for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

General-Purpose AC Servo MELSERVO-J4 Series
HG-JR Series Ultra-Large Capacity Servo Motor
Servo Motor HG-JR_K24W0C (400 V 110 kW to 220 kW)
Drive unit MR-J4-DU_KB4-RJ100 (400 V 45 kW and 55 kW)

April, 2018

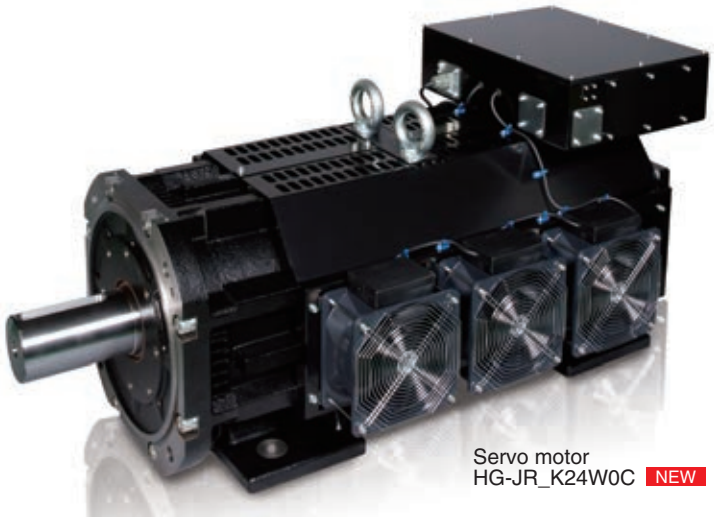
New Product Release
SV1804-3E

Power regeneration converter unit
MR-CV55K4

Drive unit
MR-J4-DU_KB4-RJ100 NEW

MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO-J4

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK



Servo motor
HG-JR_K24W0C NEW

Releasing ultra-large capacity servo motors, MELSERVO-J4 series covers a wide range of capacity from 10 W to 220 kW.

Product lines

- Ultra-large capacity servo motors with functional safety
  HG-JR_K24W0C
  400 V class: 110 kW, 150 kW, 180 kW, 200 kW, 220 kW
- Drive units for the ultra-large capacity servo motors
  MR-J4-DU_KB4-RJ100
  400 V class: 45 kW and 55 kW

Features

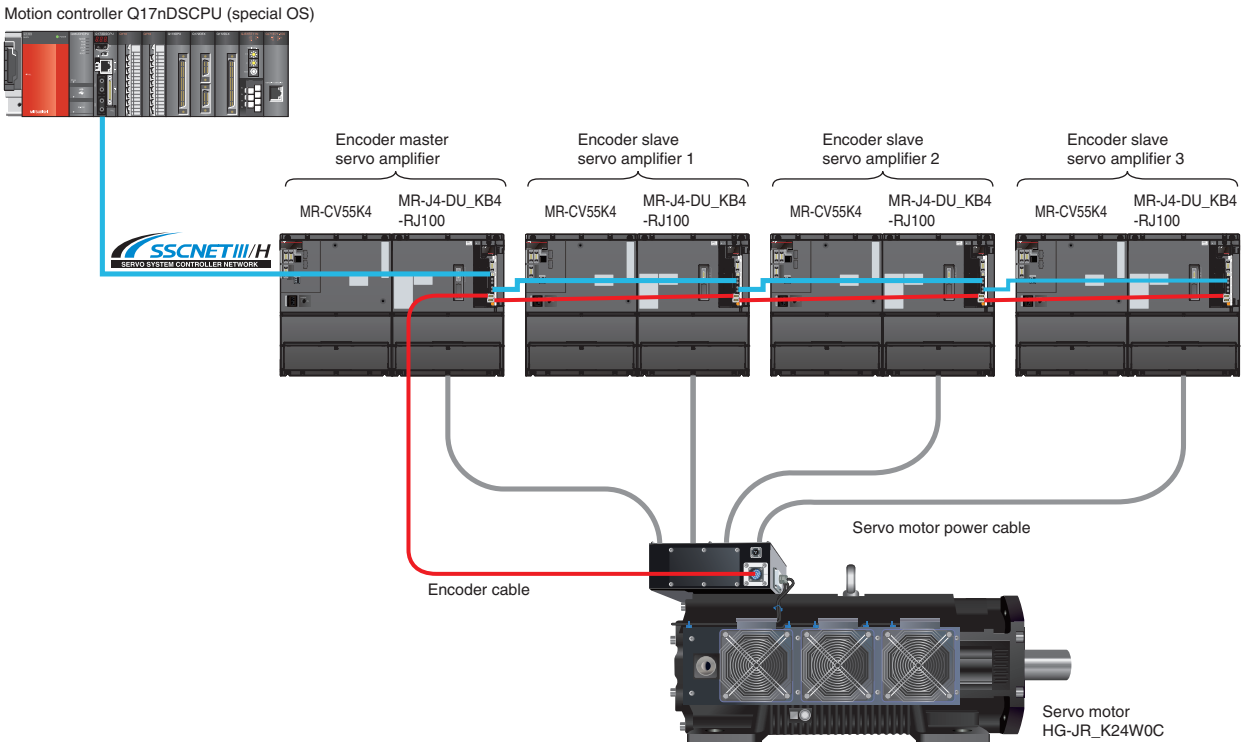
- Servo motors with functional safety
  Safety level is Category 4 PL e, SIL 3 with a combination with MR-D30 functional safety unit.
- Ultra-large capacity servo systems can be configured with multiple drive units driving the servo motor parallelly.

Ultra-Large Capacity Servo Motors

Ideal for increasing machine output and replacing conventional hydraulic systems

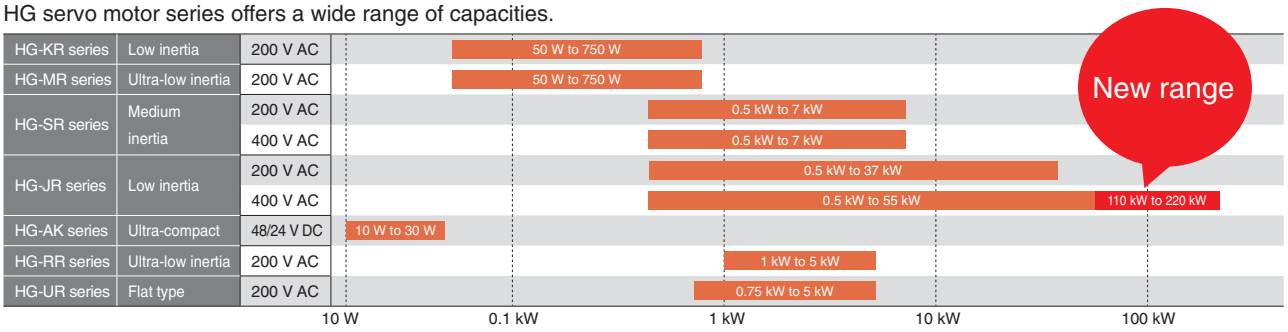
The ultra-large capacity servo motor is driven by parallelly connected two or four sets of MR-CV55K4 power regeneration converter units and MR-J4-DU_KB4-RJ100 drive units.
Using power regeneration system, the converter units effectively use regenerative power and support a power saving system.

■Example of parallel drive system configuration



Wide Range of Capacity

HG servo motor series offers a wide range of capacities.

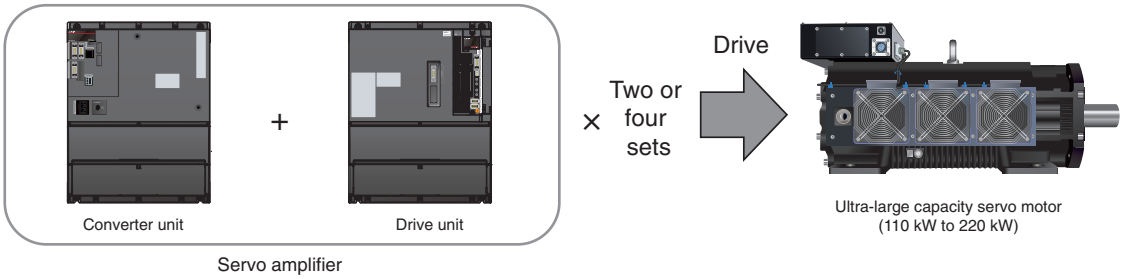


Lines of ultra-large capacity servo motors HG-JR_K24W0C

Model	Power supply class	Rated output [kW]	Rated speed [r/min]	Maximum speed [r/min]
HG-JR110K24W0C	400 V	110	2000	3000
HG-JR150K24W0C		150	2000	3000
HG-JR180K24W0C		180	2000	3000
HG-JR200K24W0C		200	2000	3000
HG-JR220K24W0C		220	2000	3000

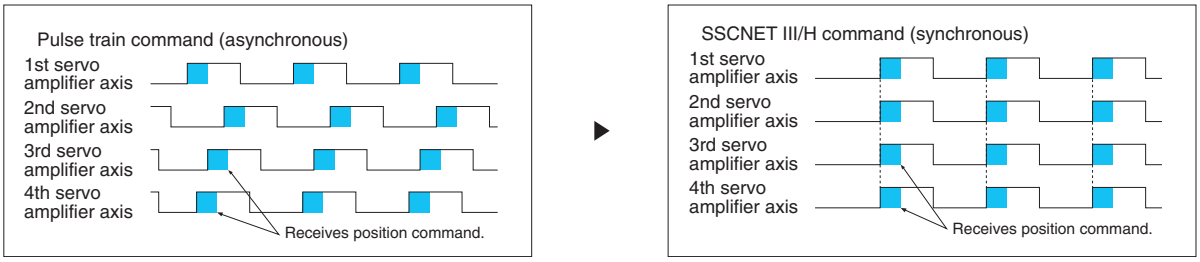
Parallel Drive System

The converter unit and drive unit are used as a combination. Two or four sets of these parallelly drive the ultra-large capacity servo motor of 110 kW to 220 kW.



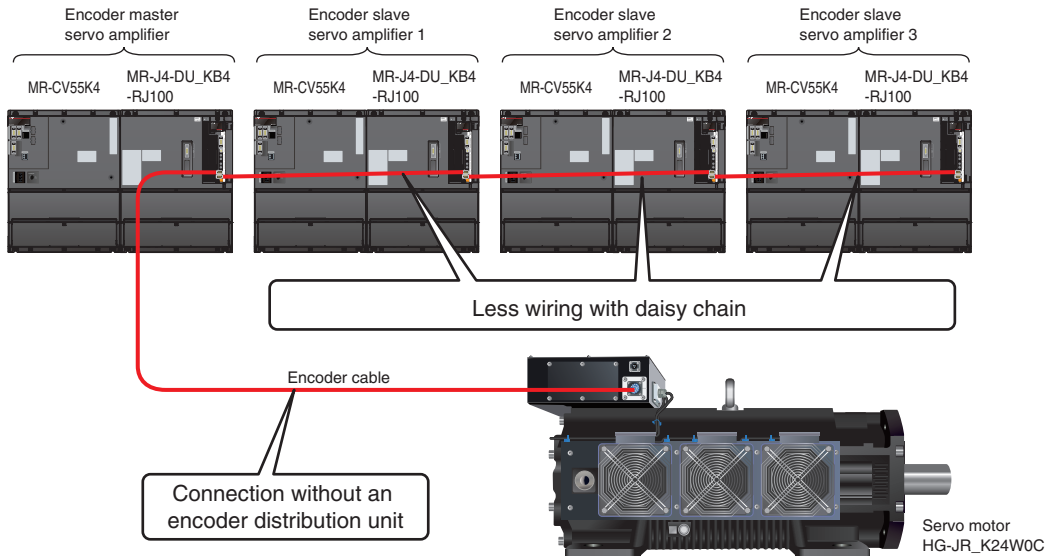
Highly accurate synchronous communication of SSCNET III/H enables a large-capacity parallel drive system.

