MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-JE

Apply servos to all machines with reliable basic performance and advanced ease-of-use!

With Mitsubishi's commitment to total system solutions and global supports,
the MELSERVO-JE becomes the answer to the world-wide needs in driving control.

Fast, Trouble-Free Setup

Mitsubishi Electric's unique "Advanced one-touch tuning" enables servo gain adjustment with one-touch ease.
The increased tolerance against instantaneous power failure, the ease of maintenance, and the simple setup software would add further usability for all MELSERVO-JE users.

High-Precision Tuning

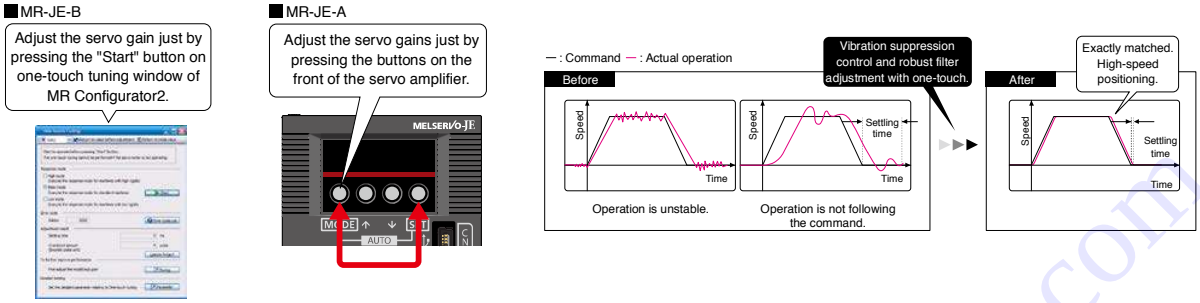
Servo gain adjustment with one-touch ease

JE-B JE-A

Advanced One-Touch Tuning Function

Servo gain adjustment is complete just by turning on the one-touch tuning function. With this function, machine resonance suppression filter, advanced vibration suppression control II*, and robust filter are automatically adjusted to maximize your machine performance.

* The advanced vibration suppression control II automatically adjusts one frequency.



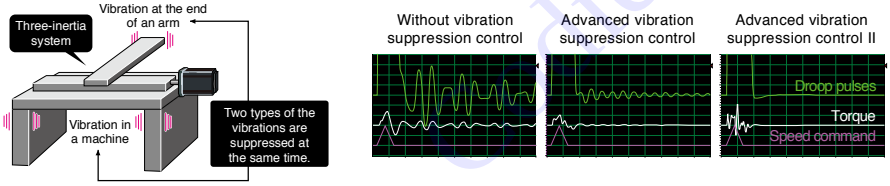
Suppress two types of low frequency vibrations at once

JE-B JE-A

Patent pending

Advanced Vibration Suppression Control II

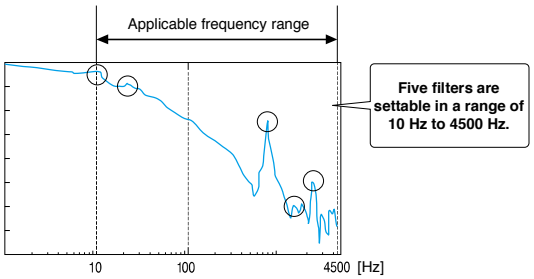
The advanced vibration suppression control II suppresses two types of low frequency vibrations owing to vibration suppression algorithm which supports three-inertia system. This function is effective in suppressing residual vibration generated at the end of an arm and in a machine, enabling a shorter settling time. Adjustment is easily performed on MR Configurator2.



Wide frequency range JE-B JE-A

Machine Resonance Suppression Filter

With advanced filter structure, applicable frequency range is expanded to between 10 Hz and 4500 Hz. Additionally, the number of simultaneously applicable filters is increased to five, improving vibration suppression performance of a machine.

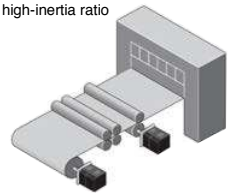


High responsivity and stability JE-B JE-A Patent pending

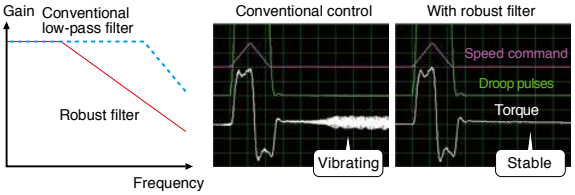
Robust Filter

Achieving both high responsivity and stability was difficult with the conventional control in high-inertia systems with belts and gears such as printing and packaging machines. Now, this function enables the high responsivity and the stability at the same time without adjustment. The robust filter gradually reduces the fluctuation of torque in wide frequency range and achieves more stability as compared to the prior model.

■ Machine with a high-inertia ratio



■ Robust filter

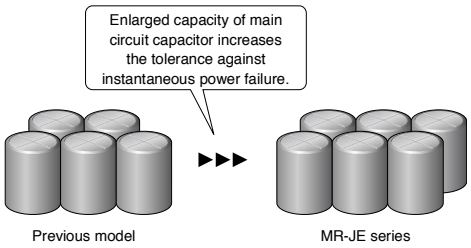


For Changes in Power Supply Environment

Reduce machine downtime JE-B JE-A

Large Capacity Main Circuit Capacitor

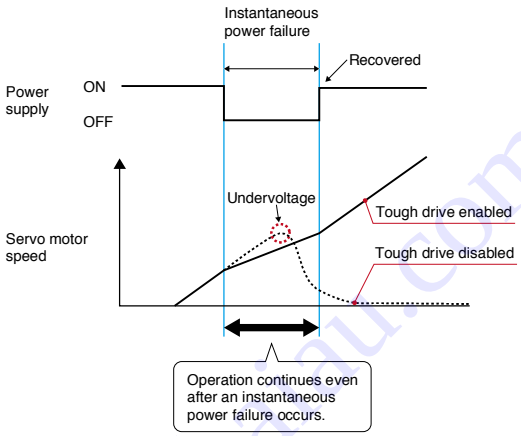
The capacity of main circuit capacitor is increased by 20% as compared to the previous model, increasing the tolerance against instantaneous power failure. The increased tolerance reduces machine downtime and then improves productivity.



Reduce undervoltage alarms JE-B JE-A

Instantaneous Power Failure Tough Drive

When an instantaneous power failure is detected, this function allows the servo amplifier to use the electric energy charged in the main circuit capacitor in the servo amplifier to avoid an alarm occurrence, increasing the machine availability even with an unstable power supply.

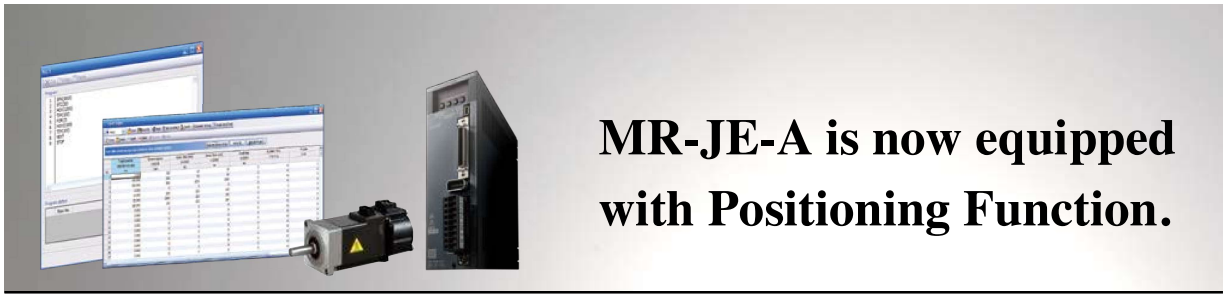


Wide power supply voltage input range JE-B JE-A

Compatible with 1-phase 200 to 240 V AC Input

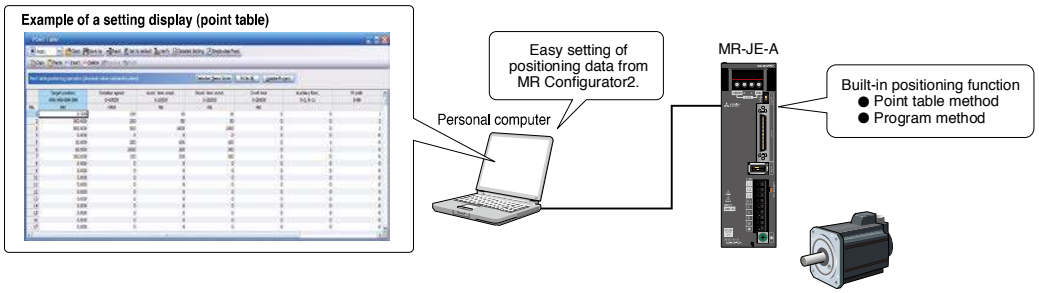
Servo amplifiers of 2 kW or smaller are compatible with power supply voltage of 1-phase 200 V AC to 240 V AC.

* When 1-phase 200 V AC to 240 V AC power supply is used with servo amplifiers of 1 kW and 2 kW, use the servo amplifiers with 75% or less of the effective load ratio. The servo amplifiers of 1 kW and 2 kW cannot be mounted closely when 1-phase power is input.



MR-JE-A is now equipped with Positioning Function.

Positioning operation with point table and program based methods became capable by built-in positioning function in MR-JE-A*1, allowing to configure positioning system without controller such as Positioning module.
Features:
- Equipped with simple cam, encoder following, and mark detection functions, making it possible to increase machine functionality.
- Command interface compatible with DIO or RS-422/RS-485 serial communication (maximum 32 axes)
- Easy setting of positioning data from MR Configurator2.



*1. Use MR-JE-A servo amplifiers with software version B7 or later when using the positioning function.

A Variety of Positioning Functions

Easy to set a positioning data

JE-A

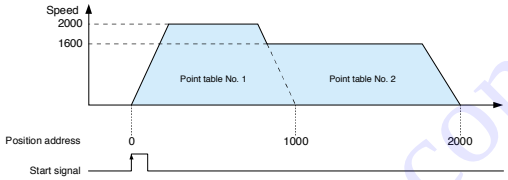
Point Table Method

Setting position data (target position), servo motor speed, and acceleration/deceleration time constants in point table is as easy as setting a parameter. Up to 31 points are settable for the point table. The positioning operation is performed with a start signal after selecting the point table No.

