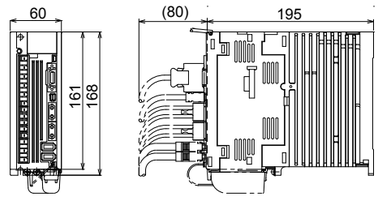
Unit outline dimension drawing

Unit [mm]

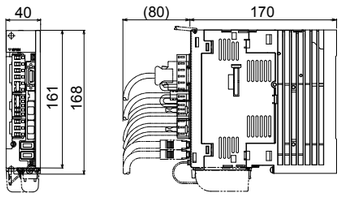
J1a



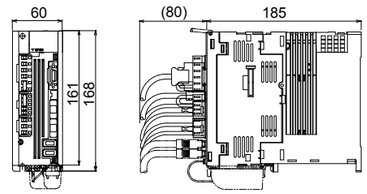
J1b



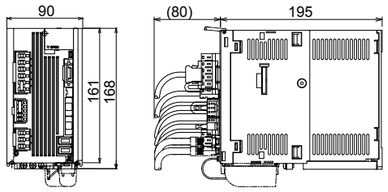
J2



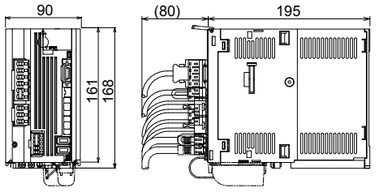
J3



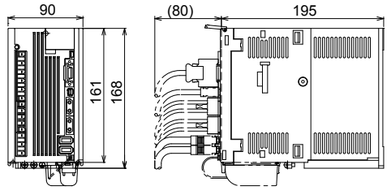
J4a



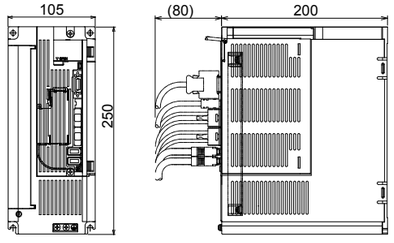
J4b



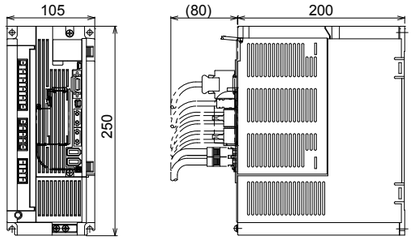
J4c



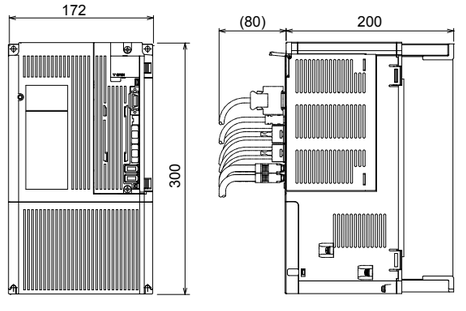
J5a



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 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 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	46	56	96
Rated output (kW)	0.4	0.5	0.9
Maximum momentary output (kW)	0.85	1.7	3.2

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	1502
Rated output (kW)	0.75	1.0	0.5	1.0	1.5	2.0	3.5	4.5	7.0	9.0	15.0
Maximum momentary output (kW)	2.6	3.6	2.3	5.0	9.0	8.0	18.0	22.0	28.0	41.0	61.0

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)

6 DRIVE SYSTEM

< 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 MDS-EM/EMH-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/EMH-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/EMH-SPV3.

Connectable drive units are determined by the rated capacity of MDS-EM/EMH-SPV3.
The following is available capacities.
Spindle drive unit : MDS-E-SP-20/40/80/160
: MDS-EH-SP-20/40/80
Servo drive unit : MDS-E-Vx-20/40/80
: MDS-EH-Vx-10/20/40/80

■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 multi-hybrid drive unit) +
(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 multi-hybrid drive unit
< MDS-EM Series >

Spindle motor rated output	Multi-hybrid drive unit MDS-EM-SPV3-		
	100xx	160xx	200xx
to 1.5kW	1.30	–	–
to 2.2kW	1.20	1.30	–
to 3.7kW	1.10	1.20	–
to 5.5kW	1.10	1.10	1.20
to 7.5kW	1.10	1.00	1.15
to 11.0kW	–	1.00	1.05
to 15.0kW	–	–	1.00
to 18.5kW	–	–	1.00

< MDS-EMH Series >

Spindle motor rated output	Multi-hybrid drive unit MDS-EMH-SPV3-	
	80xx	100xx
to 2.2kW	1.30	–
to 3.7kW	1.20	–
to 5.5kW	1.10	1.20
to 7.5kW	1.00	1.15
to 11.0kW	1.00	1.05
to 15.0kW	–	1.00
to 18.5kW	–	1.00

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

< MDS-EH Series >

Spindle motor rated output	Additional axis (spindle) drive unit MDS-EH-SP-		
	20	40	80
to 1.5kW	1.00	1.15	1.25
to 2.2kW	–	1.00	1.15
to 3.7kW	–	1.00	1.05
to 5.5kW	–	–	1.00
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 following table.

Data for servo motor output selection
< 200V series >

Motor HG	96
Rated output (kW)	0.75
Maximum momentary output (kW)	3.2

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)	2.2	3.5	2.5	5.9	9.5	12.6	9.6	19.0

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)	3.2	6.3	12.0	23.0	3.2	6.3

< 400V series >

Motor HG-H	75	105	54	104	154	204	354	453
Rated output (kW)	0.75	1.0	0.5	1.0	1.5	2.0	3.5	4.5
Maximum momentary output (kW)	2.2	3.5	2.5	5.9	9.5	9.6	20.0	24.0

(Note) The maximum momentary output in this table is reference data for selecting the additional axis drive unit connecting to MDS-EM/EMH-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/EMH-SPV3.

(1) Calculation of required rated output

MDS-EM/EMH-SPV3 rated capacity > 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/EMH-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 MDS-EM/EMH-SPV3 is less than the value in the following table.

(2) Calculation of required maximum momentary output

Maximum momentary rated capacity of MDS-EM/EMH-SPV3 ≥
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/EMH-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/EMH-SPV3 is less than the value in the following table.

Power supply unit rated capacity and maximum momentary rated capacity
< MDS-EM Series >

Unit	MDS-EM-SPV3-	10040/10080/16040/16080/20080/200120
Rated capacity (kW)		20
Maximum momentary rated capacity (kW)		70

< MDS-EMH Series >

Unit	MDS-EMH-SPV3-	8040/10040/10060
Rated capacity (kW)		22
Maximum momentary rated capacity (kW)		76

⚠ 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/EMH-SPV3]) × Power supply capacity base value of MDS-EM/EMH-SPV3}

Power supply capacity base value of MDS-EM/EMH-SPV3 is as the following table.

< MDS-EM Series >

Unit	MDS-EM-SPV3-	10040/10080/16040/16080/20080/200120
Power supply capacity base value (kVA)		29

< MDS-EMH Series >

Unit	MDS-EMH-SPV3-	8040/10040/10060
Power supply capacity base value (kVA)		32

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

< MDS-EM Series >
(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 (Additional 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 (Additional 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 (Additional 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)

< MDS-EMH Series >
(Example 1)

Axis name	Motor	Drive unit	Rated output	Maximum momentary output
X-axis	HG-H204	MDS-EMH-SPV3-10060	2.0kW	8.0kW
Y-axis	HG-H204		2.0kW	8.0kW
Z-axis	HG-H354		3.5kW	18kW
MG-axis	HG-H104	MDS-EH-V1-20 (Additional axis)	1.0kW	5.0kW
Spindle	Spindle motor 15kW	MDS-EMH-SPV3-10060	15kW	18kW
Total			0.3×(2.0+2.0+3.5+1.0) + 15 = 17.55kW < 22kW (EMH-SPV3)	(8.0+8.0+18+5.0) + 18 = 57kW < 76kW (EMH-SPV3)

Required power supply capacity (kVA) = (17.55/22)×32 = 25.5(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)	Rectangular wave signal	–	
				APE Series (HEIDENHAIN)	Rectangular wave signal	–	
		LS187C, LS487C (HEIDENHAIN)	SIN wave signal	MDS-EX-HR-11 (MITSUBISHI ELECTRIC)	Mitsubishi serial signal	(Required) Note 1	Distance-coded reference scale (Note 2)
				EIB Series (HEIDENHAIN)			
		Various scale	SIN wave signal	MDS-EX-HR-11 (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	OSA405ET2AS, OSA676ET2AS (MITSUBISHI ELECTRIC)	Mitsubishi serial signal	–	Mitsubishi serial signal	Required	Ball screw side encoder
		SR27, SR77, SR87, SR67A (MAGNESCALE)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		LC195M, LC495M,LC291M (HEIDENHAIN)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	Mitsu03-4
		LC193M, LC493M (HEIDENHAIN)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	Mitsu02-4
		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	
		AMS-ABS-3B Series (Schneeberger)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		LMFA Series (AMO)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		LMBA Series (AMO)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
	SIN wave signal output	MPS Series (Mitsubishi Heavy Industries Machine Tool)	SIN wave signal	ADB-20J60 (Mitsubishi Heavy Industries Machine Tool)	Mitsubishi serial signal	Required	
		MPI Series (Mitsubishi Heavy Industries Machine Tool)	SIN wave signal	ADS-20J60 (Mitsubishi Heavy Industries Machine Tool)	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-EX-HR-11 (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	Mitsu02-4
		RCN727M, RCN827M (HEIDENHAIN)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	Mitsu02-4
		RA Series (Renishaw)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		HAM Series (FAGOR)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
		WMFA Series WMBA Series WMRA Series (AMO)	Mitsubishi serial signal	–	Mitsubishi serial signal	Not required	
	SIN wave signal output	MPRZ Series (Mitsubishi Heavy Industries Machine Tool)	SIN wave signal	ADB-20J71 (Mitsubishi Heavy Industries Machine Tool)	Mitsubishi serial signal	Not required	
		MPI Series (Mitsubishi Heavy Industries Machine Tool)	SIN wave signal	ADB-20J60 (Mitsubishi Heavy Industries Machine Tool)	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.
(Note 3) Use the encoders according to each manufacturer's specifications.