■Timing of servo amplifier processing



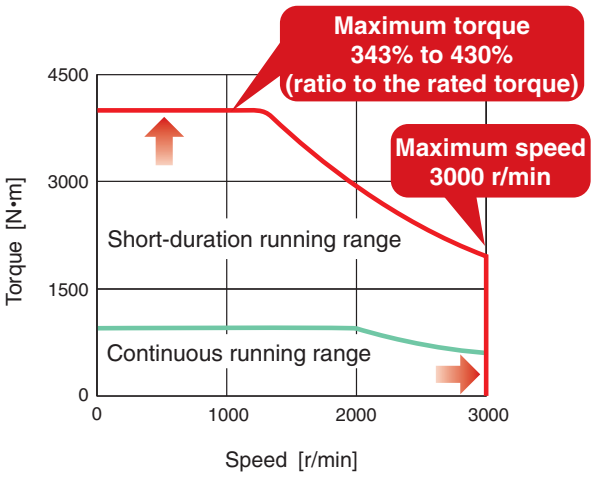
Simple Encoder Connection

The drive units and the servo motor offer easy, cost-effective connection with less cables. The drive units are connected with daisy chain encoder cables, and encoder information is sent from the encoder master servo amplifier to all of the encoder slave servo amplifiers without an encoder distribution unit. In addition, thermistor signal wires are included in the encoder cable, and thus additional wiring for thermistor signal is no more necessary. The simple connection helps reduce complication and errors.

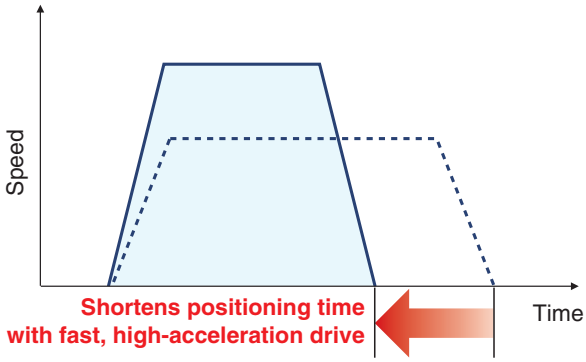


High-Speed, High-Torque Servo Motors

The rotor structure of the servo motor is optimized to provide high-speed, high-torque operation. The fast, high-acceleration drive shortens positioning time and boosts your productivity.

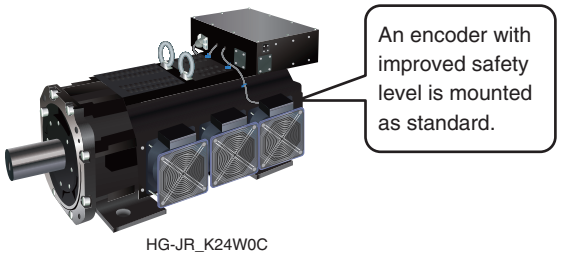


* As an example of HG-JR220K24W0C

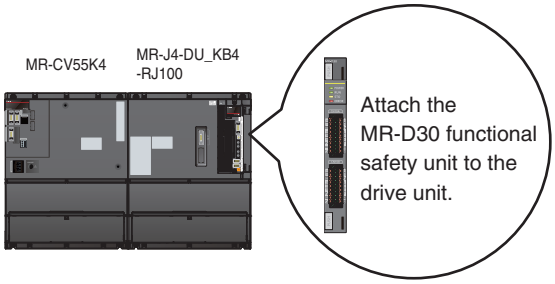


Increased Safety Level

The HG-JR_K24W0C servo motors are equipped with an encoder with improved safety level. Use of the drive unit, MR-D30 functional safety unit, and the servo motor with functional safety provide the safety level up to Category 4 PL e, SIL 3 and the following functions: Safe torque off, Safe stop 1, Safe stop 2, Safe operating stop, Safely-limited speed, Safe brake control, and Safe speed monitor.



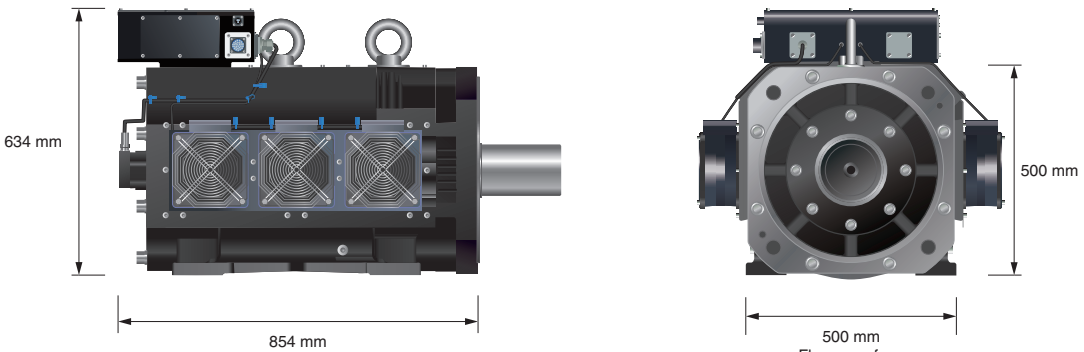
HG-JR_K24W0C



* Refer to "MR-J4-DU_B4-RJ100 Drive Unit Instruction Manual" for details on the use of MR-D30 functional safety unit combined with the drive unit.

Industry's Shortest Class

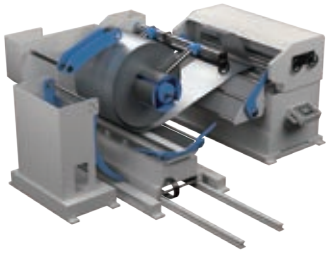
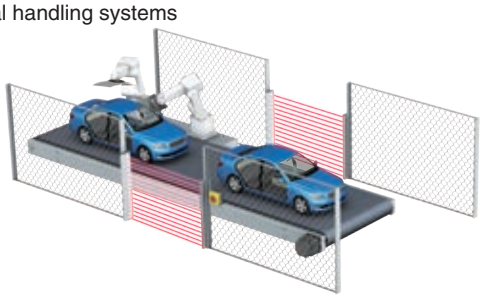
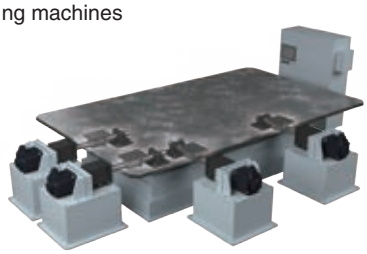
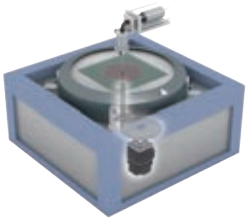
Cooling fans are mounted on the sides of the servo motor, making the motor length shorter than ever. The industry's shortest class has been achieved.



* As an example of HG-JR220K24W0C

Application Examples

A wide capacity range of the ultra-large servo motors supports an increase of machine output and replacement of your conventional hydraulic system with an electric system.

Press Machines 	Molding machines 
Loaders, unloaders, and feeders 	Material handling systems 
Vibration testing machines 	Spin coaters 

Related Catalog

For MR-CV_ power regeneration converter units and other MELSERVO-J4 series products, refer to "MELSERVO-J4 catalog (L(NA)03058)".

MELSERVO-J4 catalog
L(NA)03058

Compliance with Global Standards and Regulations

MELSERVO-J4 series complies with global standards. For corresponding standards and models, contact your local sales office.

Servo amplifier

Europe	Low voltage directive	EN 61800-5-1 EN 60950-1 (MR-J4-03A6 and MR-J4W2-0303B6 also comply with this standard.)
	EMC directive	EN 61800-3 Category C3
	Machinery directive	EN ISO 13849-1 Category 3 PL e / EN 62061 SIL CL 3 / EN 61800-5-2
	RoHS directive	EN 50581
North America	UL standard	UL 508C
	CSA standard	CSA C22.2 No.14
China	National Standard of the People's Republic of China (GB standards)	GB 12668.501, GB 12668.3
	Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products (Chinese RoHS)	Compliant (Article 13 (Names and the content of hazardous substances are described in instruction Manuals.)) Compliant (Article 14 (Marking for the Restricted Use of Hazardous Substances is labeled.))
	China Compulsory Certification (CCC)	N/A
Korea	Korea Radio Wave Law (KC)	KN 61800-3
Russia, Belarus, Kazakhstan	Certification system of the Eurasian Economic Union (EAC)	TR CU 004, TR CU 020

Servo motor

Europe	Low voltage directive	EN 60034-1
	EMC directive	EN 61800-3 Category C3
	Machinery directive	-
	RoHS directive	EN 50581
North America	UL standard	UL 1004-1 / UL 1004-6
	CSA standard	CSA C22.2 No.100
China	National Standard of the People's Republic of China (GB standards)	GB 755
	Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products (Chinese RoHS)	Compliant (Article 13 (Names and the content of hazardous substances are described in instruction Manuals.)) Compliant (Article 14 (Marking for the Restricted Use of Hazardous Substances is labeled.))
	China Compulsory Certification (CCC)	N/A
Korea	Korea Radio Wave Law (KC)	N/A
Russia, Belarus, Kazakhstan	Certification system of the Eurasian Economic Union (EAC)	TR CU 004, TR CU 020

Model Designation for Drive Unit (Note 1)

MR-J4-DU55KB4-RJ100

Mitsubishi Electric general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Rated output [kW]
45K	45
55K	55

Symbol	Interface
B	SSCNET III/H

Symbol	Power supply
4	3-phase 400 V AC

Symbol	Special specification
RJ100	Parallel drive compatible

Notes: 1. The dimensions of MR-J4-DU_B4-RJ100 drive units are the same as those of MR-J4-DU_B4-RJ. Refer to "MELSERVO-J4 catalog L(NA) 03058" for details.

Model Designation for Power Regeneration Converter Unit (Note 1)

MR-CV55K 4

Symbol	Capacity [kW]
55K	55

Symbol	Power supply
4	3-phase 400 V AC

Notes: 1. Refer to "MELSERVO-J4 catalog (L(NA)03058)" for specifications and dimensions of the power regeneration converter unit.

Model Designation for Rotary Servo Motor (Note 1)

H G - J R 1 1 0 K 2 4 K W 0 C

Symbol	Special specification
W0C	Servo motors with functional safety

Symbol	Shaft end
None	Straight shaft
K	Key shaft (without key)

Symbol	Voltage
4	400 V class

Symbol	Rated speed [r/min]
2	2000

Symbol	Rated output [kW]
110K	110
150K	150
180K	180
200K	200
220K	220

Symbol	Inertia/capacity
HG-JR	Low inertia, medium/large/ultra-large capacity

Notes: 1. An oil seal is attached for HG-JR series as standard.