Point table example

Point table No.	Position data	Servo motor speed	Acceleration time constant	Deceleration time constant	Dwell	Sub function	M code
1	1000	2000	200	200	0	1	1
2	2000	1600	100	100	0	0	2
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
31	3000	3000	100	100	0	2	99

Operation



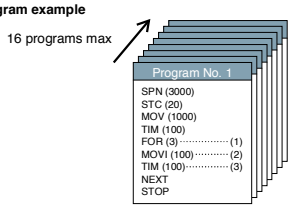
Easy operation by program

JE-A

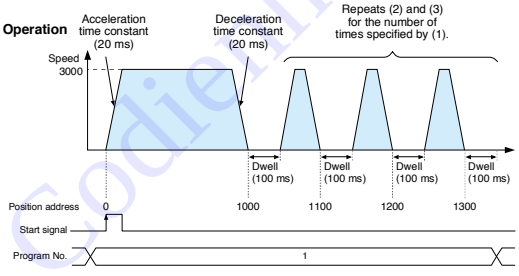
Program Method*

Create positioning programs with dedicated commands. The positioning operation is performed with a start signal after selecting the program No. The program method enables more complex positioning operation than the point table method. Maximum of 16 programs are settable. (The total number of steps of program: 480)

Program example



Operation

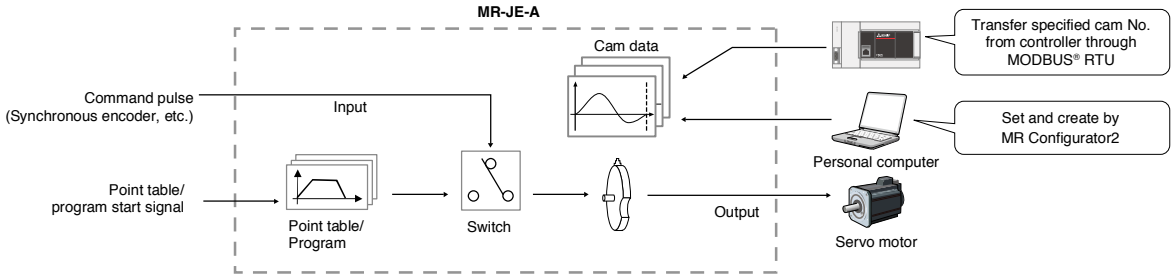


* MR Configurator2 is required to create programs.

Easy to create electronic cam JE-A

Simple Cam Function

Various patterns of cam data* can be created easily by using MR Configurator2. Command pulse or point table/program start signal can be used as input to the simple cam. The input command will be outputted to the servo motor according to the cam data.



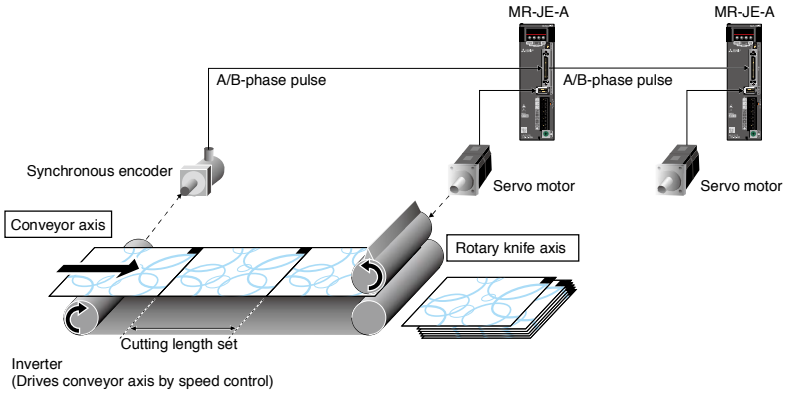
* Cam curve can be selected from 12 types (constant speed/constant acceleration/5th curve/single hypotenuse/cycloid/distorted trapezoid/distorted sine/distorted constant speed/trapecloid/reverse trapecloid/double hypotenuse/reverse double hypotenuse).

Synchronous operation by encoder signal input JE-A

Encoder Following Function/Command Pulse Input Through Function

With the encoder following function, the servo amplifier receives A/B-phase output signal from the synchronous encoder as command pulse, and the input command will be outputted to the servo motor according to the cam data. By setting cam data that matches with sheet length, a diameter of the rotary knife axis, and synchronous section of the sheet; a system in which the conveyor axis and the rotary knife axis are synchronized can be configured. Up to 4 Mpulses/s of input from synchronous encoder is compatible with the servo amplifier.

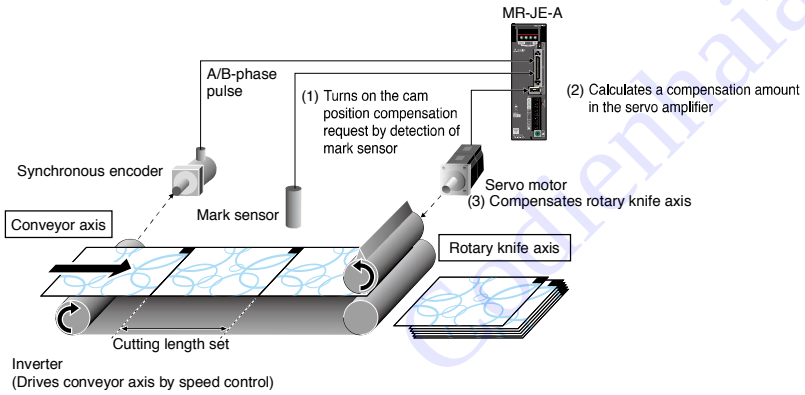
The command pulse input through function allows the first axis to output A/B-phase pulse from the synchronous encoder to the next axis, enabling a system the second and later axes are synchronized with the synchronous encoder.



Compensating a position gap by sensor input JE-A

Mark Sensor Input Compensation Function

The actual position of the servo motor can be obtained based on the inputs from the sensor that detects the registration marks printed on the high-speed moving film. The servo amplifier calculates compensation amounts and corrects position errors of the rotary knife axis based on those inputs from the sensor so that the film can be cut at the set position.



Positioning Using Communication Function

Compatible with MODBUS® protocol

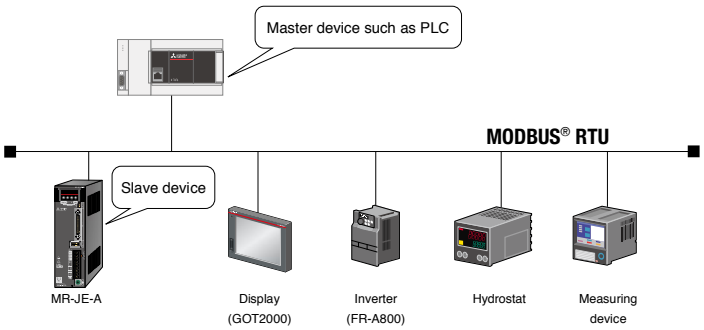
JE-A

Communication Function (MODBUS® RTU)

In addition to RS-422 communication (Mitsubishi general-purpose AC servo protocol), RS-485 communication (MODBUS® RTU protocol) is supported. MODBUS® RTU protocol is compatible with function code 03h (Read holding registers), etc. Controlling and monitoring the servo amplifier by external devices is possible.

Compatible function code

03h	Read holding registers
08h	Diagnostics
10h	Preset multiple registers



Point to Point positioning

While the point table is in operation, the next target position of the point table can be overwritten.

Current position latch

While the point table is in operation, the position data is latched by the mark detection function, and the current position latch function let the controller to obtain the latched data.

Easy Monitoring and Maintenance

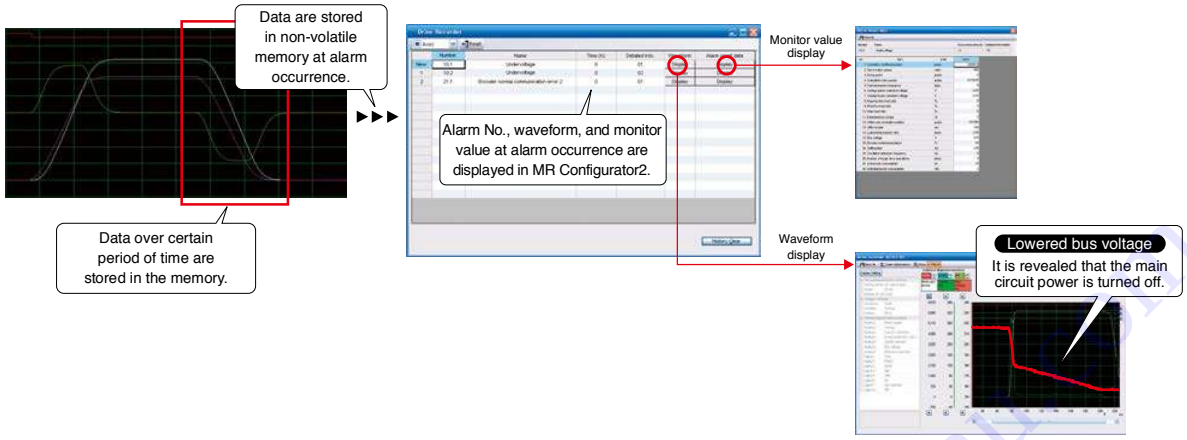
Analyze cause of alarm

JE-B JE-A

Patent pending

Large Capacity Drive Recorder

- Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of the servo amplifier. Reading the servo data on MELSOFT MR Configurator2 helps you analyze the cause of the alarm.
- Check the waveform ((analog 16 bits × 7 channels + digital 8 channels) × 256 points) and the monitor values of 16 alarms in the alarm history.

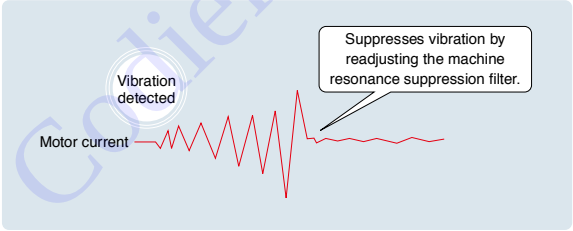


Reduce machine downtime incurred by age-related deterioration

JE-B JE-A

Vibration Tough Drive

Machine resonance suppression filter is automatically readjusted when a change in machine resonance frequency is detected by the servo amplifier. Losses from the machine stop due to age-related deterioration are reduced.



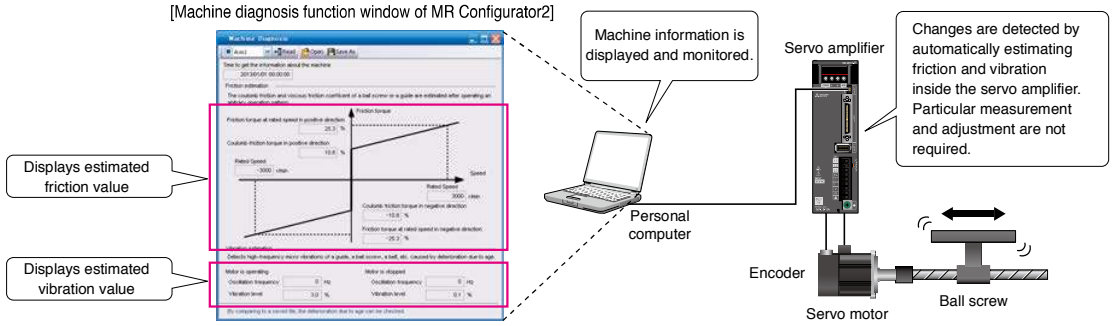
Support optimal maintenance of driving parts

JE-B JE-A

Patent pending

Machine Diagnosis Function

This function detects changes of machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier, supporting timely maintenance of the driving parts.



Easy troubleshooting

JE-B JE-A

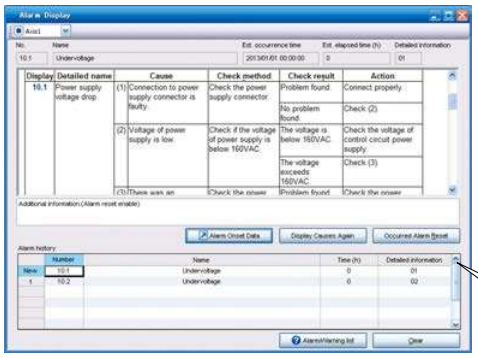
Three-Digit Alarm

MR-JE series displays the alarm No. in three digits to show the servo alarm in more details, making troubleshooting easy.

