MITSUBISHI ELECTRIC
Changes for the Better

for a greener tomorrow eco Changes

SERVO AMPLIFIERS & MOTORS

Ensuring safety and protecting the ecology. Our sights aren't limited to achieving the industry-leading level of speed. * Based on Mitsubishi Electric research as of April 2012.

Man, machine and environment in

4

perfect harmony

MELSERVO-J4 — trusted technology makes an evolutionary leap forward

Introducing the MELSERVO-J4 series. Offering more than just improved performance, these servos are designed to drive the industries of tomorrow. Backed by Mitsubishi leadership in all-digital technology, MELSERVO has become one of the most globally respected names in factory automation. And now — with the safety, ease of use, and energy-efficient design of the new MELSERVO-J4 series — man, machine and environment can at last work together in perfect harmony.

A complete system lineup to meet your production and manufacturing

Responding to expanding applications such as semiconductor and LCD manufacturing, machine tools, robots, and food processing machines, Electric's product lines such as Motion controllers, servo system networks as well as displays and programmable controllers. MELSERVO-J4

HUMAN MACHINE I/F

GOT1000

PC/AT compatible computer

SOFTWARE

MELSOFT

iQ Platform

CONTROLLER

Motion controller

SSCNET III/H compatible Motion controller

Q173DSCPU
Q172DSCPU

Programmable controller

MELSEC Q series

MELSEC L series

Simple Motion module

SSCNET III/H compatible Simple Motion module

QD77MS16
QD77MS4
QD77MS2

Positioning module

QD75P1/2/4N
QD75D1/2/4N

NETWORK

SSCNET III/H serial bus

Pulse train input

SERVO AMPLIFIER

MR-J4_-B

SSCNET III/H compatible servo amplifier

MR-J4-B

SSCNET III/H compatible 2-axis servo amplifier

MR-J4W2-B

SSCNET III/H compatible 3-axis servo amplifier

MR-J4W3-B

MR-J4-A

General-purpose interface compatible servo amplifier

MR-J4-A

SERVO MOTOR

Rotary servo motor

Small capacity, low inertia

HG-KR series

Capacity: 50 to 750 W

Small capacity, ultra-low inertia

HG-MR series

Capacity: 50 to 750 W

Medium capacity, medium inertia

HG-SR series

Capacity: 0.5 to 7 kW

Linear servo motor

Core type

LM-H3 series

Rating: 70 to 960 N

Core type with magnetic attraction counter-force

LM-K2 series

Rating: 120 to 2400 N

SOLUTION

e-F@ctory

Mitsubishi Electric's integrated FA solution for achieving seamless information collaboration between information systems and control systems, and enabling lateral integration of production sites.

iQ

MELSERVO-J4 flexibly collaborates with Mitsubishi allows you to freely create an advanced servo system.

Motion controller engineering environment — MELSOFT **MT Works2**

PLC engineering software — MELSOFT **GX Works2**

Servo setup software — MELSOFT **MR Configurator2**

Capacity selection software

MELSEC FX series

QD70P4/8
QD70D4/8

LD75P4
LD75D4

FX2N-10PG

LOW-VOLTAGE SWITCHGEAR

Magnetic contactor

MS-N

Molded case circuit breaker

WS-V

Core type
(natural/liquid cooling)
LM-F series
Rating: 300 to 1200 N (natural cooling)
Rating: 600 to 2400 N (liquid cooling)

Coreless type
LM-U2 series
Rating: 50 to 800 N

Direct drive motor

TM-RFM series
Rating: 2 to 240 N•m

Platform

Mitsubishi Electric's integrated FA platform for achieving lateral integration of controllers & HMI, engineering environments and networks at production sites.

I N D E X

Machine

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-J4

The leading edge in drive control, with unrivaled accuracy and response for next-generation machine performance.

Backed by Mitsubishi MELSERVO's global track record of proven reliability, the new MR-J4 takes machine performance to the highest level.

Industry-leading* 2.5 kHz speed frequency response, with servo amplifiers, servo motors, and optical networks linked in symphonic productivity

* Based on Mitsubishi Electric research as of April 2012.

MELSERVO-J4 | Industry-leading basic performance

Increased speed frequency response of 2.5 kHz

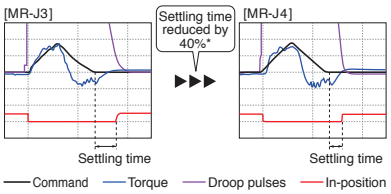
Industry-leading level of servo amplifier basic performance

Industry-leading levels

Our original, ever-evolving high-speed servo control architecture is applied to the dedicated execution engine. **Speed frequency response is increased to 2.5 kHz, achieving the industry-leading level of speed*.** Compatible servo motors are equipped with **a high-resolution absolute encoder of 4,194,304 pulses/rev (22-bit)**, improving the processing speed substantially. The performance of the high-end machine is utilized to the fullest.

* Based on Mitsubishi Electric research as of April 2012.

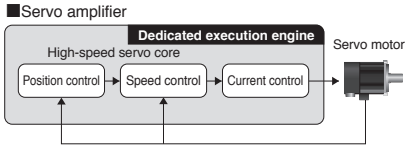
[Settling time comparison with the prior model]



* The result is based on our evaluation condition.

[Dedicated execution engine]

Equipped with the servo control engine with our original architecture.



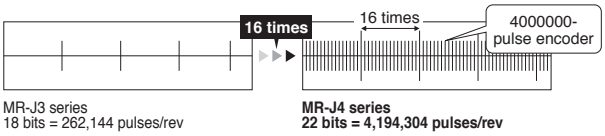
4,194,304 pulses/rev (22-bit) absolute encoder is incorporated as standard.

Improving machine performance with high-performance motors

Industry-leading levels

Rotary servo motors achieve high-accuracy positioning and smooth rotation with a high-resolution encoder and improved processing speed.

[Resolution comparison with the prior model]

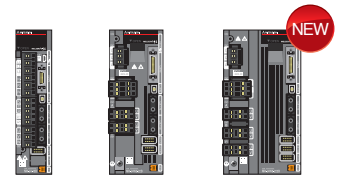


Fully closed loop control supported as standard. Operate rotary servo motors, linear servo motors, or direct drive motors.

Applicable for various control and driving systems

1-axis/2-axis/3-axis servo amplifiers

For SSCNET III/H compatible servo amplifiers, 2-axis and 3-axis types are available in addition to 1-axis type. Flexible system is configured accordingly with the number of control axes.



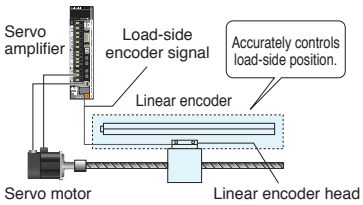
MR-J4-B MR-J4W2-B MR-J4W3-B

Compatible with fully closed loop control

Standard equipment

The servo amplifiers are compatible with fully closed loop control system*. Accurate control of load-side position is achieved.

* MR-J4-A will be compatible in the future.



Compatible servo motors

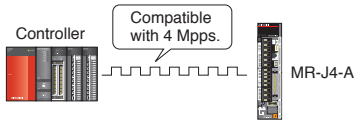
MR-J4 series servo amplifier operates rotary servo motors, linear servo motors*, and direct drive motors* as standard.

* MR-J4-A will be compatible in the future.

Rotary servo motor Linear servo motor Direct drive motor

Maximum command pulse frequency

General-purpose interface compatible MR-J4-A supports maximum command pulse frequency of 4 Mpps.



LM-H3 series

NEW

LM-H3 linear servo motor series supports maximum speed of 3 m/s. High-speed machine is achieved.

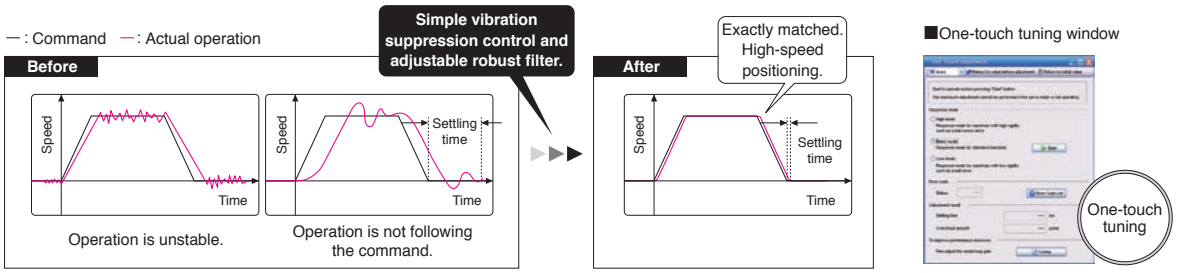
Advanced servo gain adjustment enables precise vibration suppression control with one-touch ease.

MELSERVO-J4 | Advanced servo gain adjustment function

Advanced one-touch tuning function

Enhanced functions

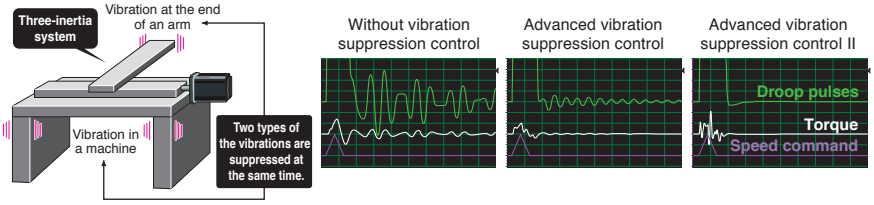
Servo gains including machine resonance suppression filter, advanced vibration suppression control II, and robust filter are adjusted just by turning on the one-touch tuning function. Machine performance is utilized to the fullest using the advanced vibration suppression control function.



Advanced vibration suppression control II

Patent pending | Enhanced functions

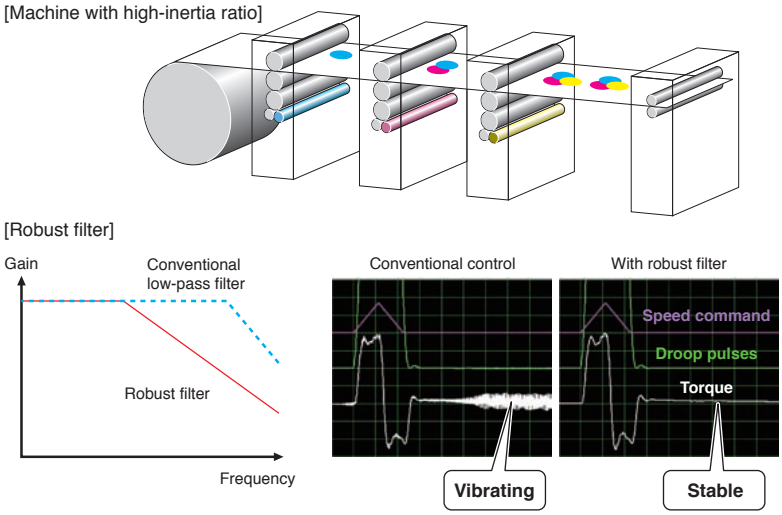
Due to vibration suppression algorithm which supports three-inertia system, two types of low frequency vibrations are suppressed at the same time. Adjustment is performed with one-touch operation. This function is effective in suppressing vibration at the end of an arm and in reducing residual vibration in a machine.



Robust filter

Patent pending | NEW

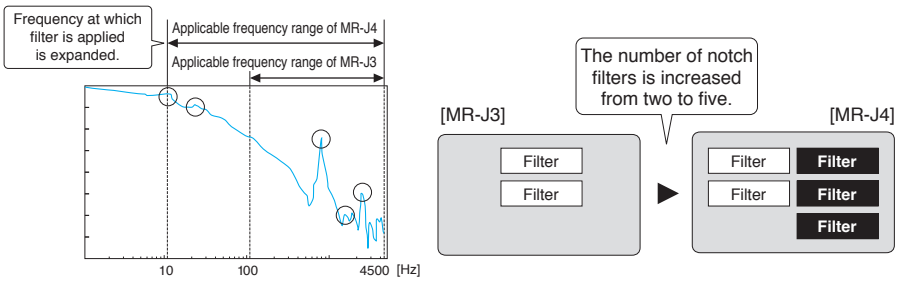
Both high response and stability of machine are achieved just by enabling this function for a high-inertia system with belt or gear such as printing and packaging machines.
Torque with wide frequency range is reduced, contributing to more stability as compared to the prior model.



Expanded machine resonance suppression filter

Enhanced functions

With advanced filter structure, applicable frequency range is expanded from between 100 Hz and 4500 Hz to between 10 Hz and 4500 Hz. Additionally, the number of simultaneously applicable filters is increased from two to five, improving vibration suppression performance of machine.



MELSERVO-J4

Reducing machine load

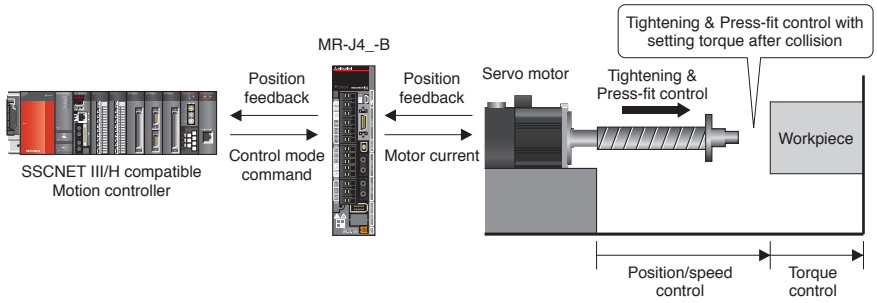
Effectively control Tightening & Press-fit control.

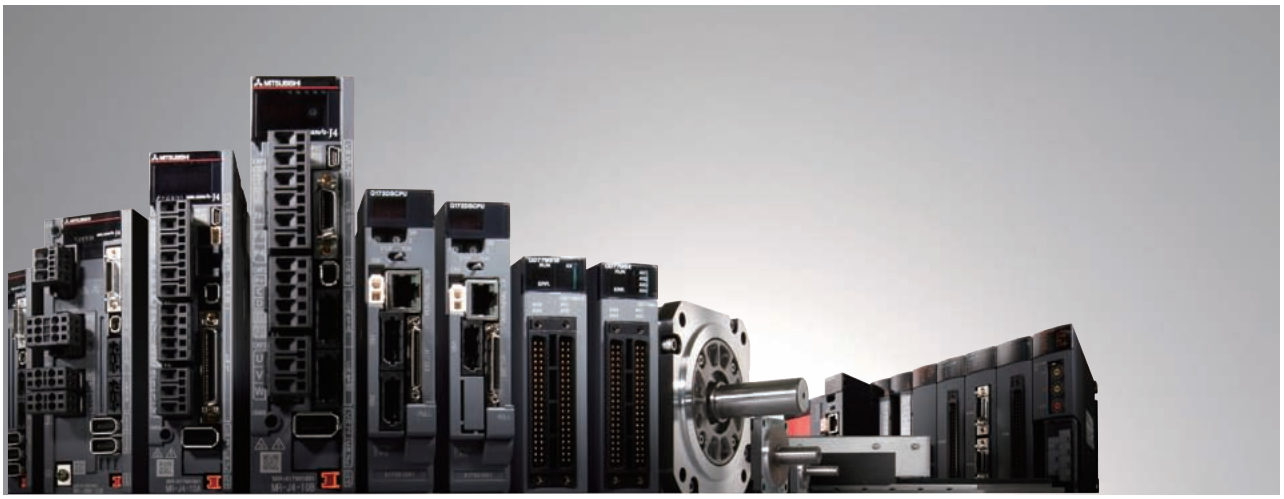
Tightening & Press-fit control function

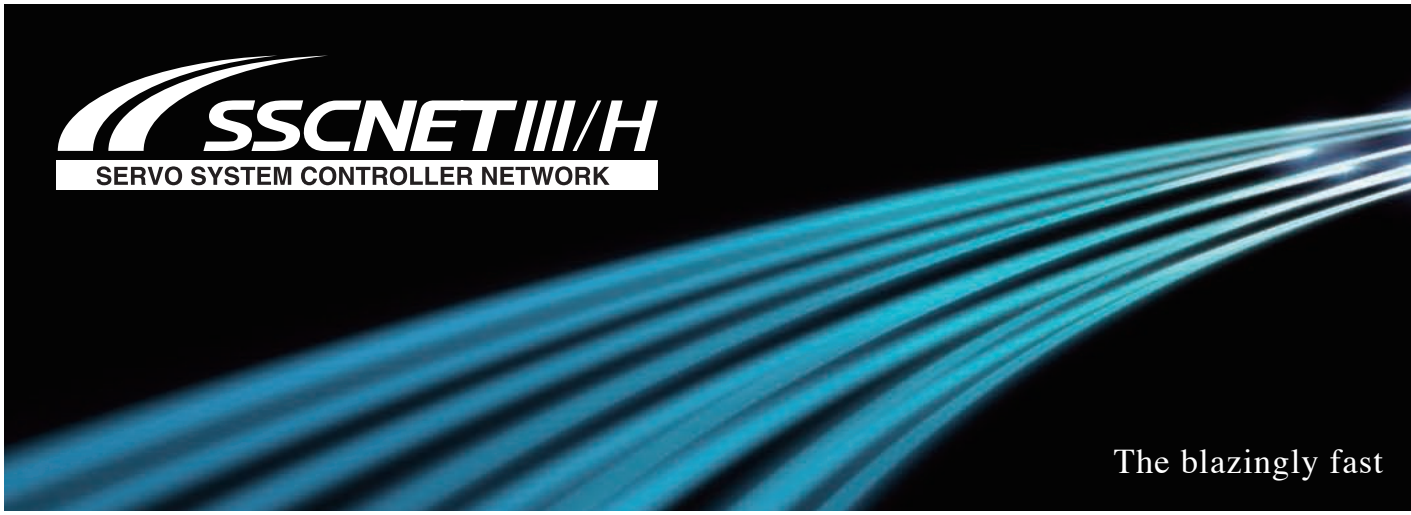
Patent pending NEW

Position/speed control switches to torque control smoothly without stopping or changing the speed or the torque rapidly. Load to the machine is reduced, and high-quality molding is achieved for an application where control is switched from position to torque such as Tightening & Press-fit control or insertion of a work, and cap or screw tightening.

* Available in MR-J4_-B only.







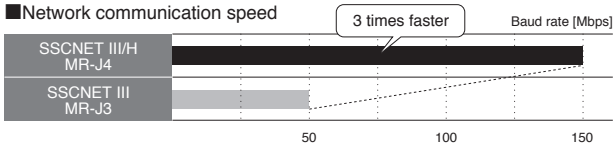
MELSERVO-J4 | High-response system achieved with SSCNET III/H

Three times faster communication speed

Industry-leading levels

Communication speed is increased to 150 Mbps full duplex (equivalent to 300 Mbps half duplex), three times faster than the conventional speed. System response is dramatically improved.

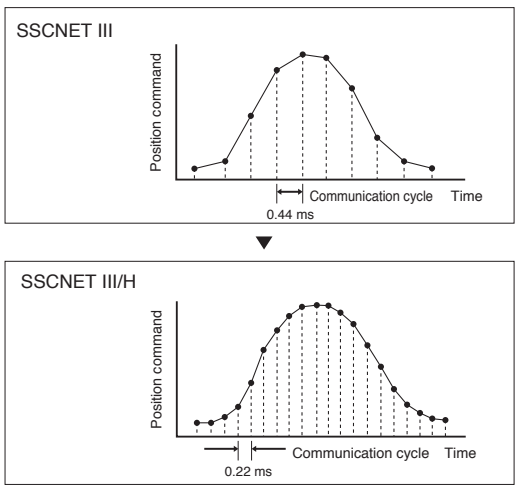
■Network communication speed



Cycle times as fast as 0.22 ms

Industry-leading levels

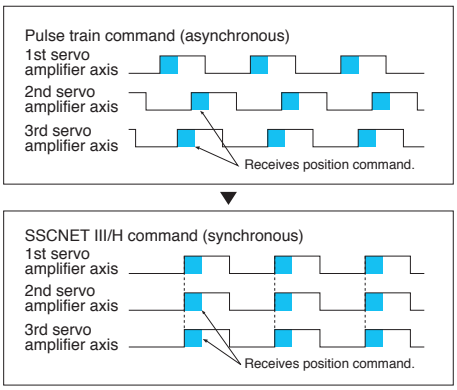
Smooth control of machine is possible using high-speed serial communication with cycle times of 0.22 ms.



Deterministic and synchronized communication

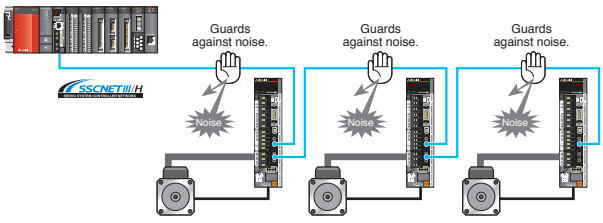
Complete deterministic and synchronized communication is achieved with SSCNET III/H, offering technical advantages in machines such as printing and food processing machines that require synchronous accuracy.

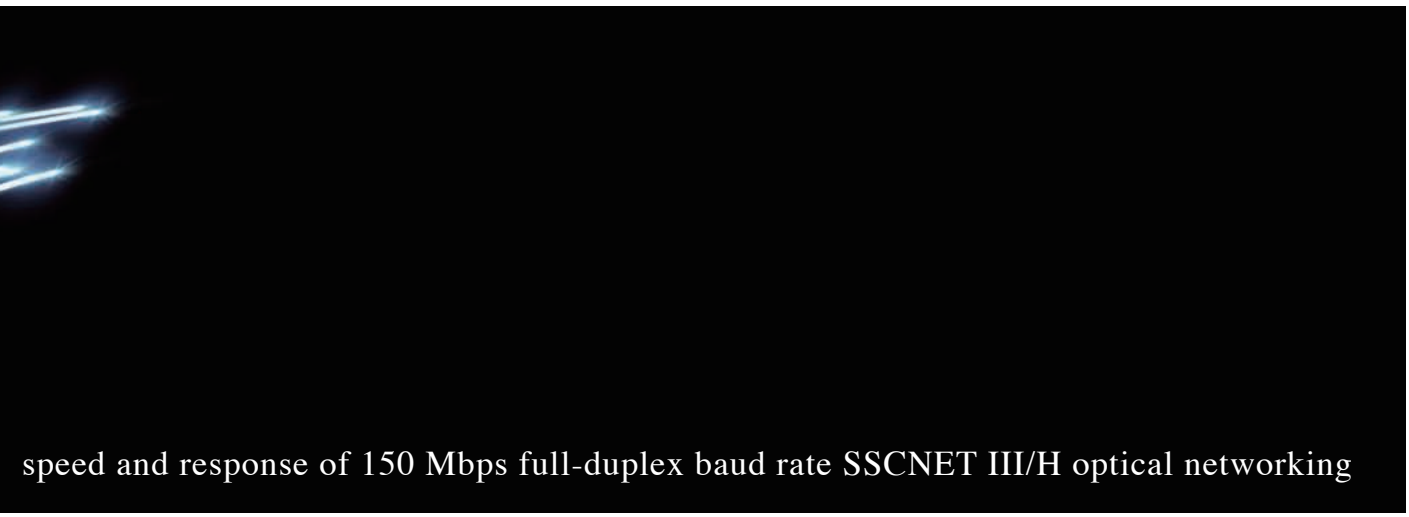
■Timing of servo amplifier processing



No transmission collision

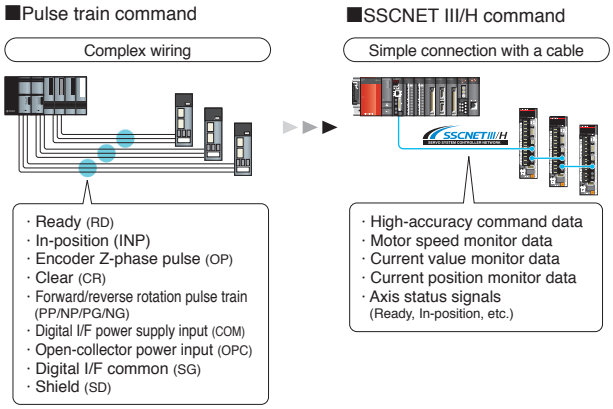
The fiber-optic cables thoroughly shut out noise that enters from the power cable or external devices. Noise immunity is dramatically improved as compared to metal cables.





Dramatically reduced wiring

Simple connections with dedicated cables reduce both wiring time and chances of wiring errors. No more complicated wiring.

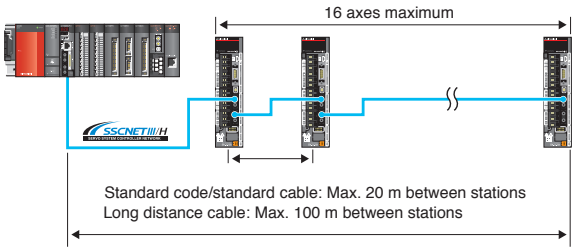


Long distance wiring up to 1600 m

Enhanced performance

Long distance wiring is possible up to 1600 m per system (maximum of 100 m between stations × 16 axes). Thus, it is suitable for large-scale systems.

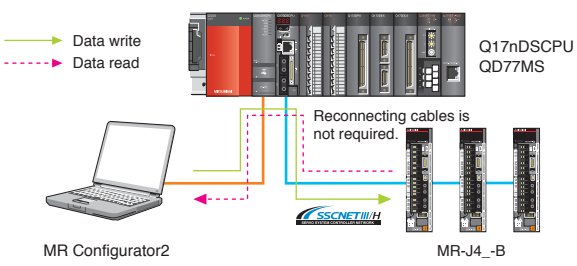
* This is when all axes are connected via SSCNET III/H.



Maximum overall distance per system
Standard code/standard cable: 320 m (20 m × 16 axes)
Long distance cable: 1600 m (100 m × 16 axes)

Central control with network

Large amounts of servo data are exchanged in real-time between the controller and the servo amplifier.
MR Configurator2 is used on a personal computer that is connected to Q17nDSCPU or QD77MS. Information for multiple servo amplifiers is consolidated.

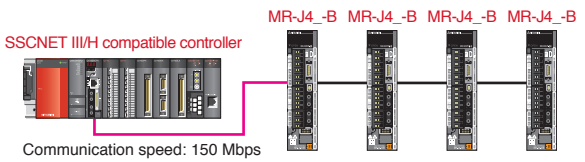


SSCNET III/H compatible and SSCNET III compatible products connected in a same system

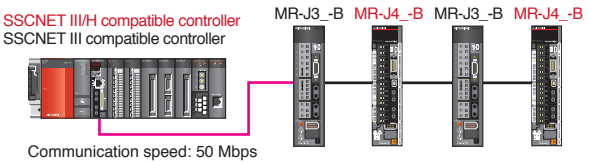
SSCNET III/H compatible and SSCNET III compatible servo amplifiers are connected in a same system.

* When using SSCNET III/H compatible and SSCNET III compatible products together, the communication speed is 50 Mbps, and the function and performance are equivalent to when using MR-J3.

■SSCNET III/H compatible controller + MR-J4_-B



■SSCNET III compatible controller and MR-J3_-B in a same system*



The leading edge in safety and convenience, designed to harmonize with the way you work.

The easy-to-use MR-J4 was created with human needs in mind. It meets world-class safety standards and is exceptionally simple to maintain, ensuring optimum setup and operating ease for both design and manufacturing personnel.

Man

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-J4

Advanced features for world-class safety

MELSERVO-J4 | Equipped with various safety functions

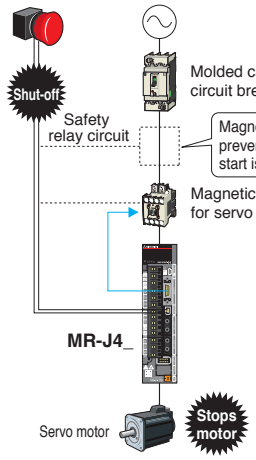
Compatible with safety function IEC/EN 61800-5-2 as standard

MELSERVO-J4 series servo amplifiers have integrated STO (Safe Torque Off) and SS1*1 (Safe Stop 1) functions. Safety system is easily configured in the machine. (SIL 2)

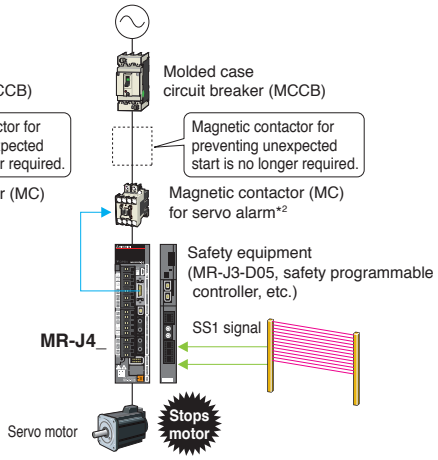
- Turning off the control power of servo amplifier is not required, cutting out the time for restart. Additionally, home position return is not required.
- Magnetic contactor for preventing unexpected motor start is not required.*2

*1. Safety equipment (MR-J3-D05, etc.) is required.
*2. Two magnetic contactors are not required when STO function is used. However, in this diagram, one magnetic contactor is used to shut off the power at alarm occurrence.

[Shut-off by STO function]



[Shut-off by STO and SS1 functions]

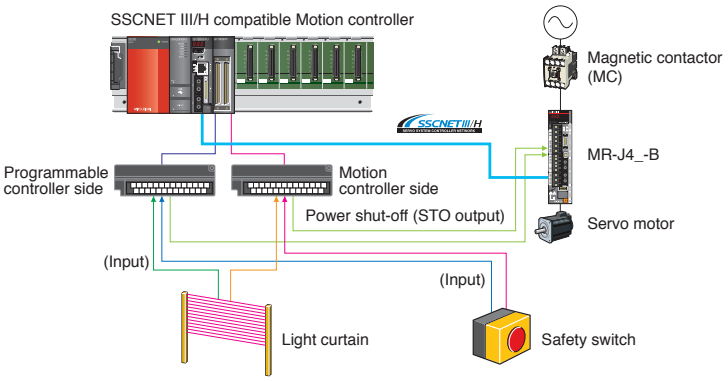


Improving safety level by combining MR-J4 with Motion controller

When combined with SSCNET III/H compatible Motion controller, MR-J4 is compatible with the following functions defined as "Power drive system electric safety function" in IEC/EN 61800-5-2 as standard.

IEC/EN 61800-5-2:2007 function
STO (Safe Torque Off)
SS1 (Safe Stop 1)
SS2 (Safe Stop 2)
SOS (Safe operating stop)
SLS (Safely-limited speed)
SBC (Safe Brake Control)
SSM (Safe Speed Monitor)

[Safety signal monitor function]



More safety functions in the future

Industry-leading safety functions will be further integrated to our products.

Enhanced operating ease and drive stability

MELSERVO-J4 | Maintenance function to achieve TCO* reduction

* TCO : Total Cost of Ownership

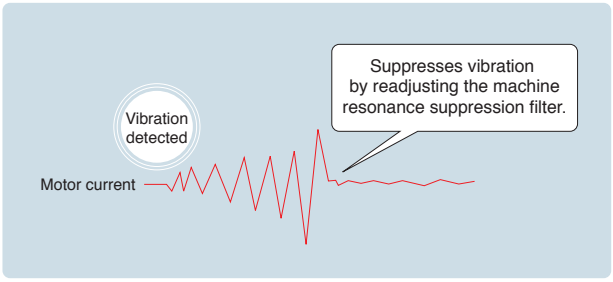
Detect changes in the operating environment to automatically adjust the servo control status. Reduce the loss due to the system stop.

Tough drive function

Enhanced functions

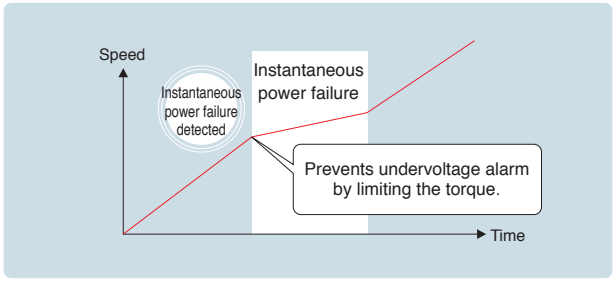
Vibration tough drive

Machine resonance suppression filter is readjusted when vibration is detected by the current command inside the servo amplifier.



Instantaneous power failure tough drive

Undervoltage alarm is prevented by changing detection time and limiting the torque when instantaneous power failure in main circuit power is detected. (Available in the future)

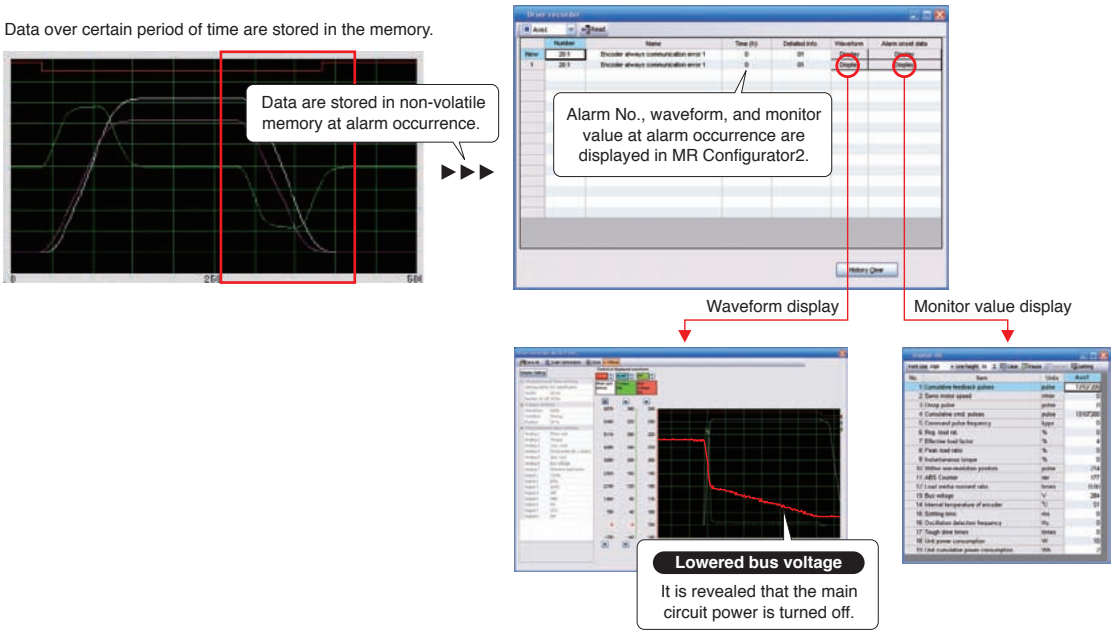


Swiftly and accurately identify the cause when alarms occur.

Large capacity drive recorder

Patent pending | Enhanced functions

- Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of servo amplifier.
  The data read on MR Configurator2 during restoration are used for cause analysis.
- Check the waveform of 16 alarms in the alarm history ((analog 16 bits × 7 channels + digital 8 channels) × 256 points) and the monitor value.

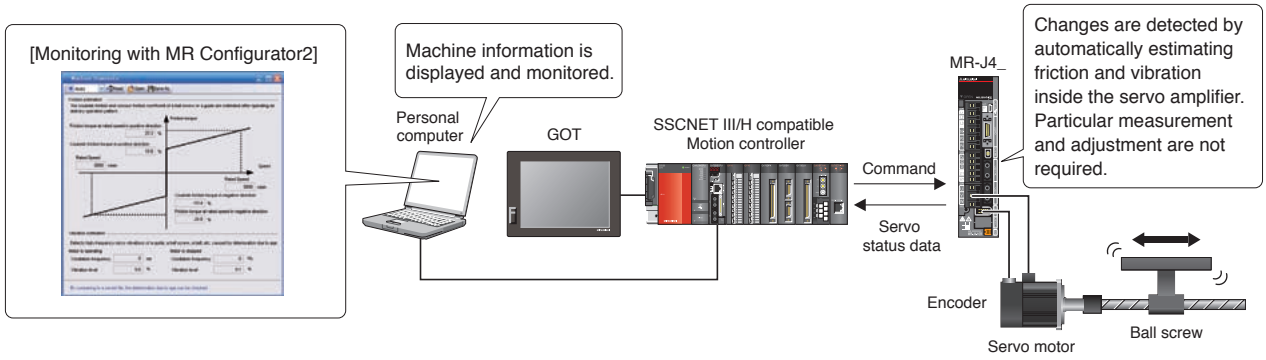


Powerful monitoring and maintenance support tools

Machine diagnosis function

Patent pending NEW

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.



Easier troubleshooting

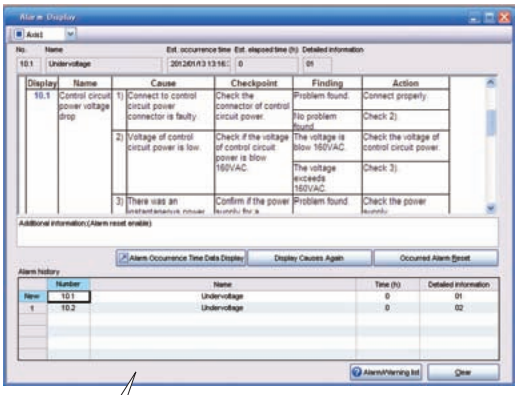
3-digit alarm

In MR-J4 series, servo alarms are displayed in 3 digits. Troubleshooting at alarm occurrence is easy.

[3-digit alarm display]

This display is of MR-J4-A.

[Alarm window example]



For the undervoltage alarm, whether the alarm occurred in the main or the control circuit is identified by the alarm No.

User-friendly software for easy setup, tuning and operation

Servo setup software

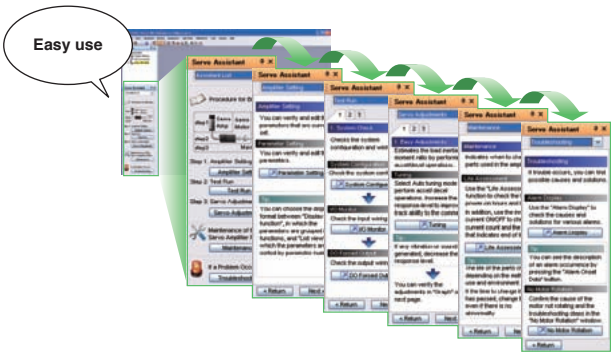
MR Configurator2 (SW1DNC-MRC2-E)

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

MELSERVO-J4 | Preparation

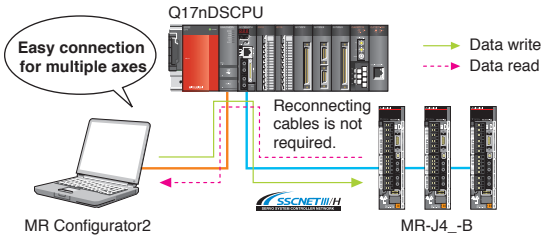
Servo assistant function

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.



Using MR Configurator2 via Motion controller

MR Configurator2 can be used with MT Developer2 on a personal computer that is connected to a Motion controller. Information such as parameter settings and monitoring for multiple servo amplifiers is consolidated easily just by connecting the Motion controller and the personal computer with cables.



MELSERVO-J4 | Setting and start-up

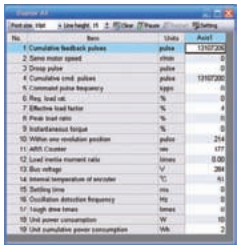
Parameter setting function

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.

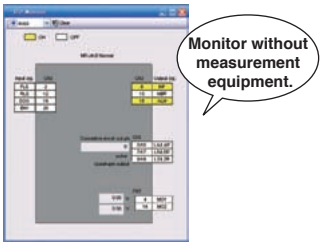
Monitor function

Monitor operation status on the "Display all" window. Measurement equipment such as electric power meter is not required since power consumption is monitored. Assigning input/output signals and monitoring ON/OFF status are also performed on the "I/O monitor" window.

["Display all" window]



["I/O monitor" window]

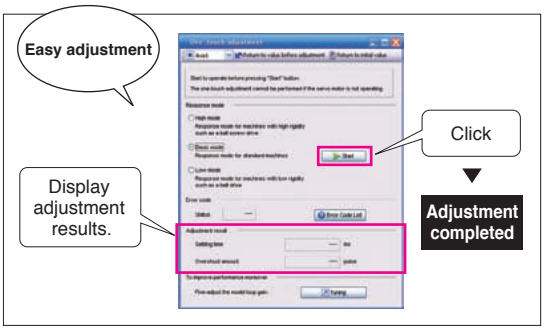


MELSERVO-J4 | Servo adjustment

One-touch tuning function

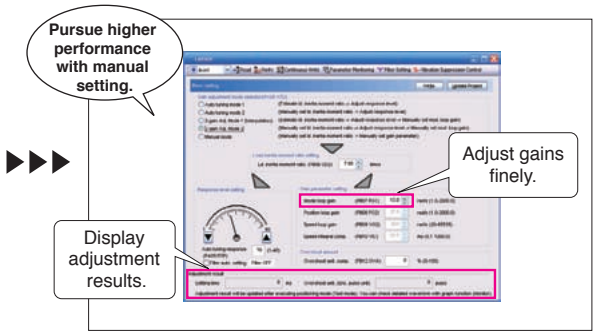
NEW

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



Tuning function

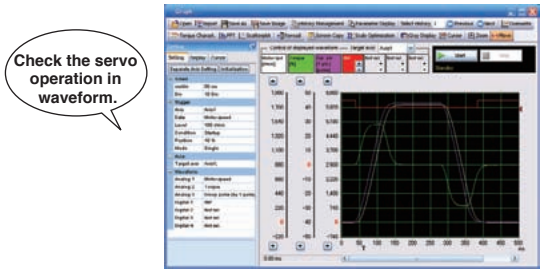
Adjust model control gain finely on [Tuning] window manually for further performance after the one-touch tuning.



Graph function

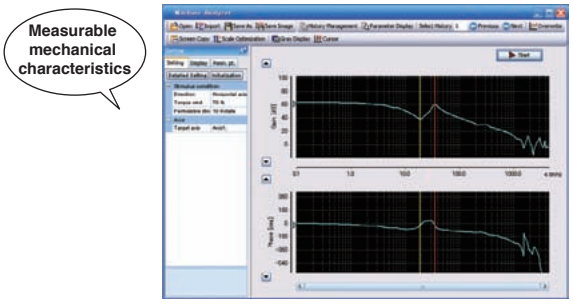
Enhanced functions

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 [Over write] for overwriting multiple data and [Graph history] for displaying graph history are available. Waveform measurement for the connected axes is simultaneously performed via Motion controller communication.



Machine analyzer function

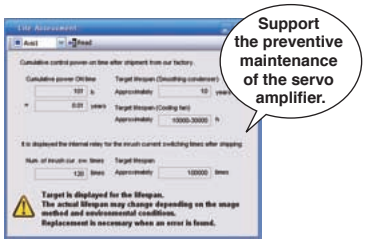
Input random torque to the servo motor automatically and analyze frequency characteristics (0.1 kHz to 4.5 kHz) of a machine system just by clicking the [Start] button. This function supports setting of machine resonance suppression filter, etc.



MELSERVO-J4 | Maintenance

Servo amplifier life diagnosis function

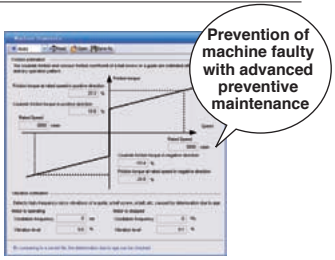
Check cumulative operation time and on/off times of inrush relay. This function provides an indication of replacement time for servo amplifier parts such as capacitor and relays.



Machine diagnosis window

NEW

Estimate and display machine friction and vibration during normal operation. No particular measurement is required. The current value is compared with the value at the operation start, and aging deterioration of machine due to operation is grasped, which is effective for preventive maintenance.



The Environment

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-J4

The new MR-J4 series: an evolution in eco-friendly design that's winning acclaim worldwide.

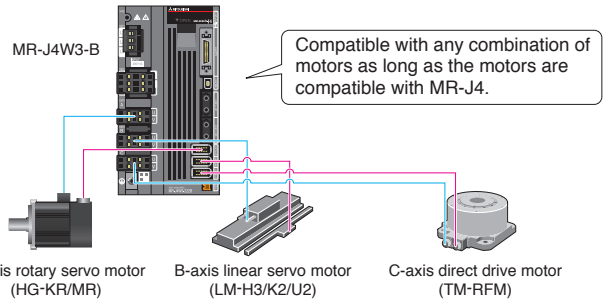
The MR-J4 series was designed with the environment in mind. In addition to helping you reduce your energy consumption, MR-J4 servos have a small footprint and simple wiring requirements that help save space and valuable resources.

Designed to cut waste and save on space, wiring, and energy use

MELSERVO-J4 | Multi-axis servo amplifier in harmony with eco-friendly society

2-axis/3-axis types for energy-conservative, miniaturized, and low-cost machine

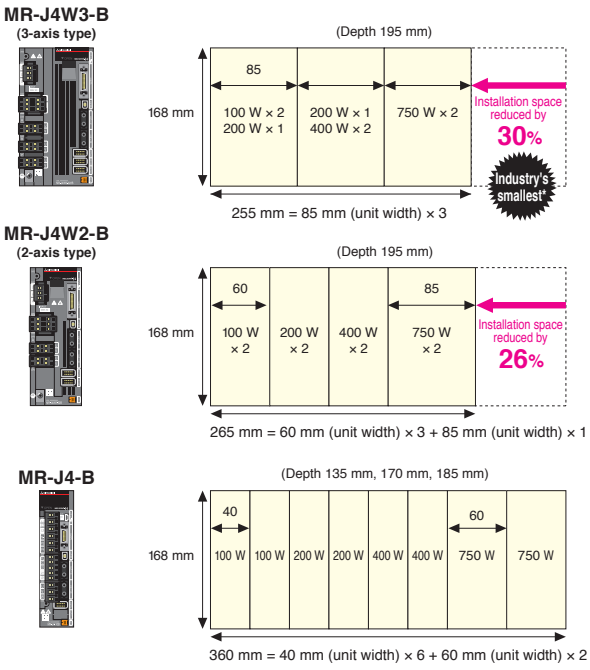
2-axis and 3-axis servo amplifiers are available for operating two and three servo motors, respectively. These servo amplifiers enable energy-conservative, compact machine at lower cost. Any combination of rotary/linear servo motors or direct drive motors is operated.



Space-saving with industry's smallest* 3-axis type

2-axis servo amplifier MR-J4W2-B requires 26% less installation space than two units of MR-J4-B. 3-axis servo amplifier MR-J4W3-B requires 30% less installation space than three units of MR-J4-B.

[Installation space]

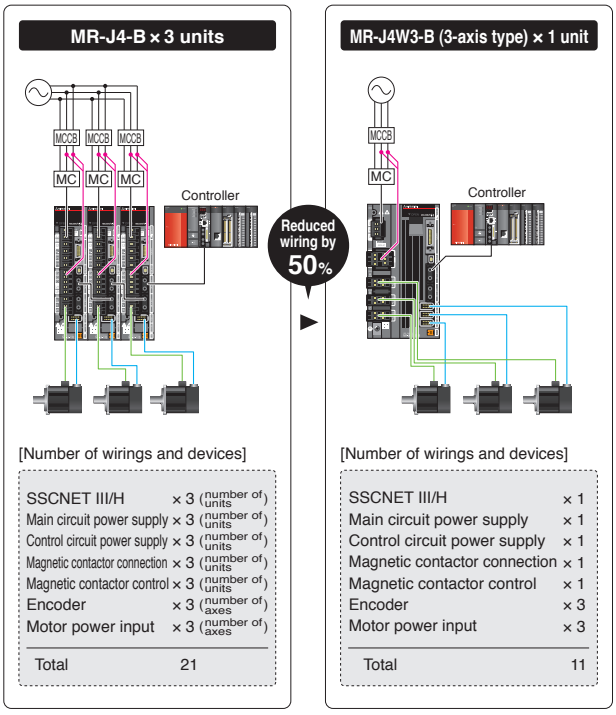


* This is when two units of 100 W, 200 W, 400 W, and 750 W each are used.
* Based on Mitsubishi Electric research as of April 2012.

Reduced wiring by approx. 50% with 3-axis type

In 3-axis servo amplifier MR-J4W3-B, the three axes use the same connections for main and control circuit power, peripheral equipment, control signal wire, etc. Thus, the number of wirings and devices is greatly reduced.

[Comparison of the number of wirings and devices]



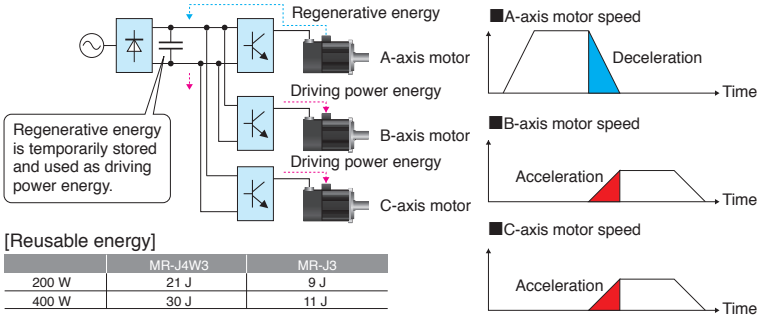
Eco-friendly performance, designed to save energy in every detail

MELSERVO-J4 | Optimal energy-conservative system for your system

Supporting energy-conservative machine using regenerative energy

In the multi-axis servo amplifier, the regenerative energy of an axis is used as driving power energy for the other axes, contributing to energy-conservation of machine. Reusable regenerative energy stored in the capacitor is increased in MR-J4W_ as compared to the prior model. Regenerative option is no longer required.

* Regenerative resistor may be required depending on the conditions.
* In the multi-axis servo amplifier, the amount of temporarily stored regenerative energy can be increased by using a capacitor bank. (Available in the future)
Contact your local sales office for more details.

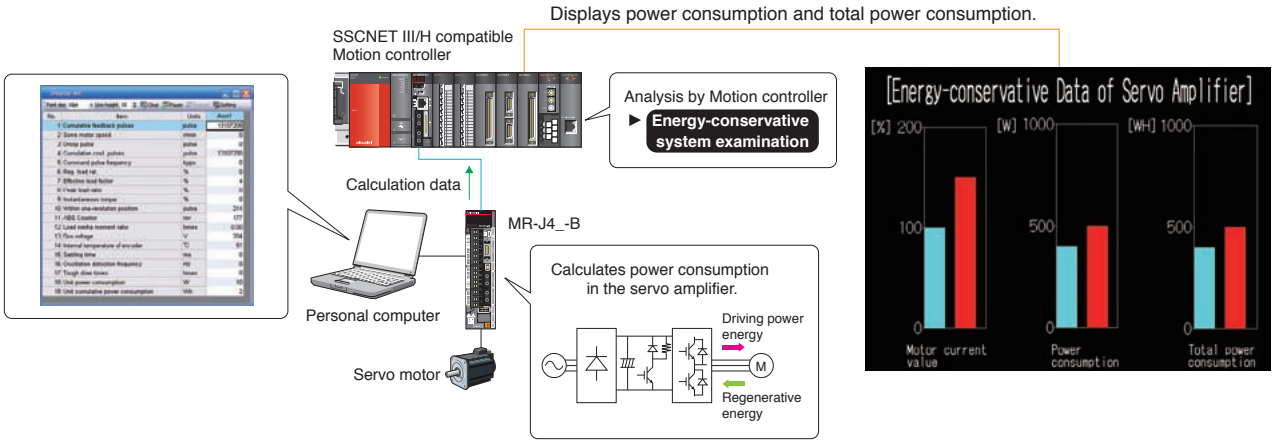


[Reusable energy]

	MR-J4W3	MR-J3
200 W	21 J	9 J
400 W	30 J	11 J

Power monitor function

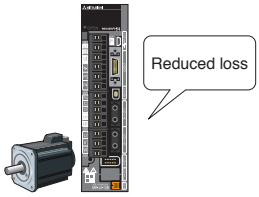
Driving power and regenerative energy are calculated from the data in the servo amplifier such as speed and current. Motor current value, power consumption, and total power consumption are monitored with MR Configurator2. In SSCNET III/H system, data are transmitted to a Motion controller, and the power consumption is analyzed and displayed.



Advanced function and performance for more energy-conservation

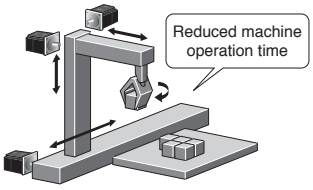
Reduced energy loss of servo amplifier and servo motor

[Servo amplifier]
Efficiency is increased by the use of a new power module.
[Servo motor]
Motor efficiency is increased by optimized design of magnetic circuit.



Energy-conservation due to the improved machine performance

Thanks to the driving system configured by servo amplifier and servo motor with industry-leading level of high performance, machine tact time and operation time are reduced, achieving energy-conservation.

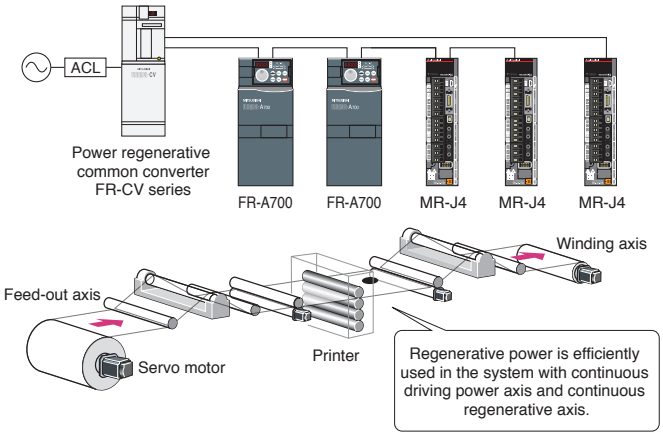


Optimal energy-conservative machine system

PN bus voltage connection + power regeneration common converter

Regenerative energy is used efficiently when multiple servo amplifiers and inverters are connected through common PN bus to the power regeneration common converter.

* System only with common PN bus connection is also possible to be configured without using the power regeneration common converter. However, there are restrictions depending on the system. Contact your local sales office for more details.
* Refer to MR-J4-B/A Servo Amplifier Instruction Manual for selection of power regenerative common converter FR-CV series.



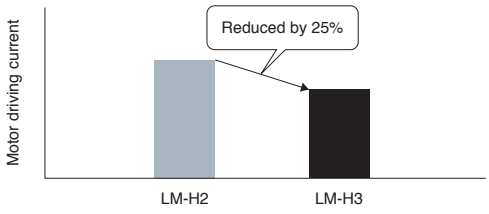
Energy-conservation achieved by LM-H3 linear servo motor series

NEW

Reduced motor driving power

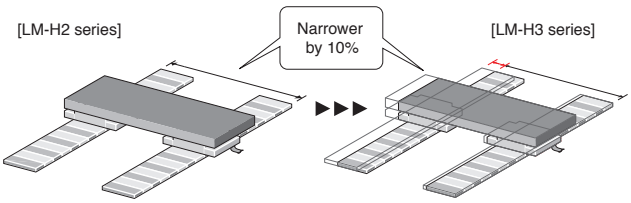
LM-H3 series achieves reduction of motor driving power due to optimized magnet form and new magnetic design by 25%*. Conservation of power is achieved for machine. As compared to the prior model, the motor coil is lighter by approximately 12%*. The energy required to drive the moving part is reduced.

* For 720 N rated linear servo motor.



Space saving

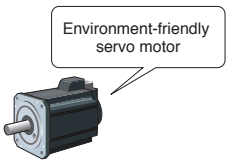
For LM-H3, widths of the motor coil and the magnet are reduced by 10% from the prior model. Increased thrust to current ratio results in using the servo amplifier in smaller capacity, contributing to more compact machine (the reduction of materials).



Contribution to resource-saving

The new environment-friendly HG rotary servo motor series uses 30% less permanent magnet than the prior HF series due to the optimized design of magnetic circuit. The total mass is also reduced.

* For HG-KR43.



Heritage

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-J4

A heritage of trust and continuity — the hallmark of every MELSERVO product.

The MR-J4 series integrates seamlessly with your existing manufacturing assets, ensuring a smooth transition to the speed and cost benefits of leading-edge MELSERVO technology.

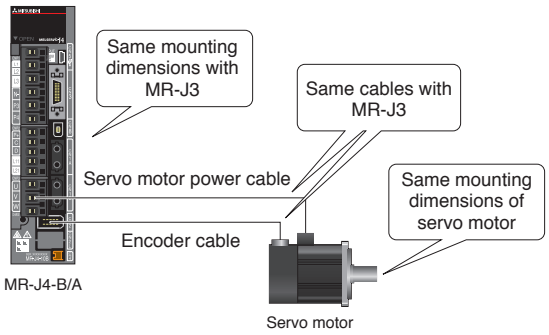
The speed and cost benefits achieved with the existing manufacturing assets

MELSERVO-J4 | Seamless integration with existing system

Easy replacement of MR-J3 series

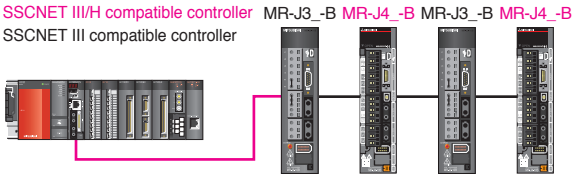
●MR-J4-B/A has the same mounting dimensions* with MR-J3-B/A. HG rotary servo motor series has the same mounting dimensions and uses the same cables for the power, the encoder, and the electromagnetic brake as HF series.

* Mounting dimensions are smaller for 5 kW servo motor.



●SSCNET III/H compatible and SSCNET III compatible products can be used together.

* When using SSCNET III/H compatible and SSCNET III compatible products together, the communication speed is 50 Mbps, and the function and performance are equivalent to when using MR-J3.



●Parameters of MR-J3-B are converted to those of MR-J4-B, using the parameter converter function of MELSOFT MT Works2.
Parameters of MR-J3-A are converted to those of MR-J4-A, using the parameter converter function of MR Configurator2.

Replacement of MR-J2 Super series

●Parameters of MR-J2S-A are converted to those of MR-J4-A, using the parameter converter function of MR Configurator2.

●MR-J4-B can be used as MR-J2S-B without converting parameters, using network converter which connects SSCNET compatible controller and MR-J4-B. Available in the future

Conformity with global standards and regulations

MELSERVO-J4 conforms to global standards as standard.

		Servo amplifier	Rotary servo motor
European EC directive	Low voltage directive	EN 61800-5-1	EN 60034-1/EN 60034-5
	EMC directive	EN 61800-3	EN 60034-1
	Machinery directive	EN ISO 13849-1 Category 3 PL d/EN 61508 SIL 2/ EN 62061 SIL CL 2/EN 61800-5-2 SIL 2	–
	RoHS directive	Compliant	Compliant
UL standard		UL508C	UL1004-1/UL1004-6
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.

A wide-ranging lineup to meet virtually every drive control need

The new MR-J4 series lineup includes servo amplifiers and servo motors to meet virtually every production need — because every production site is different, with unique problems that require unique and innovative solutions.

2-axis and 3-axis types are available for your system.

Servo amplifier

MR-J4-B

SSCNET III/H compatible servo amplifier

MR-J4W2-B

SSCNET III/H compatible servo amplifier for operating two units of servo motors by one

■Product lines

SSCNET III/H compatible and general-purpose interface compatible products are available.

Model	Power supply	Command interface	Fully closed loop control*1	Compatible servo motor		
				Rotary	Linear	Direct drive
MR-J4-B	1-phase 100 V AC	SSCNET III/H	○ (Released in the future)	○ (Released in the future)	○ (Released in the future)	○ (Released in the future)
	3-phase 200 V AC		●	●	●	●
	3-phase 400 V AC		○ (Released in the future)	○ (Released in the future)	○*3 (Released in the future)	–
MR-J4W2-B	3-phase 200 V AC 2-axis		●	●	●	●
MR-J4W3-B	3-phase 200 V AC 3-axis		–*2	●	●	●
MR-J4-A	1-phase 100 V AC	General-purpose pulse train/ analog voltage	○ (Released in the future)	○ (Released in the future)	○ (Released in the future)	○ (Released in the future)
	3-phase 200 V AC		○ (Available in the future)	●	○ (Available in the future)	○ (Available in the future)
	3-phase 400 V AC		○ (Released in the future)	○ (Released in the future)	○*3 (Released in the future)	–

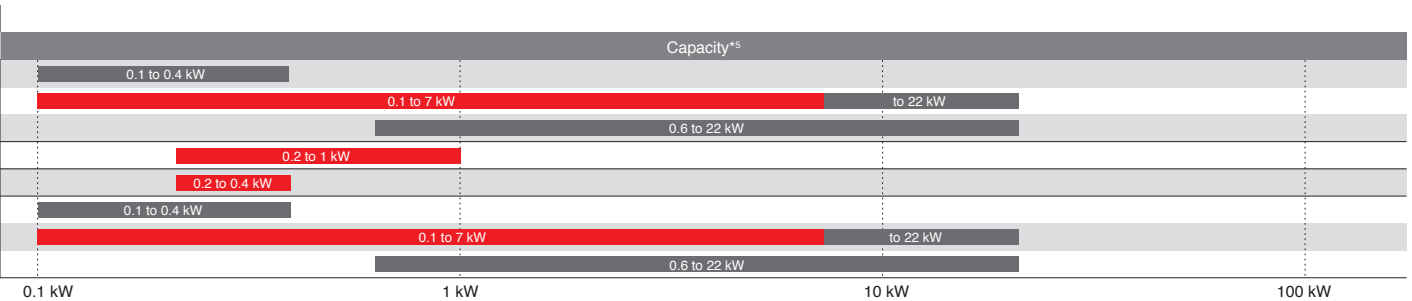
*1. Only two-wire type linear encoder is compatible. Contact your local sales office for four-wire type and for compatibility with A/B/Z-phase differential output type linear encoders. *2. Contact your local

MR-J4W3-B

SSCNET III/H compatible
servo amplifier for operating
three units of servo motors by one

MR-J4-A

General-purpose interface compatible servo amplifier
Compatible with the maximum command pulse
frequency of 4 Mpps.



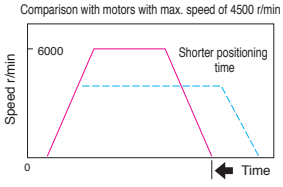
sales office for more details. *3. Available only in some models. *4. Functions described as "available in the future" in this catalog will be available within 2012. *5. ▬ will be released in the future.

High-speed, high-torque servo motors for fast, precise machine operation

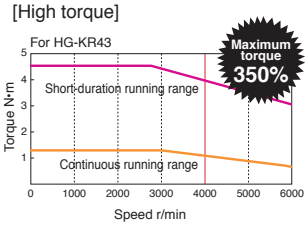
HG-KR/HG-MR Series

Rated speed: 3000 r/min
Maximum speed: 6000 r/min
Maximum torque is 350%* of the rated torque, and high torque is achieved during high-speed. * Available only in HG-KR.

[High speed]



[High torque]

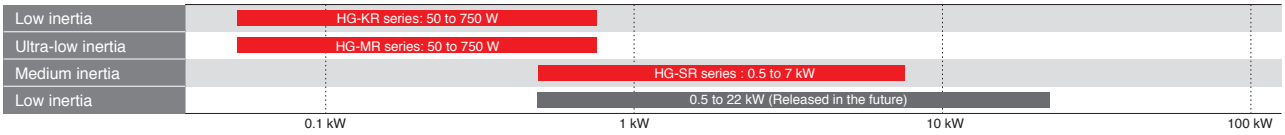


HG-SR Series

This medium inertia servo motor enables stable operation. The industry's shortest length is achieved by optimizing the structural design.

Product lines

Small capacity models are available in two types: ultra-low inertia and low inertia.



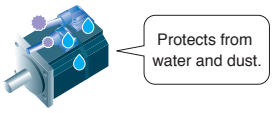
Equipped with high-resolution absolute encoder

Servo motors are equipped with a high-resolution absolute encoder of 4,194,304 pulses/rev (22-bit) as standard. Positioning accuracy is increased.

Improved environmental safety

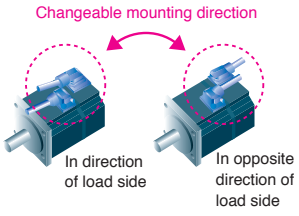
HG-KR/HG-MR and HG-SR are rated IP65 and IP67, respectively.

* The shaft-through portion is excluded.



Cable leading direction

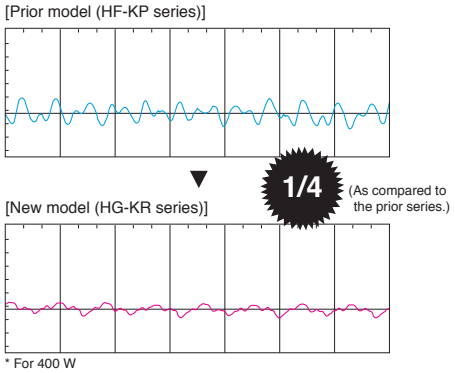
The power cable, the encoder cable, and the electromagnetic brake cable are let out to either in direction of or in opposite direction of the load side, depending on the selected cables.



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 machine is achieved.

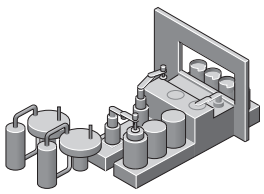
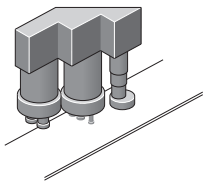
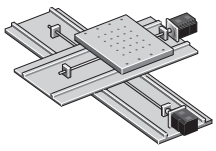
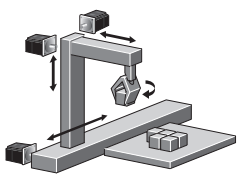
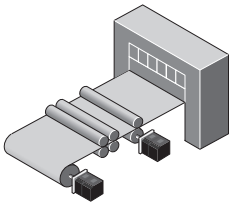
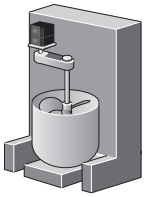
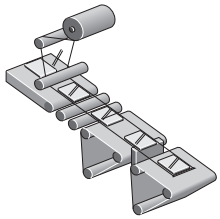
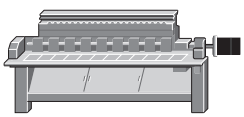
■Torque ripple



* For 400 W

Application examples

For various applications of every kinds of machine.

Semiconductor/LCD/photovoltaic manufacturing systems 	Mounters/bonders 	X-Y tables 	Robots 
Loaders/unloaders, feeders and sliders 	Food processing machines (filling machine, mixer, measuring machine, etc.) 	Food packaging machines 	Knitting and embroidery machines 

Servo motors for high-speed, high-accuracy, linear drive systems

Sophisticated performance

- Maximum speed: 3 m/s (LM-H3 series)
  Maximum thrust range: 150 N to 7200 N
  Small size and high thrust are achieved by increasing the winding density and by optimizing core and magnet geometries using electromagnetic field analysis.
- Four series are available: core, coreless, and liquid-cooling core types, and core type with magnetic attraction counter-force.
- The linear servo motors are compatible with a variety of serial interface linear encoders with resolution range from 0.005 μm and up.
  * Contact your local sales office for compatibility with A/B/Z-phase differential output type linear encoders.
- High-performance systems such as high-accuracy tandem synchronous control are achieved using MR-J4 series servo amplifier and a SSCNET III/H compatible Motion controller.

Achieving high-performance machine

For higher machine performance

- Improved productivity due to high-speed driving part.
- High-accuracy positioning by fully closed loop control system.

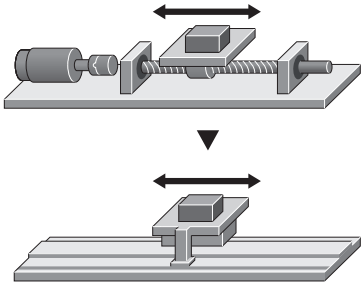
For easier use

- The linear servo motor enables simple and compact machine with high rigidity.
- Smooth operation and clean system are achieved.

For flexible machine configurations

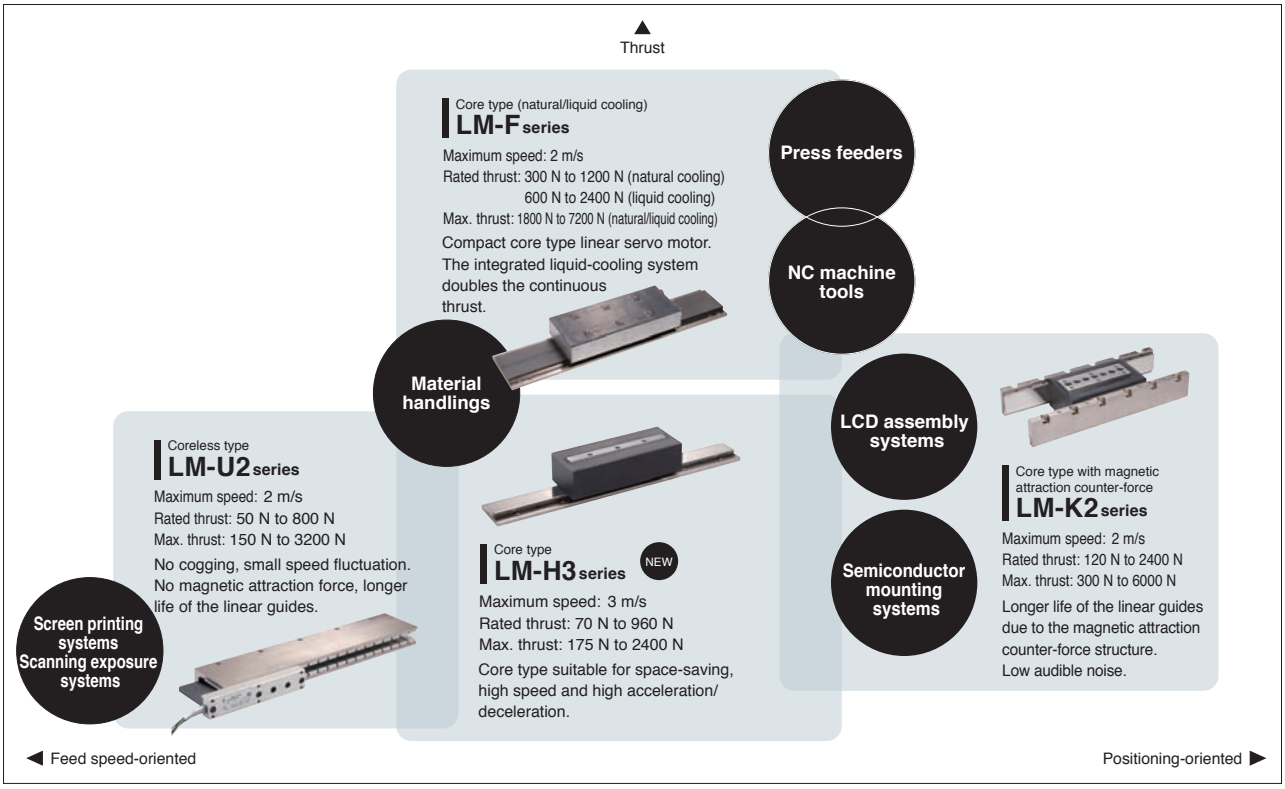
- Multi-head and tandem systems are easily configured.
- The linear servo motor is suitable for long-stroke applications.

[Offers more advantage than conventional ball screw driving systems]



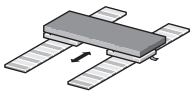
Product lines

Four series are available depending on applications.



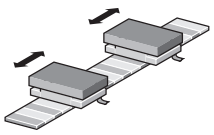
Application examples

Optimum for a direct acting system which requires a high speed and high accuracy. Easily achieve a tandem configuration or multi-head configuration.



Tandem configuration

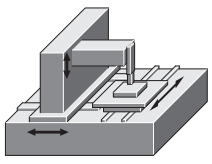
The linear servo motors configured in tandem are suitable for large systems that require highly accurate synchronous operation between two axes.



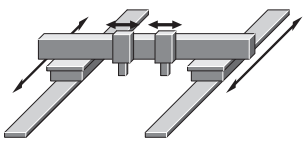
Multi-head configuration

Multi-head systems enable control of two motor coils independently, thereby simplifying machine mechanisms. This system is suitable for machines that require short tact time.

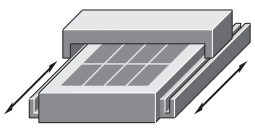
Machine tool devices XYZ stage



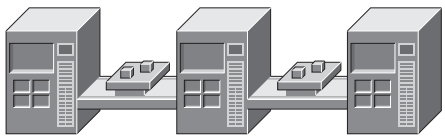
Semiconductor/LCD manufacturing systems
Electrical parts assembling/manufacturing systems



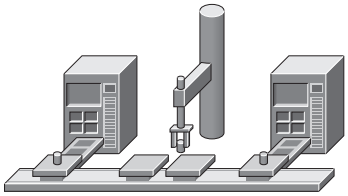
Screen printing systems and large LCD coaters



Material handling systems



Multi-head material handling between machines



Compact and robust direct drive motors for high-accuracy applications

Direct drive motor

TM-RFM Series

Sophisticated performance

High performance due to the latest technologies

Our latest magnetic design and winding technologies enable high torque density. In addition, extremely smooth rotation is achieved by minimizing torque ripple.

Compact and low-profile design

Due to high level of structural design technology, compact and low-profile design is achieved. This design enables a small mounting space and a low center of gravity.

20-bit high-resolution absolute encoder

The servo motor is equipped with 20-bit high-resolution absolute encoder (1,048,576 pulses/rev) as standard. High-accuracy machine is achieved.

Hollow shaft diameter range: ø20 mm to 104 mm

The motor is equipped with a large hollow shaft resulting from using bearing and encoder with large diameter. It allows cables and air tubing to pass through.

Achieving high-performance machine

For higher machine performance

- Suitable for low-speed and high-torque operations.
- High-accuracy positioning is achieved because the motor is directly connected to the driving part.

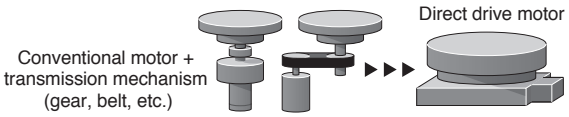
For easier use

- Since transmission mechanism is no longer required, no backlash and no abrasion occurs, enabling smooth operation with less audible noise, clean system, and easy maintenance.
- Less components are required for the system.

For flexible machine configurations

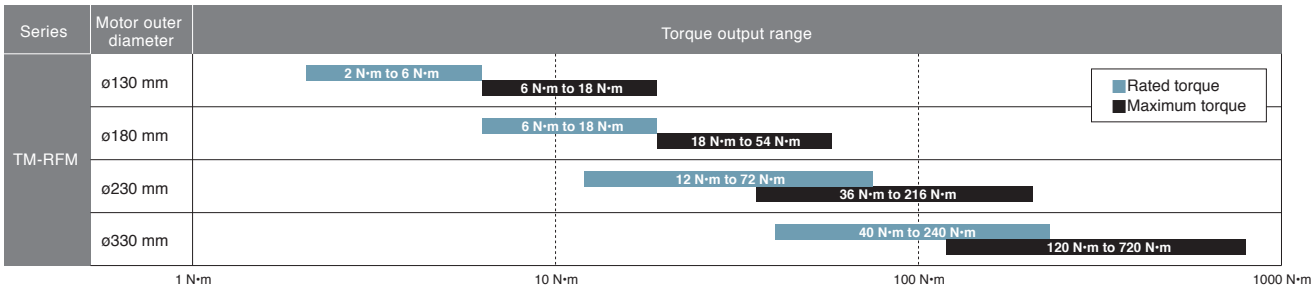
- Simple, compact, and rigid machine is achieved.
- Machine stability is enhanced due to the low-profile design and a low center of gravity.
- The motor has an inner rotor with hollow shaft that allows cables and pipes to pass through.

[No transmission mechanism contributing to no warp or distortion.]



Product lines

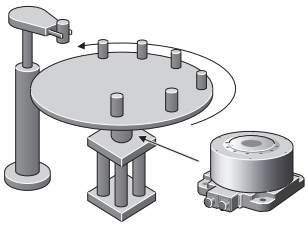
12 models with 4 different diameters are available.



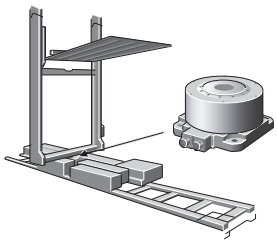
Application examples

Suitable for low speed and high torque applications.

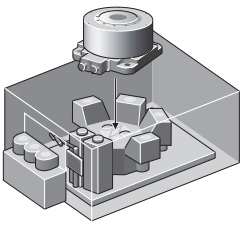
Index table for machine tools



Rotary axis for material handling robots

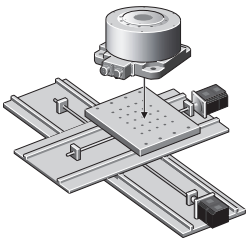


Painting and vapor deposition systems

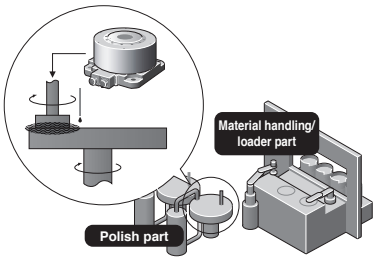


LCD/semiconductor spin-type cleaning systems

LCD/semiconductor testing systems (XYθ tables)



Rotary axis for polishing systems

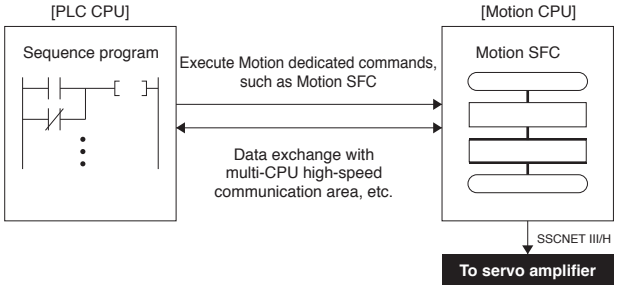


Most-advanced Motion controller

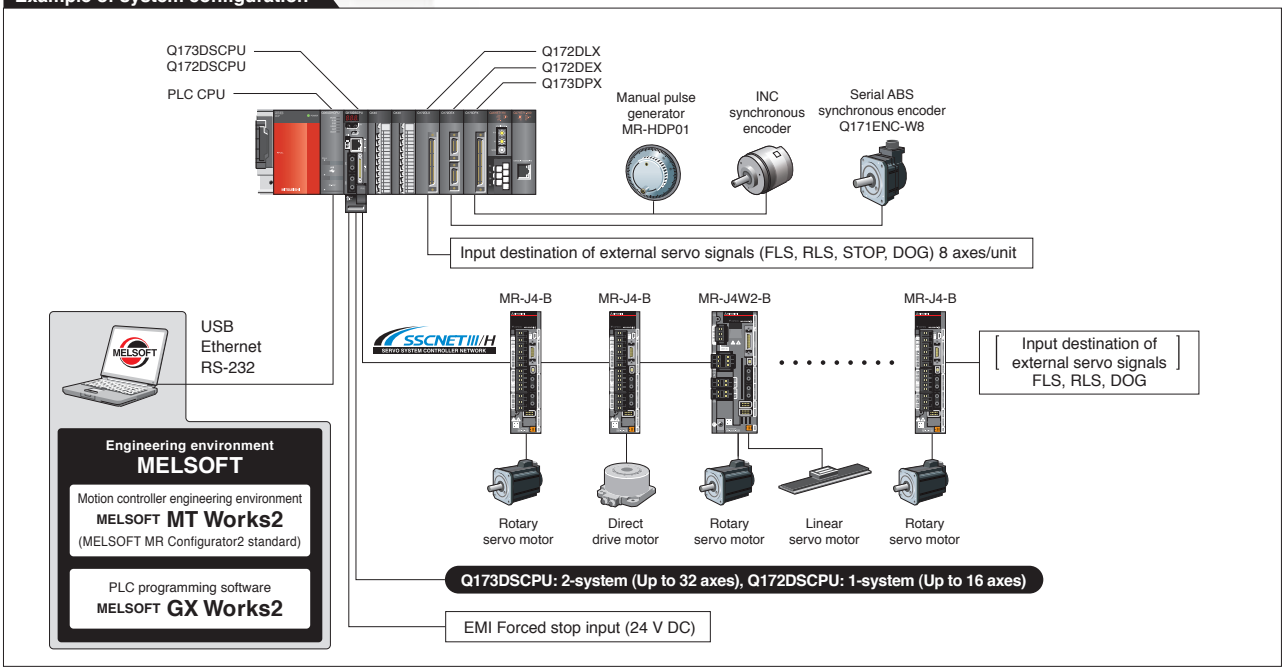
SSCNET III/H compatible Motion controller

Q173DSCPU
Q172DSCPU

Motion controller is a CPU module used with PLC CPU for Motion control. High speed control is achieved as Motion controller with Motion SFC program independently control modules, such as input/output modules, from PLC CPU.



Example of system configuration



Comparison with QD77MS: Superior Equivalent Others

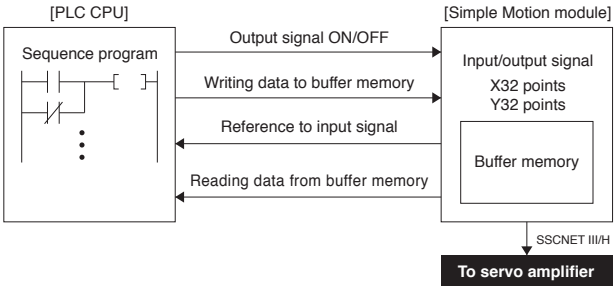
	Q173DSCPU	Q172DSCPU
Number of control axes	32 axes	16 axes NEW
Operation cycle	0.22 ms or more	
Programming language	Motion SFC	
Control modes	Position control, Speed control NEW, Torque control NEW, Tightening & Press-fit control NEW, Synchronous control, Cam control	
Positioning control	Linear interpolation, Circular interpolation, Trajectory control, Helical interpolation, Position follow-up control, Speed control with fixed position stop, High-speed oscillation control, Speed/position switching control	
Sub functions	Forced stop function, Hardware stroke limit function, Software stroke limit function, Absolute position system, Amplifier-less operation function, Unlimited length feed function, Optional data monitor function, Mark detection function, ROM operation function, M-code output function, Error history, Digital oscilloscope function, Safety monitor function NEW, Vision system connection, Software security key function NEW, High-speed reading function, Limit switch output function	

Advanced but simple as a positioning module

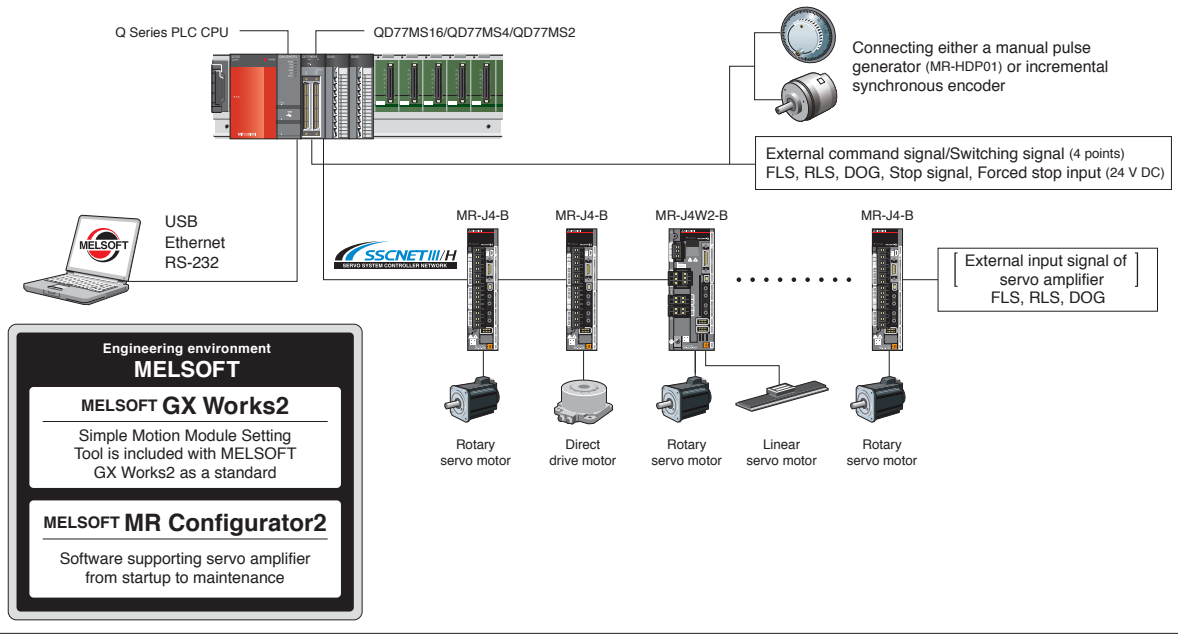
SSCNET III/H compatible Simple Motion module

QD77MS16
QD77MS4
QD77MS2

Simple Motion module is an intelligent function module controlled by PLC CPU, which easily perform positioning control. Synchronous control that was previously unavailable with the conventional positioning module is now available with this Simple Motion module just like the positioning module.



Example of system configuration



Comparison with Q17nDSCPU: Superior Equivalent Others

	QD77MS16	QD77MS4	QD77MS2
Number of control axes	16 axes NEW	4 axes	2 axes
Operation cycle	0.88 ms/1.77 ms		
Programming language	—		
Control modes	Position control; Speed control NEW; Torque control NEW; Tightening & Press-fit control NEW; Synchronous control NEW; Cam control NEW		
Positioning control	Linear interpolation; Circular interpolation; Trajectory control; Speed/position switching control (INC); Position/speed switching control; Speed/position switching control (ABS)		
Sub functions	Forced stop function; Hardware stroke limit function; Software stroke limit function; Absolute position system; Amplifier-less operation function NEW; Unlimited length feed function; Optional data monitor function NEW; Mark detection function NEW; Flash ROM backup; M-code output function; Error history NEW; Digital oscilloscope function NEW; Cam generated automatically function NEW		

As a recognized leader in factory automation,
Mitsubishi Electric is committed to maintaining a world-class level
of customer satisfaction in every area of development, production, and service.

Unrivalled engineering quality and craftsmanship backed by over 80 years of proven expertise

For more than 80 years from the start of operations in 1924, Mitsubishi Electric Nagoya Works has manufactured various universal devices including motors, programmable controllers and inverters. The history of AC servo production at Nagoya Works spans over 30 years. We have expanded our production system based on the technology and tradition amassed during this time, and have incorporated world-class research and development to create high-performance, high-quality products that can be supplied for a long time.