Combinations of Rotary Servo Motor and Servo Amplifier (Drive Unit and Power Regeneration Converter Unit)

Rotary servo motor	Servo amplifier	
	Drive unit	Power regeneration converter unit
HG-JR110K24W0C	MR-J4-DU55KB4-RJ100 × 2	MR-CV55K4 × 2
HG-JR150K24W0C	MR-J4-DU45KB4-RJ100 × 4	MR-CV55K4 × 4
HG-JR180K24W0C	MR-J4-DU45KB4-RJ100 × 4	MR-CV55K4 × 4
HG-JR200K24W0C	MR-J4-DU55KB4-RJ100 × 4	MR-CV55K4 × 4
HG-JR220K24W0C	MR-J4-DU55KB4-RJ100 × 4	MR-CV55K4 × 4

Compatible Controllers

Motion controller model	Operation system	Note
Q172DSCPU	SW8DNC-SV22S87QL	Special OS (Note 1)
Q173DSCPU	SW8DNC-SV22S87QJ	Special OS (Note 1)

Notes: 1. Special motion operating system is required. Ultra-large capacity servo motors cannot be driven with standard motion operating system. Contact your local sales office for more details.

MR-J4-DU_B4-RJ100 (SSCNET III/H Interface) Specifications (400 V)

Drive unit model MR-J4-_			DU45KB4-RJ100	DU55KB4-RJ100
Compatible power regeneration converter unit model			MR-CV55K4 (Note 5)	
Output	Rated voltage		3-phase 323 V AC	
	Rated current	[A]	131	143
Main circuit power supply input			Main circuit power is supplied from the power regeneration converter unit to the drive unit.	
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz	
	Rated current	[A]	0.2	
	Permissible voltage fluctuation		1-phase 323 V AC to 528 V AC	
	Permissible frequency fluctuation		±5% maximum	
	Power consumption	[W]	45	
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))	
Control method			Sine-wave PWM control/current control method	
Dynamic Brake (Note 7)			External option (Note 4)	
SSCNET III/H command communication cycle (Note 3)			0.222 ms, 0.444 ms, 0.888 ms	
Communication function	USB		Connect a personal computer (MR Configurator2 compatible)	
Encoder output pulse			Compatible (A/B/Z-phase pulse)	
Analog monitor			2 channels	
Fully closed loop control			Not compatible	
Servo functions			Robust filter, auto tuning, drive recorder function, tightening & press-fit control, machine diagnosis function, master-slave operation function, super trace control, lost motion compensation	
Protective functions			Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection	
Functional safety			STO (IEC/EN 61800-5-2)	
Safety performance	Standards certified by CB (Note 6)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2	
	Response performance		8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 2)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)	
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]	
	Probability of dangerous Failure per Hour (PFH)		PFH = 6.4×10^{-9} [1/h]	
Compliance with global standards			Refer to "Compliance with Global Standards and Regulations" on p. 6 in this brochure.	
Structure (IP rating)			Force cooling, open (IP20) (Note 1)	
Environment	Ambient temperature		Operation: 0 ˚C to 55 ˚C (non-freezing), storage: -20 ˚C to 65 ˚C (non-freezing)	
	Ambient humidity		Operation/storage: 5 %RH to 90 %RH (non-condensing)	
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude		2000 m or less above sea level (Note 8)	
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y, and Z axes)	
Mass		[kg]	21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. The command communication cycle depends on the servo system controller specifications and the number of axes connected.
4. Use one external dynamic brake (option) per drive unit. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
5. One unit of power regeneration converter unit is required for each drive unit. Refer to "MELSERVO-J4 catalog (L(NA)03058)" for specifications and dimensions of the power regeneration converter unit.
6. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to "MR-CV_ MR-CR55K_ MR-J4-DU_B_(-RJ) MR-J4-DU_A_(-RJ) Instruction Manual" for details.
7. When using the dynamic brake, refer to "MR-J4-DU_B4-RJ100 Drive Unit Instruction Manual" for the permissible load to motor inertia ratio
8. Refer to "MR-CV_ MR-CR55K_ MR-J4-DU_B_(-RJ) MR-J4-DU_A_(-RJ) Instruction Manual" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

HG-JR 2000 r/min Series (Low Inertia, Ultra-Large Capacity) (400 V Class) Specifications

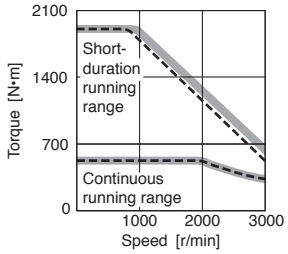
Rotary servo motor model HG-JR			110K24W0C	150K24W0C	180K24W0C	200K24W0C	220K24W0C
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier (Drive Unit and Power Regeneration Converter Unit)" on p. 8 in this brochure.				
Power supply capacity *1		[kVA]	156	213	256	284	312
Continuous running duty	Rated output	[kW]	110	150	180	200	220
	Rated torque (Note 3)	[N•m]	525	716	859	954	1050
Maximum torque		[N•m]	1900	2600	3300	4100	3600
Rated speed		[r/min]	2000				
Maximum speed		[r/min]	3000				
Permissible instantaneous speed		[r/min]	3450				
Power rate at continuous rated torque		[kW/s]	804	1184	1361	1334	799
Rated current		[A]	170	295	293	357	357
Maximum current		[A]	772	1344	1321	1653	1539
Moment of inertia J		[× 10^{-4} kg•m^2]	3430	4330	5420	6820	13800
Recommended load to motor inertia ratio (Note 1)			10 times or less				
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal			Installed				
Thermistor			Built-in				
Insulation class			155 (F)				
Structure			Totally enclosed, force cooling (IP rating: IP44) (Note 2)				
Environment *2	Ambient temperature		Operation: 0 ˚C to 40 ˚C (non-freezing), storage: -15 ˚C to 70 ˚C (non-freezing)				
	Ambient humidity		Operation: 10 %RH to 80 %RH (non-condensing), storage: 10 %RH to 90 %RH (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		2000 m or less above sea level (Note 4)				
	Vibration resistance *3		X: 9.8 m/s^2 Y: 9.8 m/s^2				
Vibration rank			V10 *5				
Compliance with global standards			Refer to "Compliance with Global Standards and Regulations" on p. 6 in this brochure.				
Permissible load for the shaft *4	L	[mm]	175	175	175	175	200
	Radial	[N]	5000	5000	5000	5000	6000
	Thrust	[N]	5000	5000	5000	5000	5000
Mass		[kg]	420	520	730	755	870
Cooling fan	Power supply	Voltage/frequency	1-phase 200 V AC, 50 Hz/1-phase 200 V AC to 230 V AC, 60 Hz				
		Input [W]	54.5 (50 Hz)/77 (60 Hz)				
	Rated current	[A]	0.4 (50 Hz)/0.5 (60 Hz)				

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 6 of "Annotations for Rotary Servo Motor Specifications" on p. 11 in this brochure for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

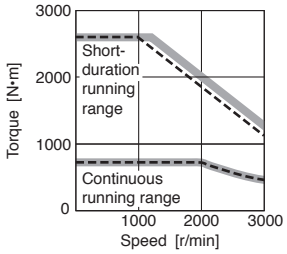
Refer to "Annotations for Rotary Servo Motor Specifications" on p. 11 in this brochure for the asterisks 1 to 6.

HG-JR 2000 r/min Series (400 V Class) Torque Characteristics

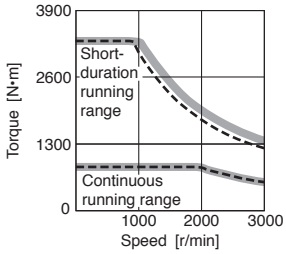
HG-JR110K24W0C (Note 1, 2, 3)



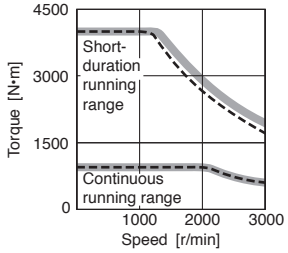
HG-JR150K24W0C (Note 1, 2, 3)



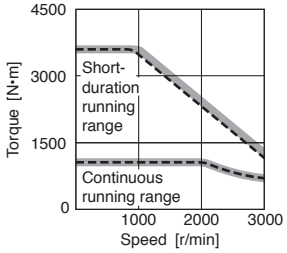
HG-JR180K24W0C (Note 1, 2, 3)



HG-JR200K24W0C (Note 1, 2, 3)



HG-JR220K24W0C (Note 1, 2, 3)



Notes: 1. For 3-phase 400 V AC.
2. For 3-phase 380 V AC.
3. Torque drops when the power supply voltage is below the specified value.

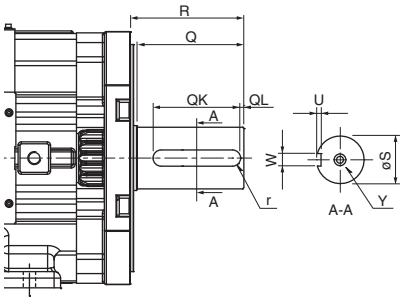
HG-JR 2000 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

Key shaft (without key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-JR110K24KW0C HG-JR150K24KW0C HG-JR180K24KW0C HG-JR200K24KW0C	95h6	175	165	25 $^{0}_{-0.04}$	135	5	9 $^{+0.2}_{0}$	12.5	M16 screw Depth: 30
HG-JR220K24KW0C	120h6	200	190	32 $^{0}_{-0.062}$	180	5	11 $^{+0.2}_{0}$	16	M24 screw Depth: 45

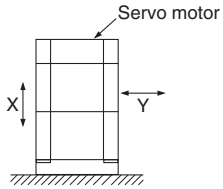
Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



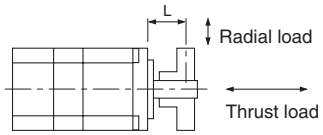
[Unit: mm]

Annotations for Rotary Servo Motor Specifications

* 1. The power supply capacity varies depending on the power supply impedance.
* 2. In the environment where the servo motor is exposed to oil mist, oil and/or water, a standard specification servo motor may not be usable. Contact your local sales office for more details.
* 3. The vibration direction is shown in the diagram below. The numerical value indicates the maximum value of the component (commonly the bracket in the opposite direction of the servo motor shaft).
Fretting tends to occur on the bearing when the servo motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.

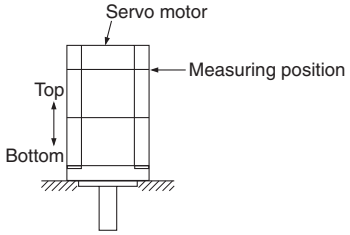


* 4. Refer to the diagram below for the permissible load for the shaft. Do not apply a load exceeding the value specified in the table on the shaft. The values in the table are applicable when each load is applied singly.