[Three-digit alarm display]

This display is of MR-JE-A.

[Example of an alarm window on MR Configurator2]



The alarm No. shows whether the undervoltage alarm was caused by instantaneous power failure or by lowered bus voltage in the servo amplifier.

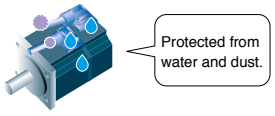
User-Friendly Motors

Even in severe environment

Improved Environment Safety

HG-KN series and HG-SN series are rated IP65 and IP67 respectively.

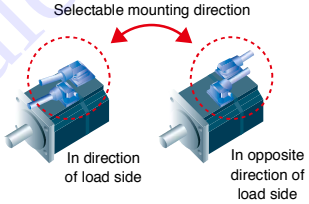
* The shaft-through portion is excluded.



Cable leading in both ways

Selectable Cable Leading Direction

The power cable, the encoder cable, and the electromagnetic brake cable are led out to either in direction of or in opposite direction of the load side, depending on the selected cables. (HG-KN series)



The easy-to-use design MR-JE series makes startup and adjustment that simple.

Servo setup software

MR Configurator2 (SW1DNC-MRC2-E)

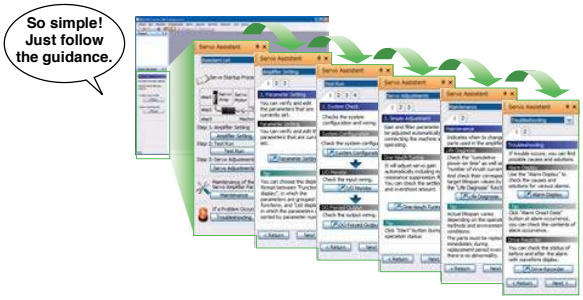
Tuning, monitor display, diagnosis, reading/writing parameters, and test operations are easily performed on a personal computer.
This startup support tool achieves a stable machine system, optimum control, and short setup time.

Preparation

Just follow the guidance, and setup is complete JE-B JE-A

Servo Assistant Function

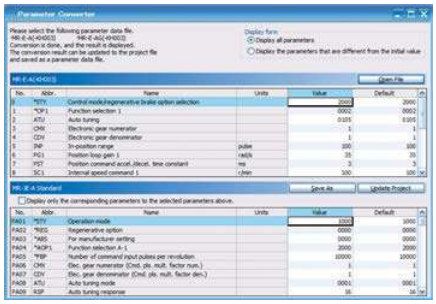
Complete setting up the servo amplifier just by following guidance displays. Setting parameters and tuning are easy since related functions are called up from shortcut buttons.



Supporting replacement from conventional system JE-A

Parameter Converter Function

With this function, parameter files for MR-E series or MR-E Super series are converted to those for MR-JE-A series.

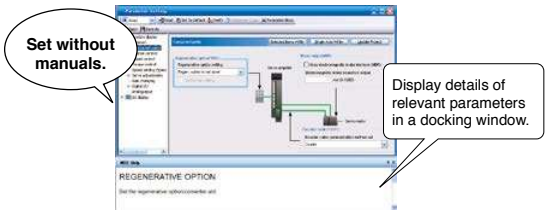


Setting and Start-up

Easy and fast parameter setting JE-B JE-A

Parameter Setting Function

Display parameter setting in list or visual formats, and set parameters by selecting from the drop down list. Set in-position range in mechanical system unit (e.g. μm). Parameter read/write time is approximately one tenth of the conventional time.



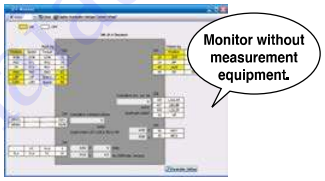
Visible operation and power status JE-B JE-A

Monitor Function

Monitor operation status on the [Display all] window. Check power consumption without any measurement equipment such as electric power meter, assign input/output signals, and monitor ON/OFF status on the [I/O monitor] window.

[Display all] window

[I/O monitor] window

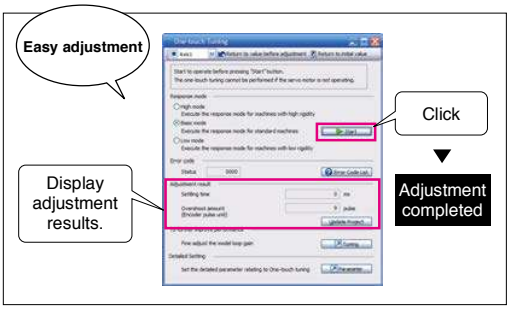


Servo Adjustment

Tuning is just one click away JE-B JE-A

One-Touch Tuning Function

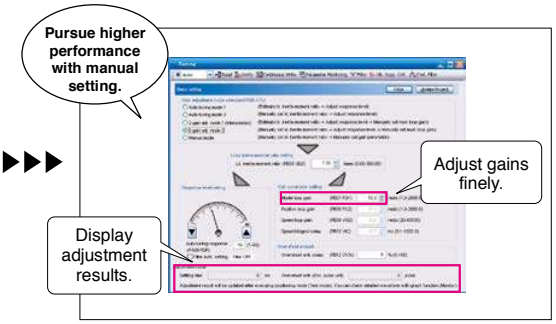
Adjustments including estimating load to motor inertia ratio, adjusting gain, and suppressing machine resonance are automatically performed for the maximum servo performance just by clicking the start button. Check the adjustment results of settling time and overshoot.



Fine tuning of loop gain JE-B JE-A

Tuning Function

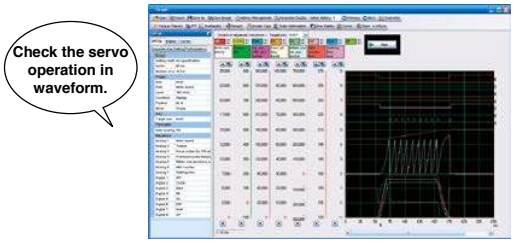
Adjust control gain finely on the [Tuning] window manually for further performance after the one-touch tuning.



Convenient with overwrite and graph history functions JE-B JE-A

Graph Function

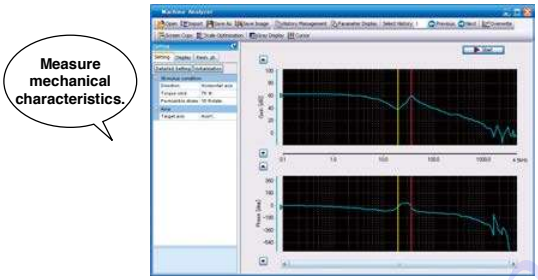
The number of measurement channels is increased to 7 channels for analog, and 8 channels for digital. Display various servo statuses in the waveform at one measurement, supporting setting and adjustment. Convenient functions such as [Overwrite] for overwriting multiple data and [Graph history] for displaying graph history are available.



Analyze the frequency characteristics JE-B JE-A

Machine Analyzer Function

Input random torque to the servo motor automatically and analyze frequency characteristics (0.1 Hz to 4.5 kHz) of a machine system just by clicking the [Start] button. This function supports setting of machine resonance suppression filter, etc.

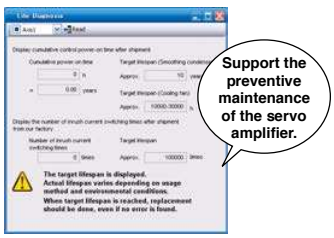


Maintenance

For timely parts replacement JE-B JE-A

Servo Amplifier Life Diagnosis Function

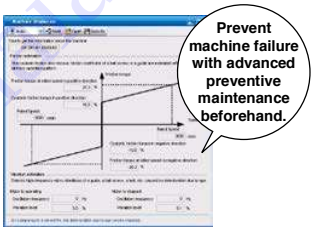
Check cumulative operation time and on/ off times of inrush relay. This function provides an indication of replacement time for servo amplifier parts such as capacitor and relays.



Find out the aging deterioration of machines JE-B JE-A Patent pending

Machine Diagnosis Function

This function estimates and displays machine friction and vibration in normal operation without any special measurement. Comparing the data of the first operation and after years of operation helps to find out the aging deterioration of a machine and is beneficial for preventive maintenance.



Further Reduction of Cycle Time

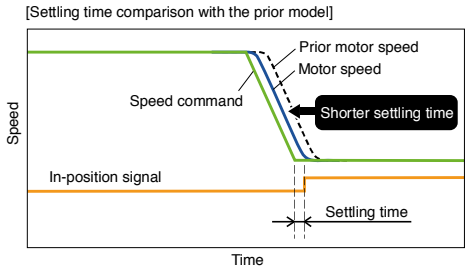
Top-level basic performance is achieved, including speed frequency response of 2.0 kHz.
The MELSERVO-JE series that utilizes regenerative energy maximizes the machine performance and energy saving.

Fast and Accurate

Class top-level speed frequency response JE-B JE-A

2.0 kHz Speed Frequency Response

The top-level speed frequency response of 2.0 kHz shortens the settling time substantially, reducing the cycle time of a machine.

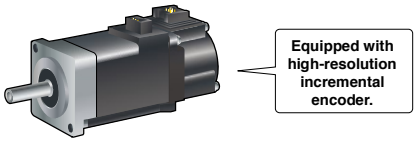


Exact positioning JE-B JE-A

High-Resolution Encoder

The servo motor equipped with an incremental encoder* of 131072 pulses/rev (17-bit) enables high-accuracy positioning and smooth rotation.

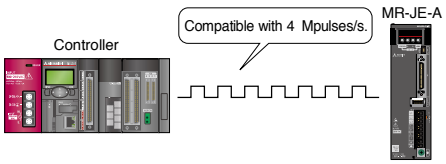
* MR-JE-A is not compatible with absolute position detection system.



Further smooth operation JE-A

Max Command Pulse Frequency of 4 Mpulses/s

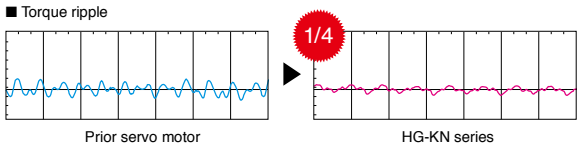
MR-JE-A having a general-purpose interface is compatible with the maximum command pulse frequency of 4 Mpulses/s, enabling smooth operation.



Smooth, constant-speed operation JE-B JE-A

Reduced Torque Ripple during Conduction

By optimizing the combination of the number of motor poles and the number of slots, torque ripple during conduction is greatly reduced. Smooth constant-velocity operation of a machine is achieved.



Compatible with pulse train and analog JE-A

Flexible Command Interface

The command interface of MR-JE-A is compatible with both pulse train command and analog voltage command. The MR-JE-A servo amplifier enables position control with pulse train command, and speed and torque control with analog voltage command.

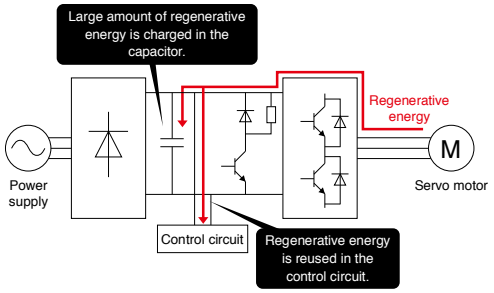
Eco-Friendly Performance

Reduce waste in energy consumption

JE-B JE-A

Efficient Utilization of Regenerative Energy

Capacity of the main circuit capacitor is increased by 20% as compared to that of the prior model, and thus the charging capacity is increased, enabling larger regenerative energy to be reused as driving power energy. Additionally, because the control circuit and the main circuit use a common power supply, the regenerative energy is also used for the control circuit, reducing waste in energy consumption.