Production system

To guarantee the high quality and performance of MELSERVO, Mitsubishi Electric has built a cooperative system of three facilities - Shinshiro Factory, a branch factory of Nagoya Works; Mitsubishi Electric Dalian Industrial Products Co., Ltd., a manufacturing base; and Nagoya Works at the core. Mitsubishi Electric responds to various needs throughout the world by uniting technologies and know-hows of these facilities. Mitsubishi Electric's FA energy solutions, "e&eco-F@ctory", are at work in the servo motor factory at the Nagoya Works. They are being used to boost capacity utilization and product quality, and reduce energy consumption.

Development system

To spread advanced servo systems to the world as quickly as possible, Mitsubishi Electric has established FA-related development centers at its Nagoya Works, and in North America and Europe. Furthermore, we have established strong connections between our Advanced Technology R&D Center, which pushes technology development beyond the limits of FA, and Information Technology R&D Center. We are moving forward with the development of new products that reflect the latest technological directions and customer input.

Mitsubishi Electric Nagoya Works

FA Development Center

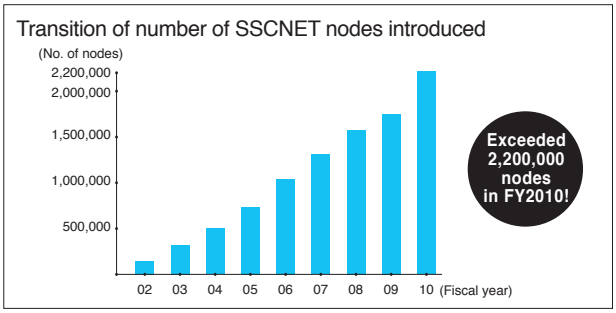
e&eco-F@ctory implementation

EDC (Europe Development Center)

Promoting the popularity of SSCNET in Japan and around the world

SSCNET Partner Association (SNP)

The SSCNET Partner Association (SNP) carries activities to introduce the advanced servo system controller network "SSCNET III" and compatible products to many users. In cooperation with partner corporations, SNP widely promotes the performance attainable with SSCNET. In recent years, SNP holds partner meetings in Japan and overseas such as Taiwan and India. SNP aims to make SSCNET a more global servo system controller network.



A global support network for MELSERVO users

Global FA Center

Across the globe, FA Centers provide customers with local assistance for purchasing Mitsubishi Electric products and with after-sales service. To enable national branch offices and local representatives to work together in responding to local needs, we have developed a service network throughout the world. We provide repairs, on-site engineering support, and sales of replacement parts. We also provide various services from technical consulting services by our expert engineers to practical training for equipment operations.

Hatfield, UK
UK FA Center

Krakowska, Poland
European FA Center (Poland)

St.Petersburg, Russia
Russian FA Center

Gurgaon, India
India FA Center

Bangkok, Thailand
Thailand FA Center

Ratingen, Germany
German FA Center/
Europe Development Center

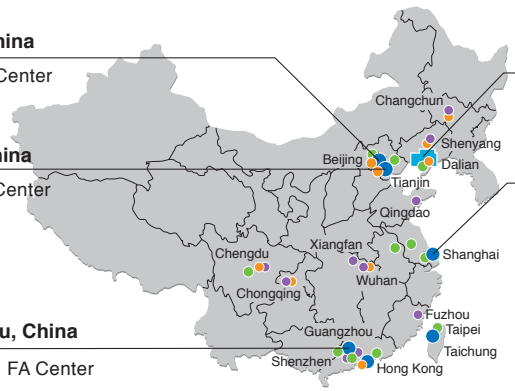
Praha, Czech Republic
Czech Republic FA Center

China (including Hong Kong District)

Beijing, China
Beijing FA Center

Tianjin, China
Tianjin FA Center

Guangzhou, China
Guangzhou FA Center



Dalian, China
China Local Factory
Mitsubishi Electric Dalian Industrial Products Co., Ltd.

Shanghai, China
Shanghai FA Center

Conformity with global standards

Complies with EN, UL and CSA (c-UL) standards.

MELSERVO-J4 series conforms to global standards.

* This product is not subject to China Compulsory Certification (CCC).
* Refer to "Servo Amplifier Instruction Manual" and "EMC Installation Guidelines" when your system needs to meet the EMC directive.
* Refer to "Conformity with global standards and regulations" on p. 22 in this catalog for corresponding standards.

● Global FA Center ● FA Center Satellite (China) ● Mechatronics Service Base (China) ● Mitsubishi Sales Offices
■ Production Facility ◆ Development Center

Seoul, Korea
Korean FA Center

Nagoya, Japan
Nagoya Works

Taiwan
Left: Taiwan FA Center (Taipei)
Right: Taiwan FA Center (Taichung)

Chicago IL, USA
North American FA Center/
North American Development Center

Singapore
ASEAN FA Center

Sao Paulo SP, Brazil
Brazil FA Center

Regions	Global FA Center	Tel/Fax
China	Shanghai FA Center	Tel: 86-21-2322-3030/Fax: 86-21-2322-3000
	Beijing FA Center	Tel: 86-10-6518-8830/Fax: 86-10-6518-3907
	Tianjin FA Center	Tel: 86-22-2813-1015/Fax: 86-22-2813-1017
	Guangzhou FA Center	Tel: 86-20-8923-6730/Fax: 86-20-8923-6715
Taiwan	Taiwan FA Center	Tel: 886-2-2299-9917/Fax: 886-2-2299-9963
Korea	Korean FA Center	Tel: 82-2-3660-9630/Fax: 82-2-3663-0475
Thailand	Thailand FA Center	Tel: 66-2906-3238/Fax: 66-2906-3239

Regions	Global FA Center	Tel/Fax
ASEAN/ India	ASEAN FA Center	Tel: 65-6470-2480/Fax: 65-6476-7439
	India FA Center	Tel: 91-124-4630300/Fax: 91-124-4630399
North/ Central/ South America	North American FA Center	Tel: 1-847-478-2100/Fax: 1-847-478-2253
	Brazil FA Center	Tel: 55-11-3146-2200/Fax: 55-11-3146-2217
Europe	European FA Center	Tel: 48-12-630-47-00/Fax: 48-12-630-47-01
	German FA Center	Tel: 49-2102-486-0/Fax: 49-2102-486-1120
	UK FA Center	Tel: 44-1707-27-6100/Fax: 44-1707-27-8695
	Czech Republic FA Center	Tel: 420-251-551-470/Fax: 420-251-551-471
	Russian FA Center	Tel: 7-812-633-3497/Fax: 7-812-633-3499

Complies with Restriction of Hazardous Substances Directive (RoHS).

Human and environment-friendly MELSERVO-J4 series is compliant with RoHS Directive.

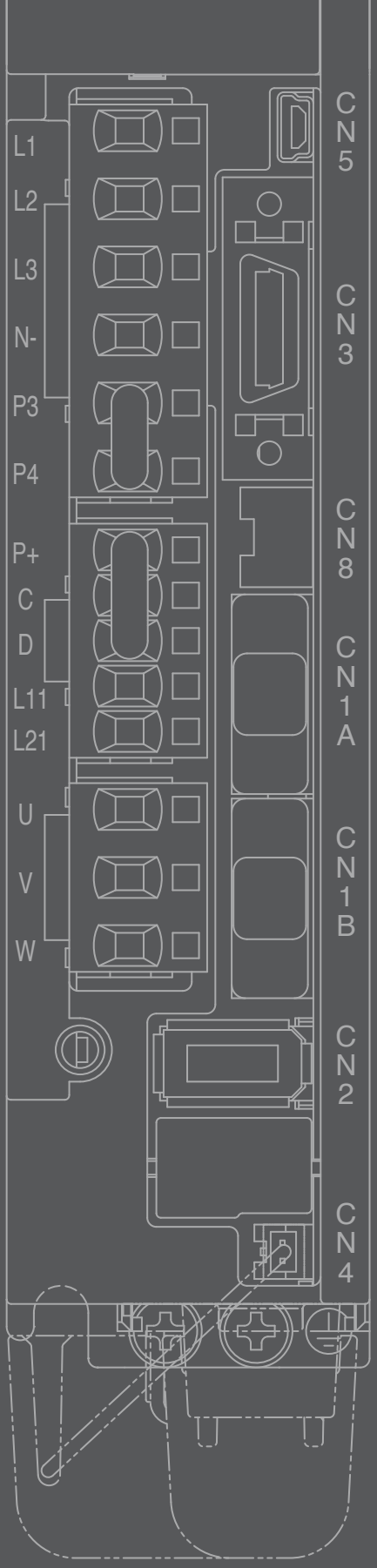
About RoHS directive
RoHS Directive requires member nations to guarantee that new electrical and electronic equipment sold in the market after July 1, 2006 do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. <G> mark indicating RoHS Directive compliance is printed on the package.

* Refer to "Servo Amplifier Instruction Manual" and "EMC Installation Guidelines" when your system needs to meet the EMC directive.

Our optional cables and connectors comply with "Measures for Administration of the Pollution Control of Electronic Information Products" (Chinese RoHS).

MEMO

1



* Refer to p. 5-45 in this catalog for conversion of units.

Servo Amplifiers

Servo Amplifiers

Product lines

	Servo amplifier	Number of control axes	Power supply specifications	Rated output [kW] (Note 1)
SSCNET III/H interface	MR-J4-B	1 axis	3-phase 200 V AC	0.1 to 7
	MR-J4W2-B	2 axes	3-phase 200 V AC	0.2 to 1
	MR-J4W3-B	3 axes	3-phase 200 V AC	0.2 to 0.4
General-purpose interface	MR-J4-A	1 axis	3-phase 200 V AC	0.1 to 7

Notes: 1. The values in the table shows the rated output of the servo amplifiers. Refer to "Combinations of Servo Amplifier and Servo Motor" for the compatible servo motor.

Features

MR-J4-B (SSCNET III/H interface)

- Transfer speed of 150 Mbps and communication cycle of 0.22 ms.
- Maximum of 6400 m long distance wiring. (Max. 100 m between stations × 64 axes (Note 1))
- Replacing MR-J3-B with MR-J4-B is easy because the servo amplifiers use the same fiber-optic cables.

MR-J4W2-B/MR-J4W3-B (SSCNET III/H interface, multi-axis servo amplifier):

- MR-J4W_-B has the same high performance, functionality, and usability as MR-J4-B. One unit of the servo amplifier operates two or three units of servo motors.
- Mounting space is smaller by approximately 25% to 30% with MR-J4W2-B and by approximately 30% with MR-J4W3-B as compared to MR-J4-B. Machine can be more compact and less wiring.

MR-J4-A (general-purpose interface):

- Pulse train and analog voltage input are available for command interface as a standard.
- Position, speed or torque control mode are switchable.
- Compatible with command pulse frequency of 4 Mpps.

Notes: 1. The number of the connectible axes depends on the controller specifications.

Environment

Ambient temperature	Operation	0 °C to 55 °C (non-freezing)
	Storage	-20 °C to 65 °C (non-freezing)
Ambient humidity	Operation	90 %RH maximum (non-condensing)
	Storage	
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)

●: Compatible, ○: Available within the year of 2012, -: Not compatible

Command interface				Control mode				Compatible servo motor series							
SSCNET III/H	Pulse train	Analog voltage	RS-422 multi-drop	Position	Speed	Torque	Fully closed loop control	HG-KR	HG-MR	HG-SR	LM-H3	LM-F	LM-K2	LM-U2	TM-RFM
●	-	-	-	●	●	●	●	●	●	●	●	●	●	●	●
●	-	-	-	●	●	●	●	●	●	●	●	-	●	●	●
●	-	-	-	●	●	●	-	●	●	-	●	-	●	●	●
-	●	●	●	●	●	●	○	●	●	●	○	○	○	○	○

1-Axis Servo Amplifier Model Designation

MR-J4-B MR-J4-A

M R - J 4 - 1 0 B - ____

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Rated output [kW]
10	0.1
20	0.2
40	0.4
60	0.6
70	0.75
100	1
200	2
350	3.5
500	5
700	7

Symbol	Interface
A	General-purpose
B	SSCNET III/H

Symbol	Special specification
None	Standard
ED	Without a dynamic brake (Note 1)

Multi-Axis Servo Amplifier Model Designation

MR-J4W-B

M R - J 4 W 2 - 2 2 B - ____

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Number of axes
W2	2 axes
W3	3 axes

Symbol	Rated output [kW]		
	A-axis (Note 2)	B-axis (Note 2)	C-axis (Note 2)
22	0.2	0.2	-
44	0.4	0.4	-
77	0.75	0.75	-
1010	1	1	-
222	0.2	0.2	0.2
444	0.4	0.4	0.4

Symbol	Interface
B	SSCNET III/H

Symbol	Special specification
None	Standard
ED	Without a dynamic brake (Note 1)

Notes: 1. When using the servo amplifier without a dynamic brake, the servo motor does not stop immediately at alarm occurrence or power failure. Take measures to ensure safety on the entire system.
2. A-axis, B-axis, and C-axis indicate names of axes of the multi-axis servo amplifier. The C-axis is available for the 3-axis servo amplifier.

Combinations of 1-Axis Servo Amplifier and Servo Motor

MR-J4-B MR-J4-A

With MR-J4-B servo amplifier

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4-10B	HG-KR053, 13 HG-MR053, 13	-	-
MR-J4-20B	HG-KR23 HG-MR23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4-40B	HG-KR43 HG-MR43	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-K2P1A-01M-2SS1 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0	TM-RFM004C20
MR-J4-60B	HG-SR51, 52	LM-U2PBD-15M-1SS0	TM-RFM006C20 TM-RFM006E20
MR-J4-70B	HG-KR73 HG-MR73	LM-H3P3B-24P-CSS0 LM-H3P3C-36P-CSS0 LM-H3P7A-24P-ASS0 LM-K2P2A-02M-1SS1 LM-U2PBF-22M-1SS0	TM-RFM012E20 TM-RFM012G20 TM-RFM040J10
MR-J4-100B	HG-SR81, 102	-	TM-RFM018E20
MR-J4-200B	HG-SR121, 201, 152, 202	LM-H3P3D-48P-CSS0 LM-H3P7B-48P-ASS0 LM-H3P7C-72P-ASS0 LM-FP2B-06M-1SS0 LM-K2P1C-03M-2SS1 LM-U2P2B-40M-2SS0	-
MR-J4-350B	HG-SR301, 352	LM-H3P7D-96P-ASS0 LM-K2P2C-07M-1SS1 LM-K2P3C-14M-1SS1 LM-U2P2C-60M-2SS0	TM-RFM048G20 TM-RFM072G20 TM-RFM120J10
MR-J4-500B	HG-SR421, 502	LM-FP2D-12M-1SS0 LM-FP4B-12M-1SS0 LM-K2P2E-12M-1SS1 LM-K2P3E-24M-1SS1 LM-U2P2D-80M-2SS0	TM-RFM240J10
MR-J4-700B	HG-SR702	LM-FP2F-18M-1SS0 LM-FP4D-24M-1SS0	-

With MR-J4-A servo amplifier

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4-10A	HG-KR053, 13 HG-MR053, 13	Available in the future	Available in the future
MR-J4-20A	HG-KR23 HG-MR23		
MR-J4-40A	HG-KR43 HG-MR43		
MR-J4-60A	HG-SR51, 52		
MR-J4-70A	HG-KR73 HG-MR73		
MR-J4-100A	HG-SR81, 102		
MR-J4-200A	HG-SR121, 201, 152, 202		
MR-J4-350A	HG-SR301, 352		
MR-J4-500A	HG-SR421, 502		
MR-J4-700A	HG-SR702		

Notes: 1. Models of the linear servo motor primary side are listed in this page. For compatible models of the secondary side, refer to "Combinations of Linear Servo Motor and Servo Amplifier" under section 3 Linear Servo Motor in this catalog.

Combinations of Multi-Axis Servo Amplifier and Servo Motor

MR-J4W-B

With MR-J4W2-B servo amplifier

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4W2-22B	HG-KR053, 13, 23 HG-MR053, 13, 23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4W2-44B	HG-KR053, 13, 23, 43 HG-MR053, 13, 23, 43	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-K2P1A-01M-2SS1 LM-U2PAB-05M-0SS0 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20 TM-RFM004C20
MR-J4W2-77B	HG-KR43, 73 HG-MR43, 73 HG-SR51, 52	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-H3P3B-24P-CSS0 LM-H3P3C-36P-CSS0 LM-H3P7A-24P-ASS0 LM-K2P1A-01M-2SS1 LM-K2P2A-02M-1SS1 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBD-15M-1SS0 LM-U2PBF-22M-1SS0	TM-RFM004C20 TM-RFM006C20 TM-RFM006E20 TM-RFM012E20 TM-RFM012G20 TM-RFM040J10
MR-J4W2-1010B	HG-KR43, 73 HG-MR43, 73 HG-SR51, 81, 52, 102	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-H3P3B-24P-CSS0 LM-H3P3C-36P-CSS0 LM-H3P7A-24P-ASS0 LM-K2P1A-01M-2SS1 LM-K2P2A-02M-1SS1 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBD-15M-1SS0 LM-U2PBF-22M-1SS0	TM-RFM004C20 TM-RFM006C20 TM-RFM006E20 TM-RFM012E20 TM-RFM018E20 TM-RFM012G20 TM-RFM040J10

With MR-J4W3-B servo amplifier

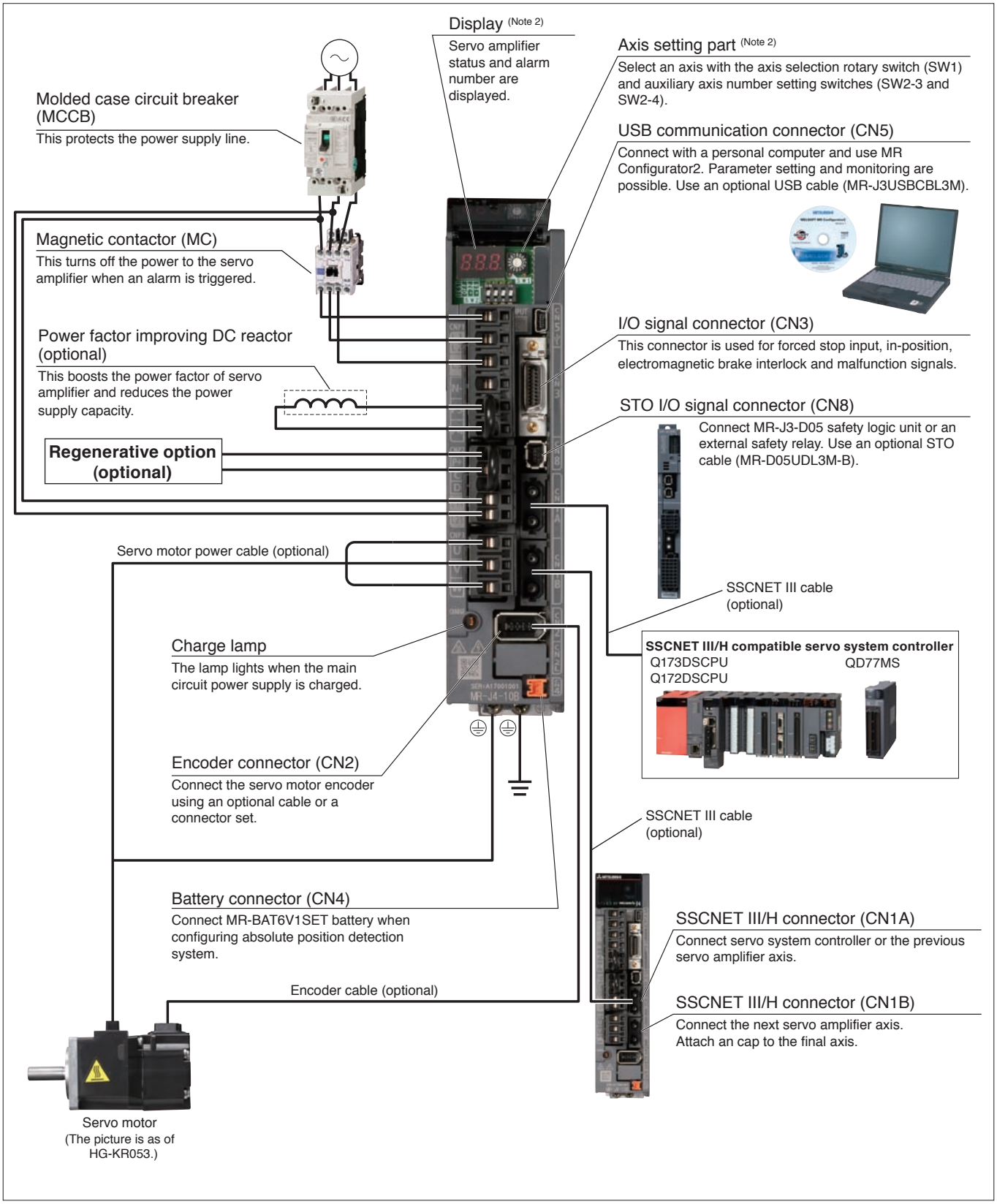
Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4W3-222B	HG-KR053, 13, 23 HG-MR053, 13, 23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4W3-444B	HG-KR053, 13, 23, 43 HG-MR053, 13, 23, 43	LM-H3P2A-07P-BSS0 LM-H3P3A-12P-CSS0 LM-K2P1A-01M-2SS1 LM-U2PAB-05M-0SS0 LM-U2PAD-10M-0SS0 LM-U2PAF-15M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20 TM-RFM004C20

Notes: 1. Models of the linear servo motor primary side are listed in this page. For compatible models of the secondary side, refer to "Combinations of Linear Servo Motor and Servo Amplifier" under section 3 Linear Servo Motor in this catalog.

MR-J4-B Connections with Peripheral Equipment (Note 1)

MR-J4-B

Peripheral equipment is connected to MR-J4-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-J4-350B or smaller servo amplifier. Refer to "MR-J4-_B Servo Amplifier Instruction Manual" for the actual connections.
2. This picture shows when the display cover is open.

MR-J4-B (SSCNET III/H Interface) Specifications

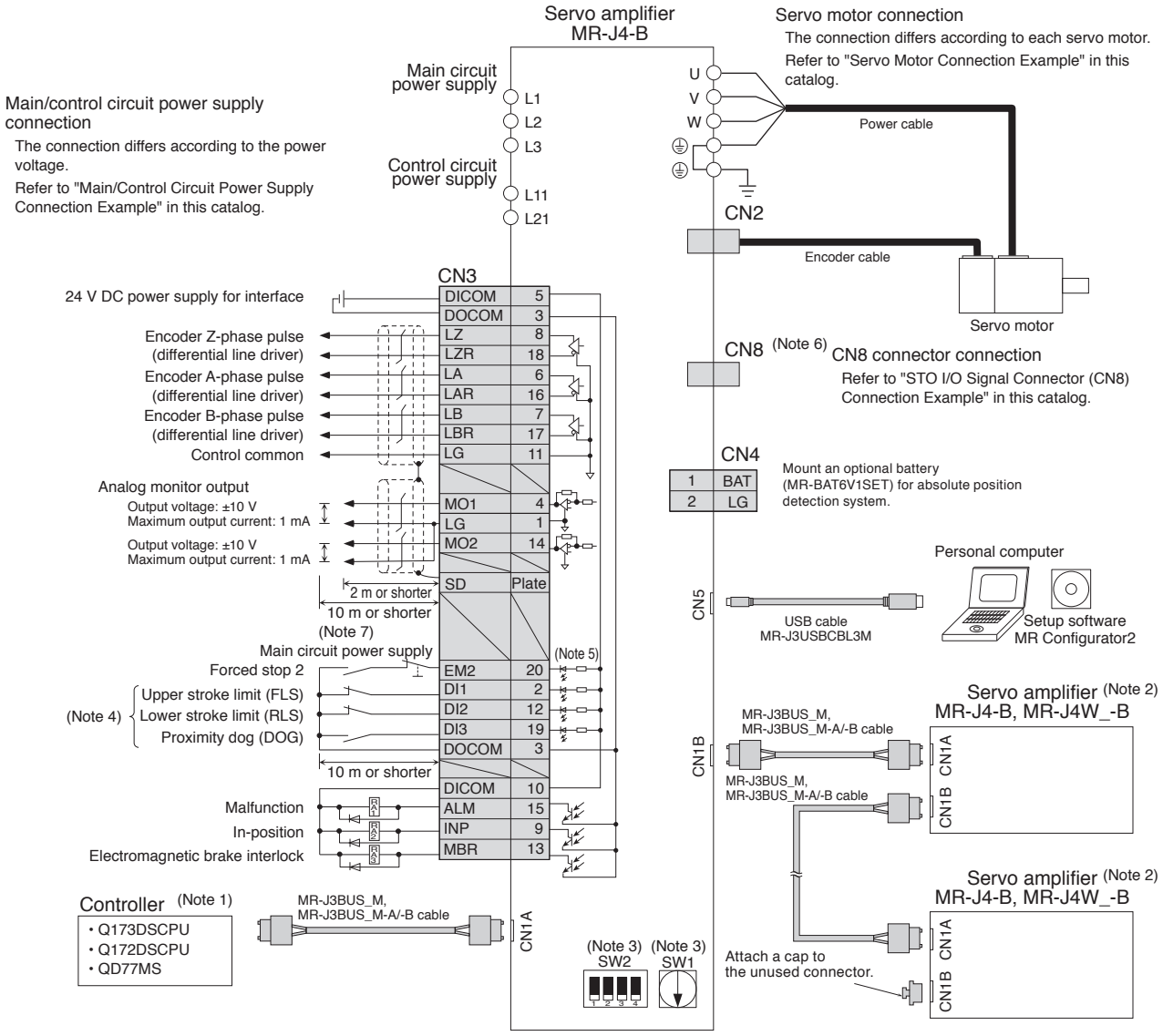
MR-J4-B

Servo amplifier model MR-J4-		10B	20B	40B	60B	70B	100B	200B	350B	500B	700B
Output	Rated voltage	3-phase 170 V AC									
	Rated current [A]	1.1	1.5	2.8	3.2	5.8	6.0	11.0	17.0	28.0	37.0
Main circuit power supply	Voltage/frequency (Note 1)	3-phase or 1-phase 200 V AC to 240 V AC, 50/60 Hz					3-phase 200 V AC to 240 V AC, 50/60 Hz				
	Rated current [A]	0.9	1.5	2.6	3.2 (Note 9)	3.8	5.0	10.5	16.0	21.7	28.9
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC					3-phase 170 V AC to 264 V AC				
	Permissible frequency fluctuation	±5% maximum									
Control circuit power supply	Voltage/frequency	1-phase 200 V AC to 240 V AC, 50/60 Hz									
	Rated current [A]	0.2								0.3	
	Permissible voltage fluctuation	1-phase 170 V AC to 264 V AC									
	Permissible frequency fluctuation	±5% maximum									
	Power consumption [W]	30								45	
Interface power supply		24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signal))									
Control method		Sine-wave PWM control/current control method									
Tolerable regenerative power of the built-in regenerative resistor [W] (Note 2, 3)		-	10	10	10	20	20	100	100	130	170
Dynamic brake		Built-in (Note 4)									
SSCNET III/H command communication cycle (Note 12)		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 (Note 10)		Available (Note 11)									
Load-side encoder interface (Note 8)		Mitsubishi high-speed serial communication									
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, magnetic pole detection protection, linear servo control fault protection									
Safety function		STO (IEC/EN 61800-5-2)									
Safety performance	Standards certified by CB	EN ISO 13849-1 Category 3 PL d, EN 61508 SIL 2, EN 62061 SIL CL 2, EN 61800-5-2 SIL 2									
	Response performance	8 ms or less (STO input OFF → energy shut-off)									
	Test pulse input (STO) (Note 7)	Test pulse frequency: 1 Hz to 25 Hz Test pulse off time: 1 ms maximum									
	Mean time to dangerous failure (MTTFd)	100 years or longer									
	Diagnostic coverage (DC)	Medium (90% to 99%)									
	Probability of dangerous Failure per Hour (PFH)	1.68×10^{-10} [1/h]									
Compliance to standards		Refer to "Conformity with global standards and regulations" on p. 22 in this catalog.									
Structure (IP rating)		Natural cooling, open (IP20)				Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)	
Close mounting		Possible (Note 6)								Not possible	
Mass [kg]		0.8	0.8	1.0	1.0	1.4	1.4	2.1	2.3	4.0	6.2

Notes: 1. Rated output and speed of a rotary servo motor and a direct drive motor; and rated thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Optimal regenerative option varies for each system. 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-J4-_B Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. 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 rate.
7. This function makes a failure diagnosis on contacts including external circuits by instantaneously turning off the signals from a controller to a servo amplifier at constant period when the input signals of the servo amplifier are on.
8. Not compatible with pulse train interface (A/B/Z-phase differential output type).
9. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
10. The load-side encoder and the servo motor encoder are compatible only with two-wire type communication method.
11. Fully closed loop control is compatible with the servo amplifiers with software version A3 or later.
12. The command communication cycle depends on the controller specifications and the number of axes connected.

MR-J4-B Standard Wiring Diagram Example

MR-J4-B



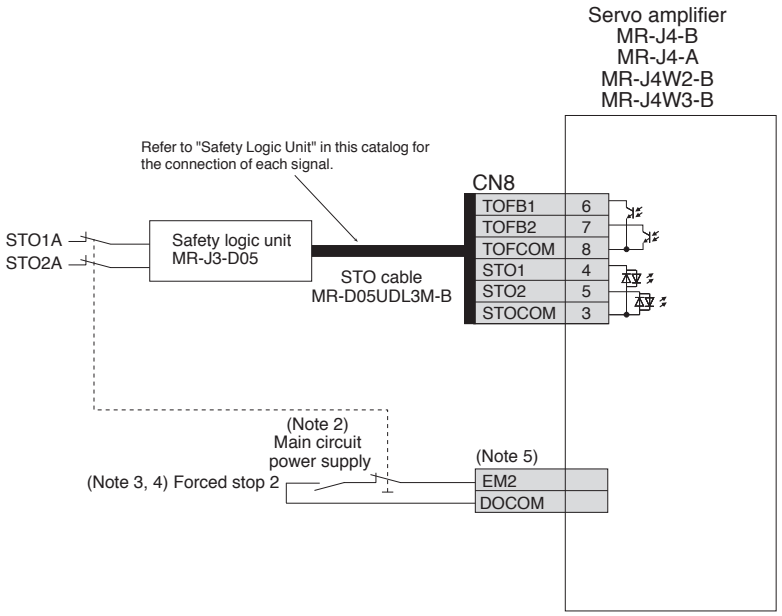
Notes: 1. For details on the controllers, refer to programming manual or user's manual for the controllers.
2. Connections for the second and following axes are omitted.
3. Up to 64 axes are set by using a combination of a axis selection rotary switch (SW1) and auxiliary axis number setting switches (SW2-3 and SW2-4). Note that the number of the connectable axes depends on the controller specifications.
4. Devices can be assigned for DI1, DI2 and DI3 with controller setting. Refer to the controller instruction manuals for details on setting.
5. This is for sink wiring. Source wiring is also possible.
6. Attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.
7. Configure up a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

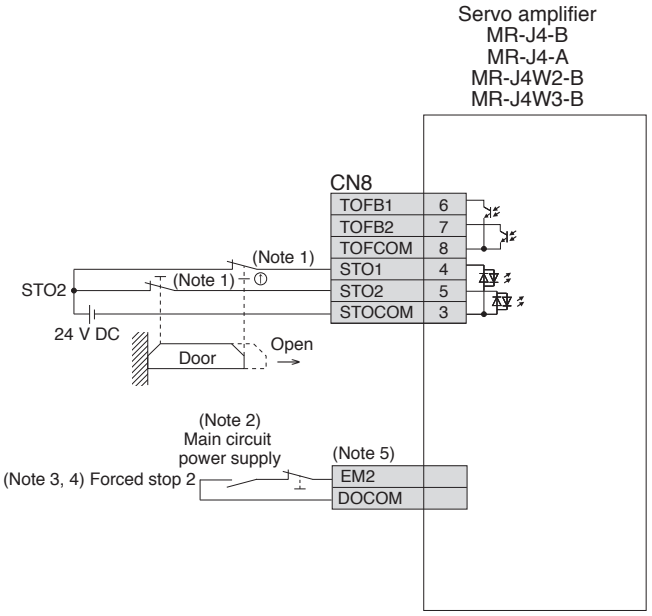
STO I/O Signal Connector (CN8) Connection Example

MR-J4-B MR-J4-A MR-J4W-B

●When used with MR-J3-D05



●When using a safety door



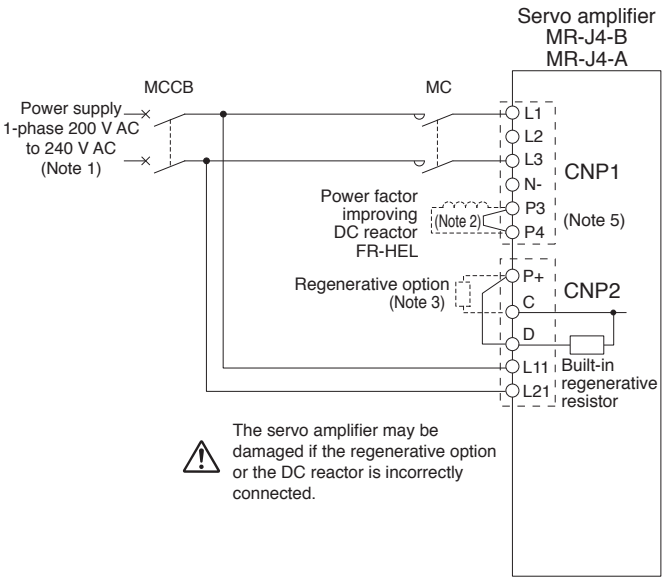
Notes: 1. When using the STO function, turn off STO1 and STO2 at the same time. Be sure to turn off STO1 and STO2 after the servo motor stops in servo-off state or after the servo motor stops with deceleration by turning off EM2 (Forced stop 2).
2. Configure up a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
3. If the controller does not have a forced stop function, install a forced stop 2 switch (normally closed contact).
4. Turn on EM2 (Forced stop 2) before starting the operation.
5. The connector and the pin numbers for each signal vary depending on the servo amplifier. Refer to the standard wiring diagram example for relevant servo amplifier in this catalog for details.

⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

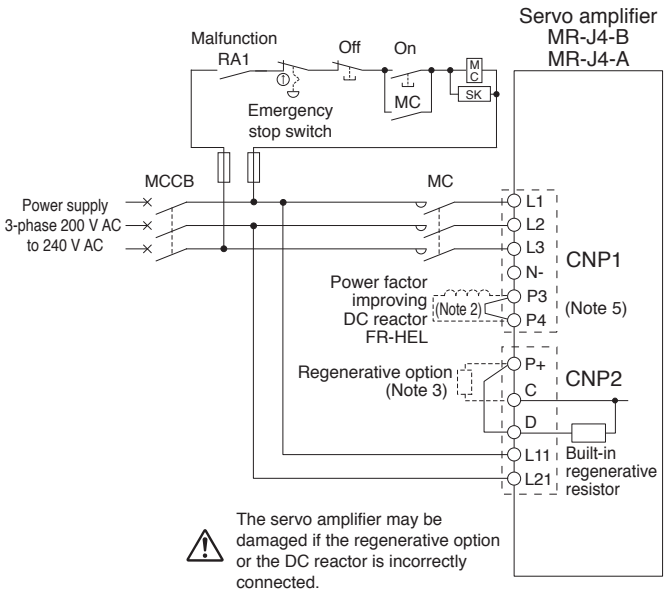
Main/Control Circuit Power Supply Connection Example

MR-J4-B MR-J4-A

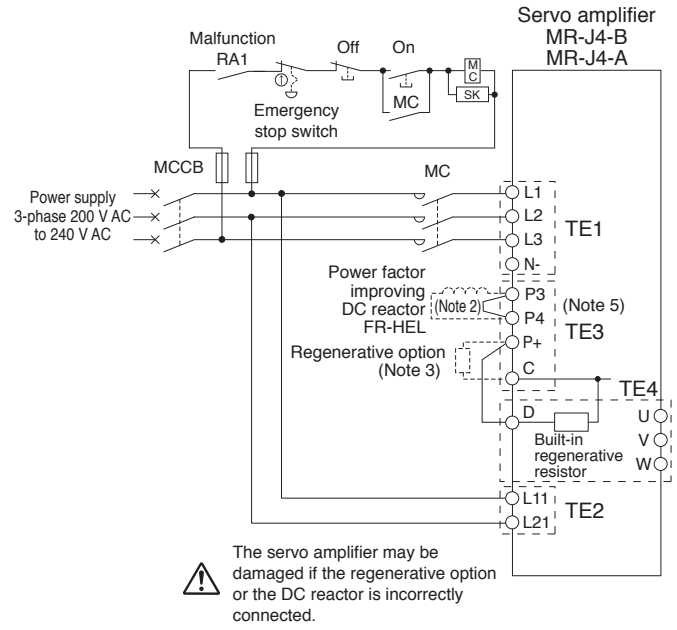
●For 1-phase 200 V AC



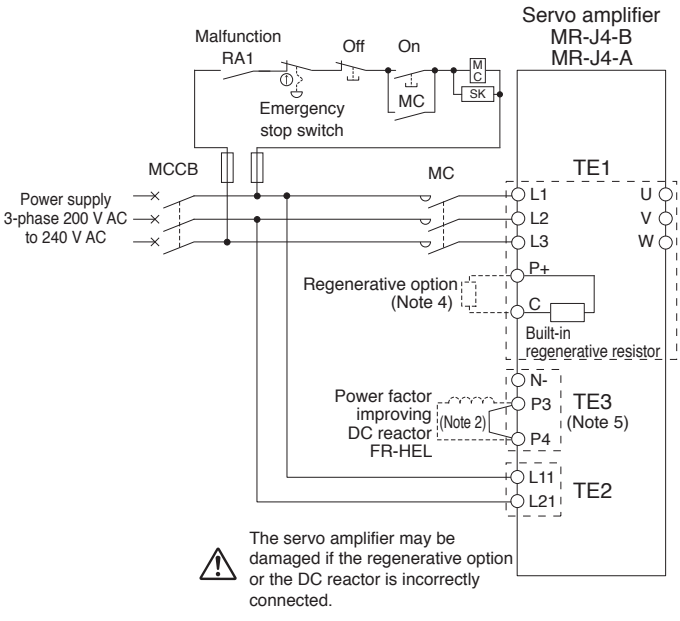
●For 3-phase 200 V AC 3.5 kW or smaller



●For 3-phase 200 V AC 5 kW



●For 3-phase 200 V AC 7 kW



Notes: 1. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L3 terminals. Do not connect anything to L2. The connections are different from MR-J3 series servo amplifiers. Be careful not to make a connection error when replacing MR-J3 with MR-J4.
2. Disconnect a short-circuit bar between P3 and P4 when using the power factor improving DC reactor.
3. Disconnect a short-circuit bar between P+ and D when connecting the regenerative option externally.
4. Disconnect the wires for the built-in regenerative resistor (P+ and C) when connecting the regenerative option externally.
5. MR-J4-B/A servo amplifiers have P3 and P4 in the upstream of the inrush current suppression circuit. They are different from P1 and P2 (downstream of the inrush current suppression circuit) of MR-J3-B/A servo amplifiers. Refer to relevant Servo Amplifier Instruction Manual for details.

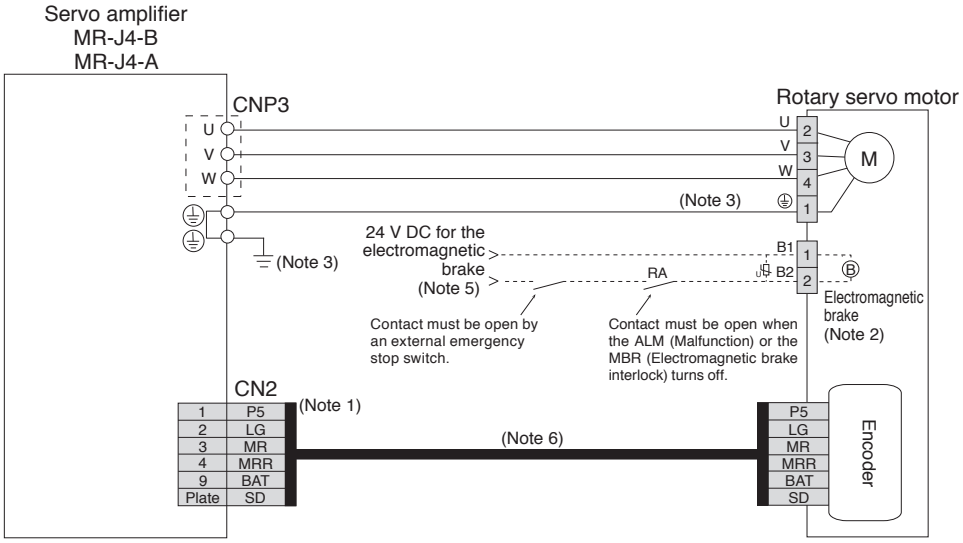
Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example

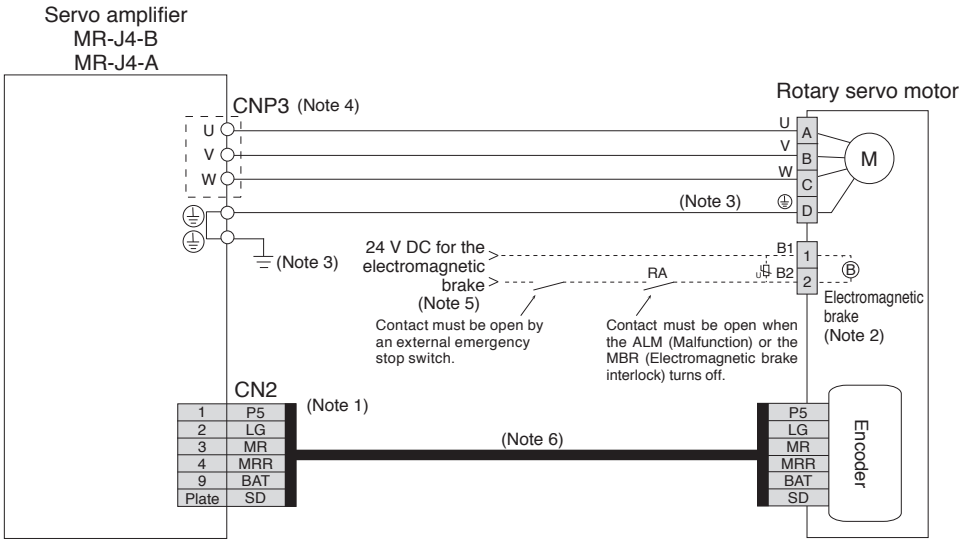
MR-J4-B MR-J4-A

(Rotary Servo Motor, Semi-Closed Loop Control System)

●For HG-KR/HG-MR series



●For HG-SR series



Notes: 1. The signals shown is applicable when using a two-wire type encoder cable.
2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.
4. U, V, and W terminals are available in TE4 for MR-J4-500B/A and in TE1 for MR-J4-700B/A.
5. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
6. Encoder cable is available as a option. Refer to "Servo Motor Instruction Manual (Vol. 3)" when fabricating the cables.

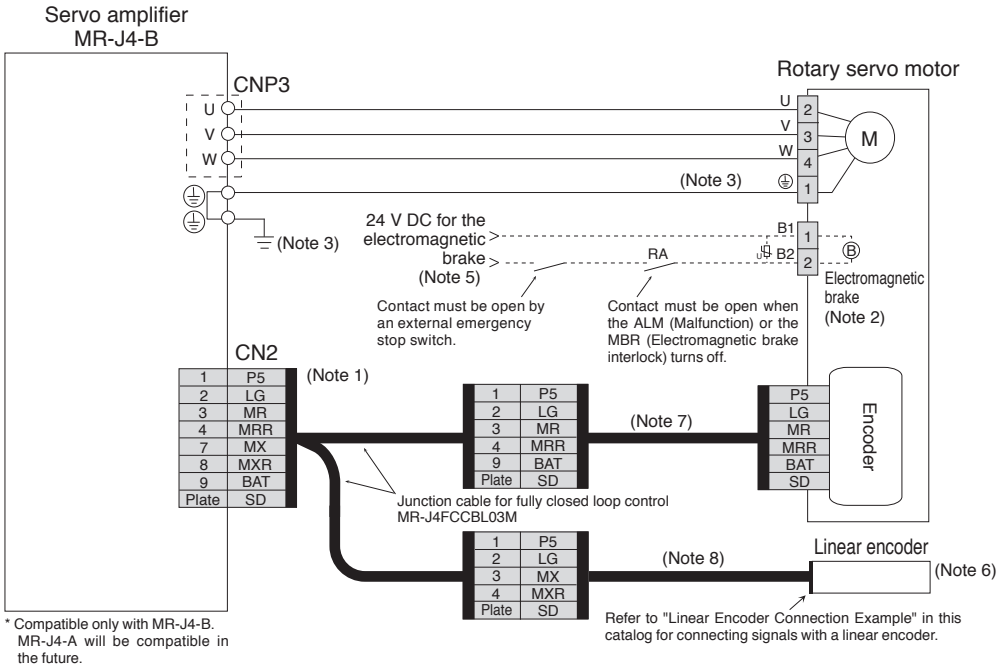
⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example

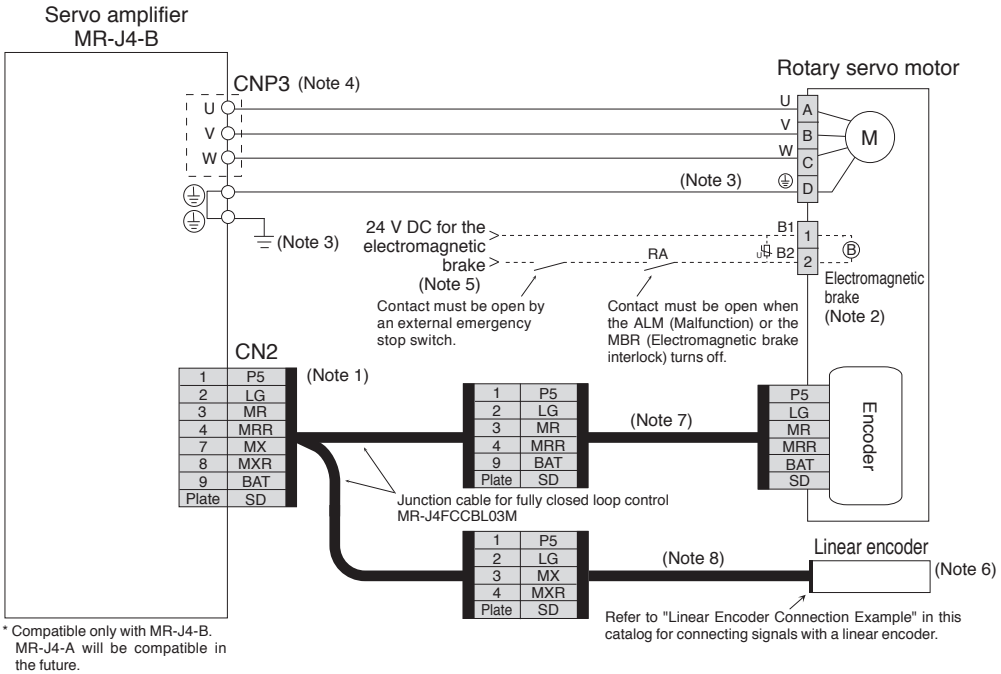
MR-J4-B MR-J4-A

(Rotary Servo Motor, Fully Closed Loop Control System)

●For HG-KR/HG-MR series



●For HG-SR series



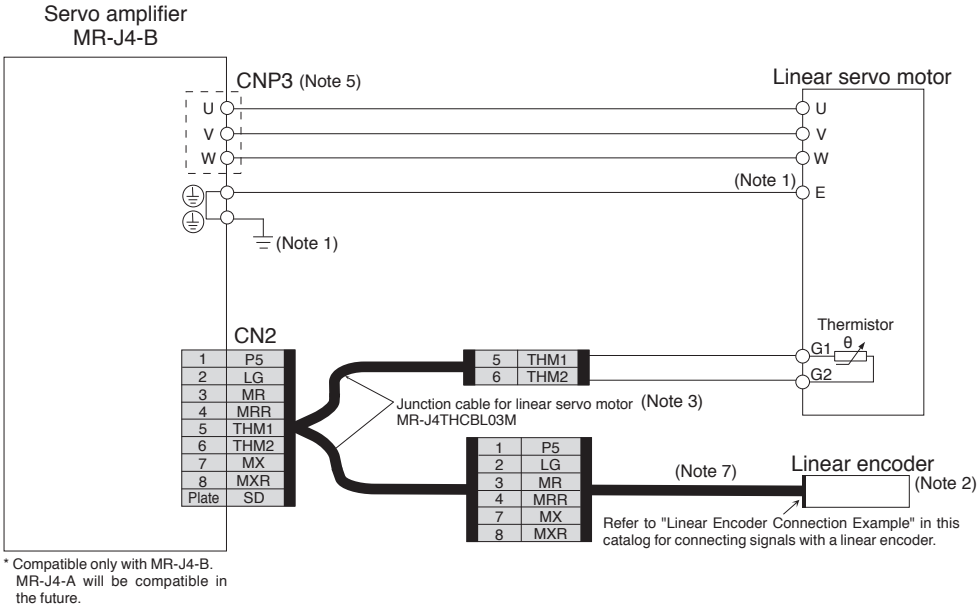
Notes: 1. For fully closed loop control, the load-side encoder and the servo motor encoder are compatible only with two-wire type communication method. Four-wire type cannot be used.
2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.
4. U, V, and W terminals are available in TE4 for MR-J4-500B/A and in TE1 for MR-J4-700B/A.
5. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
6. For linear encoders, refer to "List of Linear Encoders" under section 3 Liner Servo Motors in this catalog.
7. Encoder cable is available as a option. Refer to "Servo Motor Instruction Manual (Vol. 3)" when fabricating the cables.
8. Necessary linear encoder cables vary depending on the linear encoder. Refer to "Linear Encoder Instruction Manual."

⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

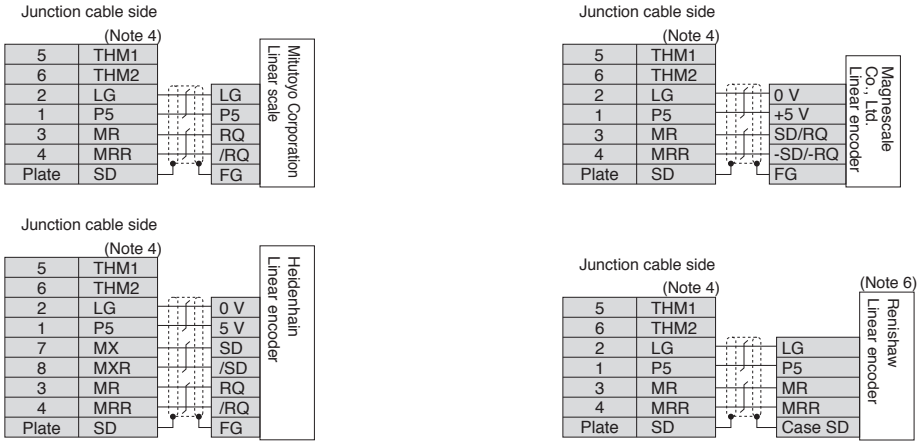
Servo Motor Connection Example (Linear Servo Motor)

MR-J4-B MR-J4-A

●For LM-H3/LM-F/LM-K2/LM-U2 series



●Linear Encoder Connection Example



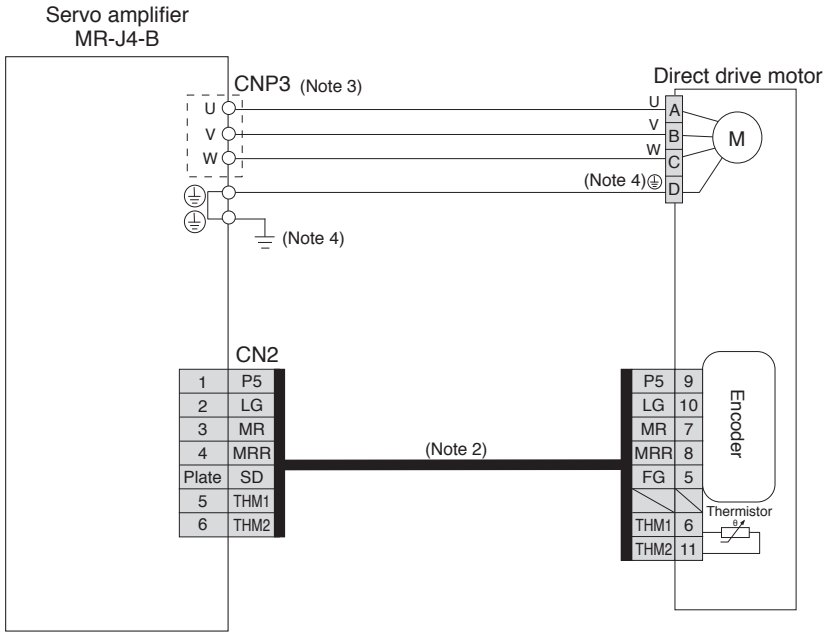
Notes: 1. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.
2. For linear encoders, refer to "List of Linear Encoders" under section 3 Liner Servo Motors in this catalog.
3. Junction cable for linear servo motor (MR-J4THCBL03M) is compatible with both 2-wire type and 4-wire type linear encoders.
4. For the number of the wire pairs for LG and P5, refer to "Linear Encoder Instruction Manual."
5. U, V, and W terminals are available in TE4 for MR-J4-500B and in TE1 for MR-J4-700B.
6. Wiring varies depending on the linear encoder series. Refer to "Linear Encoder Instruction Manual" for details.
7. Necessary linear encoder cables vary depending on the linear encoder. Refer to "Linear Encoder Instruction Manual."

⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example (Direct Drive Motor)

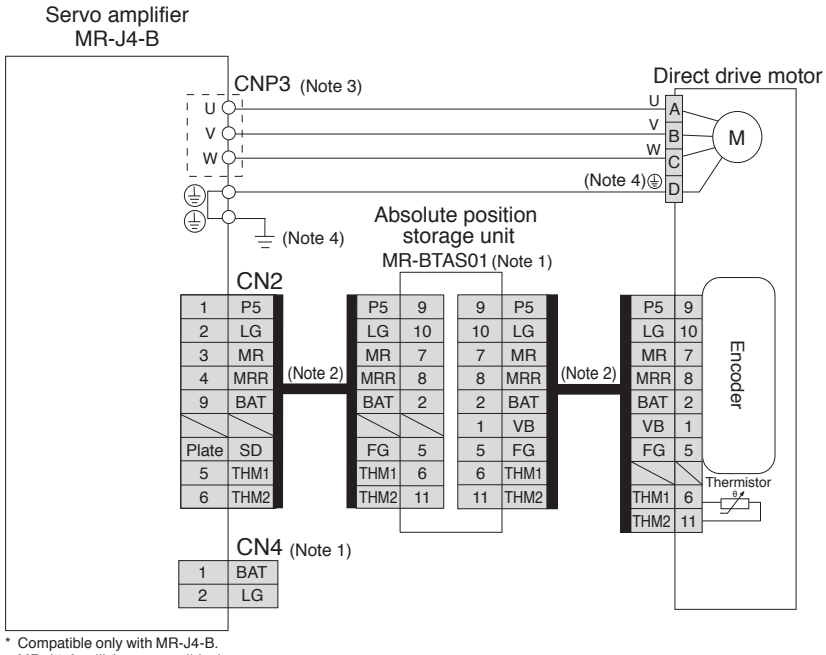
MR-J4-B MR-J4-A

●For TM-RFM series (incremental system)



* Compatible only with MR-J4-B. MR-J4-A will be compatible in the future.

●For TM-RFM series (absolute position detection system)



* Compatible only with MR-J4-B. MR-J4-A will be compatible in the future.

Notes: 1. Optional MR-BTAS01 absolute position storage unit and MR-BAT6V1SET battery are required for absolute position detection system. Refer to relevant Servo Amplifier Instruction Manual and "Direct Drive Motor Instruction Manual" for details.
2. Fabricate this encoder cable. Refer to "Direct Drive Motor Instruction Manual" for fabricating the encoder cable.
3. U, V, and W terminals are available in TE4 for MR-J4-500B,
4. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for grounding.

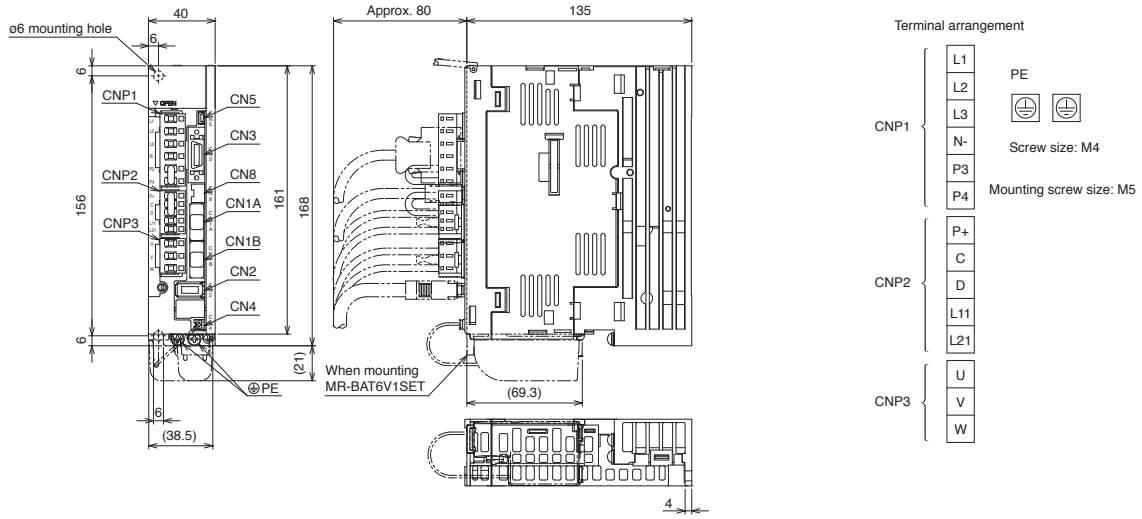
⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-J4-B Dimensions

MR-J4-B

●MR-J4-10B (Note 1)

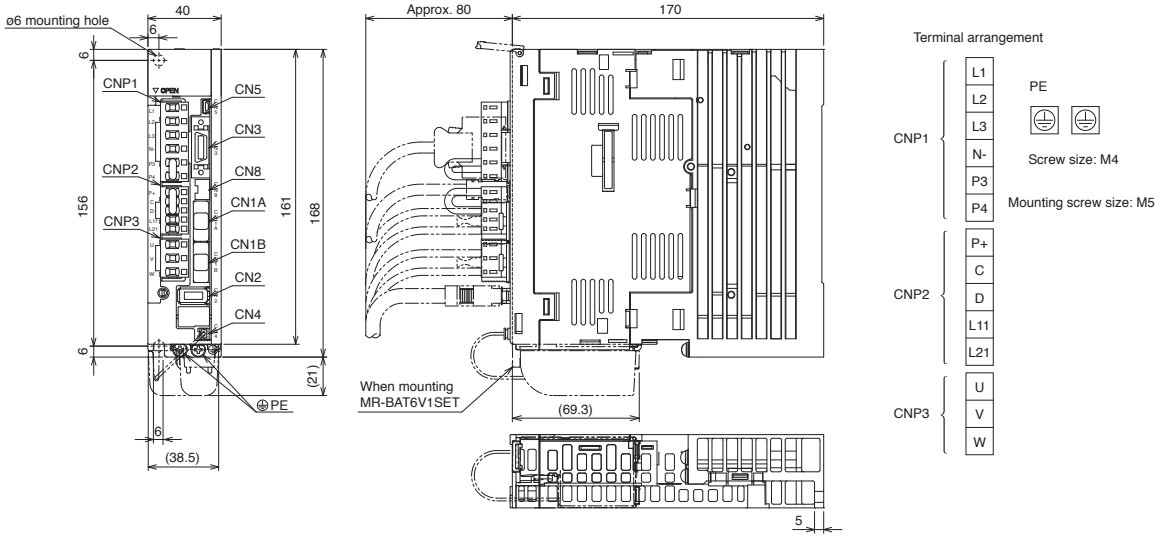
●MR-J4-20B (Note 1)



[Unit: mm]

●MR-J4-40B (Note 1)

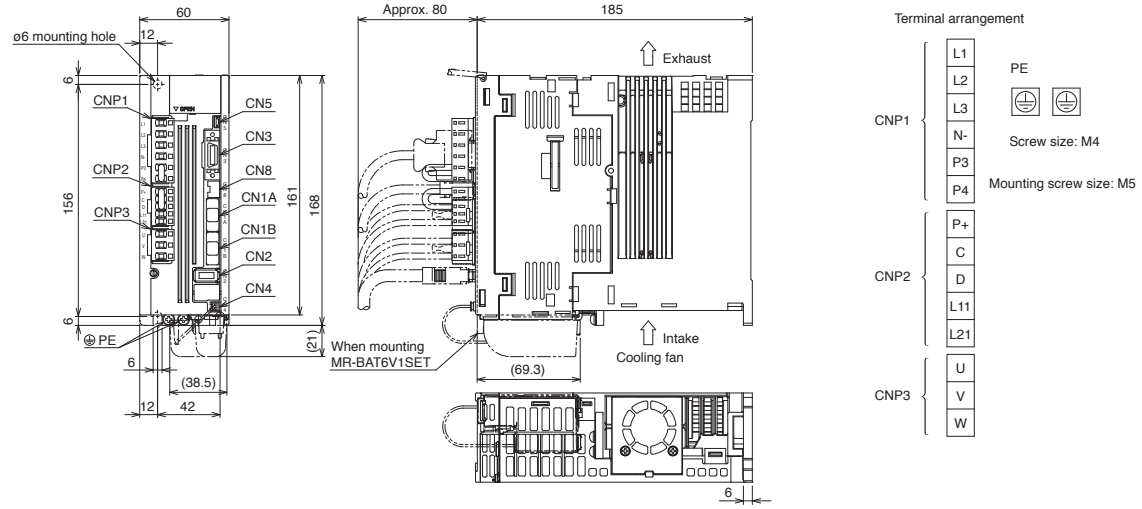
●MR-J4-60B (Note 1)



[Unit: mm]

●MR-J4-70B (Note 1)

●MR-J4-100B (Note 1)



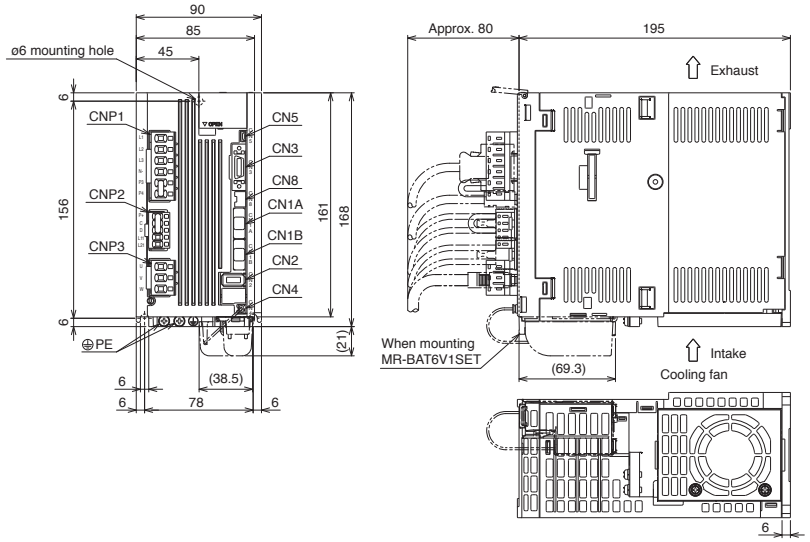
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.

MR-J4-B Dimensions

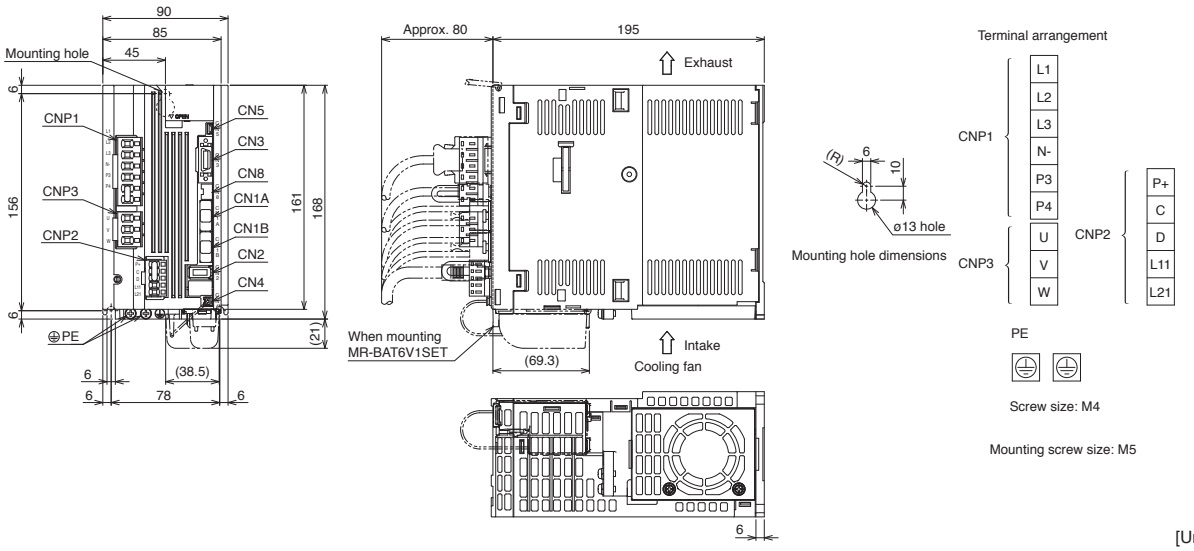
MR-J4-B

●MR-J4-200B (Note 1)



[Unit: mm]

●MR-J4-350B (Note 1)



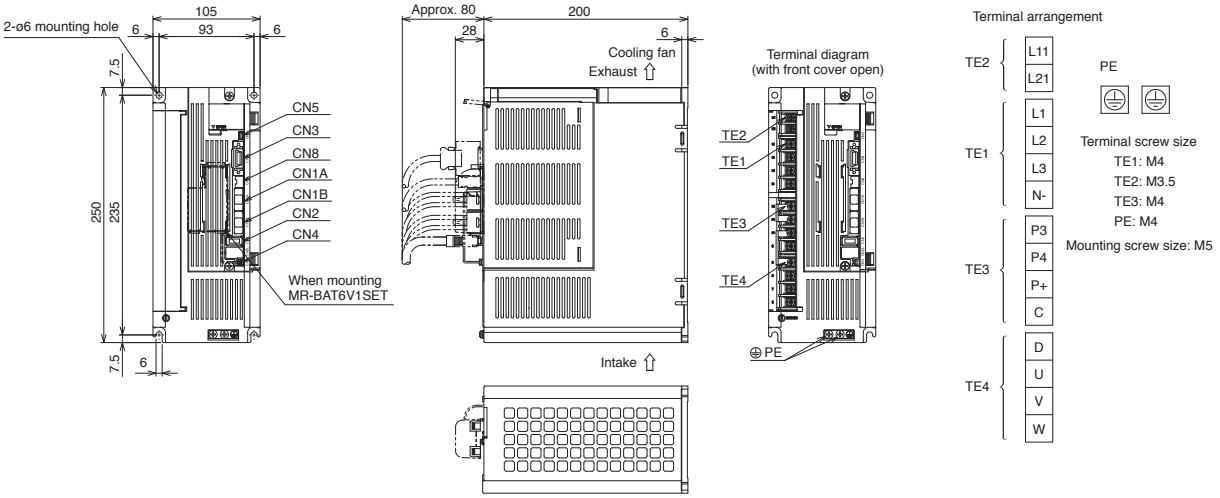
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.

MR-J4-B Dimensions

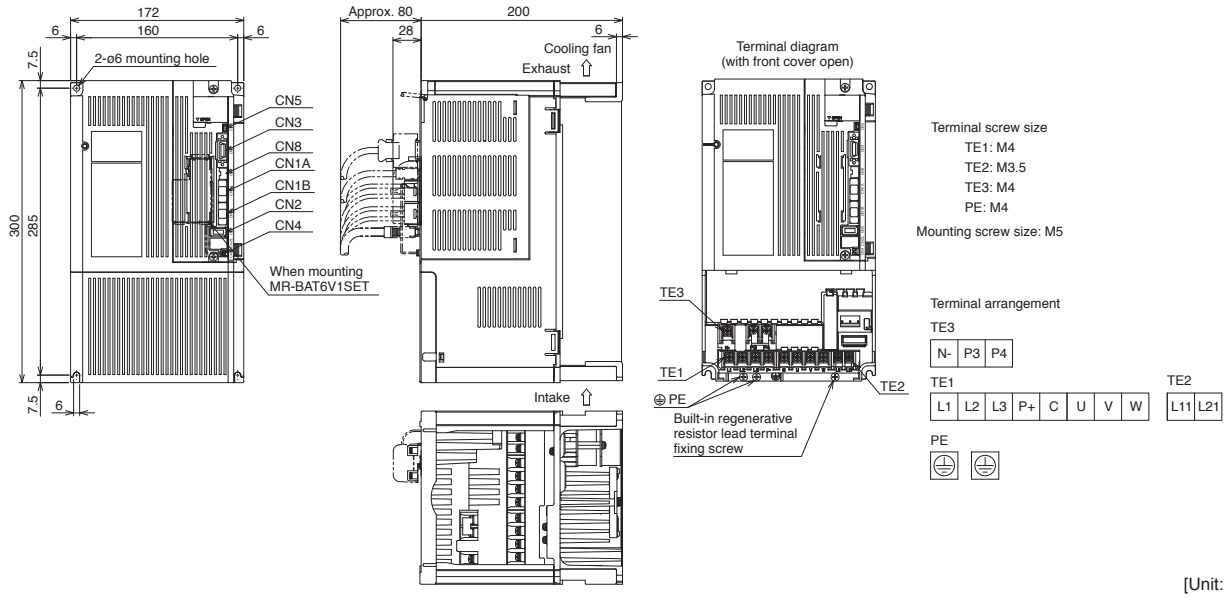
MR-J4-B

●MR-J4-500B



[Unit: mm]

●MR-J4-700B

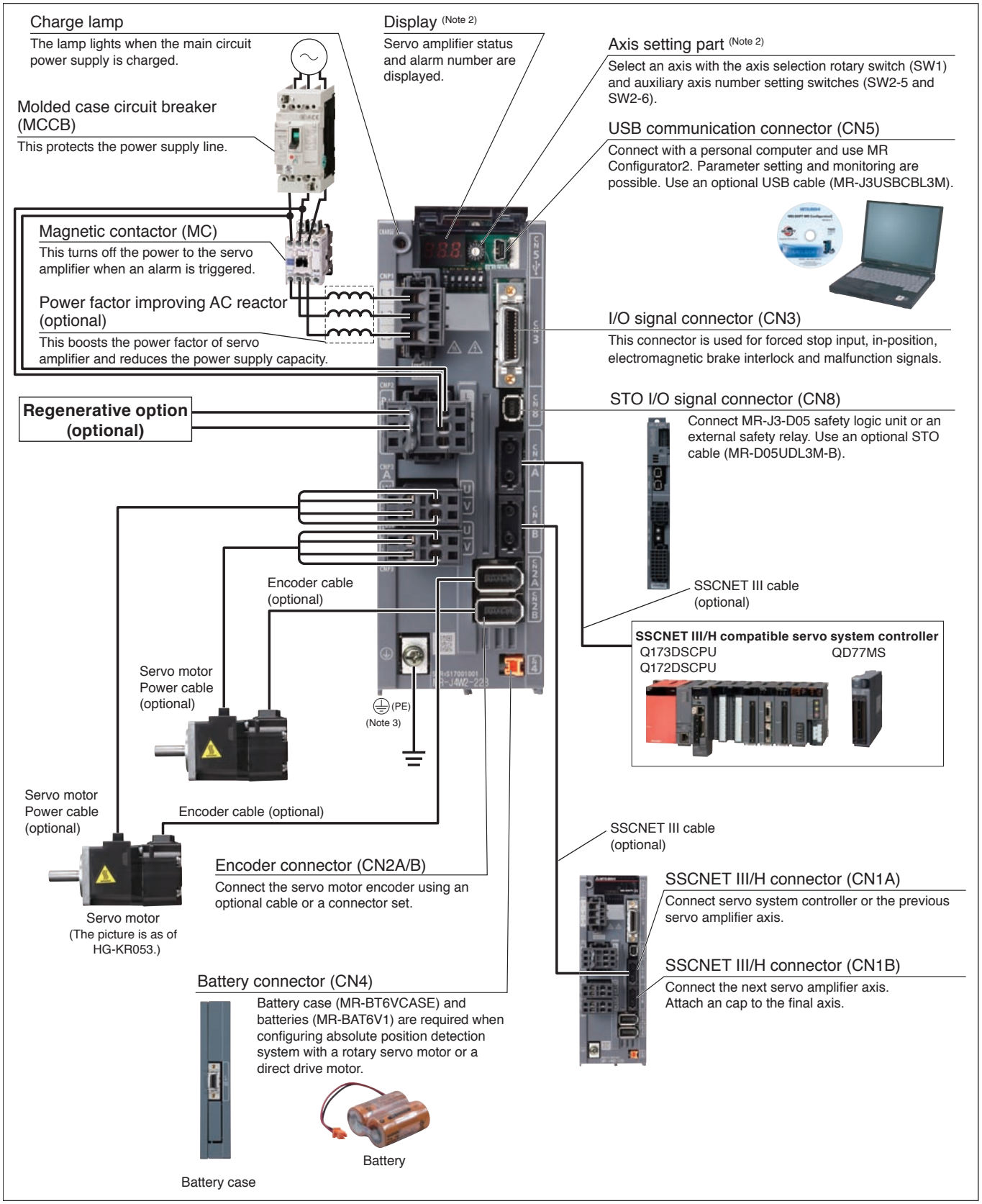


[Unit: mm]

MR-J4W_-B Connections with Peripheral Equipment (Note 1)

MR-J4W-B

Peripheral equipment is connected to MR-J4W_-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-J4W2-22B. CNP3C and CN2C connectors are available for MR-J4W3-B servo amplifier. Refer to "MR-J4W_-_B Servo Amplifier Instruction Manual" for the actual connections of the multi-axis servo amplifier.
2. This picture shows when the display cover is open.
3. Connect the grounding terminal of the servo motor to ⏚ of CNP3A, CNP3B, and CNP3C. Connect the protective earth (PE) terminal (⏚) located on the lower front of the servo amplifier to the cabinet protective earth (PE).

MR-J4W2-B (2-axis, SSCNET III/H Interface) Specifications

MR-J4W-B

Servo amplifier model MR-J4W2-			22B	44B	77B	1010B
Rated output		[kW]	0.2	0.4	0.75	1
Output	Rated voltage		3-phase 170 V AC			
	Rated current (each axis)	[A]	1.5	2.8	5.8	6.0
Main circuit power supply	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50/60 Hz			3-phase 200 V AC to 240 V AC, 50/60 Hz
	Rated current	[A]	2.9	5.2	7.5	9.8
	Permissible voltage fluctuation		3-phase or 1-phase 170 V AC to 264 V AC			3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation		±5% maximum			
Control circuit power supply	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50/60 Hz			
	Rated current	[A]	0.4			
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC			
	Permissible frequency fluctuation		±5% maximum			
	Power consumption	[W]	55			
Interface power supply			24 V DC ± 10% (required current capacity: 0.35 A (including CN8 connector signal))			
Control method			Sine-wave PWM control/current control method			
Capacitor regeneration	Reusable regenerative energy (Note 5)	[J]	17	21	44	
	Moment of inertia (J) equivalent to permissible charging amount (Note 6)	[× 10^{-4} kg•m^2]	3.45	4.26	8.92	
	Mass equivalent to permissible charging amount (Note 7) [kg]	LM-H3	3.8	4.7	9.8	
		LM-K2 LM-U2	8.5	10.5	22.0	
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3)		[W]	20		100	
Dynamic brake			Built-in (Note 4)			
SSCNET III/H command communication cycle (Note 13)			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-phase pulse)			
Analog monitor			None			
Fully closed loop control (Note 11)			Available (Note 12)			
Load-side encoder interface (Note 9)			Mitsubishi high-speed serial communication			
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, magnetic pole detection protection, linear servo control fault protection			
Safety function			STO (IEC/EN 61800-5-2) (Note 10)			
Safety performance	Standards certified by CB		EN ISO 13849-1 Category 3 PL d, EN 61508 SIL 2, EN 62061 SIL CL 2, EN 61800-5-2 SIL 2			
	Response performance		8 ms or less (STO input OFF → energy shut-off)			
	Test pulse input (STO) (Note 8)		Test pulse frequency: 1 Hz to 25 Hz, Test pulse off time: 1 ms maximum			
	Mean time to dangerous failure (MTTFd)		100 years or longer			
	Diagnostic coverage (DC)		Medium (90% to 99%)			
	Probability of dangerous Failure per Hour (PFH)		1.68 × 10^{-10} [1/h]			
Compliance to standards			Refer to "Conformity with global standards and regulations" on p. 22 in this catalog.			
Structure (IP rating)			Natural cooling, open (IP20)	Force cooling, open (IP20)		
Close mounting			Possible			
Mass		[kg]	1.5	1.5	2.0	2.0

Notes: 1. Rated output and speed of a rotary servo motor and a direct drive motor; and rated thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Optimal regenerative option varies for each system. 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-J4W_-_B Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. For rotary servo motors and direct drive motors, "regenerative energy" is the energy generated when a machine, which has a moment of inertia equivalent to the permissible charging amount, decelerates from the rated speed to a stop. For linear servo motors, "regenerative energy" is the energy generated when a machine, which has mass equivalent to the permissible charging amount, decelerates from the maximum speed to a stop.
6. This is applicable for the rotary servo motor and the direct drive motor. When two axes are simultaneously decelerated, the permissible charging amount is equivalent to the total moments of inertia of the two axes. Otherwise, the permissible charging amount is equivalent to the moment of inertia of each axis.
7. This is applicable for the linear servo motor. Mass of primary side (coil) is included. When two axes are simultaneously decelerated, the permissible charging amount is equivalent to the total masses of the two axes. Otherwise, the permissible charging amount is equivalent to the mass of each axis.
8. This function makes a failure diagnosis on contacts including external circuits by instantaneously turning off the signals from a controller to a servo amplifier at constant period when the input signals of the servo amplifier are on.
9. Not compatible with pulse train interface (A/B/Z-phase differential output type).
10. STO is common for all axes.
11. The load-side encoder and the servo motor encoder are compatible only with two-wire type communication method.
12. Fully closed loop control is compatible with the servo amplifiers with software version A3 or later.
13. The command communication cycle depends on the controller specifications and the number of axes connected.

MR-J4W3-B (3-axis, SSCNET III/H Interface) Specifications

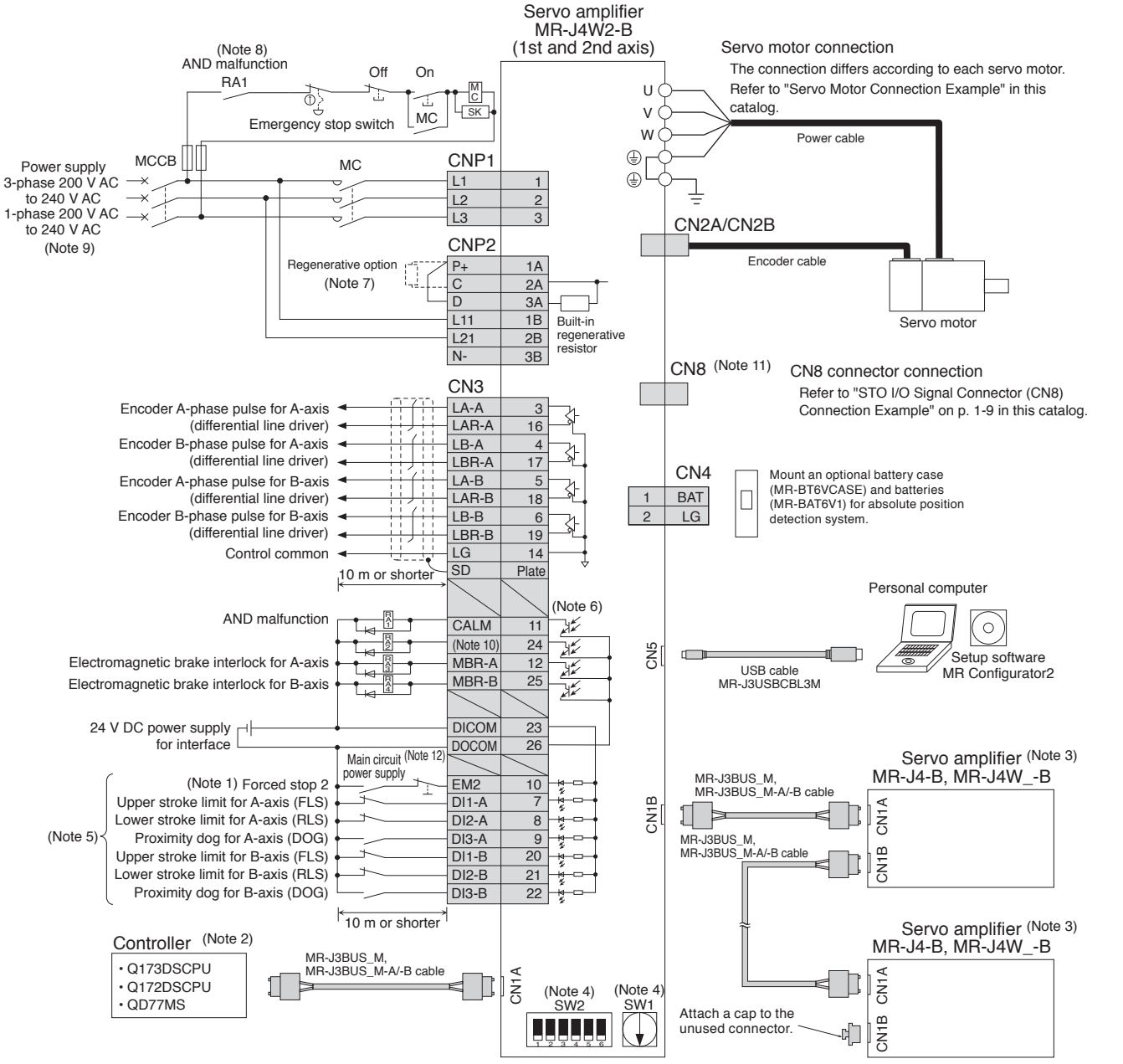
MR-J4W-B

Servo amplifier model MR-J4W3-			222B	444B
Rated output		[kW]	0.2	0.4
Output	Rated voltage		3-phase 170 V AC	
	Rated current (each axis)	[A]	1.5	2.8
Main circuit power supply	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50/60 Hz	
	Rated current	[A]	4.3	7.8
	Permissible voltage fluctuation		3-phase or 1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation		±5% maximum	
Control circuit power supply	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50/60 Hz	
	Rated current	[A]	0.4	
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation		±5% maximum	
	Power consumption	[W]	55	
Interface power supply			24 V DC ± 10% (required current capacity: 0.45 A (including CN8 connector signal))	
Control method			Sine-wave PWM control/current control method	
Capacitor regeneration	Reusable regenerative energy (Note 5)	[J]	21	30
	Moment of inertia (J) equivalent to permissible charging amount (Note 6)	[× 10^{-4} kg•m^2]	4.26	6.08
	Mass equivalent to permissible charging amount (Note 7)	LM-H3 [kg]	4.7	6.7
		LM-K2 LM-U2 [kg]	10.5	15.0
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3)		[W]	30	
Dynamic brake			Built-in (Note 4)	
SSCNET III/H command communication cycle (Note 10)			0.222 ms (Note 11), 0.444 ms, 0.888 ms	
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)	
Encoder output pulse			Not compatible	
Analog monitor			None	
Fully closed loop control			Not compatible	
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, magnetic pole detection protection, linear servo control fault protection	
Safety function			STO (IEC/EN 61800-5-2) (Note 9)	
Safety performance	Standards certified by CB		EN ISO 13849-1 Category 3 PL d, EN 61508 SIL 2, EN 62061 SIL CL 2, EN 61800-5-2 SIL 2	
	Response performance		8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 8)		Test pulse frequency: 1 Hz to 25 Hz, Test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)		100 years or longer	
	Diagnostic coverage (DC)		Medium (90% to 99%)	
	Probability of dangerous Failure per Hour (PFH)		1.68 × 10^{-10} [1/h]	
Compliance to standards			Refer to "Conformity with global standards and regulations" on p. 22 in this catalog.	
Structure (IP rating)			Force cooling, open (IP20)	
Close mounting			Possible	
Mass		[kg]	1.9	1.9

Notes: 1. Rated output and speed of a rotary servo motor and a direct drive motor; and rated thrust and maximum speed of a linear servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage and frequency.
2. Optimal regenerative option varies for each system. 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-J4W_-_B Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. For rotary servo motors and direct drive motors, "regenerative energy" is the energy generated when a machine, which has a moment of inertia equivalent to the permissible charging amount, decelerates from the rated speed to a stop. For linear servo motors, "regenerative energy" is the energy generated when a machine, which has mass equivalent to the permissible charging amount, decelerates from the maximum speed to a stop.
6. This is applicable for the rotary servo motor and the direct drive motor. When three axes are simultaneously decelerated, the permissible charging amount is equivalent to the total moments of inertia of the three axes. Otherwise, the permissible charging amount is equivalent to the moment of inertia of each axis.
7. This is applicable for the linear servo motor. Mass of primary side (coil) is included. When three axes are simultaneously decelerated, the permissible charging amount is equivalent to the total masses of the three axes. Otherwise, the permissible charging amount is equivalent to the mass of each axis.
8. This function makes a failure diagnosis on contacts including external circuits by instantaneously turning off the signals from a controller to a servo amplifier at constant period when the input signals of the servo amplifier are on.
9. STO is common for all axes.
10. The command communication cycle depends on the controller specifications and the number of axes connected.
11. Servo amplifier with software version A3 or later is compatible with the command communication cycle of 0.222 ms. However, note that the following functions are not available when 0.222 ms is used: auto tuning (real time, one-touch, and vibration suppression control), adaptive filter II, vibration tough drive, and power monitoring.