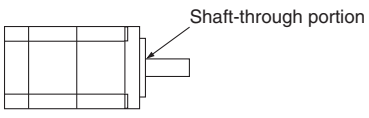


L: Distance between the flange mounting surface and the center of load

* 5. V10 indicates that the amplitude of the servo motor itself is 10 μm or less. The following shows mounting posture and measuring position of the servo motor during the measurement:

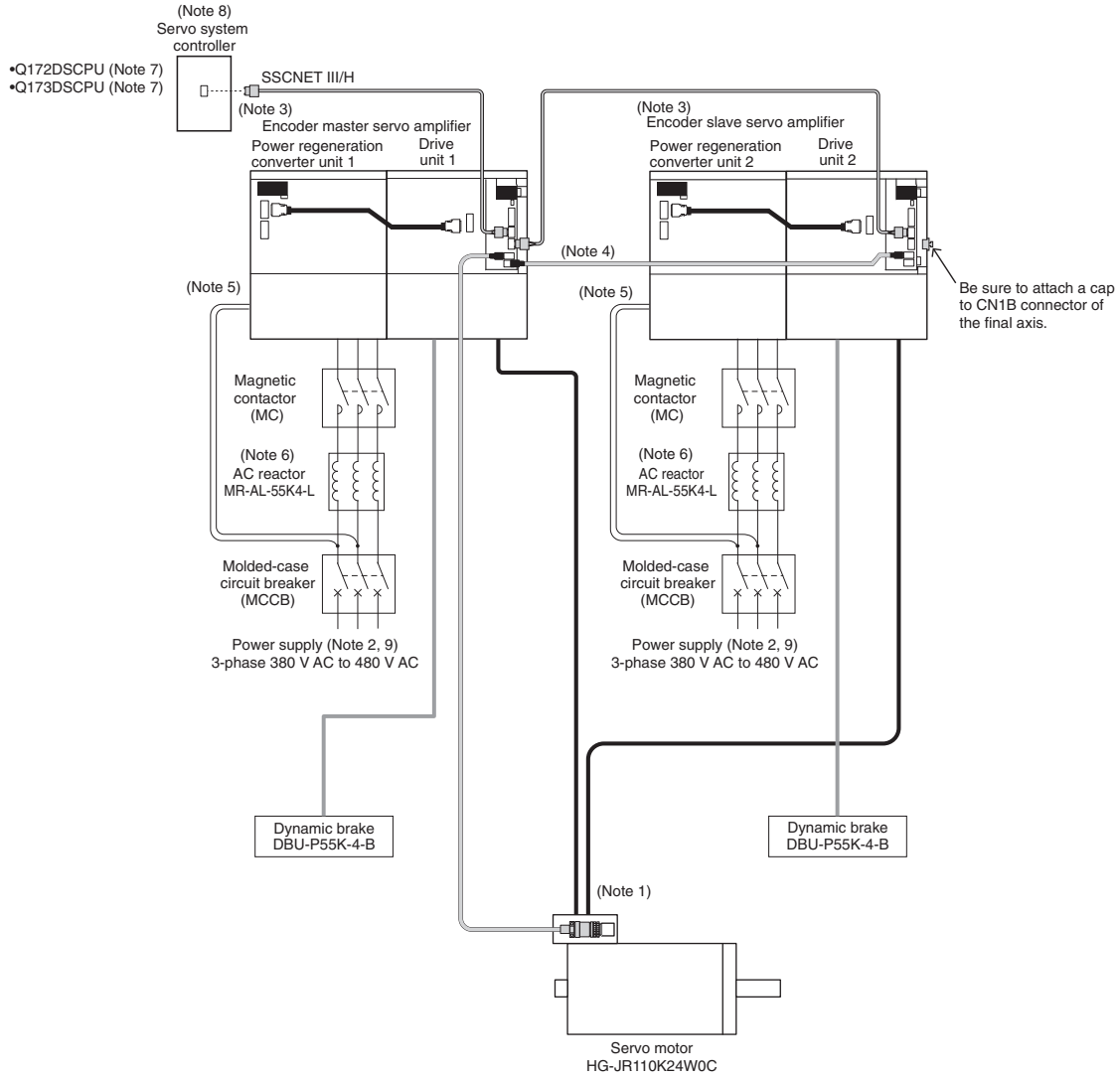


* 6. Refer to the diagram below for shaft-through portion.



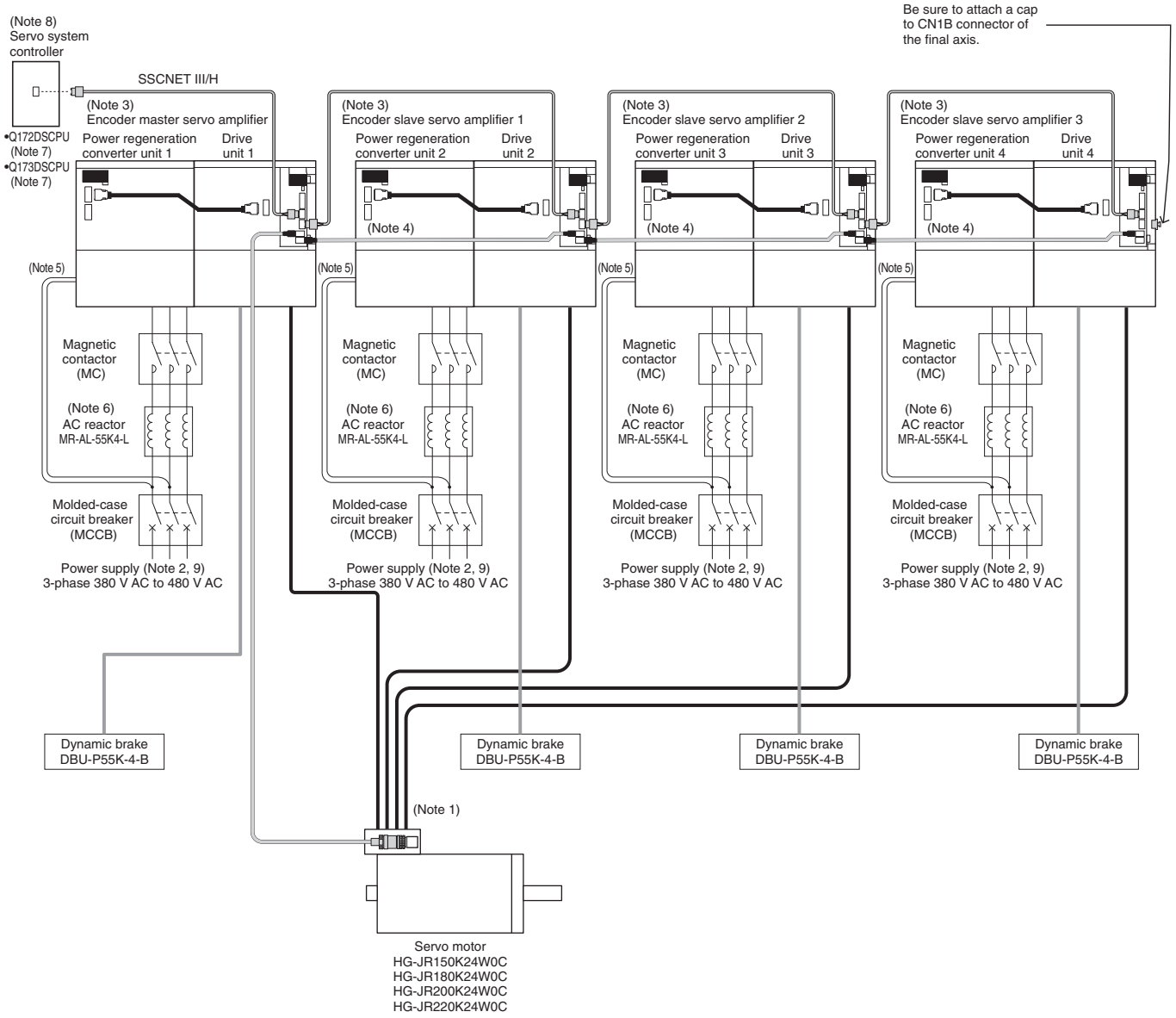
System Configurations

●For HG-JR110K24W0C



Notes: 1. Connect the grounding wire of the servo motor only to the first drive unit. If the grounding wire is connected to two drive units, circulating current may flow to the grounding wire, depending on the wiring situation. However, if the grounding wire has to be connected to the two drive units for safety reasons, be sure to twist the U, V and W wires of each drive unit.
2. For power supply, a molded-case circuit breaker, an AC reactor (MR-AL-55K4-L), and a magnetic contactor are required per power regeneration converter unit.
3. For SSCNET III/H connection, connect the encoder master servo amplifier closest to the Motion controller and then the encoder slave servo amplifier. Connect the encoder master servo amplifier and encoder slave servo amplifier in series on the same SSCNET III/H system.
4. Keep the encoder cable length between two drive units within 5 m.
5. Simultaneously turn on the control circuit power supplies of all the servo amplifiers (power regeneration converter units and drive units).
6. The AC reactor may be installed between the power regeneration converter unit and the magnetic contactor.
7. Special motion operating system is required. Refer to "Compatible Controllers" on p. 8 in this brochure. Contact your local sales office for more details.
8. Create a sequence that stops the servo motor with the controller forced stop when an alarm occurs.
9. All the servo amplifiers (power regeneration converter units and drive units) must be powered from a single power source. If power is supplied from different power sources, the output may be different between the encoder master servo amplifier and the encoder slave servo amplifier, causing the servo motor to be driven improperly.

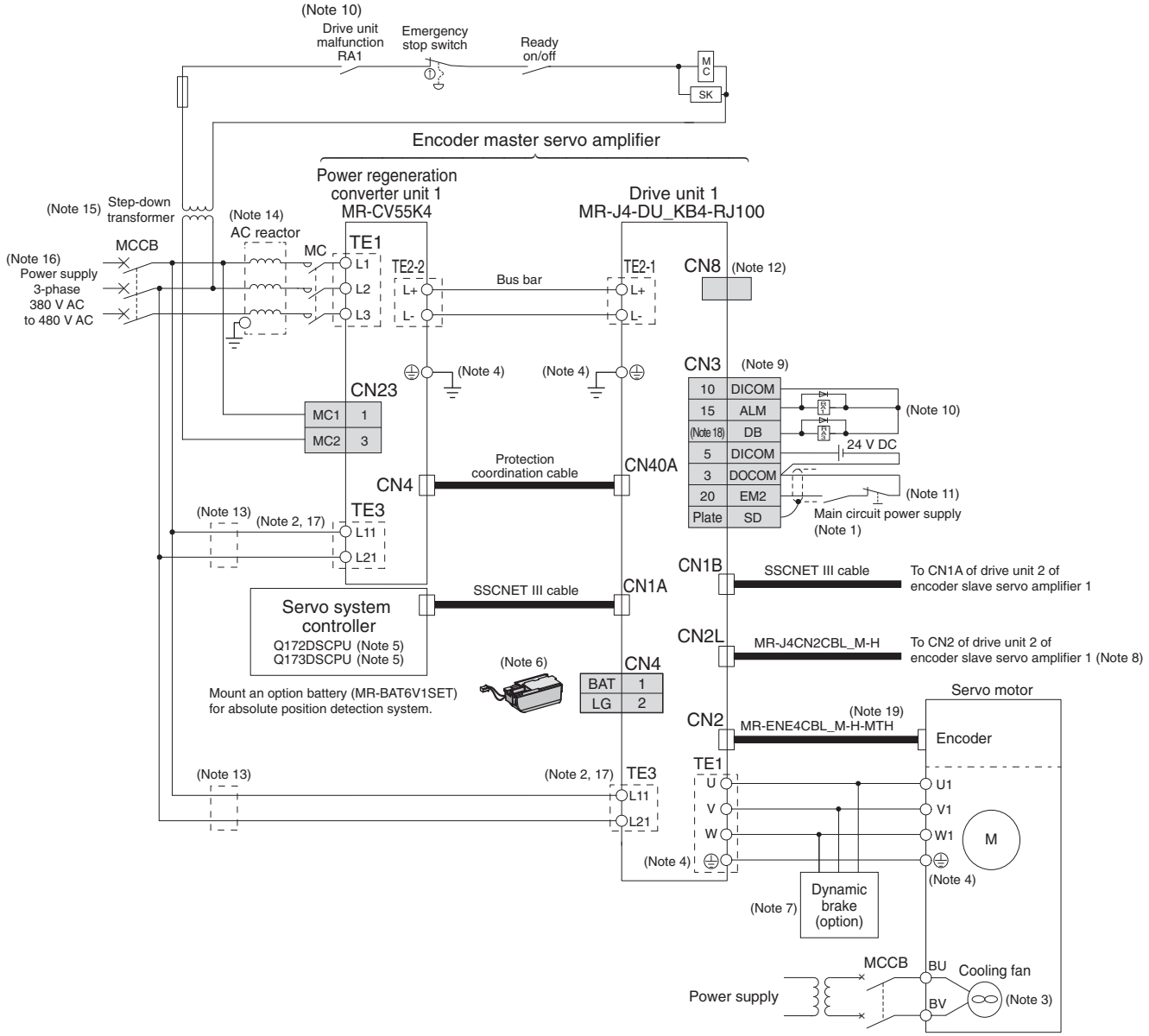
●For HG-JR150K24W0C/HG-JR180K24W0C/HG-JR200K24W0C/HG-JR220K24W0C