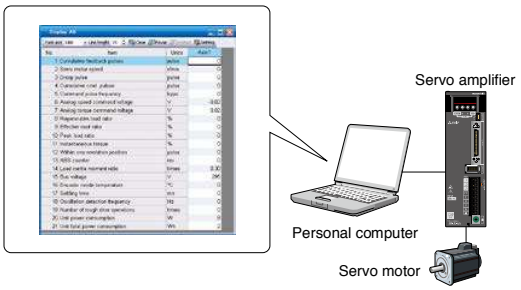


Visualize power consumption

JE-B JE-A

Power Monitor

Driving power and regenerative energy are calculated from the data in the servo amplifier such as speed and current, and the power consumption is monitored with MR Configurator2. Visualization of the power consumption helps to save energy.



Achieve further energy saving

JE-B JE-A

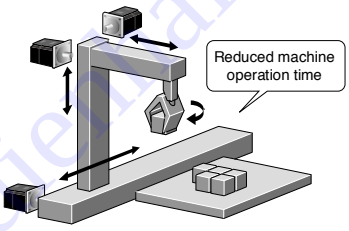
Saving Energy with Advanced Technologies

Reducing energy loss of the servo amplifier

Efficiency is increased by the use of a new power module. Energy loss of the servo amplifier itself is reduced.

Saving energy by improving machine performance

The servo amplifiers and the servo motors with the industry-leading level of high performance reduce machine cycle time and operation time, resulting less energy consumption.



Fully Compliant Worldwide

To satisfy growing needs in driving control throughout the world, the MR-JE series complies with global standards.
Command pulse input and digital input/output are compatible with both sink and source type connections.

Global Servo Meets Global Standards

Best quality all over the world

JE-B JE-A

Conformity with Global Standards and Regulations

Use the MR-JE series globally. The servo amplifiers and the servo motors conform to global standards as standard.

Conformity with global standards and regulations

		Servo amplifier	Servo motor
European EC directive	Low voltage directive	EN 61800-5-1	EN 60034-1
	EMC directive	EN 61800-3	EN 60034-1
	RoHS directive	Compliant	Compliant
UL standard		UL 508C	UL 1004-1 / UL 1004-6
CSA standard		CSA C22.2 No.14	CSA C22.2 No.100
Measures for Administration of the Pollution Control of Electronic Information Products (Chinese RoHS)		Compliant (optional cables and connectors)	Compliant (optional cables and connectors)
China Compulsory Certification (CCC)		N/A	N/A
Korea Radio Wave Law (KC)		Compliant	N/A

*1. Refer to "Servo Amplifier Instruction Manual" and "EMC Installation Guidelines" when your system needs to meet the EMC directive.
*2. When exporting the product, follow the local laws and regulations.

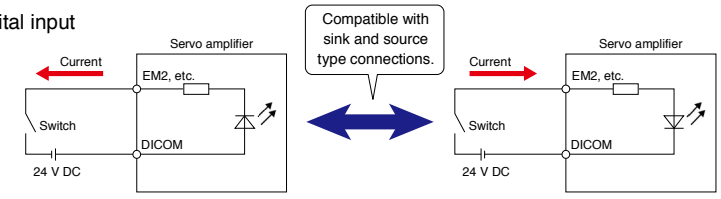
Flexible connections for the global use

JE-B JE-A

Sink and Source Connections

Command pulse input and digital input/output are compatible with both sink and source type connections.

■ Example of digital input



Sink input　　Source input

MELSERVO-JE

● Servo Amplifiers

Servo Amplifier Model Designation

B A

M R - J E - 1 0 B

Mitsubishi general-purpose AC servo amplifier MELSERVO-JE Series

Symbol	Rated output [kW]
10	0.1
20	0.2
40	0.4
70	0.75
100	1
200	2
300	3

Symbol	Interface
B	SSCNET III/H
A	General-purpose

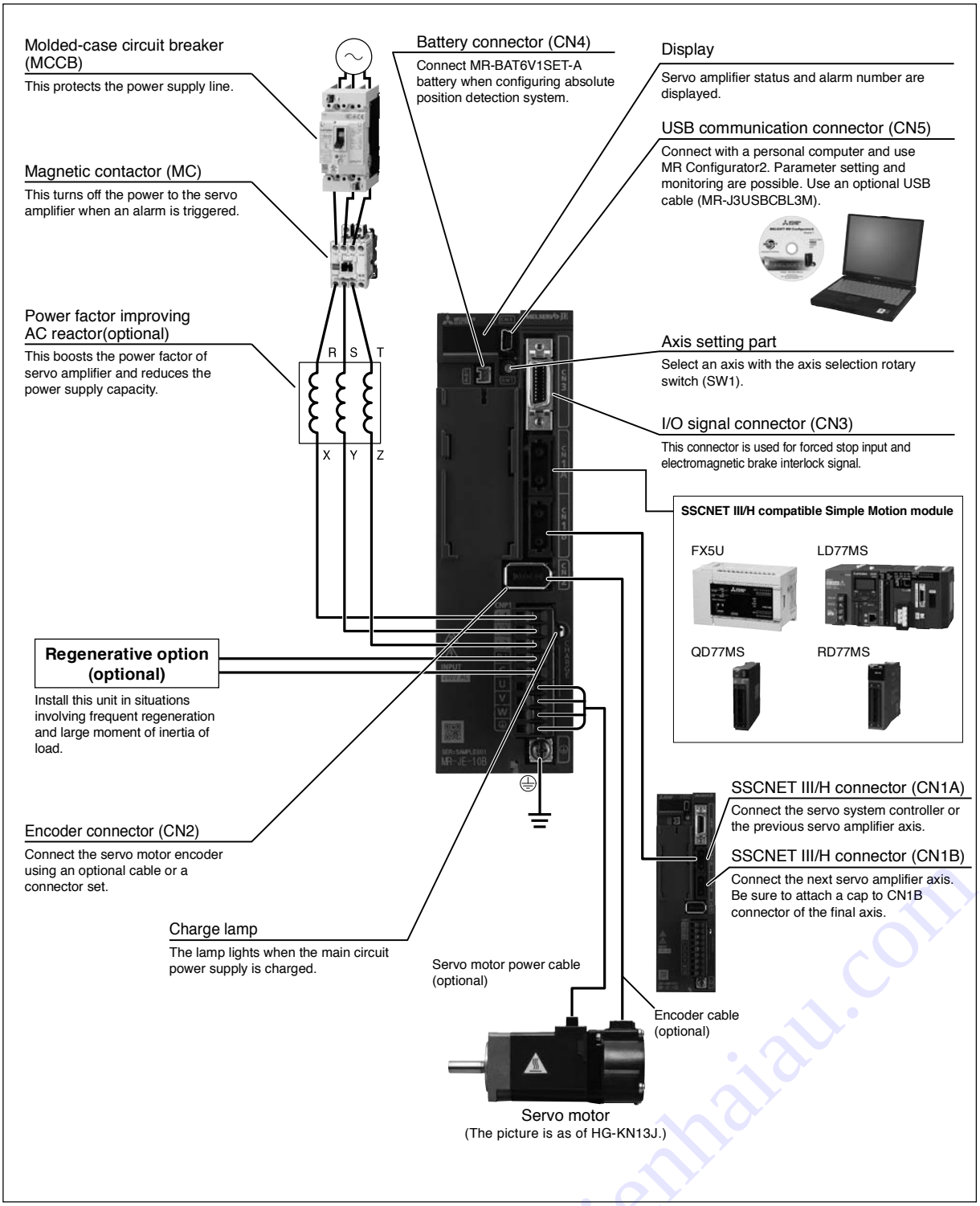
Combinations of Servo Amplifier and Servo Motor

B A

Servo amplifier	Servo motor	
	HG-KN series	HG-SN series
MR-JE-10B/MR-JE-10A	HG-KN13J	-
MR-JE-20B/MR-JE-20A	HG-KN23J	-
MR-JE-40B/MR-JE-40A	HG-KN43J	-
MR-JE-70B/MR-JE-70A	HG-KN73J	HG-SN52J
MR-JE-100B/MR-JE-100A	-	HG-SN102J
MR-JE-200B/MR-JE-200A	-	HG-SN152J, HG-SN202J
MR-JE-300B/MR-JE-300A	-	HG-SN302J

MR-JE-B Connections with Peripheral Equipment (Note 1) B

Peripheral equipment is connected to MR-JE-B as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-JE-100B or smaller servo amplifiers. Refer to "MR-JE-_B Servo Amplifier Instruction Manual" for the actual connections.

MR-JE-B (SSCNET III/H Interface) Specifications

B

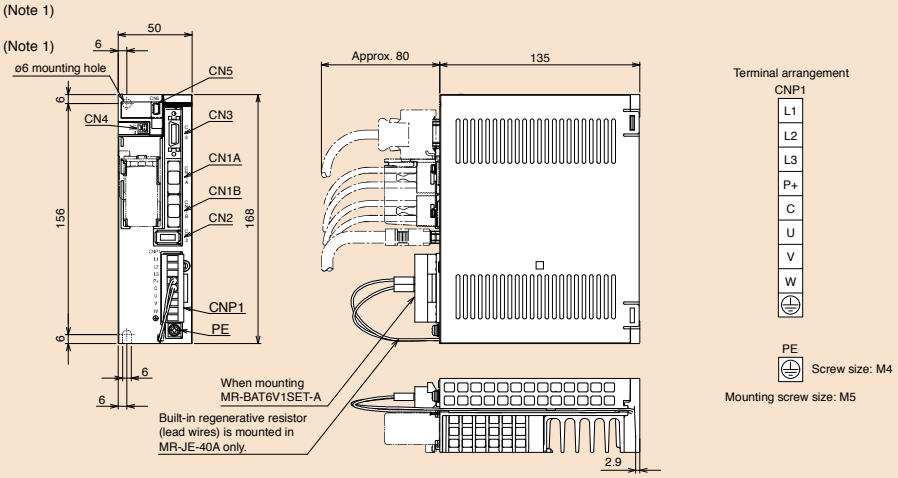
Servo amplifier model MR-JE-		10B	20B	40B	70B	100B	200B	300B
Output	Rated voltage	3-phase 170 V AC						
	Rated current [A]	1.1	1.5	2.8	5.8	6.0	11.0	11.0
Power supply input	Voltage/frequency (Note 1)	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 8)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 7) [A]	0.9	1.5	2.6	3.8	5.0	10.5	14.0
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC (Note 8)		3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation	±5% maximum						
Interface power supply		24 V DC ± 10% (required current capacity: 0.1 A)						
Control method		Sine-wave PWM control/current control method						
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3) [W]		-	-	10	20	20	100	100
Dynamic brake		Built-in (Note 4)						
SSCNET III/H command communication cycle (Note 6)		0.444 ms, 0.888 ms						
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)						
Servo function		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit function, machine diagnosis function, power monitoring function, lost motion compensation function						
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, hotline forced stop function (Note 9)						
Compliance to global standards		Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.						
Structure (IP rating)		Natural cooling, open (IP20)					Force cooling, open (IP20)	
Close mounting (Note 5)	3-phase power supply input	Possible						
	1-phase power supply input	Possible				Not possible		-
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)						
	Ambient humidity	Operation/Storage: 90 %RH maximum (non-condensing)						
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude	1000 m or less above sea level						
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)						
Mass [kg]		0.8	0.8	0.8	1.5	1.5	2.1	2.1

Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the tolerable regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-JE-_B Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
5. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use them with 75% or less of the effective load ratio.
6. The command communication cycle depends on the controller specifications and the number of axes connected.
7. This value is applicable when a 3-phase power supply is used.
8. When a 1-phase 200 V AC to 240 V AC power supply is used, use the servo amplifiers with 75% or less of the effective load ratio.
9. When an alarm occurs on MR-JE-B servo amplifier, the hot line forced stop signal will be sent to other servo amplifiers through a controller, and all the servo motors that are operated normally by MR-JE-B servo amplifiers decelerate to a stop. Refer to "MR-JE-_B Servo Amplifier Instruction Manual" for details.