■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/V3) 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/V3	For MDS-E/EH-V1x2 units	Remarks
SIN wave signal output scale	MDS-EX-HR-11 (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.

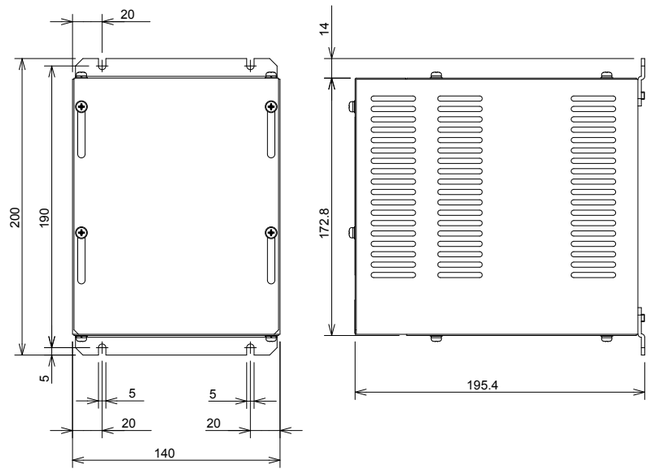
■Dynamic brake unit (MDS-D-DBU)

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

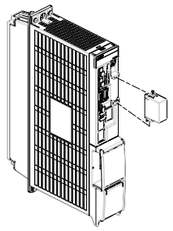
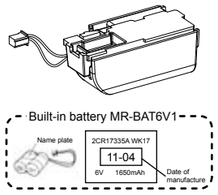
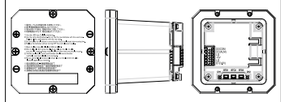
MDS-D-DBU



[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	MR-BAT6V1SET	MDSBTBOX-LR2060
Installation type		Drive unit with battery holder type	Drive unit with battery holder type	Unit and battery integration type
Hazard Class		Not applicable	Not applicable	Not applicable
Number of connectable axes		Up to 3 axes	Up to 3 axes	Up to 8 axes
Battery change		Possible	Possible	Possible
Appearance				
Compatible model	E/EH	○	–	○
	EM/EMH	–	○	○
	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 (Note 3)		Up to 3 axes
Battery continuous backup time		Up to 2 axes: Approx. 10,000 hours 3 axes connected: Approx. 6,600 hours
Back up time from battery warning to alarm occurrence (Note 2)		Up to 2 axes: Approx. 100 hours 3 axes connected: Approx. 60 hours
Compatible model	E/EH	○
	EM/EMH	–
	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, 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.

■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 (Note 3)		Up to 3 axes
Battery continuous backup time		Up to 2 axes: Approx. 10,000 hours 3 axes connected: Approx. 6,600 hours
Back up time from battery warning to alarm occurrence (Note 2)		Up to 2 axes: Approx. 100 hours 3 axes connected: Approx. 60 hours
Compatible model	E/EH	–
	EM/EMH	○
	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, 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.

DEDICATED OPTIONS SERVO OPTIONS

■Battery box (MDSBTBOX-LR2060)

Specifications

Battery option type		Battery box
		MDSBTBOX-LR2060
Battery model name (Note 1)		Size-D alkaline batteries LR20×4 pieces
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 (Note 2)		Approx. 10000 hours (when 8 axes are connected, cumulative time in non-energized state)
Back up time from battery warning to alarm occurrence (Note 2)		Approx. 336 hours (when 8 axes are connected)
Compatible model	E/EH	○
	EM/EMH	○
	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.

■Ball screw side encoder OSA405ET2AS, OSA676ET2AS

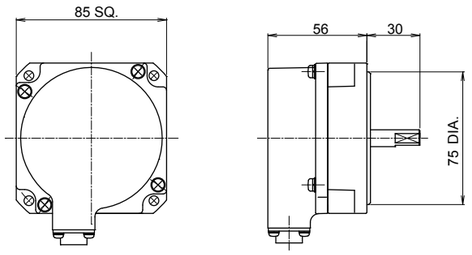
Specifications

Type		OSA405ET2AS	OSA676ET2AS
Electrical characteristics	Encoder resolution	4,194,304pulse/rev	67,108,864pulse/rev
	Detection method	Absolute position method (battery backup method)	
	Accuracy (*1)	±3 seconds	
	Tolerable rotation speed at power off (*2)	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^{4}rad/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	IP67 (The shaft-through portion is excluded.)	
	Recommended coupling	Bellows coupling	
Compatible model	E/EH	○	○
	EM/EMH	○	–
	EJ/EJH	○	–

(*1) The values above are typical values after the calibration with our shipping test device and are not guaranteed.
(*2) If the tolerable rotation speed at power off is exceeded, the absolute position cannot be repaired.

Outline dimension drawing

OSA405ET2AS/OSA676ET2AS



[Unit : mm]

■Twin-head magnetic encoder (MBA Series)

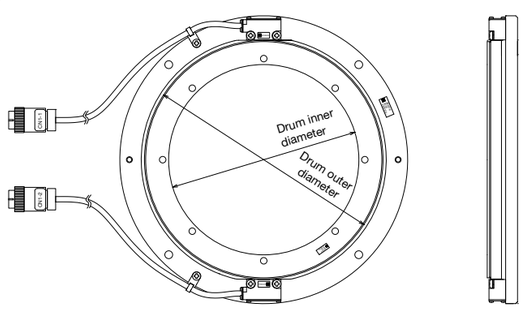
Specifications

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.

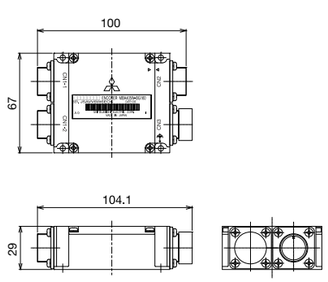
Outline dimension drawing

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)

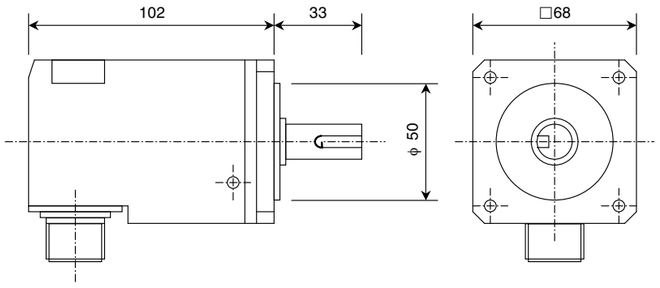
When a spindle and motor are connected with a V-belt, or connected with a gear ratio other than 1:1, use this spindle side encoder to detect the position and speed of the spindle. Also use this encoder when orientation control and synchronous tap control, etc are executed under the above conditions.