Notes: 1. Connect the grounding wire of the servo motor only to the first drive unit. If the grounding wire is connected to two or more drive units, circulating current may flow to the grounding wire, depending on the wiring situation. However, if the grounding wire has to be connected to the two or more drive units for safety reasons, be sure to twist the U, V and W wires of each drive unit.
2. For power supply, a molded-case circuit breaker, an AC reactor (MR-AL-55K4-L), and a magnetic contactor are required per power regeneration converter unit.
3. For SSCNET III/H connection, connect the encoder master servo amplifier closest to the Motion controller and then the encoder slave servo amplifiers. Connect the encoder master servo amplifier and encoder slave servo amplifiers in series on the same SSCNET III/H system.
4. Keep the encoder cable length between two drive units within 5 m.
5. Simultaneously turn on the control circuit power supplies of all the servo amplifiers (power regeneration converter units and drive units).
6. The AC reactor may be installed between the power regeneration converter unit and the magnetic contactor.
7. Special motion operating system is required. Refer to "Compatible Controllers" on p. 8 in this brochure. Contact your local sales office for more details.
8. Create a sequence that stops the servo motor with the controller forced stop when an alarm occurs.
9. All the servo amplifiers (power regeneration converter units and drive units) must be powered from a single power source. If power is supplied from different power sources, the output may be different between the encoder master servo amplifier and the encoder slave servo amplifiers, causing the servo motor to be driven improperly.

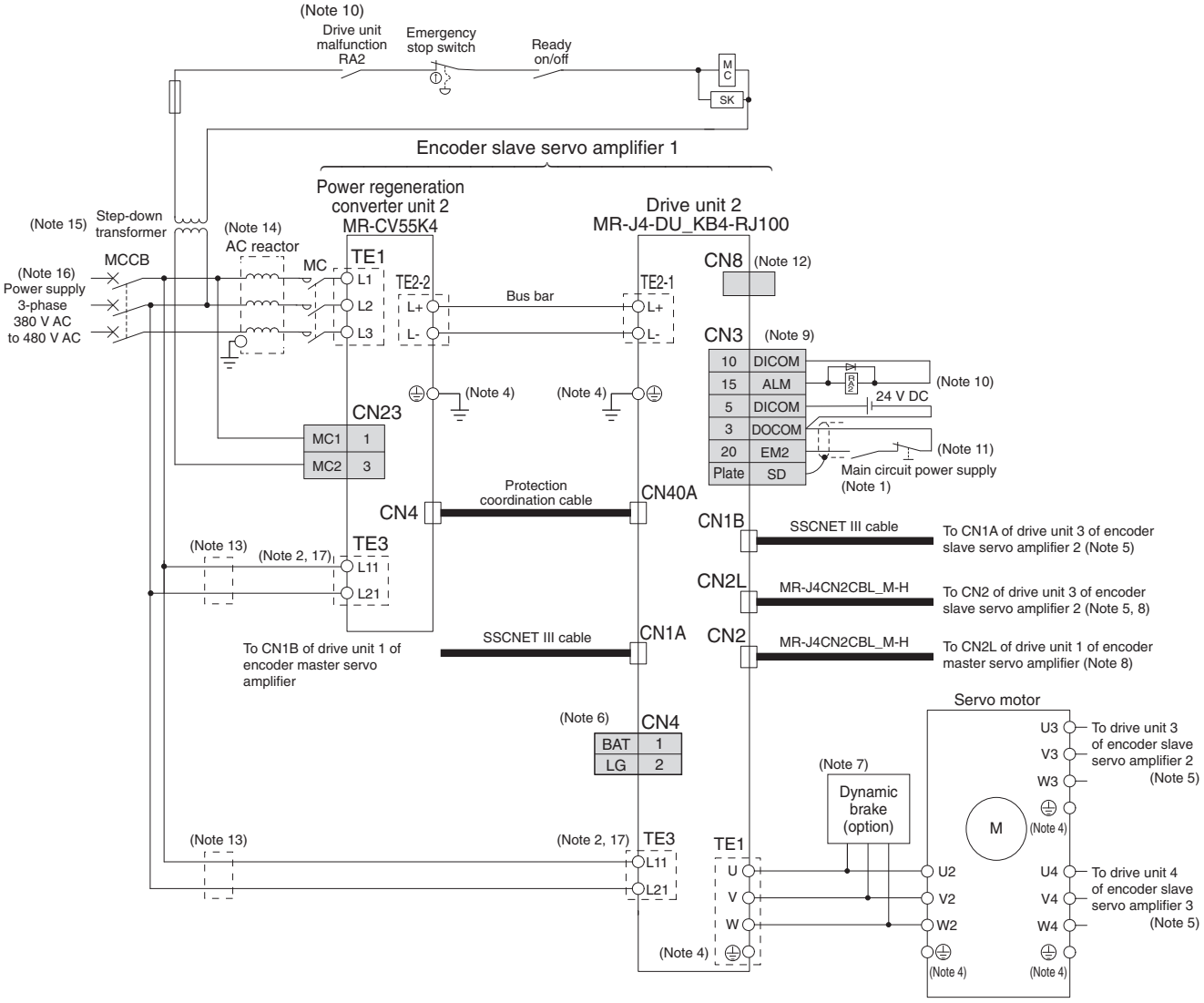
MR-J4-DU_KB4-RJ100 Standard Wiring Diagram Example

●Connection example for encoder master servo amplifier



Notes: 1. To prevent an unexpected restart of the drive unit, create a circuit to turn off EM2 (Forced stop 2) when the main circuit power is turned off.
2. The phases of the power supply connected to L11 and L21 on the power regeneration converter unit and the drive unit must always match the phases connected to L1 and L2. An incorrect connection may damage the drive unit and the power regeneration converter unit.
3. Be sure to supply power to the cooling fan terminals. For specifications of the cooling fan power supply and how to detect a failure, refer to "Servo Motor Instruction Manual (Vol. 3)".
4. Connect the grounding wire of the servo motor to the drive unit protective earth (PE) terminal. Put the grounding wires of the drive unit and the power regeneration converter unit together into one on the cabinet protective earth (PE) terminal, and then connect to ground. Connect the grounding wire of the servo motor only to the drive unit of the encoder master servo amplifier. If the grounding wire is connected to two or more drive units, circulating current may flow to the grounding wire, depending on the wiring situation. However, if the grounding wire has to be connected to the two or more drive units for safety reasons, be sure to twist the U, V and W wires of each drive unit.
5. Special motion operating system is required. Refer to "Compatible Controllers" on p. 8 in this brochure. Contact your local sales office for more details.
6. For absolute position detection system, connect an option battery only to the drive unit of the encoder master servo amplifier. Do not connect the battery to the drive units of the encoder slave servo amplifiers.
7. Use an external dynamic brake (option) with the drive unit. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Refer to "MR-J4-DU_B4-RJ100 Drive Unit Instruction Manual" when wiring the dynamic brake.
8. Encoder signals are distributed to all the drive units in the system via each drive unit.
9. This is for sink wiring. Source wiring is also possible.
10. Create a sequence that shuts off the main circuit power when an alarm occurs.
11. Create a circuit to turn on or off EM2 (Forced stop 2) of the drive units of the encoder master servo amplifier and encoder slave servo amplifiers simultaneously.
12. Be sure to attach a short-circuit connector supplied with the drive unit when the STO function is not used.
13. Install an overcurrent protection device (molded-case circuit breaker, fuse, etc.) to protect the branch circuit. Refer to "MR-CV_ MR-CR55K_ MR-J4-DU_B_(-RJ) MR-J4-DU_A_(-RJ) Instruction Manual" for details.
14. The AC reactor may be installed between the power regeneration converter unit and the magnetic contactor.
15. A step-down transformer is required if coil voltage of the magnetic contactor is in 200 V class.
16. All the servo amplifiers (power regeneration converter units and drive units) must be powered from a single power source. If power is supplied from different power sources, the output may be different between the encoder master servo amplifier and the encoder slave servo amplifiers, causing the servo motor to be driven improperly.
17. Simultaneously turn on the control circuit power supplies of all the servo amplifiers (power regeneration converter units and drive units).
18. The dynamic brake must be controlled by the drive unit of the encoder master servo amplifier. Assign DB (Dynamic brake interlock) with [Pr. PD07] to [Pr. PD09].
19. The encoder cable has thermistor signal wires. No additional wiring is required for the thermistor signal.

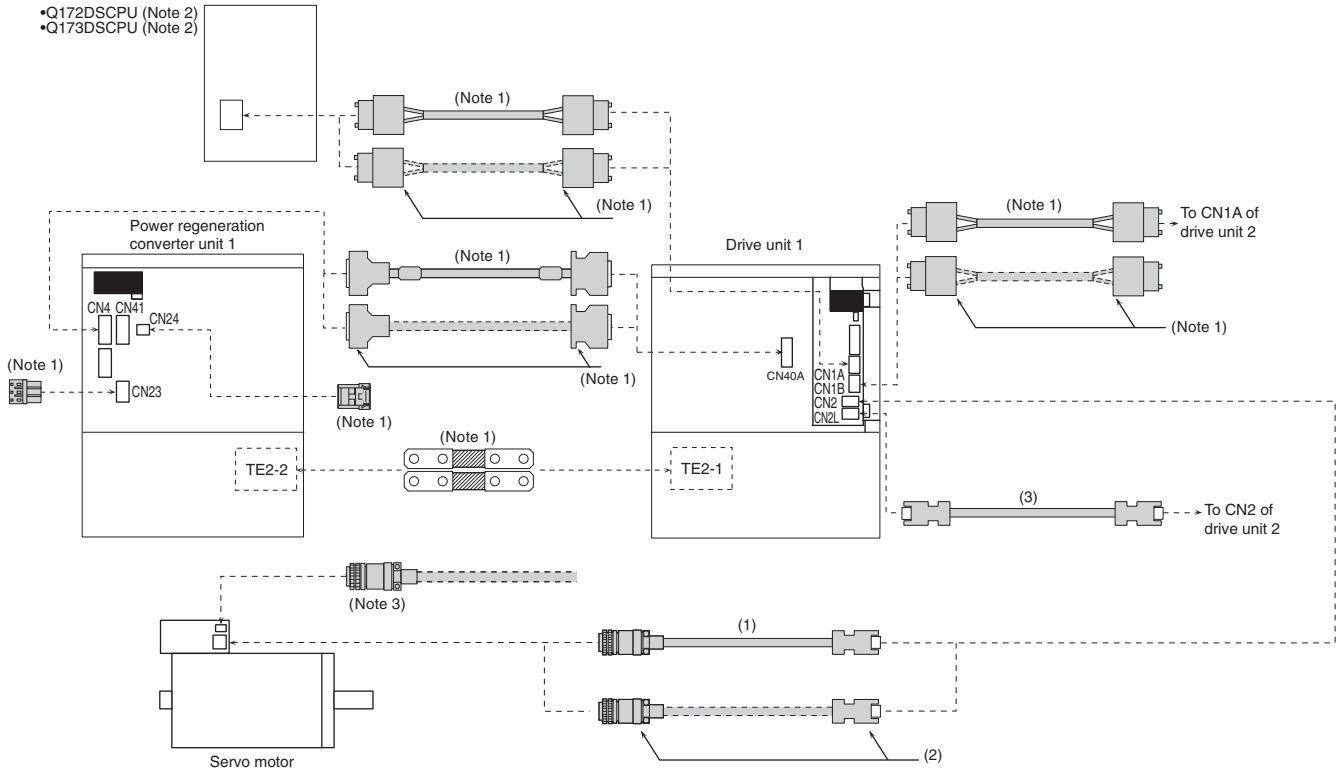
●Connection example for encoder slave servo amplifier (Note 3)