MR-JE-B Dimensions

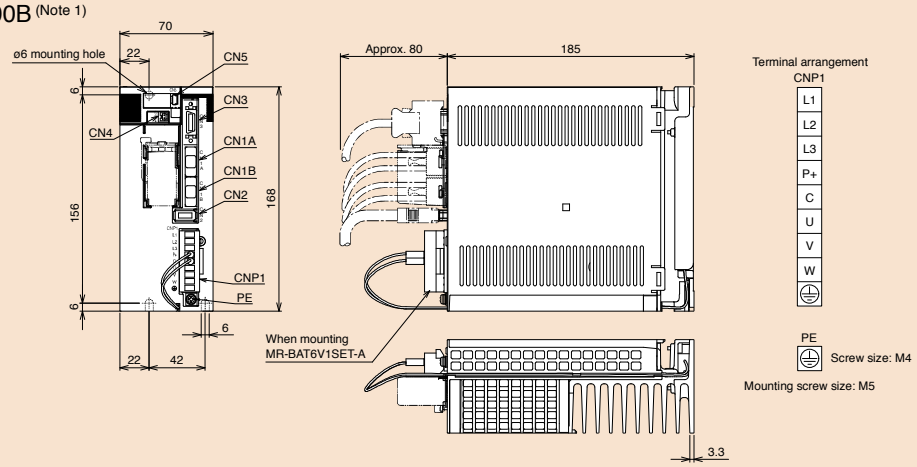
B

● MR-JE-10B (Note 1)
● MR-JE-20B (Note 1)
● MR-JE-40B (Note 1)



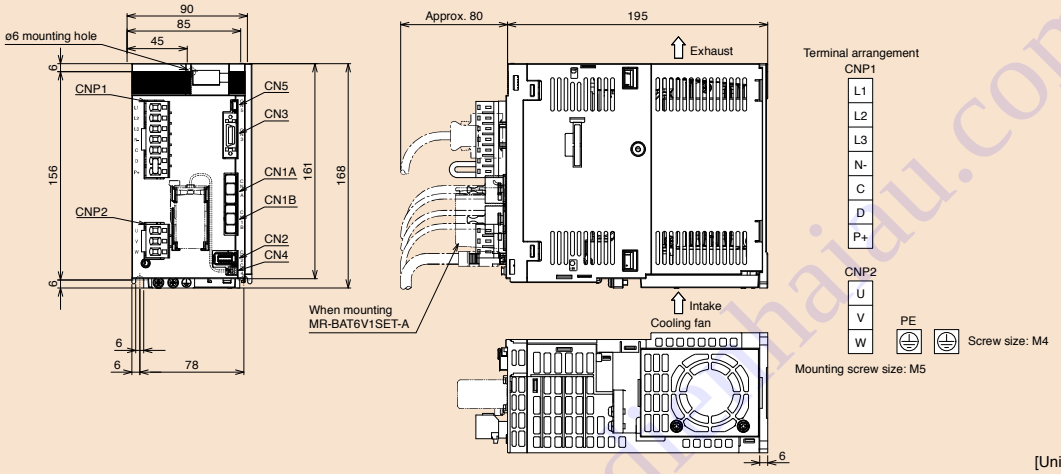
[Unit: mm]

● MR-JE-70B (Note 1)
● MR-JE-100B (Note 1)



[Unit: mm]

● MR-JE-200B (Note 2)
● MR-JE-300B (Note 2)

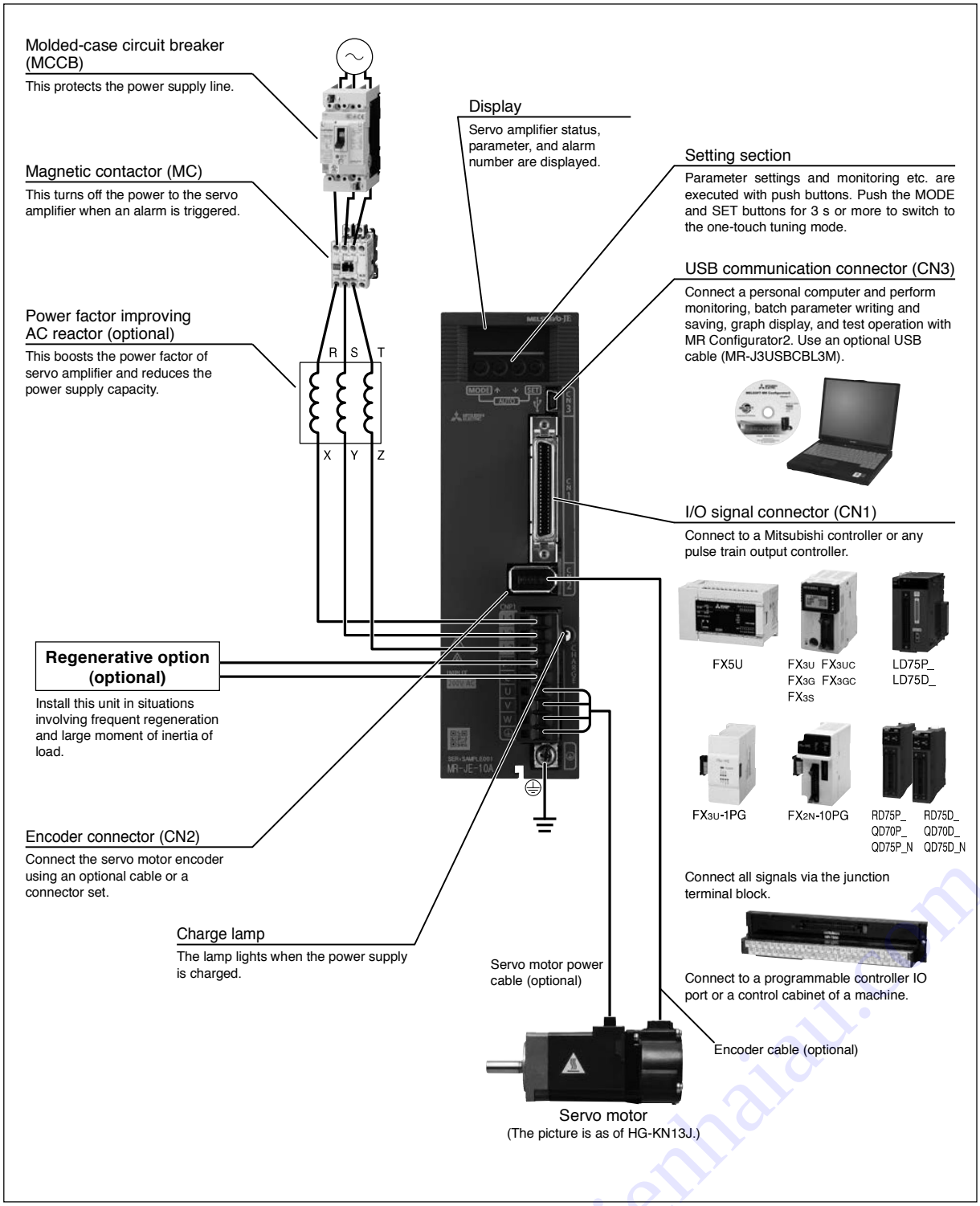


[Unit: mm]

Notes: 1. CNP1 connector (insertion type) is supplied with the servo amplifier.
2. CNP1 and CNP2 connectors (insertion type) are supplied with the servo amplifier.

MR-JE-A Connections with Peripheral Equipment (Note 1) A

Peripheral equipment is connected to MR-JE-A as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-JE-100A or smaller servo amplifiers. Refer to "MR-JE-_A Servo Amplifier Instruction Manual" for the actual connections.

MR-JE-A (General-purpose Interface) Specifications

A

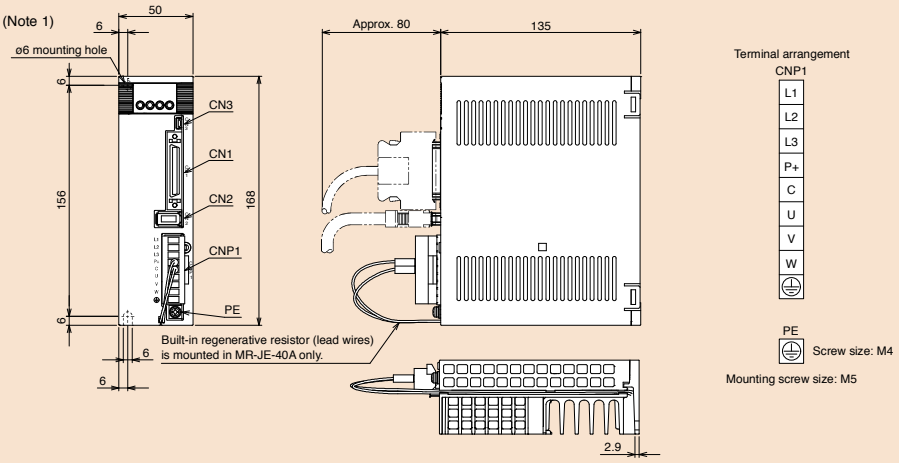
Servo amplifier model MR-JE-		10A	20A	40A	70A	100A	200A	300A
Output	Rated voltage	3-phase 170 V AC						
	Rated current [A]	1.1	1.5	2.8	5.8	6.0	11.0	11.0
Power supply input	Voltage/frequency (Note 1)	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 9)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 7) [A]	0.9	1.5	2.6	3.8	5.0	10.5	14.0
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC (Note 9)		3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation	±5% maximum						
Interface power supply		24 V DC ± 10% (required current capacity: 0.3 A)						
Control method		Sine-wave PWM control/current control method						
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3) [W]		-	-	10	20	20	100	100
Dynamic brake		Built-in (Note 4, 8)						
Communication function		USB: Connect a personal computer (MR Configurator2 compatible) RS-422/RS-485 (Note 10): Connect a controller (1 : n communication up to 32 axes) (Note 6)						
Encoder output pulse		Compatible (A/B/Z-phase pulse)						
Analog monitor		2 channels						
Position control mode	Maximum input pulse frequency	4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open-collector)						
	Positioning feedback pulse	Encoder resolution: 131072 pulses/rev						
	Command pulse multiplying factor	Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000						
	Positioning complete width setting	0 pulse to ±65535 pulses (command pulse unit)						
	Error excessive	±3 rotations						
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)						
Speed control mode	Speed control range	Analog speed command 1:2000, internal speed command 1:5000						
	Analog speed command input	0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)						
	Speed fluctuation rate	±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command						
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)						
Torque control mode	Analog torque command input	0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)						
	Speed limit	Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)						
Positioning mode		Point table method, program method						
Servo function		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function						
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection						
Compliance to global standards		Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.						
Structure (IP rating)		Natural cooling, open (IP20)					Force cooling, open (IP20)	
Close mounting (Note 5)	3-phase power supply input	Possible						
	1-phase power supply input	Possible				Not possible		-
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)						
	Ambient humidity	Operation/Storage: 90 %RH maximum (non-condensing)						
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude	1000 m or less above sea level						
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)						
Mass [kg]		0.8	0.8	0.8	1.5	1.5	2.1	2.1

Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the tolerable regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-JE-_A Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
5. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use them with 75% or less of the effective load ratio.
6. RS-422 communication function is available with the servo amplifiers manufactured on December 2013 or later. RS-485 communication function is available with the servo amplifiers manufactured on May 2015 or later. Refer to "MR-JE-_A Servo Amplifier Instruction Manual" for how to verify the manufacturing date of the products.
7. This value is applicable when a 3-phase power supply is used.
8. The coast distance by dynamic brake of HG-KN/HG-SN servo motor series may be different from prior HF-KN/HF-SN. Contact your local sales office for more details.
9. When 1-phase 200 V AC to 240 V AC power supply is used, use them with 75% or less of the effective load ratio.
10. Compatible with Mitsubishi general-purpose AC servo protocol (RS-422/RS-485 communication) and MODBUS® RTU protocol (RS-485 communication).