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/EMH	○	○
	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]		-0.070 to -0.030									
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/EMH		○									
	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]		ϕ60H5									
	Thickness [mm]		12									
Notched fitting section	Outer diameter [mm]		ϕ79.2									
	Outer diameter tolerance [mm]		0 to +0.040									
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/EMH		○									
	EJ/EJH		○									

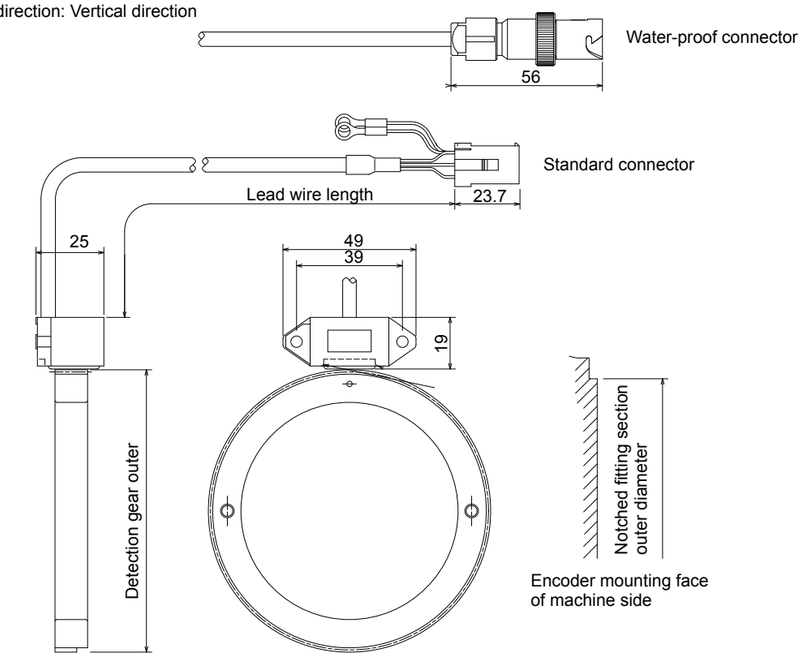
	Series type		TS5690N12xx									
Sensor	xx (The end of the type name)	Standard connector	12	22	32	42	52	17	27	37	47	57
		Water-proof connector	19	29	39	49	59	18	28	38	48	58
	Length of lead [mm]		400±10	800±20	1200±20	1600±30	2000±30	400±10	800±20	1200±20	1600±30	2000±30
	Lead wire lead-out direction		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/EMH		○									
	EJ/EJH		○									

Sensor	Series type		TS5690N19xx									
	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									
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/EMH		○									
	EJ/EJH		○									

Sensor	Series type		TS5690N25xx									
	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]		ϕ160H5									
	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/EMH		○									
	EJ/EJH		○									

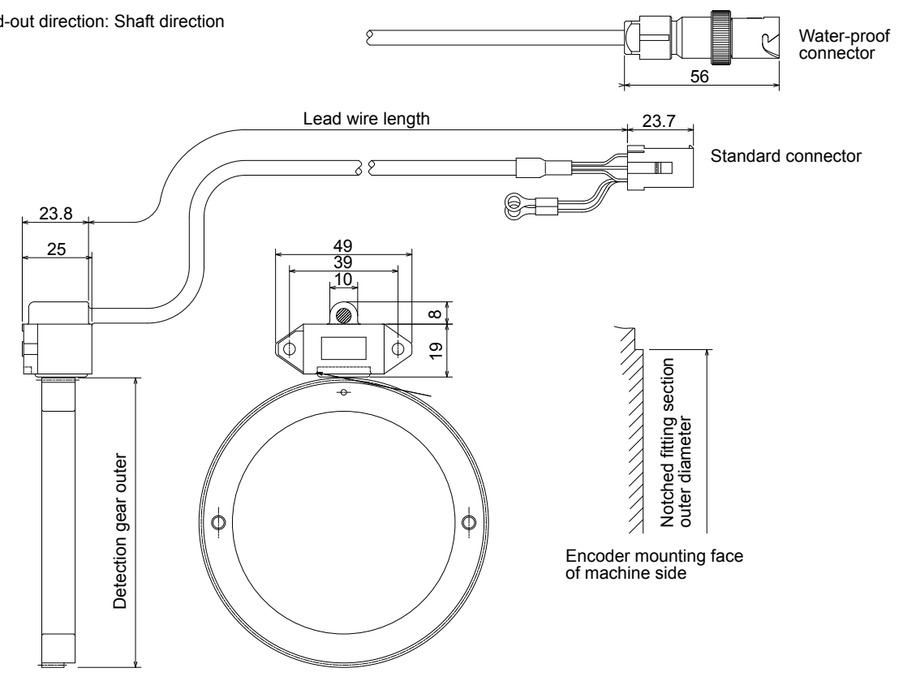
Outline dimension drawing

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.

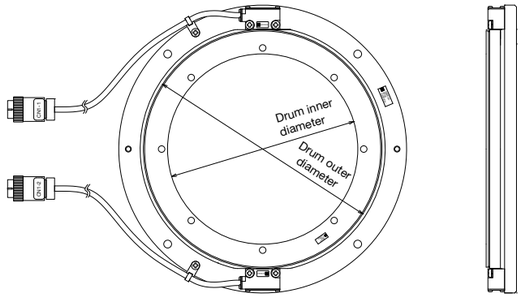
(*2) The user is requested to install the magnetic drum and installation ring in the encoder within the accuracy range specified herein. Even when the accuracy of the encoder when shipped and when installed by the user is both within the specified range, there is a difference in the installation position. 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.

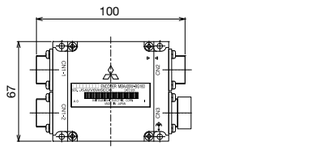
Outline dimension drawing

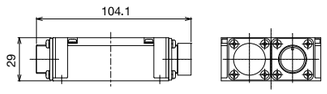
[Unit : mm]

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 Machine Tool
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/EMH	○		○
	EJ/EJH	○		○

DRIVE SYSTEM ENCODER INTERFACE UNIT

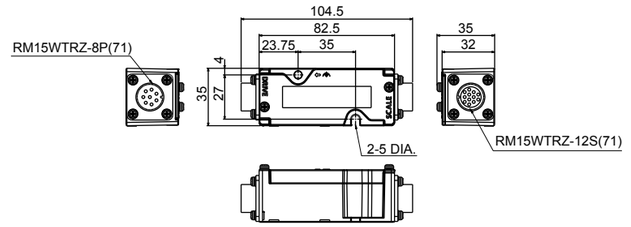
■Serial output interface unit for ABZ analog encoder MDS-EX-HR

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.

Specifications

Type		MDS-EX-HR-11
Compatible scale (example)		LS186 / LS486 / LS186C / LS486C (HEIDENHAIN)
Signal 2-division function		Not possible
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 / 16384 division
Input/output communication style		High-speed serial communication I/F, RS485 or equivalent
Tolerable power voltage		5VDC±5%
Maximum heating value		2W
Mass		0.2kg or less
Degree of protection		IP67
Compatible model	E/EH	○
	EM/EMH	○
	EJ/EJH	○

Outline dimension drawing



[Unit : mm]

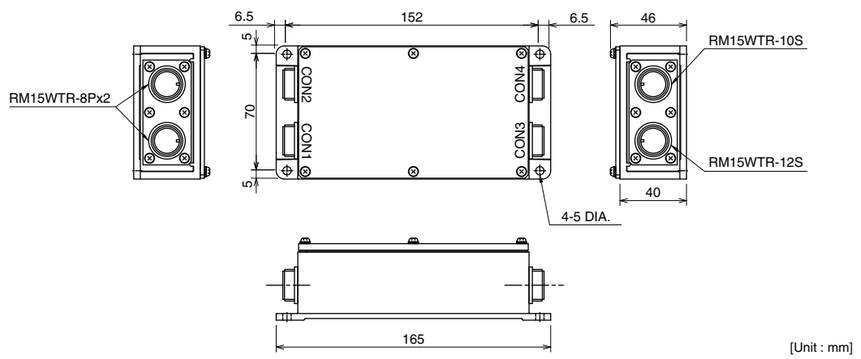
■Serial output interface unit for ABZ analog encoder MDS-B-HR

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/EMH	○	–	○	–
	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/EMH	–
	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/EMH	○	○	○
	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/EMH	○	○	○
	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 Machine Tool Co., Ltd.			
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/EMH	○	○	○	○
	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.

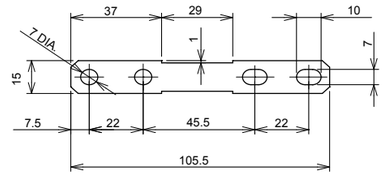
Specifications

Series		MDS-E		MDS-EH		
Large capacity drive unit		MDS-E-SP-400 MDS-E-SP-640	MDS-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-300 MDS-E-CV-370 MDS-E-CV-450	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-B0606	E-BAR-A0606 (Two-parts set)	E-BAR-A0606 (Two-parts set)	DH-BAR-B0606	DH-BAR-C0606
Compatible model	E/EH	○	○	○	○	○
	EM/EMH	–	–	–	–	–
	EJ/EJH	–	–	–	–	–

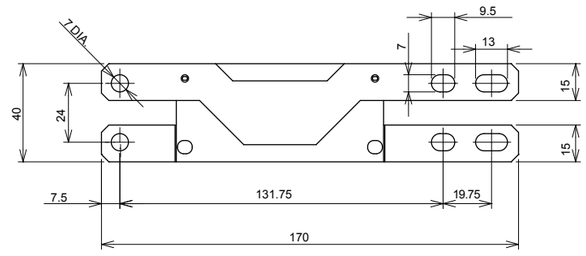
Outline dimension drawings

[Unit:mm]

E-BAR-A0606

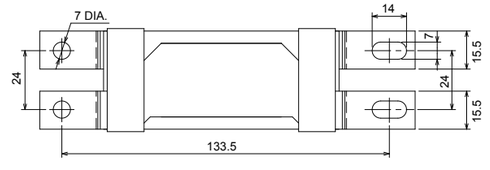


E-BAR-B0606



(Note) E-BAR-A0606 is a set of two DC connection bars.