Notes: 1. To prevent an unexpected restart of the drive unit, create a circuit to turn off EM2 (Forced stop 2) when the main circuit power is turned off.
2. The phases of the power supply connected to L11 and L21 on the power regeneration converter unit and the drive unit must always match the phases connected to L1 and L2. An incorrect connection may damage the drive unit and the power regeneration converter unit.
3. This connection is an example for the encoder slave servo amplifier 1.
4. Connect the grounding wire of the servo motor to the drive unit protective earth (PE) terminal. Put the grounding wires of the drive unit and the power regeneration converter unit together into one on the cabinet protective earth (PE) terminal, and then connect to ground. Connect the grounding wire of the servo motor only to the drive unit of the encoder master servo amplifier. If the grounding wire is connected to two or more drive units, circulating current may flow to the grounding wire, depending on the wiring situation. However, if the grounding wire has to be connected to the two or more drive units for safety reasons, be sure to twist the U, V and W wires of each drive unit.
5. This diagram is applicable when HG-JR150K24W0C, HG-JR180K24W0C, HG-JR200K24W0C, or HG-JR220K24W0C servo motor is used. For HG-JR110K24W0C, connections to drive unit 3 and 4 are not required.
6. For absolute position detection system, connect an option battery only to the drive unit of the encoder master servo amplifier. Do not connect the battery to the drive units of the encoder slave servo amplifiers.
7. Use an external dynamic brake (option) with the drive unit. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Refer to "MR-J4-DU_B4-RJ100 Drive Unit Instruction Manual" when wiring the dynamic brake.
8. Encoder signals are distributed to all the drive units in the system via each drive unit.
9. This is for sink wiring. Source wiring is also possible.
10. Create a sequence that shuts off the main circuit power when an alarm occurs.
11. Create a circuit to turn on or off EM2 (Forced stop 2) of the drive units of the encoder master servo amplifier and encoder slave servo amplifiers simultaneously.
12. Be sure to attach a short-circuit connector supplied with the drive unit when the STO function is not used.
13. Install an overcurrent protection device (molded-case circuit breaker, fuse, etc.) to protect the branch circuit. Refer to "MR-CV_ MR-CR55K_ MR-J4-DU_B_(-RJ) MR-J4-DU_A_(-RJ) Instruction Manual" for details.
14. The AC reactor may be installed between the power regeneration converter unit and the magnetic contactor.
15. A step-down transformer is required if coil voltage of the magnetic contactor is in 200 V class.
16. All the servo amplifiers (power regeneration converter units and drive units) must be powered from a single power source. If power is supplied from different power sources, the output may be different between the encoder master servo amplifier and the encoder slave servo amplifiers, causing the servo motor to be driven improperly.
17. Simultaneously turn on the control circuit power supplies of all the servo amplifiers (power regeneration converter units and drive units).

Configuration Example

Except for encoder cables and cooling fan power connectors, connectors and cables are the same as those for the standard drive units and power regeneration converter unit. Refer to "MELSERVO-J4 catalog L(NA)03058".



Notes: 1. These options are the same as those for the standard drive units and power regeneration converter unit. Refer to "MELSERVO-J4 catalog L(NA)03058".
2. Special motion operating system is required. Refer to "Compatible Controllers" on p. 8 in this brochure. Contact your local sales office for more details.
3. Refer to "Products on the Market for Servo Motors" on p. 17 in this brochure for these connectors.

Cables and Connectors

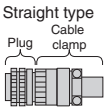
Encoder cables are not subject to European Low Voltage Directive (50 V AC to 1000 V AC and 75 V DC to 1500 V DC).

	Item	Model	Cable length	IP rating (Note 1)	Description
(1)	Encoder cable	MR-ENE4CBL5M-H-MTH	5 m	IP67	Encoder connector Plug: D/MS3106A-20-29S-BSS (with waterproof straight backshell) Cable clamp: CE3057-12A-3-D (DDK Ltd.) Drive unit connector Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex) 
		MR-ENE4CBL10M-H-MTH	10 m		
		MR-ENE4CBL20M-H-MTH	20 m		
		MR-ENE4CBL30M-H-MTH	30 m		
		MR-ENE4CBL40M-H-MTH	40 m		
		MR-ENE4CBL50M-H-MTH	50 m		
(2)	Encoder connector set	MR-ENECNS	-	IP67	Encoder connector Plug: D/MS3106A20-29S(D190) Backshell: CE02-20BS-S-D (straight) Cable clamp: CE3057-12A-3-D (DDK Ltd.) Drive unit connector Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)   Applicable cable Wire size: 0.3 mm² to 1.25 mm² (AWG 22 to 16) Cable OD: 6.8 mm to 10 mm
(3)	Encoder cable between drive units (Note 2)	MR-J4CN2CBL1M-H	1 m	-	Drive unit connector Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex) Drive unit connector Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex) 
		MR-J4CN2CBL2M-H	2 m		
		MR-J4CN2CBL3M-H	3 m		
		MR-J4CN2CBL5M-H	5 m		

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Use these dedicated encoder cables between drive units. Using other cables than dedicated cables may lead to device failure.

Products on the Market for Servo Motors

Contact the relevant manufacturers directly. When fabricating a cable with the following connectors, refer to the relevant manufacturers' instruction manuals for wiring and assembling procedures.



Cooling fan power connector for HG-JR 2000 r/min series (IP67 rated)

Applicable servo motor	Feature (Note 1)	Plug (DDK Ltd.)	Cable clamp (with backshell) (Nippon Flex Co., Ltd.)		Applicable cable example	
		Model	Type	Model	Wire size (Note 2)	Cable OD [mm]
HG-JR110K24W0C HG-JR150K24W0C HG-JR180K24W0C HG-JR200K24W0C HG-JR220K24W0C	IP67	CE05-6A10SL-3SC-D	Straight	ACS-10RL-MS10F	0.3 mm^2 to 1.25 mm^2 (AWG 22 to 16)	6 to 10

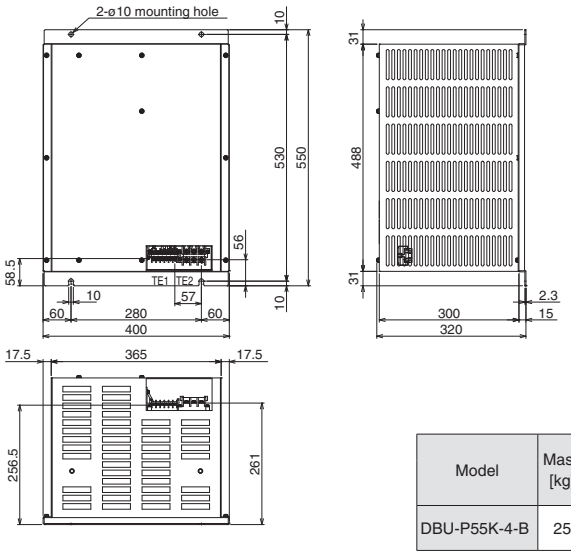
Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. The wire size shows wiring specification of the connector.

Dynamic Brake (DBU-P55K-4-B)

Use the following option external dynamic brake with the drive unit.
Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.

Dimensions

[Unit: mm]



TE1

		a	b	13	14

Terminal screw size: M3.5

TE2

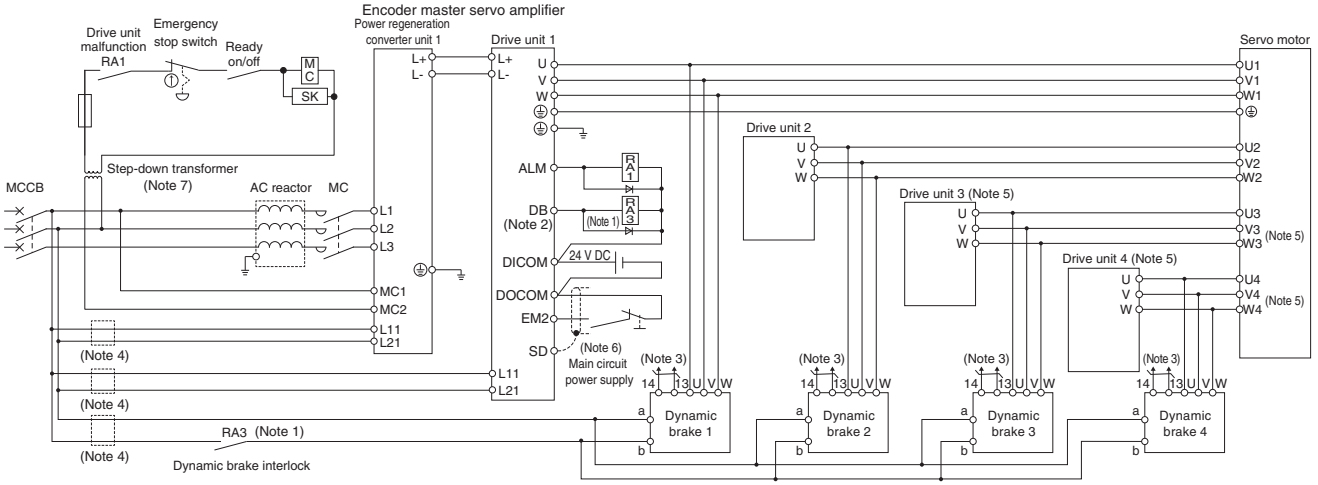
U	V	W

Terminal screw size: M5

Mounting screw size
M8

Model	Mass [kg]	Wire size [mm^2] (Note 8)	
		U, V, W	Other than U, V, and W
DBU-P55K-4-B	25	14 (AWG 6)	2 (AWG 14)

Connections



Notes: 1. The dynamic brake must be controlled by the drive unit of the encoder master servo amplifier.
2. Assign DB (Dynamic brake interlock) with [Pr. PD07] to [Pr. PD09].
3. The terminals 13 and 14 are normally opened outputs. If the dynamic brake is welded, the terminals 13 and 14 will be opened. Thus, create an external sequence circuit so that SON (Servo-on) does not turn on when the terminals 13 and 14 are opened.
4. Install an overcurrent protection device (molded-case circuit breaker, fuse, etc.) to protect the branch circuit. Refer to "MR-CV_ MR-CR55K_ MR-J4-DU_B_(-RJ) MR-J4-DU_A_(-RJ) Instruction Manual" for details.
5. This diagram is applicable when HG-JR150K24W0C, HG-JR180K24W0C, HG-JR200K24W0C, or HG-JR220K24W0C servo motor is used. For HG-JR110K24W0C, connections to drive unit 3 and 4 are not required.
6. To prevent an unexpected restart of the drive unit, create a circuit to turn off EM2 (Forced stop 2) when the main circuit power is turned off.
7. A step-down transformer is required if coil voltage of the magnetic contactor is in 200 V class.
8. The wire size is applicable when 600 V grade heat-resistant polyvinyl chloride insulated wire (HIV wires) is used.