MR-JE-A Dimensions

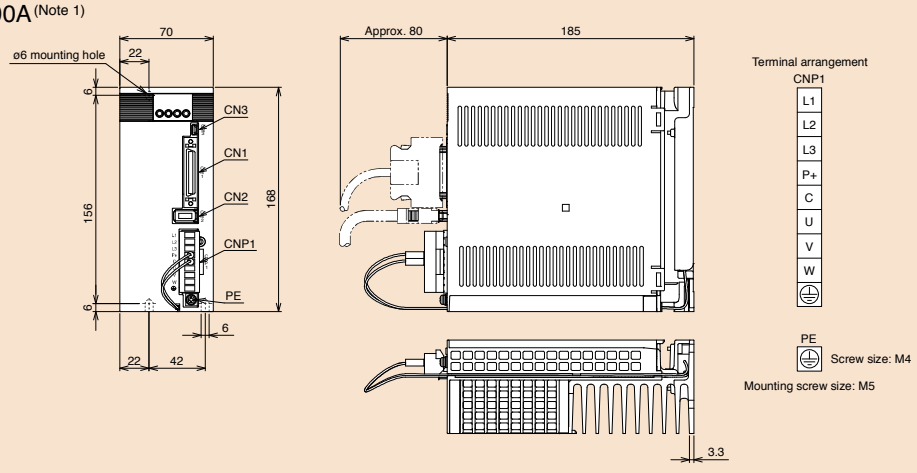
A

- MR-JE-10A (Note 1)
- MR-JE-20A (Note 1)
- MR-JE-40A (Note 1)



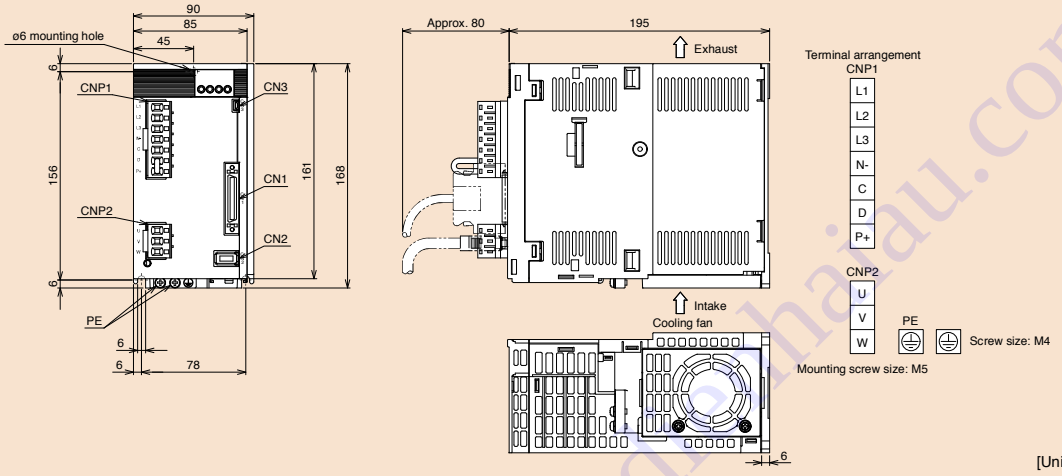
[Unit: mm]

- MR-JE-70A (Note 1)
- MR-JE-100A (Note 1)



[Unit: mm]

- MR-JE-200A (Note 2)
- MR-JE-300A (Note 2)



[Unit: mm]

Notes: 1. CNP1 connector (insertion type) is supplied with the servo amplifier.
2. CNP1 and CNP2 connectors (insertion type) are supplied with the servo amplifier.

● Servo Motors

Model Designation

H G - K N 1 3 B J □

Symbol	Shaft end
None	Standard (Straight shaft)
K	Key shaft (with/without key) (Note 4)
D	D-cut shaft (Note 4)

Symbol	Oil seal
J	Installed (Note 5)
None	None (Note 6)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

Symbol	Rated speed [r/min]
2	2000 (Note 2)
3	3000 (Note 3)

Symbol	Rated output [kW]
1	0.1
2	0.2
4	0.4
5	0.5
7	0.75
10	1.0
15	1.5
20	2.0
30	3.0

Symbol	Inertia/capacity
HG-KN	Low inertia, small capacity
HG-SN	Medium inertia, medium capacity

Notes: 1. Refer to electromagnetic brake specifications of each servo motor series in this catalog for the available models and detailed specifications.
2. 2000 r/min is for HG-SN series only.
3. 3000 r/min is for HG-KN series only.
4. Refer to special shaft end specifications of each servo motor series in this catalog for the available models and detailed specifications.
5. An oil seal is attached as a standard for all servo motors.
6. Available in HG-KN13 to HG-KN43.

Combinations of Servo Motor and Servo Amplifier

Servo motor		Servo amplifier
HG-KN series	HG-KN13(B)J	MR-JE-10B/MR-JE-10A
	HG-KN23(B)J	MR-JE-20B/MR-JE-20A
	HG-KN43(B)J	MR-JE-40B/MR-JE-40A
	HG-KN73(B)J	MR-JE-70B/MR-JE-70A
HG-SN series	HG-SN52(B)J	MR-JE-70B/MR-JE-70A
	HG-SN102(B)J	MR-JE-100B/MR-JE-100A
	HG-SN152(B)J	MR-JE-200B/MR-JE-200A
	HG-SN202(B)J	MR-JE-200B/MR-JE-200A
	HG-SN302(B)J	MR-JE-300B/MR-JE-300A

HG-KN Series (Low Inertia, Small Capacity) Specifications

Servo motor model	HG-KN	13(B)J	23(B)J	43(B)J	73(B)J
Compatible servo amplifier model		Refer to "Combinations of Servo Motor and Servo Amplifier" on p. 426 in this catalog.			
Power supply capacity *1	[kVA]	0.3	0.5	0.9	1.3
Continuous running duty — Rated output	[W]	100	200	400	750
Continuous running duty — Rated torque (Note 3)	[N•m]	0.32	0.64	1.3	2.4
Maximum torque	[N•m]	0.95	1.9	3.8	7.2
Rated speed	[r/min]	3000			
Maximum speed	[r/min]	5000			
Permissible instantaneous speed	[r/min]	5750			
Power rate at continuous rated torque — Standard	[kW/s]	12.9	18.0	43.2	44.5
Power rate at continuous rated torque — With electromagnetic brake	[kW/s]	12.0	16.4	40.8	41.0
Rated current	[A]	0.8	1.3	2.6	4.8
Maximum current	[A]	2.4	3.9	7.8	14
Regenerative braking frequency *2, *3	[times/min]	(Note 4)	(Note 5)	276	159
Moment of inertia J — Standard	[× 10^{-4} kg•m^2]	0.0783	0.225	0.375	1.28
Moment of inertia J — With electromagnetic brake	[× 10^{-4} kg•m^2]	0.0843	0.247	0.397	1.39
Recommended load to motor inertia ratio (Note 1)		15 times or less			
Speed/position detector — Combination with MR-JE-B		Absolute/incremental 17-bit encoder (resolution: 131072 pulses/rev)			
Speed/position detector — Combination with MR-JE-A		Incremental 17-bit encoder (resolution: 131072 pulses/rev)			
Oil seal		Installed. Without oil seal is also available.			Installed
Insulation class		130 (B)			
Structure		Totally enclosed, natural cooling (IP rating: IP65) (Note 2)			
Environment *4 — Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)			
Environment *4 — Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)			
Environment *4 — Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
Environment *4 — Altitude		1000 m or less above sea level			
Environment *4 — Vibration resistance *5		X: 49 m/s^2 Y: 49 m/s^2			
Vibration rank		V10 *7			
Compliance to global standards		Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.			
Permissible load for the shaft *6 — L	[mm]	25	30	30	40
Permissible load for the shaft *6 — Radial	[N]	88	245	245	392
Permissible load for the shaft *6 — Thrust	[N]	59	98	98	147
Mass — Standard	[kg]	0.6	0.98	1.5	3.0
Mass — With electromagnetic brake	[kg]	0.8	1.4	1.9	4.0

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 8 of "Annotations for Servo Motor Specifications" on p. 431 in this catalog 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. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 11 times or less.
5. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 9 times or less. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 3 times or less.

Refer to "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the asterisks 1 to 7.

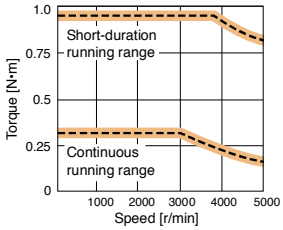
HG-KN Series Electromagnetic Brake Specifications (Note 1)

Servo motor model HG-KN		13BJ	23BJ	43BJ	73BJ
Type		Spring actuated type safety brake			
Rated voltage		24 V DC $^{0}_{-10}$%			
Power consumption	[W] at 20 °C	6.3	7.9	7.9	10
Electromagnetic brake static friction torque	[N•m]	0.32	1.3	1.3	2.4
Permissible braking work	Per braking [J]	5.6	22	22	64
	Per hour [J]	56	220	220	640
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000	20000
	Work per braking[J]	5.6	22	22	64

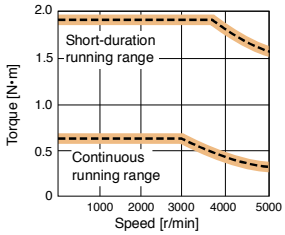
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-KN Series Torque Characteristics

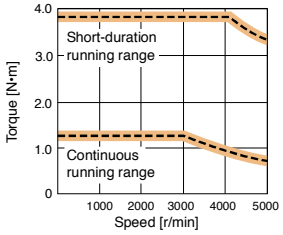
HG-KN13(B)J (Note 1, 2, 3)



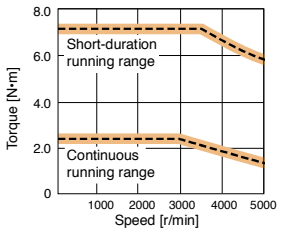
HG-KN23(B)J (Note 1, 2, 3)



HG-KN43(B)J (Note 1, 2, 3)



HG-KN73(B)J (Note 1, 2, 3)

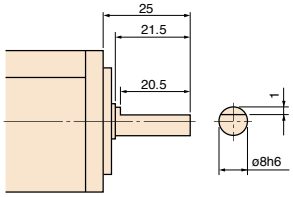


Notes: 1. ——— : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. Torque drops when the power supply voltage is below the specified value.