DH-BAR-B0606



DH-BAR-C0606

■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	–	○	○		
MDS-EJ-SP-40	–			○	○
MDS-EJ-SP-80	–			○	○
MDS-EJ-SP-100	–			○	○
MDS-EJ-SP-120	–				○
MDS-EJ-SP-160	–				

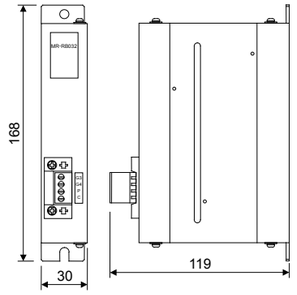
Corresponding spindle drive unit		External option regenerative resistor			
		FCUA-RB22	FCUA-RB37	FCUA-RB55	FCUA-RB75/2 (1 unit)
	Mass	0.8kg	1.2kg	2.2kg	2.2kg
	Unit outline dimension	30mm×60mm×215mm	30mm×60mm×335mm	40mm×80mm×400mm	40mm×80mm×400mm
		W5	W5	W6	W6
	Regenerative capacity	155W	185W	340W	340W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

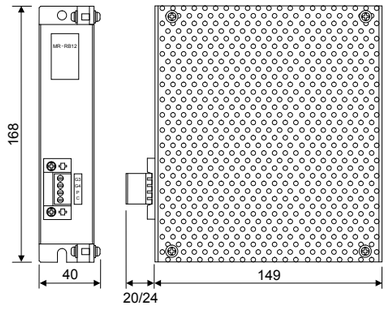
External option regenerative resistor

[Unit : mm]

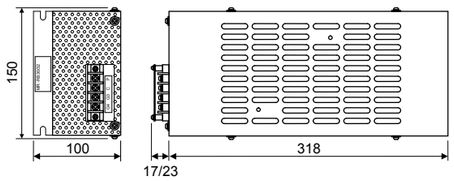
W1



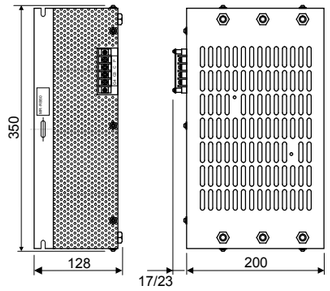
W2



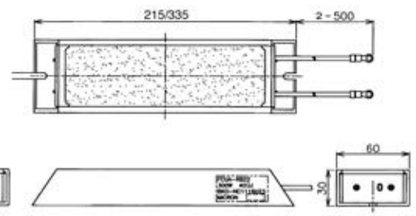
W3



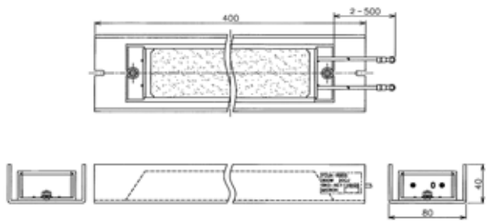
W4



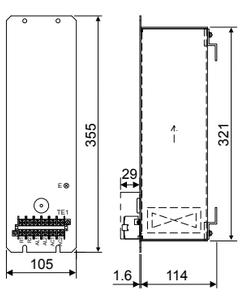
W5



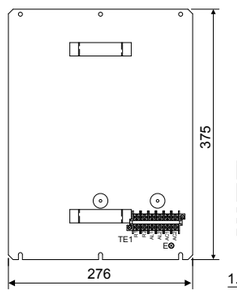
W6

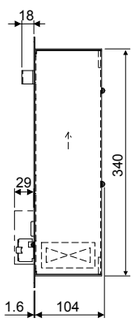


W7

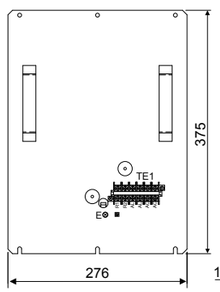


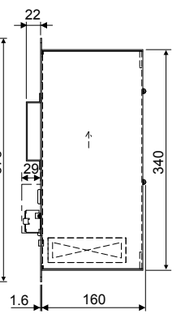
W8





W9





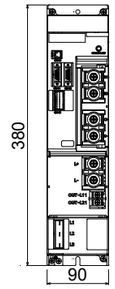
■Power backup unit MDS-D/DH-PFU

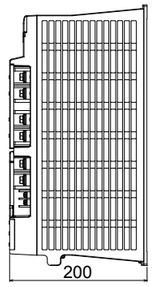
Use this unit to protect machines or drive units at power failure.

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





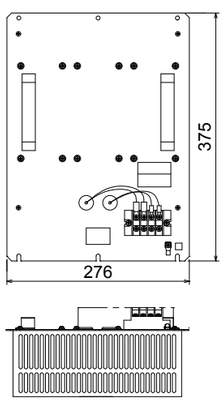
[Unit : mm]

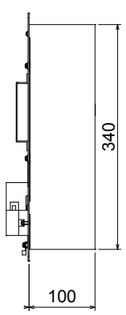
■Regenerative resistor unit for power backup unit R-UNIT-6, R-UNIT-7

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





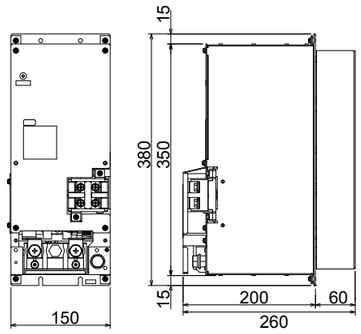
[Unit : mm]

■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]

DRIVE SYSTEM SELECTION OF CABLES AND CONNECTORS

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

Servo motor type		Drive unit type MDS-E-			Power Connector			Brake Connector		
						Motor side			Motor side	
		V1	V2	V3	Drive unit side	Lead out in direction of motor shaft	Lead out in opposite direction of motor shaft	Drive unit side	Lead out in direction of motor shaft	Lead out in opposite direction of motor shaft
HG Series	HG46	20	20	20	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	MR-PWS1CBL ☐ M-A1-H ☐ : Length (m) 2, 3, 5, 7, 10	MR-PWS1CBL ☐ M-A2-H ☐ : Length (m) 2, 3, 5, 7, 10	CNU23S (AWG14)	MR-BKS1CBL ☐ M-A1-H ☐ : Length (m) 2, 3, 5, 7, 10	MR-BKS1CBL ☐ M-A2-H ☐ : Length (m) 2, 3, 5, 7, 10
	HG56		20 40	20 40						
	HG96									

Servo motor type		Drive unit type MDS-E-			Power Connector			Brake Connector		
						Motor side			Motor side	
		V1	V2	V3	Drive unit side	Straight	Right angle	Drive unit side	Straight	Right angle
HG Series	HG75☐-S105010	20	20 40	20 40	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	CNP14-2S (12) Applicable cable outline ϕ10 to 12 (mm)	CNP14-2L (12) Applicable cable outline ϕ10 to 12 (mm)	CNU23S (AWG14)	CNB10-R2S (6) CNB10S-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) CNB10S-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG105☐-S105010									
	HG75					CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)			
	HG105									
	HG123									
	HG142	20	20							
	HG54	40	40 80	40		CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)			
	HG104									
	HG223									
	HG302									
	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 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	—		Terminal block connection					

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

Servo motor type		Drive unit type MDS-E-			Servo encoder cable							
					Motor side encoder cable				Ball screw side encoder cable			
					Cable (for D48/D51/D74)		Single connector		Ball screw side encoder (OSA405ET2AS/OSA676ET2AS)			
									Cable		Single connector	
		V1	V2	V3	Straight	Right angle	Drive unit side	Motor side Straight	Motor side Right angle	Straight	Right angle	Straight	Right angle
HG Series	HG46	20	20	20	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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG56												
	HG96												
	HG75		20 40	20 40									
	HG105												
	HG123												
	HG142	20	20										
	HG54	40	40 80	40									
	HG104												
	HG223												
	HG302												
	HG154	80	80 160	—									
	HG224												
	HG204												
	HG303												
	HG354	160	160 160W										
	HG453												
	HG703	160W	160W										
	HG903	320	—										

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

Spindle motor type		Drive unit type MDS-E-		Power Connector	
		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-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-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-VL Series (Low-inertia)	SJ-VL2.2-02ZT	40	40	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	
	SJ-VL11-02FZT	160	16080 (L)	Terminal block connection	
	SJ-VL11-05FZT-S01				
	SJ-VL18.5-05FZT	240	—		

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

Spindle motor type		Drive unit type MDS-E-		Spindle encoder cable										
				When connecting to a spindle motor			When connecting to a spindle side encoder							
				Motor side PLG cable			Spindle side accuracy encoder TS5690 cable			Spindle side encoder OSE-1024 cable				
					Single connector			Single connector		Cable		Single connector		
		SP	SP2	Cable	Drive unit side	Encoder side	Cable	Drive unit side	Encoder side	Straight	Right angle	Drive unit side	Encoder side	
													Straight	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-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-VL Series (Low-inertia)	SJ-VL2.2-02ZT	40	40											
	SJ-VL11-02FZT	160	16080 (L)											
	SJ-VL11-05FZT-S01													
	SJ-VL18.5-05FZT	240	—											