Wires, Molded-Case Circuit Breakers, and Magnetic Contactors (Example of Selection)

The following are examples of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) with a length of 30 m are used.

Use non-halogen, flame-retardant, flexible, cross-linked polyethylene insulated electric wires for U, V, W, and ⏚ of the servo motor.

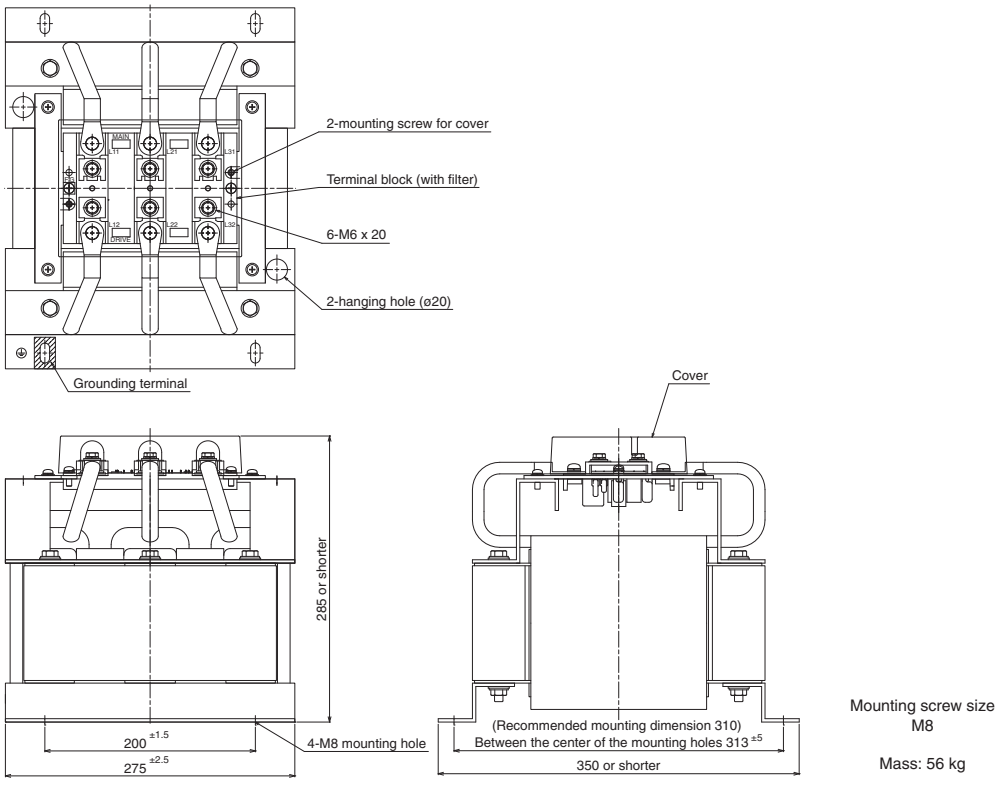
Servo motor model (Note 1)	Drive unit model (Note 1)	Converter unit model (Note 1)	Wire size [mm^2] (Note 3)			
			L1, L2, L3, ⏚	L11, L21	U, V, W, ⏚	BU, BV, ⏚
HG-JR110K24W0C	MR-J4-DU55KB4-RJ100	MR-CV55K4	38 (AWG 2)	2 (AWG 14)	38 (AWG 2)	0.75 (AWG 18)
HG-JR150K24W0C	MR-J4-DU45KB4-RJ100	MR-CV55K4	38 (AWG 2)	2 (AWG 14)	38 (AWG 2)	0.75 (AWG 18)
HG-JR180K24W0C	MR-J4-DU45KB4-RJ100	MR-CV55K4	38 (AWG 2)	2 (AWG 14)	38 (AWG 2)	0.75 (AWG 18)
HG-JR200K24W0C	MR-J4-DU55KB4-RJ100	MR-CV55K4	38 (AWG 2)	2 (AWG 14)	38 (AWG 2)	0.75 (AWG 18)
HG-JR220K24W0C	MR-J4-DU55KB4-RJ100	MR-CV55K4	38 (AWG 2)	2 (AWG 14)	38 (AWG 2)	0.75 (AWG 18)

Servo motor model (Note 1)	Drive unit model (Note 1)	Converter unit model (Note 1)	Molded-case circuit breaker (Note 3, 4, 5)	Magnetic contactor (Note 2, 4)
HG-JR110K24W0C	MR-J4-DU55KB4-RJ100	MR-CV55K4	225 A frame 175 A	S-N150
HG-JR150K24W0C	MR-J4-DU45KB4-RJ100	MR-CV55K4	225 A frame 125 A	S-T100
HG-JR180K24W0C	MR-J4-DU45KB4-RJ100	MR-CV55K4	225 A frame 150 A	S-N125
HG-JR200K24W0C	MR-J4-DU55KB4-RJ100	MR-CV55K4	225 A frame 175 A	S-N150
HG-JR220K24W0C	MR-J4-DU55KB4-RJ100	MR-CV55K4	225 A frame 175 A	S-N150

Notes: 1. When connecting the wires to the terminal blocks, be sure to use the screws attached to the terminal blocks.
2. Be sure to use a magnetic contactor with an operation delay time of 80 ms or less. The operation delay time is the time interval from current being applied to the coil until closure of contacts.
3. When complying with IEC/EN/UL/CSA standard, refer to "MR-CV_/MR-CR_/MR-J4-DU_ Instructions and Cautions for Safe Use of AC Servos" enclosed with the converter unit and the drive unit.
4. Install one molded-case circuit breaker and one magnetic contactor for each power regeneration converter unit.
5. Use a molded-case circuit breaker having the operation characteristics equal to or higher than Mitsubishi Electric general-purpose products.

AC Reactor (MR-AL-55K4-L) (Note 1)

Dimensions [Unit: mm]



Notes: 1. MR-AL-55K4-L is for parallel drive. MR-AL-55K4 cannot be used.

MR-CV55K4 Power Regeneration Converter Unit Dimensions

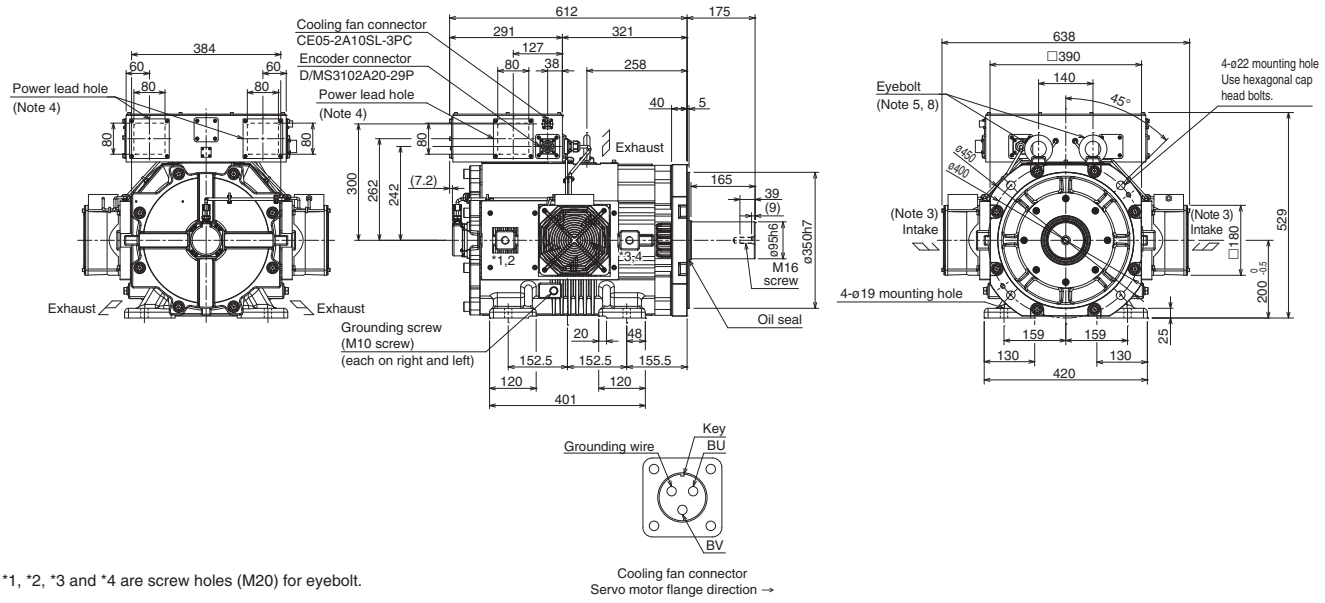
MR-J4-DU_KB4-RJ100 Drive Unit Dimensions

Panel Cut Dimensions for Power Regeneration Converter Unit and Drive unit

Refer to "MELSERVO-J4 catalog L(NA)03058" for the dimensions of these units and the panel cut.
The dimensions of MR-J4-DU_KB4-RJ100 are the same as those of MR-J4-DU_KB4-RJ.

HG-JR Series Dimensions (Note 1, 2, 6, 7)

●HG-JR110K24W0C



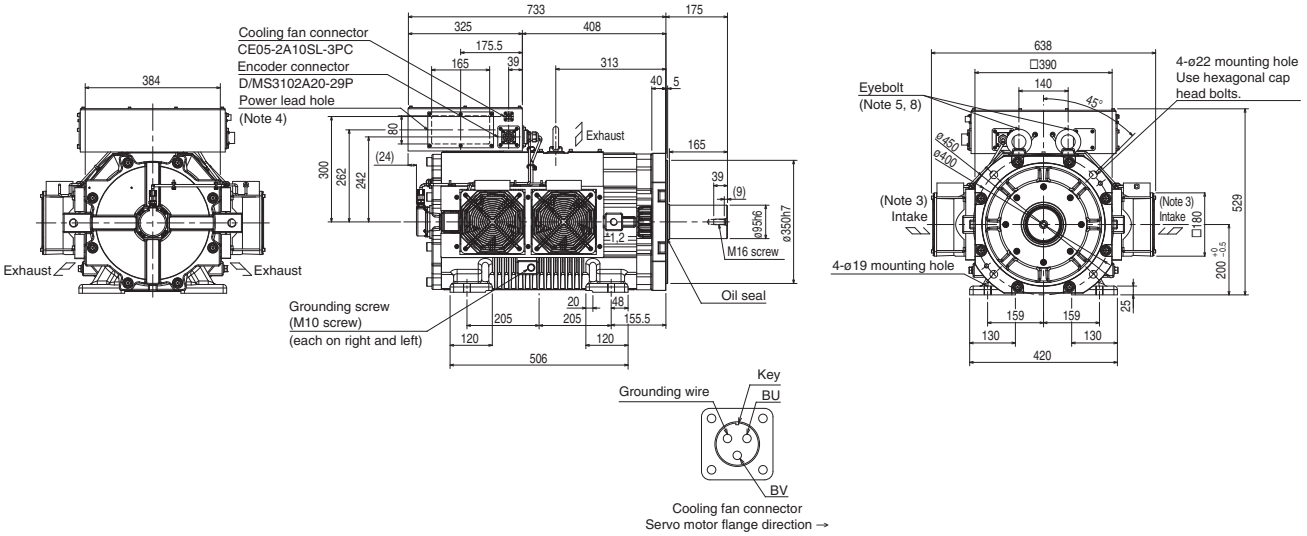
*1, *2, *3 and *4 are screw holes (M20) for eyebolt.