MR-J4W2-B Standard Wiring Diagram Example

MR-J4W-B

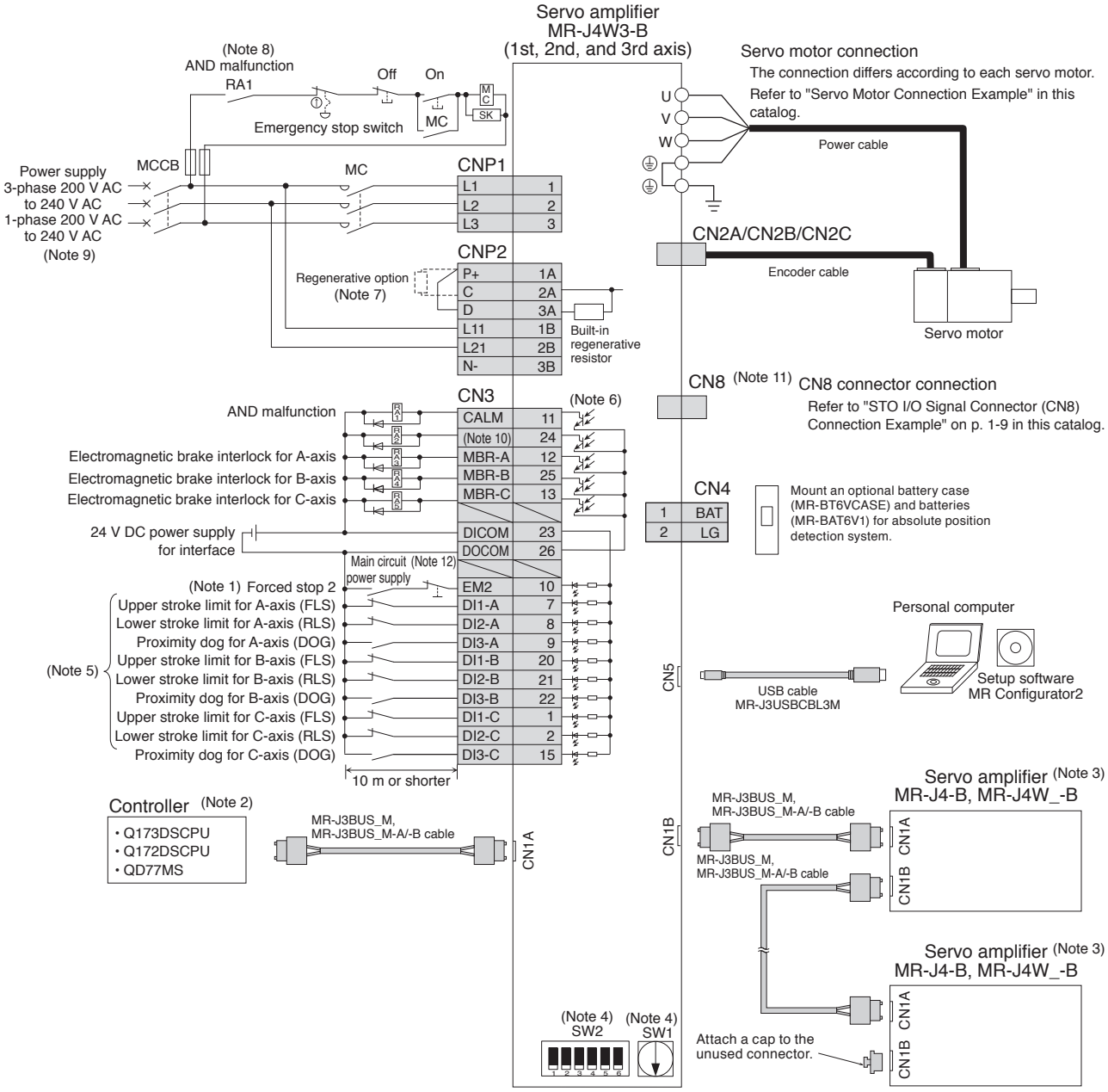


Notes: 1. The forced stop signal is issued for two axes of the servo amplifier. For overall system, apply the emergency stop on the controller side.
2. For details such as setting the controllers, refer to programming manual or user's manual for the controllers.
3. Connections for the third and following axes are omitted.
4. Up to 64 axes can be set by using a combination of a axis selection rotary switch (SW1) and auxiliary axis number setting switches (SW2-5 and SW2-6). Note that the number of the connectable axes depends on the controller specifications.
5. Devices can be assigned for DI1-A/B, DI2-A/B and DI3-A/B with controller setting. Refer to the controller instruction manuals for details on setting.
6. This is for sink wiring. Source wiring is also possible.
7. When not using a regenerative option, connect a short-circuit bar between P+ and D to use the built-in regenerative resistor. When using a regenerative option, disconnect the short-circuit bar between P+ and D, and then connect the regenerative option to P+ and C.
8. Select either of the following function for CALM (AND malfunction) with the controller.
1) The contact opens when an alarm occurs on one of the axes.
2) The contact opens when an alarm occurs on all axes.
9. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L3 terminals. Do not connect anything to L2. The connections are different from MR-J3W-B series servo amplifiers. Be careful not to make a connection error when replacing MR-J3W-B with MR-J4W2-B. Refer to "MR-J4W2-B (2-axis, SSCNET III/H Interface) Specifications" in this catalog for power supply specifications.
10. CINP (AND in-position) is assigned to this pin as default. Device for this pin can be changed by [Pr. PD07], [Pr. PD08], or [Pr. PD09].
11. Attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.
12. Configure up a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-J4W3-B Standard Wiring Diagram Example

MR-J4W-B



Notes: 1. The forced stop signal is issued for three axes of the servo amplifier. For overall system, apply the emergency stop on the controller side.
2. For details such as setting the controllers, refer to programming manual or user's manual for the controllers.
3. Connections for the fourth and following axes are omitted.
4. Up to 64 axes can be set by using a combination of a axis selection rotary switch (SW1) and auxiliary axis number setting switches (SW2-5 and SW2-6). Note that the number of the connectable axes depends on the controller specifications.
5. Devices can be assigned for DI1-A/B/C, DI2-A/B/C and DI3-A/B/C with controller setting. Refer to the controller instruction manuals for details on setting.
6. This is for sink wiring. Source wiring is also possible.
7. When not using a regenerative option, connect a short-circuit bar between P+ and D to use the built-in regenerative resistor. When using a regenerative option, disconnect the short-circuit bar between P+ and D, and then connect the regenerative option to P+ and C.
8. Select either of the following function for CALM (AND malfunction) with the controller.
1) The contact opens when an alarm occurs on one of the axes.
2) The contact opens when an alarm occurs on all axes.
9. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L3 terminals. Do not connect anything to L2. Refer to "MR-J4W3-B (3-axis, SSCNET III/H Interface) Specifications" in this catalog for power supply specifications.
10. CINP (AND in-position) is assigned to this pin as default. Device for this pin can be changed by [Pr. PD07], [Pr. PD08], or [Pr. PD09].
11. Attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.
12. Configure up a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

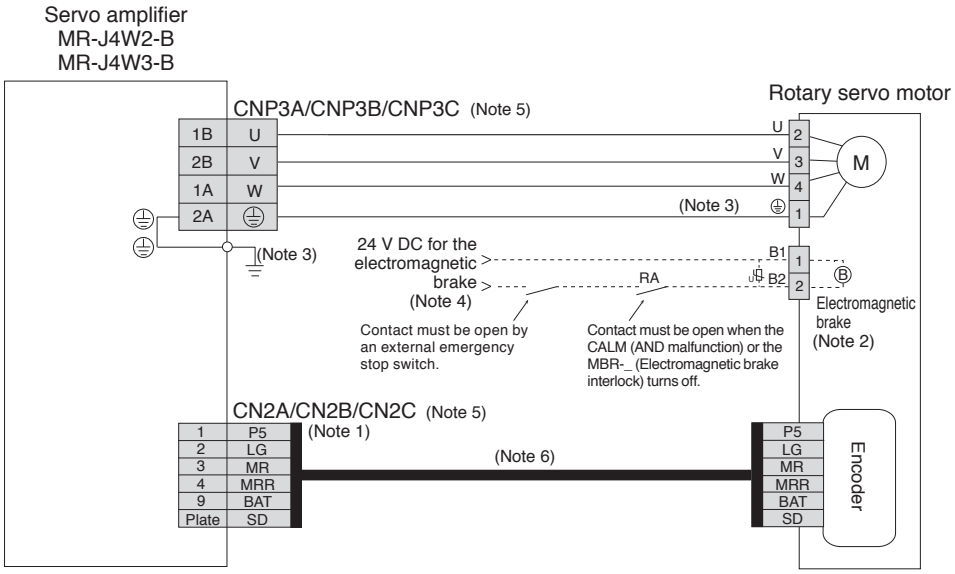
⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example

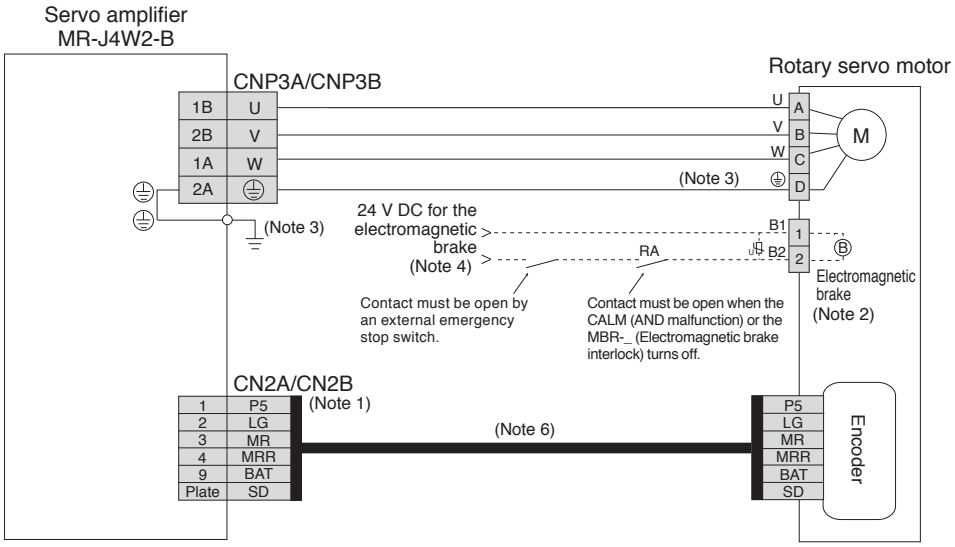
MR-J4W-B

(Rotary Servo Motor, Semi-Closed Loop Control System)

●For HG-KR/HG-MR series



●For HG-SR series

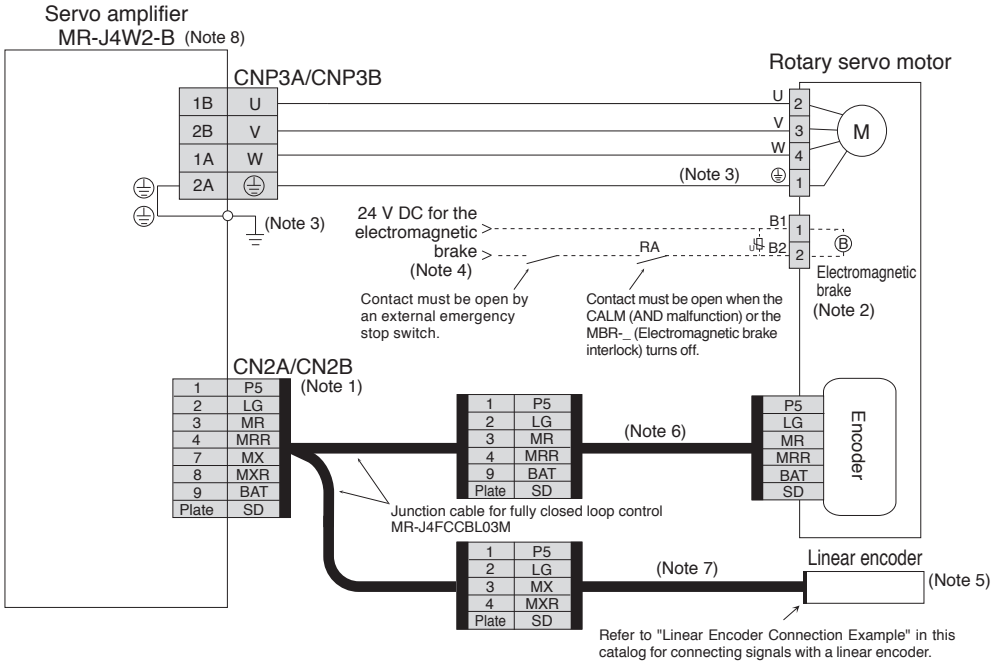


Notes: 1. The signals shown is applicable when using a two-wire type encoder cable.
2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Connect the grounding terminal of the servo motor to ⏚ of CNP3A, CNP3B, and CNP3C. Connect the protective earth (PE) terminal (⏚) located on the lower front of the servo amplifier to the cabinet protective earth (PE).
4. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
5. CNP3C and CN2C connectors are available for MR-J4W3-B servo amplifier.
6. Encoder cable is available as a option. Refer to "Servo Motor Instruction Manual (Vol. 3)" when fabricating the cables.

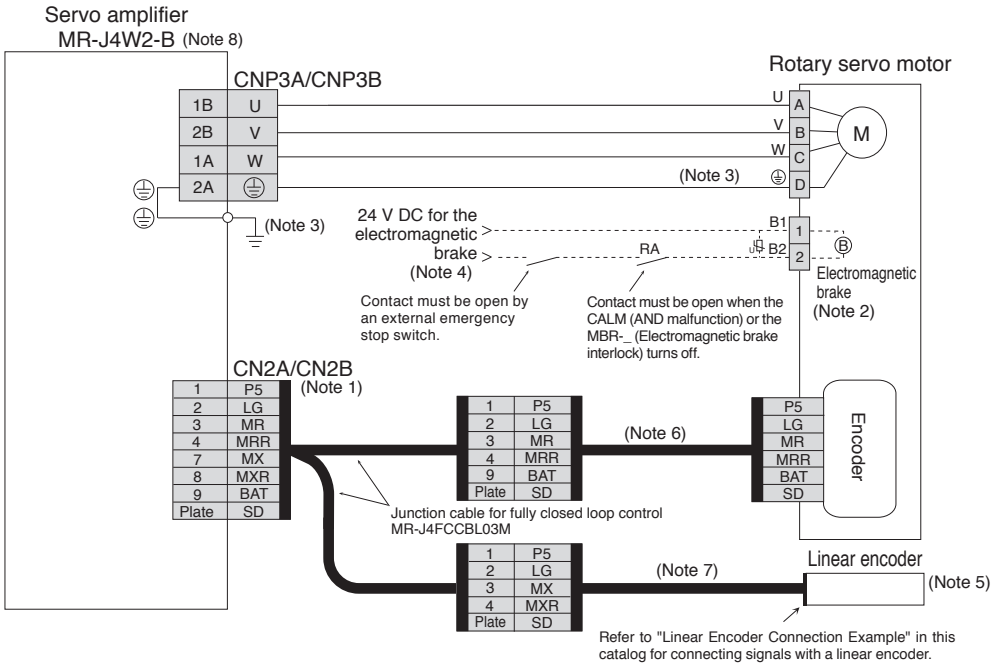
⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example
(Rotary Servo Motor, Fully Closed Loop Control System)

●For HG-KR/HG-MR series



●For HG-SR series



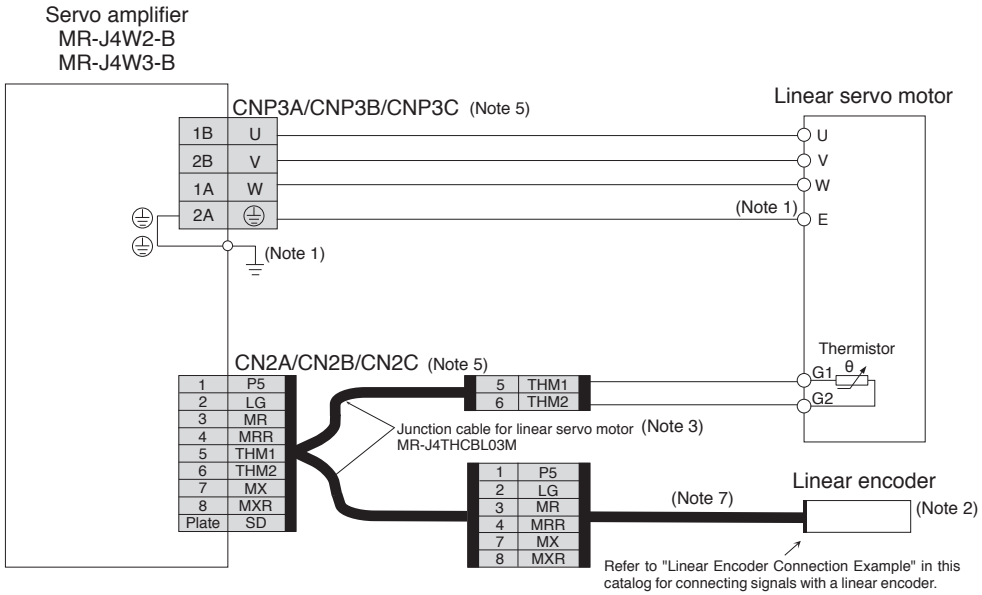
Notes: 1. For fully closed loop control, the load-side encoder and the servo motor encoder are compatible only with two-wire type communication method. Four-wire type cannot be used.
2. This is for the servo motor with electromagnetic brake. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Connect the grounding terminal of the servo motor to ⏚ of CNP3A, CNP3B, and CNP3C. Connect the protective earth (PE) terminal (⏚) located on the lower front of the servo amplifier to the cabinet protective earth (PE).
4. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
5. For linear encoders, refer to "List of Linear Encoders" under section 3 Liner Servo Motors in this catalog.
6. Encoder cable is available as a option. Refer to "Servo Motor Instruction Manual (Vol. 3)" when fabricating the cables.
7. Necessary linear encoder cables vary depending on the linear encoder. Refer to "Linear Encoder Instruction Manual."
8. MR-J4W3-B is not compatible with fully closed loop control.

⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

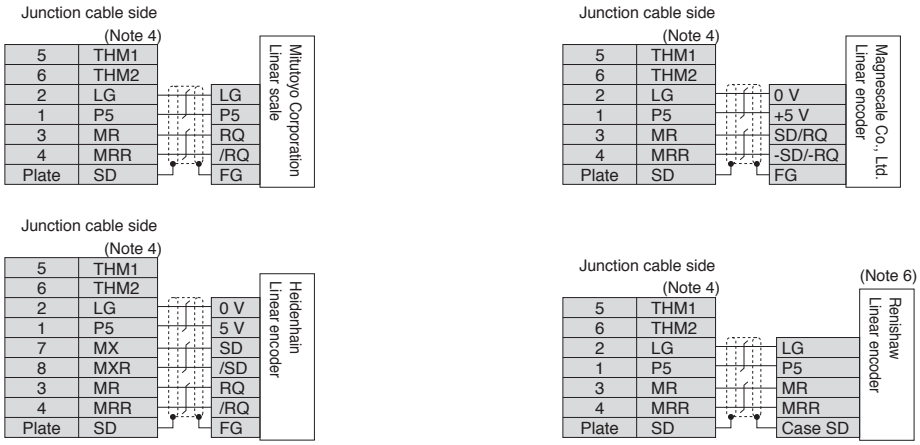
Servo Motor Connection Example (Linear Servo Motor)

MR-J4W-B

●For LM-H3/LM-K2/LM-U2 series



●Linear Encoder Connection Example

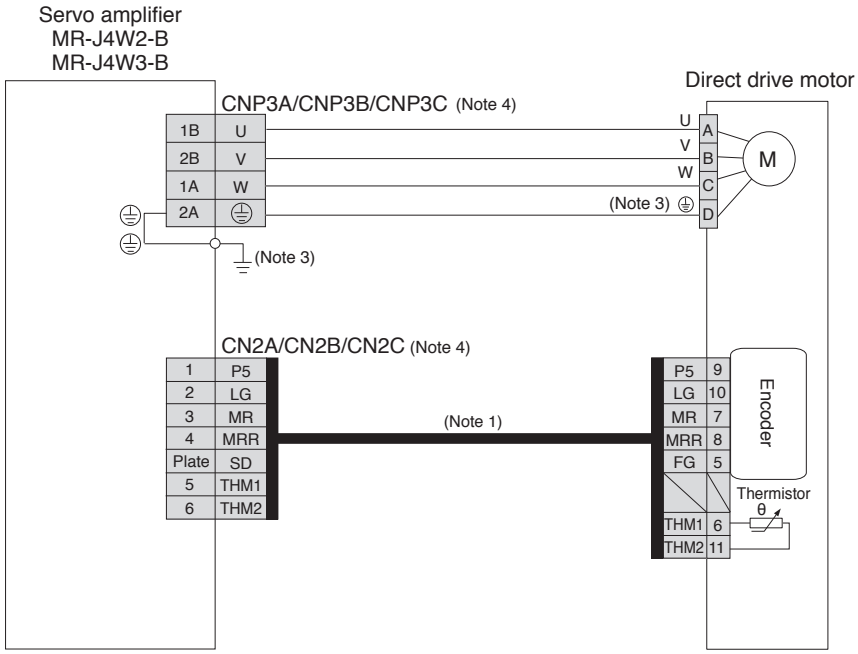


Notes: 1. Connect the grounding terminal of the servo motor to ⏚ of CNP3A, CNP3B, and CNP3C. Connect the protective earth (PE) terminal (⏚) located on the lower front of the servo amplifier to the cabinet protective earth (PE).
2. For linear encoders, refer to "List of Linear Encoders" under section 3 Liner Servo Motors in this catalog.
3. Junction cable for linear servo motor (MR-J4THCBL03M) is compatible with both 2-wire type and 4-wire type linear encoders.
4. For the number of the wire pairs for LG and P5, refer to "Linear Encoder Instruction Manual."
5. CNP3C and CN2C connectors are available for MR-J4W3-B servo amplifier.
6. Wiring varies depending on the linear encoder series. Refer to "Linear Encoder Instruction Manual" for details.
7. Necessary linear encoder cables vary depending on the linear encoder. Refer to "Linear Encoder Instruction Manual."

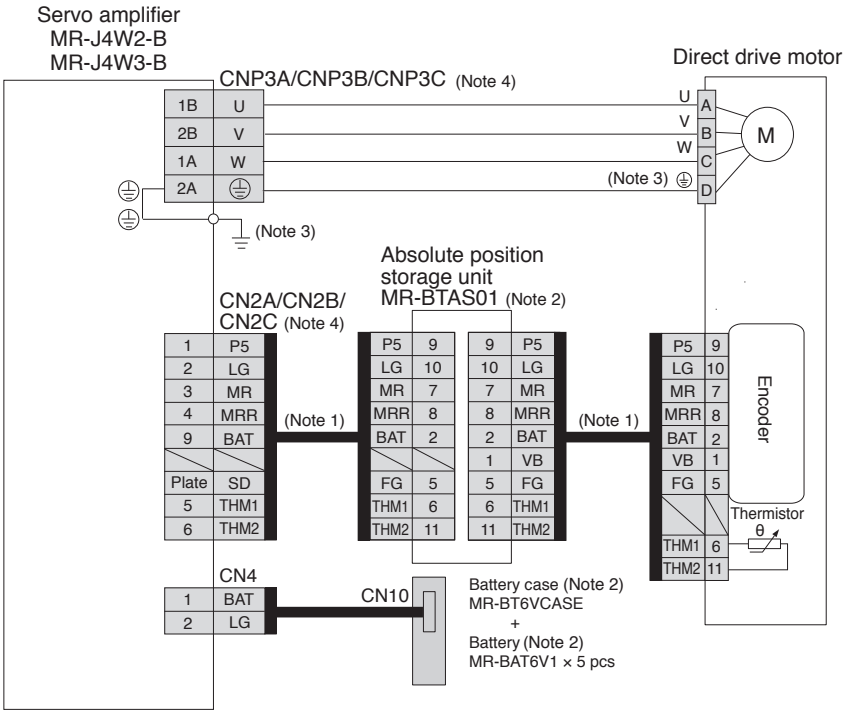
⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example (Direct Drive Motor)

●For TM-RFM series (incremental system)



●For TM-RFM series (absolute position detection system)



Notes: 1. Fabricate this encoder cable. Refer to "Direct Drive Motor Instruction Manual" for fabricating the encoder cable.
2. Optional MR-BTAS01 absolute position storage unit, MR-BT6VCASE battery case, and MR-BAT6V1 batteries are required for absolute position detection system. Refer to relevant Servo Amplifier Instruction Manual and "Direct Drive Motor Instruction Manual" for details.
3. Connect the grounding terminal of the servo motor to ⏚ of CNP3A, CNP3B, and CNP3C. Connect the protective earth (PE) terminal (⏚) located on the lower front of the servo amplifier to the cabinet protective earth (PE).
4. CNP3C and CN2C connectors are available for MR-J4W3-B servo amplifier.

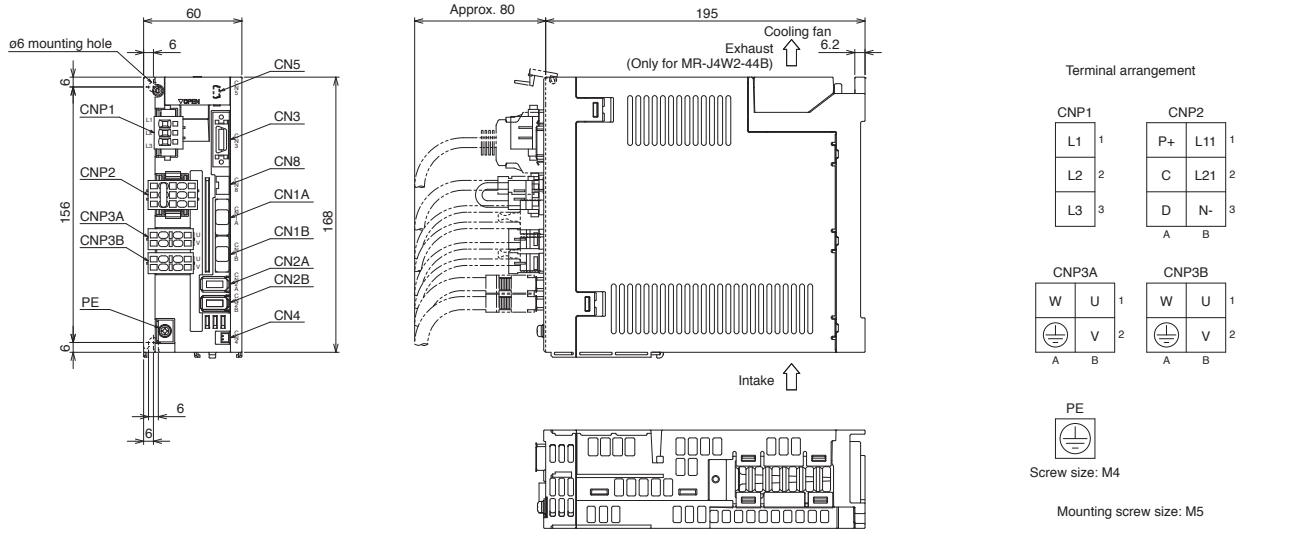
⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-J4W2-B Dimensions

MR-J4W-B

●MR-J4W2-22B (Note 1)

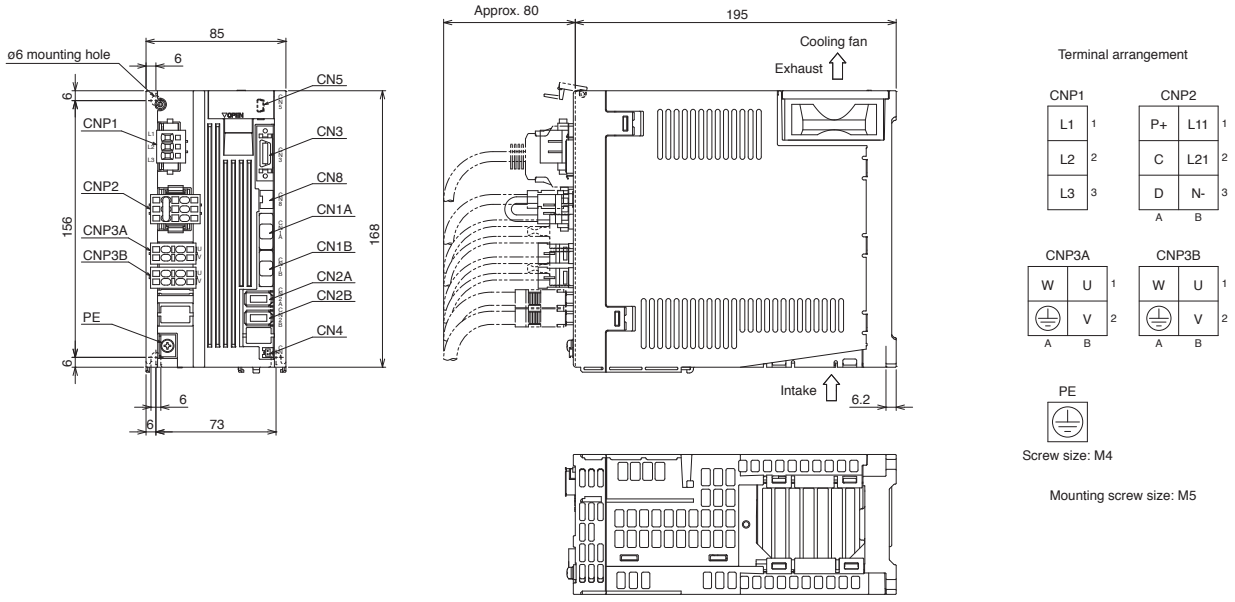
●MR-J4W2-44B (Note 1)



[Unit: mm]

●MR-J4W2-77B (Note 1)

●MR-J4W2-1010B (Note 1)



[Unit: mm]

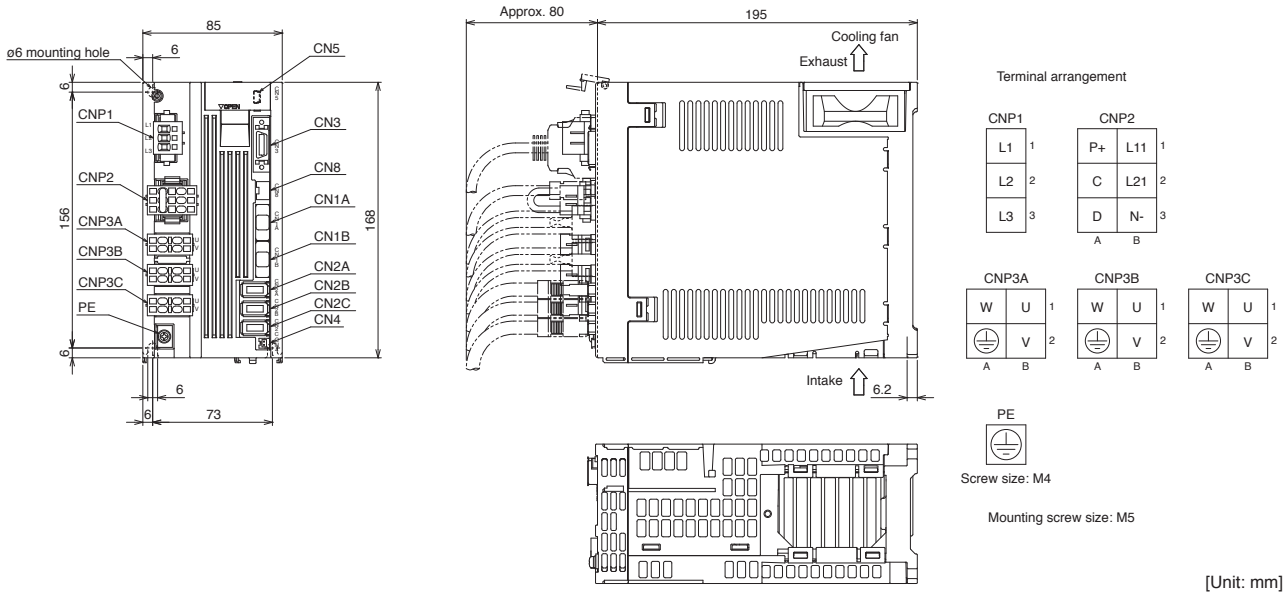
Notes: 1. CNP1, CNP2, CNP3A and CNP3B connectors (insertion type) are supplied with the servo amplifier.

MR-J4W3-B Dimensions

MR-J4W-B

●MR-J4W3-222B (Note 1)

●MR-J4W3-444B (Note 1)



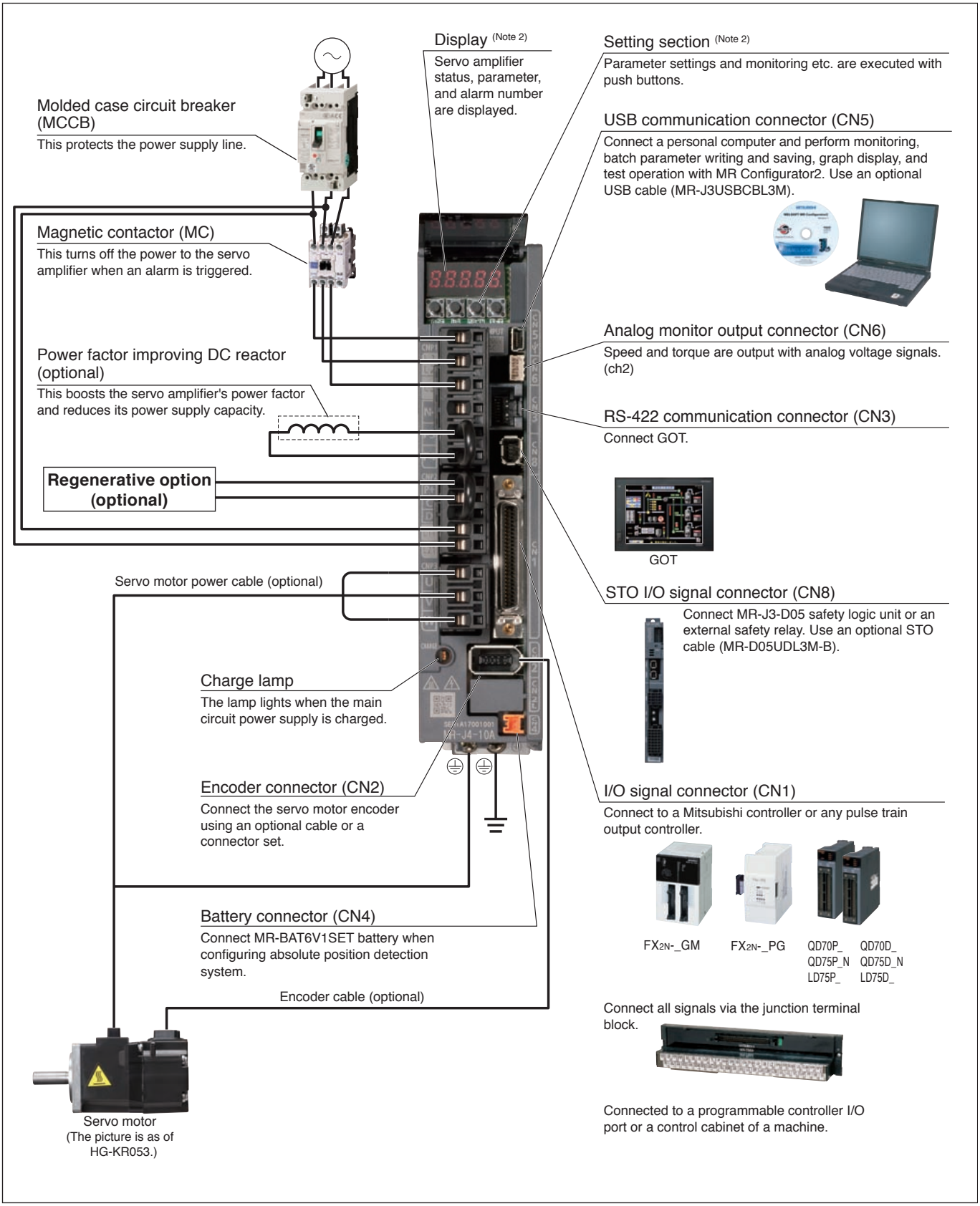
[Unit: mm]

Notes: 1. CNP1, CNP2, CNP3A, CNP3B and CNP3C connectors (insertion type) are supplied with the servo amplifier.

MR-J4-A Connections with Peripheral Equipment (Note 1)

MR-J4-A

Peripheral equipment is connected to MR-J4-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-J4-350A or smaller servo amplifier. Refer to "MR-J4-_A Servo Amplifier Instruction Manual" for the actual connections.
2. This picture shows when the display cover is open.

MR-J4-A (General-purpose Interface) Specifications

MR-J4-A

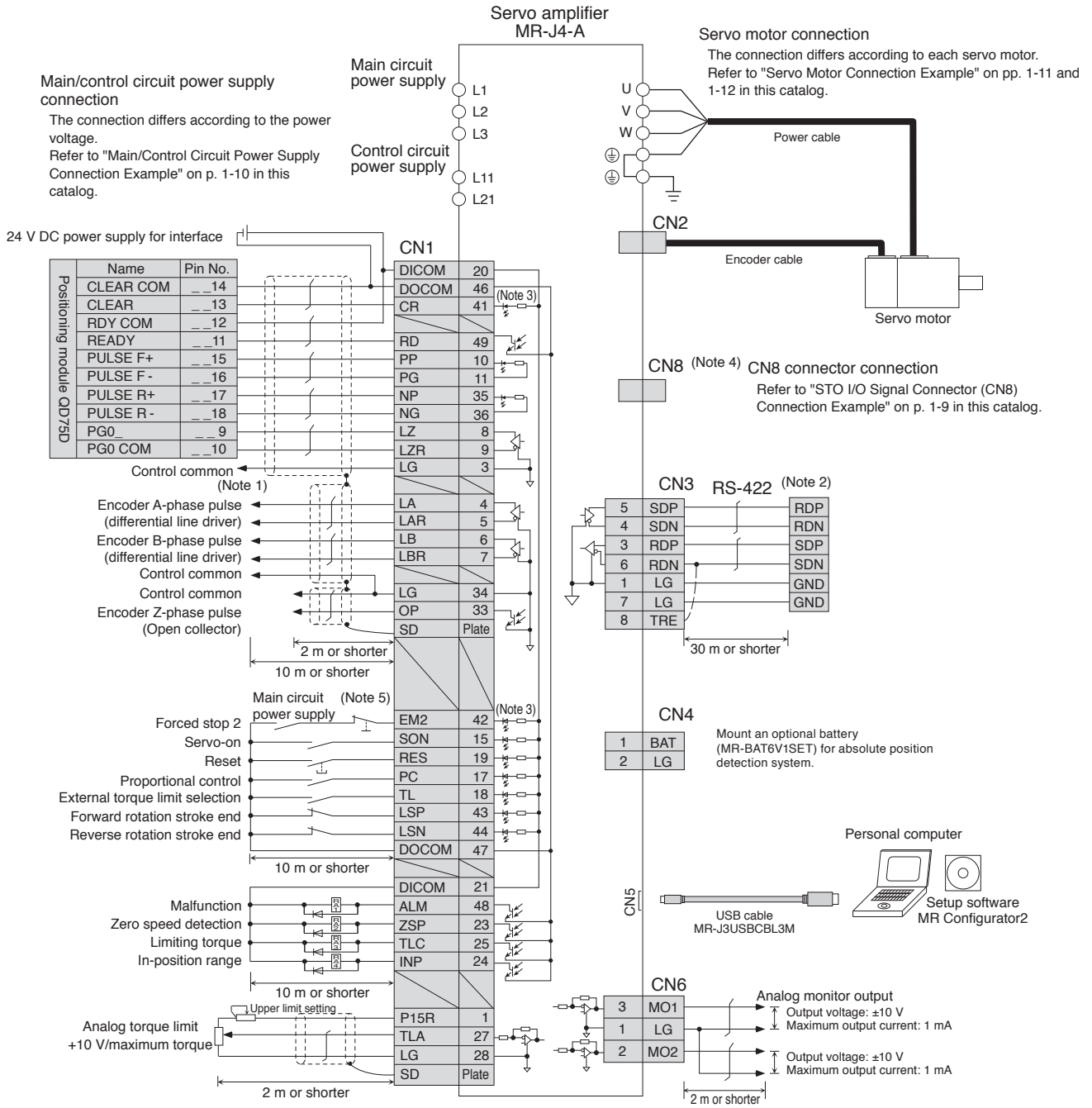
Servo amplifier model MR-J4-		10A	20A	40A	60A	70A	100A	200A	350A	500A	700A
Output	Rated voltage	3-phase 170 V AC									
	Rated current [A]	1.1	1.5	2.8	3.2	5.8	6.0	11.0	17.0	28.0	37.0
Main circuit power supply	Voltage/frequency (Note 1)	3-phase or 1-phase 200 V AC to 240 V AC, 50/60 Hz					3-phase 200 V AC to 240 V AC, 50/60 Hz				
	Rated current [A]	0.9	1.5	2.6	3.2 (Note 8)	3.8	5.0	10.5	16.0	21.7	28.9
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC					3-phase 170 V AC to 264 V AC				
	Permissible frequency fluctuation	±5% maximum									
Control circuit power supply	Voltage/frequency	1-phase 200 V AC to 240 V AC, 50/60 Hz									
	Rated current [A]	0.2								0.3	
	Permissible voltage fluctuation	1-phase 170 V AC to 264 V AC									
	Permissible frequency fluctuation	±5% maximum									
	Power consumption [W]	30								45	
Interface power supply		24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signal))									
Control method		Sine-wave PWM control/current control method									
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3) [W]		-	10	10	10	20	20	100	100	130	170
Dynamic brake		Built-in (Note 4)									
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)									
		RS-422: 1 : n communication (up to 32 axes) (Note 11)									
Encoder output pulse		Compatible (A/B/Z-phase pulse)									
Analog monitor		2 channels									
Position control mode	Maximum input pulse frequency	4 Mpps (when using differential receiver), 200 kpps (when using open-collector)									
	Positioning feedback pulse	Encoder resolution: 22 bits									
	Command pulse multiplying factor	Electronic gear A/B multiple, A: 1 to 16777216, B: 1 to 16777216, 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)									
Fully closed loop control (Note 10)		Available in the future									
Load-side encoder interface (Note 9)		Mitsubishi high-speed serial communication									
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									
Safety function		STO (IEC/EN 61800-5-2)									
Safety performance	Standards certified by CB	EN ISO 13849-1 Category 3 PL d, EN 61508 SIL 2, EN 62061 SIL CL 2, EN 61800-5-2 SIL 2									
	Response performance	8 ms or less (STO input OFF → energy shut-off)									
	Test pulse input (STO) (Note 7)	Test pulse frequency: 1 Hz to 25 Hz, Test pulse off time: 1 ms maximum									
	Mean time to dangerous failure (MTTFd)	100 years or longer									
	Diagnostic coverage (DC)	Medium (90% to 99%)									
	Probability of dangerous Failure per Hour (PFH)	1.68×10^{-10} [1/h]									
Compliance to standards		Refer to "Conformity with global standards and regulations" on p. 22 in this catalog.									
Structure (IP rating)		Natural cooling, open (IP20)				Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)	
Close mounting		Possible (Note 6)								Not possible	
Mass [kg]		0.8	0.8	1.0	1.0	1.4	1.4	2.1	2.3	4.0	6.2

Notes: 1. Rated output and speed of a rotary servo motor are applicable when the servo amplifier, combined with the rotary servo motor, is operated within the specified power supply voltage and frequency.
2. Optimal regenerative option varies for each system. 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-J4-_A Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
5. Terminal blocks are excluded.
6. 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 rate.
7. This function makes a failure diagnosis on contacts including external circuits by instantaneously turning off the signals from a controller to a servo amplifier at constant period when the input signals of the servo amplifier are on.
8. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
9. Not compatible with pulse train interface (A/B/Z-phase differential output type).
10. Fully closed loop control will be compatible only with two-wire type communication method.
11. RS-422 communication is compatible with the servo amplifiers with software version A3 or later.

MR-J4-A Standard Wiring Diagram Example: Position Control Operation

MR-J4-A

Connecting to QD75D (position servo, incremental)

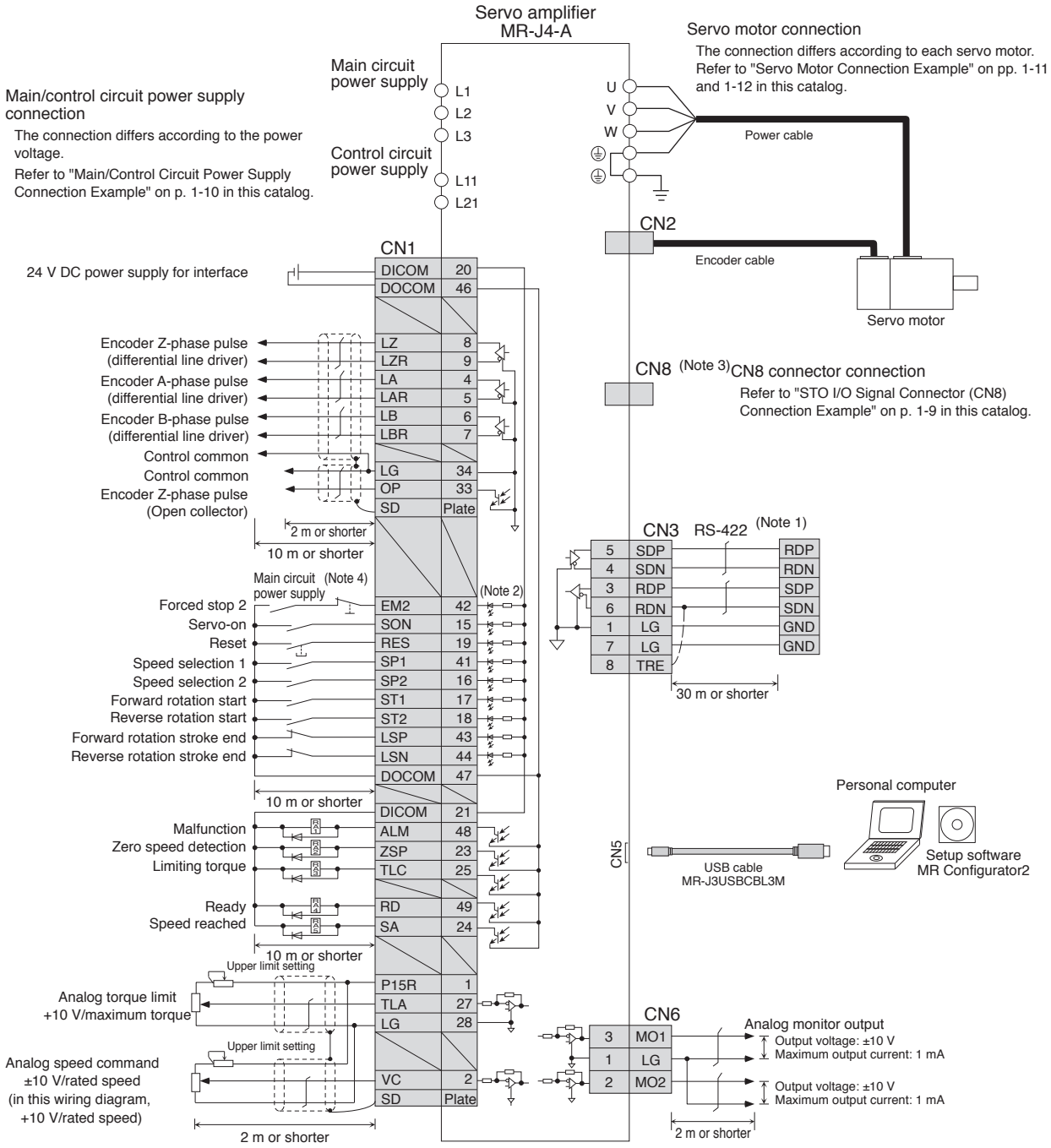


Notes: 1. This connection is not necessary for QD75D positioning module. Note that the connection between LG and control common terminal is recommended for some positioning modules to improve noise immunity.
2. It is also possible to connect a personal computer to CN3 connector with an RS-422/RS-232C conversion cable. However, USB interface (CN5 connector) and RS-422 interface (CN3 connector) are mutually exclusive. Do not use them at the same time. Refer to "Products on the Market for Servo Amplifiers" in this catalog for the RS-422/RS-232C conversion cable.
3. This is for sink wiring. Source wiring is also possible.
4. Attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.
5. Configure up a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-J4-A Standard Wiring Diagram Example: Speed Control Operation

MR-J4-A

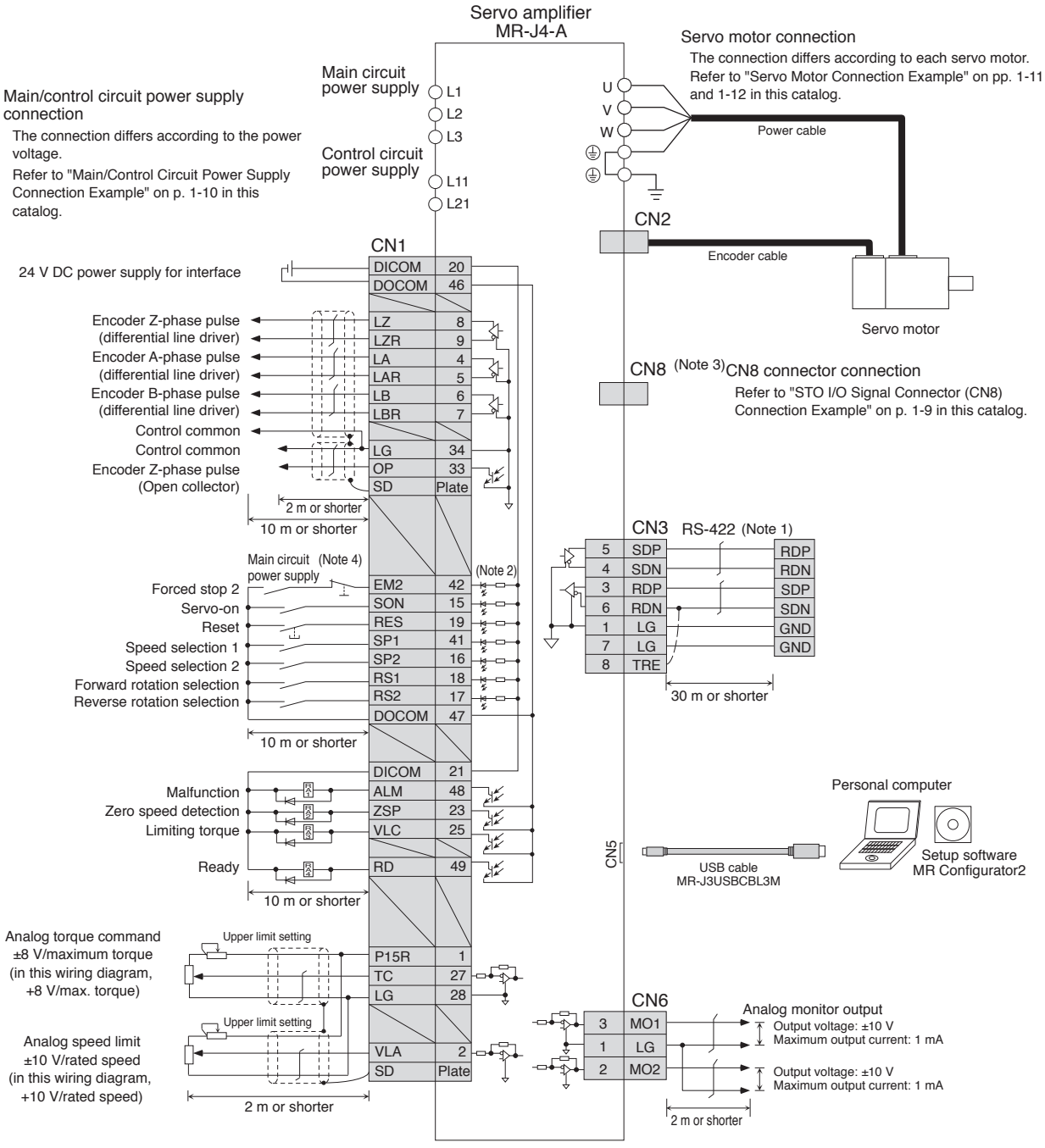


Notes: 1. It is also possible to connect a personal computer to CN3 connector with an RS-422/RS-232C conversion cable. However, USB interface (CN5 connector) and RS-422 interface (CN3 connector) are mutually exclusive. Do not use them at the same time. Refer to "Products on the Market for Servo Amplifiers" in this catalog for the RS-422/RS-232C conversion cable.
2. This is for sink wiring. Source wiring is also possible.
3. Attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.
4. Configure up a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-J4-A Standard Wiring Diagram Example: Torque Control Operation

MR-J4-A



Notes: 1. It is also possible to connect a personal computer to CN3 connector with an RS-422/RS-232C conversion cable. However, USB interface (CN5 connector) and RS-422 interface (CN3 connector) are mutually exclusive. Do not use them at the same time. Refer to "Products on the Market for Servo Amplifiers" in this catalog for the RS-422/RS-232C conversion cable.
2. This is for sink wiring. Source wiring is also possible.
3. Attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.
4. Configure up a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

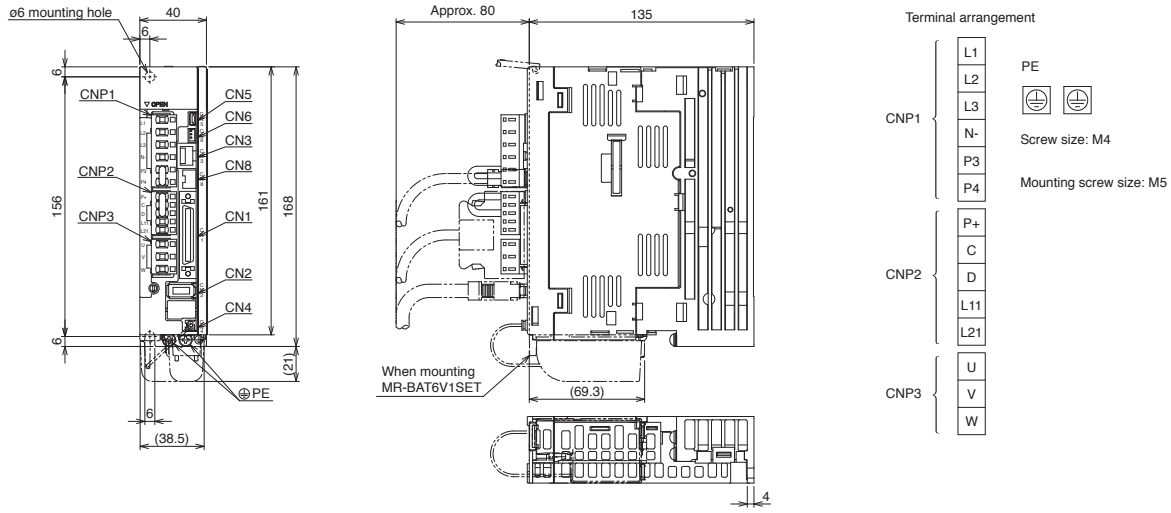
⚠ Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-J4-A Dimensions

MR-J4-A

●MR-J4-10A (Note 1)

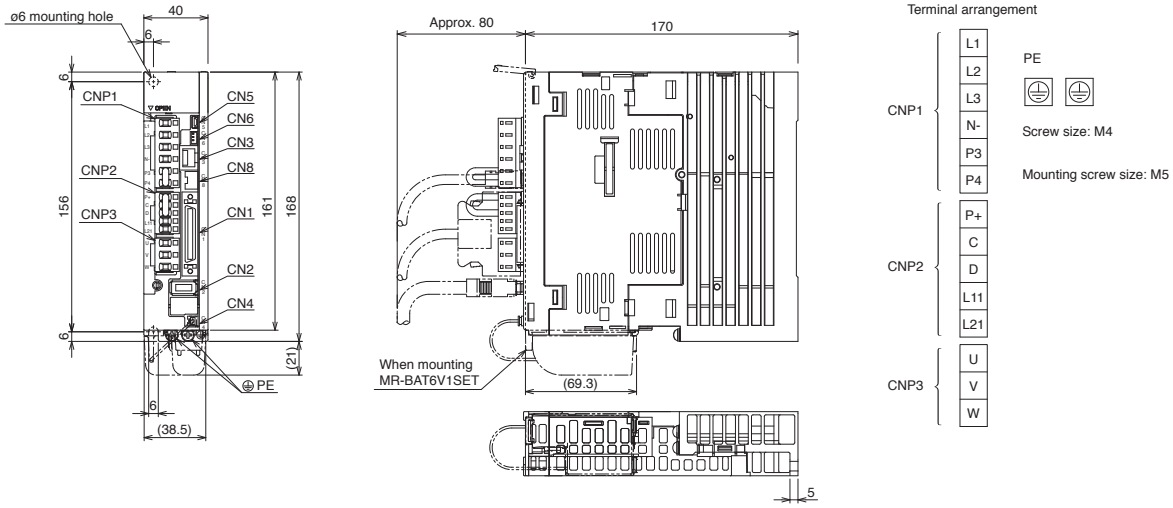
●MR-J4-20A (Note 1)



[Unit: mm]

●MR-J4-40A (Note 1)

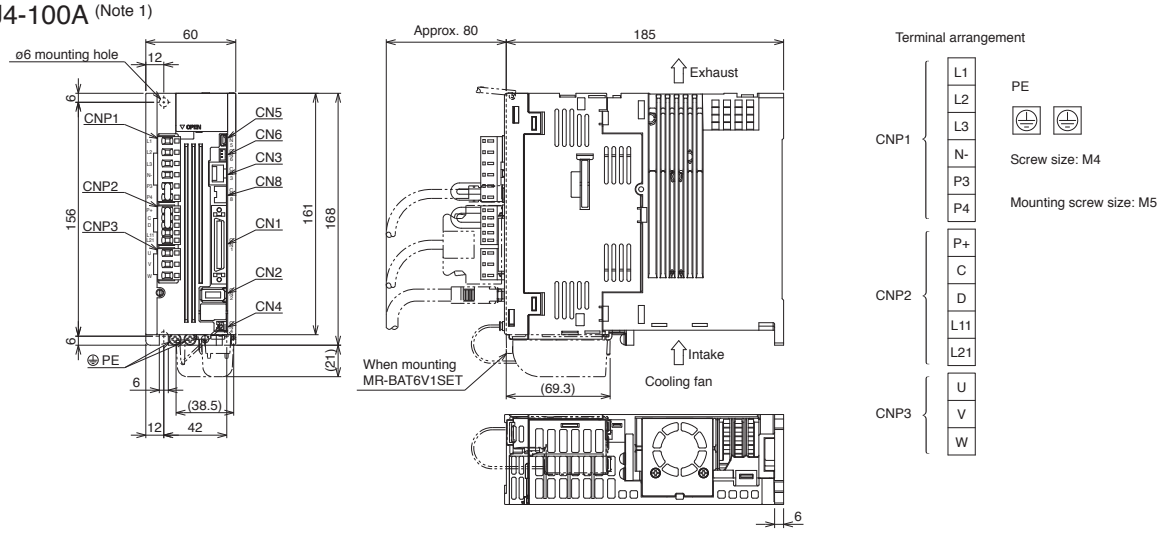
●MR-J4-60A (Note 1)



[Unit: mm]

●MR-J4-70A (Note 1)

●MR-J4-100A (Note 1)



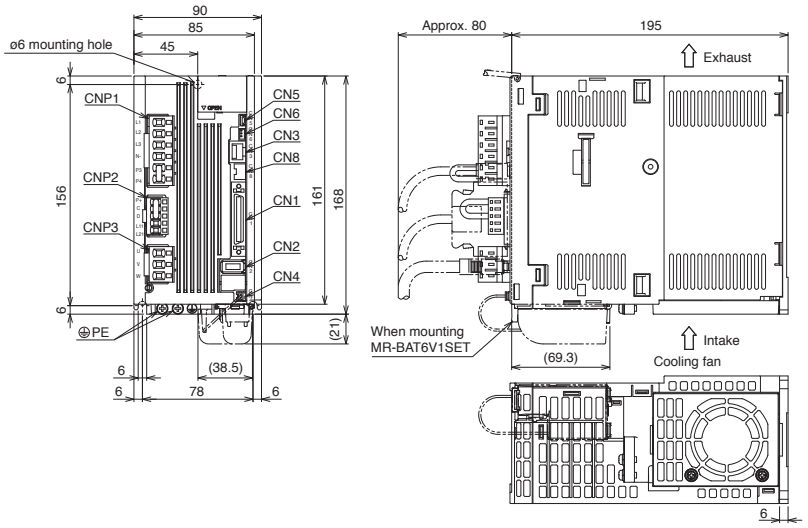
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.

MR-J4-A Dimensions

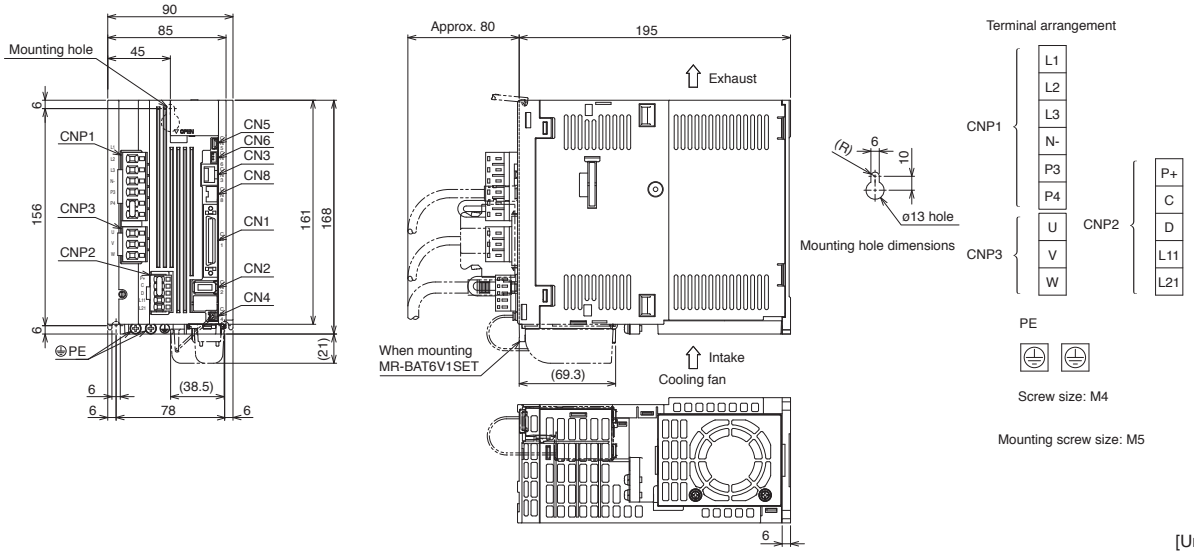
MR-J4-A

●MR-J4-200A (Note 1)



[Unit: mm]

●MR-J4-350A (Note 1)



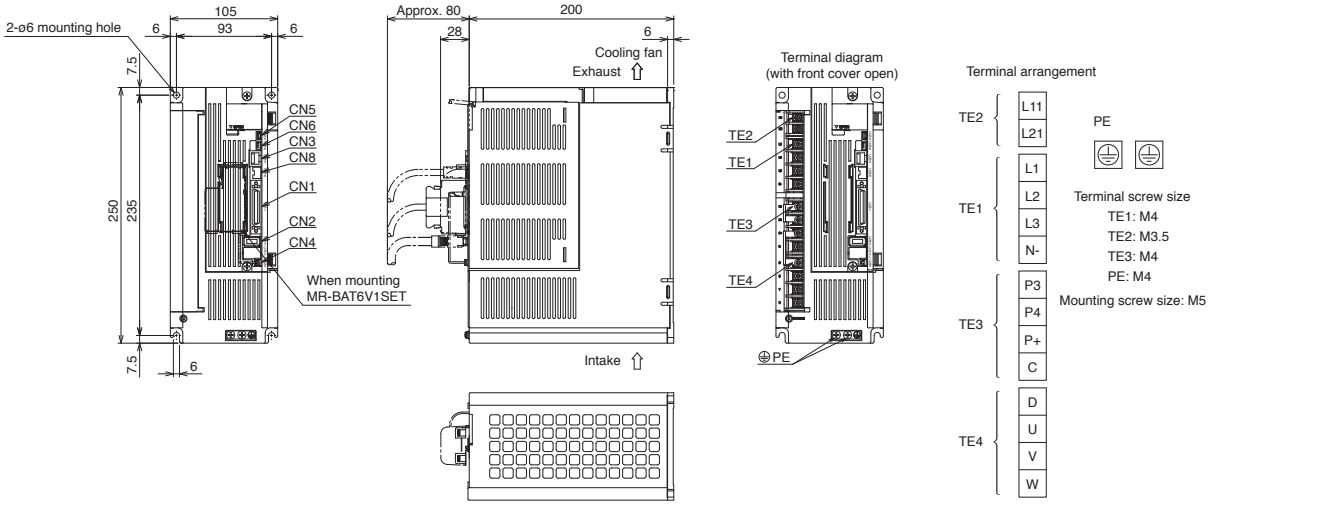
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.

MR-J4-A Dimensions

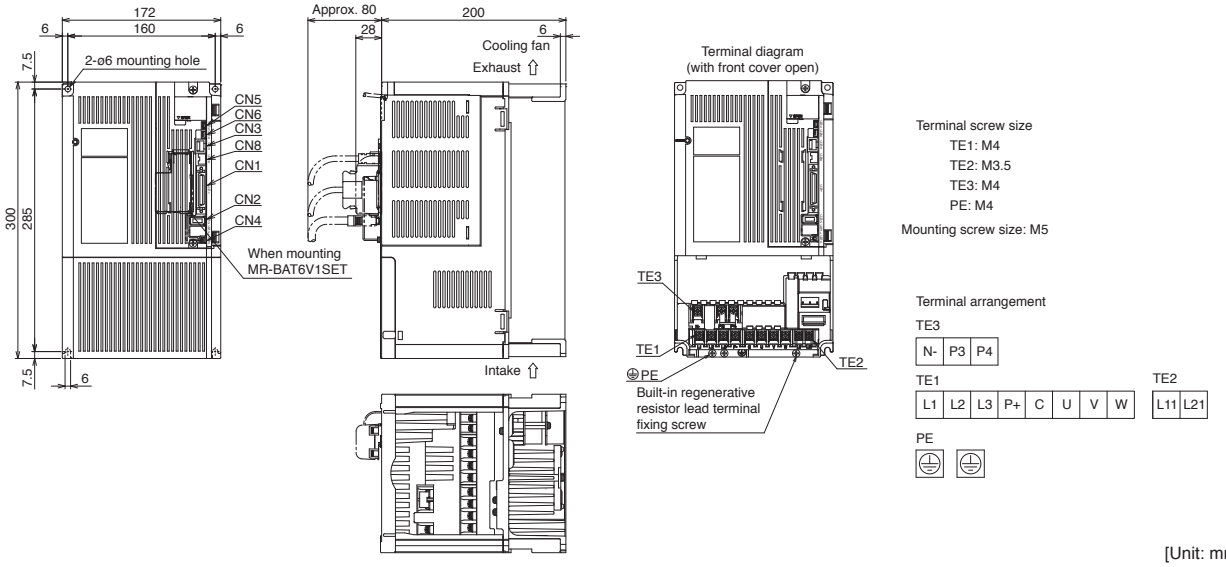
MR-J4-A

●MR-J4-500A



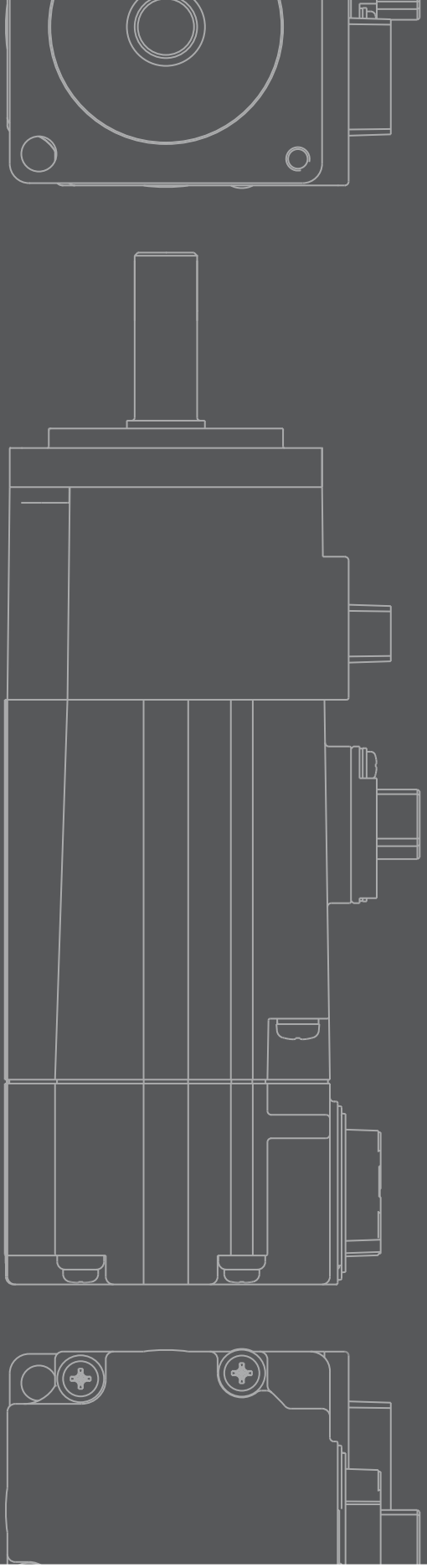
[Unit: mm]

●MR-J4-700A



[Unit: mm]

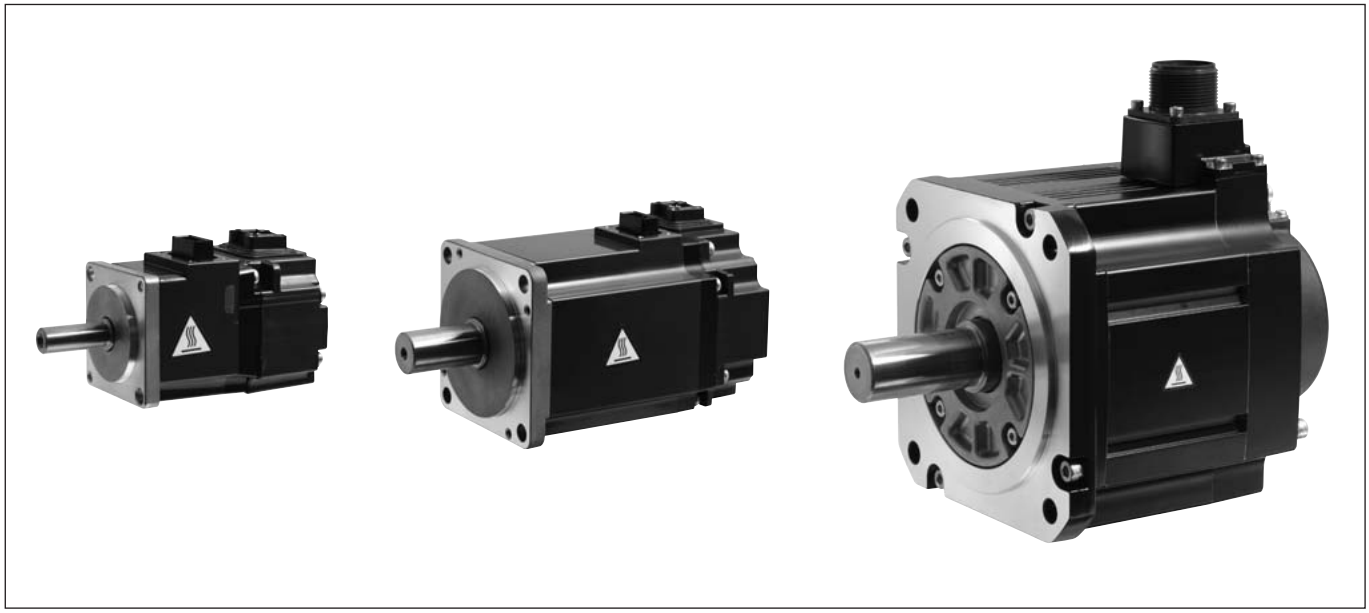
2



* Refer to p. 5-45 in this catalog for conversion of units.

Rotary Servo Motors

Rotary Servo Motors



Product lines

Rotary servo motor series		Rated Speed [r/min]	Maximum Speed [r/min]	Output 0.1 kW — 1 kW — 10 kW
Small capacity series	HG-KR series 	3000	6000	0.05 – 0.75
	HG-MR series 	3000	6000	0.05 – 0.75
Medium capacity series	HG-SR series 	1000	1500	0.5 – 4.2
		2000	3000	0.5 – 7.0

Features

All rotary servo motor series are standard equipped with 22-bit (4,194,304 pulses/rev) absolute/incremental encoder for extreme accuracy. The motor length is in the smallest class in the industry. Replacing the prior HF series with these new HG series is easy since the HG series have the same flange shapes and dimensions, and also use the same power cable, encoder cable, and electromagnetic cable as the prior models.

- Fast - HG-KR/HG-MR series reaches the maximum speeds of 6000 r/min.
- High torque - HG-KR series reaches 350% of the rated torque maximally.
- Stable operation - HG-SR series provides stable control from low to high speeds.
- Flexible cabling - For HG-KR/HG-MR series, power, encoder and electromagnetic cables are led out to either in direction of or opposite direction of the load side.
- High level of protection against dust and water - IP67 for HG-SR and IP65 for HG-KR/HG-MR. (Note 1)

Notes: 1. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the shaft-through portion.

The servo motors are compatible with global standards.
Refer to "Conformity with global standards and regulations" on p. 22 in this catalog.

●: Available, -: Not available

Rated output [kW]	Servo motor type			IP rating (Note 2)	Compatible series	Features	Application examples
	With electromagnetic brake (B)	With reducer (G1) (Note 1)	With reducer (G5, G7) (Note 1)				
5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	●	●	IP65	HF-KP	Low inertia Perfect for general industrial machines.	• Belt drives • Robots • Mounters • Sewing machines • X-Y tables • Food processing machines • Semiconductor manufacturing equipment • Knitting and embroidery machines
5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	-	-	IP65	HF-MP	Ultra-low inertia Well suited for high-throughput operations.	• Inserters • Mounters
6 types 0.5, 0.85, 1.2, 2.0, 3.0, 4.2	●	-	-	IP67	HF-SP	Medium inertia This series is available with two rated speeds.	• Material handling systems • Robots • X-Y tables
7 types 0.5, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0	●	●	●	IP67			

Notes: 1. G1 for general industrial machines. G5 and G7 for high precision applications.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the shaft-through portion. For geared servo motor, IP rating of the reducer portion is equivalent to IP44.

Model Designation

HG-KR 05 3 B □ □ □

Symbol	Inertia/capacity
HG-KR	Low inertia, small capacity
HG-MR	Ultra-low inertia, small capacity
HG-SR	Medium inertia, medium capacity

Symbol	Rated output [kW]
05	0.05
1 to 8	0.1 to 0.85
10 to 70	1.0 to 7.0

Symbol	Rated speed [r/min]
1	1000
2	2000
3	3000

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

Symbol	Oil seal
None	None
J	Installed (Note 2, 3, 4)

Symbol	Reducer (Note 5)
None	None
G1	With reducer for general industrial machines, flange mounting
G1H	With reducer for general industrial machines, foot mounting (Note 6)
G5	With flange-output type reducer for high precision applications, flange mounting
G7	With shaft-output type reducer for high precision applications, flange mounting

Symbol	Shaft end
None	Standard (Straight shaft) (Note 7)
K	Key shaft (with/without key) (Note 8)
D	D-cut shaft (Note 8)

Notes: 1. Refer to electromagnetic brake specifications of each servo motor series in this catalog for the available models and detailed specifications.
2. Available in 0.1 kW or larger HG-KR/HG-MR series and all HG-SR series.
3. Oil seal is not installed in the geared servo motor.
4. Dimensions for HG-KR/HG-MR series with an oil seal are different from the standard models. Contact your local sales office for more details.
5. Refer to "Geared Servo Motor Specifications" in this catalog for the available models and detailed specifications.
6. Available only in HF-SR 2000 r/min series.
7. Standard HG-SR G1/G1H has a key shaft (with key).
8. Refer to special shaft end specifications of each servo motor series in this catalog for the available models and detailed specifications.

Combinations of Rotary Servo Motor and Servo Amplifier

With MR-J4 servo amplifier

Rotary servo motor			Servo amplifier
HG-KR	HG-MR	HG-SR	
053, 13	053, 13	-	MR-J4-10B/A
23	23	-	MR-J4-20B/A
43	43	-	MR-J4-40B/A
-	-	51, 52	MR-J4-60B/A
73	73	-	MR-J4-70B/A
-	-	81, 102	MR-J4-100B/A
-	-	121, 201, 152, 202	MR-J4-200B/A
-	-	301, 352	MR-J4-350B/A
-	-	421, 502	MR-J4-500B/A
-	-	702	MR-J4-700B/A

With MR-J4W2 servo amplifier

Rotary servo motor			Servo amplifier	
HG-KR	HG-MR	HG-SR	Model	Axis (Note 1)
053, 13, 23	053, 13, 23	-	MR-J4W2-22B	A/B
053, 13, 23, 43	053, 13, 23, 43	-	MR-J4W2-44B	A/B
43, 73	43, 73	51, 52	MR-J4W2-77B	A/B
43, 73	43, 73	51, 81, 52, 102	MR-J4W2-1010B	A/B

With MR-J4W3 servo amplifier

Rotary servo motor			Servo amplifier	
HG-KR	HG-MR	HG-SR	Model	Axis (Note 2)
053, 13, 23	053, 13, 23	-	MR-J4W3-222B	A/B/C
053, 13, 23, 43	053, 13, 23, 43	-	MR-J4W3-444B	A/B/C

Notes: 1. A-axis and B-axis indicate names of axes of the multi-axis servo amplifier. Any combination of the servo motors is available such as rotary servo motor for A-axis, and linear servo motor or direct drive motor for B-axis. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motor" on p. 1-5 in this catalog.
2. A-axis, B-axis, and C-axis indicate names of axes of the multi-axis servo amplifier. Any combination of the servo motors is available such as rotary servo motor for A-axis, linear servo motor for B-axis, and direct drive motor for C-axis. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motor" on p. 1-5 in this catalog.

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

Rotary servo motor model		HG-KR	053(B)	13(B)	23(B)	43(B)	73(B)
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on p. 2-4 in this catalog.				
		MR-J4W_-					
Power supply capacity *1		[kVA]	0.3	0.3	0.5	0.9	1.3
Continuous running duty	Rated output	[W]	50	100	200	400	750
	Rated torque (Note 3)	[N•m]	0.16	0.32	0.64	1.3	2.4
Maximum torque		[N•m]	0.56	1.1	2.2	4.5	8.4
Rated speed		[r/min]	3000				
Maximum speed		[r/min]	6000				
Permissible instantaneous speed		[r/min]	6900				
Power rate at continuous rated torque	Standard	[kW/s]	5.63	13.0	18.3	43.7	45.2
	With electromagnetic brake	[kW/s]	5.37	12.1	16.7	41.3	41.6
Rated current		[A]	0.9	0.8	1.3	2.6	4.8
Maximum current		[A]	3.2	2.5	4.6	9.1	17.2
Regenerative braking frequency *2	MR-J4-	[times/min]	(Note 4)	(Note 4)	453	268	157
	MR-J4W_-	[times/min]	2500	1350	451	268	393
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	0.0450	0.0777	0.221	0.371	1.26
	With electromagnetic brake	[× 10^{-4} kg•m^2]	0.0472	0.0837	0.243	0.393	1.37
Recommended load to motor inertia ratio (Note 1)			17 times or less		26 times or less	25 times or less	17 times or less
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal			None	None (Servo motors with oil seal are available. (HG-KR_J))			
Insulation class			130 (B)				
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		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 *4		X: 49 m/s^2 Y: 49 m/s^2				
Vibration rank			V10 *6				
Permissible load for the shaft *5	L	[mm]	25	25	30	30	40
	Radial	[N]	88	88	245	245	392
	Thrust	[N]	59	59	98	98	147
Mass	Standard	[kg]	0.34	0.54	0.91	1.4	2.8
	With electromagnetic brake	[kg]	0.54	0.74	1.3	1.8	3.8

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. For geared servo motor, IP rating of the reducer portion is equivalent to IP44. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, it is recommended that the unbalanced torque of the machine be kept 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 if the effective torque is within the rated torque range. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the following requirements are met.
• HG-KR053(B): The load to motor inertia ratio is 8 times or less, and the effective torque is within the rated torque range.
• HG-KR13(B): The load to motor inertia ratio is 4 times or less, and the effective torque is within the rated torque range.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the asterisks 1 to 6.

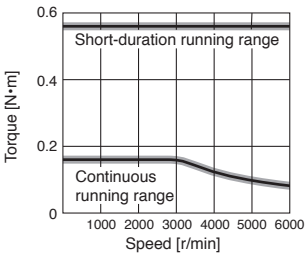
HG-KR Series Electromagnetic Brake Specifications (Note 1)

Model			HG-KR				
			053B	13B	23B	43B	73B
Type			Spring actuated type safety brake				
Rated voltage			24 V DC_{-10}^{0}%				
Power consumption		[W] at 20 °C	6.3	6.3	7.9	7.9	10
Electromagnetic brake static friction torque		[N•m]	0.32	0.32	1.3	1.3	2.4
Permissible braking work	Per braking	[J]	5.6	5.6	22	22	64
	Per hour	[J]	56	56	220	220	640
Electromagnetic brake life (Note 2)	Number of times	[Times]	20000	20000	20000	20000	20000
	Work per braking	[J]	5.6	5.6	22	22	64

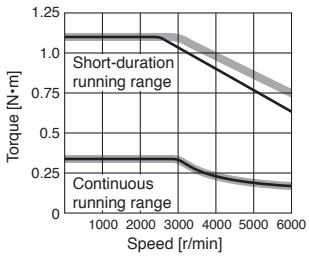
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-KR Series Torque Characteristics (Note 3)

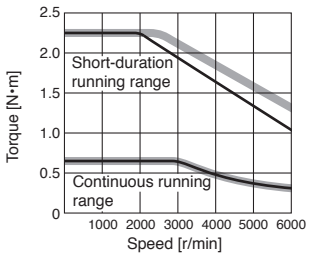
HG-KR053(B) (Note 1, 2)



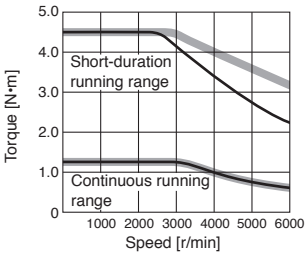
HG-KR13(B) (Note 1, 2)



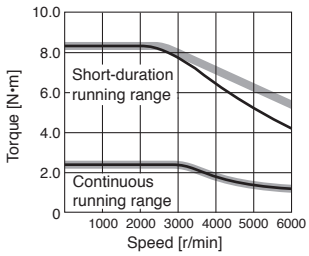
HG-KR23(B) (Note 1, 2)



HG-KR43(B) (Note 1, 2)



HG-KR73(B) (Note 1, 2)

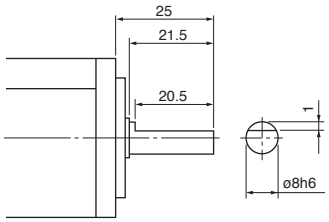


Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 230 V AC.
2. ——— : For 1-phase 200 V AC.
3. Torque drops when the power supply voltage is below the specified value.

HG-KR Series Special Shaft End Specifications

Motors with the following specifications are also available.

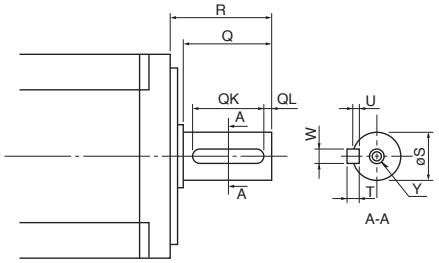
D-cut shaft (Note 1): 50 W and 100 W



[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-KR	23(B)K, 43(B)K	5	14h6	30	26	5	20	3	3	M4 screw Depth: 15
	73(B)K	6	19h6	40	36	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-MR Series (Ultra-low Inertia, Small Capacity) Specifications

Rotary servo motor model		HG-MR	053(B)	13(B)	23(B)	43(B)	73(B)
Compatible servo amplifier model		MR-J4- MR-J4W_-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on p. 2-4 in this catalog.				
Power supply capacity *1		[kVA]	0.3	0.3	0.5	0.9	1.3
Continuous running duty	Rated output	[W]	50	100	200	400	750
	Rated torque (Note 3)	[N•m]	0.16	0.32	0.64	1.3	2.4
Maximum torque		[N•m]	0.48	0.95	1.9	3.8	7.2
Rated speed		[r/min]	3000				
Maximum speed		[r/min]	6000				
Permissible instantaneous speed		[r/min]	6900				
Power rate at continuous rated torque	Standard	[kW/s]	15.6	33.8	46.9	114.2	97.3
	With electromagnetic brake	[kW/s]	11.3	28.0	37.2	98.8	82.1
Rated current		[A]	1.0	0.9	1.5	2.6	5.8
Maximum current		[A]	3.1	2.5	5.3	9.0	20
Regenerative braking frequency *2	MR-J4-	[times/min]	(Note 4)	(Note 4)	1180	713	338
	MR-J4W_-	[times/min]	7310	3620	1170	710	846
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	0.0162	0.0300	0.0865	0.142	0.586
	With electromagnetic brake	[× 10^{-4} kg•m^2]	0.0224	0.0362	0.109	0.164	0.694
Recommended load to motor inertia ratio (Note 1)			35 times or less	32 times or less			
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal			None	None (Servo motors with oil seal are available. (HG-MR_J))			
Insulation class			130 (B)				
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		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 *4		X: 49 m/s^2 Y: 49 m/s^2				
Vibration rank			V10 *6				
Permissible load for the shaft *5	L	[mm]	25	25	30	30	40
	Radial	[N]	88	88	245	245	392
	Thrust	[N]	59	59	98	98	147
Mass	Standard	[kg]	0.34	0.54	0.91	1.4	2.8
	With electromagnetic brake	[kg]	0.54	0.74	1.3	1.8	3.8

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 7 of "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, it is recommended that the unbalanced torque of the machine be kept 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 if the effective torque is within the rated torque range. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the following requirements are met.
• HG-MR053(B): The load to motor inertia ratio is 24 times or less, and the effective torque is within the rated torque range.
• HG-MR13(B): The load to motor inertia ratio is 12 times or less, and the effective torque is within the rated torque range.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the asterisks 1 to 6.