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

Servo motor type		Drive unit type MDS-EM-	Power Connector			Brake Connector	
			Drive unit side	Motor side		Motor side	
		SPV3		Lead out in direction of motor shaft	Lead out in opposite direction of motor shaft	Lead out in direction of motor shaft	Lead out in opposite direction of motor shaft
HG Series	HG96	10040 16040	- All axes CNU01SEF(AWG14) - L-axis only CNU01SEL(AWG14) - M-axis only CNU01SEM(AWG14) - S-axis only CNU01SES(AWG14)	MR-PWS1CBL □-M-A1-H □ : Length (m) 2, 3, 5, 7, 10	MR-PWS1CBL □ M-A2-H □ : Length (m) 2, 3, 5, 7, 10	MR-BKS1CBL □ M-A1-H □ : Length (m) 2, 3, 5, 7, 10	MR-BKS1CBL □ M-A2-H □ : Length (m) 2, 3, 5, 7, 10

Servo motor type		Drive unit type MDS-EM-	Power Connector			Brake Connector	
			Drive unit side	Motor side		Motor side	
		SPV3		Straight	Right angle	Straight	Right angle
HG Series	HG75□-S105010	10040 16040	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	CNP14-2S (12) Applicable cable outline ϕ10 to 12 (mm)	CNP14-2L (12) Applicable cable outline ϕ10 to 12 (mm)	CNB10-R2S (6) CNB10S-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) CNB10S-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG105□-S105010						
	HG75			CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)		
	HG105						
	HG123						
	HG142						
	HG54	10040 10080 16040 16080 20080		CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)		
	HG104						
	HG223						
	HG302						
	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			CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)		
	HG303						
	HG354	200120					
	HG453						

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

Servo motor type		Drive unit type MDS-EM-	Servo encoder cable							
			Motor side encoder cable					Ball screw side encoder cable		
			Cable (for D48/D51)		Single connector			Ball screw side encoder (OSA405ET2AS)		
					Drive unit side	Motor side		Cable		Single connector
		SPV3	Straight	Right angle		Straight	Right angle	Straight	Right angle	Straight	Right angle
HG Series	HG96	10040 16040	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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG75										
	HG105										
	HG123										
	HG142										
	HG54	10040 10080 16040 16080 20080									
	HG104										
	HG223										
	HG302										
	HG154	10080 16080 20080 200120									
	HG224										
	HG204										
	HG303										
	HG354	200120									
	HG453										

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

Spindle motor type		Drive unit type MDS-EM-	Power Connector		Spindle encoder cable											
			Drive unit side	Motor side	When connecting to a spindle motor			When connecting to a spindle side encoder								
					Motor side PLG cable			Spindle side accuracy encoder TS5690 cable			Spindle side encoder OSE-1024 cable					
					Cable	Single connector		Cable	Single connector		Cable		Single connector			
						Drive unit side	Encoder side		Drive unit side	Encoder side	Straight	Right angle	Drive unit side	Encoder 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			CNP2E-1-□M □ : Length (m) 2, 3, 4, 5, 7, 10, 15, 20, 25, 30			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		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 16040 16080 20080 200120														
	SJ-D11/100-01	16040 16080														
SJ-D Series (Hollow shaft)	SJ-D5.5/120-02T-S	10040 10080 16040 16080 20080 200120														
SJ-DG Series (High output)	SJ-DG3.7/120-03T	16040 16080														
	SJ-DG5.5/120-04T															
	SJ-DG7.5/120-05T															
	SJ-DG11/100-03T	20080 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	16040 16080														
	SJ-DJ15/80-01	20080 200120														
SJ-DL Series (Low-inertia)	SJ-DL5.5/150-01T	16040 16080														
	SJ-DL7.5/150-01T															
SJ-V Series (Normal)	SJ-V7.5-03ZT	16040 16080														
	SJ-V11-08ZT	20080 200120														
	SJ-V11-13ZT															
	SJ-V15-01ZT															
	SJ-V15-09ZT															
	SJ-V18.5-01ZT															
SJ-V Series (Wide range constant output)	SJ-V11-01T	16040 16080														
	SJ-V11-09T															
	SJ-V15-03T	20080 200120														
SJ-V Series (Hollow shaft)	SJ-VL11-02FZT	16040 16080														
	SJ-VL11-05FZT-S01															

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

Servo motor type		Drive unit type MDS-EJ-	Power Connector			Brake Connector	
			Drive unit side	Motor side		Motor side	
		V1		Lead out in direction of motor shaft	Lead out in opposite direction of motor shaft	Lead out in direction of motor shaft	Lead out in opposite direction of motor shaft
HG Series	HG46	10	Supplied for each drive unit	MR-PWS1CBL □ M-A1-H □ : Length (m) 2, 3, 5, 7, 10	MR-PWS1CBL □ M-A2-H □ : Length (m) 2, 3, 5, 7, 10	MR-BKS1CBL □ M-A1-H □ : Length (m) 2, 3, 5, 7, 10	MR-BKS1CBL □ M-A2-H □ : Length (m) 2, 3, 5, 7, 10
	HG56	15					
	HG96	30					

Servo motor type		Drive unit type MDS-EJ-	Power Connector			Brake Connector	
			Drive unit side	Motor side		Motor side	
		V1		Straight	Right angle	Straight	Right angle
HG Series	HG75□-S105010	30	Supplied for each drive unit	CNP14-2S (12) Applicable cable outline ϕ10 to 12 (mm)	CNP14-2L (12) Applicable cable outline ϕ10 to 12 (mm)	CNB10-R2S (6) CNB10S-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) CNB10S-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG105□-S105010						
	HG75			CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)		
	HG105						
	HG54						
	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 Encoder Cable and Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EJ-	Servo encoder cable								
			Motor side encoder cable					Ball screw side encoder cable			
			Cable (for D48/D51)		Single connector			Ball screw side encoder (OSA405ET2AS)			
					Drive unit side	Motor side		Cable		Single connector	
		V1	Straight	Right angle		Straight	Right angle	Straight	Right angle	Straight	Right angle
HG Series	HG46	10	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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG56	15									
	HG96	30									
	HG75										
	HG105										
	HG54										
	HG104	40									
	HG123										
	HG142										
	HG223										
	HG302										
	HG154	80									
	HG224										
	HG204										
	HG303										
	HG354	100									

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

Spindle motor type		Drive unit type MDS-EJ-	Power Cable		Spindle encoder cable										
			When connecting to a spindle motor		When connecting to a spindle motor			When connecting to a spindle side encoder							
					Motor side PLG cable			Spindle side accuracy encoder TS5690 cable			Spindle side encoder OSE-1024 cable				
					Cable	Single connector		Cable	Single connector		Cable		Single connector		
			Drive unit side	Motor side		Drive unit side	Encoder side		Drive unit side	Encoder side	Straight	Right angle	Drive unit side	Encoder 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	Terminal block connection												
	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													

■MDS-EH Series Power Connector and Brake Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EH-		Power Connector			Brake Connector		
				Drive unit side	Motor side		Drive unit side	Motor side	
		V1	V2		Straight	Right angle		Straight	Right angle
HG-H Series	HG-H75□-S105010	10	10 20	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	CNP14-2S (12) Applicable cable outline ϕ10 to 12 (mm)	CNP14-2L (12) Applicable cable outline ϕ10 to 12 (mm)	CNU23S (AWG14)	CNB10-R2S (6) CNB10S-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) CNB10S-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG-H105□-S105010								
	HG-H75								
	HG-H105								
	HG-H54	20	20 40		CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)			
	HG-H104								
	HG-H154	40	40 80						
	HG-H204								
	HG-H354	80	80 80W		CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)			
	HG-H453								
	HG-H703	80W	80W						
	HG-H903	160	—	Terminal block connection	CNP32-17S (23) Applicable cable outline ϕ22 to 23.8 (mm)	CNP32-17L (23) Applicable cable outline ϕ22 to 23.8 (mm)			
	HG-H1502	200	—		Terminal block connection				
HQ-H Series	HQ-H903	160	—		CNP32-17S (23) Applicable cable outline ϕ22 to 23.8 (mm)	CNP32-17L (23) Applicable cable outline ϕ22 to 23.8 (mm)			
	HQ-H1103	160W	—						

■MDS-EH Series Encoder Cable and Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EH-		Servo encoder cable								
				Motor side encoder cable					Ball screw side encoder cable			
				Cable (for D48/D51/D74)		Single connector			Ball screw side encoder (OSA405ET2AS/OSA676ET2AS)			
						Drive unit side	Motor side		Cable		Single connector	
		V1	V2	Straight	Right angle		Straight	Right angle	Straight	Right angle	Straight	Right angle
HG Series	HG-H75	10	10 20	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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG-H105											
	HG-H54	20	20 40									
	HG-H104											
	HG-H154	40	40 80									
	HG-H204											
	HG-H354	80	80 80W									
	HG-H453											
	HG-H703	80W	80W									
	HG-H903	160	—									
	HG-H1502	200	—									
HQ Series	HQ-H903	160	—									
	HQ-H1103	160W	—									