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. Use a friction coupling to fasten a load.
3. Leave a clearance of at least 300 mm between the intake side of the servo motor and wall.
4. Prevent oil, water, dust, and other foreign matter from entering the servo motor through the lead hole.
5. A washer is placed between the eyebolt and the servo motor to adjust the bolt angle.
6. The terminal block in the terminal box consists of M8 screws for the motor power input (U, V, and W).
7. The servo motor must be installed with the shaft end horizontal or downward. Do not install the servo motor with the shaft end upward. When mounting the servo motor with the shaft horizontal, fix the servo motor with the feet, keeping the feet downward. When mounting the servo motor with the shaft vertical, fix the servo motor with the flange and also fix the feet to support the servo motor.
8. When using the servo motor without the eyebolt, plug the threaded hole with a bolt of M20 × 25 or shorter.

HG-JR Series Dimensions (Note 1, 2, 6, 7)

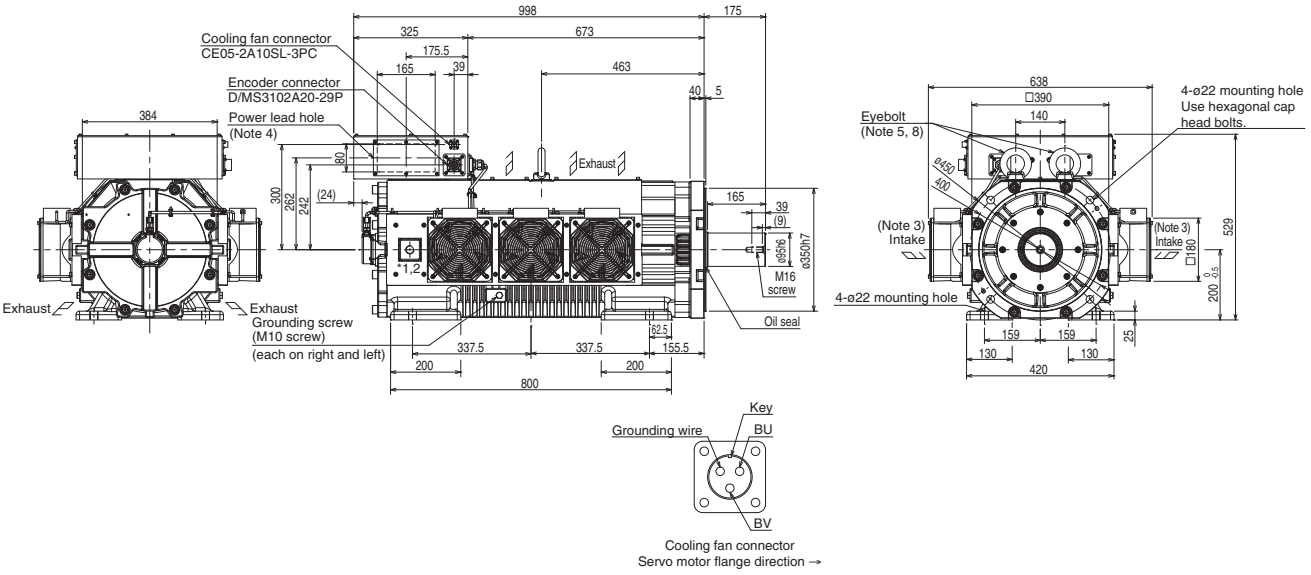
●HG-JR150K24W0C



*1 and *2 are screw holes (M30) for eyebolt.

[Unit: mm]

●HG-JR180K24W0C, HG-JR200K24W0C



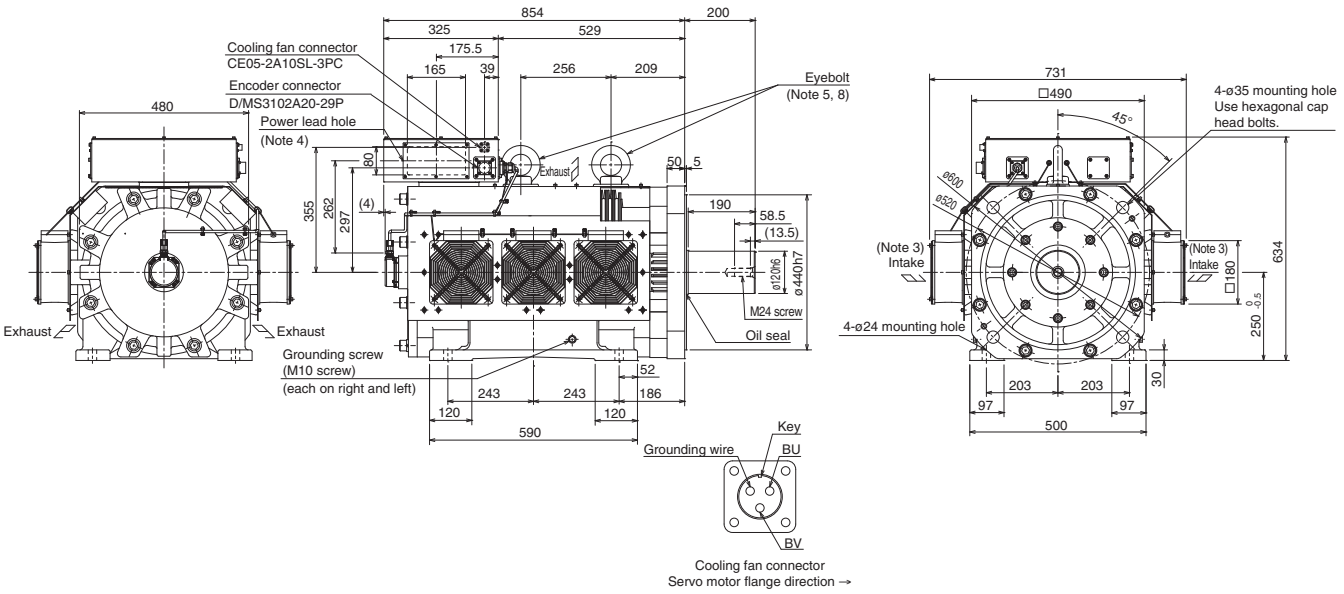
*1 and *2 are screw holes (M30) for eyebolt.

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. Use a friction coupling to fasten a load.
3. Leave a clearance of at least 300 mm between the intake side of the servo motor and wall.
4. Prevent oil, water, dust, and other foreign matter from entering the servo motor through the lead hole.
5. A washer is placed between the eyebolt and the servo motor to adjust the bolt angle.
6. The terminal block in the terminal box consists of M8 screws for the motor power input (U, V, and W).
7. The servo motor must be installed with the shaft end horizontal or downward. Do not install the servo motor with the shaft end upward. When mounting the servo motor with the shaft horizontal, fix the servo motor with the feet, keeping the feet downward. When mounting the servo motor with the shaft vertical, fix the servo motor with the flange and also fix the feet to support the servo motor.
8. When using the servo motor without the eyebolt, plug the threaded hole with a bolt of M30 × 45 or shorter.

HG-JR Series Dimensions (Note 1, 2, 6, 7)

●HG-JR220K24W0C



[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. Use a friction coupling to fasten a load.
3. Leave a clearance of at least 300 mm between the intake side of the servo motor and wall.
4. Prevent oil, water, dust, and other foreign matter from entering the servo motor through the lead hole.
5. A washer is placed between the eyebolt and the servo motor to adjust the bolt angle.
6. The terminal block in the terminal box consists of M8 screws for the motor power input (U, V, and W).
7. The servo motor must be installed with the shaft end horizontal or downward. Do not install the servo motor with the shaft end upward. When mounting the servo motor with the shaft horizontal, fix the servo motor with the feet, keeping the feet downward. When mounting the servo motor with the shaft vertical, fix the servo motor with the flange and also fix the feet to support the servo motor.
8. When using the servo motor without the eyebolt, plug the threaded hole with a bolt of M30 × 45 or shorter.

List of Instruction Manuals

Instruction Manuals for MELSERVO-J4 series are listed below.

Manual name	Manual No.
HG-MR HG-KR HG-SR HG-JR HG-RR HG-UR HG-AK Servo Motor Instruction Manual (Vol. 3)	SH-030113ENG
MR-J4-DU_B4-RJ100 Drive Unit Instruction Manual	SH-030280ENG
MR-J4-_B_(-RJ) Servo Amplifier Instruction Manual	SH-030106ENG
MR-CV_ MR-CR55K_ MR-J4-DU_B_(-RJ) MR-J4-DU_A_(-RJ) Instruction Manual	SH-030153ENG
MELSERVO-J4 Servo Amplifier Instruction Manual (Trouble Shooting)	SH-030109ENG
Functional safety unit MR-D30 Instruction Manual	SH-030132ENG

Product List

●Servo amplifiers

Item		Model	Rated output	Main circuit power supply
Drive unit MR-J4-DUB-RJ100	400 V class	MR-J4-DU45KB4-RJ100	45 kW	Main circuit power is supplied from the power regeneration converter unit to the drive unit.
		MR-J4-DU55KB4-RJ100	55 kW	

●Rotary Servo Motors

Item		Model	Rated output	Rated speed
Servo motors with functional safety HG-JR 2000 r/min series	400 V class	HG-JR110K24W0C	110 kW	2000 r/min
		HG-JR150K24W0C	150 kW	2000 r/min
		HG-JR180K24W0C	180 kW	2000 r/min
		HG-JR200K24W0C	200 kW	2000 r/min
		HG-JR220K24W0C	220 kW	2000 r/min

●Encoder cables

Item	Model	Length	IP rating	Application
Encoder cable	MR-ENE4CBL5M-H-MTH	5 m	IP67	For ultra-large capacity servo motor HG-JR110K24W0C HG-JR150K24W0C HG-JR180K24W0C HG-JR200K24W0C HG-JR220K24W0C
	MR-ENE4CBL10M-H-MTH	10 m	IP67	
	MR-ENE4CBL20M-H-MTH	20 m	IP67	
	MR-ENE4CBL30M-H-MTH	30 m	IP67	
	MR-ENE4CBL40M-H-MTH	40 m	IP67	
	MR-ENE4CBL50M-H-MTH	50 m	IP67	
Encoder cable between drive units	MR-J4CN2CBL1M-H	1 m	-	For ultra-large capacity servo motor HG-JR110K24W0C HG-JR150K24W0C HG-JR180K24W0C HG-JR200K24W0C HG-JR220K24W0C
	MR-J4CN2CBL2M-H	2 m	-	
	MR-J4CN2CBL3M-H	3 m	-	
	MR-J4CN2CBL5M-H	5 m	-	

●Peripheral units

Item	Model	Application
AC reactor	MR-AL-55K4-L	For MR-CV55K4 and MR-J4-DU_KB4-RJ100
Dynamic brake (for 400 V)	DBU-P55K-4-B	For ultra-large capacity servo motor HG-JR110K24W0C HG-JR150K24W0C HG-JR180K24W0C HG-JR200K24W0C HG-JR220K24W0C

●Motion controller software (special operating system software) (Note 1)

Item	Model	Application
Operating system software for MR-J4-DU_KB4-RJ100	SW8DNC-SV22S87QL	Special software for Q172DSCPU
	SW8DNC-SV22S87QJ	Special software for Q173DSCPU

Notes: 1. Ultra-large capacity servo motors cannot be driven with standard motion operating system. Contact your local sales office for more details.

Country/Region	Sales office	
USA	Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100
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Brazil	Mitsubishi Electric do Brasil Comercio e Servicos Ltda. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil	Tel : +55-11-4689-3000
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ISO 9001 BUREAU VERITAS Certification UKAS MANAGEMENT SYSTEMS 0008

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