HG-KN Series Special Shaft End Specifications

Motors with the following specifications are also available.

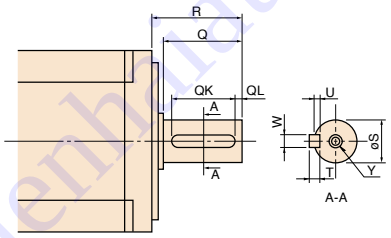
D-cut shaft (Note 1): 100 W



[Unit: mm]

Key shaft (with key) (Note 1, 2): 200 W, 400 W, and 750 W

Model	Variable dimensions								
	T	S	R	Q	W	QK	QL	U	Y
HG-KN23(B)JK, 43(B)JK	5	14h6	30	27	5	20	3	3	M4 screw Depth: 15
HG-KN73(B)JK	6	19h6	40	37	6	25	5	3.5	M5 screw Depth: 20



[Unit: mm]

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. 2 round end key is attached.

HG-SN Series (Medium Inertia, Medium Capacity) Specifications

Servo motor model		HG-SN	52(B)J	102(B)J	152(B)J	202(B)J	302(B)J
Compatible servo amplifier model			Refer to "Combinations of Servo Motor and Servo Amplifier" on p. 426 in this catalog.				
Power supply capacity *1		[kVA]	1.0	1.7	2.5	3.5	4.8
Continuous running duty	Rated output	[kW]	0.5	1.0	1.5	2.0	3.0
	Rated torque (Note 3)	[N•m]	2.39	4.77	7.16	9.55	14.3
Maximum torque		[N•m]	7.16	14.3	21.5	28.6	42.9
Rated speed		[r/min]	2000				
Maximum speed		[r/min]	3000				2500
Permissible instantaneous speed		[r/min]	3450				2875
Power rate at continuous rated torque	Standard	[kW/s]	7.85	19.7	32.1	19.5	26.1
	With electromagnetic brake	[kW/s]	6.01	16.5	28.2	16.1	23.3
Rated current		[A]	2.9	5.6	9.4	9.6	11
Maximum current		[A]	9.0	17	29	31	33
Regenerative braking frequency *2, *3		[times/min]	62	38	139	47	28
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	7.26	11.6	16.0	46.8	78.6
	With electromagnetic brake	[× 10^{-4} kg•m^2]	9.48	13.8	18.2	56.5	88.2
Recommended load to motor inertia ratio (Note 1)			15 times or less				
Speed/position detector	Combination with MR-JE-B		Absolute/incremental 17-bit encoder (resolution: 131072 pulses/rev)				
	Combination with MR-JE-A		Incremental 17-bit encoder (resolution: 131072 pulses/rev)				
Oil seal			Installed				
Insulation class			155 (F)				
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)				
Environment *4	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		1000 m or less above sea level				
	Vibration resistance *5		X: 24.5 m/s^2 Y: 24.5 m/s^2			X: 24.5 m/s^2 Y: 49 m/s^2	
Vibration rank			V10 *7				
Compliance to global standards			Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.				
Permissible load for the shaft *6	L	[mm]	55	55	55	79	79
	Radial	[N]	980	980	980	2058	2058
	Thrust	[N]	490	490	490	980	980
Mass	Standard	[kg]	4.8	6.2	7.3	11	16
	With electromagnetic brake	[kg]	6.7	8.2	9.3	17	22

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 8 of "Annotations for Servo Motor Specifications" on p. 431 in this catalog 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.

Refer to "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the asterisks 1 to 7.

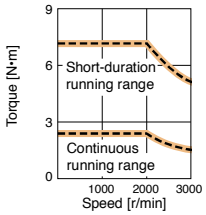
HG-SN Series Electromagnetic Brake Specifications (Note 1)

Servo motor model	HG-SN	52BJ	102BJ	152BJ	202BJ	302BJ
Type		Spring actuated type safety brake				
Rated voltage		24 V DC $^{0}_{-10}$%				
Power consumption	[W] at 20 °C	20	20	20	34	34
Electromagnetic brake static friction torque	[N•m]	8.5	8.5	8.5	44	44
Permissible braking work	Per braking [J]	400	400	400	4500	4500
	Per hour [J]	4000	4000	4000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000	20000	20000
	Work per braking [J]	200	200	200	1000	1000

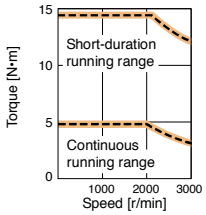
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-SN Series Torque Characteristics

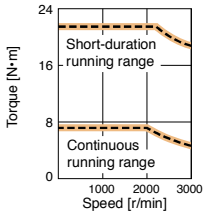
HG-SN52(B)J (Note 1, 2, 3)



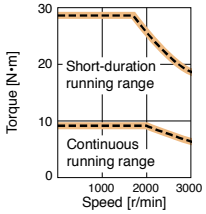
HG-SN102(B)J (Note 1, 2, 3)



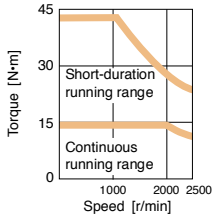
HG-SN152(B)J (Note 1, 2, 3)



HG-SN202(B)J (Note 1, 2, 3)



HG-SN302(B)J (Note 1, 3)



Notes: 1. ——— : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. Torque drops when the power supply voltage is below the specified value.

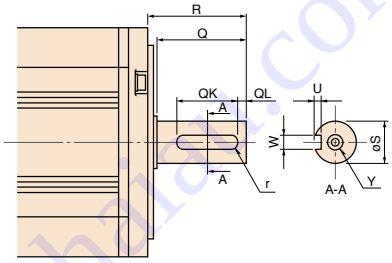
HG-SN Series Special Shaft End Specifications

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-SN52(B)JK, 102(B)JK, 152(B)JK	24h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
HG-SN202(B)JK, 302(B)JK	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

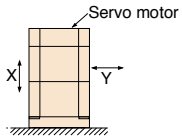
Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



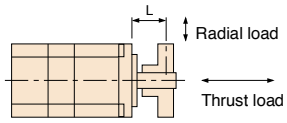
[Unit: mm]

Annotations for Servo Motor Specifications

*1. The power supply capacity varies depending on the power supply impedance.
*2. The regenerative braking frequency shows the permissible frequency when the servo motor, without a load and a regenerative option, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Moment of inertia of load/Moment of inertia of servo motor.
When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). Take measures to keep the regenerative power [W] during operation below the tolerable regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software.
Refer to "Regenerative Option" in this catalog for the tolerable regenerative power [W] when regenerative option is used.
*3. For 400 W or smaller servo amplifiers, the regenerative braking frequency may change affected by the power supply voltage due to the large ratio of the energy charged into the electrolytic capacitor in the servo amplifier.
*4. 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.
*5. 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 more likely occurs on the bearing when the servo motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.

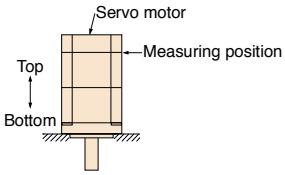


*6. Refer to the diagram below for the permissible load for the shaft. Do not apply a load exceeding the value specified in the table on the shaft. The values in the table are applicable when each load is applied singly.

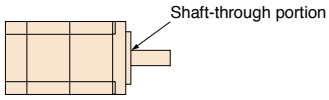


L: Distance between the flange mounting surface and the center of load

*7. 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:

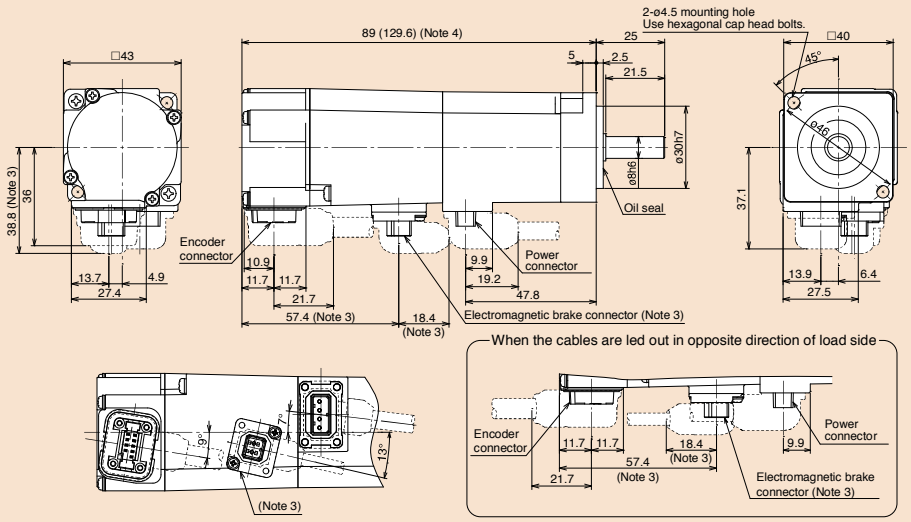


*8. Refer to the diagram below for shaft-through portion.



HG-KN Series Dimensions (Note 1, 5)

●HG-KN13(B)J



Power connector

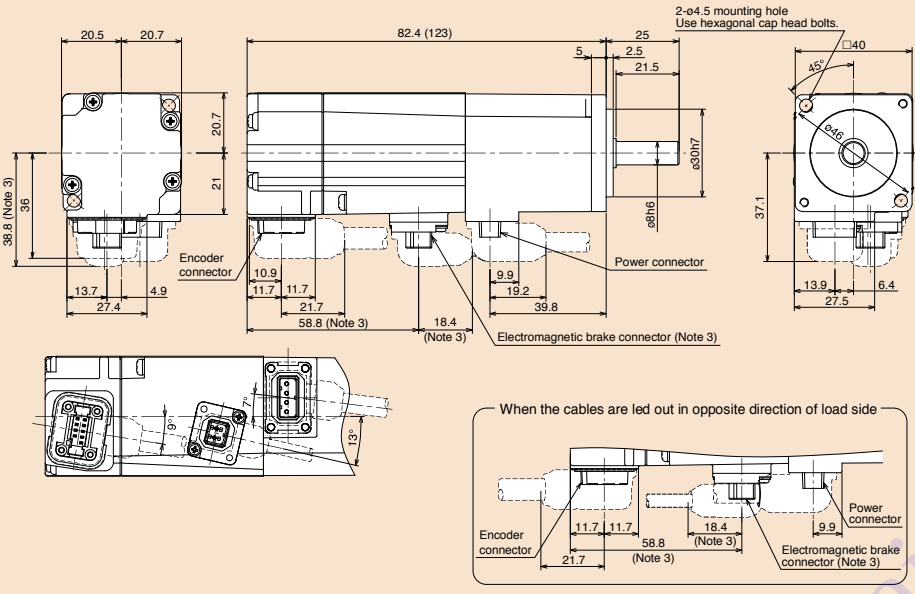
Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

●HG-KN13(B)