■MDS-EH Series Power Connector for Spindle Motor Selection List

Spindle motor type		Drive unit type MDS-EH-	Power Connector	
		SP	Drive unit side	Motor side
SJ-4-V Series (Normal)	SJ-4-V2.2-03T	20	- All axes CNU01SEF (AWG14) - L-axis only CNU01SEL (AWG14) - M-axis only CNU01SEM (AWG14) - S-axis only CNU01SES (AWG14)	Terminal block connection
	SJ-4-V3.7-03T			
	SJ-4-V5.5-07T	40		
	SJ-4-V7.5-12T			
	SJ-4-V7.5-13ZT	80		
	SJ-4-V11-18T			
	SJ-4-V18.5-14T	100	Terminal block connection	
	SJ-4-V22-15T	160		
	SJ-4-V22-18ZT			
	SJ-4-V26-08ZT			
	SJ-4-V37-04ZT	200		
	SJ-4-V45-02T	320		
	SJ-4-V55-03T			
SJ-4-V Series (Wide range constant output)	SJ-4-V15-20T	100		
	SJ-4-V22-16T	160		

■MDS-EH Series Encoder Cable and Connector for Spindle Motor Selection List

Spindle motor type		Drive unit type MDS-EH-	Spindle encoder cable											
			When connecting to a spindle motor			When connecting to a spindle side encoder								
			Motor side PLG cable			Spindle side accuracy encoder TS5690 cable			Spindle side encoder OSE-1024 cable					
				Single connector			Single connector		Cable		Single connector			
		SP	Cable	Drive unit side	Encoder side	Cable	Drive unit side	Encoder side	Straight	Right angle	Drive unit side	Encoder side		
												Straight	Right angle	
SJ-4-V Series (Normal)	SJ-4-V2.2-03T	20	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-4-V3.7-03T													
	SJ-4-V5.5-07T	40												
	SJ-4-V7.5-12T													
	SJ-4-V7.5-13ZT	80												
	SJ-4-V11-18T													
	SJ-4-V18.5-14T	100												
	SJ-4-V22-15T	160												
	SJ-4-V22-18ZT													
	SJ-4-V26-08ZT													
	SJ-4-V37-04ZT	200												
	SJ-4-V45-02T	320												
	SJ-4-V55-03T													
SJ-4-V Series (Wide range constant output))	SJ-4-V15-20T	100												
	SJ-4-V22-16T	160												

■MDS-EMH Series Power Connector and Brake Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EMH-	Power Connector			Brake Connector	
			Drive unit side	Motor side		Motor side	
				Straight	Right angle	Straight	Right angle
		SPV3					
HG-H Series	HG-H54	8040 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) CNB10S-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) CNB10S-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG-H104						
	HG-H154	8040 10040 10060		CNP22-22S (16) Applicable cable outline ϕ12.5 to 16 (mm)	CNP22-22L (16) Applicable cable outline ϕ12.5 to 16 (mm)		
	HG-H204						
	HG-H354	10060					
	HG-H453						

■MDS-EMH Series Encoder Cable and Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EMH-	Servo encoder cable							
			Motor side encoder cable					Ball screw side encoder cable		
			Cable (for D48/D51)		Single connector			Ball screw side encoder (OSA405ET2AS)		
					Drive unit side	Motor side		Cable		Single connector	
		SPV3	Straight	Right angle		Straight	Right angle	Straight	Right angle	Straight	Right angle
HG-H Series	HG-H54	8040 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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG-H104										
	HG-H154	8040 10040 10060									
	HG-H204										
	HG-H354	10060									
	HG-H453										

■MDS-EMH Series Power Connector, Encoder Cable, and Connector for Spindle Motor Selection List

Servo motor type		Drive unit type MDS-EMH-	Power Cable		Spindle encoder cable										
					When connecting to a spindle motor			When connecting to a spindle side encoder							
					Motor side PLG cable			Spindle side accuracy encoder TS5690 cable			Spindle side encoder OSE-1024 cable				
			Drive unit side	Motor side	Cable	Single connector		Cable	Single connector		Cable		Single connector		
						Drive unit side	Encoder side		Drive unit side	Encoder side	Straight	Right angle	Drive unit side	Encoder side	
		SPV3												Straight	Right angle
SJ-4-V Series (Normal)	SJ-4-V7.5-13ZT	8040	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-4-V11-18T														
	SJ-4-V18.5-14T	10040 10060													
SJ-4-V Series (Wide range constant output)	SJ-4-V15-20T	10060													

■MDS-EJH Series Power Connector and Brake Connector for Servo Motor Selection List

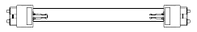
Servo motor type		Drive unit type MDS-EJH-	Power Connector			Brake Connector	
			Drive unit side	Motor side		Motor side	
				Straight	Right angle	Straight	Right angle
		V1					
HG-H Series	HG-H75□-S105010	15	Supplied for each drive unit	CNP14-2S (12) Applicable cable outline ϕ10 to 12 (mm)	CNP14-2L (12) Applicable cable outline ϕ10 to 12 (mm)	CNB10-R2S (6) CNB10S-R2S (6) Applicable cable outline ϕ4.0 to 6.0 (mm)	CNB10-R2L (6) CNB10S-R2L (6) Applicable cable outline ϕ4.0 to 6.0 (mm)
	HG-H105□-S105010	20					
	HG-H75	15		CNP18-10S (14) Applicable cable outline ϕ10.5 to 14 (mm)	CNP18-10L (14) Applicable cable outline ϕ10.5 to 14 (mm)		
	HG-H105	20					
	HG-H54						
	HG-H104						
	HG-H154	40					

■MDS-EJH Series Encoder Cable and Connector for Servo Motor Selection List

Servo motor type		Drive unit type MDS-EJH-	Servo encoder cable									
			Motor side encoder cable					Ball screw side encoder cable				
			Cable (for D48/D51)		Single connector			Ball screw side encoder (OSA405ET2AS)				
					Drive unit side	Motor side		Cable		Single connector		
		V1	Straight	Right angle		Straight	Right angle	Straight	Right angle	Straight	Right angle	
HG-H Series	HG-H75	15	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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-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) CNE10S-R10S (9) Applicable cable outline ϕ6.0 to 9.0 (mm)	CNE10-R10L (9) CNE10S-R10L (9) Applicable cable outline ϕ6.0 to 9.0 (mm)
	HG-H105	20										
	HG-H54											
	HG-H104											
	HG-H154	40										

DRIVE SYSTEM LIST OF CABLES

<Optical communication cable>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM/EMH	EJ/EJH
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/EMH	EJ/EJH
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/EMH	EJ/EJH
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/EMH	EJ/EJH
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 and connector>

Item		Model	Length (m)	Contents	Compatible model E/EH	EM/EMH	EJ/EJH
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)	–		○	○	○
		CNE10S-R10S(9)	–		○	○	○
		CNE10S-R10L(9)	–		○	○	○

Item		Model	Length (m)	Contents	Compatible model E/EH	EM/EMH	EJ/EJH
CN3	MDS-EX-HR/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-EX-HR/ MDS-B-HR unit	MDS-EX-HR/MDS-B-HR connector (For DRIVE, CON1, 2: 1) (For SCALE, 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/EMH	EJ/EJH
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)	–		○	○	○
		CNB10S-R2S(6)	–		○	○	○
		CNB10S-R2L(6)	–		○	○	○
	Brake cable for HG46/56/96 Lead out in direction of motor shaft	MR-BKS1CBL 2M-A1-H	2		○	○	○
		MR-BKS1CBL 3M-A1-H	3				
		MR-BKS1CBL 5M-A1-H	5				
		MR-BKS1CBL 7M-A1-H	7				
		MR-BKS1CBL 10M-A1-H	10				
	Brake cable for HG46/56/96 Lead out in opposite direction of motor shaft	MR-BKS1CBL 2M-A2-H	2		○	○	○
		MR-BKS1CBL 3M-A2-H	3				
		MR-BKS1CBL 5M-A2-H	5				
		MR-BKS1CBL 7M-A2-H	7				
		MR-BKS1CBL 10M-A2-H	10				
For CN20	Brake connector for motor brake control output	CNU23S(AWG14)	–		○	–	–