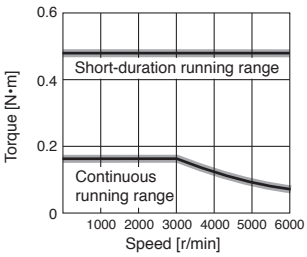
HG-MR Series Electromagnetic Brake Specifications (Note 1)

Model			HG-MR				
			053B	13B	23B	43B	73B
Type			Spring actuated type safety brake				
Rated voltage			24 V DC-$^{0}_{10}$%				
Power consumption		[W] at 20 °C	6.3	6.3	7.9	7.9	10
Electromagnetic brake static friction torque		[N•m]	0.32	0.32	1.3	1.3	2.4
Permissible braking work	Per braking	[J]	5.6	5.6	22	22	64
	Per hour	[J]	56	56	220	220	640
Electromagnetic brake life (Note 2)	Number of times	[Times]	20000	20000	20000	20000	20000
	Work per braking	[J]	5.6	5.6	22	22	64

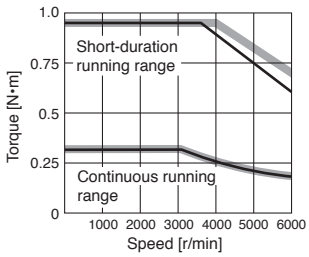
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-MR Series Torque Characteristics (Note 3)

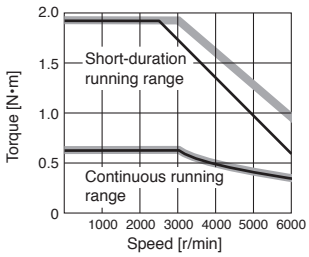
HG-MR053(B) (Note 1, 2)



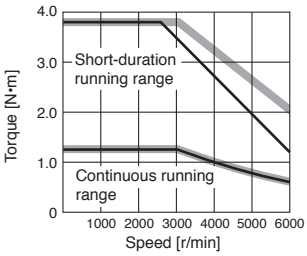
HG-MR13(B) (Note 1, 2)



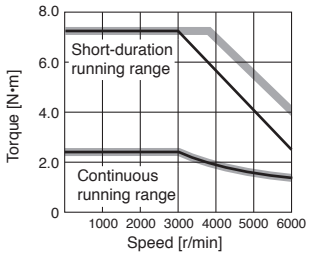
HG-MR23(B) (Note 1, 2)



HG-MR43(B) (Note 1, 2)



HG-MR73(B) (Note 1, 2)

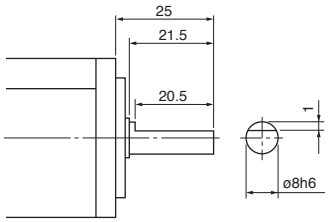


Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 230 V AC.
2. ——— : For 1-phase 200 V AC.
3. Torque drops when the power supply voltage is below the specified value.

HG-MR Series Special Shaft End Specifications

Motors with the following specifications are also available.

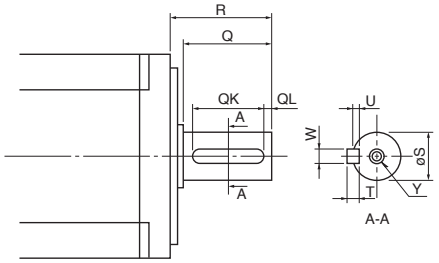
D-cut shaft (Note 1): 50 W and 100 W



[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-MR	23(B)K, 43(B)K	5	14h6	30	26	5	20	3	3	M4 screw Depth: 15
	73(B)K	6	19h6	40	36	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-SR 1000 r/min Series (Medium Inertia, Medium Capacity) Specifications

Rotary servo motor model		HG-SR	51(B)	81(B)	121(B)	201(B)	301(B)	421(B)
Compatible servo amplifier model		MR-J4- MR-J4W_-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on p. 2-4 in this catalog.					
Power supply capacity *1		[kVA]	1.0	1.5	2.1	3.5	4.8	6.3
Continuous running duty	Rated output	[kW]	0.5	0.85	1.2	2.0	3.0	4.2
	Rated torque (Note 3)	[N•m]	4.8	8.1	11.5	19.1	28.6	40.1
Maximum torque		[N•m]	14.3	24.4	34.4	57.3	85.9	120
Rated speed		[r/min]	1000					
Maximum speed		[r/min]	1500					
Permissible instantaneous speed		[r/min]	1725					
Power rate at continuous rated torque	Standard	[kW/s]	19.7	41.2	28.1	46.4	82.3	107
	With electromagnetic brake	[kW/s]	16.5	36.2	23.2	41.4	75.3	99.9
Rated current		[A]	2.8	5.2	7.1	9.4	13	19
Maximum current		[A]	9.0	16.6	22.7	30.1	41.6	60.8
Regenerative braking frequency *2	MR-J4-	[times/min]	77	114	191	113	89	76
	MR-J4W_-	[times/min]	392	286	-	-	-	-
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake	[× 10^{-4} kg•m^2]	13.8	18.2	56.5	88.2	109	161
Recommended load to motor inertia ratio (Note 1)			17 times or less		15 times or less			
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)					
Oil seal			None (Servo motors with oil seal are available. (HG-SR_J))					
Insulation class			155 (F)					
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)					
Environment *3	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		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 *4		X: 24.5 m/s² Y: 24.5 m/s²		X: 24.5 m/s² Y: 49 m/s²		X: 24.5 m/s² Y: 29.4 m/s²	
Vibration rank			V10 *6					
Permissible load for the shaft *5	L	[mm]	55	55	79	79	79	79
	Radial	[N]	980	980	2058	2058	2058	2058
	Thrust	[N]	490	490	980	980	980	980
Mass	Standard	[kg]	6.2	7.3	11	16	20	27
	With electromagnetic brake	[kg]	8.2	9.3	17	22	26	33

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. The servo motor with oil seal is rated IP67 as well (excluding the shaft-through portion). Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, it is recommended that the unbalanced torque of the machine be kept under 70% of the servo motor rated torque.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the asterisks 1 to 6.

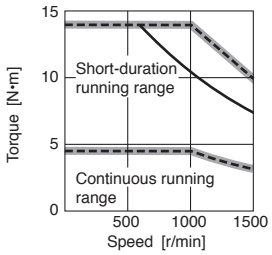
HG-SR 1000 r/min Series Electromagnetic Brake Specifications (Note 1)

Model			HG-SR					
			51B	81B	121B	201B	301B	421B
Type			Spring actuated type safety brake					
Rated voltage			24 V DC$^{0}_{-10}$%					
Power consumption		[W] at 20 °C	20	20	34	34	34	34
Electromagnetic brake static friction torque		[N•m]	8.5	8.5	44	44	44	44
Permissible braking work	Per braking	[J]	400	400	4500	4500	4500	4500
	Per hour	[J]	4000	4000	45000	45000	45000	45000
Electromagnetic brake life (Note 2)	Number of times	[Times]	20000	20000	20000	20000	20000	20000
	Work per braking	[J]	200	200	1000	1000	1000	1000

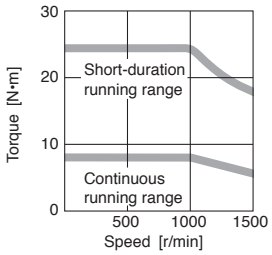
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-SR 1000 r/min Series Torque Characteristics (Note 4)

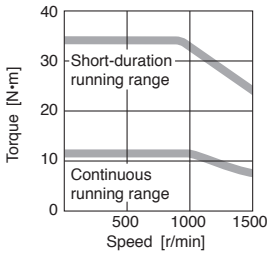
HG-SR51(B) (Note 1, 2, 3)



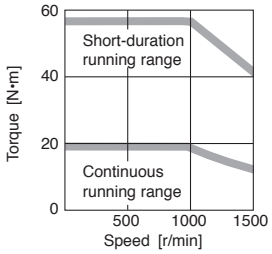
HG-SR81(B) (Note 1)



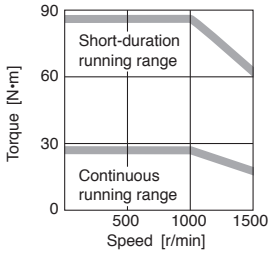
HG-SR121(B) (Note 1)



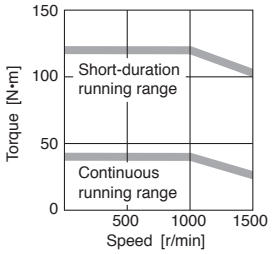
HG-SR201(B) (Note 1)



HG-SR301(B) (Note 1)



HG-SR421(B) (Note 1)



Notes: 1. ▬ : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

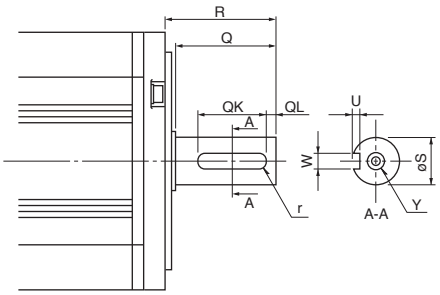
HG-SR 1000 r/min Series Special Shaft End Specifications

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-SR	51(B)K, 81(B)K	24h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
	121(B)K, 201(B)K, 301(B)K, 421(B)K	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]

HG-SR 2000 r/min Series (Medium Inertia, Medium Capacity) Specifications

Rotary servo motor model		HG-SR	52(B)	102(B)	152(B)	202(B)	352(B)	502(B)	702(B)
Compatible servo amplifier model		MR-J4- MR-J4W_-	Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on p. 2-4 in this catalog.						
Power supply capacity *1		[kVA]	1.0	1.7	2.5	3.5	5.5	7.5	10
Continuous running duty	Rated output	[kW]	0.5	1.0	1.5	2.0	3.5	5.0	7.0
	Rated torque (Note 3)	[N•m]	2.4	4.8	7.2	9.5	16.7	23.9	33.4
Maximum torque		[N•m]	7.2	14.3	21.5	28.6	50.1	71.6	100
Rated speed		[r/min]	2000						
Maximum speed		[r/min]	3000						
Permissible instantaneous speed		[r/min]	3450						
Power rate at continuous rated torque	Standard	[kW/s]	7.85	19.7	32.1	19.5	35.5	57.2	74.0
	With electromagnetic brake	[kW/s]	6.01	16.5	28.2	16.1	31.7	52.3	69.4
Rated current		[A]	2.9	5.6	9.4	9.6	14	22	26
Maximum current		[A]	9.0	17.4	29.1	30.7	44.8	70.4	83.2
Regenerative braking frequency *2	MR-J4-	[times/min]	31	38	139	47	28	29	25
	MR-J4W_-	[times/min]	154	96	-	-	-	-	-
Moment of inertia J	Standard	[× 10^{-4} kg•m^2]	7.26	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake	[× 10^{-4} kg•m^2]	9.48	13.8	18.2	56.5	88.2	109	161
Recommended load to motor inertia ratio (Note 1)			15 times or less	17 times or less		15 times or less			
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)						
Oil seal			None (Servo motors with oil seal are available. (HG-SR_J))						
Insulation class			155 (F)						
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)						
Environment *3	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity		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 *4		X: 24.5 m/s^2 Y: 24.5 m/s^2			X: 24.5 m/s^2 Y: 49 m/s^2		X: 24.5 m/s^2 Y: 29.4 m/s^2	
Vibration rank			V10 *6						
Permissible load for the shaft *5	L	[mm]	55	55	55	79	79	79	79
	Radial	[N]	980	980	980	2058	2058	2058	2058
	Thrust	[N]	490	490	490	980	980	980	980
Mass	Standard	[kg]	4.8	6.2	7.3	11	16	20	27
	With electromagnetic brake	[kg]	6.7	8.2	9.3	17	22	26	33

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. The servo motor with oil seal is rated IP67 as well (excluding the shaft-through portion), and for geared servo motor, IP rating of the reducer portion is equivalent to IP44. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, it is recommended that the unbalanced torque of the machine be kept under 70% of the servo motor rated torque.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 2-13 in this catalog for the asterisks 1 to 6.

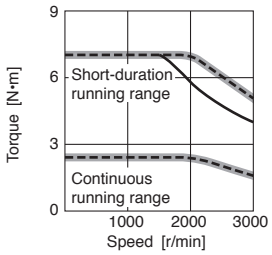
HG-SR 2000 r/min Series Electromagnetic Brake Specifications (Note 1)

Model			HG-SR						
			52B	102B	152B	202B	352B	502B	702B
Type			Spring actuated type safety brake						
Rated voltage			24 V DC$^{0}_{-10}$%						
Power consumption		[W] at 20 °C	20	20	20	34	34	34	34
Electromagnetic brake static friction torque		[N•m]	8.5	8.5	8.5	44	44	44	44
Permissible braking work	Per braking	[J]	400	400	400	4500	4500	4500	4500
	Per hour	[J]	4000	4000	4000	45000	45000	45000	45000
Electromagnetic brake life (Note 2)	Number of times	[Times]	20000	20000	20000	20000	20000	20000	20000
	Work per braking	[J]	200	200	200	1000	1000	1000	1000

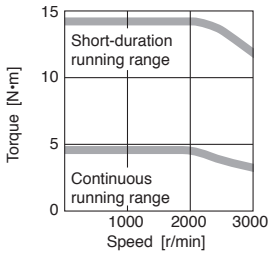
Notes: 1. The electromagnetic brake is for holding. It should not be used for deceleration applications.
2. Brake gap is not adjustable. Electromagnetic brake life is defined as the time period until the readjustment is needed.

HG-SR 2000 r/min Series Torque Characteristics (Note 4)

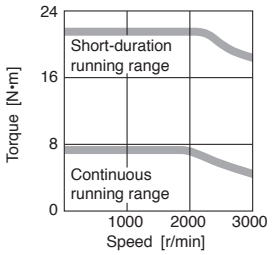
HG-SR52(B) (Note 1, 2, 3)



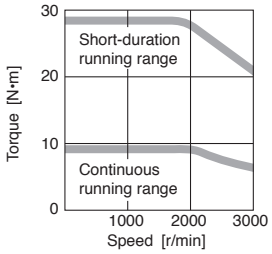
HG-SR102(B) (Note 1)



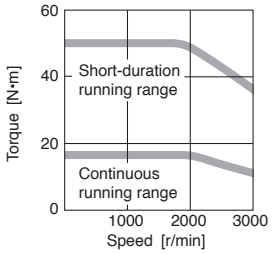
HG-SR152(B) (Note 1)



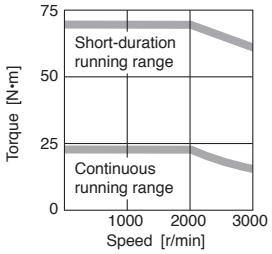
HG-SR202(B) (Note 1)



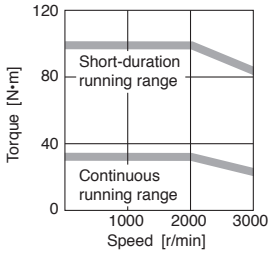
HG-SR352(B) (Note 1)



HG-SR502(B) (Note 1)



HG-SR702(B) (Note 1)



Notes: 1. ▬ : For 3-phase 200 V AC.
2. - - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

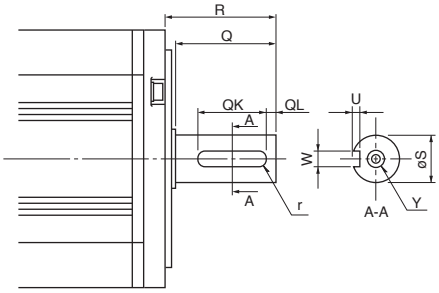
HG-SR 2000 r/min Series Special Shaft End Specifications

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-SR	52(B)K, 102(B)K, 152(B)K	24h6	55	50	8 $^{0}_{-0.036}$	36	5	4 $^{+0.2}_{0}$	4	M8 screw Depth: 20
	202(B)K, 352(B)K, 502(B)K, 702(B)K	35 $^{+0.010}_{0}$	79	75	10 $^{0}_{-0.036}$	55	5	5 $^{+0.2}_{0}$	5	

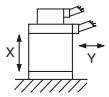
Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. A key is not supplied with the servo motor. The key shall be installed by the user.



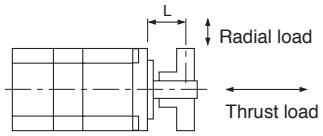
[Unit: mm]

Annotations for Rotary 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] of the regenerative options.
* 3. 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.
* 4. 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.

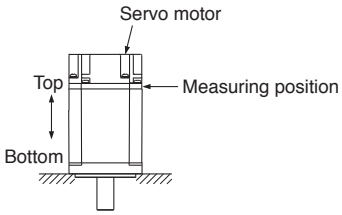


* 5. Refer to the diagram below for the permissible load for the shaft. Do not apply a load exceeding the value specified in the table on the shaft. The values in the table are applicable when each load is applied singly.

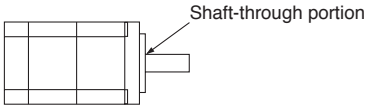


L: Distance between the flange mounting surface and the center of load

* 6. 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:



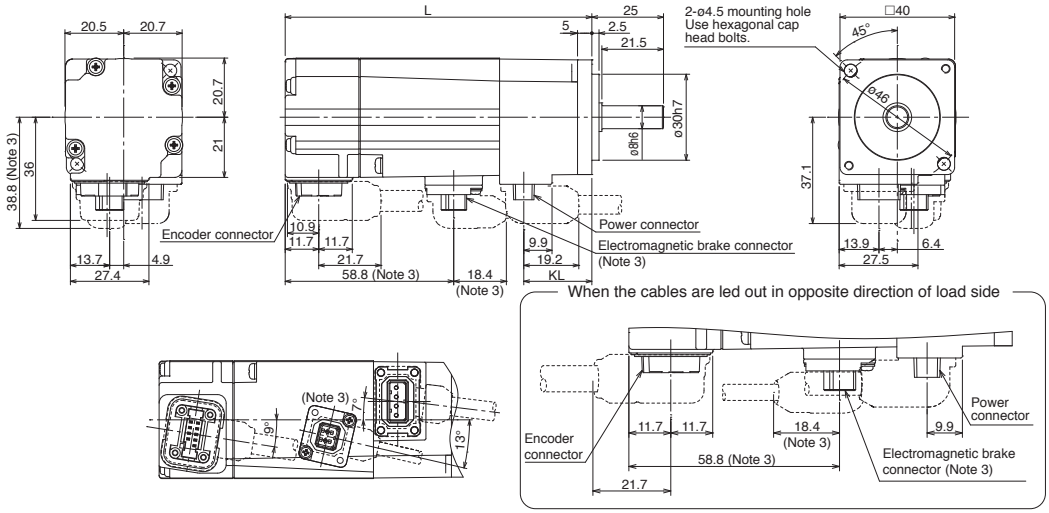
* 7. Refer to the diagram below for shaft-through portion.



HG-KR/HG-MR Series Dimensions (Note 1, 5, 6)

●HG-KR053(B), HG-KR13(B)

●HG-MR053(B), HG-MR13(B)



Power connector

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

Electromagnetic brake connector (Note 2)

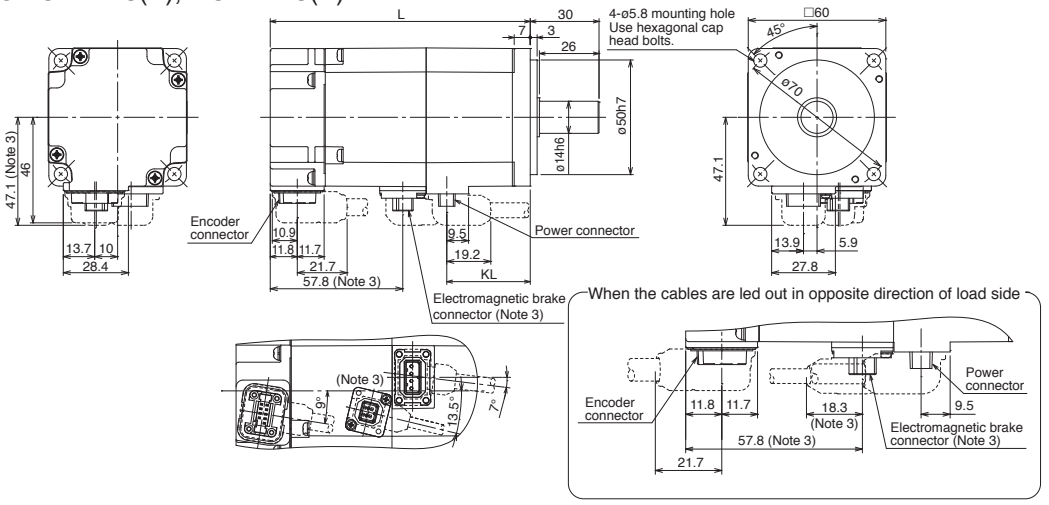
Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions (Note 4)	
	L	KL
HG-KR053(B) HG-MR053(B)	66.4 (107)	23.8
HG-KR13(B) HG-MR13(B)	82.4 (123)	39.8

[Unit: mm]

●HG-KR23(B), HG-KR43(B)

●HG-MR23(B), HG-MR43(B)



Power connector

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

Electromagnetic brake connector (Note 2)

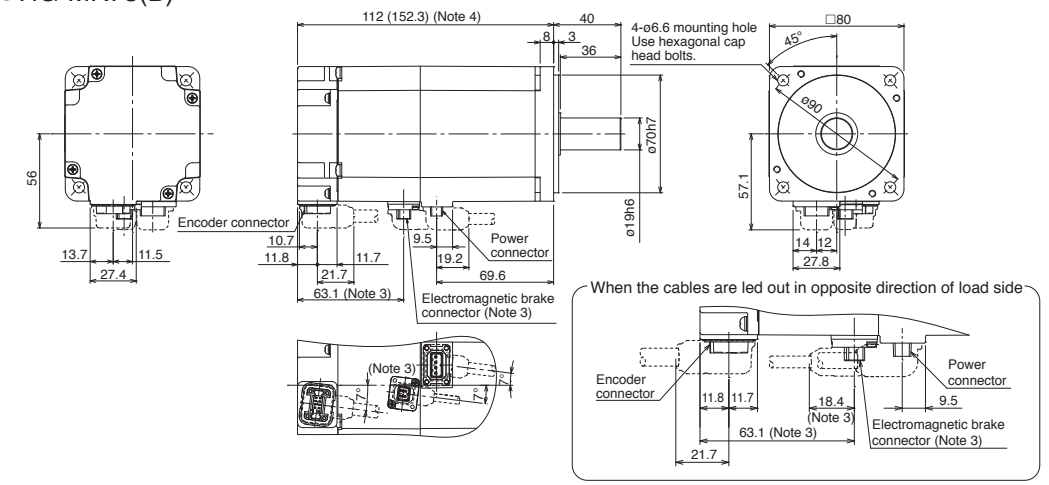
Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions (Note 4)	
	L	KL
HG-KR23(B) HG-MR23(B)	76.6 (113.4)	36.4
HG-KR43(B) HG-MR43(B)	98.3 (135.1)	58.1

[Unit: mm]

●HG-KR73(B)

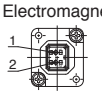
●HG-MR73(B)



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

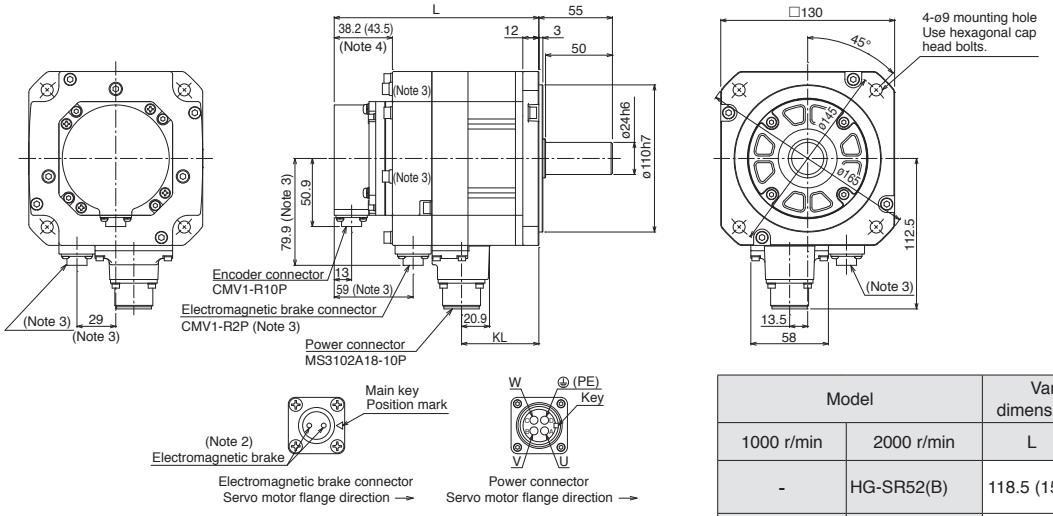
[Unit: mm]

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 inside ( ) are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.
6. Servo motors with oil seal (HG-KR_J and HG-MR_J) have different dimensions. Contact your local sales office for more details.

HG-SR Series Dimensions (Note 1, 5)

●HG-SR51(B), HG-SR81(B)

●HG-SR52(B), HG-SR102(B), HG-SR152(B)

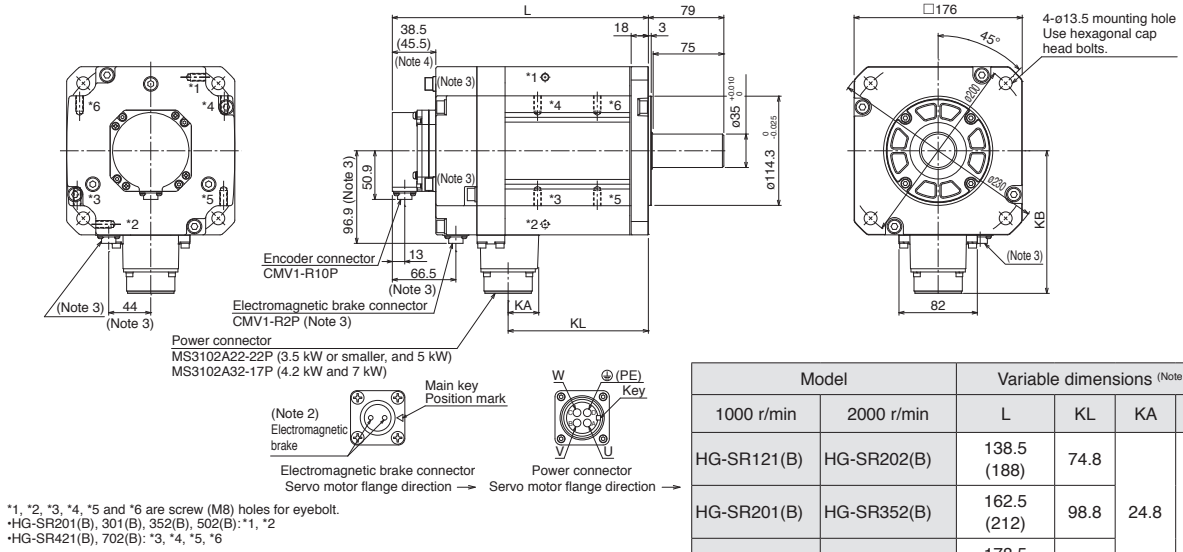


Model		Variable dimensions (Note 4)	
1000 r/min	2000 r/min	L	KL
-	HG-SR52(B)	118.5 (153)	57.8
HG-SR51(B)	HG-SR102(B)	132.5 (167)	71.8
HG-SR81(B)	HG-SR152(B)	146.5 (181)	85.8

[Unit: mm]

●HG-SR121(B), HG-SR201(B), HG-SR301(B), HG-SR421(B)

●HG-SR202(B), HG-SR352(B), HG-SR502(B), HG-SR702(B)



*1, *2, *3, *4, *5 and *6 are screw (M8) holes for eyebolt.
•HG-SR201(B), 301(B), 352(B), 502(B):*1, *2
•HG-SR421(B), 702(B): *3, *4, *5, *6

Model		Variable dimensions (Note 4)			
1000 r/min	2000 r/min	L	KL	KA	KB
HG-SR121(B)	HG-SR202(B)	138.5 (188)	74.8	24.8	140.9
HG-SR201(B)	HG-SR352(B)	162.5 (212)	98.8		
HG-SR301(B)	HG-SR502(B)	178.5 (228)	114.8		
HG-SR421(B)	HG-SR702(B)	218.5 (268)	146.8	32	149.1

[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 inside ( ) are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-KR Series Geared Servo Motor Specifications

With reducer for general industrial machines: G1

Model	Output [W]	Reduction ratio	Actual reduction ratio	Moment of inertia J [× 10^{-4} kg•m^2] (Note 1)		Permissible load to motor inertia ratio (Note 2) (when converted into the servo motor shaft)	Mass [kg]		Lubrication method	Mounting direction
				Standard	With electromagnetic brake		Standard	With electromagnetic brake		
HG-KR053(B)G1	50	1/5	9/44	0.0820	0.0840	5 times or less	1.4	1.6	Grease (filled)	Any direction
		1/12	49/576	0.104	0.106		1.8	2.0		
		1/20	25/484	0.0860	0.0880					
HG-KR13(B)G1	100	1/5	9/44	0.115	0.121	5 times or less	1.6	1.8		
		1/12	49/576	0.137	0.143		2.0	2.2		
		1/20	25/484	0.119	0.125					
HG-KR23(B)G1	200	1/5	19/96	0.375	0.397	7 times or less	3.3	3.7		
		1/12	961/11664	0.418	0.440		3.9	4.3		
		1/20	513/9984	0.391	0.413					
HG-KR43(B)G1	400	1/5	19/96	0.525	0.547	7 times or less	3.7	4.1		
		1/12	961/11664	0.568	0.590		4.3	4.7		
		1/20	7/135	0.881	0.903		5.4	5.8		
HG-KR73(B)G1	750	1/5	1/5	1.68	1.79	5 times or less	6.0	7.0		
		1/12	7/87	2.35	2.46		7.1	8.1		
		1/20	625/12544	2.41	2.52		10	11		

Item	Specifications
Mounting method	Flange mounting
Output shaft rotating direction	Same as the servo motor output shaft direction
Backlash (Note 4)	60 minutes or less at reducer output shaft
Maximum torque	Three times of the rated torque (Refer to HG-KR series specifications in this catalog for the rated torque.)
Permissible speed (at servo motor shaft)	4500 r/min (permissible instantaneous speed: 5175 r/min)
IP rating (reducer part)	Equivalent to IP44
Reducer efficiency (Note 3)	45% to 75%

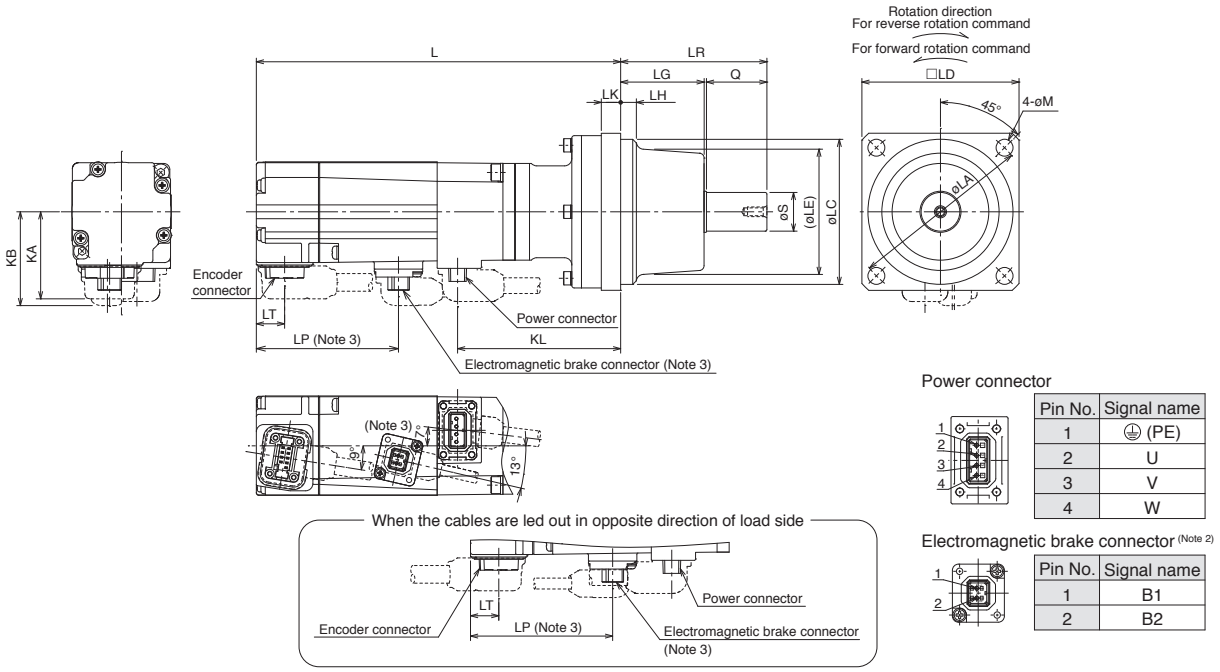
Notes: 1. The moments of inertia in the table are the values that are converted into motor shaft for the servo motor with reducer (and with electromagnetic brake).
2. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
3. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, and temperature. The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
4. The backlash can be converted: 1 minute = 0.0167°

HG-KR Series Geared Servo Motor Dimensions (Note 1, 5)

With reducer for general industrial machines

●HG-KR_(B)G1

Drawing is schematic only, and the shapes or the mounting screws may differ from those of the actual servo motor. Refer to "Servo Motor Instruction Manual (Vol. 3)" for details.



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]

Model	Reduction ratio (Actual reduction ratio)	Variable dimensions (Note 4)																
		L	LA	LC	LD	LE	S	LH	LK	KL	LG	Q	LR	M	KA	KB	LT	LP
HG-KR053(B)G1	1/5 (9/44)	110.1 (150.7)	75	60h7	65	52	16h6	6.5	8	67.5	34.5	25	60.5	7	36	37.1 (38.8)	11.7	– (58.8)
	1/12 (49/576)	128.9 (169.5)								86.3								
	1/20 (25/484)																	
HG-KR13(B)G1	1/5 (9/44)	126.1 (166.7)								83.5								
	1/12 (49/576)	144.9 (185.5)								102.3								
	1/20 (25/484)																	
HG-KR23(B)G1	1/5 (19/96)	129.8 (166.6)	100	82h7	90	76	25h6	8	10	89.6	38	35	74	9	46	47.1 (47.1)	11.8	– (57.8)
	1/12 (961/11664)	149.6 (186.4)								109.4								
	1/20 (513/9984)																	
HG-KR43(B)G1	1/5 (19/96)	151.5 (188.3)								111.3								
	1/12 (961/11664)	171.3 (208.1)								131.1								
	1/20 (7/135)	175.3 (212.1)				85		9.5		135.1								
HG-KR73(B)G1	1/5 (1/5)	177 (217.3)	115	95h7	100	87	32h6	10		134.6	39	50	90		56	57.1 (57.1)		– (63.1)
	1/12 (7/87)	199 (239.3)								156.6								
	1/20 (625/12544)	212 (252.3)	140	115h7	120	104	40h6	11.5	15	169.6	45	60	106	14				

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated since the outer frame of the reducer is made by casting. Make allowance for the actual dimensions in the design of a machine.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions inside ( ) are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

HG-KR Series Geared Servo Motor Specifications

With flange-output type reducer for high precision applications, flange mounting: G5

Model	Output [W]	Reduction ratio	Moment of inertia J [× 10^{-4} kg•m^2] (Note 1)		Permissible load to motor inertia ratio (Note 2) (when converted into the servo motor shaft)	Mass [kg]		Lubrication method	Mounting direction
			Standard	With electromagnetic brake		Standard	With electromagnetic brake		
HG-KR053(B)G5	50	1/5 (40 × 40)	0.0485	0.0507	10 times or less	0.55	0.75	Grease (filled)	Any direction
		1/5 (60 × 60)	0.113	0.115		1.1	1.3		
		1/9	0.0475	0.0497		0.56	0.76		
		1/11	0.105	0.107		1.2	1.4		
		1/21	0.0960	0.0980					
		1/33	0.0900	0.0920					
		1/45	0.0900	0.0920					
HG-KR13(B)G5	100	1/5 (40 × 40)	0.0812	0.0872	10 times or less	0.75	0.95		
		1/5 (60 × 60)	0.146	0.152		1.3	1.5		
		1/11	0.138	0.144		1.4	1.6		
		1/21	0.129	0.135					
		1/33	0.140	0.146		2.6	2.8		
		1/45	0.139	0.145					
HG-KR23(B)G5	200	1/5	0.422	0.444	14 times or less	1.8	2.2		
		1/11	0.424	0.446		1.9	2.3		
		1/21	0.719	0.741		3.4	3.8		
		1/33	0.673	0.695					
		1/45	0.672	0.694					
HG-KR43(B)G5	400	1/5	0.572	0.594	14 times or less	2.3	2.7		
		1/11	0.947	0.969		3.9	4.3		
		1/21	0.869	0.891					
		1/33	0.921	0.943		6.0	6.4		
		1/45	0.915	0.937					
HG-KR73(B)G5	750	1/5	1.91	2.02	10 times or less	4.8	5.8		
		1/11	1.82	1.93		5.1	6.1		
		1/21	2.01	2.12		7.2	8.2		
		1/33	1.79	1.90					
		1/45	1.79	1.90					

Item	Specifications
Mounting method	Flange mounting
Output shaft rotating direction	Same as the servo motor output shaft direction
Backlash (Note 4)	3 minutes or less at reducer output shaft
Maximum torque	Three times of the rated torque (Refer to HG-KR series specifications in this catalog for the rated torque.)
Permissible speed (at servo motor shaft)	6000 r/min (permissible instantaneous speed: 6900 r/min)
IP rating (reducer part)	Equivalent to IP44
Reducer efficiency (Note 3)	1/5 (60 × 60), 1/11, 1/21, 1/33 and 1/45 of HG-KR053(B)G5: 22% to 41% 1/5 (40 × 40) and 1/9 of HG-KR053(B)G5, and HG-KR13(B)G5 to HG-KR73(B)G5: 58% to 87%

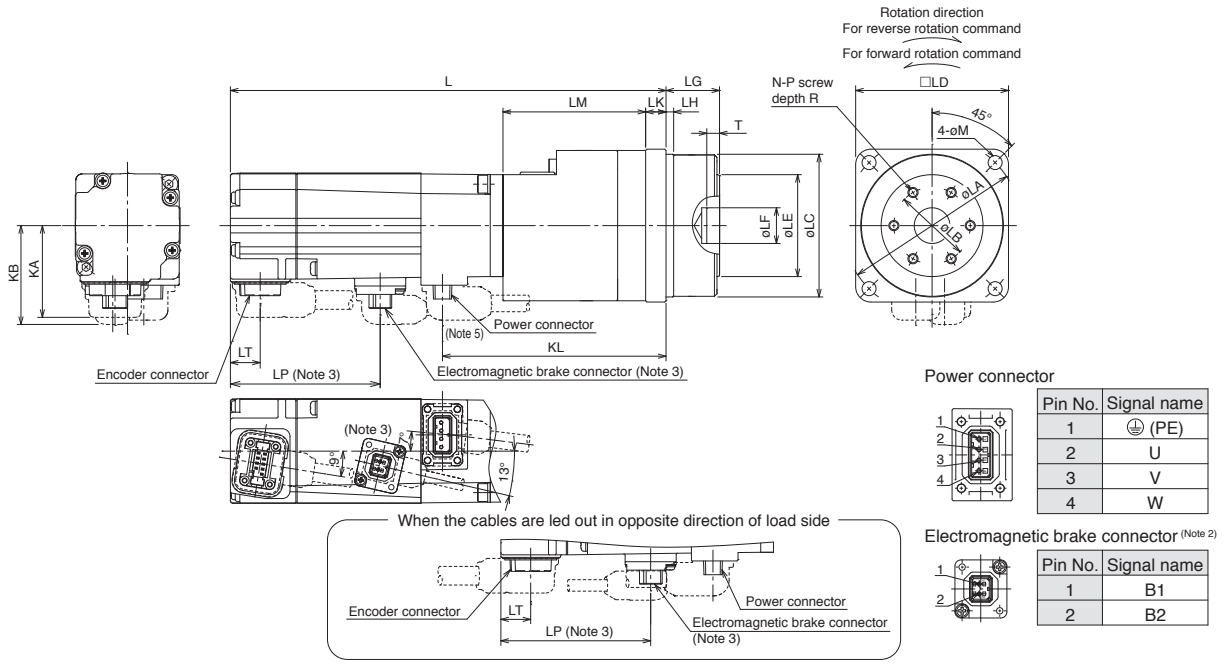
Notes: 1. The moments of inertia in the table are the values that are converted into motor shaft for the servo motor with reducer (and with electromagnetic brake).
2. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
3. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, and temperature. The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
4. The backlash can be converted: 1 minute = 0.0167°

HG-KR Series Geared Servo Motor Dimensions (Note 1)

With flange-output type reducer for high precision applications, flange mounting

●HG-KR_(B)G5

Drawing is schematic only, and the shapes or the mounting screws may differ from those of the actual servo motor. Refer to "Servo Motor Instruction Manual (Vol. 3)" for details.



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]

Model	Reduction ratio	Variable dimensions (Note 4)																				
		L	LA	LB	LC	LD	LE	LF	LG	LH	LK	LM	KL	T	N	P	R	M	KA	KB	LT	LP
HG-KR053(B)G5	1/5 (40 × 40)	105.9 (146.5)	46	18	40h7	40	24	5H7	15 +0.25 -0.20	2.5	5	34.5	63.3	3	3	M4	6	3.4	36	37.1 (38.8)	11.7	– (58.8)
	1/5 (60 × 60) (Note 5)	130.4 (171)	70	30	56h7	60	40	14H7	21 +0.4 -0.5	3	8	56	87.8	5	6		7	5.5				
	1/9	105.9 (146.5)	46	18	40h7	40	24	5H7	15 +0.25 -0.20	2.5	5	34.5	63.3	3	3		6	3.4				
	1/11 (Note 5)	130.4 (171)	70	30	56h7	60	40	14H7	21 +0.4 -0.5	3	8	56	87.8	5	6		7	5.5				
	1/21 (Note 5)																					
	1/33 (Note 5)																					
	1/45 (Note 5)																					
HG-KR13(B)G5	1/5 (40 × 40)	121.9 (162.5)	46	18	40h7	40	24	5H7	15 +0.25 -0.20	2.5	5	34.5	79.3	3	3		6	3.4				
	1/5 (60 × 60) (Note 5)	146.4 (187)	70	30	56h7	60	40	14H7	21 +0.4 -0.5	3	8	56	103.8	5	6		7	5.5				
	1/11 (Note 5)																					
	1/21 (Note 5)																					
	1/33 (Note 5)	148.9 (189.5)	105	45	85h7	90	59	24H7	27 +0.4 -0.5	8	10	56.5	106.3			M6	10	9				
	1/45 (Note 5)																					
HG-KR23(B)G5	1/5	140.6 (177.4)	70	30	56h7	60	40	14H7	21 +0.4 -0.5	3	8	56	100.4			M4	7	5.5	46	47.1 (47.1)	11.8	– (57.8)
	1/11																					
	1/21 (Note 5)	147.6 (184.4)	105	45	85h7	90	59	24H7	27 +0.4 -0.5	8	10	61	107.4			M6	10	9				
	1/33 (Note 5)																					
	1/45 (Note 5)																					
HG-KR43(B)G5	1/5	162.3 (199.1)	70	30	56h7	60	40	14H7	21 +0.4 -0.5	3	8	56	122.1	5	6	M4	7	5.5				
	1/11	169.3 (206.1)	105	45	85h7	90	59	24H7	27 +0.4 -0.5	8	10	61	129.1			M6	10	9				
	1/21																					
	1/33	181.3 (218.1)	135	60	115h7	120	84	32H7	35 +0.4 -0.5	13	13	70	141.1			M8	12	11				
	1/45																					
HG-KR73(B)G5	1/5	190 (230.3)	105	45	85h7	90	59	24H7	27 +0.4 -0.5	8	10	68	147.6			M6	10	9	56	57.1 (57.1)		– (63.1)
	1/11																					
	1/21	200 (240.3)	135	60	115h7	120	84	32H7	35 +0.4 -0.5	13	13	75	157.6			M8	12	11				
	1/33																					
	1/45																					

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated since the outer frame of the reducer is made by casting. Make allowance for the actual dimensions in the design of a machine.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions inside ( ) are for the models with electromagnetic brake.
5. Lead out the power cable in opposite direction of the motor shaft.

HG-KR Series Geared Servo Motor Specifications

With shaft-output type reducer for high precision applications, flange mounting: G7

Model	Output [W]	Reduction ratio	Moment of inertia J [× 10^{-4} kg•m^2] (Note 1)		Permissible load to motor inertia ratio (Note 2) (when converted into the servo motor shaft)	Mass [kg]		Lubrication method	Mounting direction
			Standard	With electromagnetic brake		Standard	With electromagnetic brake		
HG-KR053(B)G7	50	1/5 (40 × 40)	0.0512	0.0534	10 times or less	0.58	0.78	Grease (filled)	Any direction
		1/5 (60 × 60)	0.119	0.121		1.2	1.4		
		1/9	0.0492	0.0514		0.58	0.78		
		1/11	0.106	0.108		1.3	1.5		
		1/21	0.0960	0.0980					
		1/33	0.0900	0.0920					
		1/45	0.0900	0.0920					
HG-KR13(B)G7	100	1/5 (40 × 40)	0.0839	0.0899	10 times or less	0.78	0.98		
		1/5 (60 × 60)	0.152	0.158		1.4	1.6		
		1/11	0.139	0.145		1.5	1.7		
		1/21	0.129	0.135					
		1/33	0.141	0.147		3.0	3.2		
		1/45	0.139	0.145					
HG-KR23(B)G7	200	1/5	0.428	0.450	14 times or less	1.9	2.3		
		1/11	0.424	0.446		2.0	2.4		
		1/21	0.721	0.743		3.8	4.2		
		1/33	0.674	0.696					
		1/45	0.672	0.694					
HG-KR43(B)G7	400	1/5	0.578	0.600	14 times or less	2.4	2.8		
		1/11	0.955	0.977		4.3	4.7		
		1/21	0.871	0.893					
		1/33	0.927	0.949		7.4	7.8		
		1/45	0.918	0.940					
HG-KR73(B)G7	750	1/5	1.95	2.06	10 times or less	5.2	6.2		
		1/11	1.83	1.94		5.5	6.5		
		1/21	2.03	2.14		8.6	9.6		
		1/33	1.80	1.91					
		1/45	1.79	1.90					

Item	Specifications
Mounting method	Flange mounting
Output shaft rotating direction	Same as the servo motor output shaft direction
Backlash (Note 4)	3 minutes or less at reducer output shaft
Maximum torque	Three times of the rated torque (Refer to HG-KR series specifications in this catalog for the rated torque.)
Permissible speed (at servo motor shaft)	6000 r/min (permissible instantaneous speed: 6900 r/min)
IP rating (reducer part)	Equivalent to IP44
Reducer efficiency (Note 3)	1/5 (60 × 60), 1/11, 1/21, 1/33 and 1/45 of HG-KR053(B)G7: 22% to 41% 1/5 (40 × 40) and 1/9 of HG-KR053(B)G7, and HG-KR13(B)G7 to HG-KR73(B)G7: 58% to 87%

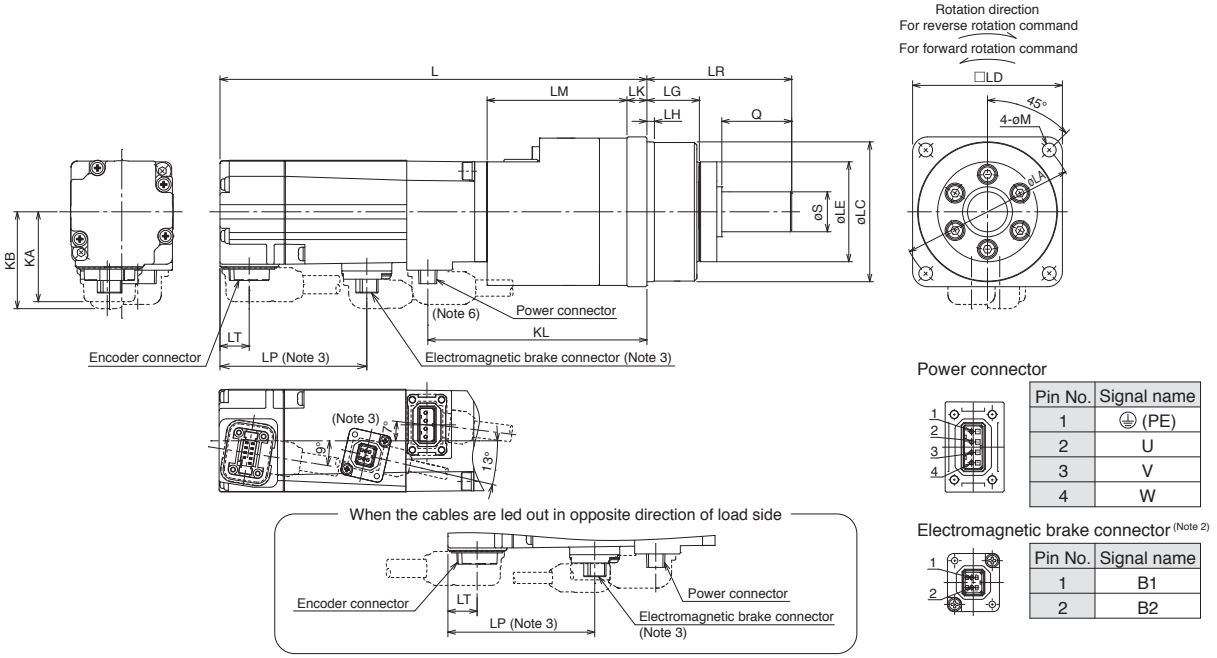
Notes: 1. The moments of inertia in the table are the values that are converted into motor shaft for the servo motor with reducer (and with electromagnetic brake).
2. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
3. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, and temperature. The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
4. The backlash can be converted: 1 minute = 0.0167°

HG-KR Series Geared Servo Motor Dimensions (Note 1, 5, 7)

With shaft-output type reducer for high precision applications, flange mounting

●HG-KR_(B)G7

Drawing is schematic only, and the shapes or the mounting screws may differ from those of the actual servo motor. Refer to "Servo Motor Instruction Manual (Vol. 3)" for details.



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]

Model	Reduction ratio	Variable dimensions (Note 4)																	
		L	LA	LC	LD	LE	S	LG	LH	Q	LR	LK	LM	KL	M	KA	KB	LT	LP
HG-KR053(B)G7	1/5 (40 × 40)	105.9 (146.5)	46	40h7	40	29	10h7	15	2.5	20	42	5	34.5	63.3	3.4	36	37.1 (38.8)	11.7	– (58.8)
	1/5 (60 × 60) (Note 6)	130.4 (171)	70	56h7	60	40	16h7	21	3	28	58	8	56	87.8	5.5				
	1/9	105.9 (146.5)	46	40h7	40	29	10h7	15	2.5	20	42	5	34.5	63.3	3.4				
	1/11 (Note 6)	130.4 (171)	70	56h7	60	40	16h7	21	3	28	58	8	56	87.8	5.5				
	1/21 (Note 6)																		
	1/33 (Note 6)																		
	1/45 (Note 6)																		
HG-KR13(B)G7	1/5 (40 × 40)	121.9 (162.5)	46	40h7	40	29	10h7	15	2.5	20	42	5	34.5	79.3	3.4				
	1/5 (60 × 60) (Note 6)	146.4 (187)	70	56h7	60	40	16h7	21	3	28	58	8	56	103.8	5.5				
	1/11 (Note 6)																		
	1/21 (Note 6)																		
	1/33 (Note 6)	148.9 (189.5)	105	85h7	90	59	25h7	27	8	42	80	10	56.5	106.3	9				
	1/45 (Note 6)																		
HG-KR23(B)G7	1/5	140.6 (177.4)	70	56h7	60	40	16h7	21	3	28	58	8	56	100.4	5.5	46	47.1 (47.1)	11.8	– (57.8)
	1/11																		
	1/21 (Note 6)	147.6 (184.4)	105	85h7	90	59	25h7	27	8	42	80	10	61	107.4	9				
	1/33 (Note 6)																		
	1/45 (Note 6)																		
HG-KR43(B)G7	1/5	162.3 (199.1)	70	56h7	60	40	16h7	21	3	28	58	8	56	122.1	5.5				
	1/11	169.3 (206.1)	105	85h7	90	59	25h7	27	8	42	80	10	61	129.1	9				
	1/21																		
	1/33	181.3 (218.1)	135	115h7	120	84	40h7	35	13	82	133	13	70	141.1	11				
	1/45																		
HG-KR73(B)G7	1/5	190 (230.3)	105	85h7	90	59	25h7	27	8	42	80	10	68	147.6	9	56	57.1 (57.1)		– (63.1)
	1/11																		
	1/21	200 (240.3)	135	115h7	120	84	40h7	35	13	82	133	13	75	157.6	11				
	1/33																		
	1/45																		

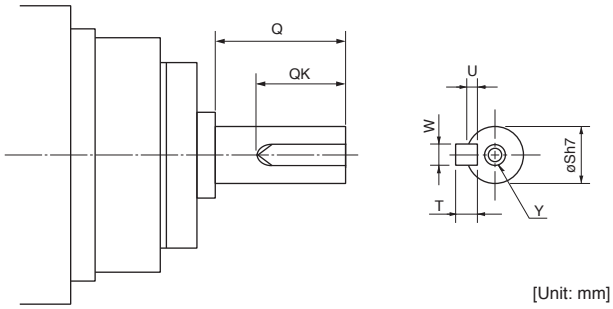
Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated since the outer frame of the reducer is made by casting. Make allowance for the actual dimensions in the design of a machine.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions inside ( ) are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.
6. Lead out the power cable in opposite direction of the motor shaft.
7. HG-KR_(B)G7K is also available for key shaft motor (with key). Refer to the following page for the shaft-end shape.

HG-KR Series Geared Servo Motor Special Shaft End Specifications

Standard HG-KR_(B)G1 (with reducer for general industrial machines) has a straight shaft. Key shaft (with key) is also available as a special specification. Contact your local sales office for more details.
Standard HG-KR_(B)G7 (with shaft-output type reducer for high precision applications, flange mounting) has a straight shaft. HG-KR_(B)G7K is also available for key shaft motor (with key). Refer to the following for the shaft-end shape.

Key shaft (with key) (Note 1, 2, 3)

Model	Reduction ratio	Variable dimensions						
		S	Q	W	QK	U	T	Y
HG-KR053(B)G7K	1/5 (40 × 40)	10	20	4	15	2.5	4	M3 screw Depth: 6
	1/5 (60 × 60)	16	28	5	25	3	5	M4 screw Depth: 8
	1/9	10	20	4	15	2.5	4	M3 screw Depth: 6
	1/11	16	28	5	25	3	5	M4 screw Depth: 8
	1/21							
	1/33							
	1/45							
HG-KR13(B)G7K	1/5 (40 × 40)	10	20	4	15	2.5	4	M3 screw Depth: 6
	1/5 (60 × 60)	16	28	5	25	3	5	M4 screw Depth: 8
	1/11							
	1/21							
	1/33	25	42	8	36	4	7	M6 screw Depth: 12
	1/45							
HG-KR23(B)G7K	1/5	16	28	5	25	3	5	M4 screw Depth: 8
	1/11							
	1/21	25	42	8	36	4	7	M6 screw Depth: 12
	1/33							
	1/45							
HG-KR43(B)G7K	1/5	16	28	5	25	3	5	M4 screw Depth: 8
	1/11	25	42	8	36	4	7	M6 screw Depth: 12
	1/21							
	1/33	40	82	12	70	5	8	M10 screw Depth: 20
	1/45							
HG-KR73(B)G7K	1/5	25	42	8	36	4	7	M6 screw Depth: 12
	1/11							
	1/21	40	82	12	70	5	8	M10 screw Depth: 20
	1/33							
	1/45							



[Unit: mm]

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. Single pointed key is attached.
3. The dimensions not mentioned in the drawings are the same as those of the straight shaft. Refer to HG-KR_(B)G7 dimensions in this catalog.

HG-SR Series Geared Servo Motor Specifications

With reducer for general industrial machines, flange mounting: G1

Model	Output [kW]	Reduction ratio	Moment of inertia J [× 10^{-4} kg•m^2] (Note 1)		Permissible load to motor inertia ratio (Note 2) (when converted into the servo motor shaft)	Mass [kg]		Lubrication method (Note 5)	Mounting direction
			Standard	With electromagnetic brake		Standard	With electromagnetic brake		
HG-SR52(B)G1	0.5	1/6	8.08	10.3	4 times or less	18	20	Grease (filled)	Any direction
		1/11	7.65	9.85					
		1/17	7.53	9.73					
		1/29	7.47	9.67					
		1/35	8.26	10.5		27	29		
		1/43	8.22	10.4					
		1/59	8.18	10.4					
HG-SR102(B)G1	1.0	1/6	14.8	17.0	4 times or less	30	32	Grease (filled)	Any direction
		1/11	13.3	15.5					
		1/17	12.9	15.1					
		1/29	12.6	14.8					
		1/35	12.6	14.8					
		1/43	13.8	16.0		49	51	Oil (Note 3)	Shaft horizontal (Note 4)
		1/59	19.1	21.3		81	83		
HG-SR152(B)G1	1.5	1/6	19.2	21.4	4 times or less	31	33	Grease (filled)	Any direction
		1/11	17.7	19.9					
		1/17	17.3	19.5					
		1/29	18.4	20.6		50	52	Oil (Note 3)	Shaft horizontal (Note 4)
		1/35	18.3	20.5					
		1/43	23.6	25.8		82	84		
		1/59	23.5	25.7					
HG-SR202(B)G1	2.0	1/6	50.0	59.4	4 times or less	36	42	Grease (filled)	Any direction
		1/11	48.4	57.8					
		1/17	48.1	57.5					
		1/29	54.8	64.2		87	93	Oil (Note 3)	Shaft horizontal (Note 4)
		1/35	54.5	63.9					
		1/43	54.3	63.7					
		1/59	54.2	63.6					
HG-SR352(B)G1	3.5	1/6	87.1	96.5	4 times or less	60	66	Oil (Note 3)	Shaft horizontal (Note 4)
		1/11	82.8	92.2					
		1/17	81.5	90.9					
		1/29	86.6	96.0		92	98		
		1/35	86.3	95.7					
		1/43	105	114		134	140	Oil	
		1/59	104	113					
HG-SR502(B)G1	5.0	1/6	126	135	4 times or less	96	102	Oil (Note 3)	Shaft horizontal (Note 4)
		1/11	114	123					
		1/17	110	119					
		1/29	141	150		165	171	Oil	
		1/35	140	150					
		1/43	139	149					
		1/59	138	147					
HG-SR702(B)G1	7.0	1/6	177	187	4 times or less	103	109	Oil (Note 3)	Shaft horizontal (Note 4)
		1/11	190	199		145	151	Oil	
		1/17	182	192					
		1/29	192	202		172	178		
		1/35	192	201					
		1/43	267	277		240	246		
		1/59	266	275					

Notes: 1. The moments of inertia in the table are the values that are converted into motor shaft for the servo motor with reducer (and with electromagnetic brake).
2. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
3. Use the grease lubricated servo motor (special specification) instead of the oil lubricated for applications where the servo motor moves.
4. Do not mount the servo motor in a way tilted to the shaft direction or to the shaft rotation direction. Refer to the asterisk 1 of "Annotations for Geared Servo Motor Specifications" on p. 2-33 in this catalog. Refer to "Servo Motor Instruction Manual (Vol. 3)" when mounting the servo motor other than the shaft horizontal.
5. Be sure to fill the reducer with lubricant oil since the oil is removed before the shipment.

HG-SR Series Geared Servo Motor Specifications

With reducer for general industrial machines, flange mounting: G1

Item	Specifications
Mounting method	Flange mounting
Output shaft rotating direction	Opposite from the servo motor output shaft direction
Backlash (Note 3)	40 minutes to 2° at reducer output shaft (Note 2)
Maximum torque	Three times of the rated torque (Refer to HG-SR 2000 r/min series specifications in this catalog for the rated torque.)
Permissible speed (at servo motor shaft)	For grease lubrication: 3000 r/min (permissible instantaneous speed: 3450 r/min) For oil lubrication: 2000 r/min (permissible instantaneous speed: 2300 r/min)
IP rating (reducer part)	Equivalent to IP44
Reducer efficiency (Note 1)	85% to 94%

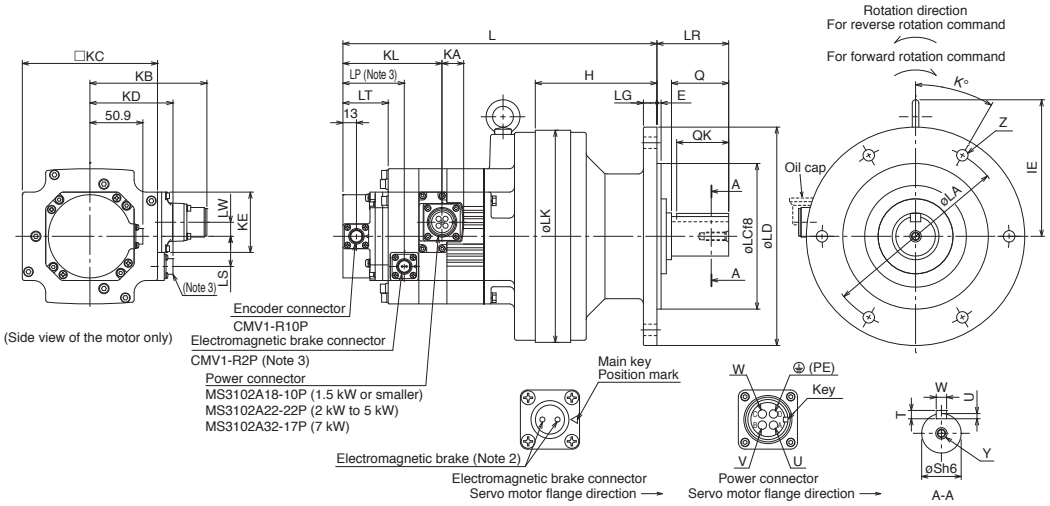
Notes: 1. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, and temperature.
The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
2. This is a designed value, not guaranteed value.
3. The backlash can be converted: 1 minute = 0.0167°

HG-SR Series Geared Servo Motor Dimensions (Note 1, 5)

With reducer for general industrial machines, flange mounting

●HG-SR_(B)G1

Drawing is schematic only, and the oil cap, the shapes, or the mounting screws may differ from those of the actual servo motor. Refer to "Servo Motor Instruction Manual (Vol. 3)" for details.



[Unit: mm]

Model	Reduction ratio	Variable dimensions (Note 4)																											
		L	LA	LC	LD	LG	LK	LR	IE	KL	KA	LP	LT	LW	LS	KE	Z	K	E	H	KB	KD	KC	Q	QK	S	T	U	W	Y
HG-SR52(B)G1	1/6	275 (309.5)	134	110	160	9	150	48	119	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	4-φ11	45	3	108	112.5	(79.9)	130	35	32	28	7	4	8	M8 screw Depth: 20
	1/11																												
	1/17																												
	1/29																												
	1/35	267.5 (302)	180	140	210	13	204	69	132	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	6-φ11	30	4	117	112.5	(79.9)	130	55	50	38	8	5	10	
	1/43																												
	1/59																												
HG-SR102(B)G1	1/6	281.5 (316)	180	140	210	13	204	69	132	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	6-φ11	30	4	117	112.5	(79.9)	130	55	50	38	8	5	10	M8 screw Depth: 20
	1/11																												
	1/17																												
	1/29																												
	1/35																												
	1/43 (Note 6)	327 (361.5)	230	200	260	15	230	76	145	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	6-φ11	60	4	164	112.5	(79.9)	130	70	56	50	9	5.5	14	M10 screw Depth: 18
	1/59 (Note 6)	384.5 (419)	310	270	340	20	300	89	192	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	6-φ11	60	4	219	112.5	(79.9)	130	90	80	60	11	7	18	
HG-SR152(B)G1	1/6	295.5 (330)	180	140	210	13	204	69	132	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	6-φ11	30	4	117	112.5	(79.9)	130	55	50	38	8	5	10	M8 screw Depth: 20
	1/11																												
	1/17																												
	1/29 (Note 6)	341 (375.5)	230	200	260	15	230	76	145	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	6-φ11	60	4	164	112.5	(79.9)	130	70	56	50	9	5.5	14	M10 screw Depth: 18
	1/35 (Note 6)																												
	1/43 (Note 6)	398.5 (433)	310	270	340	20	300	89	192	60.7 (95.2)	20.9	(59)	38.2 (43.5)	13.5	(29)	58	6-φ11	60	4	219	112.5	(79.9)	130	90	80	60	11	7	18	
	1/59 (Note 6)																												
HG-SR202(B)G1	1/6	305.5 (355)	180	140	210	13	204	69	142	63.7 (113.2)	24.8	(66.5)	38.5 (45.5)	0	(44)	82	6-φ11	30	4	117	140.9	(96.9)	176	55	50	38	8	5	10	M8 screw Depth: 20
	1/11																												
	1/17																												
	1/29 (Note 6)	402.5 (452)	310	270	340	20	300	89	181	63.7 (113.2)	24.8	(66.5)	38.5 (45.5)	0	(44)	82	6-φ11	60	4	219	140.9	(96.9)	176	90	80	60	11	7	18	M10 screw Depth: 18
	1/35 (Note 6)																												
	1/43 (Note 6)																												
	1/59 (Note 6)																												
HG-SR352(B)G1	1/6 (Note 6)	372 (421.5)	230	200	260	15	230	76	145	63.7 (113.2)	24.8	(66.5)	38.5 (45.5)	0	(44)	82	6-φ11	60	4	164	140.9	(96.9)	176	70	56	50	9	5.5	14	M10 screw Depth: 18
	1/11 (Note 6)																												
	1/17 (Note 6)																												
	1/29 (Note 6)	426.5 (476)	310	270	340	20	300	89	181	63.7 (113.2)	24.8	(66.5)	38.5 (45.5)	0	(44)	82	6-φ11	60	4	219	140.9	(96.9)	176	90	80	60	11	7	18	
	1/35 (Note 6)																												
	1/43 (Note 6)	466 (515.5)	360	316	400	22	340	94	181	63.7 (113.2)	24.8	(66.5)	38.5 (45.5)	0	(44)	82	8-φ14	22.5	5	258	140.9	(96.9)	176	90	80	70	12	7.5	20	M12 screw Depth: 24
	1/59 (Note 6)																												
HG-SR502(B)G1	1/6 (Note 6)	442.5 (492)	310	270	340	20	300	89	181	63.7 (113.2)	24.8	(66.5)	38.5 (45.5)	0	(44)	82	6-φ11	60	4	219	140.9	(96.9)	176	90	80	60	11	7	18	M10 screw Depth: 18
	1/11 (Note 6)																												
	1/17 (Note 6)																												
	1/29 (Note 6)	506 (555.5)	390	345	430	22	370	110	176	63.7 (113.2)	24.8	(66.5)	38.5 (45.5)	0	(44)	82	8-φ18	22.5	5	279	140.9	(96.9)	176	110	100	80	14	9	22	M12 screw Depth: 24
	1/35 (Note 6)																												
	1/43 (Note 6)																												
	1/59 (Note 6)																												
HG-SR702(B)G1	1/6 (Note 6)	482.5 (532)	310	270	340	20	300	89	181	71.7 (121.2)	32	(66.5)	38.5 (45.5)	0	(44)	82	6-φ11	60	4	219	149.1	(96.9)	176	90	80	60	11	7	18	M10 screw Depth: 18
	1/11 (Note 6)	522 (571.5)	360	316	400	22	340	94	181	71.7 (121.2)	32	(66.5)	38.5 (45.5)	0	(44)	82	8-φ14	22.5	5	258	149.1	(96.9)	176	90	80	70	12	7.5	20	M12 screw Depth: 24
	1/17 (Note 6)																												
	1/29 (Note 6)	546 (595.5)	390	345	430	22	370	110	176	71.7 (121.2)	32	(66.5)	38.5 (45.5)	0	(44)	82	8-φ18	22.5	5	279	149.1	(96.9)	176	110	100	80	14	9	22	
	1/35 (Note 6)																												
	1/43 (Note 6)	602 (651.5)	450	400	490	30	430	145	210	71.7 (121.2)	32	(66.5)	38.5 (45.5)	0	(44)	82	12-φ18	15	6	320	149.1	(96.9)	176	135	125	95	14	9	25	M20 screw Depth: 34
	1/59 (Note 6)																												

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated since the outer frame of the reducer is made by casting. Make allowance for the actual dimensions in the design of a machine.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions inside ( ) are for the models with electromagnetic brake.
5. Be sure to fill the reducer with lubricant oil since the oil is removed before the shipment.
6. Do not mount the servo motor in a way tilted to the shaft direction or to the shaft rotation direction. Refer to "Servo Motor Instruction Manual (Vol. 3)" when mounting the servo motor other than the shaft horizontal.

HG-SR Series Geared Servo Motor Specifications

With reducer for general industrial machines, foot mounting: G1H

Model	Output [kW]	Reduction ratio	Moment of inertia J [× 10^{-4} kg•m^2] (Note 1)		Permissible load to motor inertia ratio (Note 2) (when converted into the servo motor shaft)	Mass [kg]		Lubrication method (Note 5)	Mounting direction
			Standard	With electromagnetic brake		Standard	With electromagnetic brake		
HG-SR52(B)G1H	0.5	1/6	8.08	10.3	4 times or less	20	22	Grease (filled)	Any direction
		1/11	7.65	9.85					
		1/17	7.53	9.73					
		1/29	7.47	9.67					
		1/35	8.26	10.5		28	30		
		1/43	8.22	10.4					
		1/59	8.18	10.4					
HG-SR102(B)G1H	1.0	1/6	14.8	17.0	4 times or less	31	33	Grease (filled)	Any direction
		1/11	13.3	15.5					
		1/17	12.9	15.1					
		1/29	12.6	14.8					
		1/35	12.6	14.8					
		1/43	13.8	16.0		50	52	Oil (Note 3)	Shaft horizontal (Note 4)
		1/59	19.1	21.3		86	88		
HG-SR152(B)G1H	1.5	1/6	19.2	21.4	4 times or less	32	34	Grease (filled)	Any direction
		1/11	17.7	19.9					
		1/17	17.3	19.5					
		1/29	18.4	20.6		51	53	Oil (Note 3)	Shaft horizontal (Note 4)
		1/35	18.3	20.5					
		1/43	23.6	25.8		87	89		
		1/59	23.5	25.7					
HG-SR202(B)G1H	2.0	1/6	50.0	59.4	4 times or less	37	43	Grease (filled)	Any direction
		1/11	48.4	57.8					
		1/17	48.1	57.5					
		1/29	54.8	64.2		92	98	Oil (Note 3)	Shaft horizontal (Note 4)
		1/35	54.5	63.9					
		1/43	54.3	63.7					
		1/59	54.2	63.6					
HG-SR352(B)G1H	3.5	1/6	87.1	96.5	4 times or less	61	67	Oil (Note 3)	Shaft horizontal (Note 4)
		1/11	82.8	92.2					
		1/17	81.5	90.9					
		1/29	86.6	96.0		97	103		
		1/35	86.3	95.7					
		1/43	105	114		137	143	Oil	
		1/59	104	113					
HG-SR502(B)G1H	5.0	1/6	126	135	4 times or less	101	107	Oil (Note 3)	Shaft horizontal (Note 4)
		1/11	114	123					
		1/17	110	119					
		1/29	141	150		178	184	Oil	
		1/35	140	150					
		1/43	139	149					
		1/59	138	147					
HG-SR702(B)G1H	7.0	1/6	177	187	4 times or less	108	114	Oil (Note 3)	Shaft horizontal (Note 4)
		1/11	190	199		148	154	Oil	
		1/17	182	192					
		1/29	192	202		185	191		
		1/35	192	201					
		1/43	267	277		256	262		
		1/59	266	275					

Notes: 1. The moments of inertia in the table are the values that are converted into motor shaft for the servo motor with reducer (and with electromagnetic brake).
2. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
3. Use the grease lubricated servo motor (special specification) instead of the oil lubricated for applications where the servo motor moves.
4. Do not mount the servo motor in a way tilted to the shaft direction or to the shaft rotation direction. Refer to the asterisk 1 of "Annotations for Geared Servo Motor Specifications" on p. 2-33 in this catalog. Refer to "Servo Motor Instruction Manual (Vol. 3)" when mounting the servo motor other than the shaft horizontal.
5. Be sure to fill the reducer with lubricant oil since the oil is removed before the shipment.

HG-SR Series Geared Servo Motor Specifications

With reducer for general industrial machines, foot mounting: G1H

Item	Specifications
Mounting method	Foot mounting
Output shaft rotating direction	Opposite from the servo motor output shaft direction
Backlash (Note 3)	40 minutes to 2° at reducer output shaft (Note 2)
Maximum torque	Three times of the rated torque (Refer to HG-SR 2000 r/min series specifications in this catalog for the rated torque.)
Permissible speed (at servo motor shaft)	For grease lubrication: 3000 r/min (permissible instantaneous speed: 3450 r/min) For oil lubrication: 2000 r/min (permissible instantaneous speed: 2300 r/min)
IP rating (reducer part)	Equivalent to IP44
Reducer efficiency (Note 1)	85% to 94%

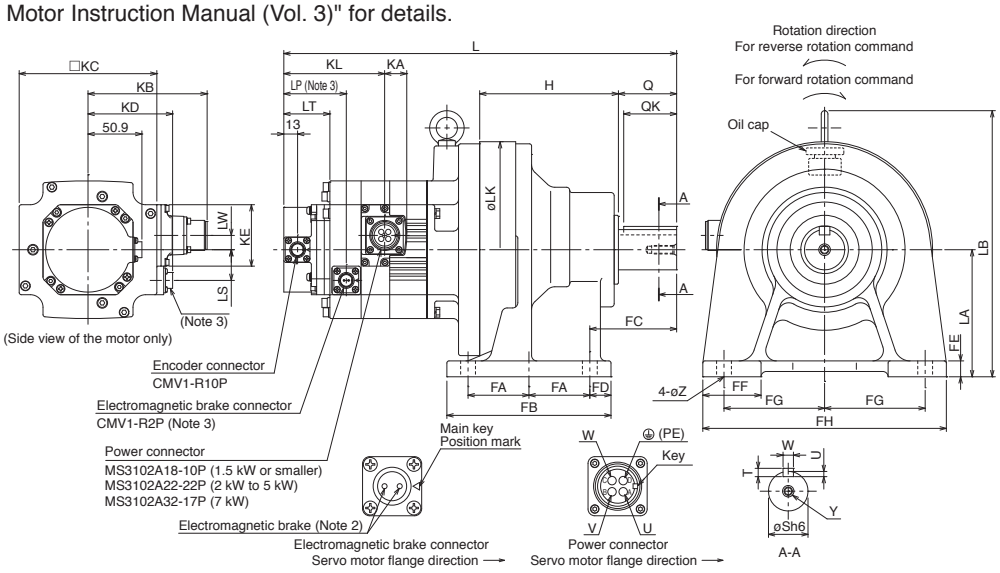
Notes: 1. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, and temperature.
The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
2. This is a designed value, not guaranteed value.
3. The backlash can be converted: 1 minute = 0.0167°

HG-SR Series Geared Servo Motor Dimensions (Note 1, 5)

With reducer for general industrial machines, foot mounting

●HG-SR_(B)G1H

Drawing is schematic only, and the oil cap, the shapes, or the mounting screws may differ from those of the actual servo motor. Refer to "Servo Motor Instruction Manual (Vol. 3)" for details.



[Unit: mm]

Model	Reduction ratio	Variable dimensions (Note 4)																													
		L	LA	LB	LK	LS	LT	LP	LW	H	KL	KA	KB	KD	KC	KE	Z	FA	FB	FC	FD	FE	FF	FG	FH	Q	QK	S	T	U	W	Y
HG-SR52(B)G1H	1/6	323 (357.5)	100	219	150	(29)	38.2 (43.5)	(59)	13.5	121	60.7 (95.2)	20.9	112.5	(79.9)	130	58	11	45	135	60	15	12	40	75	180	35	32	28	7	4	8	M8 screw Depth: 20
	1/11																														
	1/17																														
	1/29																														
	1/35	336.5 (371)	120	252	204	(29)	38.2 (43.5)	(59)	13.5	131	60.7 (95.2)	20.9	112.5	(79.9)	130	58	14	57.5	155	82	20	15	55	95	230	55	50	38	8	5	10	
	1/43																														
	1/59																														
HG-SR102(B)G1H	1/6	350.5 (385)	120	252	204	(29)	38.2 (43.5)	(59)	13.5	131	60.7 (95.2)	20.9	112.5	(79.9)	130	58	14	57.5	155	82	20	15	55	95	230	55	50	38	8	5	10	M8 screw Depth: 20
	1/11																														
	1/17																														
	1/29																														
	1/35																														
	1/43 (Note 6)	403 (437.5)	150	295	230	(29)	38.2 (43.5)	(59)	13.5	170	60.7 (95.2)	20.9	112.5	(79.9)	130	58	18	72.5	195	100	25	22	65	145	330	70	56	50	9	5.5	14	M10 screw Depth: 18
	1/59 (Note 6)	473.5 (508)	160	352	300	(29)	38.2 (43.5)	(59)	13.5	218	60.7 (95.2)	20.9	112.5	(79.9)	130	58	18	75	238	139	44	25	75	185	410	90	80	60	11	7	18	
HG-SR152(B)G1H	1/6	364.5 (399)	120	252	204	(29)	38.2 (43.5)	(59)	13.5	131	60.7 (95.2)	20.9	112.5	(79.9)	130	58	14	57.5	155	82	20	15	55	95	230	55	50	38	8	5	10	M8 screw Depth: 20
	1/11																														
	1/17																														
	1/29 (Note 6)	417 (451.5)	150	295	230	(29)	38.2 (43.5)	(59)	13.5	170	60.7 (95.2)	20.9	112.5	(79.9)	130	58	18	72.5	195	100	25	22	65	145	330	70	56	50	9	5.5	14	M10 screw Depth: 18
	1/35 (Note 6)																														
	1/43 (Note 6)	487.5 (522)	160	352	300	(29)	38.2 (43.5)	(59)	13.5	218	60.7 (95.2)	20.9	112.5	(79.9)	130	58	18	75	238	139	44	25	75	185	410	90	80	60	11	7	18	
	1/59 (Note 6)																														
HG-SR202(B)G1H	1/6	374.5 (424)	120	262	204	(44)	38.5 (45.5)	(66.5)	0	131	63.7 (113.2)	24.8	140.9	(96.9)	176	82	14	57.5	155	82	20	15	55	95	230	55	50	38	8	5	10	M8 screw Depth: 20
	1/11																														
	1/17																														
	1/29 (Note 6)	491.5 (541)	160	341	300	(44)	38.5 (45.5)	(66.5)	0	218	63.7 (113.2)	24.8	140.9	(96.9)	176	82	18	75	238	139	44	25	75	185	410	90	80	60	11	7	18	M10 screw Depth: 18
	1/35 (Note 6)																														
	1/43 (Note 6)																														
	1/59 (Note 6)																														
HG-SR352(B)G1H	1/6 (Note 6)	448 (497.5)	150	295	230	(44)	38.5 (45.5)	(66.5)	0	170	63.7 (113.2)	24.8	140.9	(96.9)	176	82	18	72.5	195	100	25	22	65	145	330	70	56	50	9	5.5	14	M10 screw Depth: 18
	1/11 (Note 6)																														
	1/17 (Note 6)																														
	1/29 (Note 6)	515.5 (565)	160	341	300	(44)	38.5 (45.5)	(66.5)	0	218	63.7 (113.2)	24.8	140.9	(96.9)	176	82	18	75	238	139	44	25	75	185	410	90	80	60	11	7	18	
	1/35 (Note 6)																														
	1/43 (Note 6)	560 (609.5)	200	381	340	(44)	38.5 (45.5)	(66.5)	0	262	63.7 (113.2)	24.8	140.9	(96.9)	176	82	22	137.5	335	125	30	30	80	190	430	90	80	70	12	7.5	20	M12 screw Depth: 24
	1/59 (Note 6)																														
HG-SR502(B)G1H	1/6 (Note 6)	531.5 (581)	160	341	300	(44)	38.5 (45.5)	(66.5)	0	218	63.7 (113.2)	24.8	140.9	(96.9)	176	82	18	75	238	139	44	25	75	185	410	90	80	60	11	7	18	M10 screw Depth: 18
	1/11 (Note 6)																														
	1/17 (Note 6)																														
	1/29 (Note 6)	616 (665.5)	220	405	370	(44)	38.5 (45.5)	(66.5)	0	279	63.7 (113.2)	24.8	140.9	(96.9)	176	82	22	160	380	145	30	30	85	210	470	110	100	80	14	9	22	M12 screw Depth: 24
	1/35 (Note 6)																														
	1/43 (Note 6)																														
	1/59 (Note 6)																														
HG-SR702(B)G1H	1/6 (Note 6)	571.5 (621)	160	341	300	(44)	38.5 (45.5)	(66.5)	0	218	71.7 (121.2)	32	149.1	(96.9)	176	82	18	75	238	139	44	25	75	185	410	90	80	60	11	7	18	M10 screw Depth: 18
	1/11 (Note 6)	616 (665.5)	200	381	340	(44)	38.5 (45.5)	(66.5)	0	262	71.7 (121.2)	32	149.1	(96.9)	176	82	22	137.5	335	125	30	30	80	190	430	90	80	70	12	7.5	20	M12 screw Depth: 24
	1/17 (Note 6)																														
	1/29 (Note 6)	656 (705.5)	220	405	370	(44)	38.5 (45.5)	(66.5)	0	279	71.7 (121.2)	32	149.1	(96.9)	176	82	22	160	380	145	30	30	85	210	470	110	100	80	14	9	22	
	1/35 (Note 6)																														
	1/43 (Note 6)	747 (796.5)	250	465	430	(44)	38.5 (45.5)	(66.5)	0	330	71.7 (121.2)	32	149.1	(96.9)	176	82	26	190	440	170	30	35	90	240	530	135	125	95	14	9	25	M20 screw Depth: 34
	1/59 (Note 6)																														

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated since the outer frame of the reducer is made by casting. Make allowance for the actual dimensions in the design of a machine.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions inside ( ) are for the models with electromagnetic brake.
5. Be sure to fill the reducer with lubricant oil since the oil is removed before the shipment.
6. Do not mount the servo motor in a way tilted to the shaft direction or to the shaft rotation direction. Refer to "Servo Motor Instruction Manual (Vol. 3)" when mounting the servo motor other than the shaft horizontal.

HG-SR Series Geared Servo Motor Specifications

With flange-output type reducer for high precision applications, flange mounting: G5

Model	Output [kW]	Reduction ratio	Moment of inertia J [× 10^{-4} kg•m^2] (Note 1)		Permissible load to motor inertia ratio (Note 2) (when converted into the servo motor shaft)	Mass [kg]		Lubrication method	Mounting direction
			Standard	With electromagnetic brake		Standard	With electromagnetic brake		
HG-SR52(B)G5	0.5	1/5	7.91	10.1	10 times or less	7.6	9.5	Grease (filled)	Any direction
		1/11	7.82	10.0		7.8	9.7		
		1/21	10.2	12.4		12	14		
		1/33	9.96	12.2					
		1/45	9.96	12.2					
HG-SR102(B)G5	1.0	1/5	12.3	14.5	10 times or less	9.0	11		
		1/11	14.9	17.1		13	15		
		1/21	14.5	16.7					
		1/33	16.3	18.5		23	25		
		1/45	16.2	18.4					
HG-SR152(B)G5	1.5	1/5	16.7	18.9	10 times or less	11	13		
		1/11	19.3	21.5		14	16		
		1/21	21.7	23.9		24	26		
		1/33	20.7	22.9					
		1/45	20.6	22.8					
HG-SR202(B)G5	2.0	1/5	51.4	61.1	10 times or less	19	25		
		1/11	51.2	60.9					
		1/21	53.2	62.9		29	35		
		1/33	52.2	61.9					
		1/45	52.2	61.9					
HG-SR352(B)G5	3.5	1/5	83.2	92.8	10 times or less	24	30		
		1/11	86.7	96.3		34	40		
		1/21	85.0	94.6					
HG-SR502(B)G5	5.0	1/5	110	119	10 times or less	36	42		
		1/11	108	117		38	44		
HG-SR702(B)G5	7.0	1/5	161	171	10 times or less	43	49		

Item	Specifications
Mounting method	Flange mounting
Output shaft rotating direction	Same as the servo motor output shaft direction
Backlash (Note 4)	3 minutes or less at reducer output shaft
Maximum torque	Three times of the rated torque (Refer to HG-SR 2000 r/min series specifications in this catalog for the rated torque.)
Permissible speed (at servo motor shaft)	3000 r/min (permissible instantaneous speed: 3450 r/min)
IP rating (reducer part)	Equivalent to IP44
Reducer efficiency (Note 3)	77% to 92%

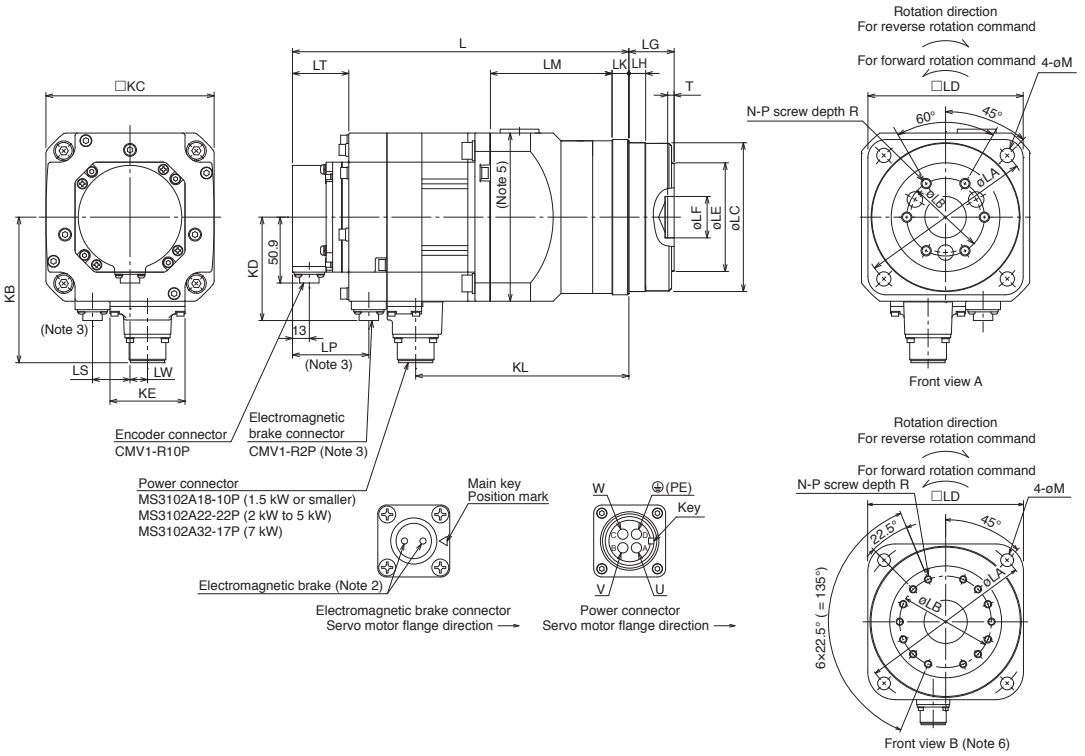
Notes: 1. The moments of inertia in the table are the values that are converted into motor shaft for the servo motor with reducer (and with electromagnetic brake).
2. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
3. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, and temperature. The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
4. The backlash can be converted: 1 minute = 0.0167°

HG-SR Series Geared Servo Motor Dimensions (Note 1)

With flange-output type reducer for high precision applications, flange mounting

●HG-SR_(B)G5

Drawing is schematic only, and the shapes or the mounting screws may differ from those of the actual servo motor. Refer to "Servo Motor Instruction Manual (Vol. 3)" for details.