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

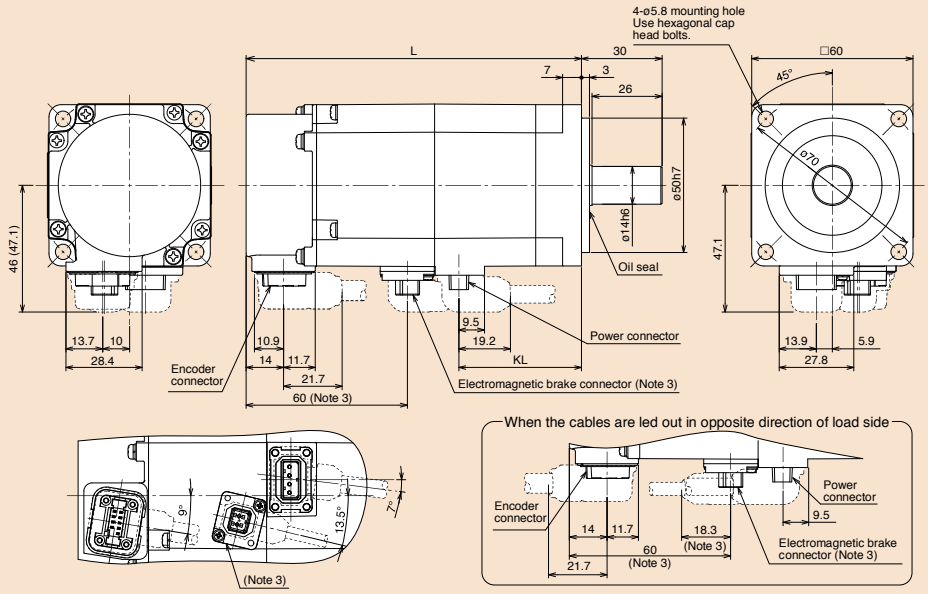
Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-KN Series Dimensions (Note 1, 5)

●HG-KN23(B)J, HG-KN43(B)J



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

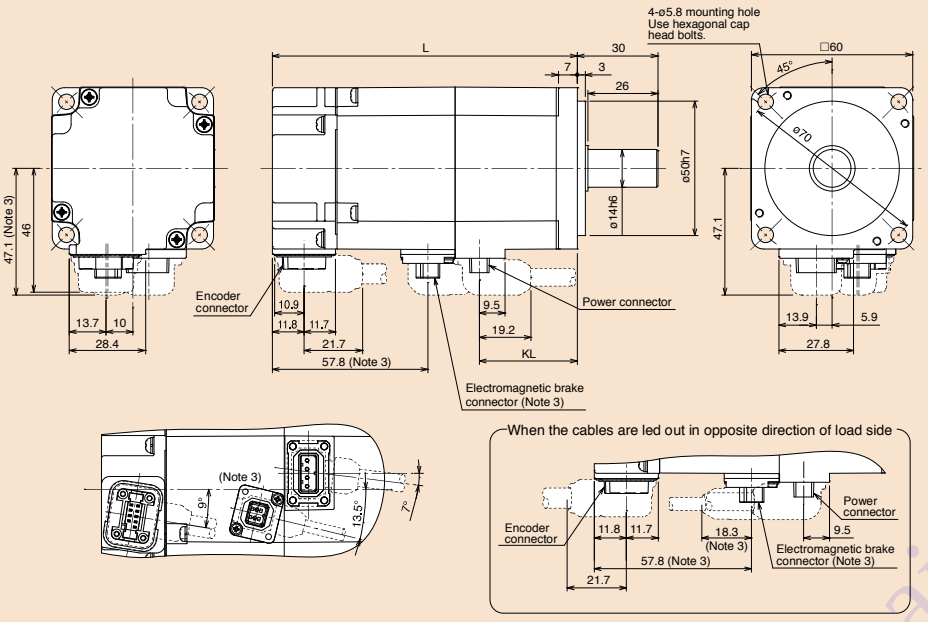
Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions (Note 4)	
	L	KL
HG-KN23(B)J	88 (124.8)	45.6
HG-KN43(B)J	109.7 (146.5)	67.3

[Unit: mm]

●HG-KN23(B), HG-KN43(B)



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

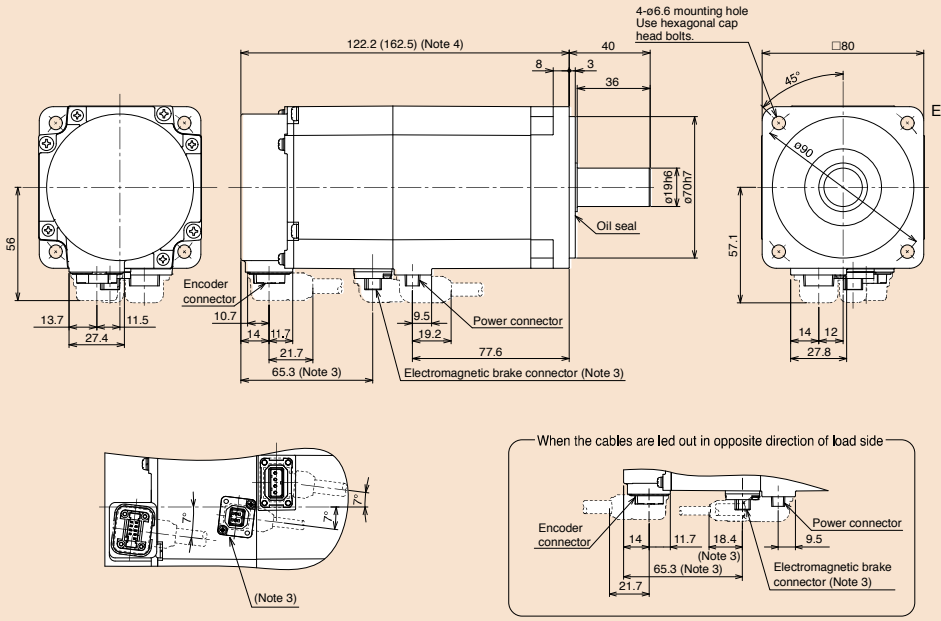
Model	Variable dimensions (Note 4)	
	L	KL
HG-KN23(B)	76.6 (113.4)	36.4
HG-KN43(B)	98.3 (135.1)	58.1

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-KN Series Dimensions (Note 1, 5)

●HG-KN73(B)J



Power connector

Pin No.	Signal name
1	⏚ (PE)
2	U
3	V
4	W

Electromagnetic brake connector (Note 2)

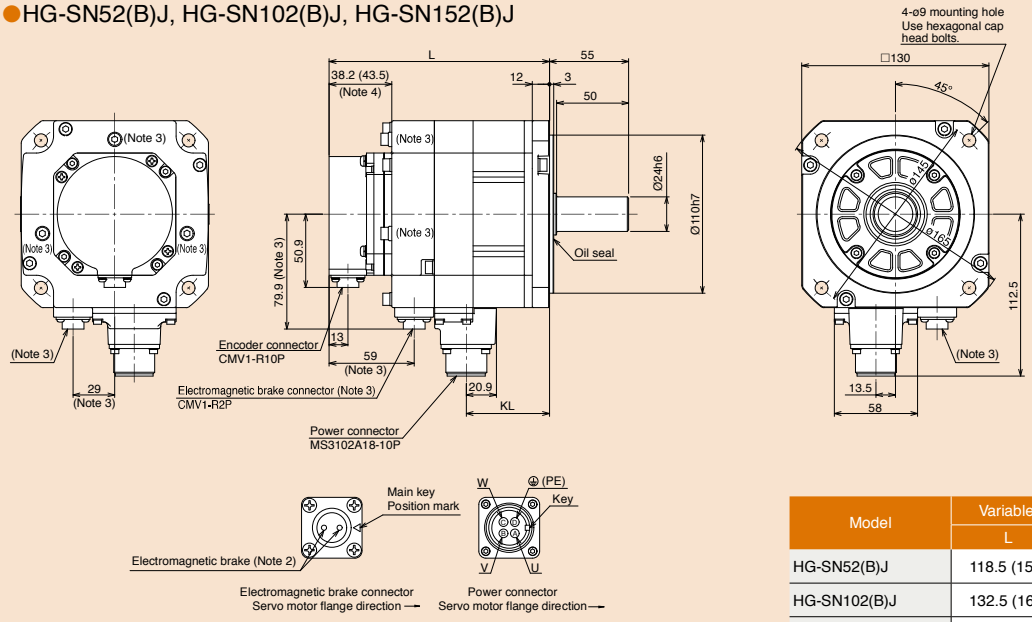
Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-SN Series Dimensions (Note 1, 5)

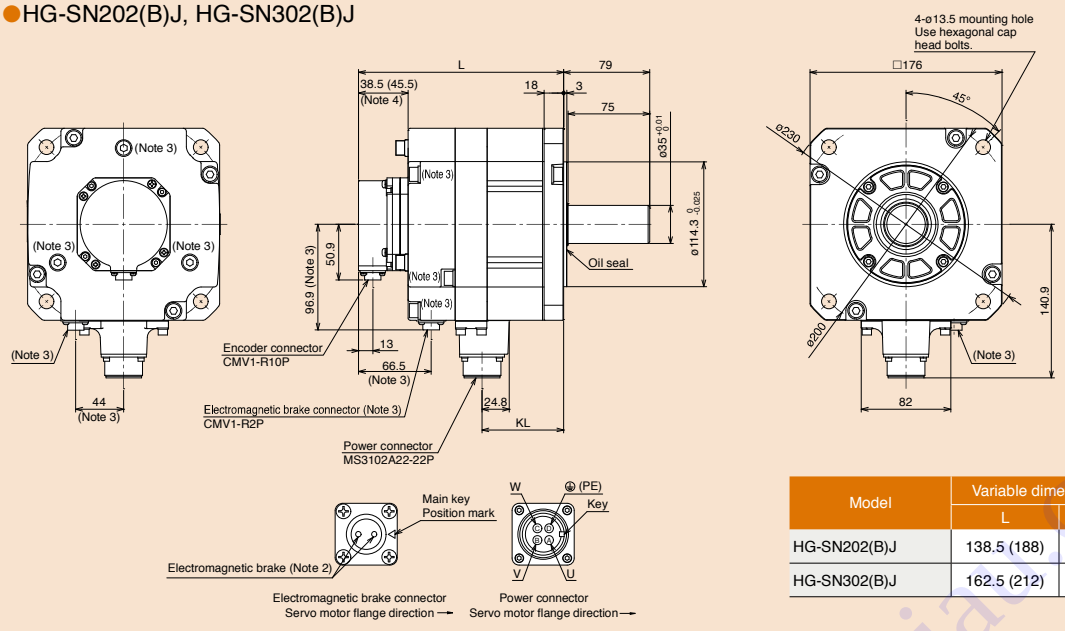
●HG-SN52(B)J, HG-SN102(B)J, HG-SN152(B)J



Model	Variable dimensions (Note 4)	
	L	KL
HG-SN52(B)J	118.5 (153)	57.8
HG-SN102(B)J	132.5 (167)	71.8
HG-SN152(B)J	146.5 (181)	85.8

[Unit: mm]

●HG-SN202(B)J, HG-SN302(B)J



Model	Variable dimensions (Note 4)	
	L	KL
HG-SN202(B)J	138.5 (188)	74.8
HG-SN302(B)J	162.5 (212)	98.8

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.