<Power connector>

Item		Model	Length (m)	Contents	Compatible model E/EH	EM/EMH	EJ/EJH
For motor power	Power connector for <200V Series> HG75, 105, 54, 104, 154, 224, 123, 223, 142 HG-JR73, 153□-S105003 <400V Series> HG-H75, 105, 54, 104, 154 HG-JR734, 1534□-S105003 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)	–		○	–	–
	Power connector for <200V Series> HG75, 105□-S105010 HG-JR73, 153□-S105010 <400V Series> HG-JR734, 1534□-S105010	CNP14-2S(12)	–		○	○	○
		CNP14-2L(12)	–		○	○	○
	Power cable for HG46/56/96 Lead out in direction of motor shaft	MR-PWS1CBL 2M-A1-H	2		○	–	○
		MR-PWS1CBL 3M-A1-H	3				
		MR-PWS1CBL 5M-A1-H	5				
		MR-PWS1CBL 7M-A1-H	7				
		MR-PWS1CBL 10M-A1-H	10				
	Power cable for HG46/56/96 Lead out in opposite direction of motor shaft	MR-PWS1CBL 2M-A2-H	2		○	–	○
		MR-PWS1CBL 3M-A2-H	3				
		MR-PWS1CBL 5M-A2-H	5				
		MR-PWS1CBL 7M-A2-H	7				
		MR-PWS1CBL 10M-A2-H	10				
For TE1	Power connector for MDS-E-V1-20 to 160 MDS-E-V2-20 to 160 MDS-E-V3-20 to 40 MDS-E-SP-20 to 80 MDS-E-SP2-20 to 80 MDS-E-SP2-16080 (L-axis) MDS-EH-V1-10 to 80W MDS-EH-V2-10 to 80W MDS-EH-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/EMH 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/EMH Series Applicable cable outline ϕ0.5 to 1.25mm	RCN22	–		–	○	–
	Control power connector for MDS-EM/EMH Series Applicable cable outline ϕ1.25 to 2.2mm	RCN22S	–		–	○	–

LIST OF CABLES

<Drive unit side main circuit connector>

Item		Model	Length (m)	Contents	Compatible model		
					E/EH	EM/EMH	EJ/EJH
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/EMH	EJ/EJH
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)	–		○	○	○

■MEMO

SOFTWARE TOOLS

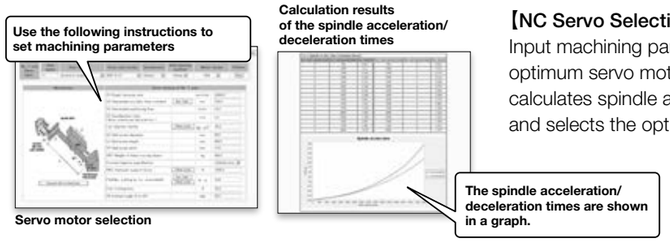
Process flow from machine design and development to operation and maintenance

Machine design → Electrical circuitry design → Machine assembly and adjustment → Operation and maintenance

•NC-related processes

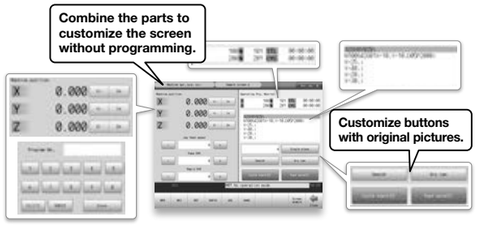
Servo selection	Custom screen creation	Parameter creation	Training
NC Servo Selection	NC Designer2	NC Configrator2	NC Trainer2
	Debug	Servo/spindle adjustment	Operation
	NC Trainer2 plus	Machine adjustment	Maintenance
		NC Analyzer2	NC Explorer
			NC Monitor2

•Machine design

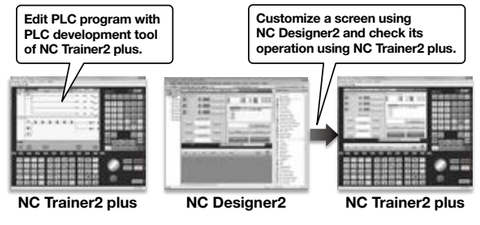


【NC Servo Selection】
Input machining parameters to determine the optimum servo motor. This function automatically calculates spindle acceleration/deceleration time and selects the optimum power supply module.

•Electrical circuitry design

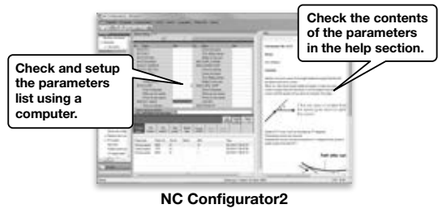


【NC Designer2】
We provide a developmental environment where the MTB can customize screens easily. Two types of screen development methods are available; the interpreter system (programming without C++) for simple screen development, and the compiler system with a complex controller (programming with 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.

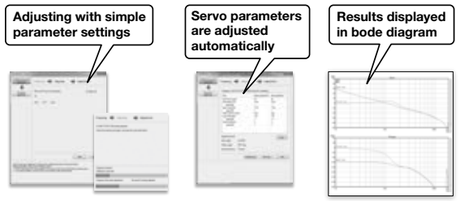
•Machine assembly and adjustment



【NC Configurator2】
NC parameters required for NC control or machine operation can be edited on a computer. It is also possible to create initial parameters simply by inputting the machine configuration.

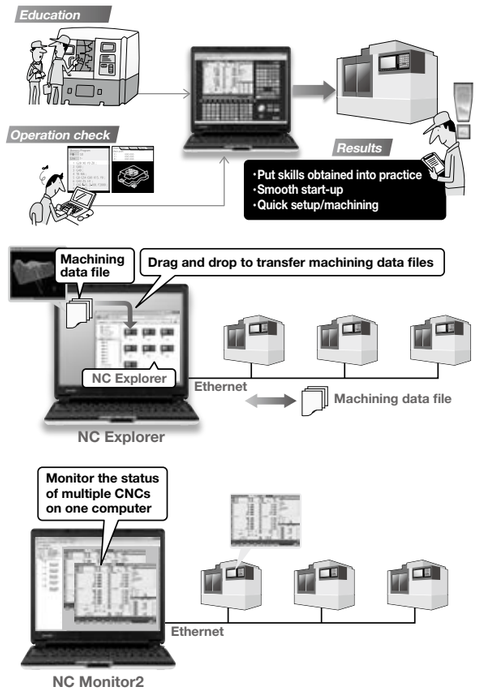
For details on each software tool, refer to the software tools catalog (BNP-A1224).

•Machine assembly and adjustment



【NC Analyzer2】
Servo parameters can be adjusted automatically by measuring and analyzing machine 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.

•Operation and maintenance

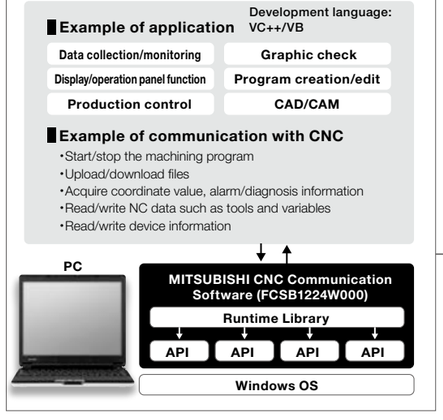


【NC Trainer2】
NC Trainer2 plus supports customization development; it helps to program the ladder programming of the user PLC to be developed by machine tool builders and debug it and check the operations of customized screens.

【NC Explorer】
CNC machining data can be managed using Windows® Explorer on a computer when the computer is connected to multiple CNCs via Ethernet.

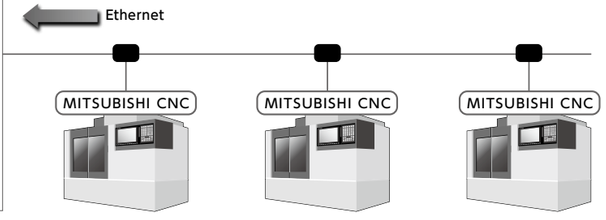
【NC Monitor2】
Taking advantage of connection with a factory network, CNC operation status can be monitored from remote locations. Several CNCs can be connected and monitored simultaneously.

Application development support



【Mitsubishi CNC Communication Software (FCSB1224W000)】
This software provides a bunch of API functions. They facilitate development of an Windows application which requires connection and communication with Mitsubishi CNC(*).
You can use the common interfaces for any Mitsubishi CNC model, which leads to high efficiency in development.

(*) The compatible model is Mitsubishi CNCs after M700/M70.