[Unit: mm]

Model	Reduction ratio	Variable dimensions (Note 4)																									Front view
		L	LA	LB	LC	LD	LE	LF	LG	LH	LK	LM	LT	KL	LP	LW	LS	T	N	P	R	M	KB	KD	KC	KE	
HG-SR52(B)G5	1/5	213.5 (248)	105	45	85h7	90	59	24H7	27 +0.4 -0.5	8	10	85	38.2 (43.5)	152.8	(59)	13.5	(29)	5	6	M6	10	9	112.5	(79.9)	130	58	A
	1/11																										
	1/21	225.5 (260)	135	60	115h7	120	84	32H7	35 +0.4 -0.5	13	13	94	38.2 (43.5)	164.8	(59)	13.5	(29)	5	6	M8	12	11	112.5	(79.9)	130	58	A
	1/33																										
	1/45																										
HG-SR102(B)G5	1/5	227.5 (262)	105	45	85h7	90	59	24H7	27 +0.4 -0.5	8	10	85	38.2 (43.5)	166.8	(59)	13.5	(29)	5	6	M6	10	9	112.5	(79.9)	130	58	A
	1/11	239.5 (274)	135	60	115h7	120	84	32H7	35 +0.4 -0.5	13	13	94	38.2 (43.5)	178.8	(59)	13.5	(29)	5	6	M8	12	11	112.5	(79.9)	130	58	A
	1/21																										
	1/33	255.5 (290)	190	100	165h8	170	122	47H7	53 +0.5 -0.8	13	16	107	38.2 (43.5)	194.8	(59)	13.5	(29)	7	14	M8	12	14	112.5	(79.9)	130	58	B
	1/45																										
HG-SR152(B)G5	1/5	241.5 (276)	105	45	85h7	90	59	24H7	27 +0.4 -0.5	8	10	85	38.2 (43.5)	180.8	(59)	13.5	(29)	5	6	M6	10	9	112.5	(79.9)	130	58	A
	1/11	253.5 (288)	135	60	115h7	120	84	32H7	35 +0.4 -0.5	13	13	94	38.2 (43.5)	192.8	(59)	13.5	(29)	5	6	M8	12	11	112.5	(79.9)	130	58	A
	1/21	269.5 (304)	190	100	165h8	170	122	47H7	53 +0.5 -0.8	13	16	107	38.2 (43.5)	208.8	(59)	13.5	(29)	7	14	M8	12	14	112.5	(79.9)	130	58	B
	1/33																										
	1/45																										
HG-SR202(B)G5	1/5	267.5 (317)	135	60	115h7	120	84	32H7	35 +0.4 -0.5	13	13	116 (Note 5)	38.5 (45.5)	203.8	(66.5)	0	(44)	5	6	M8	12	11	140.9	(96.9)	176	82	A
	1/11																										
	1/21	287.5 (337)	190	100	165h8	170	122	47H7	53 +0.5 -0.8	13	16	133 (Note 5)	38.5 (45.5)	223.8	(66.5)	0	(44)	7	14	M8	12	14	140.9	(96.9)	176	82	B
	1/33																										
	1/45																										
HG-SR352(B)G5	1/5	291.5 (341)	135	60	115h7	120	84	32H7	35 +0.4 -0.5	13	13	116 (Note 5)	38.5 (45.5)	227.8	(66.5)	0	(44)	5	6	M8	12	11	140.9	(96.9)	176	82	A
	1/11	311.5 (361)	190	100	165h8	170	122	47H7	53 +0.5 -0.8	13	16	133 (Note 5)	38.5 (45.5)	247.8	(66.5)	0	(44)	7	14	M8	12	14	140.9	(96.9)	176	82	B
	1/21																										
HG-SR502(B)G5	1/5	327.5 (377)	190	100	165h8	170	122	47H7	53 +0.5 -0.8	13	16	133 (Note 5)	38.5 (45.5)	263.8	(66.5)	0	(44)	7	14	M8	12	14	140.9	(96.9)	176	82	B
	1/11																										
HG-SR702(B)G5	1/5	367.5 (417)	190	100	165h8	170	122	47H7	53 +0.5 -0.8	13	16	133 (Note 5)	38.5 (45.5)	295.8	(66.5)	0	(44)	7	14	M8	12	14	149.1	(96.9)	176	82	B

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated since the outer frame of the reducer is made by casting. Make allowance for the actual dimensions in the design of a machine.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions inside ( ) are for the models with electromagnetic brake.
5. The models with (Note 5) in the LM column of the variable dimension table have the maximum dimension of 180 mm × 180 mm in this part.
6. For the front view B, the screws are not placed at equal intervals.

HG-SR Series Geared Servo Motor Specifications

With shaft-output type reducer for high precision applications, flange mounting: G7

Model	Output [kW]	Reduction ratio	Moment of inertia J [× 10^{-4} kg•m^2] (Note 1)		Permissible load to motor inertia ratio (Note 2) (when converted into the servo motor shaft)	Mass [kg]		Lubrication method	Mounting direction
			Standard	With electromagnetic brake		Standard	With electromagnetic brake		
HG-SR52(B)G7	0.5	1/5	7.95	10.2	10 times or less	8.0	9.9	Grease (filled)	Any direction
		1/11	7.82	10.0		8.2	11		
		1/21	10.2	12.4		13	15		
		1/33	9.96	12.2					
		1/45	9.96	12.2					
HG-SR102(B)G7	1.0	1/5	12.3	14.5	10 times or less	9.4	12		
		1/11	15.0	17.2		15	17		
		1/21	14.5	16.7					
		1/33	16.3	18.5		26	28		
		1/45	16.3	18.5					
HG-SR152(B)G7	1.5	1/5	16.7	18.9	10 times or less	11	13		
		1/11	19.4	21.6		16	18		
		1/21	21.7	23.9		27	29		
		1/33	20.7	22.9					
		1/45	20.7	22.9					
HG-SR202(B)G7	2.0	1/5	51.7	61.4	10 times or less	20	26		
		1/11	51.3	61.0		21	27		
		1/21	53.3	63.0		32	38		
		1/33	52.2	61.9					
		1/45	52.2	61.9					
HG-SR352(B)G7	3.5	1/5	83.5	93.1	10 times or less	25	31		
		1/11	87.0	96.6		37	43		
		1/21	85.1	94.7					
HG-SR502(B)G7	5.0	1/5	111	121	10 times or less	39	45		
		1/11	108	117		41	47		
HG-SR702(B)G7	7.0	1/5	163	173	10 times or less	46	52		

Item	Specifications
Mounting method	Flange mounting
Output shaft rotating direction	Same as the servo motor output shaft direction
Backlash (Note 4)	3 minutes or less at reducer output shaft
Maximum torque	Three times of the rated torque (Refer to HG-SR 2000 r/min series specifications in this catalog for the rated torque.)
Permissible speed (at servo motor shaft)	3000 r/min (permissible instantaneous speed: 3450 r/min)
IP rating (reducer part)	Equivalent to IP44
Reducer efficiency (Note 3)	77% to 92%

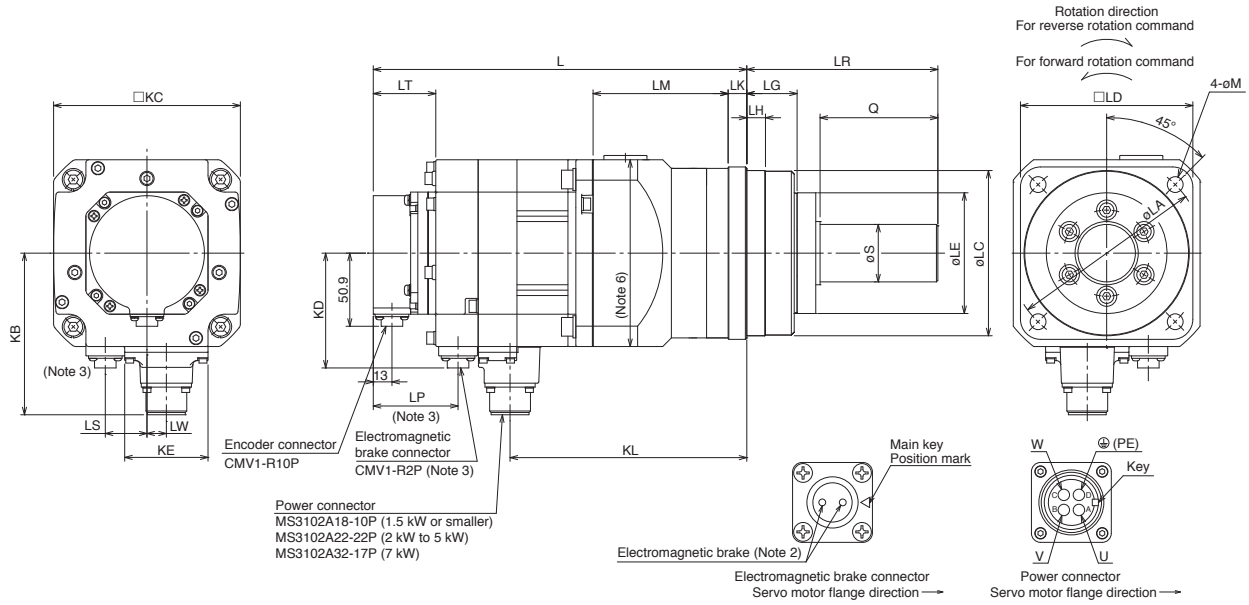
Notes: 1. The moments of inertia in the table are the values that are converted into motor shaft for the servo motor with reducer (and with electromagnetic brake).
2. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
3. The reducer efficiency varies depending on the reduction ratio. It also changes depending on the conditions of use, such as output torque, speed, and temperature. The values in the table represent typical values at the rated torque and speed and at the normal temperature. They are not guaranteed values.
4. The backlash can be converted: 1 minute = 0.0167˚

HG-SR Series Geared Servo Motor Dimensions (Note 1, 5, 7)

With shaft-output type reducer for high precision applications, flange mounting

●HG-SR_(B)G7

Drawing is schematic only, and the shapes or the mounting screws may differ from those of the actual servo motor. Refer to "Servo Motor Instruction Manual (Vol. 3)" for details.



[Unit: mm]

Model	Reduction ratio	Variable dimensions (Note 4)																					
		L	LA	LC	LD	LE	S	LG	LH	Q	LR	LK	LM	LT	KL	LP	LW	LS	M	KB	KD	KC	KE
HG-SR52(B)G7	1/5	213.5 (248)	105	85h7	90	59	25h7	27	8	42	80	10	85	38.2 (43.5)	152.8	(59)	13.5	(29)	9	112.5	(79.9)	130	58
	1/11																						
	1/21	225.5 (260)	135	115h7	120	84	40h7	35	13	82	133	13	94	38.2 (43.5)	164.8	(59)	13.5	(29)	11	112.5	(79.9)	130	58
	1/33																						
	1/45																						
HG-SR102(B)G7	1/5	227.5 (262)	105	85h7	90	59	25h7	27	8	42	80	10	85	38.2 (43.5)	166.8	(59)	13.5	(29)	9	112.5	(79.9)	130	58
	1/11	239.5 (274)	135	115h7	120	84	40h7	35	13	82	133	13	94	38.2 (43.5)	178.8	(59)	13.5	(29)	11	112.5	(79.9)	130	58
	1/21																						
	1/33	255.5 (290)	190	165h8	170	122	50h7	53	13	82	156	16	107	38.2 (43.5)	194.8	(59)	13.5	(29)	14	112.5	(79.9)	130	58
	1/45																						
HG-SR152(B)G7	1/5	241.5 (276)	105	85h7	90	59	25h7	27	8	42	80	10	85	38.2 (43.5)	180.8	(59)	13.5	(29)	9	112.5	(79.9)	130	58
	1/11	253.5 (288)	135	115h7	120	84	40h7	35	13	82	133	13	94	38.2 (43.5)	192.8	(59)	13.5	(29)	11	112.5	(79.9)	130	58
	1/21	269.5 (304)	190	165h8	170	122	50h7	53	13	82	156	16	107	38.2 (43.5)	208.8	(59)	13.5	(29)	14	112.5	(79.9)	130	58
	1/33																						
	1/45																						
HG-SR202(B)G7	1/5	267.5 (317)	135	115h7	120	84	40h7	35	13	82	133	13	116 (Note 6)	38.5 (45.5)	203.8	(66.5)	0	(44)	11	140.9	(96.9)	176	82
	1/11																						
	1/21	287.5 (337)	190	165h8	170	122	50h7	53	13	82	156	16	133 (Note 6)	38.5 (45.5)	223.8	(66.5)	0	(44)	14	140.9	(96.9)	176	82
	1/33																						
	1/45																						
HG-SR352(B)G7	1/5	291.5 (341)	135	115h7	120	84	40h7	35	13	82	133	13	116 (Note 6)	38.5 (45.5)	227.8	(66.5)	0	(44)	11	140.9	(96.9)	176	82
	1/11	311.5 (361)	190	165h8	170	122	50h7	53	13	82	156	16	133 (Note 6)	38.5 (45.5)	247.8	(66.5)	0	(44)	14	140.9	(96.9)	176	82
	1/21																						
HG-SR502(B)G7	1/5	327.5 (377)	190	165h8	170	122	50h7	53	13	82	156	16	133 (Note 6)	38.5 (45.5)	263.8	(66.5)	0	(44)	14	140.9	(96.9)	176	82
	1/11																						
HG-SR702(B)G7	1/5	367.5 (417)	190	165h8	170	122	50h7	53	13	82	156	16	133 (Note 6)	38.5 (45.5)	295.8	(66.5)	0	(44)	14	149.1	(96.9)	176	82

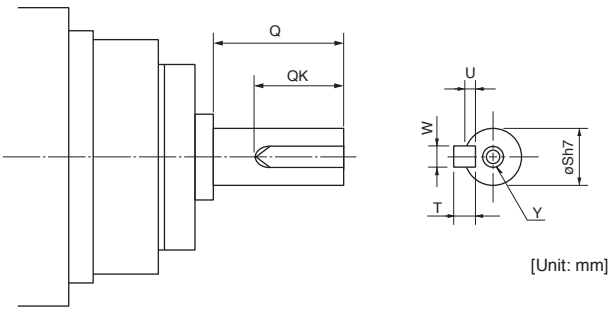
Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated since the outer frame of the reducer is made by casting. Make allowance for the actual dimensions in the design of a machine.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions inside ( ) are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.
6. The models with (Note 6) in the LM column of the variable dimension table have the maximum dimension of 180 mm × 180 mm in this part.
7. HG-SR_(B)G7K is also available for key shaft motor (with key). Refer to the following page for the shaft-end shape.

HG-SR Series Geared Servo Motor Special Shaft End Specifications

Standard HG-SR_(B)G1/G1H (with reducer for general industrial machines) has a key shaft (with key).
Standard HG-SR_(B)G7 (with shaft-output type reducer for high precision applications, flange mounting) has a straight shaft.
HG-SR_(B)G7K is also available for key shaft motor (with key). Refer to the following for the shaft-end shape.

Key shaft (with key) (Note 1, 2, 3)

Model	Reduction ratio	Variable dimensions						
		S	Q	W	QK	U	T	Y
HG-SR52(B)G7K	1/5	25	42	8	36	4	7	M6 screw Depth: 12
	1/11							
	1/21	40	82	12	70	5	8	M10 screw Depth: 20
	1/33							
	1/45							
HG-SR102(B)G7K	1/5	25	42	8	36	4	7	M6 screw Depth: 12
	1/11	40	82	12	70	5	8	M10 screw Depth: 20
	1/21							
	1/33	50	82	14	70	5.5	9	M10 screw Depth: 20
	1/45							
HG-SR152(B)G7K	1/5	25	42	8	36	4	7	M6 screw Depth: 12
	1/11	40	82	12	70	5	8	M10 screw Depth: 20
	1/21	50	82	14	70	5.5	9	M10 screw Depth: 20
	1/33							
	1/45							
HG-SR202(B)G7K	1/5	40	82	12	70	5	8	M10 screw Depth: 20
	1/11							
	1/21	50	82	14	70	5.5	9	M10 screw Depth: 20
	1/33							
	1/45							
HG-SR352(B)G7K	1/5	40	82	12	70	5	8	M10 screw Depth: 20
	1/11	50	82	14	70	5.5	9	M10 screw Depth: 20
	1/21							
HG-SR502(B)G7K	1/5							
	1/11							
HG-SR702(B)G7K	1/5							

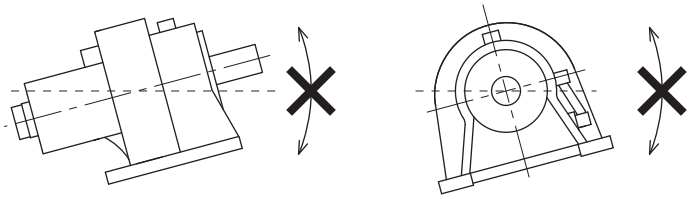


[Unit: mm]

Notes: 1. The servo motors with special shaft end are not suitable for frequent start/stop applications.
2. Single pointed key is attached.
3. The dimensions not mentioned in the drawings are the same as those of the straight shaft. Refer to HG-SR_(B)G7 dimensions in this catalog.

Annotations for Geared Servo Motor Specifications

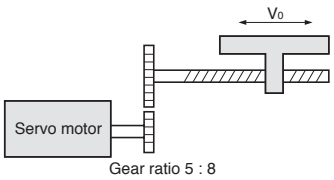
* 1. Do not mount the following servo motor in a way tilted to the shaft direction or to the shaft rotation direction.
- HG-SR102(B)G1/G1H 1/43, 1/59
- HG-SR152(B)G1/G1H 1/29, 1/35, 1/43, 1/59
- HG-SR202(B)G1/G1H 1/29, 1/35, 1/43, 1/59
- HG-SR352(B)G1/G1H all reduction ratios
- HG-SR502(B)G1/G1H all reduction ratios
- HG-SR702(B)G1/G1H all reduction ratios



Rotary Servo Motor Sizing Example

1. Selection criteria

(1) Configurations



Feed speed of moving part	V_0 = 30000 mm/min	D_B = ball screw diameter	20 mm
Feed length per cycle	ℓ = 400 mm	L_B = ball screw length	500 mm
Positioning time	t_0 = within 1 s	D_{G1} = gear diameter (servo motor shaft)	25 mm
Number of feed times	40 times/min	D_{G2} = gear diameter (load shaft)	40 mm
(Operating cycle	t_f = 1.5 s)	L_G = gear tooth thickness	10 mm
Reduction ratio	1/n = 5/8		
Moving part mass	W = 60 kg		
Drive system efficiency	η = 0.8		
Friction coefficient	μ = 0.2		
Ball screw lead	P_B = 16 mm		

(2) Servo motor speed

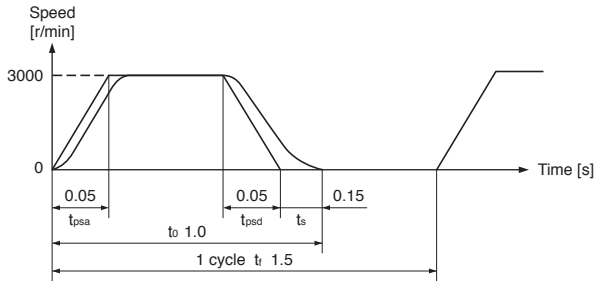
$$N_0 = \frac{V_0}{P_B} \times \frac{1}{1/n} = \frac{30000}{16} \times \frac{8}{5} = 3000 \text{ r/min}$$

(3) Acceleration/deceleration time constant

$$t_{psa} = t_{psd} = t_0 - \frac{\ell}{V_0/60} - t_s = 0.05 \text{ s}$$

t_s: settling time. Here assumed 0.15 s.

(4) Operating pattern



2. Selecting rotary servo motor

(1) Load torque (converted into the servo motor shaft)

Travel distance per servo motor revolution

$$\triangle S = P_B \times \frac{1}{n} = 10 \text{ mm}$$

$$T_L = \frac{\mu \times W \times g \times \triangle S}{2 \times 10^3 \pi \eta} = 0.23 \text{ N•m}$$

(2) Moment of inertia of load (converted into the servo motor shaft)

Moving part

$$J_{L1} = W \times \left(\frac{\triangle S \times 10^{-3}}{2\pi}\right)^2 = 1.52 \times 10^{-4} \text{ kg•m}^2$$

Ball screw

$$J_{L2} = \frac{\pi \times \rho \times L_B}{32} \times D_B^4 \times \left(\frac{1}{n}\right)^2 = 0.24 \times 10^{-4} \text{ kg•m}^2$$

$\rho = 7.8 \times 10^3$ kg/m^3 (iron)

Gear (servo motor shaft)

$$J_{L3} = \frac{\pi \times \rho \times L_G}{32} \times D_{G1}^4 = 0.03 \times 10^{-4} \text{ kg•m}^2$$

Gear (load shaft)

$$J_{L4} = \frac{\pi \times \rho \times L_G}{32} \times D_{G2}^4 \times \left(\frac{1}{n}\right)^2 = 0.08 \times 10^{-4} \text{ kg•m}^2$$

Moment of inertia of all loads (converted into the servo motor shaft)

$$J_L = J_{L1} + J_{L2} + J_{L3} + J_{L4} = 1.87 \times 10^{-4} \text{ kg•m}^2$$

(3) Select a servo motor

Selection criteria

Load torque < Rated torque of servo motor

Moment of inertia of all loads < J_R × Moment of inertia of servo motor

J_R: Recommended load to motor inertia ratio

Select the following servo motor to meet the criteria above.

HG-KR23 (rated torque: 0.64 N•m, max. torque: 2.2 N•m, moment of inertia: 0.221 × 10^{-4} kg•m^2)

(4) Acceleration/deceleration torque

Torque required during acceleration

$$T_{Ma} = \frac{(J_L + J_M) \times N_0}{9.55 \times 10^4 \times t_{psa}} + T_L = 1.56 \text{ N•m}$$

J_M: moment of inertia of servo motor

Torque required during deceleration

$$T_{Md} = -\frac{(J_L + J_M) \times N_0}{9.55 \times 10^4 \times t_{psd}} + T_L = -1.10 \text{ N•m}$$

Torque required during acceleration/deceleration must be equal to or lower than the max. torque of the servo motor.

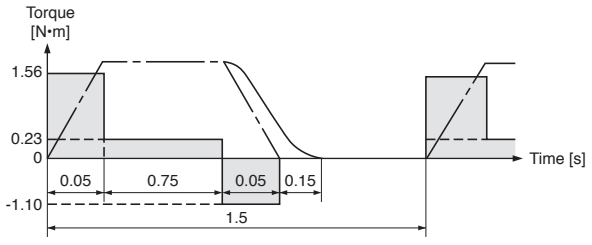
(5) Continuous effective load torque

$$T_{rms} = \sqrt{\frac{T_{Ma}^2 \times t_{psa} + T_L^2 \times t_c + T_{Md}^2 \times t_{psd}}{t_f}} = 0.38 \text{ N•m}$$

$t_c = t_0 - t_s - t_{psa} - t_{psd}$

Continuous effective load torque must be equal to or lower than the rated torque of the servo motor.

(6) Torque pattern



(7) Result

Select the following:

Servo motor: HG-KR23

Servo amplifier: MR-J4-20B

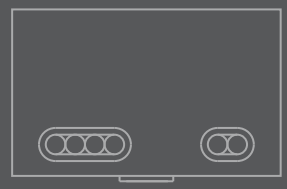
[Free capacity selection software]

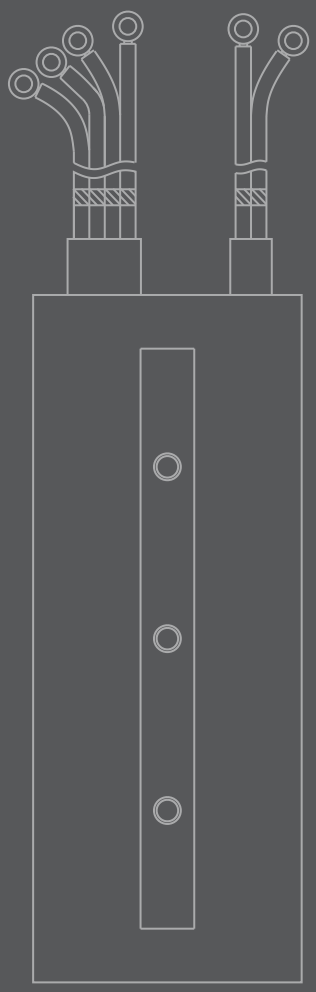
Capacity selection software (MRZJW3-MOTSZ111E) does all the calculations for you. The capacity selection software is available for free download. Contact your local sales office for more details.

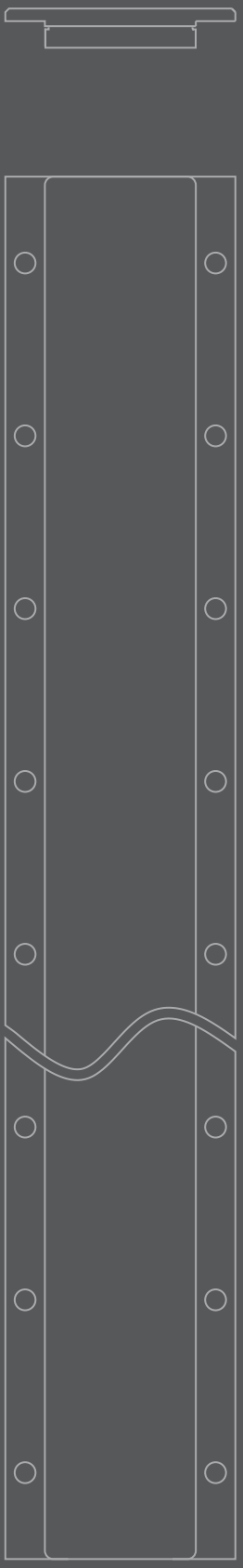
* MRZJW3-MOTSZ111E software version C5 or later is compatible.

MEMO

3



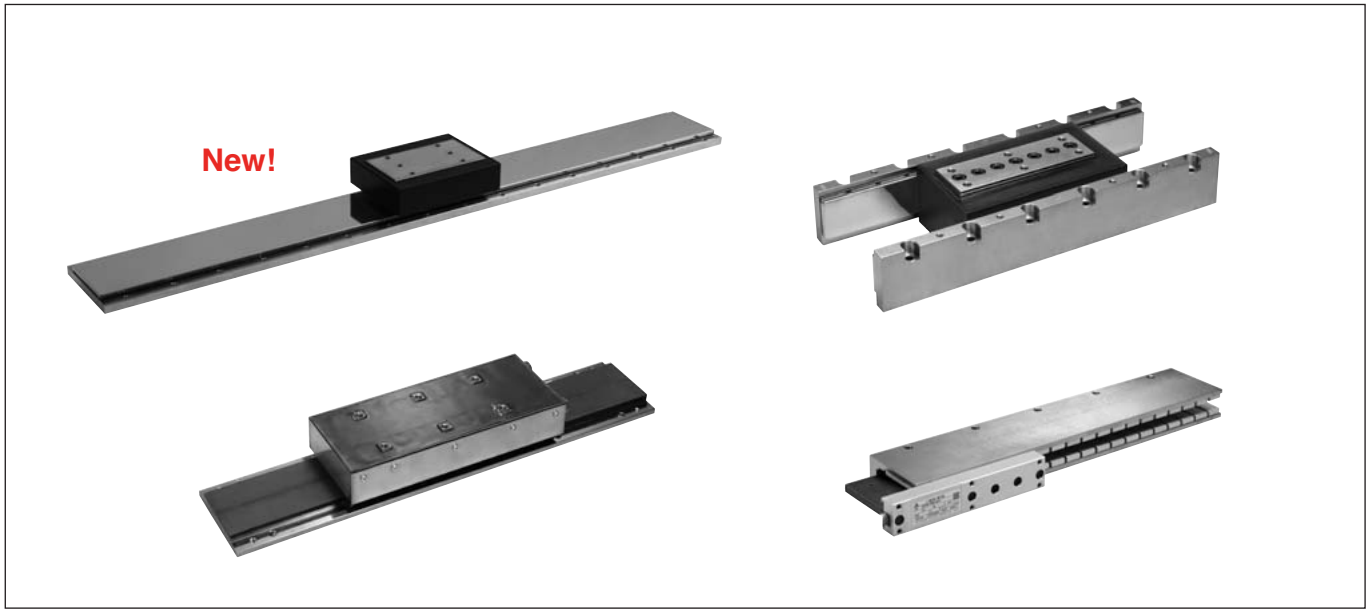




* Refer to p. 5-45 in this catalog for conversion of units.

Linear Servo Motors

Linear servo motors

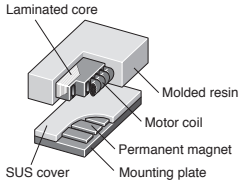
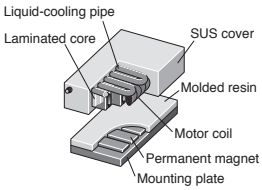
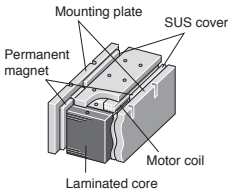
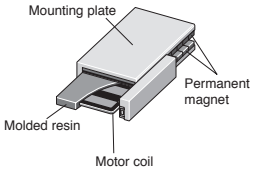


Product lines

	Linear servo motor series	Max. speed [m/s]	Thrust 100 N 1000 N 10000 N	Continuous thrust [N]	Max. thrust [N]	Cooling method
Core type	LM-H3 series New! 	3.0	70 960 Continuous 175 2400 Maximum	9 types 70, 120, 240, 360, 480, 720, 960	175, 300, 600, 900, 1200, 1800, 2400	Natural cooling
	LM-F series 	2.0	300 1200 Continuous 1800 7200 Maximum	5 types 300, 600, 900, 1200	1800, 3600, 5400, 7200	Natural cooling
		2.0	600 2400 Continuous 1800 7200 Maximum	5 types 600, 1200, 1800, 2400	1800, 3600, 5400, 7200	Liquid cooling
	LM-K2 series 	2.0	120 2400 Continuous 300 6000 Maximum	7 types 120, 240, 360, 720, 1200, 1440, 2400	300, 600, 900, 1800, 3000, 3600, 6000	Natural cooling
Coreless type	LM-U2 series 	2.0	50 800 Continuous 150 3200 Maximum	9 types 50, 75, 100, 150, 225, 400, 600, 800	150, 225, 300, 450, 675, 1600, 2400, 3200	Natural cooling

Features

- **Four series of linear servo motors include:**
  core type, liquid-cooling core type, core type with magnetic attraction counter-force, and coreless type
- **High-speed operation: 3.0 m/s (maximum speed for LM-H3 series)**
- **Wide range of maximum thrust with complete lines of the linear servo motors in four series: from 150 N to 7200 N**
- **Small size and high thrust: achieved by increasing the winding density and by optimizing core and magnet geometries using electromagnetic field analysis.**
- **Compatible with a variety of serial interface linear encoders with a minimum resolution of 0.005 μm and up.**
  Fully closed loop control system with the linear encoder enables high-accuracy positioning.

Features	Structure		Application examples
Suitable for space-saving. Compact size and high thrust.		• The motor primary side consists of laminated core and motor coil. The coil is inserted into the slots on the core. The entire section is molded with resin. • The secondary side consists of permanent magnets and mounting plate. The permanent magnets are precisely positioned and fixed on the mounting plate, and then covered with SUS plate.	• Semiconductor mounting systems • Wafer cleaning systems • LCD assembly machines • Material handlings
Compact size. The integrated liquid-cooling system doubles the continuous thrust.		• The basic structure is the same as the LM-H3 series. However, this series has a liquid-cooling pipe in the primary side to suppress heat generation.	• Press feeders • NC machine tools • Material handlings
High thrust density. Magnetic attraction counter-force structure enables longer life of the linear guides and lower audible noise.		• The motor primary side consists of laminated core and motor coil. The coil is inserted into the slots on the core. The entire section is molded with resin. • The secondary side consists of permanent magnets and mounting plates. The permanent magnets are precisely positioned and fixed on the mounting plates, which are located on both sides of the primary side, and then covered with SUS plate.	• Semiconductor mounting systems • Wafer cleaning systems • LCD assembly machines
No cogging and small speed fluctuation. No magnetic attraction force structure extends life of the linear guides.		• The motor primary side consists of motor coil and no laminated core. The coil is precisely positioned on the base, and molded with resin. • The secondary side consists of permanent magnets and mounting plate. The permanent magnets are precisely positioned and fixed to face each other on a U-shaped mounting plate.	• Screen printing systems • Scanning exposure systems • Inspection systems • Material handlings

Model Designation

●LM-H3 series

L M - H 3 P 2 A - 0 7 P - □ (Primary side: coil)

Symbol	Linear servo motor model
BSS0	LM-H3P2A-07P
CSS0	LM-H3P3A-12P
	LM-H3P3B-24P
	LM-H3P3C-36P
	LM-H3P3D-48P
ASS0	LM-H3P7A-24P
	LM-H3P7B-48P
	LM-H3P7C-72P
	LM-H3P7D-96P

Symbol	Maximum speed [m/s]
P	3.0

Symbol	Continuous thrust [N]
07	70
12	120
24	240
36	360
48	480
72	720
96	960

Symbol	Length (nominal) [mm]
A	128
B	224
C	320
D	416

Symbol	Width (nominal) [mm]
2	50
3	65
7	100

Primary side (coil)

L M - H 3 S 2 0 - 2 8 8 - □ (Secondary side: magnet)

Symbol	Linear servo motor model
BSS0	LM-H3S20-288
	LM-H3S20-384
	LM-H3S20-480
	LM-H3S20-768
CSS0	LM-H3S30-288
	LM-H3S30-384
	LM-H3S30-480
	LM-H3S30-768
ASS0	LM-H3S70-288
	LM-H3S70-384
	LM-H3S70-480
	LM-H3S70-768

Symbol	Length (nominal) [mm]
288	288
384	384
480	480
768	768

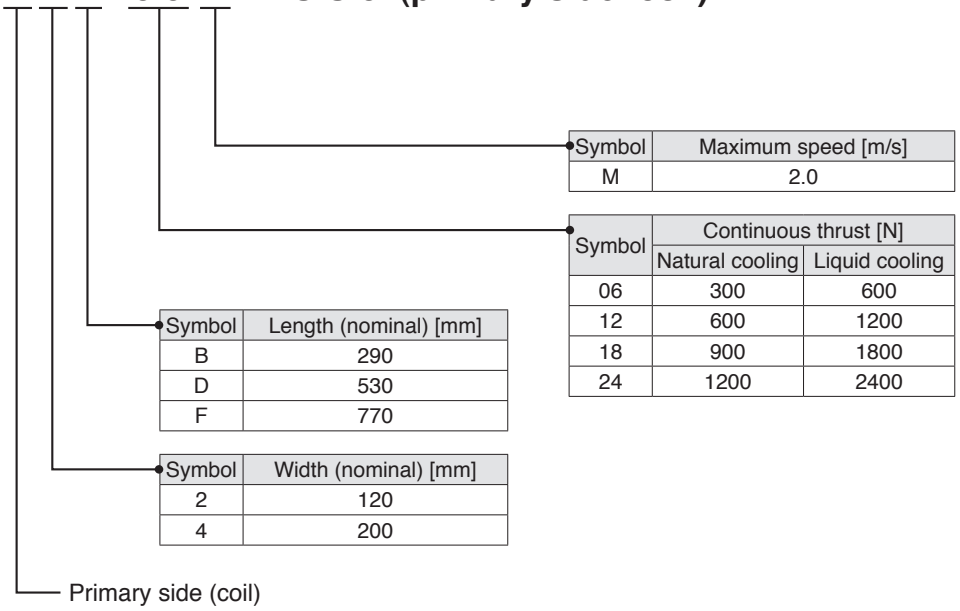
Symbol	Width (nominal) [mm]
2	42
3	60
7	95

Secondary side (magnet)

Model Designation

●LM-F series

L M - F P 2 B - 0 6 M - 1 S S 0 (primary side: coil)



Symbol	Maximum speed [m/s]
M	2.0

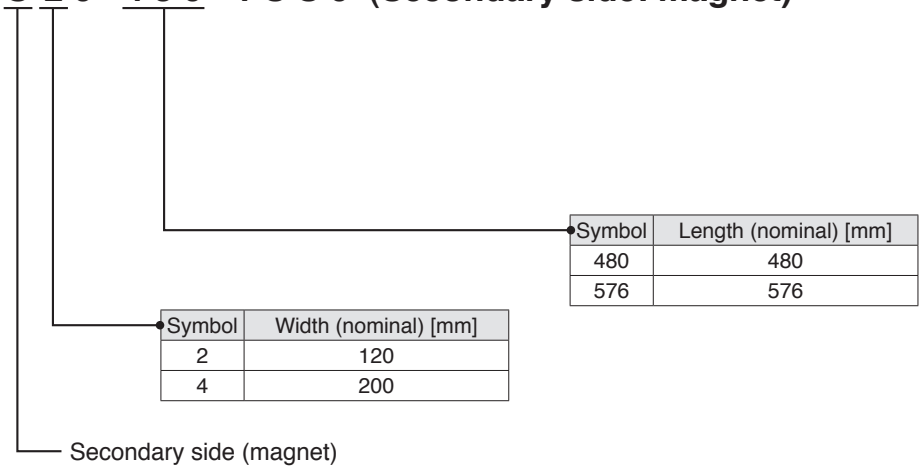
Symbol	Continuous thrust [N]	
	Natural cooling	Liquid cooling
06	300	600
12	600	1200
18	900	1800
24	1200	2400

Symbol	Length (nominal) [mm]
B	290
D	530
F	770

Symbol	Width (nominal) [mm]
2	120
4	200

Primary side (coil)

L M - F S 2 0 - 4 8 0 - 1 S S 0 (Secondary side: magnet)



Symbol	Length (nominal) [mm]
480	480
576	576

Symbol	Width (nominal) [mm]
2	120
4	200

Secondary side (magnet)

Model Designation

●LM-K2 series

L M - K 2 P 1 A - 0 1 M - □ (Primary side: coil)

Symbol	Linear servo motor model
2SS1	LM-K2P1A-01M
	LM-K2P1C-03M
1SS1	LM-K2P2A-02M
	LM-K2P2C-07M
	LM-K2P2E-12M
	LM-K2P3C-14M
	LM-K2P3E-24M

Symbol	Maximum speed [m/s]
M	2.0

Symbol	Continuous thrust [N]
01	120
02	240
03	360
07	720
12	1200
14	1440
24	2400

Symbol	Length (nominal) [mm]
A	138
C	330
E	522

Symbol	Height (nominal) [mm]
1	54
2	74.5
3	114.5

Primary side (coil)

L M - K 2 S 1 0 - 2 8 8 - □ (Secondary side: magnet)

Symbol	Linear servo motor model
2SS1	LM-K2S10-288
	LM-K2S10-384
	LM-K2S10-480
	LM-K2S10-768
1SS1	LM-K2S20-288
	LM-K2S20-384
	LM-K2S20-480
	LM-K2S20-768
	LM-K2S30-288
	LM-K2S30-384
	LM-K2S30-480
	LM-K2S30-768

Symbol	Length (nominal) [mm]
288	288
384	384
480	480
768	768

Symbol	Width (nominal) [mm]
1	46
2	61
3	101

Secondary side (magnet)

Model Designation

●LM-U2 (medium thrust) series

L M - U 2 P A B - 0 5 M - □ (Primary side: coil)

Symbol	Linear servo motor model
0SS0	LM-U2PAB-05M
	LM-U2PAD-10M
	LM-U2PAF-15M
1SS0	LM-U2PBB-07M
	LM-U2PBD-15M
	LM-U2PBF-22M

Symbol	Maximum speed [m/s]
M	2.0

Symbol	Continuous thrust [N]
05	50
07	75
10	100
15	150
22	225

Symbol	Length (nominal) [mm]
B	130
D	250
F	370

Symbol	Width (nominal) [mm]
A	66.5
B	86.5

Primary side (coil)

L M - U 2 S A 0 - 2 4 0 - □ (Secondary side: magnet)

Symbol	Linear servo motor model
0SS0	LM-U2SA0-240
	LM-U2SA0-300
	LM-U2SA0-420
1SS0	LM-U2SB0-240
	LM-U2SB0-300
	LM-U2SB0-420

Symbol	Length (nominal) [mm]
240	240
300	300
420	420

Symbol	Width (nominal) [mm]
A	62
B	82

Secondary side (magnet)

●LM-U2 (large thrust) series

L M - U 2 P 2 B - 4 0 M - □ (Primary side: coil)

Symbol	Linear servo motor model
2SS0	LM-U2P2B-40M
	LM-U2P2C-60M
	LM-U2P2D-80M

Symbol	Maximum speed [m/s]
M	2.0

Symbol	Continuous thrust [N]
40	400
60	600
80	800

Symbol	Length (nominal) [mm]
B	286
C	406
D	526

Primary side (coil)

L M - U 2 S 2 0 - 3 0 0 - □ (Secondary side: magnet)

Symbol	Linear servo motor model
2SS0	LM-U2S20-300
	LM-U2S20-480

Symbol	Length (nominal) [mm]
300	300
480	480

Secondary side (magnet)

Combinations of Linear Servo Motor and Servo Amplifier

With MR-J4 servo amplifier

	Linear servo motor		Servo amplifier
	Primary side (coil)	Secondary side (magnet)	
LM-H3 series	LM-H3P2A-07P-BSS0	LM-H3S20-288-BSS0, LM-H3S20-384-BSS0, LM-H3S20-480-BSS0, LM-H3S20-768-BSS0	MR-J4-40B
	LM-H3P3A-12P-CSS0	LM-H3S30-288-CSS0, LM-H3S30-384-CSS0, LM-H3S30-480-CSS0, LM-H3S30-768-CSS0	MR-J4-40B
	LM-H3P3B-24P-CSS0		MR-J4-70B
	LM-H3P3C-36P-CSS0		MR-J4-70B
	LM-H3P3D-48P-CSS0		MR-J4-200B
	LM-H3P7A-24P-ASS0	LM-H3S70-288-ASS0, LM-H3S70-384-ASS0, LM-H3S70-480-ASS0, LM-H3S70-768-ASS0	MR-J4-70B
	LM-H3P7B-48P-ASS0		MR-J4-200B
	LM-H3P7C-72P-ASS0		MR-J4-200B
	LM-H3P7D-96P-ASS0		MR-J4-350B
LM-F series	LM-FP2B-06M-1SS0	LM-FS20-480-1SS0, LM-FS20-576-1SS0	MR-J4-200B
	LM-FP2D-12M-1SS0		MR-J4-500B
	LM-FP2F-18M-1SS0		MR-J4-700B
	LM-FP4B-12M-1SS0	LM-FS40-480-1SS0, LM-FS40-576-1SS0	MR-J4-500B
	LM-FP4D-24M-1SS0		MR-J4-700B
LM-K2 series	LM-K2P1A-01M-2SS1	LM-K2S10-288-2SS1, LM-K2S10-384-2SS1, LM-K2S10-480-2SS1, LM-K2S10-768-2SS1	MR-J4-40B
	LM-K2P1C-03M-2SS1		MR-J4-200B
	LM-K2P2A-02M-1SS1	LM-K2S20-288-1SS1, LM-K2S20-384-1SS1, LM-K2S20-480-1SS1, LM-K2S20-768-1SS1	MR-J4-70B
	LM-K2P2C-07M-1SS1		MR-J4-350B
	LM-K2P2E-12M-1SS1		MR-J4-500B
	LM-K2P3C-14M-1SS1	LM-K2S30-288-1SS1, LM-K2S30-384-1SS1, LM-K2S30-480-1SS1, LM-K2S30-768-1SS1	MR-J4-350B
	LM-K2P3E-24M-1SS1		MR-J4-500B
LM-U2 series	LM-U2PAB-05M-0SS0	LM-U2SA0-240-0SS0, LM-U2SA0-300-0SS0, LM-U2SA0-420-0SS0	MR-J4-20B
	LM-U2PAD-10M-0SS0		MR-J4-40B
	LM-U2PAF-15M-0SS0		MR-J4-40B
	LM-U2PBB-07M-1SS0	LM-U2SB0-240-1SS0, LM-U2SB0-300-1SS0, LM-U2SB0-420-1SS0	MR-J4-20B
	LM-U2PBD-15M-1SS0		MR-J4-60B
	LM-U2PBF-22M-1SS0		MR-J4-70B
	LM-U2P2B-40M-2SS0	LM-U2S20-300-2SS0, LM-U2S20-480-2SS0	MR-J4-200B
	LM-U2P2C-60M-2SS0		MR-J4-350B
	LM-U2P2D-80M-2SS0		MR-J4-500B

Combinations of Linear Servo Motor and Servo Amplifier

With MR-J4W2 servo amplifier

	Linear servo motor		Servo amplifier	
	Primary side (coil)	Secondary side (magnet)	Model	Axis (Note 1)
LM-H3 series	LM-H3P2A-07P-BSS0	LM-H3S20-288-BSS0, LM-H3S20-384-BSS0, LM-H3S20-480-BSS0, LM-H3S20-768-BSS0	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-H3P3A-12P-CSS0	LM-H3S30-288-CSS0, LM-H3S30-384-CSS0, LM-H3S30-480-CSS0, LM-H3S30-768-CSS0	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-H3P3B-24P-CSS0		MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-H3P3C-36P-CSS0		MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-H3P7A-24P-ASS0	LM-H3S70-288-ASS0, LM-H3S70-384-ASS0, LM-H3S70-480-ASS0, LM-H3S70-768-ASS0	MR-J4W2-77B, MR-J4W2-1010B	A/B
LM-K2 series	LM-K2P1A-01M-2SS1	LM-K2S10-288-2SS1, LM-K2S10-384-2SS1, LM-K2S10-480-2SS1, LM-K2S10-768-2SS1	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-K2P2A-02M-1SS1	LM-K2S20-288-1SS1, LM-K2S20-384-1SS1, LM-K2S20-480-1SS1, LM-K2S20-768-1SS1	MR-J4W2-77B, MR-J4W2-1010B	A/B
LM-U2 series	LM-U2PAB-05M-0SS0	LM-U2SA0-240-0SS0, LM-U2SA0-300-0SS0, LM-U2SA0-420-0SS0	MR-J4W2-22B, MR-J4W2-44B	A/B
	LM-U2PAD-10M-0SS0		MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-U2PAF-15M-0SS0		MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-U2PBB-07M-1SS0	LM-U2SB0-240-1SS0, LM-U2SB0-300-1SS0, LM-U2SB0-420-1SS0	MR-J4W2-22B, MR-J4W2-44B	A/B
	LM-U2PBD-15M-1SS0		MR-J4W2-77B, MR-J4W2-1010B	A/B
	LM-U2PBF-22M-1SS0		MR-J4W2-77B, MR-J4W2-1010B	A/B

With MR-J4W3 servo amplifier

	Linear servo motor		Servo amplifier	
	Primary side (coil)	Secondary side (magnet)	Model	Axis (Note 2)
LM-H3 series	LM-H3P2A-07P-BSS0	LM-H3S20-288-BSS0, LM-H3S20-384-BSS0, LM-H3S20-480-BSS0, LM-H3S20-768-BSS0	MR-J4W3-444B	A/B/C
	LM-H3P3A-12P-CSS0	LM-H3S30-288-CSS0, LM-H3S30-384-CSS0, LM-H3S30-480-CSS0, LM-H3S30-768-CSS0	MR-J4W3-444B	A/B/C
LM-K2 series	LM-K2P1A-01M-2SS1	LM-K2S10-288-2SS1, LM-K2S10-384-2SS1, LM-K2S10-480-2SS1, LM-K2S10-768-2SS1	MR-J4W3-444B	A/B/C
LM-U2 series	LM-U2PAB-05M-0SS0	LM-U2SA0-240-0SS0, LM-U2SA0-300-0SS0, LM-U2SA0-420-0SS0	MR-J4W3-222B, MR-J4W3-444B	A/B/C
	LM-U2PAD-10M-0SS0		MR-J4W3-444B	A/B/C
	LM-U2PAF-15M-0SS0		MR-J4W3-444B	A/B/C
	LM-U2PBB-07M-1SS0	LM-U2SB0-240-1SS0, LM-U2SB0-300-1SS0, LM-U2SB0-420-1SS0	MR-J4W3-222B, MR-J4W3-444B	A/B/C

Notes: 1. A-axis and B-axis indicate names of axes of the multi-axis servo amplifier. Any combination of the servo motors is available such as rotary servo motor for A-axis, and linear servo motor or direct drive motor for B-axis. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motor" on p. 1-5 in this catalog.
2. A-axis, B-axis, and C-axis indicate names of axes of the multi-axis servo amplifier. Any combination of the servo motors is available such as rotary servo motor for A-axis, linear servo motor for B-axis, and direct drive motor for C-axis. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motor" on p. 1-5 in this catalog.

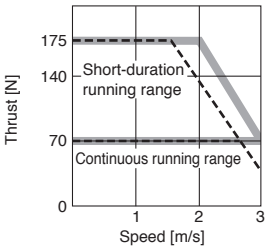
LM-H3 Series Specifications

Linear servo motor model	Primary side (coil)	LM-H3	P2A-07P-BSS0	P3A-12P-CSS0	P3B-24P-CSS0	P3C-36P-CSS0	P3D-48P-CSS0	P7A-24P-ASS0	P7B-48P-ASS0	P7C-72P-ASS0	P7D-96P-ASS0
	Secondary side (magnet)	LM-H3	S20-288-BSS0 S20-384-BSS0 S20-480-BSS0 S20-768-BSS0	S30-288-CSS0 S30-384-CSS0 S30-480-CSS0 S30-768-CSS0				S70-288-ASS0 S70-384-ASS0 S70-480-ASS0 S70-768-ASS0			
Compatible servo amplifier model		MR-J4- MR-J4W_-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on pp. 3-7 and 3-8 in this catalog.								
Power supply capacity		[kVA]	0.9	0.9	1.3	1.9	3.5	1.3	3.5	3.8	5.5
Cooling method			Natural cooling								
Thrust	Continuous	[N]	70	120	240	360	480	240	480	720	960
	Maximum	[N]	175	300	600	900	1200	600	1200	1800	2400
Maximum speed (Note 1)		[m/s]	3.0								
Magnetic attraction force		[N]	630	1100	2200	3300	4400	2200	4400	6600	8800
Rated current		[A]	1.8	1.7	3.4	5.1	6.8	3.4	6.8	10.2	13.6
Maximum current		[A]	5.8	5.0	9.9	14.9	19.8	9.6	19.1	28.6	38.1
Regenerative braking frequency (Note 2)	MR-J4-	[times/min]	175	95	108	78	300	108	308	210	159
	MR-J4W_-	[times/min]	173 (Note 3)	95 (Note 4)	271	197	-	241	-	-	-
Recommended load to motor mass ratio			Maximum of 35 times the mass of the linear servo motor primary side								
Structure			Open (IP rating: IP00)								
Environment	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		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		49 m/s^2								
Mass	Primary side (coil)	[kg]	0.9	1.3	2.3	3.3	4.3	2.2	3.9	5.6	7.3
	Secondary side (magnet)	[kg]	288 mm/pc: 0.7 384 mm/pc: 0.9 480 mm/pc: 1.1 768 mm/pc: 1.8	288 mm/pc: 1.0 384 mm/pc: 1.4 480 mm/pc: 1.7 768 mm/pc: 2.7				288 mm/pc: 2.8 384 mm/pc: 3.7 480 mm/pc: 4.7 768 mm/pc: 7.4			

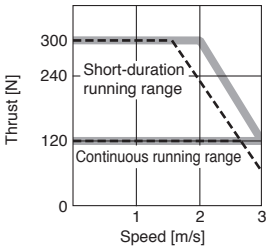
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). 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] of the regenerative options.
3. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 942 for MR-J4W2-77B or MR-J4W2-1010B.
4. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 497 for MR-J4W2-77B or MR-J4W2-1010B.

LM-H3 Series Thrust Characteristics (Note 3)

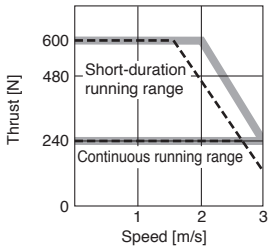
LM-H3P2A-07P-BSS0 (Note 1, 2)



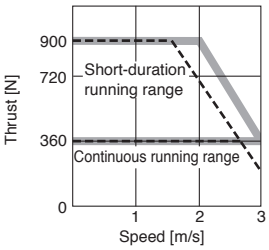
LM-H3P3A-12P-CSS0 (Note 1, 2)



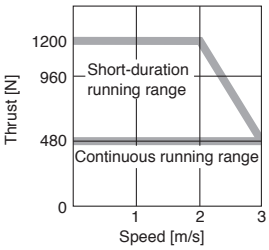
LM-H3P3B-24P-CSS0 (Note 1, 2)



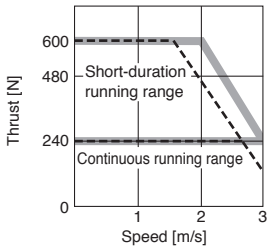
LM-H3P3C-36P-CSS0 (Note 1, 2)



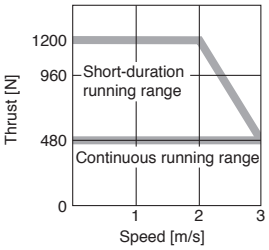
LM-H3P3D-48P-CSS0 (Note 1)



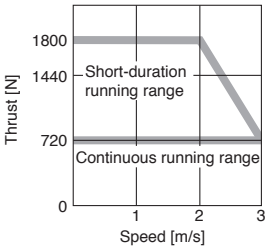
LM-H3P7A-24P-ASS0 (Note 1, 2)



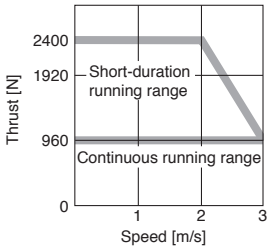
LM-H3P7B-48P-ASS0 (Note 1)



LM-H3P7C-72P-ASS0 (Note 1)



LM-H3P7D-96P-ASS0 (Note 1)



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

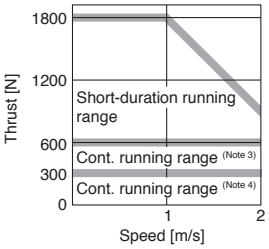
LM-F Series Specifications

Linear servo motor model	Primary side (coil)		LM-F	P2B-06M-1SS0	P2D-12M-1SS0	P2F-18M-1SS0	P4B-12M-1SS0	P4D-24M-1SS0
	Secondary side (magnet)		LM-F	S20-480-1SS0 S20-576-1SS0			S40-480-1SS0 S40-576-1SS0	
Compatible servo amplifier model			MR-J4-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on p. 3-7 in this catalog.				
Power supply capacity			[kVA]	3.5	5.5	10	7.5	18
Cooling method				Natural cooling or liquid cooling				
Thrust	Continuous (natural cooling)		[N]	300	600	900	600	1200
	Continuous (liquid cooling)		[N]	600	1200	1800	1200	2400
	Maximum		[N]	1800	3600	5400	3600	7200
Maximum speed (Note 1)			[m/s]	2.0				
Magnetic attraction force			[N]	4500	9000	13500	9000	18000
Rated current		Natural cooling	[A]	4.0	7.8	12	7.8	15
		Liquid cooling	[A]	7.8	16	23	17	31
Maximum current			[A]	30	58	87	57	109
Regenerative braking frequency (Note 2)	MR-J4-	Natural cooling	[times/min]	348	264	318	393	169
		Liquid cooling	[times/min]	671	396	No limit	366	224
	MR-J4W_-		[times/min]	-	-	-	-	-
Recommended load to motor mass ratio				Maximum of 15 times the mass of the linear servo motor primary side				
Structure				Open (IP rating: IP00)				
Environment	Ambient temperature			0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity			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			49 m/s^2				
Mass	Primary side (coil)		[kg]	9.0	18	27	14	28
	Secondary side (magnet)		[kg]	480 mm/pc: 7.0 576 mm/pc: 9.0			480 mm/pc: 12 576 mm/pc: 15	

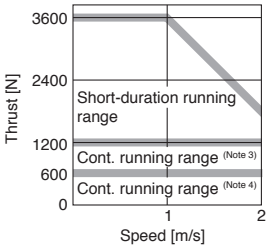
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). 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] of the regenerative options.

LM-F Series Thrust Characteristics (Note 2)

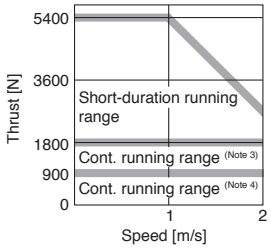
LM-FP2B-06M-1SS0 (Note 1)



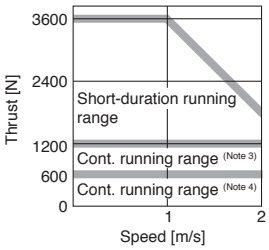
LM-FP2D-12M-1SS0 (Note 1)



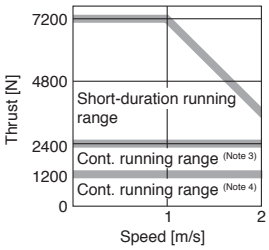
LM-FP2F-18M-1SS0 (Note 1)



LM-FP4B-12M-1SS0 (Note 1)



LM-FP4D-24M-1SS0 (Note 1)



Notes: 1. ▬ : For 3-phase 200 V AC.
2. Thrust drops when the power supply voltage is below the specified value.
3. Continuous running range (liquid cooling)
4. Continuous running range (natural cooling)

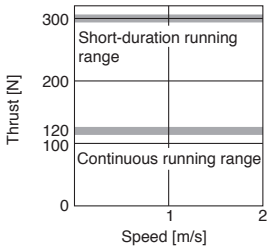
LM-K2 Series Specifications

Linear servo motor model	Primary side (coil)	LM-K2	P1A-01M-2SS1	P1C-03M-2SS1	P2A-02M-1SS1	P2C-07M-1SS1	P2E-12M-1SS1	P3C-14M-1SS1	P3E-24M-1SS1
	Secondary side (magnet) (Note 4)	LM-K2	S10-288-2SS1 S10-384-2SS1 S10-480-2SS1 S10-768-2SS1		S20-288-1SS1 S20-384-1SS1 S20-480-1SS1 S20-768-1SS1			S30-288-1SS1 S30-384-1SS1 S30-480-1SS1 S30-768-1SS1	
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on pp. 3-7 and 3-8 in this catalog.						
		MR-J4W_-							
Power supply capacity		[kVA]	0.9	3.5	1.3	5.5	7.5	5.5	7.5
Cooling method			Natural cooling						
Thrust	Continuous	[N]	120	360	240	720	1200	1440	2400
	Maximum	[N]	300	900	600	1800	3000	3600	6000
Maximum speed (Note 1)		[m/s]	2.0						
Magnetic attraction force		[N]	0						
Rated current		[A]	2.3	6.8	3.7	12	19	15	25
Maximum current		[A]	7.6	23	13	39	65	47	79
Regenerative braking frequency (Note 2)	MR-J4-	[times/min]	111	427	142	281	226	152	124
	MR-J4W_-	[times/min]	110 (Note 3)	-	355	-	-	-	-
Recommended load to motor mass ratio			Maximum of 30 times the mass of the linear servo motor primary side						
Structure			Open (IP rating: IP00)						
Environment	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity		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		49 m/s^2						
Mass	Primary side (coil)	[kg]	2.5	6.5	4.0	10	16	17	27
	Secondary side (magnet)	[kg]	288 mm/pc: 1.5 384 mm/pc: 2.0 480 mm/pc: 2.5 768 mm/pc: 3.9		288 mm/pc: 1.9 384 mm/pc: 2.5 480 mm/pc: 3.2 768 mm/pc: 5.0			288 mm/pc: 5.5 384 mm/pc: 7.3 480 mm/pc: 9.2 768 mm/pc: 14.6	

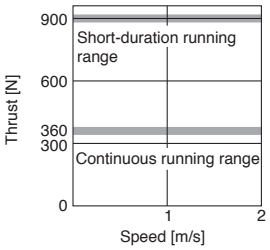
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). 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] of the regenerative options.
3. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 584 for MR-J4W2-77B or MR-J4W2-1010B.
4. LM-K2 series has a structure of magnetic attraction counter-force and requires at least two blocks of identical secondary side (magnet).

LM-K2 Series Thrust Characteristics (Note 3)

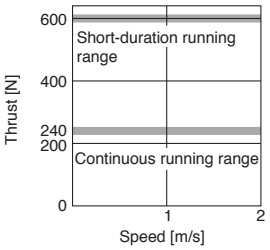
LM-K2P1A-01M-2SS1 (Note 1)



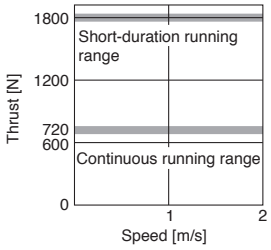
LM-K2P1C-03M-2SS1 (Note 2)



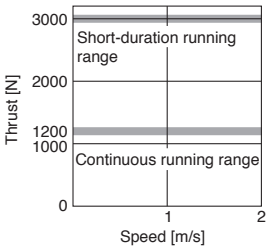
LM-K2P2A-02M-1SS1 (Note 1)



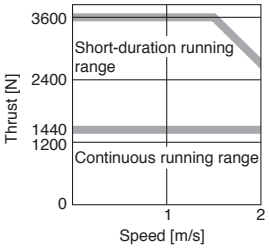
LM-K2P2C-07M-1SS1 (Note 2)



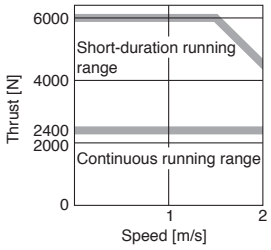
LM-K2P2E-12M-1SS1 (Note 2)



LM-K2P3C-14M-1SS1 (Note 2)



LM-K2P3E-24M-1SS1 (Note 2)



Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 200 V AC.
2. ▬ : For 3-phase 200 V AC.
3. Thrust drops when the power supply voltage is below the specified value.

LM-U2 Series Specifications

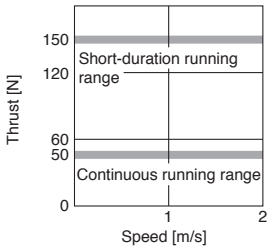
Linear servo motor model	Primary side (coil) LM-U2		PAB-05M-0SS0	PAD-10M-0SS0	PAF-15M-0SS0	PBB-07M-1SS0	PBD-15M-1SS0	PBF-22M-1SS0	P2B-40M-2SS0	P2C-60M-2SS0	P2D-80M-2SS0
	Secondary side (magnet) LM-U2		SA0-240-0SS0 SA0-300-0SS0 SA0-420-0SS0			SB0-240-1SS0 SB0-300-1SS0 SB0-420-1SS0			S20-300-2SS0 S20-480-2SS0		
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on pp. 3-7 and 3-8 in this catalog.								
		MR-J4W_-									
Power supply capacity		[kVA]	0.5	0.9	0.9	0.5	1.0	1.3	3.5	5.5	7.5
Cooling method			Natural cooling								
Thrust	Continuous	[N]	50	100	150	75	150	225	400	600	800
	Maximum	[N]	150	300	450	225	450	675	1600	2400	3200
Maximum speed (Note 1)		[m/s]	2.0								
Magnetic attraction force		[N]	0								
Rated current		[A]	1.0	1.9	2.8	1.5	3.2	4.7	6.6	9.8	13.1
Maximum current		[A]	2.7	5.5	8.3	4.5	8.9	13.7	26.7	40.3	53.7
Regenerative braking frequency (Note 2)	MR-J4-	[times/min]	No limit	No limit	No limit	No limit	3480	No limit	1820	2800	1190
	MR-J4W_-	[times/min]	No limit	No limit	No limit	6030	No limit	No limit	-	-	-
Recommended load to motor mass ratio			Maximum of 30 times the mass of the linear servo motor primary side								
Structure			Open (IP rating: IP00)								
Environment	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		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		49 m/s^2								
Mass	Primary side (coil)	[kg]	0.3	0.6	0.8	0.4	0.8	1.1	2.9	4.2	5.5
	Secondary side (magnet)	[kg]	240 mm/pc: 2.0 300 mm/pc: 2.5 420 mm/pc: 3.5			240 mm/pc: 2.6 300 mm/pc: 3.2 420 mm/pc: 4.5			300 mm/pc: 9.6 480 mm/pc: 15.3		

Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.

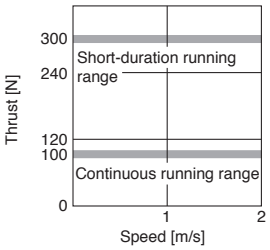
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). 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] of the regenerative options.

LM-U2 Series Thrust Characteristics (Note 3)

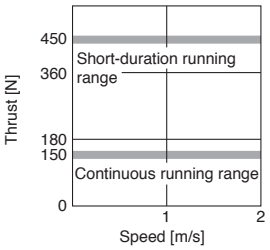
LM-U2PAB-05M-0SS0 (Note 1)



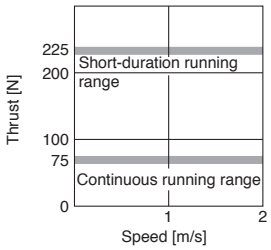
LM-U2PAD-10M-0SS0 (Note 1)



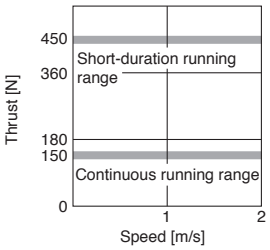
LM-U2PAF-15M-0SS0 (Note 1)



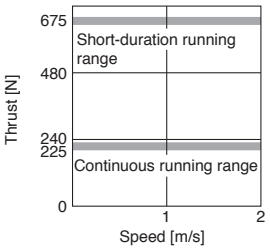
LM-U2PBB-07M-1SS0 (Note 1)



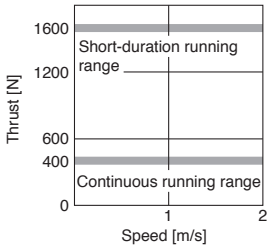
LM-U2PBD-15M-1SS0 (Note 1)



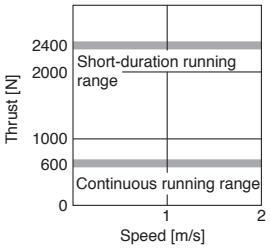
LM-U2PBF-22M-1SS0 (Note 1)



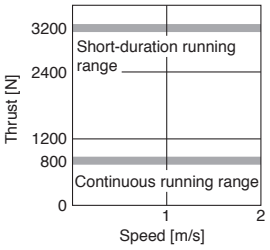
LM-U2P2B-40M-2SS0 (Note 2)



LM-U2P2C-60M-2SS0 (Note 2)



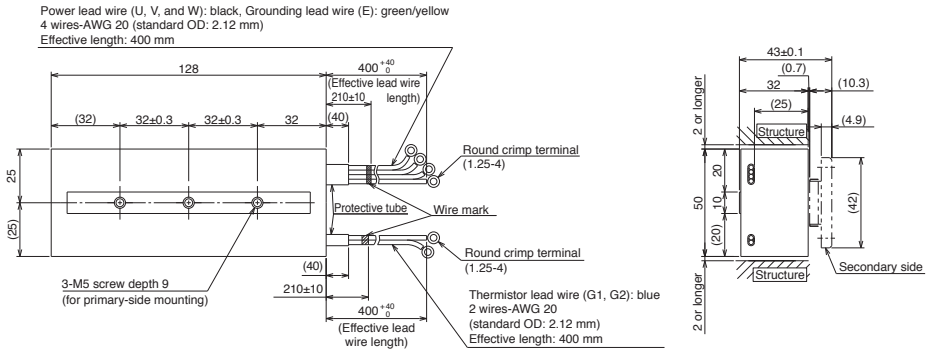
LM-U2P2D-80M-2SS0 (Note 2)



Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 200 V AC.
2. ▬ : For 3-phase 200 V AC.
3. Thrust drops when the power supply voltage is below the specified value.

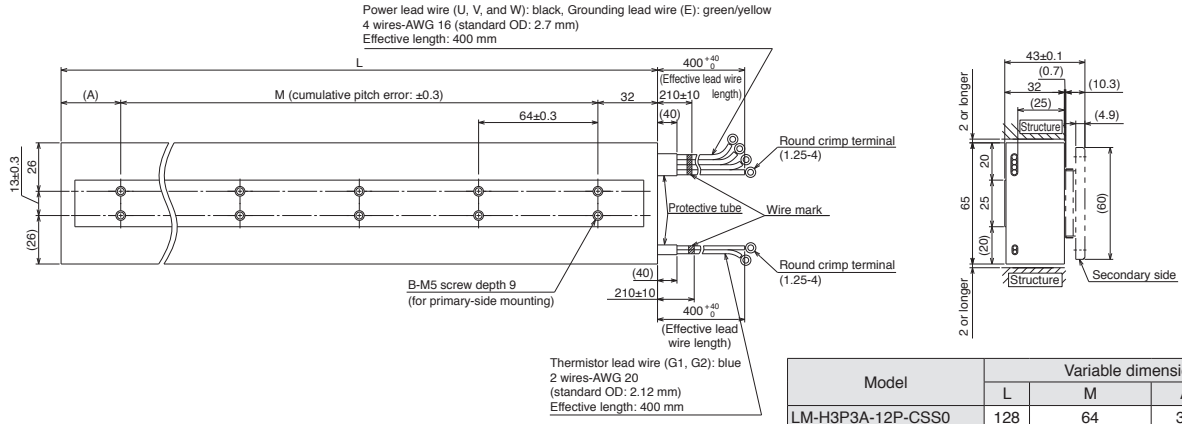
LM-H3 Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-H3P2A-07P-BSS0



[Unit: mm]

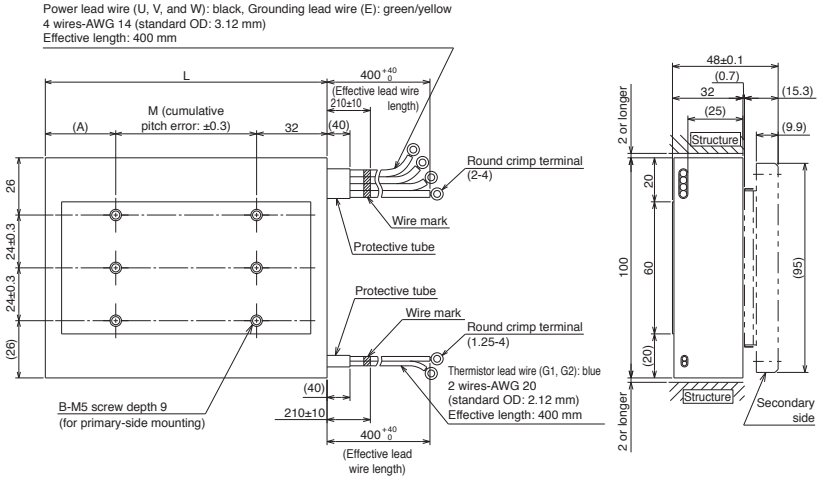
●LM-H3P3A-12P-CSS0 ●LM-H3P3B-24P-CSS0 ●LM-H3P3C-36P-CSS0
●LM-H3P3D-48P-CSS0



[Unit: mm]

Model	Variable dimensions			
	L	M	A	B
LM-H3P3A-12P-CSS0	128	64	32	2 × 2
LM-H3P3B-24P-CSS0	224	2 × 64 = 128	64	2 × 3
LM-H3P3C-36P-CSS0	320	4 × 64 = 256	32	2 × 5
LM-H3P3D-48P-CSS0	416	5 × 64 = 320	64	2 × 6

●LM-H3P7A-24P-ASS0 ●LM-H3P7B-48P-ASS0 ●LM-H3P7C-72P-ASS0
●LM-H3P7D-96P-ASS0



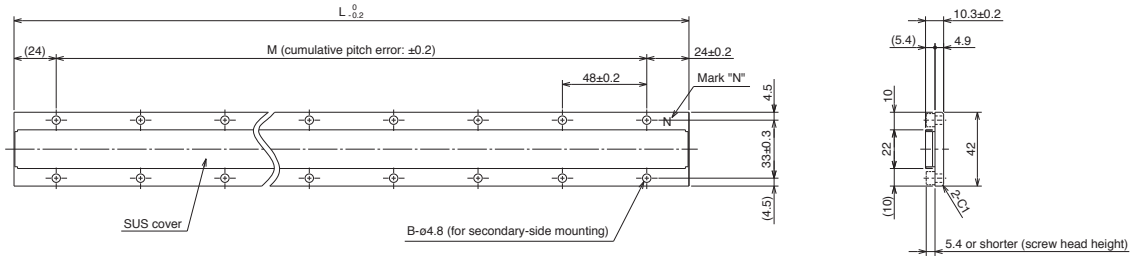
[Unit: mm]

Model	Variable dimensions			
	L	M	A	B
LM-H3P7A-24P-ASS0	128	64	32	3 × 2
LM-H3P7B-48P-ASS0	224	2 × 64 = 128	64	3 × 3
LM-H3P7C-72P-ASS0	320	4 × 64 = 256	32	3 × 5
LM-H3P7D-96P-ASS0	416	5 × 64 = 320	64	3 × 6

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-H3 Series Secondary Side (Magnet) Dimensions

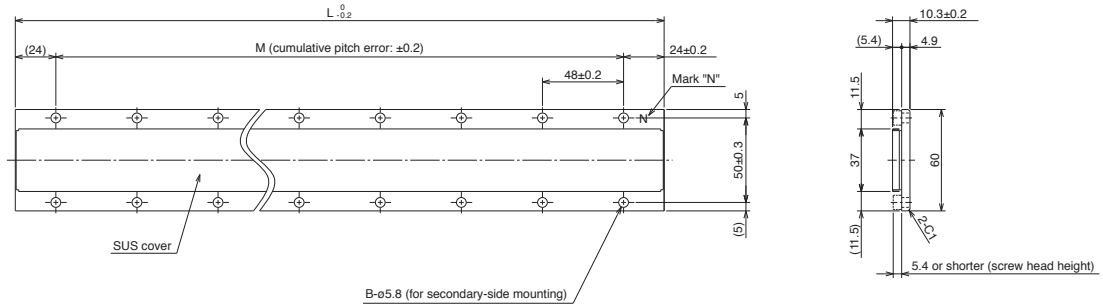
●LM-H3S20-288-BSS0 ●LM-H3S20-384-BSS0 ●LM-H3S20-480-BSS0
●LM-H3S20-768-BSS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S20-288-BSS0	288	5 × 48 = 240	2 × 6
LM-H3S20-384-BSS0	384	7 × 48 = 336	2 × 8
LM-H3S20-480-BSS0	480	9 × 48 = 432	2 × 10
LM-H3S20-768-BSS0	768	15 × 48 = 720	2 × 16

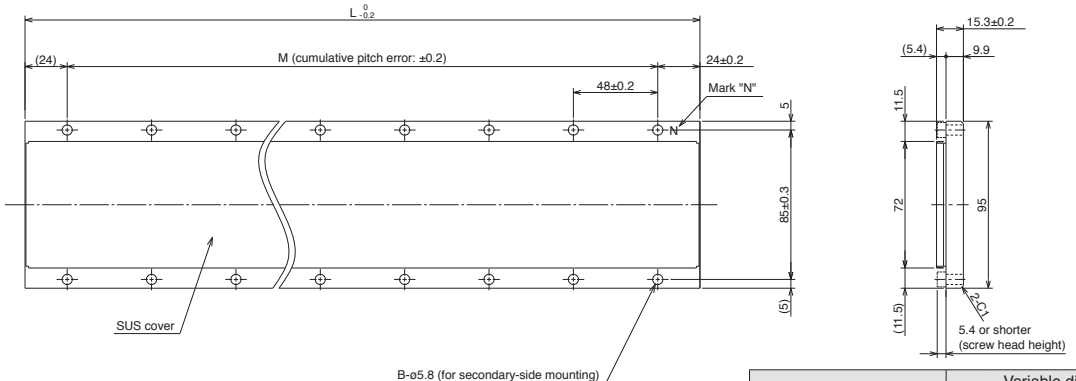
●LM-H3S30-288-CSS0 ●LM-H3S30-384-CSS0 ●LM-H3S30-480-CSS0
●LM-H3S30-768-CSS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S30-288-CSS0	288	5 × 48 = 240	2 × 6
LM-H3S30-384-CSS0	384	7 × 48 = 336	2 × 8
LM-H3S30-480-CSS0	480	9 × 48 = 432	2 × 10
LM-H3S30-768-CSS0	768	15 × 48 = 720	2 × 16

●LM-H3S70-288-ASS0 ●LM-H3S70-384-ASS0 ●LM-H3S70-480-ASS0
●LM-H3S70-768-ASS0

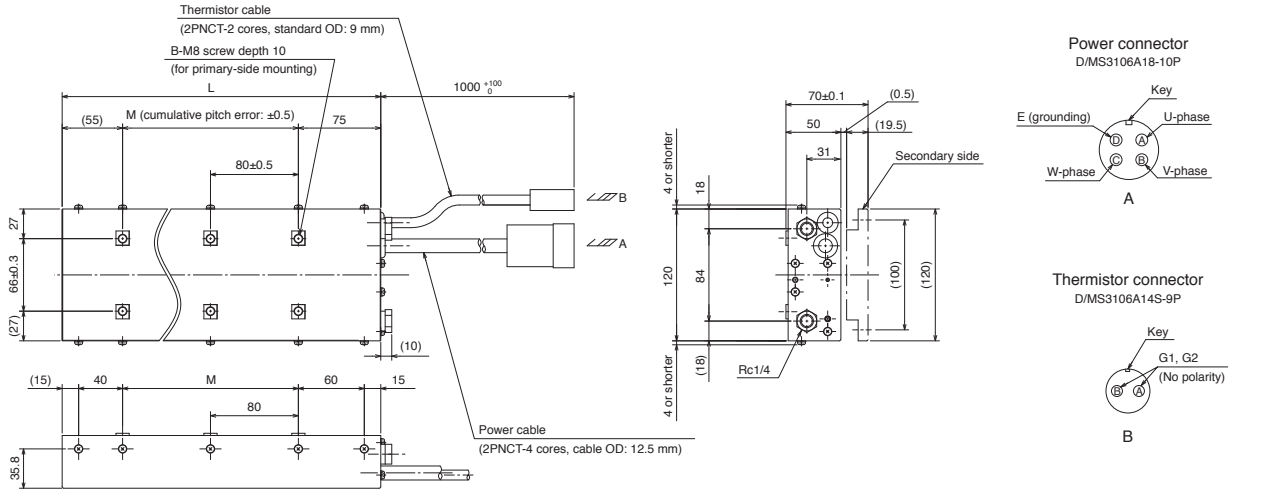


[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S70-288-ASS0	288	5 × 48 = 240	2 × 6
LM-H3S70-384-ASS0	384	7 × 48 = 336	2 × 8
LM-H3S70-480-ASS0	480	9 × 48 = 432	2 × 10
LM-H3S70-768-ASS0	768	15 × 48 = 720	2 × 16

LM-F Series Primary Side (Coil) Dimensions (Note 1, 2)

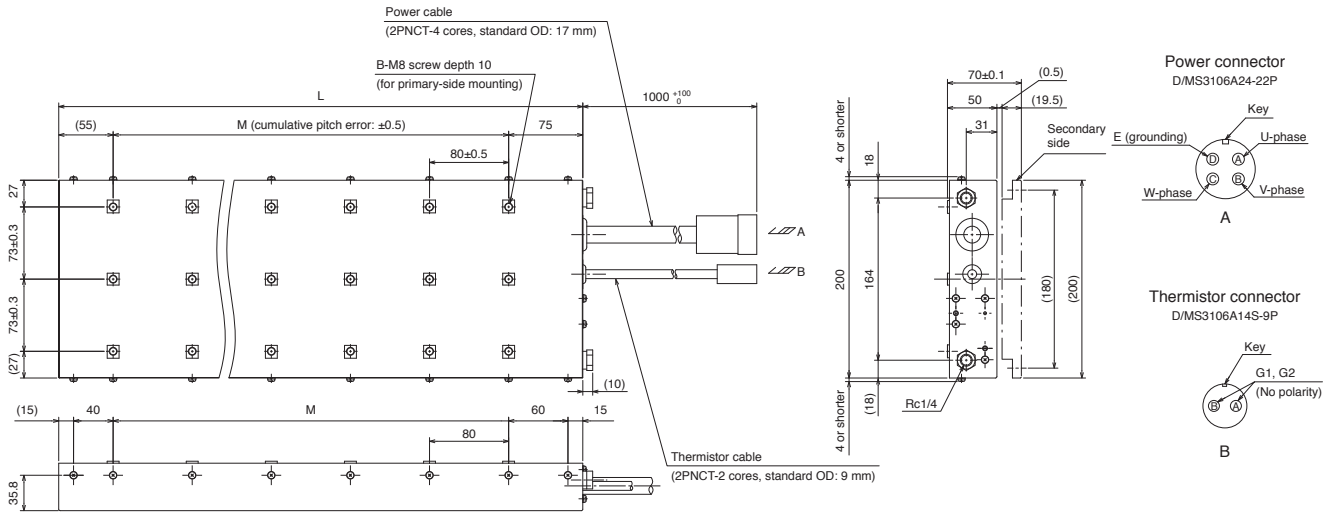
●LM-FP2B-06M-1SS0 ●LM-FP2D-12M-1SS0 ●LM-FP2F-18M-1SS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-FP2B-06M-1SS0	290	2 × 80 = 160	2 × 3
LM-FP2D-12M-1SS0	530	5 × 80 = 400	2 × 6
LM-FP2F-18M-1SS0	770	8 × 80 = 640	2 × 9

●LM-FP4B-12M-1SS0 ●LM-FP4D-24M-1SS0



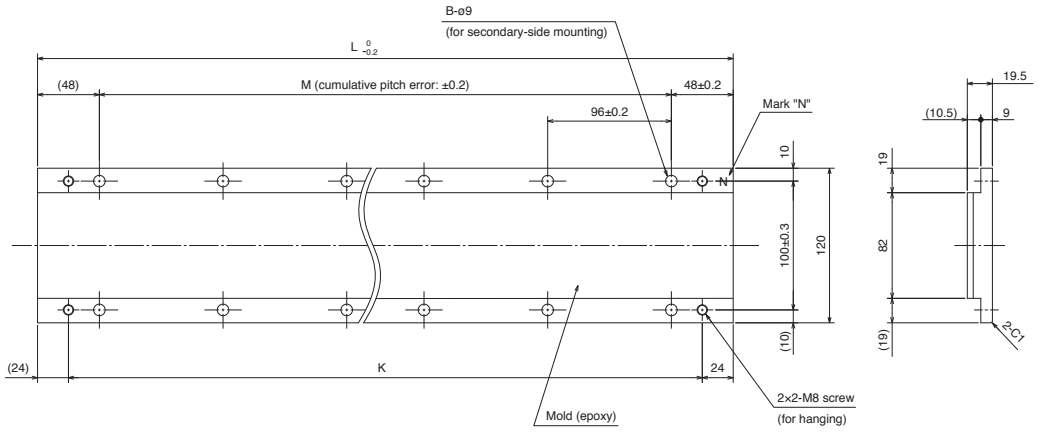
[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-FP4B-12M-1SS0	290	2 × 80 = 160	3 × 3
LM-FP4D-24M-1SS0	530	5 × 80 = 400	3 × 6

Notes: 1. Power and thermistor cables do not have a long bending life. Fix the cables led from the primary side (coil) to a moving part to prevent the cables from repetitive bending.
2. Minimum bending radius of the cable equals to six times the standard overall diameter of the cable.

LM-F Series Secondary Side (Magnet) Dimensions

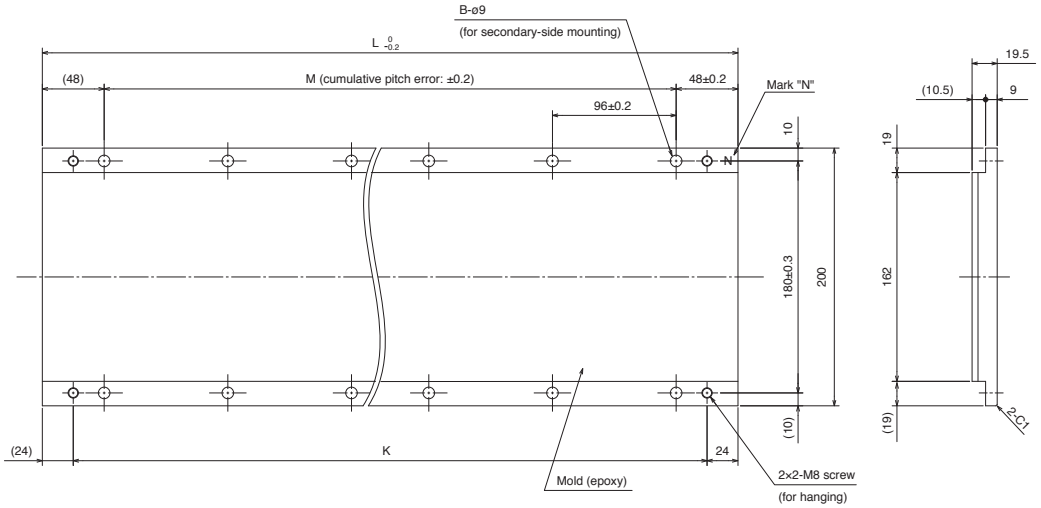
●LM-FS20-480-1SS0 ●LM-FS20-576-1SS0



[Unit: mm]

Model	Variable dimensions			
	L	M	B	K
LM-FS20-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS20-576-1SS0	576	5 × 96 = 480	2 × 6	528

●LM-FS40-480-1SS0 ●LM-FS40-576-1SS0

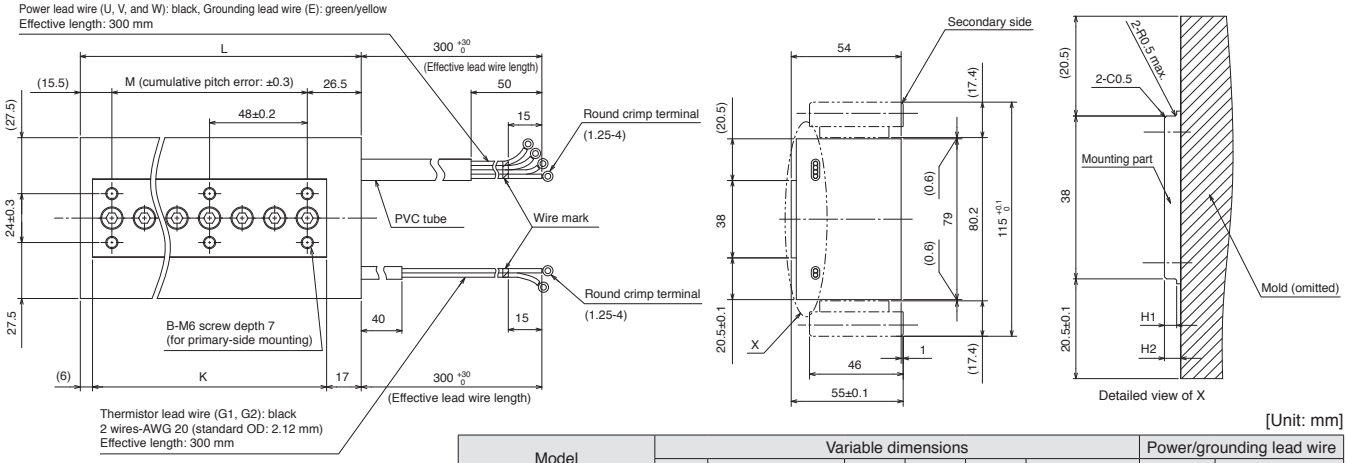


[Unit: mm]

Model	Variable dimensions			
	L	M	B	K
LM-FS40-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS40-576-1SS0	576	5 × 96 = 480	2 × 6	528

LM-K2 Series Primary Side (Coil) Dimensions (Note 1, 2)

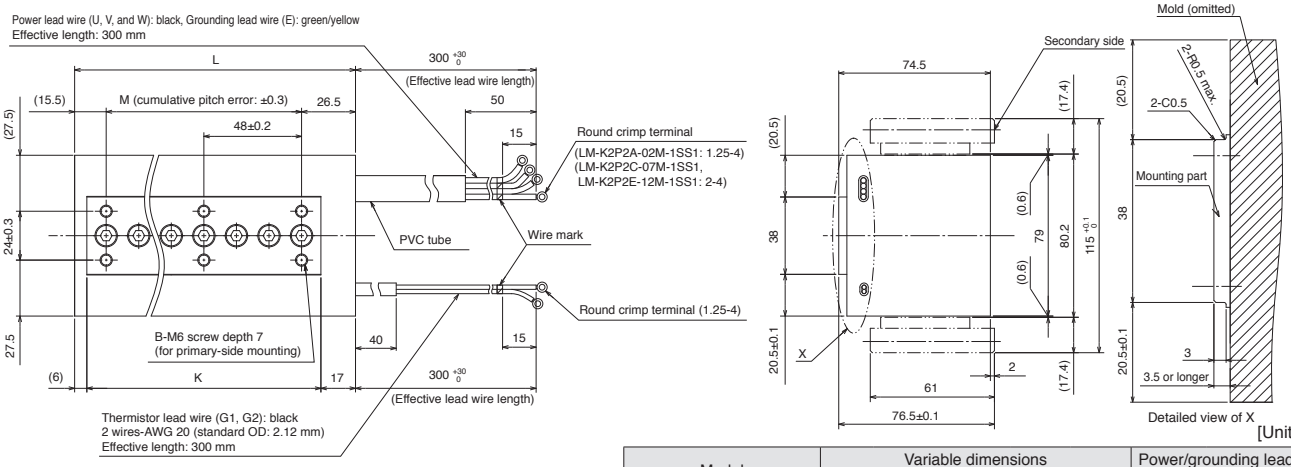
●LM-K2P1A-01M-2SS1 ●LM-K2P1C-03M-2SS1



[Unit: mm]

Model	Variable dimensions						Power/grounding lead wire	
	L	M	K	B	H1	H2	Size	Standard OD
LM-K2P1A-01M-2SS1	138	2 × 48 = 96	115	2 × 3	3	3.5 or longer	AWG 20	2.12
LM-K2P1C-03M-2SS1	330	6 × 48 = 288	307	2 × 7	1.5	2.5 or longer	AWG 16	2.7

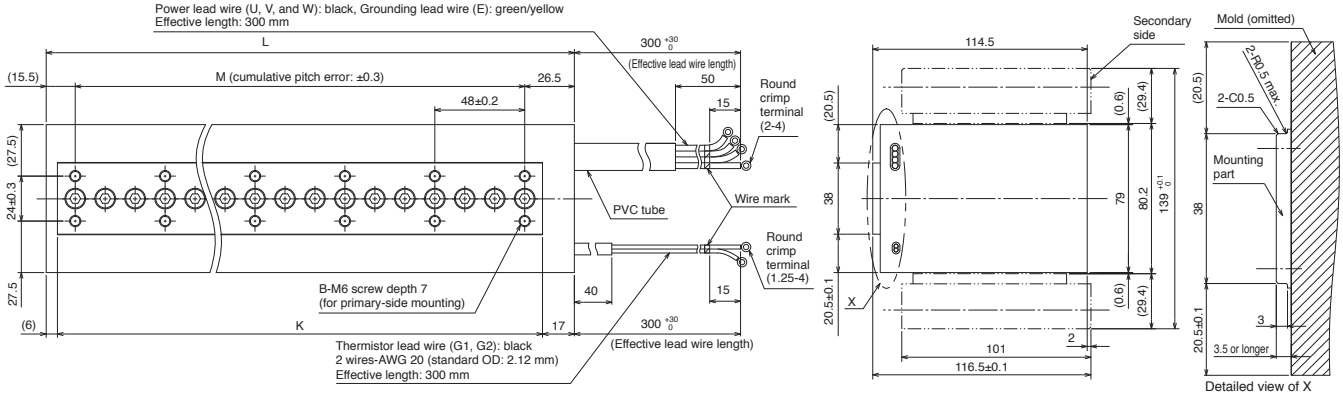
●LM-K2P2A-02M-1SS1 ●LM-K2P2C-07M-1SS1 ●LM-K2P2E-12M-1SS1



[Unit: mm]

Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P2A-02M-1SS1	138	2 × 48 = 96	115	2 × 3	AWG 16	2.7
LM-K2P2C-07M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P2E-12M-1SS1	522	10 × 48 = 480	499	2 × 11		

●LM-K2P3C-14M-1SS1 ●LM-K2P3E-24M-1SS1



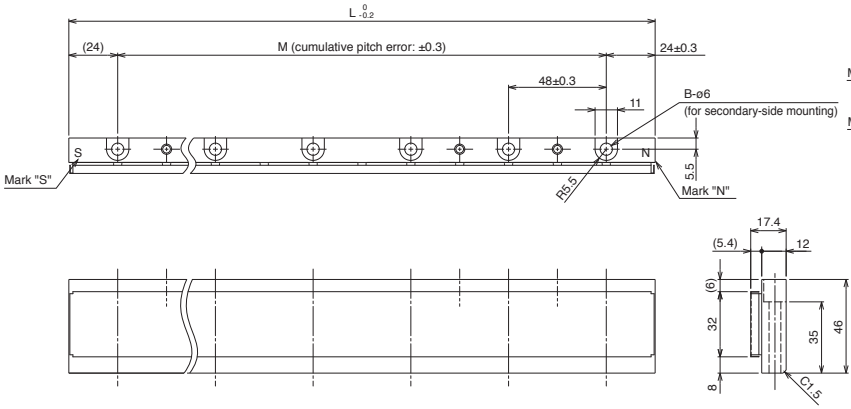
[Unit: mm]

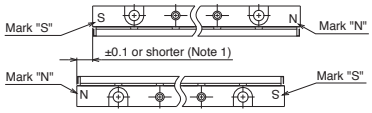
Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P3C-14M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P3E-24M-1SS1	522	10 × 48 = 480	499	2 × 11		

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-K2 Series Secondary Side (Magnet) Dimensions

●LM-K2S10-288-2SS1 ●LM-K2S10-384-2SS1 ●LM-K2S10-480-2SS1
●LM-K2S10-768-2SS1



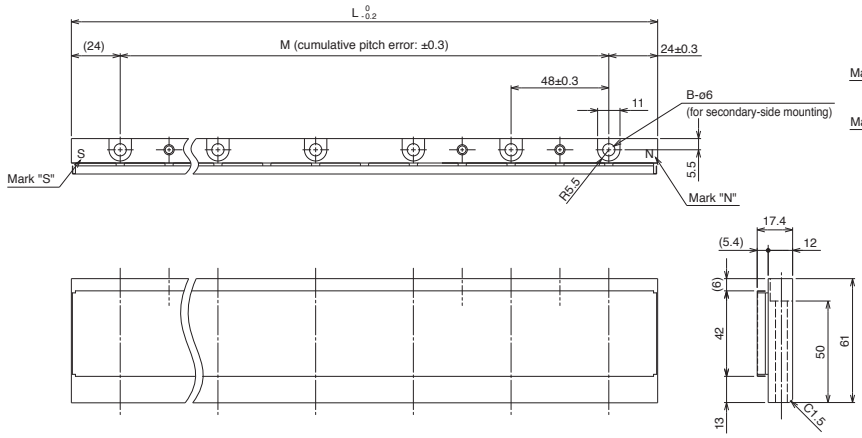


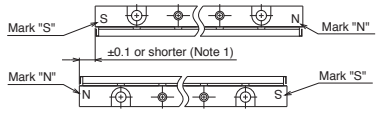
Detailed view of secondary-side ends

[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-K2S10-288-2SS1	288	5 × 48 = 240	6
LM-K2S10-384-2SS1	384	7 × 48 = 336	8
LM-K2S10-480-2SS1	480	9 × 48 = 432	10
LM-K2S10-768-2SS1	768	15 × 48 = 720	16

●LM-K2S20-288-1SS1 ●LM-K2S20-384-1SS1 ●LM-K2S20-480-1SS1
●LM-K2S20-768-1SS1



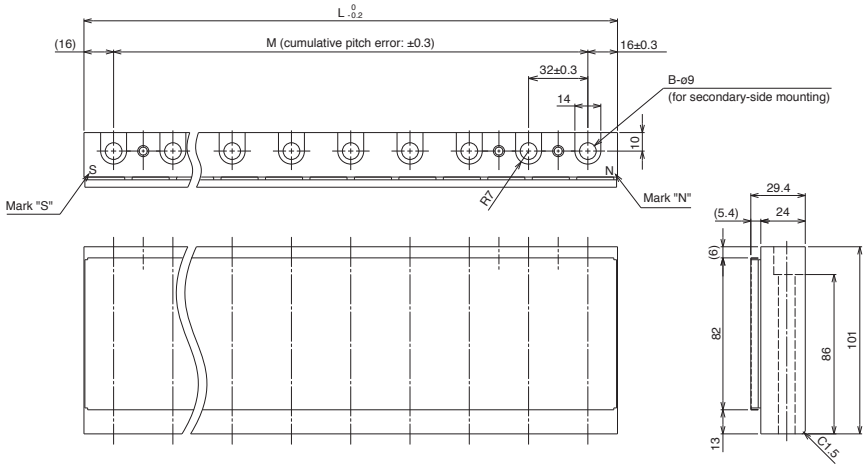


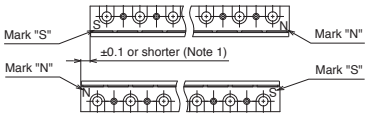
Detailed view of secondary-side ends

[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-K2S20-288-1SS1	288	5 × 48 = 240	6
LM-K2S20-384-1SS1	384	7 × 48 = 336	8
LM-K2S20-480-1SS1	480	9 × 48 = 432	10
LM-K2S20-768-1SS1	768	15 × 48 = 720	16

●LM-K2S30-288-1SS1 ●LM-K2S30-384-1SS1 ●LM-K2S30-480-1SS1
●LM-K2S30-768-1SS1





Detailed view of secondary-side ends

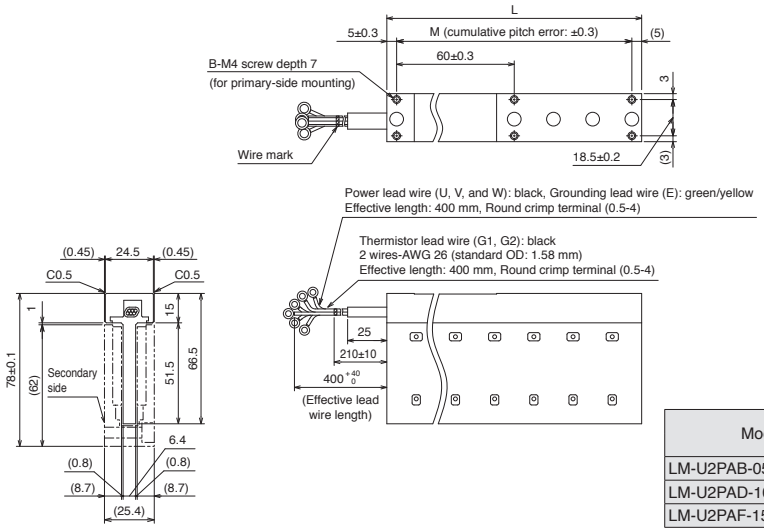
[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-K2S30-288-1SS1	288	8 × 32 = 256	9
LM-K2S30-384-1SS1	384	11 × 32 = 352	12
LM-K2S30-480-1SS1	480	14 × 32 = 448	15
LM-K2S30-768-1SS1	768	23 × 32 = 736	24

Notes: 1. Longitudinal deviation of the secondary side must be within ±0.1 mm.

LM-U2 Series Primary Side (Coil) Dimensions (Note 1, 2)

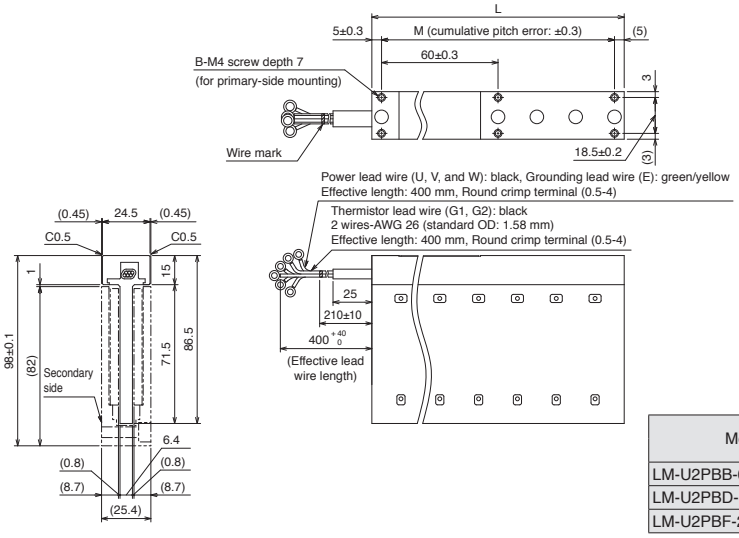
●LM-U2PAB-05M-0SS0 ●LM-U2PAD-10M-0SS0 ●LM-U2PAF-15M-0SS0



[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2PAB-05M-0SS0	130	2 × 60 = 120	2 × 3	AWG 26	1.58
LM-U2PAD-10M-0SS0	250	4 × 60 = 240	2 × 5		
LM-U2PAF-15M-0SS0	370	6 × 60 = 360	2 × 7		

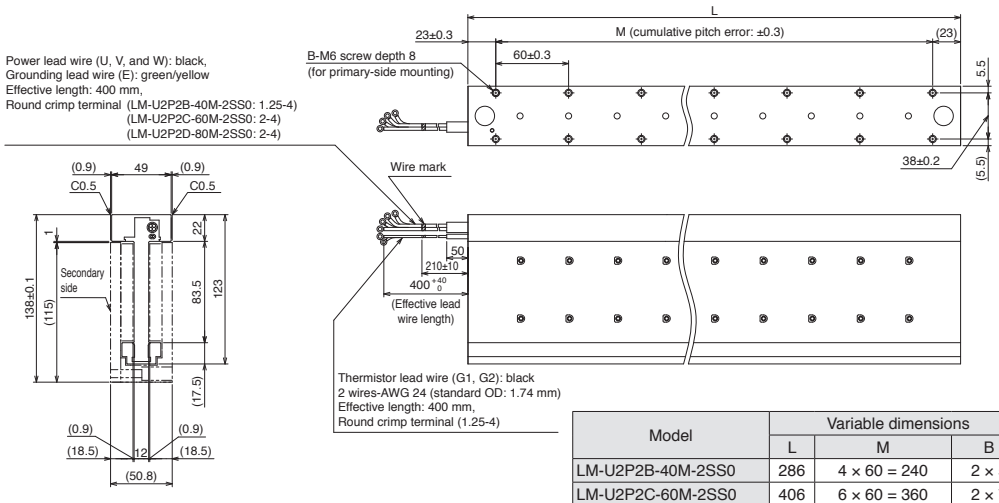
●LM-U2PBB-07M-1SS0 ●LM-U2PBD-15M-1SS0 ●LM-U2PBF-22M-1SS0



[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2PBB-07M-1SS0	130	2 × 60 = 120	2 × 3	AWG 26	1.58
LM-U2PBD-15M-1SS0	250	4 × 60 = 240	2 × 5		
LM-U2PBF-22M-1SS0	370	6 × 60 = 360	2 × 7		

●LM-U2P2B-40M-2SS0 ●LM-U2P2C-60M-2SS0 ●LM-U2P2D-80M-2SS0



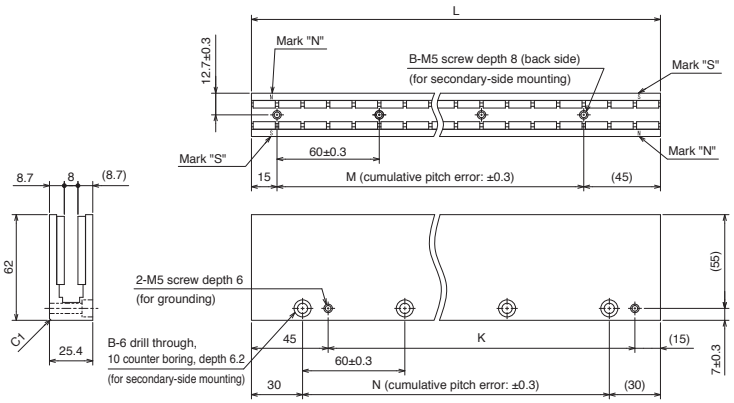
[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2P2B-40M-2SS0	286	4 × 60 = 240	2 × 5	AWG 16	2.7
LM-U2P2C-60M-2SS0	406	6 × 60 = 360	2 × 7	AWG 14	3.12
LM-U2P2D-80M-2SS0	526	8 × 60 = 480	2 × 9		

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-U2 Series Secondary Side (Magnet) Dimensions

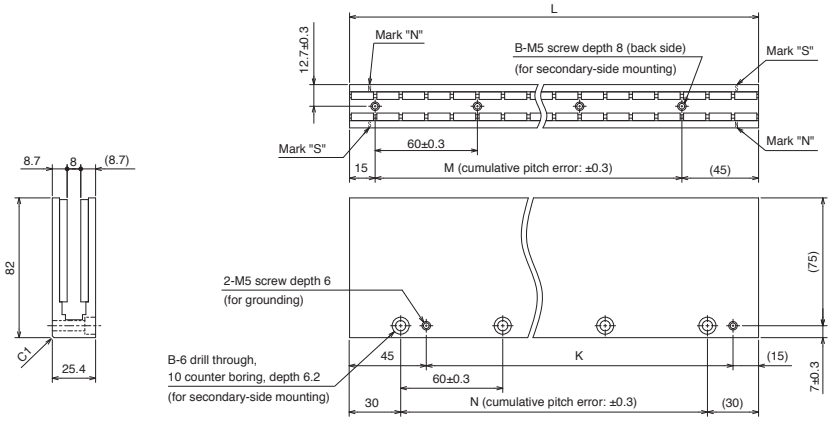
●LM-U2SA0-240-0SS0 ●LM-U2SA0-300-0SS0 ●LM-U2SA0-420-0SS0



[Unit: mm]

Model	Variable dimensions				
	L	M	B	K	N
LM-U2SA0-240-0SS0	240	3 × 60 = 180	4	180	3 × 60 = 180
LM-U2SA0-300-0SS0	300	4 × 60 = 240	5	240	4 × 60 = 240
LM-U2SA0-420-0SS0	420	6 × 60 = 360	7	360	6 × 60 = 360

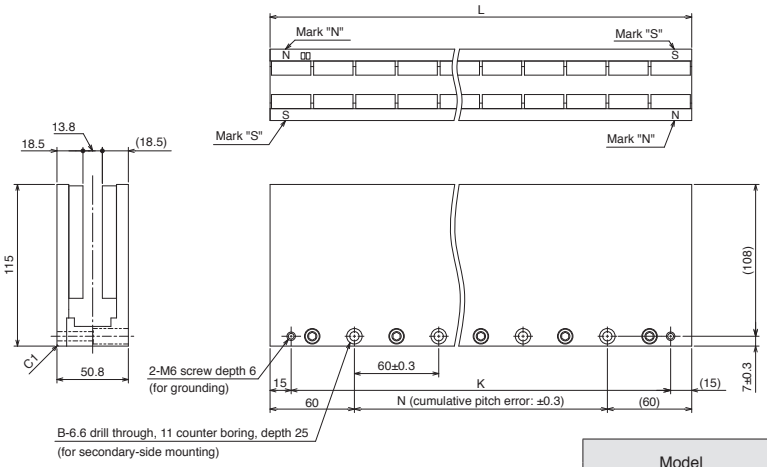
●LM-U2SB0-240-1SS0 ●LM-U2SB0-300-1SS0 ●LM-U2SB0-420-1SS0



[Unit: mm]

Model	Variable dimensions				
	L	M	B	K	N
LM-U2SB0-240-1SS0	240	3 × 60 = 180	4	180	3 × 60 = 180
LM-U2SB0-300-1SS0	300	4 × 60 = 240	5	240	4 × 60 = 240
LM-U2SB0-420-1SS0	420	6 × 60 = 360	7	360	6 × 60 = 360

●LM-U2S20-300-2SS0 ●LM-U2S20-480-2SS0



[Unit: mm]

Model	Variable dimensions			
	L	N	B	K
LM-U2S20-300-2SS0	300	3 × 60 = 180	4	270
LM-U2S20-480-2SS0	480	6 × 60 = 360	7	450

List of Linear Encoders (Note 1)

Linear encoder type	Manufacturer	Model	Resolution	Rated speed (Note 2)	Maximum effective measurement length (Note 3)	Communication method
Absolute type	Magnescale Co., Ltd.	SR77	0.05 μm/0.01 μm	3.3 m/s	2040 mm	Two-wire type
		SR87			3040 mm	
	Mitutoyo Corporation	AT343A	0.05 μm	2.0 m/s	3000 mm	Two-wire type
		AT543A-SC		2.5 m/s	2200 mm	
		AT545A-SC	20 μm/4096 (Approx. 0.005 μm)	2.5 m/s	2200 mm	
		ST741A	0.5 μm	4.0 m/s	6000 mm	
		ST742A				
		ST743A	0.1 μm			
		ST744A				
	Renishaw	RESOLUTE RL40M	1 nm/50 nm	4.0 m/s	10000 mm	Two-wire type
	Heidenhain	LC 493M	0.05 μm/0.01 μm	3.0 m/s	2040 mm	Four-wire type (Note 4)
		LC 193M			4240 mm	
Incremental type	Magnescale Co., Ltd.	SR75	0.05 μm/0.01 μm	3.3 m/s	2040 mm	Two-wire type
		SR85			3040 mm	
		SL710 + PL101-RM/ RHM	0.1 μm	4.0 m/s	100000 mm	
	Renishaw	RGH26P	5 μm	4.0 m/s	70000 mm	Two-wire type
		RGH26Q	1 μm	3.2 m/s		
		RGH26R	0.5 μm	1.6 m/s		
	Heidenhain	LIDA 485 + EIB 392M	20 μm/16384 (Approx. 1.22 nm)	4.0 m/s	30040 mm	Four-wire type (Note 4)
		LIDA 487 + EIB 392M			6040 mm	

Notes: 1. Contact the relevant linear encoder manufacturer for details on operating environment and specifications of the linear encoder such as ambient temperature, vibration resistance and IP rating.
2. The rated speed of the linear encoder is applicable when the linear encoder is used with MR-J4 series servo amplifier. The values may differ from the manufacturers' specifications.
3. The length is specified by the linear encoder manufacturers. The maximum length of the encoder cable between linear encoder and servo amplifier is 30 m.
4. For fully closed loop control system, use two-wire type linear encoder. Four-wire type cannot be used.

Selecting Linear Servo Motor

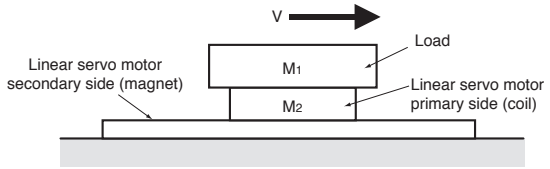
- **Linear servo motor must be selected according to the purpose of the application. Select the optimal linear servo motor after completely understanding the characteristics of the guides, the linear encoders and the linear servo motors.**
- **The maximum speed is 3.0 m/s for LM-H3 series, and 2.0 m/s for LM-F, LM-K2 and LM-U2 series. Note that the maximum speed may not be reached, depending on the selected linear encoder.**

Linear Servo Motor Sizing Example

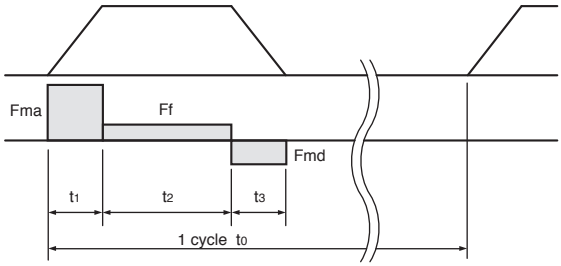
- **In order to select a suitable linear servo motor, it is necessary to calculate the maximum thrust required during acceleration/deceleration and the continuous effective load thrust according to the machine specifications and the operating patterns. Here the linear servo motor is selected according to linear acceleration/deceleration operating patterns.**

1. Selection criteria

(1) Configurations



(2) Operating pattern



Load mass	M_1 = 20 kg
Linear servo motor primary-side (coil) mass (Determined after the motor is selected.)	M_2 = kg
Acceleration	a = 14.4 m/s^2
Deceleration	d = 14.4 m/s^2
Resistive force (including friction, unbalance and cable chain) (Determined after the motor is selected.)	Ff = N
Feed speed	V = 1.8 m/s
Operating cycle	t_0 = 2 s
Acceleration time	t_1 = 0.125 s
Constant velocity time	t_2 = 0.75 s
Deceleration time	t_3 = 0.125 s
Mechanical efficiency	η = 1.0
Friction coefficient	μ = 0.020 (for iron)

2. Method of selecting linear servo motor (theoretical value)

(1) Select a linear servo motor

From the linear servo motor series that is suitable for your application or machine, select a linear servo motor with the mass ratio of load to primary side (coil) which is equal to or less than the recommended load to motor mass ratio.

For LM-H3 series: 35 times (Note 1) $\geq M_1/M_2$

Select linear servo motors that satisfy the above formula, e.g., LM-H3P2A-07P-BSS0, LM-H3P3A-12P-CSS0, and LM-H3P3B-24P-CSS0.

Calculate thrusts during acceleration and deceleration, and continuous effective load thrust for each linear servo motor selected in (1).

The following is an example of calculation for LM-H3P3B-24P-CSS0.

(2) Calculate necessary thrust

Resistive force

$M = M_1 + M_2 = 22.3$ kg

$Ff = \mu \cdot (M \cdot 9.8 +$ Magnetic attraction force [N]) (when considering friction only) = 48.4 N

Thrust during acceleration and deceleration

$Fma = M \cdot a + Ff = 369.5$ N

$Fmd = -M \cdot d + Ff = -272.7$ N

Continuous effective load thrust

$Frms = \sqrt{(Fma^2 \cdot t_1 + Ff^2 \cdot t_2 + Fmd^2 \cdot t_3) / t_0} = 118.6$ N

(3) Verify the selected linear servo motor.

$Frms/\eta \leq$ Continuous thrust [N] of the selected linear servo motor

$Fma/\eta \leq$ Maximum thrust [N] of the selected linear servo motor

If the above criteria are not satisfied, select one rank larger capacity linear servo motor and recalculate.

(4) Result

Select the following:

Linear servo motor: LM-H3P3B-24P-CSS0

Servo amplifier: MR-J4-70B

Notes: 1. The ratio of 35 times is applicable for LM-H3 series. Select a linear servo motor with the mass ratio of 30 times or less for LM-K2 or LM-U2 series, and 15 times or less for LM-F series.

[Free capacity selection software]

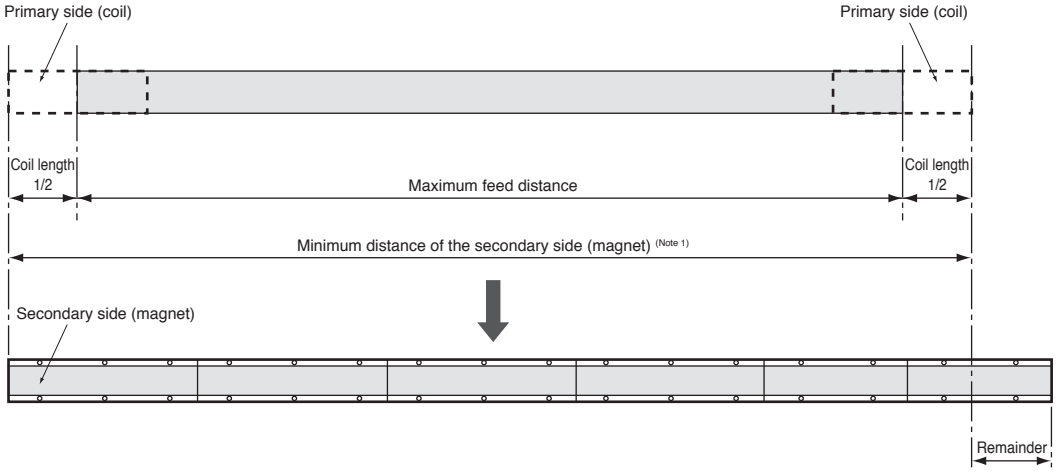
Capacity selection software (MRZJW3-MOTSZ111E) does all the calculations for you. The capacity selection software is available for free download. Contact your local sales office for more details.

* MRZJW3-MOTSZ111E software version C5 or later is compatible.

3. Determining the number of the secondary-side (magnet) blocks

The number of the secondary-side (magnet) blocks is determined according to the total distance calculated from the following equation (Note 2) :

(Total length of aligned secondary side (magnet)) ≥ (Maximum feed distance) + (Length of the primary side (coil))



Notes: 1. Keep the cumulative pitch error of the mounting screw holes within ±0.2 mm. When two or more secondary sides (magnets) are aligned, spaces may exist between each secondary side (magnet) block, depending on the mounting method and the number of the secondary-side blocks.
2. LM-K2 series has a structure of magnetic attraction counter-force and requires at least two blocks of identical secondary side (magnet). Therefore, the total number of the secondary side necessary equals to twice the number determined from the equation.

4. Selecting regenerative option

The following table shows the energy charged into the capacitor of the servo amplifier and the inverse efficiency of the linear servo motor.

The energy consumed by a regenerative resistor is calculated as follows:

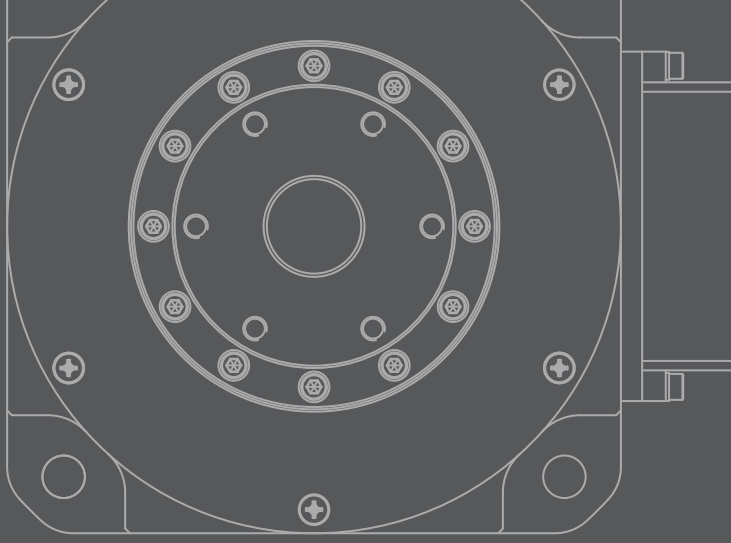
Regenerative energy P [W] = {-Fmd • (t_3 • Speed/2) • (Inverse efficiency/100) - Capacitor charging}/t_0

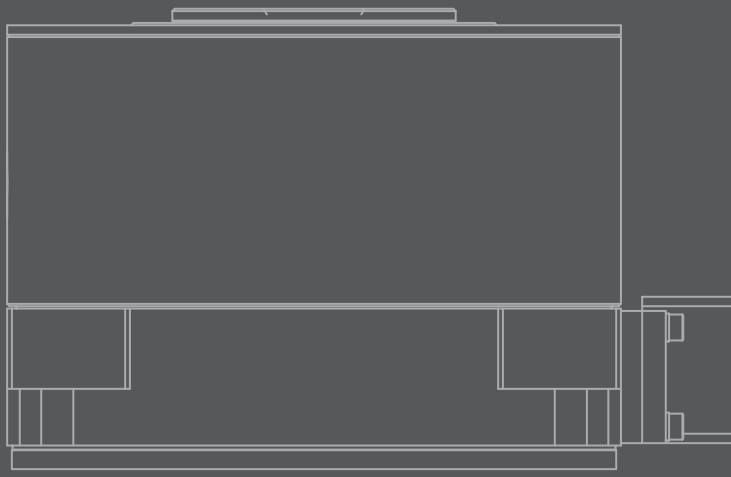
Select a suitable regenerative option as necessary to keep the consumed regenerative energy below the regenerative power shown in the following table:

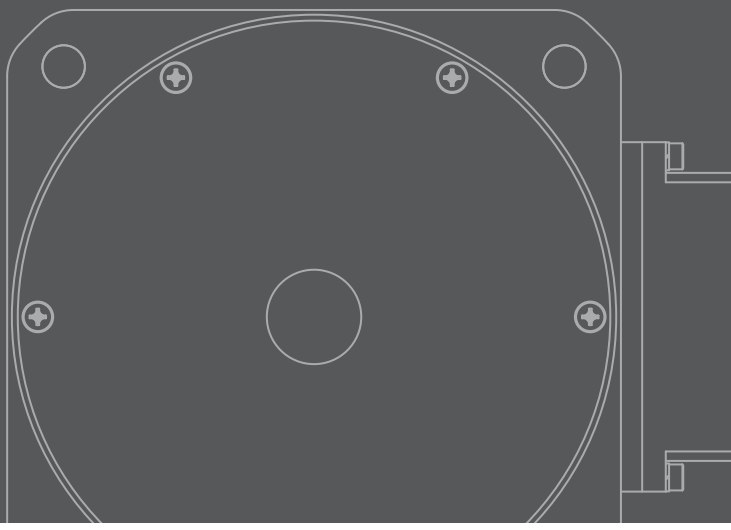
Servo Amplifier (Note 2)	Capacitor charging [J]	Inverse efficiency [%]	Tolerable regenerative power of built-in regenerative resistor [W]	Tolerable regenerative power of regenerative option [W]								
				MR-RB (Note 3)								
				032	12	30	3N	31	32	50 (Note 1)	5N (Note 1)	51 (Note 1)
				40 Ω	40 Ω	13 Ω	9 Ω	6.7 Ω	40 Ω	13 Ω	9 Ω	6.7 Ω
MR-J4-20B	9	75	10	30	100	-	-	-	-	-	-	-
MR-J4-40B	11	85	10	30	100	-	-	-	-	-	-	-
MR-J4-60B	11	85	10	30	100	-	-	-	-	-	-	-
MR-J4-70B	18	85	20	30	100	-	-	-	300	-	-	-
MR-J4-200B	36	85	100	-	-	300	-	-	-	500	-	-
MR-J4-350B	40	85	100	-	-	-	300	-	-	-	500	-
MR-J4-500B	45	90	130	-	-	-	-	300	-	-	-	500
MR-J4-700B	70	90	170	-	-	-	-	300	-	-	-	500

Notes: 1. Be sure to cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m³/min). The cooling fan must be prepared by user.
2. For selecting a regenerative option for MR-J4W_-B, refer to "MR-J4W_-_B Servo Amplifier Instruction Manual" for details.
3. Refer to "Regenerative Option" in this catalog for details on the regenerative option.

4







* Refer to p. 5-45 in this catalog for conversion of units.

Direct Drive Motors

Direct Drive Motors

Product lines

Direct drive motor series	Motor outer diameter [mm]	Hollow shaft diameter [mm]	Rated speed [r/min]	Maximum speed [r/min]	Torque: 10 N•m – 100 N•m – 1000 N•m
TM-RFM series 	ø130	ø20	200	500	Rating: 2 – 6; Maximum: 6 – 18
	ø180	ø47	200	500	Rating: 6 – 18; Maximum: 18 – 54
	ø230	ø62	200	500	Rating: 12 – 72; Maximum: 36 – 216
	ø330	ø104	100	200	Rating: 40 – 240; Maximum: 120 – 720

Features

Mitsubishi direct drive motors with high-level structural design technologies offer a high performance servo solution. The motor achieves very high torque density owing to our latest magnetic design and winding technologies, and the 20-bit (1,048,576 pulses/rev) absolute/incremental encoder allows for extreme accuracy. The motor's low profile design contributes to compact construction and a low center of gravity for enhanced machine stability.

- **12 types of motors with outer diameter ranges from ø130 mm to 330 mm**
- **Large hollow shaft ranges from ø20 mm to 104 mm diameter**
- **High torque at low speed - torque ranges from 6 N•m to 720 N•m**
- **No backlash - direct drive achieves accurate operation and shorter settling times**
- **No transmission elements such as gearbox and belts necessary - this offers smooth operation with less audible noise**
- **Clean room compatible**

	Rated torque [N•m]	Maximum torque [N•m]	IP rating (Note 1)	Features	Application examples
	Three types 2, 4, 6	6, 12, 18	IP42	• Suitable for low speed and high torque operations.	• Semiconductor manufacturing devices • Liquid crystal manufacturing devices • Machine tools
	Three types 6, 12, 18	18, 36, 54	IP42		
	Three types 12, 48, 72	36, 144, 216	IP42		
	Three types 40, 120, 240	120, 360, 720	IP42		

Notes: 1. Connectors and gap between rotor and stator are excluded.

Model Designation

T M - R F M □ □ □

Direct drive motor series

Symbol	Rated torque [N•m]
002	2
004	4
006	6
012	12
018	18
040	40
048	48
072	72
120	120
240	240

Symbol	Motor outer diameter [mm] (Frame dimensions)
C	ø130
E	ø180
G	ø230
J	ø330

Symbol	Rated speed [r/min]
10	100
20	200

Combinations of Direct Drive Motor and Servo Amplifier

With MR-J4 servo amplifier

Direct drive motor				Servo amplifier
TM-RFM002C20	-	-	-	MR-J4-20B
TM-RFM004C20	-	-	-	MR-J4-40B
TM-RFM006C20	TM-RFM006E20	-	-	MR-J4-60B
-	TM-RFM012E20	TM-RFM012G20	TM-RFM040J10	MR-J4-70B
-	TM-RFM018E20	-	-	MR-J4-100B
-	-	TM-RFM048G20 TM-RFM072G20	TM-RFM120J10	MR-J4-350B
-	-	-	TM-RFM240J10	MR-J4-500B

With MR-J4W2 servo amplifier

Direct drive motor				Servo amplifier	
				Model	Axis (Note 1)
TM-RFM002C20	-	-	-	MR-J4W2-22B, MR-J4W2-44B	A/B
TM-RFM004C20	-	-	-	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	A/B
TM-RFM006C20	TM-RFM006E20	-	-	MR-J4W2-77B, MR-J4W2-1010B	A/B
-	TM-RFM012E20	TM-RFM012G20	TM-RFM040J10	MR-J4W2-77B, MR-J4W2-1010B	A/B
-	TM-RFM018E20	-	-	MR-J4W2-1010B	A/B

With MR-J4W3 servo amplifier

Direct drive motor	Servo amplifier	
	Model	Axis (Note 2)
TM-RFM002C20	MR-J4W3-222B, MR-J4W3-444B	A/B/C
TM-RFM004C20	MR-J4W3-444B	A/B/C

Notes: 1. A-axis and B-axis indicate names of axes of the multi-axis servo amplifier. Any combination of the servo motors is available such as rotary servo motor for A-axis, and linear servo motor or direct drive motor for B-axis. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motor" on p. 1-5 in this catalog.
2. A-axis, B-axis, and C-axis indicate names of axes of the multi-axis servo amplifier. Any combination of the servo motors is available such as rotary servo motor for A-axis, linear servo motor for B-axis, and direct drive motor for C-axis. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motor" on p. 1-5 in this catalog.

TM-RFM Series Specifications

Direct drive motor model		TM-RFM	002C20	004C20	006C20	006E20	012E20	018E20
Compatible servo amplifier model		MR-J4- MR-J4W_-	Refer to "Combinations of Direct Drive Motor and Servo Amplifier" on p. 4-3 in this catalog.					
Motor outer diameter (frame dimensions)		[mm]	ø130			ø180		
Power supply capacity *1		[kVA]	0.25	0.38	0.53	0.46	0.81	1.3
Continuous running duty	Rated output	[W]	42	84	126	126	251	377
	Rated torque	[N•m]	2	4	6	6	12	18
Maximum torque		[N•m]	6	12	18	18	36	54
Rated speed		[r/min]	200					
Maximum speed		[r/min]	500					
Permissible instantaneous speed		[r/min]	575					
Power rate at continuous rated torque		[kW/s]	3.7	9.6	16.1	4.9	12.9	21.8
Rated current		[A]	1.3	2.1	3.2	3.2	3.8	5.9
Maximum current		[A]	3.9	6.3	9.6	9.6	12	18
Regenerative braking frequency *2	MR-J4-	[times/min]	No limit	5830	2950	464	572	421
	MR-J4W_-	[times/min]	No limit	5620	No limit	2370	1430	1050
Moment of inertia J		[× 10^{-4} kg•m^2]	10.9	16.6	22.4	74.0	111	149
Recommended load to motor inertia ratio (Note 1)			50 times or less					
Absolute accuracy		[s]	±15			±12.5		
Speed/position detector			Absolute/incremental 20-bit encoder *3 (resolution: 1048576 pulses/rev)					
Insulation class			155 (F)					
Structure			Totally enclosed, natural cooling (IP rating: IP42) (Note 2)					
Environment *4	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, dust or splash of oil or water					
	Altitude		1000 m or less above sea level					
	Vibration resistance *5		X: 49 m/s^2 Y: 49 m/s^2					
Vibration rank			V10 *7					
Rotor permissible load *6	Moment load	[N•m]	22.5			70		
	Axial load	[N]	1100			3300		
Mass		[kg]	5.2	6.8	8.4	11	15	18

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. Connectors and gap between rotor and stator are excluded.

Refer to "Annotations for Direct Drive Motor Specifications" on p. 4-7 in this catalog for the asterisks 1 to 7.

TM-RFM Series Specifications

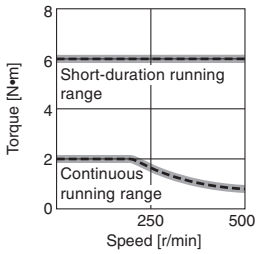
Direct drive motor model		TM-RFM	012G20	048G20	072G20	040J10	120J10	240J10
Compatible servo amplifier model		MR-J4- MR-J4W_-	Refer to "Combinations of Direct Drive Motor and Servo Amplifier" on p. 4-3 in this catalog.					
Motor outer diameter (frame dimensions)		[mm]	ø230			ø330		
Power supply capacity *1		[kVA]	0.71	2.7	3.8	1.2	3.4	6.6
Continuous running duty	Rated output	[W]	251	1005	1508	419	1257	2513
	Rated torque	[N•m]	12	48	72	40	120	240
Maximum torque		[N•m]	36	144	216	120	360	720
Rated speed		[r/min]	200			100		
Maximum speed		[r/min]	500			200		
Permissible instantaneous speed		[r/min]	575			230		
Power rate at continuous rated torque		[kW/s]	6.0	37.5	59.3	9.4	40.9	91.4
Rated current		[A]	3.6	11	16	4.3	11	19
Maximum current		[A]	11	33	48	13	33	57
Regenerative braking frequency *2	MR-J4-	[times/min]	202	373	251	125	281	171
	MR-J4W_-	[times/min]	507	-	-	313	-	-
Moment of inertia J		[× 10^{-4} kg•m^2]	238	615	875	1694	3519	6303
Recommended load to motor inertia ratio (Note 1)			50 times or less					
Absolute accuracy		[s]	±12.5			±10		
Speed/position detector			Absolute/incremental 20-bit encoder *3 (resolution: 1048576 pulses/rev)					
Insulation class			155 (F)					
Structure			Totally enclosed, natural cooling (IP rating: IP42) (Note 2)					
Environment *4	Ambient temperature		0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, dust or splash of oil or water					
	Altitude		1000 m or less above sea level					
	Vibration resistance *5		X: 49 m/s^2 Y: 49 m/s^2			X: 24.5 m/s^2 Y: 24.5 m/s^2		
Vibration rank			V10 *7					
Rotor permissible load *6	Moment load	[N•m]	93			350		
	Axial load	[N]	5500			16000		
Mass		[kg]	17	38	52	48	85	150

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. Connectors and gap between rotor and stator are excluded.

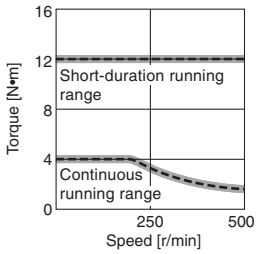
Refer to "Annotations for Direct Drive Motor Specifications" on p. 4-7 in this catalog for the asterisks 1 to 7.

TM-RFM Series Torque Characteristics (Note 4)

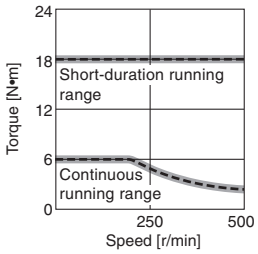
TM-RFM002C20 (Note 1, 2, 3)



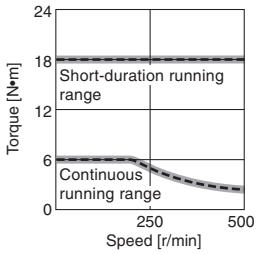
TM-RFM004C20 (Note 1, 2, 3)



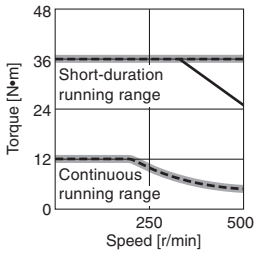
TM-RFM006C20 (Note 1, 2, 3)



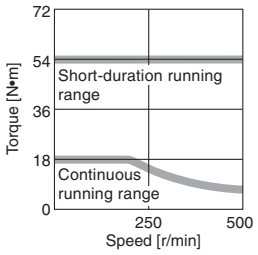
TM-RFM006E20 (Note 1, 2, 3)



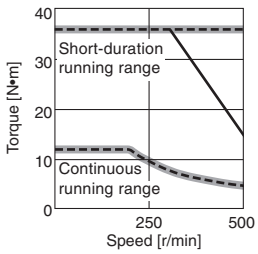
TM-RFM012E20 (Note 1, 2, 3)



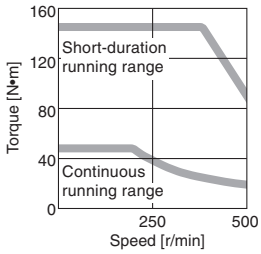
TM-RFM018E20 (Note 1)



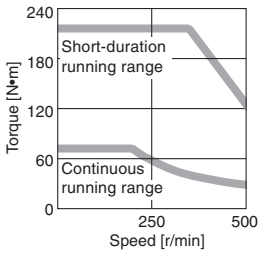
TM-RFM012G20 (Note 1, 2, 3)



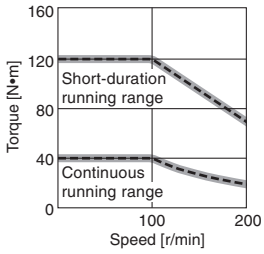
TM-RFM048G20 (Note 1)



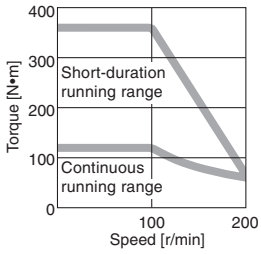
TM-RFM072G20 (Note 1)



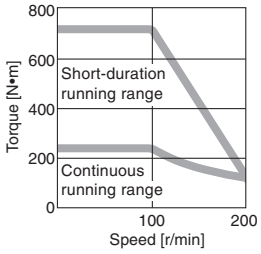
TM-RFM040J10 (Note 1, 2, 3)



TM-RFM120J10 (Note 1)



TM-RFM240J10 (Note 1)

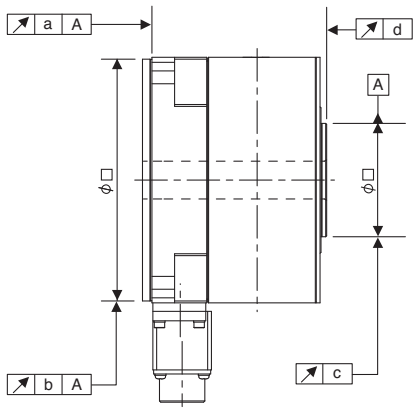


Notes: 1. ▬ : For 3-phase 200 V AC.
2. - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

Direct Drive Motor Machine Accuracy

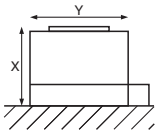
The machine accuracy related to the direct drive motor rotor (output shaft) and installation is indicated below:

Item	Measuring position	Accuracy [mm]
Runout of flange surface about rotor (output shaft)	a	0.05
Runout of fitting outer diameter of flange surface	b	0.07
Runout of rotor (output shaft)	c	0.04
Runout of rotor (output shaft) end	d	0.02

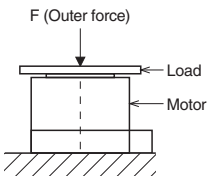


Annotations for Direct Drive Motor Specifications

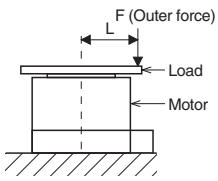
* 1. The power supply capacity varies depending on the power supply impedance.
* 2. The regenerative braking frequency shows the permissible frequency when the direct drive motor, without a load and a regenerative option, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m + 1), where m = Moment of inertia of load/Moment of inertia of direct drive 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] of the regenerative options.
* 3. Be sure to connect the following options for absolute position detection system.
  • MR-J4: battery (MR-BAT6V1SET) and absolute position storage unit (MR-BTAS01)
  • MR-J4W_: battery case (MR-BT6VCASE), battery (MR-BAT6V1) × 5 pcs, and absolute position storage unit (MR-BTAS01).
  Refer to "MR-J4-_B Servo Amplifier Instruction Manual" or "MR-J4W_-_B Servo Amplifier Instruction Manual" for details.
* 4. In the environment where the direct drive motor is exposed to oil mist, oil and/or water, a standard specification direct drive 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.
  Fretting more likely occurs on the bearing when the direct drive motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.



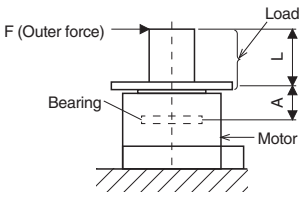
* 6. The following is calculation examples of axial and moment loads to the rotor (output shaft) of the direct drive motor. The axial and moment loads must be maintained equal to or below the permissible value.



Axial load
= F + Load mass



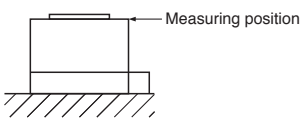
Axial load
= F + Load mass
Moment load
= F × L



Axial load = Load mass
Moment load = F × (L + A)

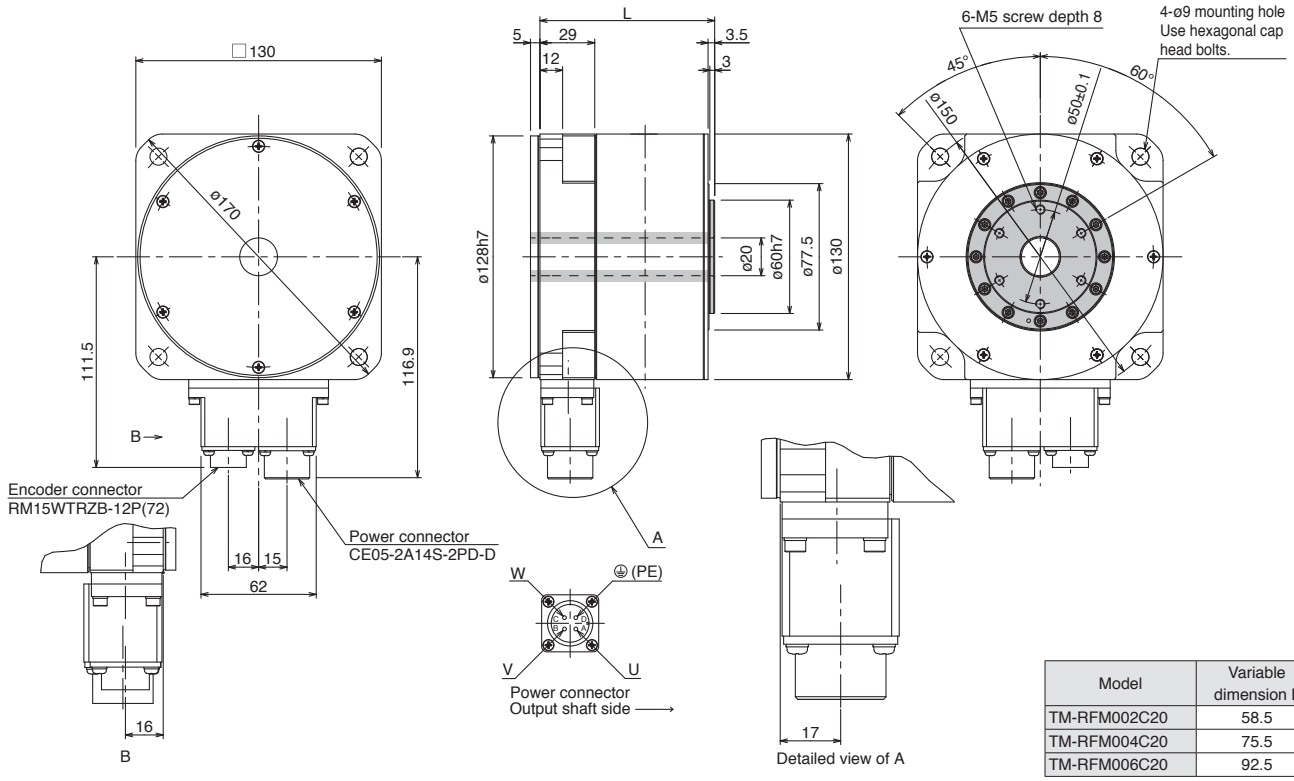
Motor outer diameter [mm] (Frame dimensions)	Dimension A [mm]
ø130	19.1
ø180	20.2
ø230	24.4
ø330	32.5

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



TM-RFM Series Dimensions (Note 1, 2)

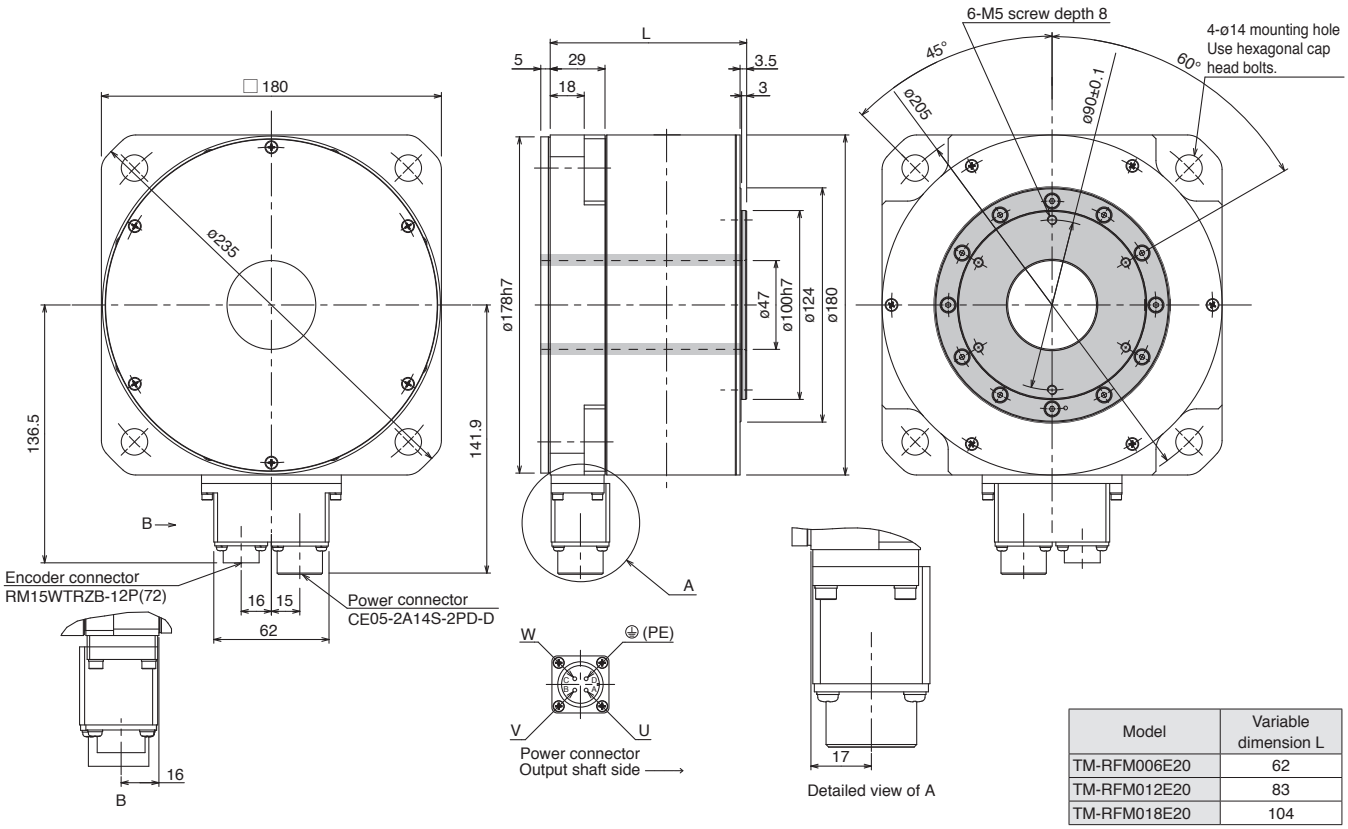
●TM-RFM002C20, TM-RFM004C20, TM-RFM006C20



Model	Variable dimension L
TM-RFM002C20	58.5
TM-RFM004C20	75.5
TM-RFM006C20	92.5

[Unit: mm]

●TM-RFM006E20, TM-RFM012E20, TM-RFM018E20



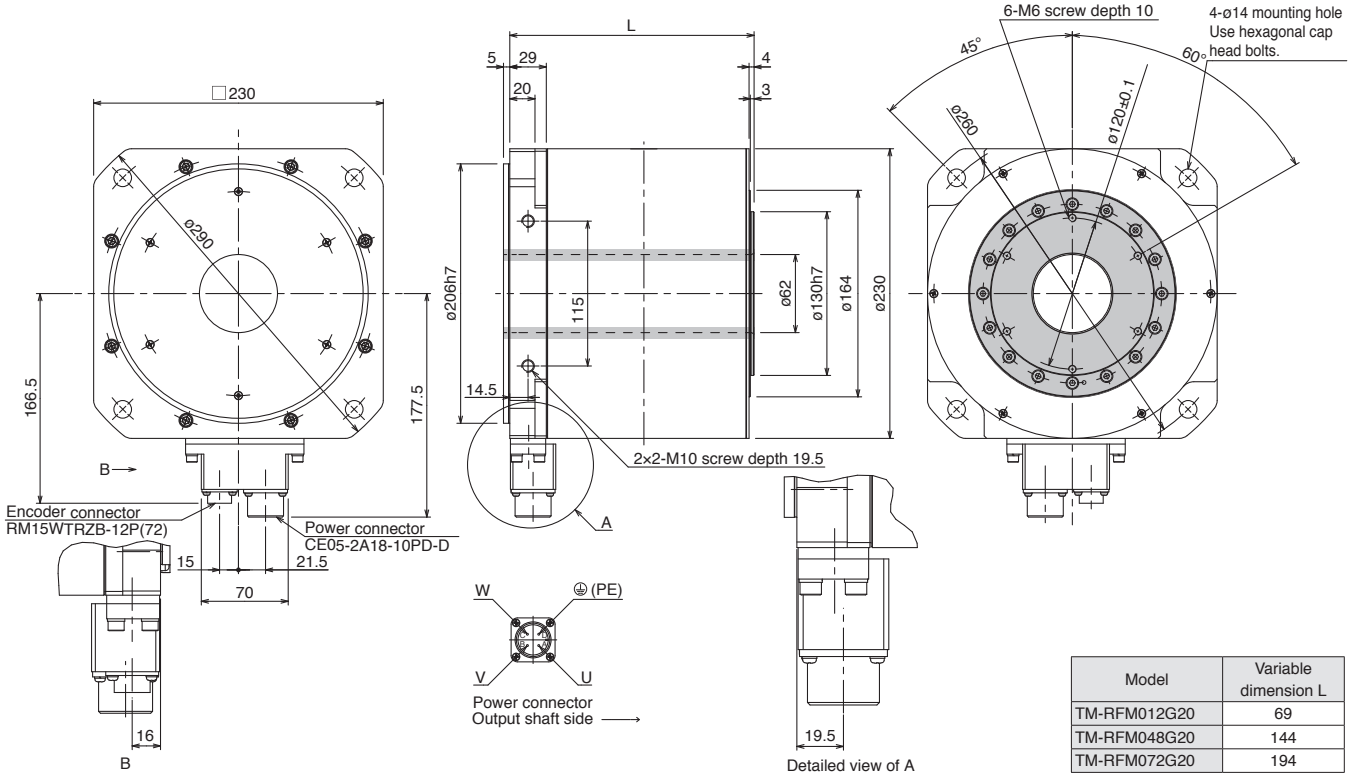
Model	Variable dimension L
TM-RFM006E20	62
TM-RFM012E20	83
TM-RFM018E20	104

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated. Make allowances for the tolerance when designing a machine.
2. ▭ indicates rotor.

TM-RFM Series Dimensions (Note 1, 2)

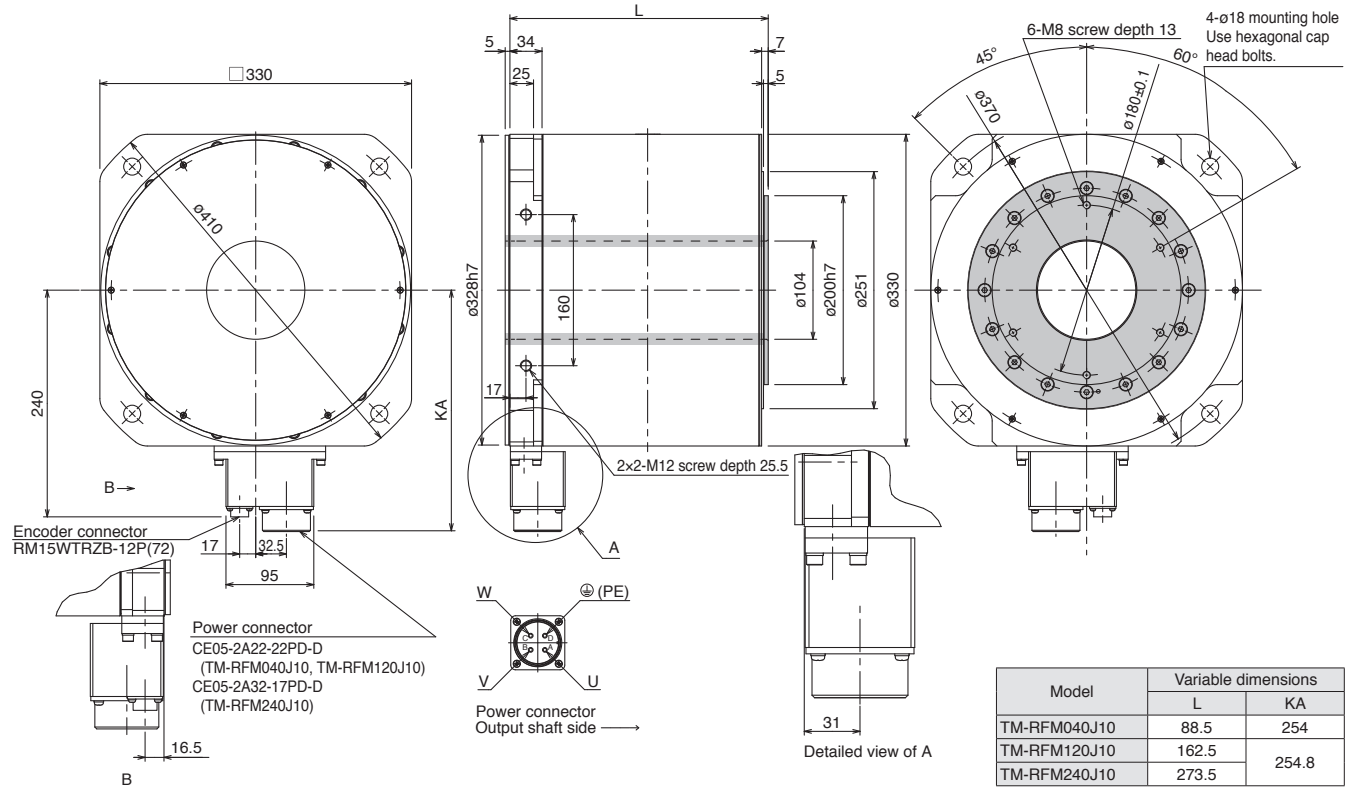
●TM-RFM012G20, TM-RFM048G20, TM-RFM072G20



Model	Variable dimension L
TM-RFM012G20	69
TM-RFM048G20	144
TM-RFM072G20	194

[Unit: mm]

●TM-RFM040J10, TM-RFM120J10, TM-RFM240J10



Model	Variable dimensions	
	L	KA
TM-RFM040J10	88.5	254
TM-RFM120J10	162.5	254.8
TM-RFM240J10	273.5	

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies. The actual dimensions may be 1 mm to 3 mm larger than the dimensions indicated. Make allowances for the tolerance when designing a machine.
2. ▒ indicates rotor.

Direct Drive Motor Sizing Example

1. Selection criteria

(1) Configurations

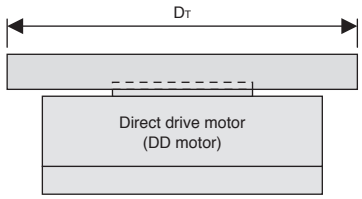


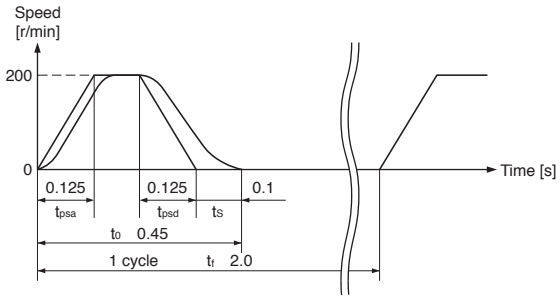
Table mass	W	= 19 kg
Rotation table diameter	D_T	= 300 mm
Rotation angle per cycle	θ	= 270 deg
Positioning time	t_0	= Within 0.45 s
Acceleration/deceleration time	$t_p = t_{psa} = t_{psd}$	= 0.125 s
Operating cycle	t_f	= 2.0 s
Load torque	T_L	= 0 N•m

(2) Direct drive motor speed

$$N_0 = \frac{\theta}{360} \times \frac{60}{(t_0 - t_p - t_s)}$$
$$= \frac{270}{360} \times \frac{60}{(0.45 - 0.125 - 0.1)} = 200 \text{ r/min}$$

t_s: settling time. Here assumed 0.1 s.

(3) Operating pattern



2. Selecting direct drive motor

(1) Moment of inertia of load

$$J_L = \frac{1}{8} \times D_T^2 \times W$$
$$= \frac{1}{8} \times (300 \times 10^{-3})^2 \times 19 = 0.214 \text{ kg•m}^2$$

(2) Torque required to accelerate/decelerate load

$$T_a = J_L \times \left(\frac{2\pi}{60} \times N_0 \right) \div t_p$$
$$= \frac{J_L \times N_0}{\frac{60}{2\pi} \times t_p}$$
$$= \frac{0.214 \times 200}{9.55 \times 0.125}$$
$$= 35.9 \text{ N•m}$$

(3) Select a direct drive motor

Selection criteria

Load torque during accel./decel. < Max. torque of DD motor

Moment of inertia of load < J_R × Moment of inertia of DD motor

J_R: Recommended load to motor inertia ratio

Select the following direct drive motor to meet the criteria above.

TM-RFM018E20 (rated torque: 18 N•m, max. torque: 54 N•m, moment of inertia: 149 × 10^{-4} kg•m^2)

(4) Acceleration/deceleration torque

Torque required during acceleration

$$T_{Ma} = \frac{(J_L + J_M) \times N_0}{9.55 \times t_{psa}} = 38.3 \text{ N•m}$$

J_M: moment of inertia of DD motor

Torque required during deceleration

$$T_{Md} = -\frac{(J_L + J_M) \times N_0}{9.55 \times t_{psd}} = -38.3 \text{ N•m}$$

Torque required during acceleration/deceleration must be equal to or lower than the max. torque of the DD motor.

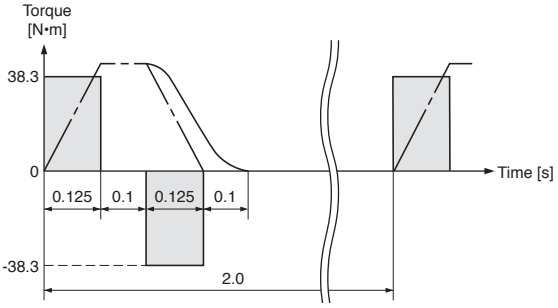
(5) Continuous effective load torque

$$T_{rms} = \sqrt{\frac{T_{Ma}^2 \times t_{psa} + T_L^2 \times t_c + T_{Md}^2 \times t_{psd}}{t_f}} = 13.5 \text{ N•m}$$

$$t_c = t_0 - t_s - t_{psa} - t_{psd}$$

Continuous effective load torque must be equal to or lower than the rated torque of the DD motor.

(6) Torque pattern



(7) Result

Select the following:

Direct drive motor: TM-RFM018E20

Servo amplifier: MR-J4-100B

[Free capacity selection software]

Capacity selection software (MRZJW3-MOTSZ111E) does all the calculations for you. The capacity selection software is available for free download. Contact your local sales office for more details.

* MRZJW3-MOTSZ111E software version C5 or later is compatible.

MEMO

5

B : MR-J4-10B to 700B WB : MR-J4W2-22B to 1010B/MR-J4W3-222B, 444B A : MR-J4-10A to 700A

* Refer to p. 5-45 in this catalog for conversion of units.

Options/Peripheral Equipment

Basic Cable Configurations for Servo Motors

Necessary optional cables and connectors vary depending on the servo amplifier type and the servo motor series.
Refer to the following tables for necessary options.

Selecting options for servo motor

Use the cables in the following tables.
For the cable descriptions, refer to the relevant numbers in each list.

Capacity	Servo motor	Reference list		
		Encoder cable	Servo motor power cable	Electromagnetic brake cable (Note 1)
Small capacity	HG-KR(B)	Column A in encoder cable list	Column A in servo motor power cable list	Column A in electromagnetic brake cable list
	HG-MR(B)	Column A in encoder cable list	Column A in servo motor power cable list	Column A in electromagnetic brake cable list
Medium capacity	HG-SR(B)	Column B in encoder cable list	Column B in servo motor power cable list	Column B in electromagnetic brake cable list

Notes: 1. An electromagnetic brake cable is required only for servo motor with electromagnetic brake.

Encoder cable list

	Cable length	IP rating (Note 1)	Cable lead out direction	Bending life	Model	Reference	Note
A	10 m or shorter (direct connection type)	IP65	In direction of load side	Long bending life	MR-J3ENCBL_M-A1-H	p. 5-8	Select one from this list.
				Standard	MR-J3ENCBL_M-A1-L		
			In opposite direction of load side	Long bending life	MR-J3ENCBL_M-A2-H	p. 5-8	
				Standard	MR-J3ENCBL_M-A2-L		
	Exceeding 10 m (junction type)	IP20	In direction of load side	Long bending life	Two types of cables are required: MR-J3JCBL03M-A1-L, MR-EKCBL_M-H	p. 5-8	
				Standard	Two types of cables are required: MR-J3JCBL03M-A1-L, MR-EKCBL_M-L		
			In opposite direction of load side	Long bending life	Two types of cables are required: MR-J3JCBL03M-A2-L, MR-EKCBL_M-H	p. 5-8	
				Standard	Two types of cables are required: MR-J3JCBL03M-A2-L, MR-EKCBL_M-L		
		IP65	In direction of load side	Long bending life	Two types of cables are required: MR-J3JSCBL03M-A1-L, MR-J3ENSCBL_M-H	pp. 5-8 and 5-9	
				Standard	Two types of cables are required: MR-J3JSCBL03M-A1-L, MR-J3ENSCBL_M-L		
			In opposite direction of load side	Long bending life	Two types of cables are required: MR-J3JSCBL03M-A2-L, MR-J3ENSCBL_M-H	pp. 5-8 and 5-9	
				Standard	Two types of cables are required: MR-J3JSCBL03M-A2-L, MR-J3ENSCBL_M-L		
B	2 m to 50 m	IP67	-	Long bending life	MR-J3ENSCBL_M-H	p. 5-9	Select one from this list.
	2 m to 30 m			Standard	MR-J3ENSCBL_M-L		

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.

Servo motor power cable list

	Cable length	IP rating (Note 1)	Cable lead out direction	Bending life	Model	Reference	Note
A	10 m or shorter (direct connection type)	IP65	In direction of load side	Long bending life	MR-PWS1CBL_M-A1-H	p. 5-11	Select one from this list.
				Standard	MR-PWS1CBL_M-A1-L		
			In opposite direction of load side	Long bending life	MR-PWS1CBL_M-A2-H	p. 5-11	
				Standard	MR-PWS1CBL_M-A2-L		
	Exceeding 10 m (junction type)	IP55	In direction of load side	Standard	Connect a user-fabricated cable to MR-PWS2CBL03M-A1-L (optional cable).	p. 5-11	
			In opposite direction of load side		Connect a user-fabricated cable to MR-PWS2CBL03M-A2-L (optional cable).	p. 5-11	

	IP rating (Note 1)	Compatible servo motor	Model	Reference	Note
B	IP67	HG-SR51, 81 HG-SR52, 102, 152	Fabricate a cable that fits to MR-PWCNS4 (optional connector set).	p. 5-11	Select one that is compatible with the servo motor.
		HG-SR121, 201, 301 HG-SR202, 352, 502	Fabricate a cable that fits to MR-PWCNS5 (optional connector set).	p. 5-11	
		HG-SR421, 702	Fabricate a cable that fits to MR-PWCNS3 (optional connector set).	p. 5-11	

Electromagnetic brake cable list

	Cable length	IP rating (Note 1)	Cable lead out direction	Bending life	Model	Reference	Note
A	10 m or shorter (direct connection type)	IP65	In direction of load side	Long bending life	MR-BKS1CBL_M-A1-H	p. 5-12	Select one from this list.
				Standard	MR-BKS1CBL_M-A1-L		
			In opposite direction of load side	Long bending life	MR-BKS1CBL_M-A2-H	p. 5-12	
				Standard	MR-BKS1CBL_M-A2-L		
	Exceeding 10 m (junction type)	IP55	In direction of load side	Standard	Connect a user-fabricated cable to MR-BKS2CBL03M-A1-L (optional cable).	p. 5-12	
			In opposite direction of load side		Connect a user-fabricated cable to MR-BKS2CBL03M-A2-L (optional cable).	p. 5-12	

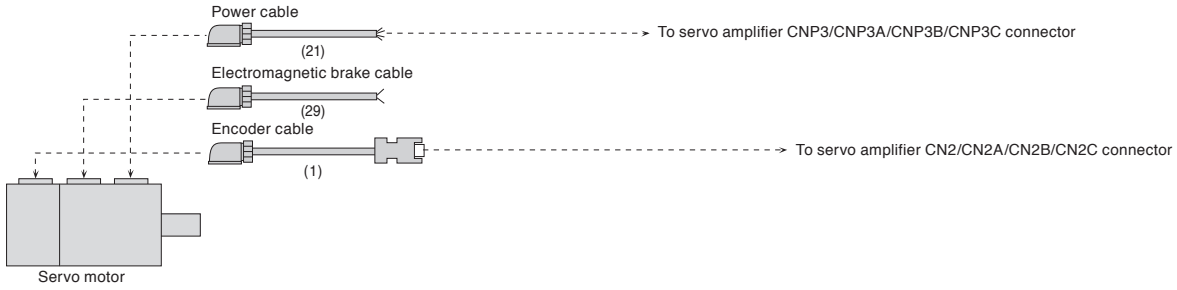
	IP rating (Note 1)	Compatible servo motor	Model	Reference	Note
B	IP67	HG-SR series	Fabricate a cable that fits to MR-BKCNS1 or MR-BKCNS2 (optional connector set) (straight type).	p. 5-12	Select one from this list.
			Fabricate a cable that fits to MR-BKCNS1A or MR-BKCNS2A (optional connector set) (angle type).	p. 5-12	

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.

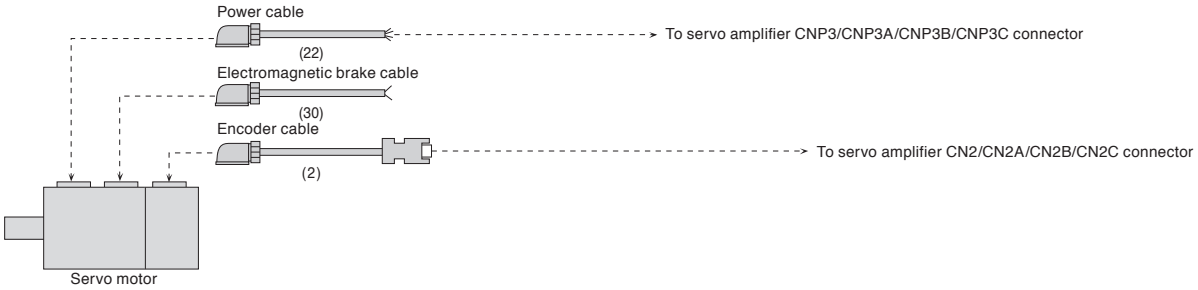
Configuration Example for Servo Motors

For HG-KR/HG-MR rotary servo motor series: encoder cable length 10 m or shorter

● For leading the cables out in direction of load side (Note 1)



● For leading the cables out in opposite direction of load side (Note 1)

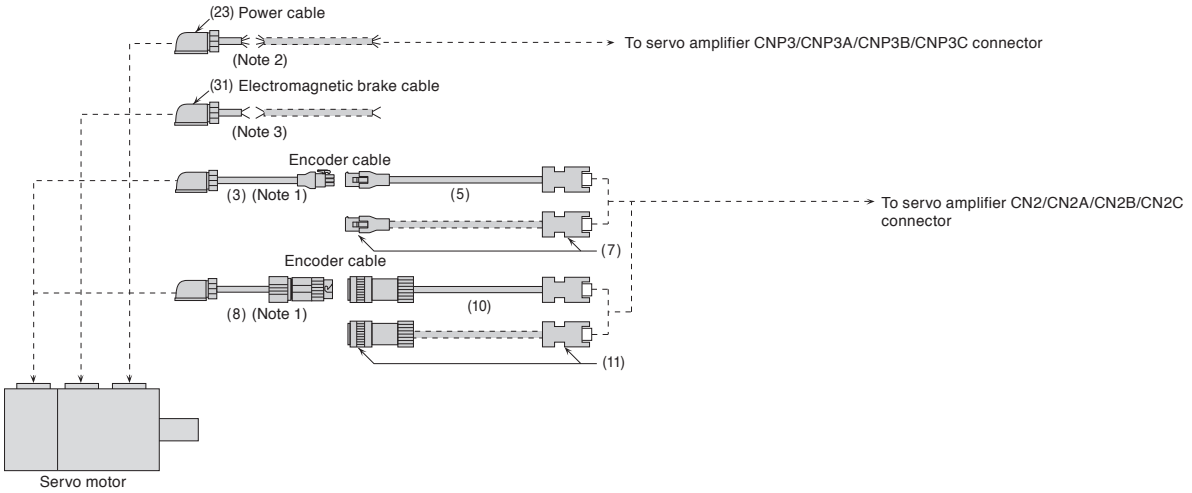


Notes: 1. Cables for leading two different directions may be used for one servo motor.