GLOBAL SALES & SERVICE NETWORK

■:Production site ●:FA Center ○:Service Center/Service Satelite

Providing reliable services in regions around the world
- our Best Partner commitment to you

Tokyo Head Office

Nagoya Works

JAPAN
·MITSUBISHI ELECTRIC CORPORATION
(TOKYO HEAD OFFICE, NAGOYA WORKS)
·MITSUBISHI ELECTRIC MECHATRONICS
ENGINEERING CORPORATION
(Headquarters)
TEL:+81-52-722-6620
FAX:+81-52-722-6662

Germany FA Center/
IAM Showroom

EUROPE
·MITSUBISHI ELECTRIC EUROPE B.V.
European Service Headquarters
(Dusseldorf, GERMANY)
TEL: +49-2102-486-1850
FAX: +49-2102-486-5910
·South Germany Service Center (Stuttgart)
·France Service Center (Paris)
·France Service Satellite (Lyon)
·Italy Service Center (Milan)
·Italy Service Satellite (Padova)
·U.K. Service Center
·Spain Service Center
·Poland Service Center
·Hungary Service Center
·MITSUBISHI ELECTRIC TURKEY A.Ş
Turkey Service Center
·Czech Republic Service Center (Service Partner)
·Russia Service Center (Service Partner)
·Sweden Service Center
·Bulgaria Service Center (Service Partner)
·Ukraine Service Center (Kharkov) (Service Partner)
·Belarus Service Center (Service Partner)
·South Africa Service Center (Service Partner)

Korea FA Center/IAM Showroom

KOREA
·MITSUBISHI ELECTRIC AUTOMATION
KOREA CO., LTD. (KOREA FA CENTER)
Korea Service Center
TEL: +82-2-3660-9609
FAX: +82-2-3664-8668
·Korea Daegu Service Satellite

Thailand FA Center

THAILAND
·MITSUBISHI ELECTRIC FACTORY
AUTOMATION (THAILAND) CO.,LTD.
Thailand Service Center
TEL: +66-2-682-6522
FAX: +66-2-682-6020

Taichung FA Center

TAIWAN
·MITSUBISHI ELECTRIC TAIWAN CO., LTD.
(TAIWAN FA CENTER)
Taiwan Taichung Service Center
TEL: +886-4-2359-0688
FAX: +886-4-2359-0689
·Taiwan Taipei Service Center
·Taiwan Tainan Service Center

OCEANIA
·MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD.
Oceania Service Center
TEL: +61-2-9684-7269
FAX: +61-2-9684-7245

North America FA Center

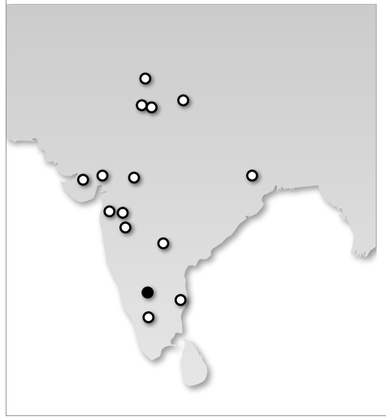
AMERICA
·MITSUBISHI ELECTRIC AUTOMATION INC.
(AMERICA FA CENTER)
Central Region Service Center (Chicago)
TEL: +1-847-478-2500
FAX: +1-847-478-2650

·Minneapolis, MN Service Satellite
·Detroit, MI Service Satellite
·Grand Rapids, MI Service Satellite
·Lima, OH Service Satellite
·Cleveland, OH Service Satellite
·Indianapolis, IN Service Satellite
·St. Louis, MO Service Satellite
·South/East Region Service Center
(Georgia)
·Charleston, SC Service Satellite
·Charlotte, NC Service Satellite
·Raleigh, NC Service Satellite
·Dallas, TX Service Satellite
·Houston, TX Service Satellite
·Hartford, CT Service Satellite
·Knoxville, TN Service Satellite
·Nashville, TN Service Satellite
·Baltimore, MD Service Satellite
·Pittsburg, PA Service Satellite
·Allentown, PA Service Satellite
·Syracuse, NY Service Satellite
·Tampa, FL Service Satellite
·Lafayette, LA Service Satellite
·Western Region Service Center
(California)
·San Francisco, CA Service Satellite
·Seattle, WA Service Satellite
·Canada Region Service Center
(Tronto)
·Edmonton, AB Service Satellite
·Montreal, QC Service Satellite
·Mexico Region Service Center
(Queretaro)
·Monterrey, NL Service Satellite
·Mexico City, DF Service Satellite

Brazil Votorantim FA Center

BRAZIL
·Mitsubishi Electric do Brasil Comércio e Serviços Ltda.
Votorantim Office
TEL: +55-15-3023-9000
·JOVIMAQ – Joinville, SC Service Satellite
·MAQSERVICE – Canoas, RS Service Satellite

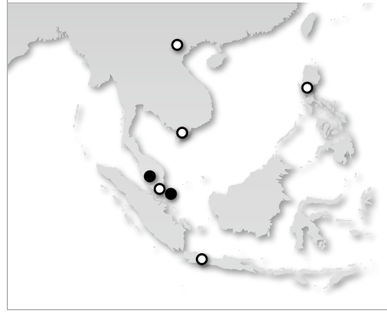
India CNC Technical Center



INDIA
·MITSUBISHI ELECTRIC INDIA PVT., LTD.
CNC Technical Center (Bangalore)
TEL : +91-80-4655-2121
FAX : +91-80-4655-2147
·Chennai Service Satellite
·Coimbatore Service Satellite
·Hyderabad Service Satellite
·North India Service Center (Gurgaon)
·Ludhiana Satellite
·Panth Nagar Service Satellite
·Delhi Service Satellite
·Jamshedpur Service Satellite
·West India Service Center (Pune)
·Kolhapur Service Satellite
·Aurangabad Service Satellite
·Mumbai Service Satellite
·West India Service Center (Ahmedabad)
·Rajkot Service Satellite

ASEAN FA Center/
IAM Showroom

Malaysia FA Center



INDONESIA
·PT. MITSUBISHI ELECTRIC INDONESIA
Indonesia Service Center (Cikarang)
TEL: +62-21-2961-7797
FAX: +62-21-2961-7794

VIETNAM
·MITSUBISHI ELECTRIC VIETNAM CO.,LTD.
Vietnam Ho Chi Minh Service Center
TEL: +84-8-3910 5945
FAX: +84-8-3910 5946
·Vietnam Hanoi Service Center

MALAYSIA
·MITSUBISHI ELECTRIC SALES MALAYSIA SDN. BHD.
Malaysia Service Center (Kuala Lumpur Service Center)
TEL: +60-3-7960-2628
FAX: +60-3-7960-2629
·Johor Bahru Satellite

ASEAN
·MITSUBISHI ELECTRIC ASIA PTE. LTD.
(ASEAN FA CENTER)
Singapore Service Center
TEL: +65-6473-2308
FAX: +65-6476-7439
·Philippines Service Center (Service Partner)

MITSUBISHI ELECTRIC
AUTOMATION MANUFACTURING
(Changshu) Co., LTD.

Shanghai FA Center/I
AM Showroom

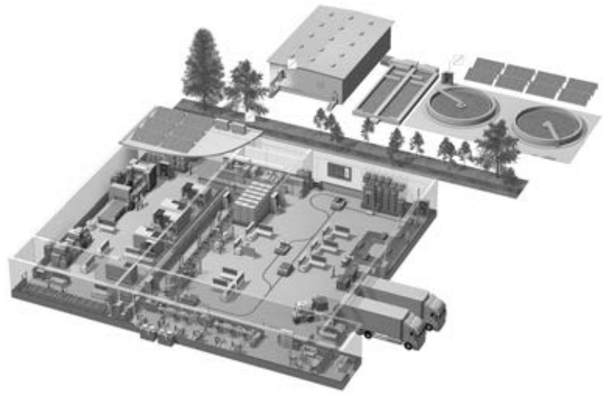
CHINA
·MITSUBISHI ELECTRIC
AUTOMATION (CHINA) LTD.
(CHINA FA CENTER)
China Shanghai Service Center
TEL: +86-21-2322-3030
FAX: +86-21-2322-3000*8422
·China Ningbo Service Partner
·China Wuxi Service Partner
·China Jinan Service Partner
·China Hangzhou Service Partner
·China Beijing Service Center
·China Beijing Service Partner
·China Tianjin Service Center
·China Chengdu Service Center
·China Shenzhen Service Center
·China Xiamen Service Partner
·China DongGuang Service Partner
·China Dalian Service Center

■MEMO

*Trademarks

MELSEC, CC-Link, CC-Link/LT and CC-Link IE are either trademarks or registered trademarks of Mitsubishi Electric Corporation in Japan and/or other countries.
Ethernet is a registered trademark of Xerox Corporation in the United States and/or other countries.
Microsoft® and Windows® are either trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries.
SD logo and SDHC logo are either registered trademarks or trademarks of LLC.
PROFIBUS-DP is a trademark of Profibus International.
Other company and product names that appear in this manual are trademarks or registered trademarks of the respective companies.

YOUR SOLUTION PARTNER



Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

A NAME TO TRUST

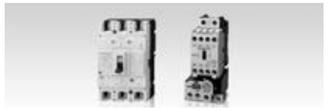
Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.



Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

Compact and Modular Controllers

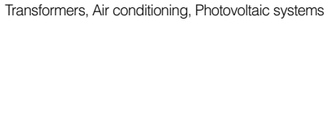
Inverters, Servos and Motors

Visualisation: HMIs

Numerical Control (NC)

Robots: SCARA, Articulated arm

Processing machines: EDM, Lasers, IDS



Transformers, Air conditioning, Photovoltaic systems

* Not all products are available in all countries.

Global Partner. Local Friend.

Visit us on

[YouTube] [YouTube logo] is a trademark or registered trademark of Google Inc.

⚠ Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001(standards for quality assurance management systems)

ISO 14001 JACO EC97J1113 UKAS MANAGEMENT SYSTEMS 051

ISO 9001 BUREAU VERITAS Certification UKAS MANAGEMENT SYSTEMS 008

MITSUBISHI ELECTRIC CORPORATION HEAD OFFICE: TOKYO BLDG., 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

K-KL2-5-C0169-B NA1705 Printed in Japan [IP]

Printed May 2017

All trademarks acknowledged.