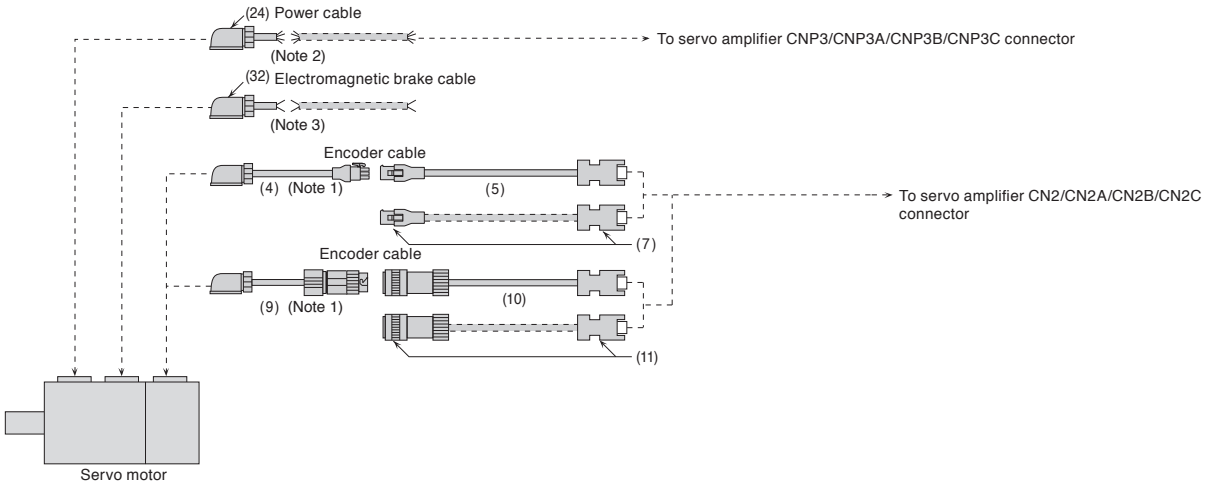
Configuration Example of Servo Motors (Note 5)

For HG-KR/HG-MR rotary servo motor series: encoder cable length over 10 m

●For leading the cables out in direction of load side (Note 4)



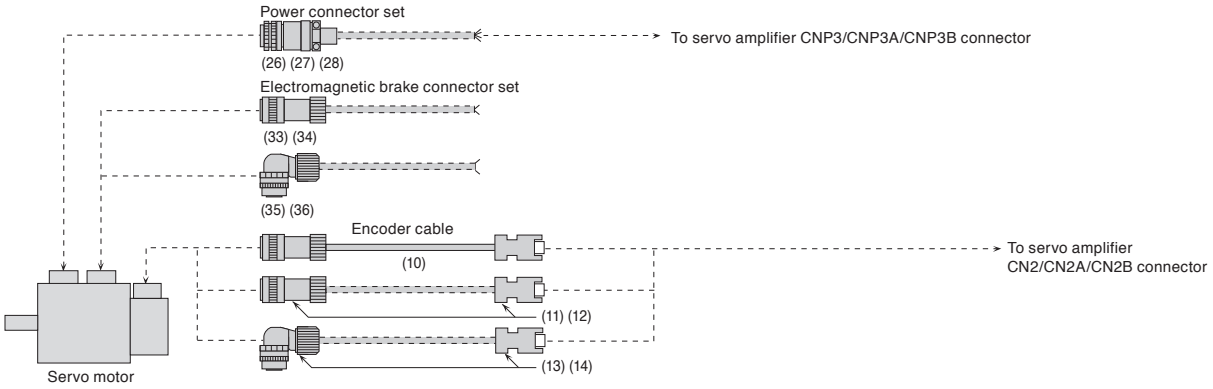
●For leading the cables out in opposite direction of load side (Note 4)



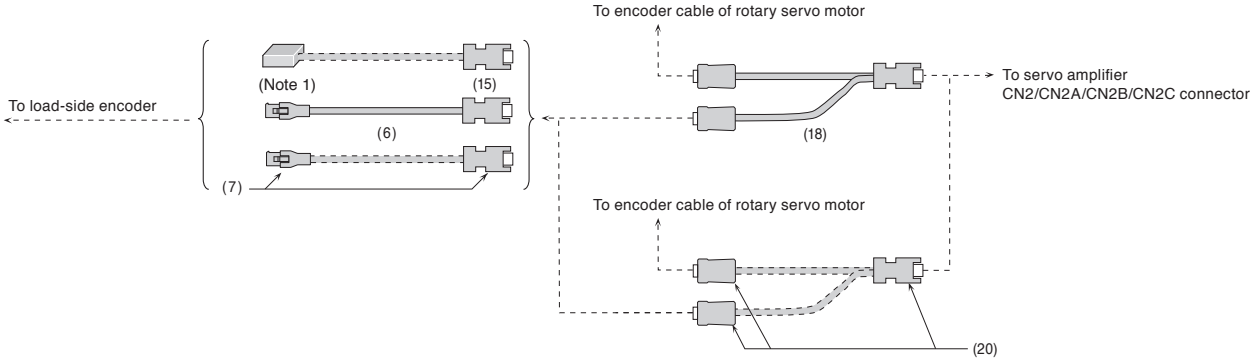
Notes: 1. This cable does not have a long bending life. Thus, be sure to fix the cable before using.
2. Relay a cable using MR-PWS2CBL03M-A1-L or MR-PWS2CBL03M-A2-L. This cable does not have a long bending life. Thus, be sure to fix the cable before using.
3. Relay a cable using MR-BKS2CBL03M-A1-L or MR-BKS2CBL03M-A2-L. This cable does not have a long bending life. Thus, be sure to fix the cable before using.
4. Cables for leading two different directions may be used for one servo motor.
5. Cables drawn with dashed lines need to be fabricated by user. Refer to relevant Servo Motor Instruction Manual for fabricating the cables.

Configuration Example for Servo Motors (Note 2)

For HG-SR rotary servo motor series



For fully closed loop control system with rotary servo motor

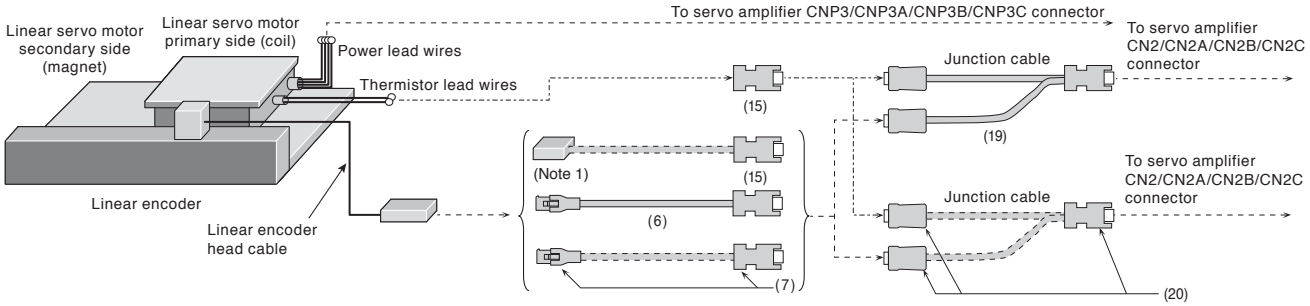


Notes: 1. Contact the relevant liner encoder manufacturers for connectors to connect with the head cables.
2. Cables drawn with dashed lines need to be fabricated by user. Refer to relevant Servo Motor Instruction Manual for fabricating the cables.

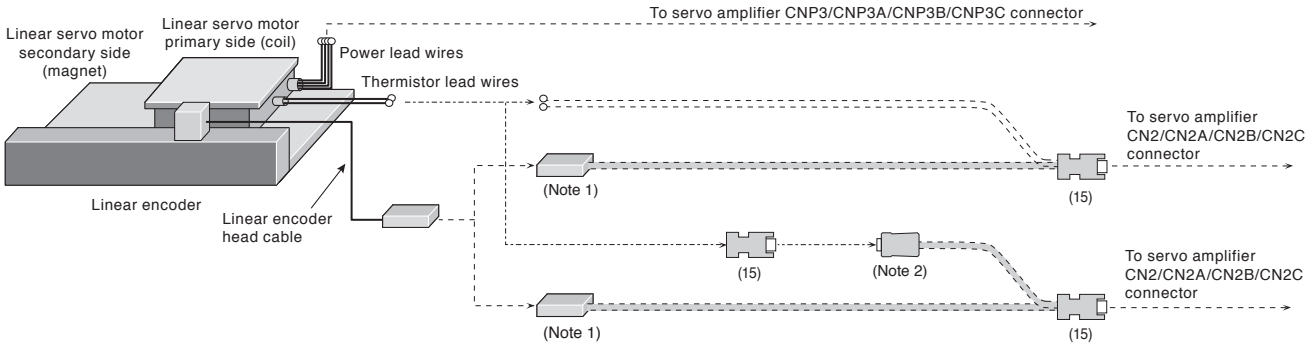
Configuration Example for Servo Motors (Note 3)

For LM-H3/LM-K2/LM-U2 linear servo motor series

●When using a junction cable for linear servo motor

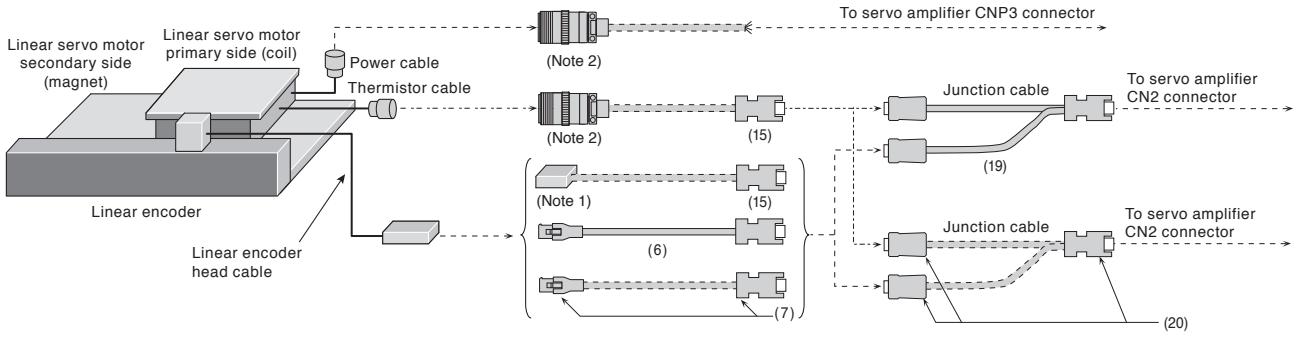


●When not using a junction cable for linear servo motor

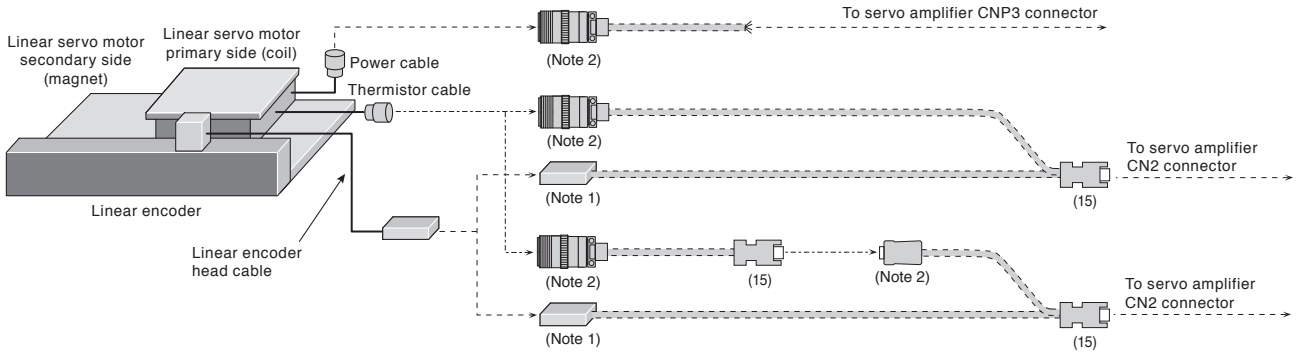


For LM-F linear servo motor series

●When using a junction cable for linear servo motor



●When not using a junction cable for linear servo motor

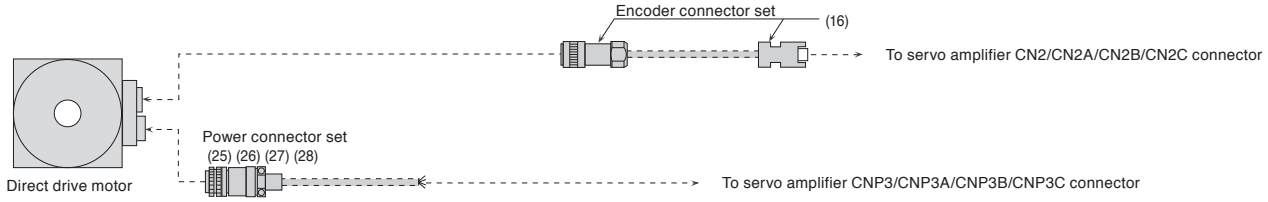


Notes: 1. Contact the relevant liner encoder manufacturers for connectors to connect with the head cables.
2. Refer to "Products on the Market for Servo Motors" in this catalog for these connectors.
3. Cables drawn with dashed lines need to be fabricated by user. Refer to relevant Servo Motor Instruction Manual for fabricating the cables.

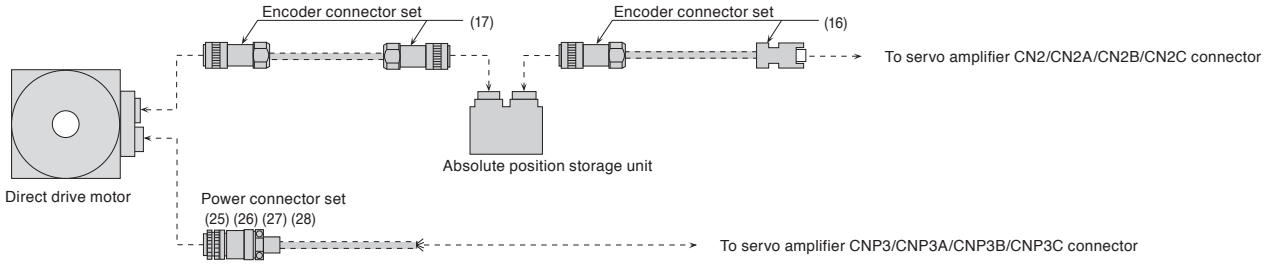
Configuration Example for Servo Motors (Note 1)

For TM-RFM direct drive motor series

●For incremental system



●For absolute position detection system



Notes: 1. Cables drawn with dashed lines need to be fabricated by user. Refer to relevant Servo Motor Instruction Manual for fabricating the cables.

Cables and Connectors for Servo Motor Encoder

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(1)	Encoder cable (Note 2) (load-side lead)	MR-J3ENCBL2M-A1-H *1	2 m	IP65	For HG-KR/HG-MR (direct connection type)	Encoder connector / Servo amplifier connector 
		MR-J3ENCBL5M-A1-H *1	5 m			
		MR-J3ENCBL10M-A1-H *1	10 m			
		MR-J3ENCBL2M-A1-L *1	2 m			
		MR-J3ENCBL5M-A1-L *1	5 m			
		MR-J3ENCBL10M-A1-L *1	10 m			
(2)	Encoder cable (Note 2) (opposite to load-side lead)	MR-J3ENCBL2M-A2-H *1	2 m	IP65	For HG-KR/HG-MR (direct connection type)	
		MR-J3ENCBL5M-A2-H *1	5 m			
		MR-J3ENCBL10M-A2-H *1	10 m			
		MR-J3ENCBL2M-A2-L *1	2 m			
		MR-J3ENCBL5M-A2-L *1	5 m			
		MR-J3ENCBL10M-A2-L *1	10 m			
(3)	Encoder cable (Note 2) (load-side lead)	MR-J3JCBL03M-A1-L *1	0.3 m	IP20	For HG-KR/HG-MR (junction type)	Encoder connector / Junction connector  Use this in combination with (5) or (7).
(4)	Encoder cable (Note 2) (opposite to load-side lead)	MR-J3JCBL03M-A2-L *1	0.3 m	IP20	For HG-KR/HG-MR (junction type)	
(5)	Encoder cable (Note 2)	MR-EKCBL20M-H *1	20 m	IP20	For HG-KR/HG-MR (junction type)	Junction connector / Servo amplifier connector  Use this in combination with (3) or (4).
		MR-EKCBL30M-H (Note 3) *1	30 m			
		MR-EKCBL40M-H (Note 3) *1	40 m			
		MR-EKCBL50M-H (Note 3) *1	50 m			
		MR-EKCBL20M-L *1	20 m			
		MR-EKCBL30M-L (Note 3) *1	30 m			
(6)	Encoder cable (Note 2, 5)	MR-EKCBL2M-H *1	2 m	IP20	For connecting linear encoder	Junction connector / Servo amplifier connector 
		MR-EKCBL5M-H *1	5 m			
(7)	Encoder connector set (Note 5)	MR-ECNM	-	IP20	For HG-KR/HG-MR (junction type) For connecting linear encoder	Junction connector / Servo amplifier connector  Use this in combination with (3) or (4) for HG-KR/HG-MR series. Applicable cable Wire size: 0.3 mm² (AWG 22) Cable OD: 8.2 mm Crimping tool (91529-1) is required.
(8)	Encoder cable (Note 2) (load-side lead)	MR-J3JSCBL03M-A1-L *1	0.3 m	IP65 (Note 4)	For HG-KR/HG-MR (junction type)	Encoder connector / Junction connector  Use this in combination with (10) or (11).
(9)	Encoder cable (Note 2) (opposite to load-side lead)	MR-J3JSCBL03M-A2-L *1	0.3 m	IP65 (Note 4)	For HG-KR/HG-MR (junction type)	

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. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
3. This encoder cable is available in four-wire type. Parameter setting is required to use the four-wire type encoder cable. Refer to relevant Servo Amplifier Instruction Manual for details.
4. The encoder cable is rated IP65 while the junction connector itself is rated IP67.
5. MR-EKCBL_M-H and MR-ECNM can be connected to an output cable for Mitutoyo Corporation scale AT343A, AT543A-SC or AT545A-SC

For unlisted lengths

*1. For unlisted lengths of the cables, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp

Cables and Connectors for Servo Motor Encoder

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(10)	Encoder cable (Note 2)	MR-J3ENSCBL2M-H *1	2 m	IP67	For HG-KR/HG-MR (junction type) For HG-SR (direct connection type)	Junction connector or encoder connector / Servo amplifier connector  Use this in combination with (8) or (9) for HG-KR/HG-MR series.
		MR-J3ENSCBL5M-H *1	5 m			
		MR-J3ENSCBL10M-H *1	10 m			
		MR-J3ENSCBL20M-H *1	20 m			
		MR-J3ENSCBL30M-H *1	30 m			
		MR-J3ENSCBL40M-H *1	40 m			
		MR-J3ENSCBL50M-H *1	50 m			
		MR-J3ENSCBL2M-L *1	2 m			
		MR-J3ENSCBL5M-L *1	5 m			
		MR-J3ENSCBL10M-L *1	10 m			
		MR-J3ENSCBL20M-L *1	20 m			
		MR-J3ENSCBL30M-L *1	30 m			
(11)	Encoder connector set (one-touch connection type)	MR-J3SCNS	-	IP67	For HG-KR/HG-MR (junction type) For HG-SR (direct connection type) (straight type)	Junction connector or encoder connector / Servo amplifier connector  Use this in combination with (8) or (9) for HG-KR/HG-MR series. Applicable cable Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm (Note 4)
(12)	Encoder connector set (Note 3) (screw type)	MR-ENCNS2 *2	-	IP67	For HG-SR (straight type)	Encoder connector / Servo amplifier connector  Applicable cable Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm (Note 4)
(13)	Encoder connector set (one-touch connection type)	MR-J3SCNSA *2	-	IP67	For HG-SR (angle type)	Encoder connector / Servo amplifier connector  Applicable cable Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm (Note 4)
(14)	Encoder connector set (Note 3) (screw type)	MR-ENCNS2A *2	-	IP67	For HG-SR (angle type)	Encoder connector / Servo amplifier connector  Applicable cable Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm (Note 4)

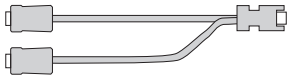
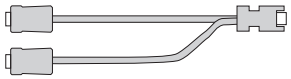
Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
3. A screw thread is cut on the encoder connector of HG-SR series, and the screw type connector can be used.
4. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.

For unlisted lengths

*1. For unlisted lengths of the cables, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp
*2. For fabricating encoder cables with these connectors, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp

Cables and Connectors for Servo Motor Encoder

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(15)	Encoder connector set	MR-J3CN2	-	-	For connecting linear encoder or thermistor	Servo amplifier connector 
(16)	Encoder connector set	MR-J3DDCNS	-	IP67	For TM-RFM (connecting direct drive motor and servo amplifier, or absolute position storage unit and servo amplifier)	Encoder connector or absolute position storage unit connector  Servo amplifier connector  Applicable cable Wire size: 0.25 mm² to 0.5 mm² (AWG 23 to 20) Cable OD: 7.8 mm to 8.2 mm
(17)	Encoder connector set	MR-J3DDSPS	-	IP67	For TM-RFM (connecting direct drive motor and absolute position storage unit)	Encoder connector  Absolute position storage unit connector  Applicable cable Wire size: 0.25 mm² to 0.5 mm² (AWG 23 to 20) Cable OD: 7.8 mm to 8.2 mm
(18)	Junction cable for fully closed loop control (Note 2)	MR-J4FCCBL03M	0.3 m	-	For branching linear encoder	Junction connector Servo amplifier connector 
(19)	Junction cable for linear servo motor (Note 2)	MR-J4THCBL03M	0.3 m	-	For branching thermistor	Junction connector Servo amplifier connector 
(20)	Connector set	MR-J3THMCN2	-	-	For fully closed loop control or branching thermistor	Junction connector  Servo amplifier connector 

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/absolute position storage unit. If the IP rating of the servo amplifier/servo motor/absolute position storage unit differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Servo system will not operate correctly when the junction cables for fully closed loop control and for linear servo motor are used mistakenly or interchangeably. Make sure of the model before placing an order.

Cables and Connectors for Servo Motor Power

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(21)	Power cable (Note 2) (load-side lead)	MR-PWS1CBL2M-A1-H *1	2 m	IP65	For HG-KR/HG-MR (direct connection type)	Power connector  Lead-out * The cable is not shielded.
		MR-PWS1CBL5M-A1-H *1	5 m			
		MR-PWS1CBL10M-A1-H *1	10 m			
		MR-PWS1CBL2M-A1-L *1	2 m			
		MR-PWS1CBL5M-A1-L *1	5 m			
		MR-PWS1CBL10M-A1-L *1	10 m			
(22)	Power cable (Note 2) (opposite to load-side lead)	MR-PWS1CBL2M-A2-H *1	2 m	IP65	For HG-KR/HG-MR (direct connection type)	
		MR-PWS1CBL5M-A2-H *1	5 m			
		MR-PWS1CBL10M-A2-H *1	10 m			
		MR-PWS1CBL2M-A2-L *1	2 m			
		MR-PWS1CBL5M-A2-L *1	5 m			
		MR-PWS1CBL10M-A2-L *1	10 m			
(23)	Power cable (Note 2) (load-side lead)	MR-PWS2CBL03M-A1-L	0.3 m	IP55	For HG-KR/HG-MR (junction type)	Power connector  Lead-out * The cable is not shielded.
(24)	Power cable (Note 2) (opposite to load-side lead)	MR-PWS2CBL03M-A2-L	0.3 m	IP55	For HG-KR/HG-MR (junction type)	
(25)	Power connector set	MR-PWCNF *2	-	IP67	For TM-RFM_C20/ TM-RFM_E20	Power connector  Applicable cable Wire size: 0.3 mm² to 1.25 mm² (AWG 22 to 16) Cable OD: 8.3 mm to 11.3 mm
(26)	Power connector set	MR-PWCNS4 *2	-	IP67	For HG-SR51, 81, 52, 102, 152/ TM-RFM_G20	Power connector  Applicable cable Wire size: 2 mm² to 3.5 mm² (AWG 14 to 12) Cable OD: 10.5 mm to 14.1 mm
(27)	Power connector set	MR-PWCNS5 *2	-	IP67	For HG-SR121, 201, 301, 202, 352, 502/ TM-RFM040J10/ TM-RFM120J10	Power connector  Applicable cable Wire size: 5.5 mm² to 8 mm² (AWG 10 to 8) Cable OD: 12.5 mm to 16 mm
(28)	Power connector set	MR-PWCNS3 *2	-	IP67	For HG-SR421, 702/ TM-RFM240J10	Power connector  Applicable cable Wire size: 14 mm² to 22 mm² (AWG 6 to 4) Cable OD: 22 mm to 23.8 mm

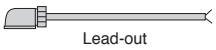
Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.

For unlisted lengths, and for fabricating power cables/electromagnetic brake cables

*1. For unlisted lengths of the cables, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp
*2. For fabricating the servo motor power cable or electromagnetic brake cable, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp

Cables and Connectors for Servo Motor Electromagnetic Brake

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(29)	Electromagnetic brake cable (Note 2) (load-side lead)	MR-BKS1CBL2M-A1-H *1	2 m	IP65	For HG-KR/HG-MR (direct connection type)	Electromagnetic brake connector  Lead-out * The cable is not shielded.
		MR-BKS1CBL5M-A1-H *1	5 m			
		MR-BKS1CBL10M-A1-H *1	10 m			
		MR-BKS1CBL2M-A1-L *1	2 m			
		MR-BKS1CBL5M-A1-L *1	5 m			
		MR-BKS1CBL10M-A1-L *1	10 m			
(30)	Electromagnetic brake cable (Note 2) (opposite to load-side lead)	MR-BKS1CBL2M-A2-H *1	2 m	IP65	For HG-KR/HG-MR (direct connection type)	
		MR-BKS1CBL5M-A2-H *1	5 m			
		MR-BKS1CBL10M-A2-H *1	10 m			
		MR-BKS1CBL2M-A2-L *1	2 m			
		MR-BKS1CBL5M-A2-L *1	5 m			
		MR-BKS1CBL10M-A2-L *1	10 m			
(31)	Electromagnetic brake cable (Note 2) (load-side lead)	MR-BKS2CBL03M-A1-L	0.3 m	IP55	For HG-KR/HG-MR (junction type)	Electromagnetic brake connector  Lead-out * The cable is not shielded.
(32)	Electromagnetic brake cable (Note 2) (opposite to load-side lead)	MR-BKS2CBL03M-A2-L	0.3 m	IP55	For HG-KR/HG-MR (junction type)	
(33)	Electromagnetic brake connector set (one-touch connection type)	MR-BKCNS1 *2	-	IP67	For HG-SR (straight type)	Electromagnetic brake connector  Applicable cable Wire size: 1.25 mm² (AWG 16) or smaller Cable OD: 9.0 mm to 11.6 mm
(34)	Electromagnetic brake connector set (Note 3) (screw type)	MR-BKCNS2 *2	-	IP67	For HG-SR (straight type)	
(35)	Electromagnetic brake connector set (one-touch connection type)	MR-BKCNS1A *2	-	IP67	For HG-SR (angle type)	Electromagnetic brake connector  Applicable cable Wire size: 1.25 mm² (AWG 16) or smaller Cable OD: 9.0 mm to 11.6 mm
(36)	Electromagnetic brake connector set (Note 3) (screw type)	MR-BKCNS2A *2	-	IP67	For HG-SR (angle type)	

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. -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
3. A screw thread is cut on the electromagnetic brake connector of HG-SR series, and the screw type connector can be used.

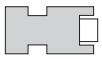
For unlisted lengths, and for fabricating power cables/electromagnetic brake cables

*1. For unlisted lengths of the cables, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp
*2. For fabricating the servo motor power cable or electromagnetic brake cable, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp

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.

Encoder connector (servo amplifier-side)

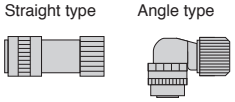


Application	Connector (Molex)
Servo amplifier CN2 connector	54599-1019 (gray)
	54599-1016 (black)
	Connector (3M)
	Receptacle: 36210-0100PL Shell kit: 36310-3200-008

Encoder connector for HG-KR/HG-MR series **Rotary**

Applicable servo motor	Feature (Note 1)	Connector (TE Connectivity Ltd. Company)	Crimping tools (TE Connectivity Ltd. Company)	Applicable cable example
HG-KR/ HG-MR series	IP65	2174053-1	For ground clip: 1596970-1 For receptacle contact: 1596847-1	Wire size: 0.13 mm^2 to 0.33 mm^2 (AWG 26 to 22) Cable OD: 6.8 mm to 7.4 mm Wire example: Fluorine resin wire (Vinyl jacket cable TPE. SVP 70/0.08(AWG#22)-3P KB-2237-2 Bando Densen Co., Ltd. (Note 2) or an equivalent product)

Encoder connector for HG-SR series **Rotary**



Applicable servo motor	Feature (Note 1)	Connector (DDK Ltd.)				Applicable cable example
		Type	Type of connection	Plug	Socket contact	Cable OD [mm]
HG-SR series	IP67	Straight	One-touch connection type	CMV1-SP10S-M1	Select from solder or press bonding type. (Refer to the table below.)	5.5 to 7.5
				CMV1-SP10S-M2		7.0 to 9.0
			Screw type	CMV1S-SP10S-M1		5.5 to 7.5
				CMV1S-SP10S-M2		7.0 to 9.0
		Angle	One-touch connection type	CMV1-AP10S-M1		5.5 to 7.5
				CMV1-AP10S-M2		7.0 to 9.0
			Screw type	CMV1S-AP10S-M1		5.5 to 7.5
				CMV1S-AP10S-M2		7.0 to 9.0

Contact	Socket contact (DDK Ltd.)	Wire size (Note 3)
Solder type	CMV1-#22ASC-S1-100	0.5 mm^2 (AWG 20) or smaller
Press bonding type	CMV1-#22ASC-C1-100	0.2 mm^2 to 0.5 mm^2 (AWG 24 to 20) Crimping tool (357J-53162T) is required.
	CMV1-#22ASC-C2-100	0.08 mm^2 to 0.2 mm^2 (AWG 28 to 24) Crimping tool (357J-53163T) is required.

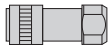
Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Contact Toa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

Rotary Rotary servo motor **Linear** Linear servo motor **Direct** Direct drive motor

Products on the Market for Servo Motors

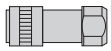
Contact the relevant manufacturers directly. When fabricating a cable with the following connectors, refer to the relevant manufacturers' instruction manuals for wiring and assembling procedures.

Encoder connector for TM-RFM series and absolute position storage unit connector (servo amplifier side) Direct



Applicable servo motor	Application	Feature (Note 1)	Plug (Hirose Electric Co., Ltd.)			Applicable cable example
			Type	Plug	Cord clamp	
TM-RFM series	For encoder or absolute position storage unit (servo amplifier side)	IP67	Straight	RM15WTPZK-12S	JR13WCCA-8(72)	Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 7.8 mm to 8.2 mm Wire example: Vinyl jacket cable 20276 VSVPAWG#23×6P KB-0492 Bando Densen Co., Ltd. (Note 3)

Encoder connector for TM-RFM series and absolute position storage unit connector (encoder side) Direct

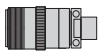


Applicable servo motor	Application	Feature (Note 1)	Plug (Hirose Electric Co., Ltd.)			Applicable cable example
			Type	Plug	Cord clamp	
TM-RFM series	For absolute position storage unit (encoder side)	IP67	Straight	RM15WTPZ-12P(72)	JR13WCCA-8(72)	Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 7.8 mm to 8.2 mm Wire example: Vinyl jacket cable 20276 VSVPAWG#23×6P KB-0492 Bando Densen Co., Ltd. (Note 3)

Thermistor junction connector for LM-H3/LM-K2/LM-U2/LM-F series Linear

Applicable servo motor	Feature (Note 1)	Connector (3M)		Applicable cable example
		Plug	Shell kit	
LM-H3/ LM-K2/ LM-U2/ LM-F series	General environment	36110-3000FD	36310-F200-008	Wire size: 0.3 mm² (AWG 22) or smaller Cable OD: 7 mm to 9 mm

Thermistor connector for LM-F series Linear



Applicable servo motor	Feature (Note 1)	Cable receptacle (DDK Ltd.)	Cable clamp (DDK Ltd.)	Applicable cable example
LM-F series	General environment	D/MS3101A14S-9S	D/MS3057A-6A	Wire size: 0.3 mm² to 1.25 mm² (AWG 22 to 16) Cable OD: up to 7.9 mm

Power connector for HG-KR/HG-MR series Rotary

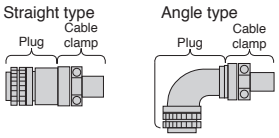
Applicable servo motor	Feature (Note 1)	Connector (Japan Aviation Electronics Industry, Limited)	Crimping tools (Japan Aviation Electronics Industry, Limited)	Applicable cable example
HG-KR/ HG-MR series	IP65	Plug: KN4FT04SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G)	For contactor: CT160-3-TMH5B	Wire size: 0.3 mm² to 0.75 mm² (AWG 22 to 18) Cable OD: 5.3 mm to 6.5 mm Wire example: Fluorine resin wire (Vinyl jacket cable RMFES-A(CL3X) AWG 19, 4 cores Dyden Corporation (Note 2) or an equivalent product)

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/absolute position storage unit. If the IP rating of the servo amplifier/servo motor/absolute position storage unit differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Contact Taisei Co., Ltd.
3. Contact Toa Electric Industry Co., Ltd.

Rotary Rotary servo motor Linear Linear servo motor Direct Direct drive motor

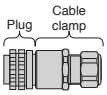
Products on the Market for Servo Motors

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.



Power connector for HG-SR/TM-RFM series **Rotary** **Direct**

Applicable servo motor	Feature (Note 1)	Plug (with backshell) (DDK Ltd.)		Cable clamp (DDK Ltd.)	Applicable cable example	
		Type	Model	Model	Wire size (Note 3)	Cable OD [mm]
HG-SR51, 81, 52, 102, 152/ TM-RFM012G20, 048G20, 072G20	IP67 EN compliant	Straight	CE05-6A18-10SD-D-BSS	CE3057-10A-2-D	2.2 mm² to 3.5 mm² (AWG 14 to 12)	8.5 to 11
				CE3057-10A-1-D		10.5 to 14.1
	General environment (Note 2)		D/MS3106B18-10S	D/MS3057-10A	2.2 mm² to 3.5 mm² (AWG 14 to 12)	14.3 or smaller (bushing ID)
HG-SR121, 201, 301, 202, 352, 502/ TM-RFM040J10, 120J10	IP67 EN compliant		CE05-6A22-22SD-D-BSS	CE3057-12A-2-D	5.5 mm² to 8 mm² (AWG 10 to 8)	9.5 to 13
				CE3057-12A-1-D		12.5 to 16
	General environment (Note 2)		D/MS3106B22-22S	D/MS3057-12A	5.5 mm² to 8 mm² (AWG 10 to 8)	15.9 or smaller (bushing ID)
HG-SR421, 702/ TM-RFM240J10	IP67 EN compliant		CE05-6A32-17SD-D-BSS	CE3057-20A-1-D	14 mm² to 22 mm² (AWG 6 to 4)	22 to 23.8
	General environment (Note 2)		D/MS3106B32-17S	D/MS3057-20A	14 mm² to 22 mm² (AWG 6 to 4)	23.8 or smaller (bushing ID)
HG-SR51, 81, 52, 102, 152	IP67 EN compliant	Angle	CE05-8A18-10SD-D-BAS	CE3057-10A-2-D	2.2 mm² to 3.5 mm² (AWG 14 to 12)	8.5 to 11
				CE3057-10A-1-D		10.5 to 14.1
	General environment (Note 2)		D/MS3108B18-10S	D/MS3057-10A	2.2 mm² to 3.5 mm² (AWG 14 to 12)	14.3 or smaller (bushing ID)
HG-SR121, 201, 301, 202, 352, 502	IP67 EN compliant		CE05-8A22-22SD-D-BAS	CE3057-12A-2-D	5.5 mm² to 8 mm² (AWG 10 to 8)	9.5 to 13
				CE3057-12A-1-D		12.5 to 16
	General environment (Note 2)		D/MS3108B22-22S	D/MS3057-12A	5.5 mm² to 8 mm² (AWG 10 to 8)	15.9 or smaller (bushing ID)
HG-SR421, 702	IP67 EN compliant		CE05-8A32-17SD-D-BAS	CE3057-20A-1-D	14 mm² to 22 mm² (AWG 6 to 4)	22 to 23.8
	General environment (Note 2)		D/MS3108B32-17S	D/MS3057-20A	14 mm² to 22 mm² (AWG 6 to 4)	23.8 or smaller (bushing ID)



Power connector for TM-RFM series **Direct**

Applicable servo motor	Feature (Note 1)	Plug (DDK Ltd.)	Cable clamp (with backshell)			Applicable cable example	
			Type	Model	Manufacturer	Wire size (Note 3)	Cable OD [mm]
TM-RFM002C20, 004C20, 006C20, 006E20, 012E20, 018E20	IP67 EN compliant	CE05-6A14S-2SD-D	Straight	ACS-08RL-MS14F	Nippon Flex Co., Ltd.	0.3 mm² to 1.25 mm² (AWG 22 to 16)	4 to 8
				ACS-12RL-MS14F			8 to 12
				YSO14-5 to 8	Daiwa Dengyo Co., Ltd.		5 to 8.3
				YSO14-9 to 11			8.3 to 11.3
	General environment (Note 2)	D/MS3106B14S-2S	Straight	D/MS3057-6A	DDK Ltd.	0.3 mm² to 1.25 mm² (AWG 22 to 16)	7.9 or smaller (bushing ID)

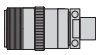
Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo amplifier/servo motor. If the IP rating of the servo amplifier/servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Not compliant with EN.
3. The wire size shows wiring specification of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for examples of wire size selection.

Rotary Rotary servo motor **Linear** Linear servo motor **Direct** Direct drive motor

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.

Power connector for LM-F series **Linear**



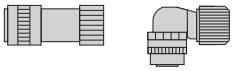
Applicable servo motor	Feature (Note 1)	Cable receptacle (DDK Ltd.)	Cable clamp (DDK Ltd.)	Applicable cable example	
				Wire size (Note 3)	Cable OD [mm]
LM-FP2B, 2D, 2F	General environment (Note 4)	D/MS3101A18-10S	D/MS3057A-10A	2.2 mm^2 to 3.5 mm^2 (AWG 14 to 12)	14.3 or smaller (bushing ID)
LM-FP4B, 4D	General environment (Note 4)	D/MS3101A24-22S	D/MS3057A-16A	5.5 mm^2 to 8 mm^2 (AWG 10 to 8)	19.1 or smaller (bushing ID)

Electromagnetic brake connector for HG-KR/HG-MR series **Rotary**

Applicable servo motor	Feature (Note 1)	Connector (Japan Aviation Electronics Industry, Limited)	Crimping tool (Japan Aviation Electronics Industry, Limited)	Applicable cable example
HG-KR/ HG-MR series	IP65	Plug: JN4FT02SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G)	For contactor: CT160-3-TMH5B	Wire size: 0.3 mm^2 to 0.5 mm^2 (AWG 22 to 20) Cable OD: 3.6 mm to 4.8 mm Wire example: Fluorine resin wire (Vinyl jacket cable RMFES-A(CL3X) AWG 20, 2 cores Dyden Corporation (Note 2) or an equivalent product)

Electromagnetic brake connector for HG-SR series **Rotary**

Straight type Angle type



Applicable servo motor	Feature (Note 1)	Connector (DDK Ltd.)				Applicable cable example
		Type	Type of connection	Plug	Socket contact	Cable OD [mm]
HG-SR series	IP67	Straight	One-touch connection type	CMV1-SP2S-S	Select from solder or press bonding type. (Refer to the table below.)	4.0 to 6.0
				CMV1-SP2S-M1		5.5 to 7.5
				CMV1-SP2S-M2		7.0 to 9.0
				CMV1-SP2S-L		9.0 to 11.6
			Screw type	CMV1S-SP2S-S		4.0 to 6.0
				CMV1S-SP2S-M1		5.5 to 7.5
				CMV1S-SP2S-M2		7.0 to 9.0
				CMV1S-SP2S-L		9.0 to 11.6
		Angle	One-touch connection type	CMV1-AP2S-S		4.0 to 6.0
				CMV1-AP2S-M1		5.5 to 7.5
				CMV1-AP2S-M2		7.0 to 9.0
				CMV1-AP2S-L		9.0 to 11.6
			Screw type	CMV1S-AP2S-S		4.0 to 6.0
				CMV1S-AP2S-M1		5.5 to 7.5
				CMV1S-AP2S-M2		7.0 to 9.0
				CMV1S-AP2S-L		9.0 to 11.6

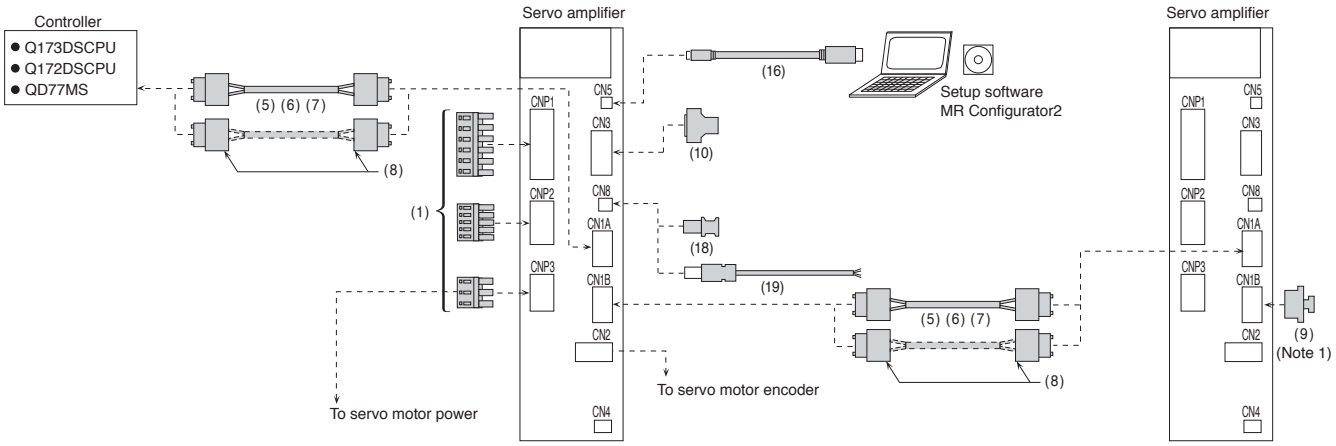
Contact	Socket contact (DDK Ltd.)	Wire size (Note 3)
Solder type	CMV1-#22BSC-S2-100	1.25 mm^2 (AWG 16) or smaller
Press bonding type	CMV1-#22BSC-C3-100	0.5 mm^2 to 1.25 mm^2 (AWG 20 to 16) Crimping tool (357J-53164T) is required.

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. Contact Taisei Co., Ltd.
3. The wire size shows wiring specification of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for examples of wire size selection.
4. Not compliant with EN.

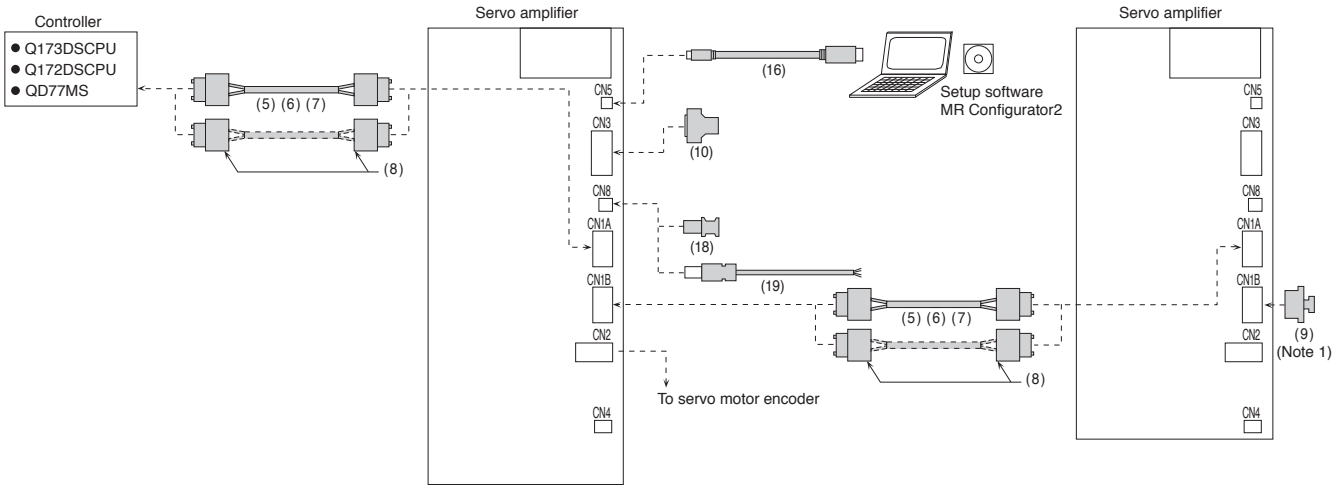
Rotary Rotary servo motor **Linear** Linear servo motor **Direct** Direct drive motor

Configuration Example for MR-J4-B

For 3.5 kW or smaller

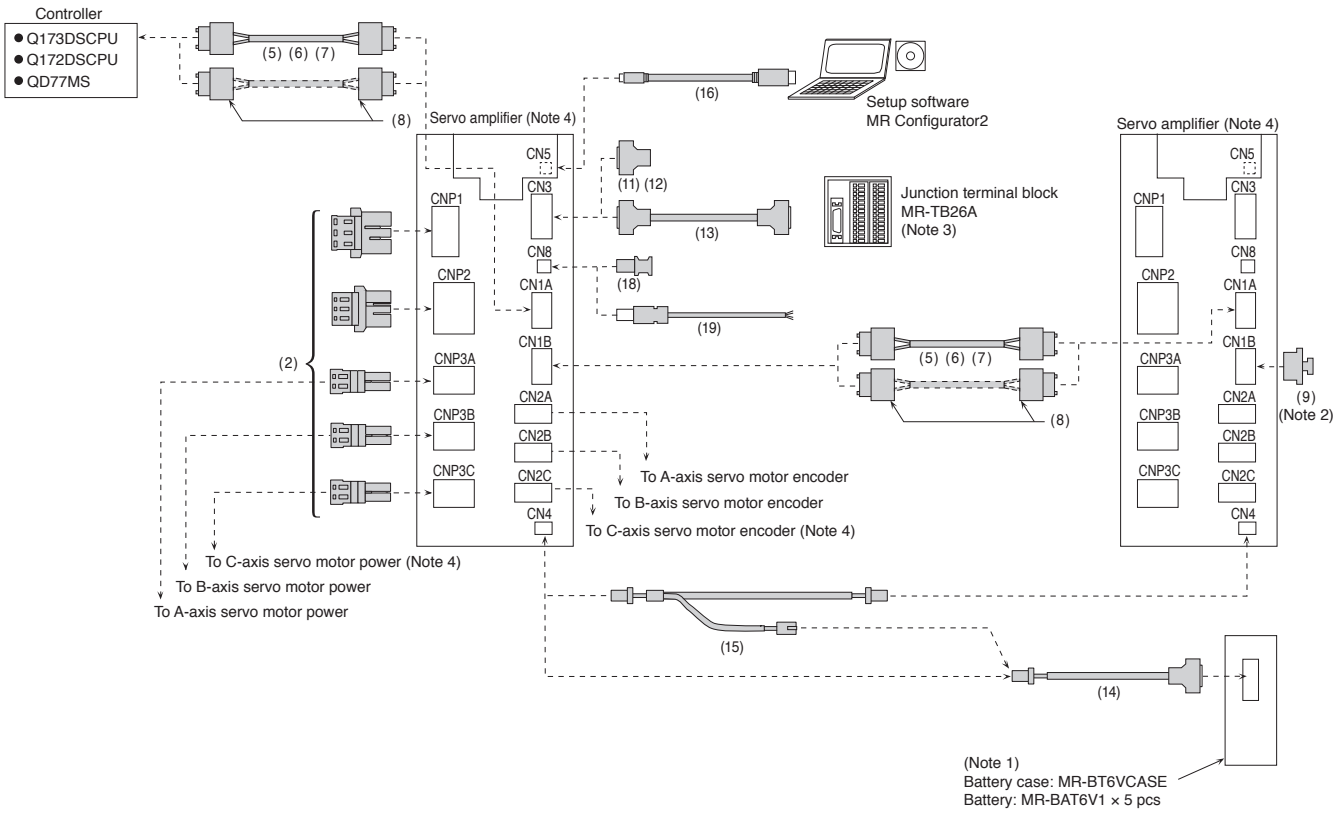


For 5 kW or larger



Notes: 1. Attach a SSCNET III connector cap to the unused connector.

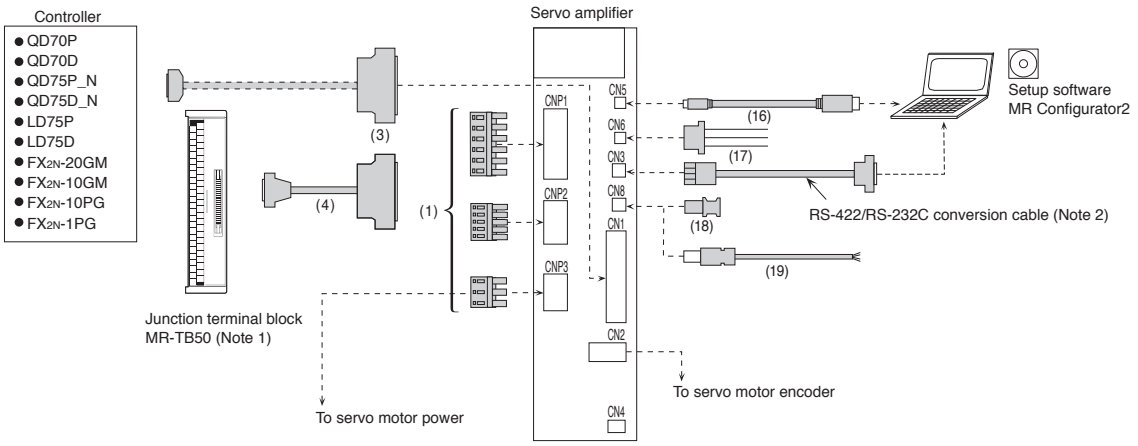
Configuration Example for MR-J4W2-B and MR-J4W3-B



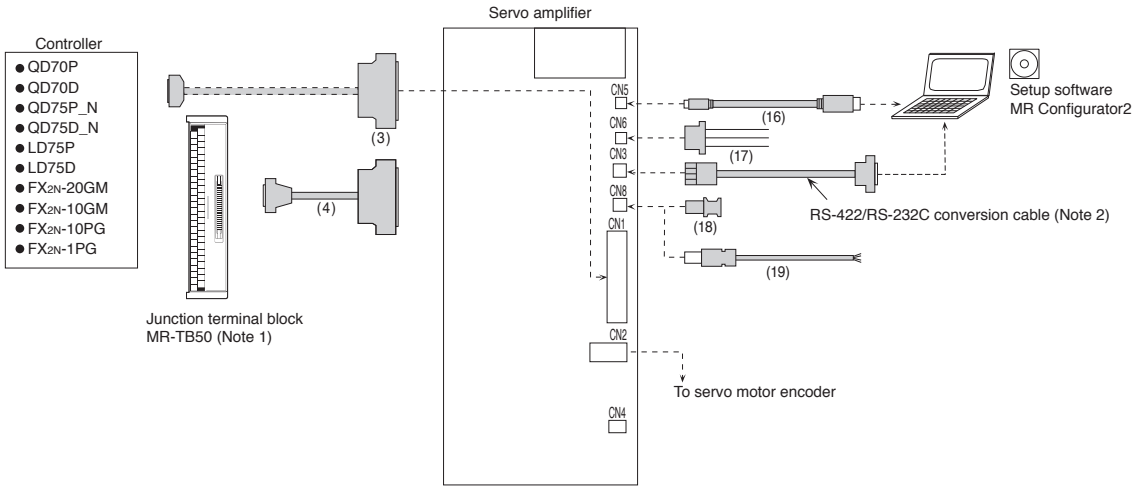
Notes: 1. MR-BT6VCASE and MR-BAT6V1 are not required when using the linear servo motor or when configuring incremental system with the MR-J4W_-B servo amplifier.
2. Attach a SSCNET III connector cap to the unused connector.
3. Refer to "Junction Terminal Block" in this catalog.
4. CNP3C and CN2C connectors are available for MR-J4W3-B servo amplifier.

Configuration Example for MR-J4-A

For 3.5 kW or smaller



For 5 kW or larger



Notes: 1. Refer to "Junction Terminal Block" in this catalog.
2. Refer to "Products on the Market for Servo Amplifiers" in this catalog.

Cables and Connectors for Servo Amplifiers

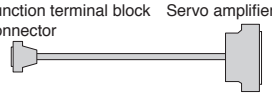
Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

		Item	Model	Cable length	IP rating	Application	Description
For CNP1/CNP2/CNP3	(1)	Servo amplifier power connector set (Note 1) (insertion type)	(Standard accessory)	-	-	For MR-J4-100B or smaller/ MR-J4-100A or smaller	CNP1 connector / CNP2 connector / CNP3 connector / Open tool  Applicable wire size (Note 2): AWG 18 to 14 Insulator OD: up to 3.9 mm
						For MR-J4-200B/ MR-J4-200A/ MR-J4-350B/ MR-J4-350A	CNP1 connector / CNP2 connector / CNP3 connector / Open tool  CNP1/CNP3 connector Applicable wire size (Note 2): AWG 16 to 10 Insulator OD: up to 4.7 mm CNP2 connector Applicable wire size (Note 2): AWG 18 to 14 Insulator OD: up to 3.9 mm
For CNP1/CNP2/CNP3_	(2)	Servo amplifier power connector set (Note 3) (insertion type)	(Standard accessory)	-	-	For MR-J4W2-B/ MR-J4W3-B	CNP1 connector  Applicable wire size (Note 2): AWG 16 to 14 Insulator OD: up to 4.2 mm CNP2 connector  Applicable wire size (Note 2): AWG 16 to 14 Insulator OD: up to 3.8 mm CNP3A/CNP3B/CNP3C connector  Open tool  Applicable wire size (Note 2): AWG 18 to 14 Insulator OD: up to 3.8 mm

Notes: 1. This connector set is not required for 5 kW or larger servo amplifiers since terminal blocks are mounted. Refer to servo amplifier dimensions in this catalog for details.
2. The wire size shows wiring specification of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for examples of wire size selection.
3. Press bonding type is also available. Refer to "MR-J4W_-_B Servo Amplifier Instruction Manual" for details.

Cables and Connectors for Servo Amplifiers

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

		Item	Model	Cable length	IP rating	Application	Description
For CN1	(3)	Connector set	MR-J3CN1	-	-	For MR-J4-A	 Servo amplifier connector
	(4)	Junction terminal block cable	MR-J2M-CN1TBL05M	0.5 m	-	For connecting MR-J4-A and MR-TB50	Junction terminal block connector Servo amplifier connector 
			MR-J2M-CN1TBL1M	1 m			
For controller/CN1A/CN1B	(5)	SSCNET III cable (Note 1) (standard cord for inside cabinet) Compatible with SSCNET III(/H)	MR-J3BUS015M	0.15 m	-	For MR-J4-B/ MR-J4W2-B/ MR-J4W3-B	SSCNET III/(H) connector SSCNET III/(H) connector 
			MR-J3BUS03M	0.3 m	-		
			MR-J3BUS05M	0.5 m	-		
			MR-J3BUS1M	1 m	-		
			MR-J3BUS3M	3 m	-		
	(6)	SSCNET III cable (Note 1) (standard cable for outside cabinet) Compatible with SSCNET III(/H)	MR-J3BUS5M-A	5 m	-	For MR-J4-B/ MR-J4W2-B/ MR-J4W3-B	
			MR-J3BUS10M-A	10 m	-		
			MR-J3BUS20M-A	20 m	-		
	(7)	SSCNET III cable (Note 1, 3) (long distance cable, long bending life) Compatible with SSCNET III(/H)	MR-J3BUS30M-B *1	30 m	-	For MR-J4-B/ MR-J4W2-B/ MR-J4W3-B	
			MR-J3BUS40M-B *1	40 m	-		
			MR-J3BUS50M-B *1	50 m	-		
	(8)	SSCNET III connector set (Note 1, 2) Compatible with SSCNET III(/H)	MR-J3BCN1	-	-	For MR-J4-B/ MR-J4W2-B/ MR-J4W3-B	SSCNET III/(H) connector SSCNET III/(H) connector 
For CN1B	(9)	SSCNET III connector cap Compatible with SSCNET III(/H)	(Standard accessory)	-	-	For MR-J4-B/ MR-J4W2-B/ MR-J4W3-B	

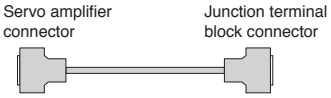
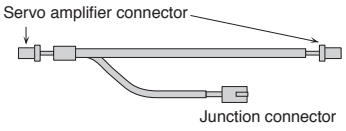
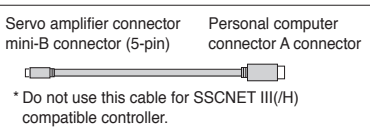
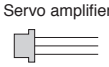
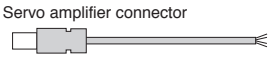
Notes: 1. Read carefully through the precautions enclosed with the options before use.
2. Dedicated tools are required. Contact your local sales office for more details.
3. When SSCNET III/H is used, refer to "Products on the Market for Servo Amplifiers" in this catalog for cables over 50 m or with ultra-long bending life.

For unlisted lengths

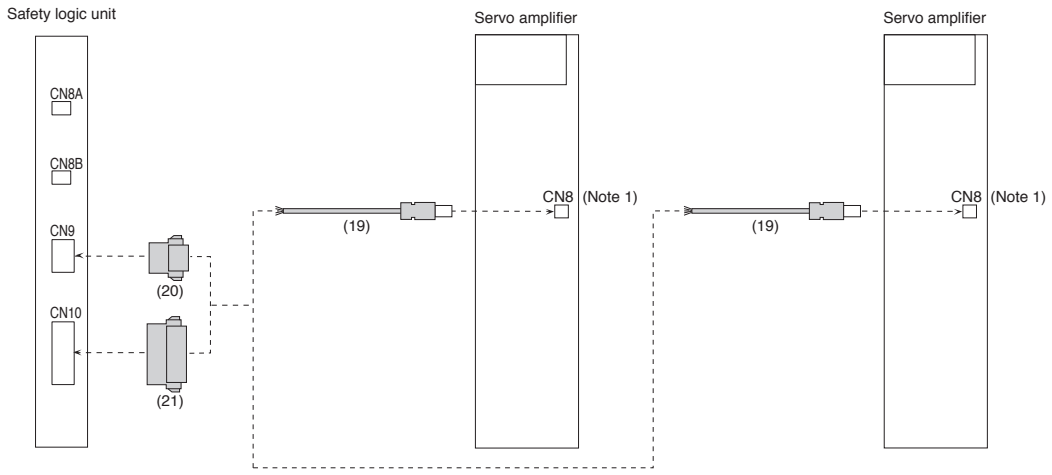
*1. For unlisted lengths of the cables, contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp

Cables and Connectors for Servo Amplifiers

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

		Item	Model	Cable length	IP rating	Application	Description
For CN3	(10)	Connector set	MR-CCN1	-	-	For MR-J4-B	 Servo amplifier connector
	(11)	Connector set (Qty: 1 pc)	MR-J2CMP2	-	-	For MR-J4W2-B/ MR-J4W3-B	 Servo amplifier connector
	(12)	Connector set (Qty: 20 pcs)	MR-ECN1	-	-	For MR-J4W2-B/ MR-J4W3-B	
	(13)	Junction terminal block cable	MR-TBNATBL05M	0.5 m	-	For connecting MR-J4W2-B/ MR-J4W3-B and MR-TB26A	 Servo amplifier connector / Junction terminal block connector
			MR-TBNATBL1M	1 m			
For CN4	(14)	Battery cable	MR-BT6V1CBL03M	0.3 m	-	For connecting MR-J4W2-B/ MR-J4W3-B and MR-BT6VCASE	 Servo amplifier connector / Battery case connector
			MR-BT6V1CBL1M	1 m			
	(15)	Junction battery cable	MR-BT6V2CBL03M	0.3 m	-	For MR-J4W2-B/ MR-J4W3-B	 Servo amplifier connector / Junction connector
			MR-BT6V2CBL1M	1 m			
For CN5	(16)	Personal computer communication cable (USB cable)	MR-J3USBCBL3M	3 m	-	For MR-J4-B/ MR-J4-A/ MR-J4W2-B/ MR-J4W3-B	 Servo amplifier connector mini-B connector (5-pin) / Personal computer connector A connector * Do not use this cable for SSCNET III(/H) compatible controller.
For CN6	(17)	Monitor cable	MR-J3CN6CBL1M	1 m	-	For MR-J4-A	 Servo amplifier connector
For CN8	(18)	Short-circuit connector	(Standard accessory)	-	-	For MR-J4-B/ MR-J4-A/ MR-J4W2-B/ MR-J4W3-B	 This connector is required when the STO function is not used.
	(19)	STO cable	MR-D05UDL3M-B	3 m	-	For connecting servo amplifier with MR-J3-D05 or other safety control device	 Servo amplifier connector

Configuration Example for MR-J3-D05 (with MR-J4-B/A and MR-J4W_-B)



Cables and Connectors for MR-J3-D05

Refer to "Details of Optional Cables and Connectors" in this catalog for the detailed models.

		Item	Model	Cable length	IP rating	Application	Description
For CN8	(19)	STO cable	MR-D05UDL3M-B	3 m	-	For connecting servo amplifier with MR-J3-D05 or other safety control device	Servo amplifier connector
For CN9	(20)	Connector	(Standard accessory of MR-J3-D05)	-	-	For MR-J3-D05	Safety logic unit connector
For CN10	(21)	Connector	(Standard accessory of MR-J3-D05)	-	-	For MR-J3-D05	Safety logic unit connector

Notes: 1. Attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.

Products on the Market for Servo Amplifiers

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.

●Personal computer communication cable A

Application	Model	Description
RS-422/RS-232C conversion cable	DSV-CABV	Servo amplifier connector — Personal computer connector Diatrend Corp.

●RS-422 connector A

Application	Model	Description
RS-422 connector	TM10P-88P	Hirose Electric Co., Ltd.

●RS-422 branch connector (for multi-drop) A

Application	Model	Description
Branch connector	BMJ-8	Hachiko Electric Co., Ltd.

●SSCNET III cable B WB

Application	Model	Description
Ultra-long bending life fiber-optic cable for SSCNET III(/H)	SC-J3BUS_M-C _ = cable length (100 m max. (Note 1), unit of 1 m)	Mitsubishi Electric System & Service Co., Ltd.

Notes: 1. The maximum wiring distance between stations is 100 m for SSCNET III/H and 50 m for SSCNET III.

●Products on the Market for MR-J4W_-B WB

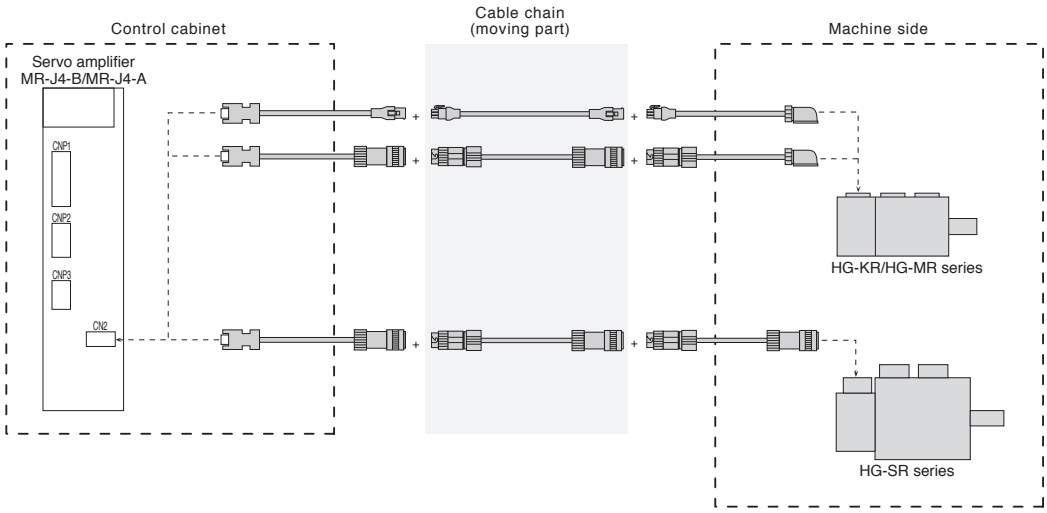
Contact Mitsubishi Electric System & Service Co., Ltd. for power cables with a press bonding type connector for MR-J4W_-B servo amplifiers and power cables for servo motors.

●Application of connecting encoder junction cable

Unlisted lengths of cables between servo amplifier and servo motor, EMC cables, and special cables for connecting servo amplifier and servo motor with multiple cables are available. Contact Mitsubishi Electric System & Service Co., Ltd. FA PRODUCT DIVISION by email: oss-ip@melsc.jp

Example) Configuration using three encoder junction cables

- Replacing only the cable of the moving part in the cable chain is possible.
- Resetting after transporting a machine is easy because the servo amplifier side and the servo motor side can be separated.



Safety Logic Unit (MR-J3-D05) B WB A

The safety logic unit has SS1 and STO functions. Servo amplifier achieves Safe stop 1 (SS1) function by adding the MR-J3-D05.

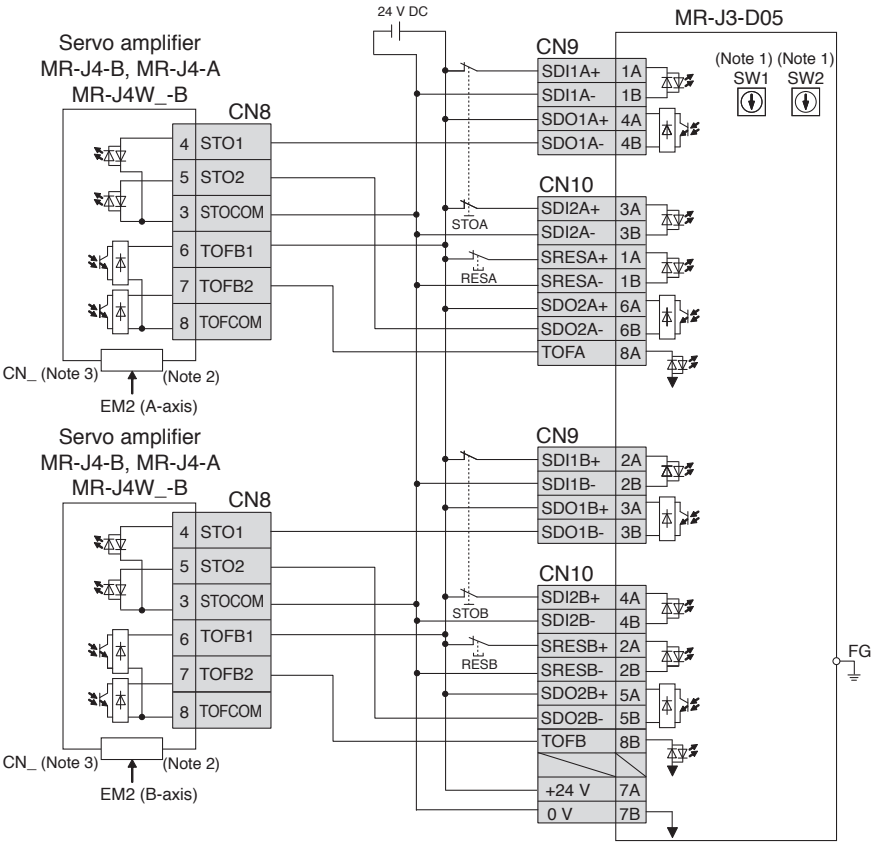
Specifications

Safety logic unit model		MR-J3-D05
Control circuit power supply	Voltage	24 V DC
	Permissible voltage fluctuation	24 V DC ± 10%
	Required current capacity [A]	0.5 (Note 1, 2)
Compatible system		2 systems (A-axis, B-axis independent)
Shut-off input		4 points (2 points × 2 systems) SDI_ : source/sink compatible (Note 3)
Shut-off release input		2 points (1 point × 2 systems) SRES_ : source/sink compatible (Note 3)
Feedback input		2 points (1 point × 2 systems) TOF_ : source compatible (Note 3)
Input type		Photocoupler insulation, 24 V DC (external supply), internal limited resistance 5.4 kΩ
Shut-off output		8 points (4 points × 2 systems) STO_ : source compatible (Note 3) SDO_ : source/sink compatible (Note 3)
Output type		Photocoupler insulation, open-collector type Permissible current: 40 mA or less per output, Inrush current: 100 mA or less per output
Delay time setting		A-axis: select from 0 s, 1.4 s, 2.8 s, 5.6 s, 9.8 s or 30.8 s B-axis: select from 0 s, 1.4 s, 2.8 s, 9.8 s or 30.8 s Accuracy: ±2%
Safety function		STO, SS1 (IEC/EN 61800-5-2) EMG STOP, EMG OFF (IEC/EN 60204-1)
Safety performance	Standards certified by CB	EN ISO 13849-1 Category 3 PL d, EN 61508 SIL 2, EN 62061 SIL CL 2, EN 61800-5-2 SIL 2
	Response performance (when delay time is set to 0 s)	10 ms or less (STO input OFF → shut-off output OFF)
	Test pulse input (STO) (Note 4)	Test pulse frequency: 1 Hz to 25 Hz Test pulse off time: 1 ms maximum
	Mean time to dangerous failure (MTTFd)	516 years
	Average diagnostic coverage (DC_{avg})	93.1%
	Probability of dangerous Failure per Hour (PFH)	4.75×10^{-9} [1/h]
Compliance to standards	CE marking	LVD: EN 61800-5-1 EMC: EN 61800-3 MD: EN ISO 13849-1, EN 61800-5-2, EN 62061
Structure (IP rating)		Natural cooling, open (IP00)
Environment	Ambient temperature	0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)
	Ambient humidity	90 %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	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)
Mass [kg]		0.2 (including CN9 and CN10 connectors)

Notes: 1. Inrush current of approximately 1.5 A flows instantaneously when the power is switched on. Select an appropriate capacity of a power supply considering the inrush current.
2. Power-on duration of the safety logic unit is 100,000 times.
3. _ in signal name represents a symbol which indicates a number and axis name.
4. This function makes a failure diagnosis on contacts including external circuits by instantaneously turning off the signals from a controller to a servo amplifier at constant period when the input signals of the servo amplifier are on.

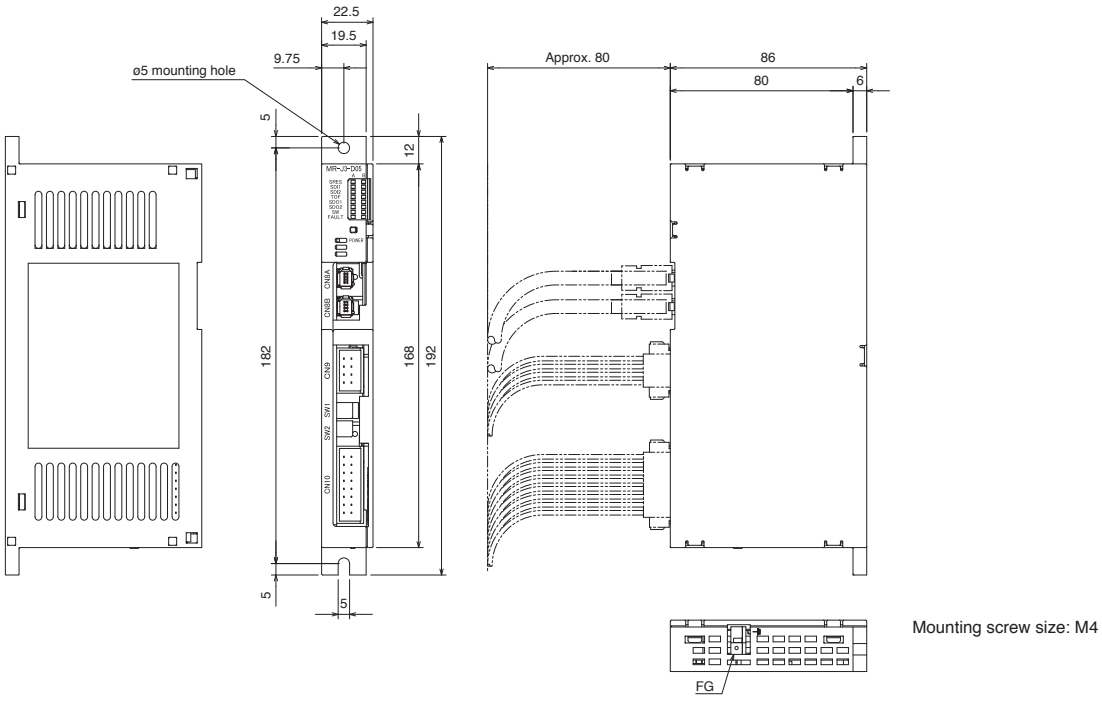
Safety Logic Unit (MR-J3-D05) B WB A

Connection example



Notes: 1. Set delay time of STO output with SW1 and SW2.
2. This connection is for source interface.
3. This connector is CN3 for MR-J4-B and MR-J4W_-B, and CN1 for MR-J4-A.

Dimensions



Mounting screw size: M4

[Unit: mm]

Regenerative Option B WB A

Servo amplifier model	Tolerable regenerative power of built-in regenerative resistor [W]	Tolerable regenerative power of regenerative option (Note 2)										
		MR-RB										
		032	12	30	3N	31	32	50 (Note 1)	5N (Note 1)	51 (Note 1)	14	34
		40 Ω	40 Ω	13 Ω	9 Ω	6.7 Ω	40 Ω	13 Ω	9 Ω	6.7 Ω	26 Ω	26 Ω
MR-J4-10B/A	-	30	-	-	-	-	-	-	-	-	-	-
MR-J4-20B/A	10	30	100	-	-	-	-	-	-	-	-	-
MR-J4-40B/A	10	30	100	-	-	-	-	-	-	-	-	-
MR-J4-60B/A	10	30	100	-	-	-	-	-	-	-	-	-
MR-J4-70B/A	20	30	100	-	-	-	300	-	-	-	-	-
MR-J4-100B/A	20	30	100	-	-	-	300	-	-	-	-	-
MR-J4-200B/A	100	-	-	300	-	-	-	500	-	-	-	-
MR-J4-350B/A	100	-	-	-	300	-	-	-	500	-	-	-
MR-J4-500B/A	130	-	-	-	-	300	-	-	-	500	-	-
MR-J4-700B/A	170	-	-	-	-	300	-	-	-	500	-	-
MR-J4W2-22B	20	-	-	-	-	-	-	-	-	-	100	-
MR-J4W2-44B	20	-	-	-	-	-	-	-	-	-	100	-
MR-J4W2-77B	100	-	-	-	300	-	-	-	-	-	-	-
MR-J4W2-1010B	100	-	-	-	300	-	-	-	-	-	-	-
MR-J4W3-222B	30	-	-	-	-	-	-	-	-	-	100	300
MR-J4W3-444B	30	-	-	-	-	-	-	-	-	-	100	300

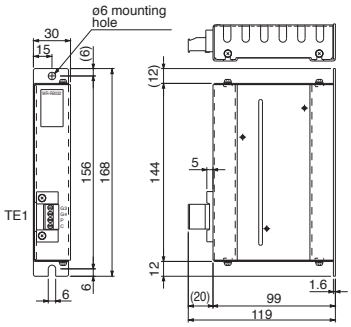
Notes: 1. Be sure to cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m^3/min). The cooling fan must be prepared by user.
2. The power values in this table are resistor-generated powers, not rated powers.

* Cautions when connecting the regenerative option

1. The regenerative option causes a temperature rise of 100 °C or higher relative to the ambient temperature. Fully examine heat dissipation, installation position, wires used before installing the unit. Use flame-retardant wires or apply flame retardant on wires, and keep the wires clear of the unit.
2. Use twisted wires for connecting the regenerative option to the servo amplifier, and keep the wire length to a maximum of 5 m.
3. Use twisted wires for connecting a thermal sensor, and make sure that the sensor does not fail to work properly due to inducted noise.

Regenerative Option B WB A

MR-RB032

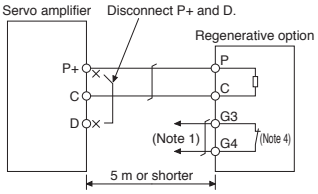


Terminal arrangement

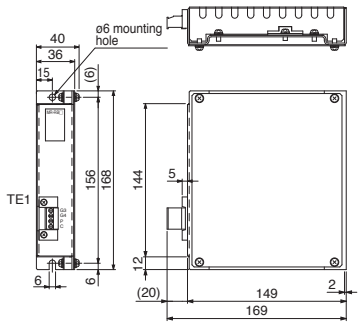
TE1
G3
G4
P
C

Applicable wire size (Note 5):
0.2 mm² to 2.5 mm² (AWG 24 to 12)
Mounting screw size: M5

Model	Mass [kg]
MR-RB032	0.5



MR-RB12, MR-RB14



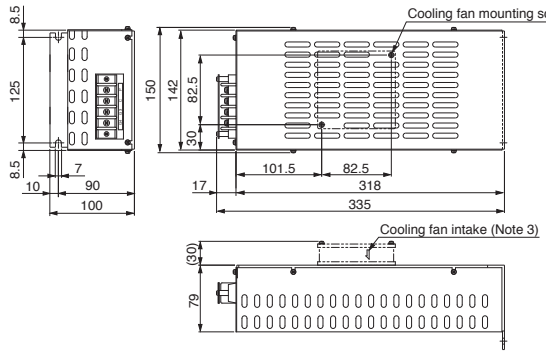
Terminal arrangement

TE1
G3
G4
P
C

Applicable wire size (Note 5):
0.2 mm² to 2.5 mm² (AWG 24 to 12)
Mounting screw size: M5

Model	Mass [kg]
MR-RB12 MR-RB14	1.1

MR-RB30, MR-RB3N, MR-RB31, MR-RB32, MR-RB34



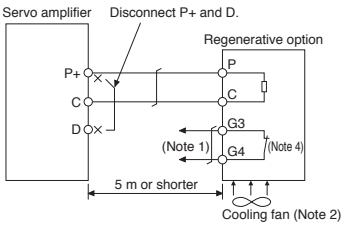
Terminal arrangement

P
C
G3
G4

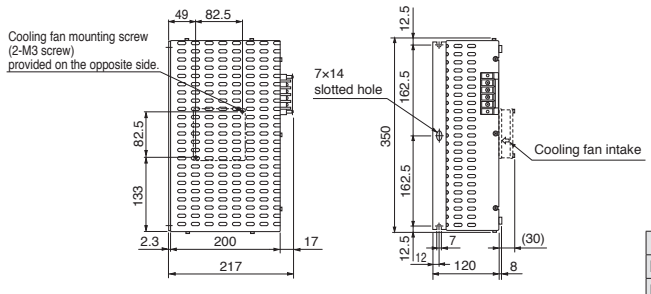
Terminal screw size: M4
Mounting screw size: M6

Model	Mass [kg]
MR-RB30 MR-RB3N MR-RB31 MR-RB32 MR-RB34	2.9

For MR-J4-500B/A or smaller, and MR-J4W_-B



MR-RB50, MR-RB5N, MR-RB51



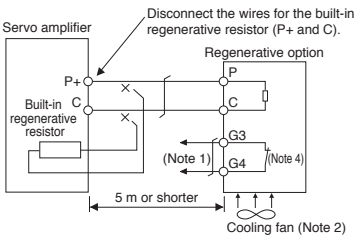
Terminal arrangement

P
C
G3
G4

Terminal screw size: M4
Mounting screw size: M6

Model	Mass [kg]
MR-RB50 MR-RB5N MR-RB51	5.6

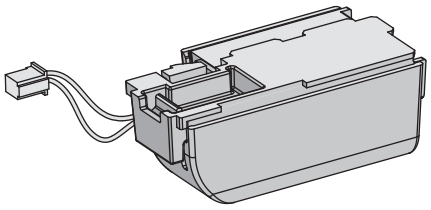
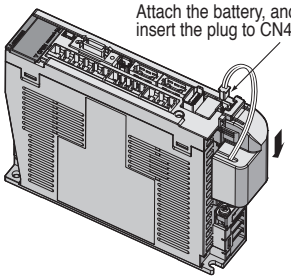
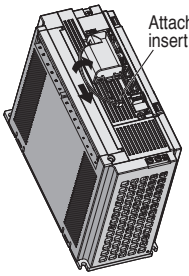
For MR-J4-700B/A



Notes: 1. Create a sequence circuit that turns off the magnetic contactor when abnormal overheating occurs.
2. When using MR-RB50, MR-RB5N, or MR-RB51, cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m³/min). The cooling fan must be prepared by user.
3. When using MR-RB30, MR-RB3N, MR-RB31, MR-RB32, or MR-RB34, it may be necessary to cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m³/min), depending on the operating environment. Refer to relevant Servo Amplifier Instruction Manual for details. The cooling fan must be prepared by user.
4. G3 and G4 terminals are thermal sensor. G3-G4 opens when the regenerative option overheats abnormally.
5. Refer to "Wires, Molded Case Circuit Breakers and Magnetic Contactors" in this catalog for examples of wire size selection.

Battery (MR-BAT6V1SET) (Note 1) B A

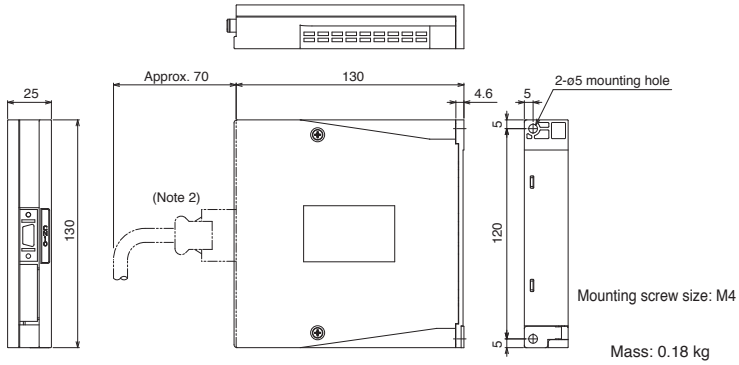
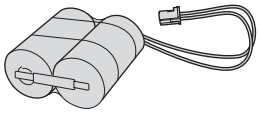
The absolute position data can be retained by mounting the battery on the servo amplifier.
This battery is not required when the servo system is used in incremental method.

Appearance	Mounting method
 Model: MR-BAT6V1SET Nominal voltage: 6 V Nominal capacity: 1650 mAh Lithium content: 1.2 g Primary battery: 2CR17335A Mass: 55 g	For MR-J4-350B/A or smaller  For MR-J4-500B/A or larger  * MR-J3BAT battery cannot be used because of the difference in voltage.

Notes: 1. MR-BAT6V1SET is an assembled battery composed of lithium metal batteries of CR17335A. This battery is not subject to the dangerous goods (Class 9) of the UN Recommendations. To transport lithium metal batteries and lithium metal batteries contained in equipment by means of transport subject to the UN Recommendations, take actions to comply with the following regulations: the United Nations Recommendations on the Transport of Dangerous Goods, the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO), and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO). To transport the batteries, check the latest standards or the laws of the destination country and take actions. Contact your local sales office for more details. (As of April 2012)

Battery Case (MR-BT6VCASE) and Battery (MR-BAT6V1) (Note 1) WB

The battery case and the batteries are required when configuring absolute position detection system using the rotary servo motor or the direct drive motor. MR-BT6VCASE is a case that stores 5 pieces of MR-BAT6V1 batteries by connecting the connectors. Up to 8 axes of MR-J4W_-_B servo amplifiers are able to be connected to this battery case. Use optional MR-BT6V2CBL_M junction battery cable for branching off the connection when connecting multiple servo amplifiers.
MR-BT6VCASE and MR-BAT6V1 are not required when using the linear servo motor or when configuring incremental system with the MR-J4W_-B servo amplifier.
MR-BAT6V1 is not included with MR-BT6VCASE. Please purchase MR-BAT6V1 separately.

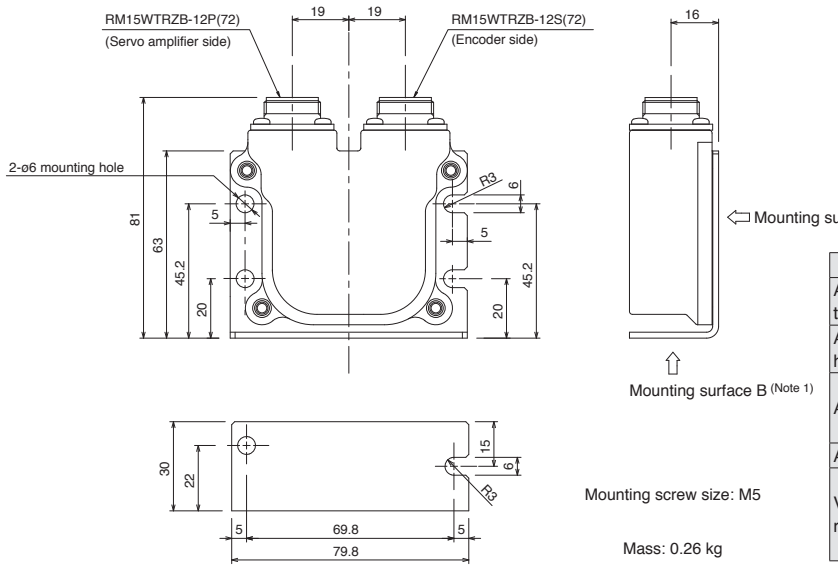
Dimensions (assembled) [Unit: mm]	MR-BAT6V1
	 Model: MR-BAT6V1 Nominal voltage: 6 V Nominal capacity: 1650 mAh Lithium content: 1.2 g Primary battery: 2CR17335A Mass: 34 g

Notes: 1. MR-BAT6V1 is an assembled battery composed of lithium metal batteries of CR17335A. This battery is not subject to the dangerous goods (Class 9) of the UN Recommendations. To transport lithium metal batteries and lithium metal batteries contained in equipment by means of transport subject to the UN Recommendations, take actions to comply with the following regulations: the United Nations Recommendations on the Transport of Dangerous Goods, the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO), and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO). To transport the batteries, check the latest standards or the laws of the destination country and take actions. Contact your local sales office for more details. (As of April 2012)
2. Use optional MR-BT6V1CBL_M battery cable. When using the battery case with multiple servo amplifiers, also use optional MR-BT6V2CBL_M junction battery cable. Refer to "Cables and Connectors for Servo Amplifiers" under section 5 Options/Peripheral Equipment in this catalog.

Absolute Position Storage Unit (MR-BTAS01) B WB

This absolute position storage unit is required for configuring absolute position detection system using the direct drive motor. This unit is not required when the servo system is used in incremental method.

Dimensions [Unit: mm]



Mounting screw size: M5

Mass: 0.26 kg

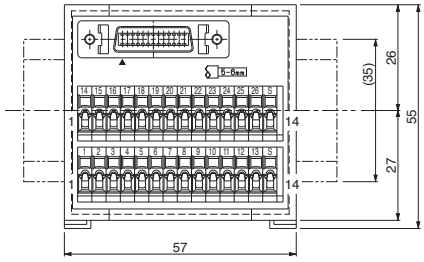
Item	Environment
Ambient temperature	0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)
Ambient humidity	90 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)
Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, dust or splash of oil or water
Altitude	1000 m or less above sea level
Vibration resistance	When the surface A is mounted: 49 m/s^2 (directions of X, Y, and Z axes) When the surface B is mounted: 5.9 m/s^2 (directions of X, Y, and Z axes)

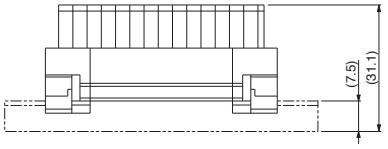
Notes: 1. When mounting the absolute position storage unit outside a cabinet, be sure to mount the surface A with 4 screws. When mounting the unit inside a cabinet, mounting the surface B with 2 screws is also possible.

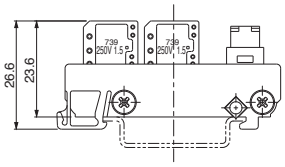
Junction Terminal Block (MR-TB26A) WB

Connect all signals via the junction terminal block.

Dimensions (Note 1) [Unit: mm]







Specifications

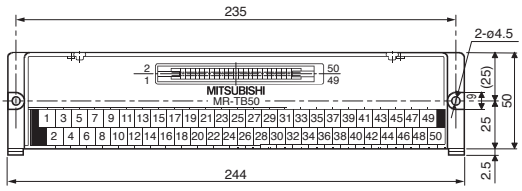
Rating		32 V AC/DC 0.5 A
Applicable wire (terminal side)	Stranded wire	0.08 mm² to 1.5 mm² (AWG 28 to 14)
	Solid wire	ø0.32 mm to 1.2 mm
	Insulator OD	3.4 mm or shorter
Operating tool		210-619 (WAGO) or equivalent 210-119SB (WAGO) or equivalent
Strip length		5 mm to 6 mm

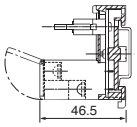
Notes: 1. The lengths in ( ) apply when the junction terminal block is mounted on a 35 mm wide DIN rail.

Junction Terminal Block (MR-TB50) A

Connect all signals via the junction terminal block.

Dimensions [Unit: mm]

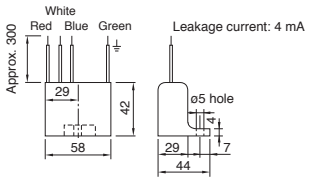
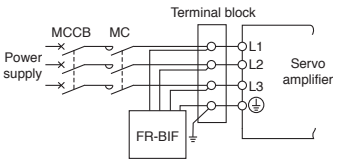
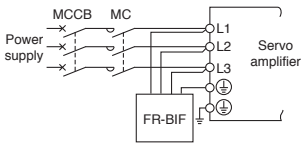




Terminal screw size: M3.5
Applicable wire: 2 mm² maximum
Crimping terminal width: 7.2 mm or shorter
Mounting screw size: M4

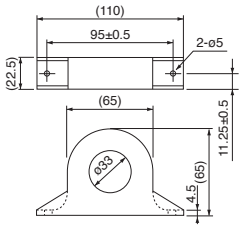
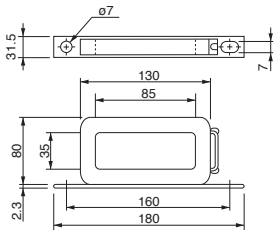
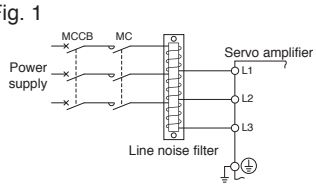
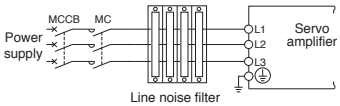
Radio Noise Filter (FR-BIF) B WB A

This filter effectively controls noise emitted from the power supply side of the servo amplifier and is especially effective for radio frequency bands 10 MHz or lower. The FR-BIF is designed for the input only.

Dimensions [Unit: mm]	Connections
	The FR-BIF is designed to be connected with the input only. Wiring should be as short as possible. Grounding is required. Be sure to insulate the unused wire when using FR-BIF with 1-phase power. For MR-J4-350B/A or smaller, and MR-J4W_-B  For MR-J4-500B/A or larger 

Line Noise Filter (FR-BSF01, FR-BLF) B WB A

This filter is effective in suppressing radio noise emitted from the power supply side or the output side of the servo amplifier, and also in suppressing high-frequency leakage current (zero-phase current), especially within 0.5 MHz to 5 MHz band.

Dimensions [Unit: mm]	Connections
FR-BSF01 For wire size of 3.5 mm² (AWG 12) or smaller  FR-BLF For wire size of 5.5 mm² (AWG 10) or larger 	Use the line noise filter for wires of the main circuit power supply (L1, L2, and L3) of the servo amplifier, and of the motor power (U, V, and W). Pass each of the wires through the line noise filter equal times in a same direction. For the main circuit power supply, the effect of the filter rises as the number of passes increases, but generally four passes would be appropriate. For the motor power supply, passes must be four times or less. Do not pass the grounding wire through the filter. Otherwise, the effect of the filter is reduced. Wind the wires to pass through the filter as the required number of passes as shown in Fig.1. If the wires are too thick to wind, use two or more filters to have the required number of passes as shown in Fig.2. Place the line noise filters as close to the servo amplifier as possible for their best performance. Fig. 1  Fig. 2 

Data Line Filter B WB A

This filter is effective in preventing noise when attached to the pulse output cable of the pulse train output controller or the motor encoder cable.

Example) ESD-SR-250 (manufactured by NEC TOKIN Corporation)
ZCAT3035-1330 (manufactured by TDK Corporation)
GRFC-13 (manufactured by Kitagawa Industries Co., Ltd.)

Surge Killer B WB A

Attach surge killers to AC relays and AC valves around the servo amplifier. Attach diodes to DC relays and DC valves.

Example) Surge killer: CR-50500 (manufactured by Okaya Electric Industries Co., Ltd.)
Diode: A diode with breakdown voltage four or more times greater than the relay drive voltage, and with current capacity two or more times greater than the relay drive current.

EMC Filter B WB A

The following filters are recommended as a filter compliant with the EMC directive for the power supply of the servo amplifier.

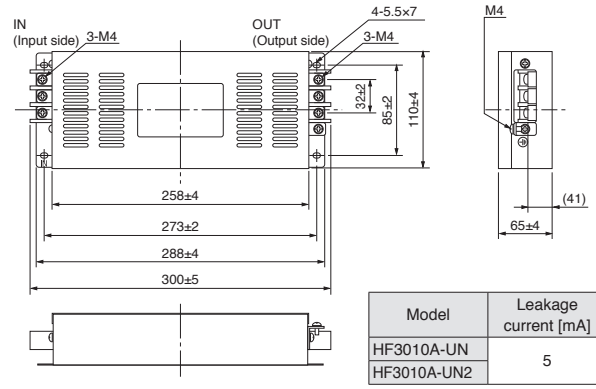
Model	Rated current [A]	Rated voltage [V AC]	Applicable servo amplifier	Fig.
HF3010A-UN (Note 1)	10	250 maximum	MR-J4-10B/A to 100B/A MR-J4W2-22B MR-J4W3-222B	A
HF3010A-UN2 (Note 1)	10	250 maximum	MR-J4W2-44B	
HF3030A-UN (Note 1)	30	250 maximum	MR-J4-200B/A, 350B/A MR-J4W2-77B, 1010B MR-J4W3-444B	B
HF3040A-UN (Note 1)	40	250 maximum	MR-J4-500B/A, 700B/A	

Notes: 1. Manufactured by Soshin Electric Co., Ltd.
A surge protector is separately required to use this EMC filter. Refer to "EMC Installation Guidelines."

Dimensions [Unit: mm]

A

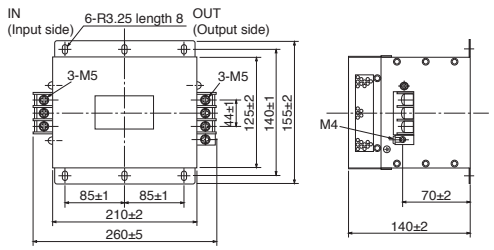
HF3010A-UN, HF3010A-UN2



Model	Leakage current [mA]	Mass [kg]
HF3010A-UN	5	3.5
HF3010A-UN2		

B

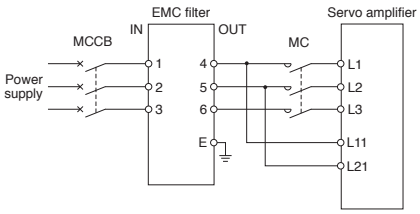
HF3030A-UN, HF3040A-UN



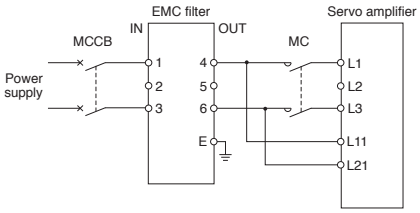
Model	Leakage current [mA]	Mass [kg]
HF3030A-UN	5	5.5
HF3040A-UN	6.5	6.0

Connections

For 3-phase 200 V AC to 240 V AC



For 1-phase 200 V AC to 240 V AC



Power Factor Improving DC Reactor (FR-HEL) B A

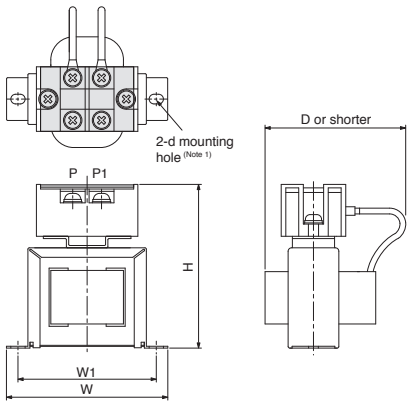
This boosts the power factor of servo amplifier and reduces the power supply capacity. Use either the DC reactor or the AC reactor. As compared to the AC reactor (FR-HAL), the DC reactor (FR-HEL) is more recommended since the DC reactor is more effective in power factor improvement, smaller and lighter, and its wiring is easier. (The DC reactor uses two wires, while the AC reactor uses six wires.)

Model	Applicable servo amplifier	Fig.
FR-HEL-0.4K	MR-J4-10B/A MR-J4-20B/A	A
FR-HEL-0.75K	MR-J4-40B/A	
FR-HEL-1.5K	MR-J4-60B/A MR-J4-70B/A	
FR-HEL-2.2K	MR-J4-100B/A	

Model	Applicable servo amplifier	Fig.
FR-HEL-3.7K	MR-J4-200B/A	B
FR-HEL-7.5K	MR-J4-350B/A	
FR-HEL-11K	MR-J4-500B/A	
FR-HEL-15K	MR-J4-700B/A	

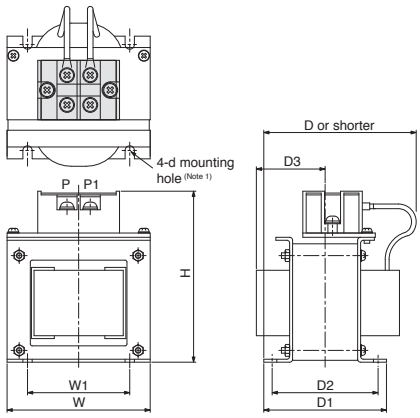
Dimensions [Unit: mm]

A



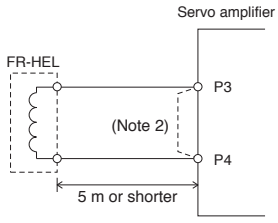
Model	Variable dimensions					Mass [kg]	Terminal screw size	Wire size [mm²]
	W	W1	H	D	d			
FR-HEL-0.4K	70	60	71	61	M4	0.4	M4	2 (AWG 14)
FR-HEL-0.75K	85	74	81	61	M4	0.5	M4	2 (AWG 14)
FR-HEL-1.5K	85	74	81	70	M4	0.8	M4	2 (AWG 14)
FR-HEL-2.2K	85	74	81	70	M4	0.9	M4	2 (AWG 14)

B



Model	Variable dimensions								Mass [kg]	Terminal screw size	Wire size [mm²]
	W	W1	H	D	D1	D2	D3	d			
FR-HEL-3.7K	77	55	92	82	66	57	37	M4	1.5	M4	2 (AWG 14)
FR-HEL-7.5K	86	60	113	98	81	72	43	M4	2.5	M5	3.5 (AWG 12)
FR-HEL-11K	105	64	133	112	92	79	47	M6	3.3	M6	5.5 (AWG 10)
FR-HEL-15K	105	64	133	115	97	84	48.5	M6	4.1	M6	8 (AWG 8)

Connections



Notes: 1. Use this mounting hole for grounding.
2. Remove the short-circuit bar between P3 and P4 when using the DC reactor.

Power Factor Improving AC Reactor (FR-HAL) B WB A

This boosts the power factor of servo amplifier and reduces the power supply capacity.

For MR-J4-B/A

Model	Applicable servo amplifier	Fig.
FR-HAL-0.4K	MR-J4-10B/A MR-J4-20B/A	A
FR-HAL-0.75K	MR-J4-40B/A	
FR-HAL-1.5K	MR-J4-60B/A MR-J4-70B/A	
FR-HAL-2.2K	MR-J4-100B/A	
FR-HAL-3.7K	MR-J4-200B/A	
FR-HAL-7.5K	MR-J4-350B/A	B
FR-HAL-11K	MR-J4-500B/A	
FR-HAL-15K	MR-J4-700B/A	

For MR-J4W2-B (Note 1)

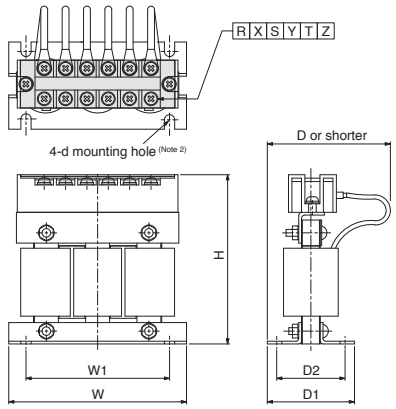
Model	Total output of rotary servo motors	Total continuous thrust of linear servo motors	Total output of direct drive motors	Fig.
FR-HAL-0.75K	450 W or less	150 N or less	100 W or less	A
FR-HAL-1.5K	Over 450 W to 600 W	Over 150 N to 240 N	Over 100 W to 377 W	
FR-HAL-2.2K	Over 600 W to 1 kW	Over 240 N to 300 N	Over 377 W to 545 W	
FR-HAL-3.7K	Over 1 kW to 2 kW	Over 300 N to 480 N	Over 545 W to 838 W	

For MR-J4W3-B (Note 1)

Model	Total output of rotary servo motors	Total continuous thrust of linear servo motors	Total output of direct drive motors	Fig.
FR-HAL-0.75K	450 W or less	150 N or less	-	A
FR-HAL-1.5K	Over 450 W to 600 W	Over 150 N to 240 N	378 W or less	
FR-HAL-2.2K	Over 600 W to 1 kW	Over 240 N to 300 N	-	
FR-HAL-3.7K	Over 1 kW to 2 kW	Over 300 N to 450 N	-	

Dimensions [Unit: mm]

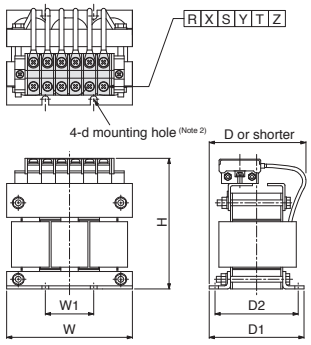
A



Model	Variable dimensions						
	W	W1	H	D	D1	D2	d
FR-HAL-0.4K	104	84	99	72	51	40	M5
FR-HAL-0.75K	104	84	99	74	56	44	M5
FR-HAL-1.5K	104	84	99	77	61	50	M5
FR-HAL-2.2K	115	40	115	77	71	57	M6
FR-HAL-3.7K	115	40	115	83	81	67	M6

Model	Mass [kg]	Terminal screw size
FR-HAL-0.4K	0.6	M4
FR-HAL-0.75K	0.8	M4
FR-HAL-1.5K	1.1	M4
FR-HAL-2.2K	1.5	M4
FR-HAL-3.7K	2.2	M4

B

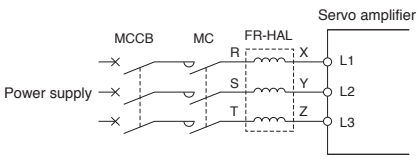


Model	Variable dimensions						
	W	W1	H	D	D1	D2	d
FR-HAL-7.5K	130	50	135	100	98	86	M6
FR-HAL-11K	160	75	164	111	109	92	M6
FR-HAL-15K	160	75	167	126	124	107	M6

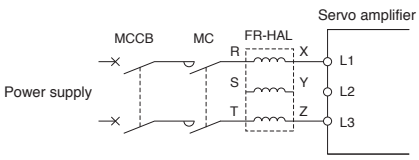
Model	Mass [kg]	Terminal screw size
FR-HAL-7.5K	4.2	M5
FR-HAL-11K	5.2	M6
FR-HAL-15K	7.0	M6

Connections

For 3-phase 200 V AC to 240 V AC



For 1-phase 200 V AC to 240 V AC



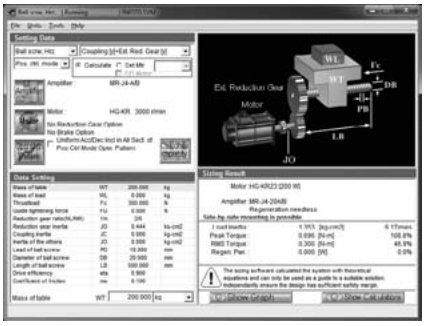
Notes: 1. Refer to "MR-J4W_-_B Servo Amplifier Instruction Manual" for selecting a power factor improving AC reactor when combining multiple servo motors among the rotary servo motor, the linear servo motor or the direct drive motor.
2. Use this mounting hole for grounding.

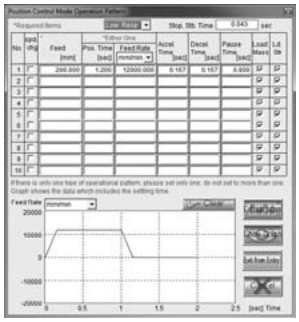
Servo Support Software

Capacity selection software (MRZJW3-MOTSZ111E) B WB A

Specifications

Item		Description
Types of machine component		Horizontal ball screws, vertical ball screws, rack and pinions, roll feeds, rotating tables, carts, elevators, conveyors, linear servo, other (direct inertia input) devices
Output of results	Item	Selected servo amplifier, selected servo motor , selected regenerative option, moment of inertia of load, load to motor inertia ratio, peak torque, peak torque ratio, effective torque, effective torque ratio, regenerative power, regenerative power ratio
	Printing	Prints entered specifications, operating pattern, calculation process, graph of selection process feed speed (or motor speed) and torque, and sizing results.
	Data saving	Entered specifications, operating patterns and sizing results are saved with a file name.
Moment of inertia calculation function		Cylinder, square block, variable speed, linear movement, hanging, conical, conical base





System requirements

IBM PC/AT compatible model running with the following requirements.

Components		Capacity selection software (MRZJW3-MOTSZ111E) (Note 2)
Personal computer (Note 1, 3)	OS (Note 4)	Windows® 98, Windows® Me, Windows® 2000 Professional, Windows® XP Home Edition/Professional, Windows Vista® Home Basic/Home Premium/Business/Ultimate/Enterprise, Windows® 7 Starter/Home Premium/Professional/Ultimate/Enterprise
	CPU	Pentium® 133 MHz or more (Windows® 98, Windows® 2000 Professional) Pentium® 150 MHz or more (Windows® Me) Pentium® 300 MHz or more (Windows® XP Home Edition/Professional) 1 GHz or more 32-bit (×86) processor (Windows Vista® Home Basic/Home Premium/Business/Ultimate/Enterprise) 1 GHz or more 32-bit (×86) or 64-bit (×64) processor (Windows® 7 Starter/Home Premium/Professional/Ultimate/Enterprise)
	Memory	24 MB or more (Windows® 98) 32 MB or more (Windows® Me, Windows® 2000 Professional) 128 MB or more (Windows® XP Home Edition/Professional) 512 MB or more (Windows Vista® Home Basic) 1 GB or more (Windows Vista® Home Premium/Business/Ultimate/Enterprise, Windows® 7 Starter/Home Premium/Professional/Ultimate/Enterprise)
	Free hard disk space	40 MB or more
	Communication interface	-
Browser		Internet Explorer 4.0 or later
Monitor		Resolution 800 × 600 or more, 16-bit high color, compatible with above personal computers.
Keyboard		Compatible with above personal computers.
Mouse		Compatible with above personal computers.
Printer		Compatible with above personal computers.
Communication cable		Not required

Notes: 1. Pentium is registered trademark of Intel Corporation. Windows and Windows Vista are registered trademarks of Microsoft Corporation in the United States and other countries.
2. Be sure to use the latest version of this software. Contact your local sales office for updating your software.
3. This software may not run correctly, depending on a personal computer being used.
4. For 64-bit operating system, this software is compatible with Windows® 7.

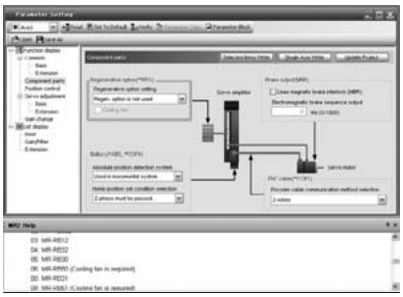
Servo Support Software
MR Configurator2 (SW1DNC-MRC2-E) (Note 1, 3) B WB A

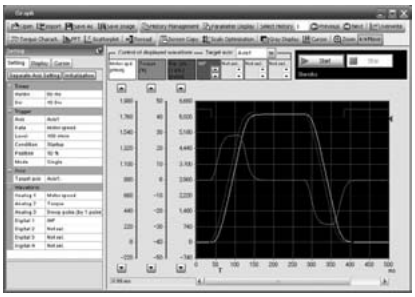
Specifications

Item	Description
Project	Create/open/save/delete project, read/write other format, system setting, print
Parameter	Parameter setting, axis name setting
Monitor	Display all, I/O monitor, graph, ABS data display
Diagnosis	Alarm display, alarm onset data, drive recorder, no motor rotation, system configuration, life diagnosis, machine diagnosis, fully closed loop diagnosis, linear diagnosis
Test mode	JOG mode, positioning mode, motor-less operation (Note 2), DO forced output, program operation, test mode information
Adjustment	One-touch tuning, tuning, machine analyzer
Others	Servo assistant, parameter setting range update, machine unit conversion setting, help display, connection to MELFANSweb

Notes: 1. MR Configurator2 can be obtained either of the following:
- Purchase MR Configurator2 alone.
- Purchase MT Works2: MR Configurator2 is included in MT Works2 with software version 1.34L or later.
- Download MR Configurator2: If you have GX Works2 or MT Works2 with software version earlier than 1.34L, you can download MR Configurator2 from website.

2. The motor-less operation is currently available only in standard control mode and will be available in fully closed loop control mode, linear servo motor control mode, and direct drive motor control mode in the future.
3. Using MR Configurator2 via RS-422 communication will be compatible in the future.





System requirements

IBM PC/AT compatible model running with the following requirements.

Components		MR Configurator2 (Note 4)
Personal computer (Note 1, 2)	OS (Note 3)	Windows® 2000 Professional, Windows® XP Home Edition/Professional, Windows Vista® Home Basic/Home Premium/Business/Ultimate/Enterprise, Windows® 7 Starter/Home Premium/Professional/Ultimate/Enterprise
	CPU (recommended)	Desktop PC: Intel® Celeron® processor 2.8 GHz or more Laptop PC: Intel® Pentium® M processor 1.7 GHz or more
	Memory (recommended)	512 MB or more (32-bit OS), 1 GB or more (64-bit OS)
	Free hard disk space	1 GB or more
	Communication interface	Use USB port
Browser		Internet Explorer 4.0 or later
Monitor		Resolution 1024 × 768 or more, 16-bit high color, compatible with above personal computers.
Keyboard		Compatible with above personal computers.
Mouse		Compatible with above personal computers.
Printer		Compatible with above personal computers.
Communication cable		MR-J3USBCBL3M

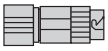
Notes: 1. Celeron and Pentium are registered trademark of Intel Corporation. Windows and Windows Vista are registered trademarks of Microsoft Corporation in the United States and other countries.
2. This software may not run correctly, depending on a personal computer being used.
3. For 64-bit operating system, this software is compatible with Windows® 7.
4. Be sure to use the latest version of this software. Contact your local sales office for updating your software.

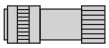
Details of Optional Cables and Connectors for Servo Motors

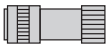
Model	Encoder connector	Servo amplifier connector
MR-J3ENCBL_M-A1-H (Note 2) MR-J3ENCBL_M-A1-L (Note 2) MR-J3ENCBL_M-A2-H (Note 2) MR-J3ENCBL_M-A2-L (Note 2)	 2174053-1 (TE Connectivity Ltd. Company)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

Model	Encoder connector	Junction connector
MR-J3JCBL03M-A1-L (Note 2) MR-J3JCBL03M-A2-L (Note 2)	 2174053-1 (TE Connectivity Ltd. Company)	 Contact: 1473226-1 (with ring) Housing: 1-172169-9 Cable clamp: 316454-1 (TE Connectivity Ltd. Company)

Model	Junction connector	Servo amplifier connector
MR-EKCBL_M-H MR-EKCBL_M-L MR-ECNM	 Housing: 1-172161-9 Connector pin: 170359-1 (TE Connectivity Ltd. Company) or an equivalent product Cable clamp: MTI-0002 (Toa Electric Industry Co., Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

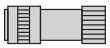
Model	Encoder connector	Junction connector
MR-J3JSCBL03M-A1-L (Note 2) MR-J3JSCBL03M-A2-L (Note 2)	 2174053-1 (TE Connectivity Ltd. Company)	 Cable receptacle: CM10-CR10P-M (DDK Ltd.)

Model	Encoder connector	Servo amplifier connector
MR-J3ENSCBL_M-H (Note 2) MR-J3ENSCBL_M-L (Note 2)	 For 10 m or shorter cable Straight plug: CMV1-SP10S-M1 Socket contact: CMV1-#22ASC-C1-100 For 20 m or longer cable Straight plug: CMV1-SP10S-M1 (long bending life) CMV1-SP10S-M2 (standard) Socket contact: CMV1-#22ASC-C2-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

Model	Junction connector or encoder connector	Servo amplifier connector
MR-J3SCNS (Note 2)	 Straight plug: CMV1-SP10S-M2 (Note 1) Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

Notes: 1. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
2. The cable or the connector set may contain different connectors but still usable.

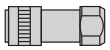
Details of Optional Cables and Connectors for Servo Motors

Model	Encoder connector	Servo amplifier connector
MR-ENCNS2	 Straight plug: CMV1S-SP10S-M2 (Note 1) Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

Model	Encoder connector	Servo amplifier connector
MR-J3SCNSA (Note 2)	 Angle plug: CMV1-AP10S-M2 (Note 1) Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

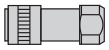
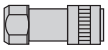
Model	Encoder connector	Servo amplifier connector
MR-ENCNS2A	 Angle plug: CMV1S-AP10S-M2 (Note 1) Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

Model	Servo amplifier connector
MR-J3CN2	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

Model	Encoder connector or absolute position storage unit connector	Servo amplifier connector
MR-J3DDCNS	 Plug: RM15WTPZK-12S Cord clamp: JR13WCCA-8(72) (Hirose Electric Co., Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex)

Notes: 1. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
2. The cable or the connector set may contain different connectors but still usable.

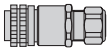
Details of Optional Cables and Connectors for Servo Motors

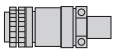
Model	Encoder connector	Absolute position storage unit connector
MR-J3DDSPS	 Plug: RM15WTPZK-12S Cord clamp: JR13WCCA-8(72) (Hirose Electric Co., Ltd.)	 Plug: RM15WTPZ-12P(72) Cord clamp: JR13WCCA-8(72) (Hirose Electric Co., Ltd.)

Model	Junction connector	Servo amplifier connector
MR-J4FCCBL03M MR-J4THCBL03M MR-J3THMCN2	 Plug: 36110-3000FD Shell kit: 36310-F200-008 (3M)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

Model	Power connector
MR-PWS1CBL_M-A1-H (Note 1) MR-PWS1CBL_M-A1-L (Note 1) MR-PWS1CBL_M-A2-H (Note 1) MR-PWS1CBL_M-A2-L (Note 1)	 Plug: KN4FT04SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

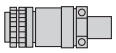
Model	Power connector
MR-PWS2CBL03M-A1-L (Note 1) MR-PWS2CBL03M-A2-L (Note 1)	 Plug: KN4FT04SJ2-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

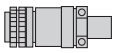
Model	Power connector
MR-PWCNF	 Plug: CE05-6A14S-2SD-D (straight) (DDK Ltd.) Cable clamp: YSO14-9 to 11 (Daiwa Dengyo Co., Ltd.)

Model	Power connector
MR-PWCNS4	 Plug: CE05-6A18-10SD-D-BSS (straight) Cable clamp: CE3057-10A-1-D (DDK Ltd.)

Notes: 1. The cable or the connector set may contain different connectors but still usable.

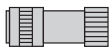
Details of Optional Cables and Connectors for Servo Motors

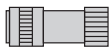
Model	Power connector	
MR-PWCNS5		Plug: CE05-6A22-22SD-D-BSS (straight) Cable clamp: CE3057-12A-1-D (DDK Ltd.)

Model	Power connector	
MR-PWCNS3		Plug: CE05-6A32-17SD-D-BSS (straight) Cable clamp: CE3057-20A-1-D (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKS1CBL_M-A1-H MR-BKS1CBL_M-A1-L MR-BKS1CBL_M-A2-H MR-BKS1CBL_M-A2-L		Plug: JN4FT02SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

Model	Electromagnetic brake connector	
MR-BKS2CBL03M-A1-L MR-BKS2CBL03M-A2-L		Plug: JN4FT02SJ2-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

Model	Electromagnetic brake connector	
MR-BKCNS1 (Note 1)		Straight plug: CMV1-SP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS2		Straight plug: CMV1S-SP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

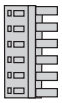
Model	Electromagnetic brake connector	
MR-BKCNS1A (Note 1)		Angle plug: CMV1-AP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS2A		Angle plug: CMV1S-AP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Notes: 1. The cable or the connector set may contain different connectors but still usable.

Details of Optional Cables and Connectors for Servo Amplifiers

Model	CNP1 connector	CNP2 connector	CNP3 connector	Open tool
Servo amplifier power connector set for MR-J4-100B or smaller/ MR-J4-100A or smaller (standard accessory)	 06JFAT-SAXGDK-H7.5 (J.S.T. Mfg. Co., Ltd.)	 05JFAT-SAXGDK-H5.0 (J.S.T. Mfg. Co., Ltd.)	 03JFAT-SAXGDK-H7.5 (J.S.T. Mfg. Co., Ltd.)	 J-FAT-OT (J.S.T. Mfg. Co., Ltd.)

Model	CNP1 connector	CNP2 connector	CNP3 connector	Open tool
Servo amplifier power connector set for MR-J4-200B/MR-J4-200A/ MR-J4-350B/MR-J4-350A (standard accessory)	 06JFAT-SAXGFK-XL (J.S.T. Mfg. Co., Ltd.)	 05JFAT-SAXGDK-H5.0 (J.S.T. Mfg. Co., Ltd.)	 03JFAT-SAXGFK-XL (J.S.T. Mfg. Co., Ltd.)	 J-FAT-OT-EXL (J.S.T. Mfg. Co., Ltd.)

Model	CNP1 connector	CNP2 connector	CNP3A/B/C connector	Open tool
Servo amplifier power connector set for MR-J4W2-B/MR-J4W3-B (standard accessory)	 03JFAT-SAXGFK-43 (J.S.T. Mfg. Co., Ltd.)	 06JFAT-SAXYGG-F-KK (J.S.T. Mfg. Co., Ltd.)	 04JFAT-SAGG-G-KK (J.S.T. Mfg. Co., Ltd.)	 J-FAT-OT-EXL (J.S.T. Mfg. Co., Ltd.)

Model	Servo amplifier connector
MR-J3CN1	 Connector: 10150-3000PE Shell kit: 10350-52F0-008 (3M) or an equivalent product

Model	Junction terminal block connector	Servo amplifier connector	
MR-J2M-CN1TBL_M	 Connector: D7950-B500FL (3M)	 Press bonding type Connector: 10150-6000EL Shell kit: 10350-3210-000 (3M)	Solder type Connector: 10150-3000PE Shell kit: 10350-52F0-008 (3M) or an equivalent product

Model	SSCNET III(/H) connector	SSCNET III(/H) connector
MR-J3BUS_M MR-J3BUS_M-A MR-J3BCN1	 Connector: PF-2D103 (Japan Aviation Electronics Industry, Limited)	 Connector: PF-2D103 (Japan Aviation Electronics Industry, Limited)

Details of Optional Cables and Connectors for Servo Amplifiers

Model	SSCNET III(/H) connector	SSCNET III(/H) connector
MR-J3BUS_M-B	 Connector: CF-2D103-S (Japan Aviation Electronics Industry, Limited)	 Connector: CF-2D103-S (Japan Aviation Electronics Industry, Limited)

Model	Servo amplifier connector	
MR-CCN1	 Press bonding type Connector: 10120-6000EL Shell kit: 10320-3210-000 (3M) or an equivalent product	Solder type Connector: 10120-3000PE Shell kit: 10320-52F0-008 (3M) or an equivalent product

Model	Servo amplifier connector
MR-J2CMP2 MR-ECN1	 Connector: 10126-3000PE Shell kit: 10326-52F0-008 (3M) or an equivalent product

Model	Servo amplifier connector	Junction terminal block connector
MR-TBNATBL_M	 Connector: 10126-6000EL Shell kit: 10326-3210-000 (3M) or an equivalent product	 Connector: 10126-6000EL Shell kit: 10326-3210-000 (3M) or an equivalent product

Model	Servo amplifier connector	Battery case connector	
MR-BT6V1CBL_M	 Contact: SPHD-001G-P0.5 Housing: PAP-02V-0 (J.S.T. Mfg. Co., Ltd.)	 Press bonding type Connector: 10140-6000EL Shell kit: 10314-3210-000 (3M) or an equivalent product	Solder type Connector: 10114-3000PE Shell kit: 10314-52F0-008 (3M) or an equivalent product

Model	Servo amplifier connector	Junction connector
MR-BT6V2CBL_M	 Contact: SPHD-001G-P0.5 Housing: PAP-02V-0 (J.S.T. Mfg. Co., Ltd.)	 Contact: SPAL-001GU-P0.5 Housing: PALR-02VF-O (J.S.T. Mfg. Co., Ltd.)

Model	Servo amplifier connector
MR-J3CN6CBL1M	 Housing: 51004-0300 Terminal: 50011-8100 (Molex)

Details of Optional Cables and Connectors for MR-J3-D05

Model	Servo amplifier connector
MR-D05UDL3M-B	 Connector set: 2069250-1 (TE Connectivity Ltd. Company)

Model	Safety logic unit connector
Connector for safety logic unit CN9 (standard accessory of MR-J3-D05)	 Connector: 1-1871940-4 (TE Connectivity Ltd. Company)

Model	Safety logic unit connector
Connector for safety logic unit CN10 (standard accessory of MR-J3-D05)	 Connector: 1-1871940-8 (TE Connectivity Ltd. Company)

Unit Conversion Table

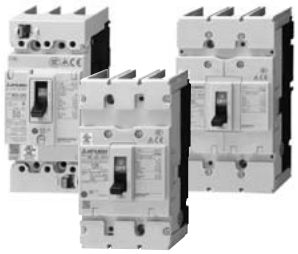
Quantity	SI (metric) unit	U.S. customary unit
Mass	1 [kg]	2.2046 [lb]
Length	1 [mm]	0.03937 [in]
Torque	1 [N•m]	141.6 [oz•in]
Moment of inertia	1 [($\times 10^{-4}$ kg•m^2)]	5.4675 [oz•in^2]
Load (thrust load/axial load)	1 [N]	0.2248 [lbf]
Temperature	n [°C] × 9/5 + 32	n [°F]

6

B : MR-J4-10B to 700B WB : MR-J4W2-22B to 1010B/MR-J4W3-222B, 444B A : MR-J4-10A to 700A

Low-voltage Switchgear/Wires

Mitsubishi Molded Case Circuit Breakers and Earth Leakage Circuit Breakers
WS-V series



WS-V series is the latest circuit breaker with superior aspects such as compliance to international standards, standardization of internal accessories, contribution to environment and energy saving. Moreover, the electric circuit breaker and MDU (Measuring Display Unit) breaker can display various measurement items.

Features

Conforms to various global standards

- New JIS standard JIS C 8201-2-1 (MCCB), JIS C 8201-2-2 (ELCB) Appendix 1 and 2
- Electrical Appliance and Material Safety Law (PSE law)
- IEC: IEC 60947-2
- EN: EN 60947.2 CE marking (TÜV Certificate Declaration of Conformity)
- Chinese GB standard: GB14048.2 CCC certification
- Korea certification: KC mark

Earth leakage circuit breaker CE and CCC products for 3-phase applications

In the 2008 version of Chinese GB14048.2 standard, "earth leakage circuit breaker functioning at phase failure" is necessary as required by EN.
WS-V series is compliant with 3-phase applications with earth leakage circuit breaker CE and CCC products, complying with the revised standard.

UL 489 listed F Style compact models *"Small Fit"* F Style

The industry's smallest F Style model with width of 54 mm contributes to compact machine device.
Satisfies IEC 35 mm rail as standard. Suitable for the cabinet where multiple circuit breakers are used in branch circuit.

* For 63 A frame class MCCB/ELCB (Based on Mitsubishi Electric research as of April 2012.)


NF50-SVFU


NF100-CVFU


NV50-SVFU


NV100-CVFU

F-type and V-type operating handles are available for F Style compact models, ensuring mechanical safety and meeting the requirements of various standards.

480 V AC compatible UL 489 listed circuit breaker *"High Performance"*

These breakers have higher breaking capacity, and Short Circuit Current Rating (SCCR) is increased.


NF125-SVU


NF125-HVU


NF250-SVU


NF250-HVU

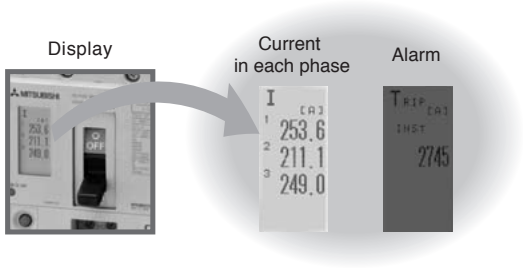
Breaking capacity for 480 V AC (UL 489)
NF125-SVU/NV125-SVU: 30 kA
NF125-HVU/NV125-HVU: 50 kA
NF250-SVU/NV250-SVU: 35 kA
NF250-HVU/NV250-HVU: 50 kA

The new electronic circuit breakers (with display) and MDU breakers can display various measurement items
This will enable energy management through “visualization”, which leads to energy saving.

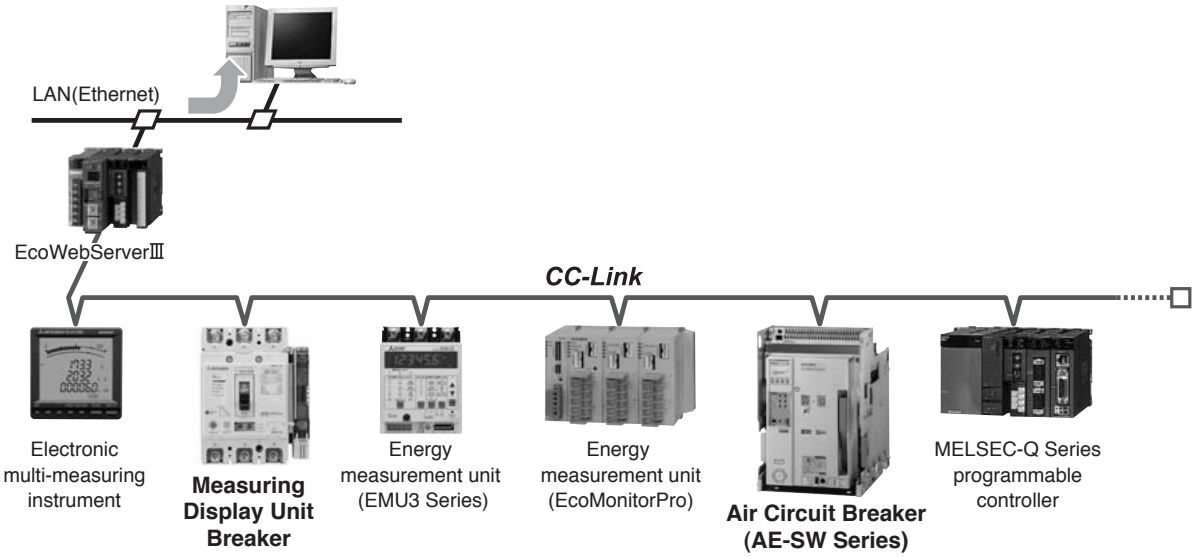
Electronic Circuit Breaker
(with display)

Measuring Display Unit
Breaker

The display is on the circuit breaker body and shows circuit information.
Detailed setting can be done on the display.
The display turns red during alarms.



Intelligent Communications through CC-Link
Measuring data can be transmitted to Personal Computer through CC-Link.



Mitsubishi Magnetic Motor Starters and Magnetic Contactors
MS-N series

MSO-N11KP

Environment-friendly Mitsubishi MS-N series ensures safety and conforms to various global standards. Its compact size contributes to space-saving in a machine. The MS-N series is suitable for MELSERVO-J4 series as well as other Mitsubishi FA equipment and can be used globally.

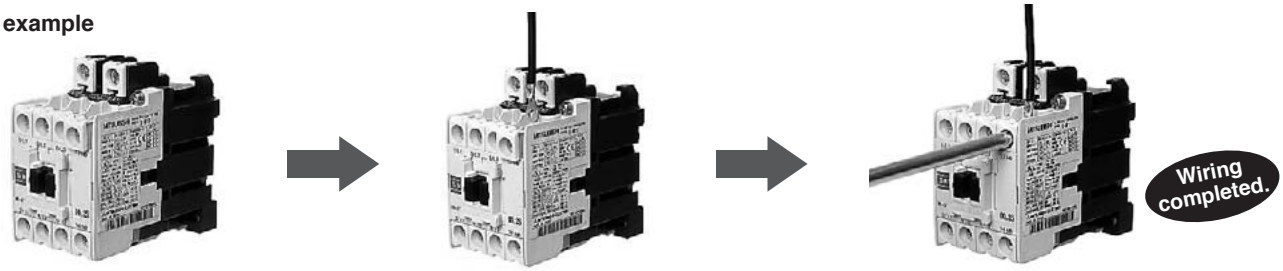
Features

Mitsubishi's original CAN terminal structure for simple wiring (optional)

Mitsubishi MS-N series adopts the CAN terminal structure for simple wiring. In the CAN terminal structure, the terminal screws are set in plastic screw holders, and loosening the terminal screws is not required when wiring. Thus, wiring is reduced by approximately 35% compared to the conventional screw terminal wiring. (Based on Mitsubishi Electric research.)

The CAN terminal structure also provides finger protection that complies with DIN VDE standard, satisfying needs for terminal cover function as well as simple wiring.

Wiring example



(1) Pull up the CAN terminal.

(2) Insert the round/Y crimps.

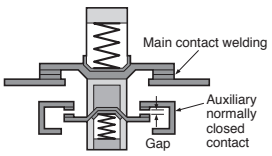
(3) Pull down the CAN terminal and tighten the screw.

Bifurcated contact adopted to achieve high contact reliability

Contact reliability is greatly improved by combining bifurcated moving contact and stationary contact. This series responds to the various needs such as the application to safety circuit.

Mirror contact (auxiliary contact off at main contact welding)

The MS-N series meets requirements of "Control functions in the event of failure" described in EN 60204-1 "Electrical equipment of machines", being suitable as interlock circuit contact. The MS-N series is applicable for category 4 safety circuit. We ensure safety for our customers.



Various option units

Various options including surge absorbers and additional auxiliary contact blocks are available.

Conforms to various global standards

◎ : Compliant as standard

Model	Standard				Certification		EC directive	Authority	CCC
	JIS/JEM	IEC	DIN/VDE	BS/EN	UL	CSA	CE	TÜV	GB
	Japan	International	Germany	England Europe	U.S.A	Canada	Europe	Germany	China
S-N10 to S-N400 MSO-N10 to MSO-N400 TH-N12KP to TH-N400KP	◎	◎	◎	◎	◎	◎	◎	◎	◎

SD-Q series

DC interface contactor SD-Q series is designed to be directly driven by the transistor output of a programmable controller. Relays and interface are not required, contributing to space-saving and less components.

SD-Q11

Features

Built-in surge absorber function (varistor)
This function prevents harmful effects to surrounding precision mechanical equipment in advance.

Equipped with terminal cover as standard
The SD-Q series is equipped with terminal covers which provide finger protection for your safety.

Conforms to various global standards

◎ : Compliant as standard

Model	Standard				Certification		EC directive	Authority	CCC
	JIS/JEM	IEC	DIN/VDE	BS/EN	UL	CSA	CE	TÜV	GB
	Japan	International	Germany	England Europe	U.S.A	Canada	Europe	Germany	China
SD-Q(R)11 to SD-Q(R)19 MSOD-Q(R)11(CX)(KP) to MSOD-Q(R)19(CX)(KP)	◎	◎	◎	◎	◎	◎	◎	◎	◎

Wires, Molded Case Circuit Breakers and Magnetic Contactors (Example of Selection for MR-J4-B/A) B A

The following are example of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) are used.

Servo amplifier model	Molded case circuit breaker (Note 5)	Magnetic contactor (Note 3)	Wire size [mm²]			
			L1, L2, L3, ⏚	L11, L21	P+, C	U, V, W, ⏚
MR-J4-10B/A	30 A frame 5 A	S-N10	2 (AWG 14) (Note 1)	1.25 to 2 (AWG 16 to 14) (Note 5)	2 (AWG 14) (Note 1)	AWG 18 to 14 (Note 4)
MR-J4-20B/A	30 A frame 5 A	S-N10				
MR-J4-40B/A	30 A frame 10 A	S-N10				
MR-J4-60B/A	30 A frame 15 A	S-N10				
MR-J4-70B/A	30 A frame 15 A	S-N10				
MR-J4-100B/A	30 A frame 15 A	S-N10				
MR-J4-200B/A	30 A frame 20 A	S-N20 (Note 7)				AWG 16 to 10 (Note 4)
MR-J4-350B/A	30 A frame 30 A	S-N20	3.5 (AWG 12) (Note 1)			
MR-J4-500B/A (Note 2)	50 A frame 50 A	S-N35	5.5 (AWG 10) (Note 1)			2 to 5.5 (AWG 14 to 10) (Note 4)
MR-J4-700B/A (Note 2)	100 A frame 75 A	S-N50	8 (AWG 8) (Note 1)			2 to 8 (AWG 14 to 8) (Note 4)

Wires (Example of Selection for MR-J4W2-B and MR-J4W3-B) WB

The following are example of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) are used.

Servo amplifier model	Molded case circuit breaker	Magnetic contactor	Wire size [mm²]			
			L1, L2, L3, ⏚	L11, L21	P+, C	U, V, W, ⏚
MR-J4W2-22B	Refer to the following.	Refer to the following.	2 (AWG 14)			AWG 18 to 14 (Note 4)
MR-J4W2-44B						
MR-J4W2-77B						
MR-J4W2-1010B						
MR-J4W3-222B						
MR-J4W3-444B						

Molded Case Circuit Breakers and Magnetic Contactors (Example of Selection for MR-J4W2-B) (Note 6) WB

Total output of rotary servo motors	Total continuous thrust of linear servo motors	Total output of direct drive motors	Molded case circuit breaker (Note 5)	Magnetic contactor (Note 3)
300 W or less	-	-	30 A frame 5 A	S-N10
Over 300 W to 600 W	150 N or less	100 W or less	30 A frame 10 A	S-N10
Over 600 W to 1 kW	Over 150 N to 300 N	Over 100 W to 252 W	30 A frame 15 A	S-N10
Over 1 kW to 2 kW	Over 300 N to 480 N	Over 252 W to 838 W	30 A frame 20 A	S-N20 (Note 7)

Molded Case Circuit Breakers and Magnetic Contactors (Example of Selection for MR-J4W3-B) (Note 6) WB

Total output of rotary servo motors	Total continuous thrust of linear servo motors	Total output of direct drive motors	Molded case circuit breaker (Note 5)	Magnetic contactor (Note 3)
450 W or less	150 N or less	-	30 A frame 10 A	S-N10
Over 450 W to 800 W	Over 150 N to 300 N	252 W or less	30 A frame 15 A	S-N10
Over 800 W to 1.5 kW	Over 300 N to 450 N	Over 252 W to 378 W	30 A frame 20 A	S-N20

Notes: 1. Connect a reactor or a regenerative option with 5 m or shorter length wire. For the wire size suitable for the power factor improving DC reactor, refer to "Power Factor Improving DC Reactor" under section 5 Options/Peripheral Equipment in this catalog.
2. When connecting the wires to the terminal blocks, be sure to use the screws attached to the terminal blocks.
3. 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.
4. The wire size shows applicable size of the servo amplifier connector and terminal block. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for details on wires for servo motors.
5. When complying with UL/CSA standard, refer to relevant Servo Amplifier Instruction Manual.
6. Refer to "MR-J4W_-_B Servo Amplifier Instruction Manual" for selecting a molded case circuit breaker when combining multiple servo motors among the rotary servo motor, the linear servo motor or the direct drive motor.
7. S-N18 can be used when auxiliary contact is not required.

Selection Example in HIV Wires for Servo Motors B WB A

The following are example of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) with a length of 30 m are used. Refer to "Servo Motor Instruction Manual (Vol. 3)" when using cab-tire cables for supplying power (U, V, and W) to HG-SR series.

Rotary servo motor	Wire size [mm²]	
	For power and grounding (U, V, W, ⏚) (general environment)	For electromagnetic brake (B1, B2)
HG-KR053, 13, 23, 43, 73	0.75 (AWG 18) (Note 1, 2, 3)	0.5 (AWG 20) (Note 4)
HG-MR053, 13, 23, 43, 73		
HG-SR51, 81	1.25 (AWG 16) (Note 5)	1.25 (AWG 16)
HG-SR121, 201	2 (AWG 14)	
HG-SR301	3.5 (AWG 12)	
HG-SR421	5.5 (AWG 10)	
HG-SR52, 102	1.25 (AWG 16) (Note 5)	
HG-SR152, 202	2 (AWG 14)	
HG-SR352	3.5 (AWG 12)	
HG-SR502	5.5 (AWG 10)	
HG-SR702	8 (AWG 8)	

Linear servo motor Primary side		Wire size [mm²]	
		For power and grounding (U, V, W, E) (general environment)	For thermistor (G1, G2)
LM-H3P2A-07P-BSS0		1.25 (AWG 16) (Note 5)	0.2 (AWG 24)
LM-H3P3A-12P-CSS0		1.25 (AWG 16) (Note 5)	
LM-H3P3B-24P-CSS0		1.25 (AWG 16) (Note 5)	
LM-H3P3C-36P-CSS0		1.25 (AWG 16) (Note 5)	
LM-H3P3D-48P-CSS0		2 (AWG 14)	
LM-H3P7A-24P-ASS0		1.25 (AWG 16) (Note 5)	
LM-H3P7B-48P-ASS0		2 (AWG 14)	
LM-H3P7C-72P-ASS0		2 (AWG 14)	
LM-H3P7D-96P-ASS0		3.5 (AWG 12)	
LM-FP2B-06M-1SS0	Natural cooling	2 (AWG 14)	
	Liquid cooling		
LM-FP2D-12M-1SS0	Natural cooling	2 (AWG 14)	
	Liquid cooling	3.5 (AWG 12)	
LM-FP2F-18M-1SS0	Natural cooling	2 (AWG 14)	
	Liquid cooling	3.5 (AWG 12) (Note 6)	
LM-FP4B-12M-1SS0	Natural cooling	5.5 (AWG 10)	
	Liquid cooling		
LM-FP4D-24M-1SS0	Natural cooling	5.5 (AWG 10)	
	Liquid cooling		
LM-K2P1A-01M-2SS1		1.25 (AWG 16)	
LM-K2P1C-03M-2SS1		2 (AWG 14)	
LM-K2P2A-02M-1SS1		1.25 (AWG 16)	
LM-K2P2C-07M-1SS1		3.5 (AWG 12)	
LM-K2P2E-12M-1SS1		5.5 (AWG 10)	
LM-K2P3C-14M-1SS1		3.5 (AWG 12)	
LM-K2P3E-24M-1SS1		5.5 (AWG 10)	
LM-U2PAB-05M-0SS0, LM-U2PAD-10M-0SS0, LM-U2PAF-15M-0SS0, LM-U2PBB-07M-1SS0, LM-U2PBD-15M-1SS0, LM-U2PBF-22M-1SS0		1.25 (AWG 16)	
LM-U2P2B-40M-2SS0		2 (AWG 14)	
LM-U2P2C-60M-2SS0		3.5 (AWG 12)	
LM-U2P2D-80M-2SS0		5.5 (AWG 10)	

Direct drive motor	Wire size [mm²]
	For power and grounding (U, V, W, ⏚)
TM-RFM002C20, TM-RFM004C20, TM-RFM006C20, TM-RFM006E20, TM-RFM012E20, TM-RFM018E20, TM-RFM012G20	1.25 (AWG 16)
TM-RFM048G20, TM-RFM072G20	3.5 (AWG 12)
TM-RFM040J10	1.25 (AWG 16)
TM-RFM120J10	3.5 (AWG 12)
TM-RFM240J10	5.5 (AWG 10)

Notes: 1. Use a fluorine resin wire (0.75 mm²) for wiring to the servo motor power connector.
2. This size is applicable for wiring length of 10 m or shorter. For over 10 m, use MR-PWS2CBL03M-A_-L and extend it with HIV wire of 1.25 mm².
3. When complying with UL/CSA standard, extend the wire using MR-PWS2CBL03M-A_-L and 2 mm² HIV wire.
4. Use a fluorine resin wire (0.5 mm²) when connecting to servo motor electromagnetic brake connector.
5. When complying with UL/CSA standard, use 2 mm². Refer to relevant Servo Amplifier Instruction Manual for details.
6. Use a fluorine resin wire (3.5 mm²) when connecting to servo motor power connector.

Servo amplifiers

Item	Model	Rated output	Main circuit power supply
MR-J4-B	MR-J4-10B	0.1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-20B	0.2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-40B	0.4 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-60B	0.6 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-70B	0.75 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-100B	1 kW	3-phase 200 V AC to 240 V AC
	MR-J4-200B	2 kW	3-phase 200 V AC to 240 V AC
	MR-J4-350B	3.5 kW	3-phase 200 V AC to 240 V AC
	MR-J4-500B	5 kW	3-phase 200 V AC to 240 V AC
	MR-J4-700B	7 kW	3-phase 200 V AC to 240 V AC
MR-J4W2-B	MR-J4W2-22B	0.2 kW × 2 axes	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4W2-44B	0.4 kW × 2 axes	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4W2-77B	0.75 kW × 2 axes	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4W2-1010B	1 kW × 2 axes	3-phase 200 V AC to 240 V AC
MR-J4W3-B	MR-J4W3-222B	0.2 kW × 3 axes	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4W3-444B	0.4 kW × 3 axes	3-phase or 1-phase 200 V AC to 240 V AC
MR-J4-A	MR-J4-10A	0.1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-20A	0.2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-40A	0.4 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-60A	0.6 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-70A	0.75 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-J4-100A	1 kW	3-phase 200 V AC to 240 V AC
	MR-J4-200A	2 kW	3-phase 200 V AC to 240 V AC
	MR-J4-350A	3.5 kW	3-phase 200 V AC to 240 V AC
	MR-J4-500A	5 kW	3-phase 200 V AC to 240 V AC
	MR-J4-700A	7 kW	3-phase 200 V AC to 240 V AC

Rotary servo motors

Item	Model	Rated output	Rated speed	Reduction ratio
HG-KR series Standard	HG-KR053	50 W	3000 r/min	-
	HG-KR13	100 W	3000 r/min	-
	HG-KR23	200 W	3000 r/min	-
	HG-KR43	400 W	3000 r/min	-
	HG-KR73	750 W	3000 r/min	-
HG-KR series With electromagnetic brake	HG-KR053B	50 W	3000 r/min	-
	HG-KR13B	100 W	3000 r/min	-
	HG-KR23B	200 W	3000 r/min	-
	HG-KR43B	400 W	3000 r/min	-
	HG-KR73B	750 W	3000 r/min	-
HG-KR series With reducer for general industrial machines B: With electromagnetic brake	HG-KR053(B)G1 1/5	50 W	3000 r/min	1/5
	HG-KR053(B)G1 1/12	50 W	3000 r/min	1/12
	HG-KR053(B)G1 1/20	50 W	3000 r/min	1/20
	HG-KR13(B)G1 1/5	100 W	3000 r/min	1/5
	HG-KR13(B)G1 1/12	100 W	3000 r/min	1/12
	HG-KR13(B)G1 1/20	100 W	3000 r/min	1/20
	HG-KR23(B)G1 1/5	200 W	3000 r/min	1/5
	HG-KR23(B)G1 1/12	200 W	3000 r/min	1/12
	HG-KR23(B)G1 1/20	200 W	3000 r/min	1/20
	HG-KR43(B)G1 1/5	400 W	3000 r/min	1/5
	HG-KR43(B)G1 1/12	400 W	3000 r/min	1/12
	HG-KR43(B)G1 1/20	400 W	3000 r/min	1/20
	HG-KR73(B)G1 1/5	750 W	3000 r/min	1/5
	HG-KR73(B)G1 1/12	750 W	3000 r/min	1/12
	HG-KR73(B)G1 1/20	750 W	3000 r/min	1/20
HG-KR series With flange-output type reducer for high precision applications, flange-mounting B: With electromagnetic brake	HG-KR053(B)G5 1/5 (40 × 40)	50 W	3000 r/min	1/5 (flange dimensions: 40 mm × 40 mm)
	HG-KR053(B)G5 1/5 (60 × 60)	50 W	3000 r/min	1/5 (flange dimensions: 60 mm × 60 mm)
	HG-KR053(B)G5 1/9	50 W	3000 r/min	1/9
	HG-KR053(B)G5 1/11	50 W	3000 r/min	1/11
	HG-KR053(B)G5 1/21	50 W	3000 r/min	1/21
	HG-KR053(B)G5 1/33	50 W	3000 r/min	1/33
	HG-KR053(B)G5 1/45	50 W	3000 r/min	1/45
	HG-KR13(B)G5 1/5 (40 × 40)	100 W	3000 r/min	1/5 (flange dimensions: 40 mm × 40 mm)
	HG-KR13(B)G5 1/5 (60 × 60)	100 W	3000 r/min	1/5 (flange dimensions: 60 mm × 60 mm)
	HG-KR13(B)G5 1/11	100 W	3000 r/min	1/11
	HG-KR13(B)G5 1/21	100 W	3000 r/min	1/21
	HG-KR13(B)G5 1/33	100 W	3000 r/min	1/33
	HG-KR13(B)G5 1/45	100 W	3000 r/min	1/45
	HG-KR23(B)G5 1/5	200 W	3000 r/min	1/5
	HG-KR23(B)G5 1/11	200 W	3000 r/min	1/11
	HG-KR23(B)G5 1/21	200 W	3000 r/min	1/21
	HG-KR23(B)G5 1/33	200 W	3000 r/min	1/33
	HG-KR23(B)G5 1/45	200 W	3000 r/min	1/45
	HG-KR43(B)G5 1/5	400 W	3000 r/min	1/5
	HG-KR43(B)G5 1/11	400 W	3000 r/min	1/11
	HG-KR43(B)G5 1/21	400 W	3000 r/min	1/21
	HG-KR43(B)G5 1/33	400 W	3000 r/min	1/33
	HG-KR43(B)G5 1/45	400 W	3000 r/min	1/45
	HG-KR73(B)G5 1/5	750 W	3000 r/min	1/5
	HG-KR73(B)G5 1/11	750 W	3000 r/min	1/11
	HG-KR73(B)G5 1/21	750 W	3000 r/min	1/21
	HG-KR73(B)G5 1/33	750 W	3000 r/min	1/33
	HG-KR73(B)G5 1/45	750 W	3000 r/min	1/45
HG-KR series With shaft-output type reducer for high precision applications, flange-mounting B: With electromagnetic brake	HG-KR053(B)G7 1/5 (40 × 40)	50 W	3000 r/min	1/5 (flange dimensions: 40 mm × 40 mm)
	HG-KR053(B)G7 1/5 (60 × 60)	50 W	3000 r/min	1/5 (flange dimensions: 60 mm × 60 mm)
	HG-KR053(B)G7 1/9	50 W	3000 r/min	1/9
	HG-KR053(B)G7 1/11	50 W	3000 r/min	1/11
	HG-KR053(B)G7 1/21	50 W	3000 r/min	1/21

Rotary servo motors

Item	Model	Rated output	Rated speed	Reduction ratio
HG-KR series With shaft-output type reducer for high precision applications, flange-mounting B: With electromagnetic brake	HG-KR053(B)G7 1/33	50 W	3000 r/min	1/33
	HG-KR053(B)G7 1/45	50 W	3000 r/min	1/45
	HG-KR13(B)G7 1/5 (40 × 40)	100 W	3000 r/min	1/5 (flange dimensions: 40 mm × 40 mm)
	HG-KR13(B)G7 1/5 (60 × 60)	100 W	3000 r/min	1/5 (flange dimensions: 60 mm × 60 mm)
	HG-KR13(B)G7 1/11	100 W	3000 r/min	1/11
	HG-KR13(B)G7 1/21	100 W	3000 r/min	1/21
	HG-KR13(B)G7 1/33	100 W	3000 r/min	1/33
	HG-KR13(B)G7 1/45	100 W	3000 r/min	1/45
	HG-KR23(B)G7 1/5	200 W	3000 r/min	1/5
	HG-KR23(B)G7 1/11	200 W	3000 r/min	1/11
	HG-KR23(B)G7 1/21	200 W	3000 r/min	1/21
	HG-KR23(B)G7 1/33	200 W	3000 r/min	1/33
	HG-KR23(B)G7 1/45	200 W	3000 r/min	1/45
	HG-KR43(B)G7 1/5	400 W	3000 r/min	1/5
	HG-KR43(B)G7 1/11	400 W	3000 r/min	1/11
	HG-KR43(B)G7 1/21	400 W	3000 r/min	1/21
	HG-KR43(B)G7 1/33	400 W	3000 r/min	1/33
	HG-KR43(B)G7 1/45	400 W	3000 r/min	1/45
	HG-KR73(B)G7 1/5	750 W	3000 r/min	1/5
	HG-KR73(B)G7 1/11	750 W	3000 r/min	1/11
	HG-KR73(B)G7 1/21	750 W	3000 r/min	1/21
	HG-KR73(B)G7 1/33	750 W	3000 r/min	1/33
	HG-KR73(B)G7 1/45	750 W	3000 r/min	1/45
HG-MR series Standard	HG-MR053	50 W	3000 r/min	-
	HG-MR13	100 W	3000 r/min	-
	HG-MR23	200 W	3000 r/min	-
	HG-MR43	400 W	3000 r/min	-
	HG-MR73	750 W	3000 r/min	-
HG-MR series With electromagnetic brake	HG-MR053B	50 W	3000 r/min	-
	HG-MR13B	100 W	3000 r/min	-
	HG-MR23B	200 W	3000 r/min	-
	HG-MR43B	400 W	3000 r/min	-
	HG-MR73B	750 W	3000 r/min	-
HG-SR 1000 r/min series Standard	HG-SR51	0.5 kW	1000 r/min	-
	HG-SR81	0.85 kW	1000 r/min	-
	HG-SR121	1.2 kW	1000 r/min	-
	HG-SR201	2.0 kW	1000 r/min	-
	HG-SR301	3.0 kW	1000 r/min	-
	HG-SR421	4.2 kW	1000 r/min	-
HG-SR 1000 r/min series With electromagnetic brake	HG-SR51B	0.5 kW	1000 r/min	-
	HG-SR81B	0.85 kW	1000 r/min	-
	HG-SR121B	1.2 kW	1000 r/min	-
	HG-SR201B	2.0 kW	1000 r/min	-
	HG-SR301B	3.0 kW	1000 r/min	-
	HG-SR421B	4.2 kW	1000 r/min	-
HG-SR 2000 r/min series Standard	HG-SR52	0.5 kW	2000 r/min	-
	HG-SR102	1.0 kW	2000 r/min	-
	HG-SR152	1.5 kW	2000 r/min	-
	HG-SR202	2.0 kW	2000 r/min	-
	HG-SR352	3.5 kW	2000 r/min	-
	HG-SR502	5.0 kW	2000 r/min	-
	HG-SR702	7.0 kW	2000 r/min	-
HG-SR 2000 r/min series With electromagnetic brake	HG-SR52B	0.5 kW	2000 r/min	-
	HG-SR102B	1.0 kW	2000 r/min	-
	HG-SR152B	1.5 kW	2000 r/min	-
	HG-SR202B	2.0 kW	2000 r/min	-
	HG-SR352B	3.5 kW	2000 r/min	-
	HG-SR502B	5.0 kW	2000 r/min	-
	HG-SR702B	7.0 kW	2000 r/min	-

Rotary servo motors

Item	Model	Rated output	Rated speed	Reduction ratio
HG-SR 2000 r/min series With reducer for general industrial machines B: With electromagnetic brake G1: Flange mounting G1H: Foot mounting	HG-SR52(B)G1(H) 1/6	0.5 kW	2000 r/min	1/6
	HG-SR52(B)G1(H) 1/11	0.5 kW	2000 r/min	1/11
	HG-SR52(B)G1(H) 1/17	0.5 kW	2000 r/min	1/17
	HG-SR52(B)G1(H) 1/29	0.5 kW	2000 r/min	1/29
	HG-SR52(B)G1(H) 1/35	0.5 kW	2000 r/min	1/35
	HG-SR52(B)G1(H) 1/43	0.5 kW	2000 r/min	1/43
	HG-SR52(B)G1(H) 1/59	0.5 kW	2000 r/min	1/59
	HG-SR102(B)G1(H) 1/6	1.0 kW	2000 r/min	1/6
	HG-SR102(B)G1(H) 1/11	1.0 kW	2000 r/min	1/11
	HG-SR102(B)G1(H) 1/17	1.0 kW	2000 r/min	1/17
	HG-SR102(B)G1(H) 1/29	1.0 kW	2000 r/min	1/29
	HG-SR102(B)G1(H) 1/35	1.0 kW	2000 r/min	1/35
	HG-SR102(B)G1(H) 1/43	1.0 kW	2000 r/min	1/43
	HG-SR102(B)G1(H) 1/59	1.0 kW	2000 r/min	1/59
	HG-SR152(B)G1(H) 1/6	1.5 kW	2000 r/min	1/6
	HG-SR152(B)G1(H) 1/11	1.5 kW	2000 r/min	1/11
	HG-SR152(B)G1(H) 1/17	1.5 kW	2000 r/min	1/17
	HG-SR152(B)G1(H) 1/29	1.5 kW	2000 r/min	1/29
	HG-SR152(B)G1(H) 1/35	1.5 kW	2000 r/min	1/35
	HG-SR152(B)G1(H) 1/43	1.5 kW	2000 r/min	1/43
	HG-SR152(B)G1(H) 1/59	1.5 kW	2000 r/min	1/59
	HG-SR202(B)G1(H) 1/6	2.0 kW	2000 r/min	1/6
	HG-SR202(B)G1(H) 1/11	2.0 kW	2000 r/min	1/11
	HG-SR202(B)G1(H) 1/17	2.0 kW	2000 r/min	1/17
	HG-SR202(B)G1(H) 1/29	2.0 kW	2000 r/min	1/29
	HG-SR202(B)G1(H) 1/35	2.0 kW	2000 r/min	1/35
	HG-SR202(B)G1(H) 1/43	2.0 kW	2000 r/min	1/43
	HG-SR202(B)G1(H) 1/59	2.0 kW	2000 r/min	1/59
	HG-SR352(B)G1(H) 1/6	3.5 kW	2000 r/min	1/6
	HG-SR352(B)G1(H) 1/11	3.5 kW	2000 r/min	1/11
	HG-SR352(B)G1(H) 1/17	3.5 kW	2000 r/min	1/17
	HG-SR352(B)G1(H) 1/29	3.5 kW	2000 r/min	1/29
	HG-SR352(B)G1(H) 1/35	3.5 kW	2000 r/min	1/35
	HG-SR352(B)G1(H) 1/43	3.5 kW	2000 r/min	1/43
	HG-SR352(B)G1(H) 1/59	3.5 kW	2000 r/min	1/59
	HG-SR502(B)G1(H) 1/6	5.0 kW	2000 r/min	1/6
	HG-SR502(B)G1(H) 1/11	5.0 kW	2000 r/min	1/11
	HG-SR502(B)G1(H) 1/17	5.0 kW	2000 r/min	1/17
	HG-SR502(B)G1(H) 1/29	5.0 kW	2000 r/min	1/29
	HG-SR502(B)G1(H) 1/35	5.0 kW	2000 r/min	1/35
	HG-SR502(B)G1(H) 1/43	5.0 kW	2000 r/min	1/43
	HG-SR502(B)G1(H) 1/59	5.0 kW	2000 r/min	1/59
	HG-SR702(B)G1(H) 1/6	7.0 kW	2000 r/min	1/6
	HG-SR702(B)G1(H) 1/11	7.0 kW	2000 r/min	1/11
	HG-SR702(B)G1(H) 1/17	7.0 kW	2000 r/min	1/17
	HG-SR702(B)G1(H) 1/29	7.0 kW	2000 r/min	1/29
	HG-SR702(B)G1(H) 1/35	7.0 kW	2000 r/min	1/35
	HG-SR702(B)G1(H) 1/43	7.0 kW	2000 r/min	1/43
	HG-SR702(B)G1(H) 1/59	7.0 kW	2000 r/min	1/59

Rotary servo motors

Item	Model	Rated output	Rated speed	Reduction ratio
HG-SR 2000 r/min series With flange-output type reducer for high precision applications, flange-mounting B: With electromagnetic brake	HG-SR52(B)G5 1/5	0.5 kW	2000 r/min	1/5
	HG-SR52(B)G5 1/11	0.5 kW	2000 r/min	1/11
	HG-SR52(B)G5 1/21	0.5 kW	2000 r/min	1/21
	HG-SR52(B)G5 1/33	0.5 kW	2000 r/min	1/33
	HG-SR52(B)G5 1/45	0.5 kW	2000 r/min	1/45
	HG-SR102(B)G5 1/5	1.0 kW	2000 r/min	1/5
	HG-SR102(B)G5 1/11	1.0 kW	2000 r/min	1/11
	HG-SR102(B)G5 1/21	1.0 kW	2000 r/min	1/21
	HG-SR102(B)G5 1/33	1.0 kW	2000 r/min	1/33
	HG-SR102(B)G5 1/45	1.0 kW	2000 r/min	1/45
	HG-SR152(B)G5 1/5	1.5 kW	2000 r/min	1/5
	HG-SR152(B)G5 1/11	1.5 kW	2000 r/min	1/11
	HG-SR152(B)G5 1/21	1.5 kW	2000 r/min	1/21
	HG-SR152(B)G5 1/33	1.5 kW	2000 r/min	1/33
	HG-SR152(B)G5 1/45	1.5 kW	2000 r/min	1/45
	HG-SR202(B)G5 1/5	2.0 kW	2000 r/min	1/5
	HG-SR202(B)G5 1/11	2.0 kW	2000 r/min	1/11
	HG-SR202(B)G5 1/21	2.0 kW	2000 r/min	1/21
	HG-SR202(B)G5 1/33	2.0 kW	2000 r/min	1/33
	HG-SR202(B)G5 1/45	2.0 kW	2000 r/min	1/45
	HG-SR352(B)G5 1/5	3.5 kW	2000 r/min	1/5
	HG-SR352(B)G5 1/11	3.5 kW	2000 r/min	1/11
	HG-SR352(B)G5 1/21	3.5 kW	2000 r/min	1/21
	HG-SR502(B)G5 1/5	5.0 kW	2000 r/min	1/5
	HG-SR502(B)G5 1/11	5.0 kW	2000 r/min	1/11
	HG-SR702(B)G5 1/5	7.0 kW	2000 r/min	1/5
HG-SR 2000 r/min series With shaft-output type reducer for high precision applications, flange-mounting B: With electromagnetic brake	HG-SR52(B)G7 1/5	0.5 kW	2000 r/min	1/5
	HG-SR52(B)G7 1/11	0.5 kW	2000 r/min	1/11
	HG-SR52(B)G7 1/21	0.5 kW	2000 r/min	1/21
	HG-SR52(B)G7 1/33	0.5 kW	2000 r/min	1/33
	HG-SR52(B)G7 1/45	0.5 kW	2000 r/min	1/45
	HG-SR102(B)G7 1/5	1.0 kW	2000 r/min	1/5
	HG-SR102(B)G7 1/11	1.0 kW	2000 r/min	1/11
	HG-SR102(B)G7 1/21	1.0 kW	2000 r/min	1/21
	HG-SR102(B)G7 1/33	1.0 kW	2000 r/min	1/33
	HG-SR102(B)G7 1/45	1.0 kW	2000 r/min	1/45
	HG-SR152(B)G7 1/5	1.5 kW	2000 r/min	1/5
	HG-SR152(B)G7 1/11	1.5 kW	2000 r/min	1/11
	HG-SR152(B)G7 1/21	1.5 kW	2000 r/min	1/21
	HG-SR152(B)G7 1/33	1.5 kW	2000 r/min	1/33
	HG-SR152(B)G7 1/45	1.5 kW	2000 r/min	1/45
	HG-SR202(B)G7 1/5	2.0 kW	2000 r/min	1/5
	HG-SR202(B)G7 1/11	2.0 kW	2000 r/min	1/11
	HG-SR202(B)G7 1/21	2.0 kW	2000 r/min	1/21
	HG-SR202(B)G7 1/33	2.0 kW	2000 r/min	1/33
	HG-SR202(B)G7 1/45	2.0 kW	2000 r/min	1/45
	HG-SR352(B)G7 1/5	3.5 kW	2000 r/min	1/5
	HG-SR352(B)G7 1/11	3.5 kW	2000 r/min	1/11
	HG-SR352(B)G7 1/21	3.5 kW	2000 r/min	1/21
	HG-SR502(B)G7 1/5	5.0 kW	2000 r/min	1/5
	HG-SR502(B)G7 1/11	5.0 kW	2000 r/min	1/11
	HG-SR702(B)G7 1/5	7.0 kW	2000 r/min	1/5

Linear servo motors

Item	Model	Continuous thrust	Maximum thrust	Maximum speed	Length
LM-H3 series Primary side (coil)	LM-H3P2A-07P-BSS0	70 N	175 N	3.0 m/s	-
	LM-H3P3A-12P-CSS0	120 N	300 N	3.0 m/s	-
	LM-H3P3B-24P-CSS0	240 N	600 N	3.0 m/s	-
	LM-H3P3C-36P-CSS0	360 N	900 N	3.0 m/s	-
	LM-H3P3D-48P-CSS0	480 N	1200 N	3.0 m/s	-
	LM-H3P7A-24P-ASS0	240 N	600 N	3.0 m/s	-
	LM-H3P7B-48P-ASS0	480 N	1200 N	3.0 m/s	-
	LM-H3P7C-72P-ASS0	720 N	1800 N	3.0 m/s	-
	LM-H3P7D-96P-ASS0	960 N	2400 N	3.0 m/s	-
LM-H3 series Secondary side (magnet)	LM-H3S20-288-BSS0	-	-	-	288 mm
	LM-H3S20-384-BSS0	-	-	-	384 mm
	LM-H3S20-480-BSS0	-	-	-	480 mm
	LM-H3S20-768-BSS0	-	-	-	768 mm
	LM-H3S30-288-CSS0	-	-	-	288 mm
	LM-H3S30-384-CSS0	-	-	-	384 mm
	LM-H3S30-480-CSS0	-	-	-	480 mm
	LM-H3S30-768-CSS0	-	-	-	768 mm
	LM-H3S70-288-ASS0	-	-	-	288 mm
	LM-H3S70-384-ASS0	-	-	-	384 mm
	LM-H3S70-480-ASS0	-	-	-	480 mm
	LM-H3S70-768-ASS0	-	-	-	768 mm
LM-F series Primary side (coil)	LM-FP2B-06M-1SS0	300 N (natural cooling)/600 N (liquid cooling)	1800 N	2.0 m/s	-
	LM-FP2D-12M-1SS0	600 N (natural cooling)/1200 N (liquid cooling)	3600 N	2.0 m/s	-
	LM-FP2F-18M-1SS0	900 N (natural cooling)/1800 N (liquid cooling)	5400 N	2.0 m/s	-
	LM-FP4B-12M-1SS0	600 N (natural cooling)/1200 N (liquid cooling)	3600 N	2.0 m/s	-
	LM-FP4D-24M-1SS0	1200 N (natural cooling)/2400 N (liquid cooling)	7200 N	2.0 m/s	-
LM-F series Secondary side (magnet)	LM-FS20-480-1SS0	-	-	-	480 mm
	LM-FS20-576-1SS0	-	-	-	576 mm
	LM-FS40-480-1SS0	-	-	-	480 mm
	LM-FS40-576-1SS0	-	-	-	576 mm
LM-K2 series Primary side (coil)	LM-K2P1A-01M-2SS1	120 N	300 N	2.0 m/s	-
	LM-K2P1C-03M-2SS1	360 N	900 N	2.0 m/s	-
	LM-K2P2A-02M-1SS1	240 N	600 N	2.0 m/s	-
	LM-K2P2C-07M-1SS1	720 N	1800 N	2.0 m/s	-
	LM-K2P2E-12M-1SS1	1200 N	3000 N	2.0 m/s	-
	LM-K2P3C-14M-1SS1	1440 N	3600 N	2.0 m/s	-
	LM-K2P3E-24M-1SS1	2400 N	6000 N	2.0 m/s	-
LM-K2 series Secondary side (magnet)	LM-K2S10-288-2SS1	-	-	-	288 mm
	LM-K2S10-384-2SS1	-	-	-	384 mm
	LM-K2S10-480-2SS1	-	-	-	480 mm
	LM-K2S10-768-2SS1	-	-	-	768 mm
	LM-K2S20-288-1SS1	-	-	-	288 mm
	LM-K2S20-384-1SS1	-	-	-	384 mm
	LM-K2S20-480-1SS1	-	-	-	480 mm
	LM-K2S20-768-1SS1	-	-	-	768 mm
	LM-K2S30-288-1SS1	-	-	-	288 mm
	LM-K2S30-384-1SS1	-	-	-	384 mm
	LM-K2S30-480-1SS1	-	-	-	480 mm
	LM-K2S30-768-1SS1	-	-	-	768 mm
LM-U2 series Primary side (coil)	LM-U2PAB-05M-0SS0	50 N	150 N	2.0 m/s	-
	LM-U2PAD-10M-0SS0	100 N	300 N	2.0 m/s	-
	LM-U2PAF-15M-0SS0	150 N	450 N	2.0 m/s	-
	LM-U2PBB-07M-1SS0	75 N	225 N	2.0 m/s	-
	LM-U2PBD-15M-1SS0	150 N	450 N	2.0 m/s	-
	LM-U2PBF-22M-1SS0	225 N	675 N	2.0 m/s	-
	LM-U2P2B-40M-2SS0	400 N	1600 N	2.0 m/s	-
	LM-U2P2C-60M-2SS0	600 N	2400 N	2.0 m/s	-
	LM-U2P2D-80M-2SS0	800 N	3200 N	2.0 m/s	-

Linear servo motors

Item	Model	Continuous thrust	Maximum thrust	Maximum speed	Length
LM-U2 series Secondary side (magnet)	LM-U2SA0-240-0SS0	-	-	-	240 mm
	LM-U2SA0-300-0SS0	-	-	-	300 mm
	LM-U2SA0-420-0SS0	-	-	-	420 mm
	LM-U2SB0-240-1SS0	-	-	-	240 mm
	LM-U2SB0-300-1SS0	-	-	-	300 mm
	LM-U2SB0-420-1SS0	-	-	-	420 mm
	LM-U2S20-300-2SS0	-	-	-	300 mm
	LM-U2S20-480-2SS0	-	-	-	480 mm

Direct drive motors

Item	Model	Rated torque	Maximum torque	Rated speed
TM-RFM series	TM-RFM002C20	2 N•m	6 N•m	200 r/min
	TM-RFM004C20	4 N•m	12 N•m	200 r/min
	TM-RFM006C20	6 N•m	18 N•m	200 r/min
	TM-RFM006E20	6 N•m	18 N•m	200 r/min
	TM-RFM012E20	12 N•m	36 N•m	200 r/min
	TM-RFM018E20	18 N•m	54 N•m	200 r/min
	TM-RFM012G20	12 N•m	36 N•m	200 r/min
	TM-RFM048G20	48 N•m	144 N•m	200 r/min
	TM-RFM072G20	72 N•m	216 N•m	200 r/min
	TM-RFM040J10	40 N•m	120 N•m	100 r/min
	TM-RFM120J10	120 N•m	360 N•m	100 r/min
	TM-RFM240J10	240 N•m	720 N•m	100 r/min

Encoder cables/Junction cables

Item	Model	Length	Bending life	IP rating	Application
Encoder cable (load-side lead)	MR-J3ENCBL2M-A1-H	2 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL5M-A1-H	5 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL10M-A1-H	10 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL2M-A1-L	2 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL5M-A1-L	5 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL10M-A1-L	10 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
Encoder cable (opposite to load-side lead)	MR-J3ENCBL2M-A2-H	2 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL5M-A2-H	5 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL10M-A2-H	10 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL2M-A2-L	2 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL5M-A2-L	5 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-J3ENCBL10M-A2-L	10 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
Encoder cable (load-side lead)	MR-J3JCBL03M-A1-L	0.3 m	Standard	IP20	For HG-KR/HG-MR (junction type) (Note 1)
Encoder cable (opposite to load-side lead)	MR-J3JCBL03M-A2-L	0.3 m	Standard	IP20	For HG-KR/HG-MR (junction type) (Note 1)
Encoder cable	MR-EKCBL20M-H	20 m	Long bending life	IP20	For HG-KR/HG-MR (junction type) (Note 2)
	MR-EKCBL30M-H	30 m	Long bending life	IP20	For HG-KR/HG-MR (junction type) (Note 2)
	MR-EKCBL40M-H	40 m	Long bending life	IP20	For HG-KR/HG-MR (junction type) (Note 2)
	MR-EKCBL50M-H	50 m	Long bending life	IP20	For HG-KR/HG-MR (junction type) (Note 2)
	MR-EKCBL20M-L	20 m	Standard	IP20	For HG-KR/HG-MR (junction type) (Note 2)
	MR-EKCBL30M-L	30 m	Standard	IP20	For HG-KR/HG-MR (junction type) (Note 2)
	MR-EKCBL2M-H	2 m	Long bending life	IP20	For connecting linear encoder
	MR-EKCBL5M-H	5 m	Long bending life	IP20	For connecting linear encoder
Encoder cable (load-side lead)	MR-J3JSCBL03M-A1-L	0.3 m	Standard	IP65	For HG-KR/HG-MR (junction type) (Note 3)
Encoder cable (opposite to load-side lead)	MR-J3JSCBL03M-A2-L	0.3 m	Standard	IP65	For HG-KR/HG-MR (junction type) (Note 3)
Encoder cable	MR-J3ENSCBL2M-H	2 m	Long bending life	IP67	For HG-KR/HG-MR (junction type) (Note 4), For HG-SR (direct connection type)
	MR-J3ENSCBL5M-H	5 m	Long bending life	IP67	
	MR-J3ENSCBL10M-H	10 m	Long bending life	IP67	
	MR-J3ENSCBL20M-H	20 m	Long bending life	IP67	
	MR-J3ENSCBL30M-H	30 m	Long bending life	IP67	
	MR-J3ENSCBL40M-H	40 m	Long bending life	IP67	
	MR-J3ENSCBL50M-H	50 m	Long bending life	IP67	
	MR-J3ENSCBL2M-L	2 m	Standard	IP67	For HG-KR/HG-MR (junction type) (Note 4), For HG-SR (direct connection type)
	MR-J3ENSCBL5M-L	5 m	Standard	IP67	
	MR-J3ENSCBL10M-L	10 m	Standard	IP67	
	MR-J3ENSCBL20M-L	20 m	Standard	IP67	
	MR-J3ENSCBL30M-L	30 m	Standard	IP67	
Junction cable for fully closed loop control	MR-J4FCCBL03M	0.3 m	-	-	For branching linear encoder
Junction cable for linear servo motor	MR-J4THCBL03M	0.3 m	-	-	For branching thermistor

Notes:
1. Use this in combination with MR-EKCBL_M-H (20 m to 50 m), MR-EKCBL_M-L (20 m or 30 m), or MR-ECNM.
2. Use this in combination with MR-J3JCBL03M-A1-L or MR-J3JCBL03M-A2-L.
3. Use this in combination with MR-J3ENSCBL_M-H, MR-J3ENSCBL_M-L, or MR-J3SCNS.
4. Use this in combination with MR-J3JSCBL03M-A1-L or MR-J3JSCBL03M-A2-L when using for HG-KR or HG-MR series.

Encoder connector sets/Junction connector sets

Item	Model	Description	IP rating	Application
Encoder connector set	MR-ECNM	Junction connector × 1 and Servo amplifier connector × 1	IP20	For HG-KR/HG-MR (junction type) (Note 1), For connecting linear encoder
Encoder connector set (one-touch connection type)	MR-J3SCNS	Straight type Junction connector or encoder connector × 1 and Servo amplifier connector × 1	IP67	For HG-KR/HG-MR (junction type) (Note 2), For HG-SR (direct connection type)
Encoder connector set (screw type)	MR-ENCNS2	Straight type Encoder connector × 1 and Servo amplifier connector × 1	IP67	For HG-SR
Encoder connector set (one-touch connection type)	MR-J3SCNSA	Angle type Encoder connector × 1 and Servo amplifier connector × 1	IP67	For HG-SR
Encoder connector set (screw type)	MR-ENCNS2A	Angle type Encoder connector × 1 and Servo amplifier connector × 1	IP67	For HG-SR
Encoder connector set	MR-J3CN2	Servo amplifier connector × 1	-	For connecting linear encoder or thermistor
	MR-J3DDCNS	Encoder connector or absolute position storage unit connector × 1, and Servo amplifier connector × 1	IP67	For TM-RFM (connecting direct drive motor and servo amplifier, or absolute position storage unit and servo amplifier)
	MR-J3DDSPS	Encoder connector × 1 and Absolute position storage unit connector × 1	IP67	For TM-RFM (connecting direct drive motor and absolute position storage unit)
Connector set	MR-J3THMCN2	Junction connector × 2 and Servo amplifier connector × 1	-	For fully closed loop control or branching thermistor

Notes:
1. Use this in combination with MR-J3JCBL03M-A1-L or MR-J3JCBL03M-A2-L.
2. Use this in combination with MR-J3JSCBL03M-A1-L, or MR-J3JSCBL03M-A2-L when using for HG-KR or HG-MR series.

Servo motor power cables

Item	Model	Length	Bending life	IP rating	Application
Servo motor power cable (load-side lead, lead-out)	MR-PWS1CBL2M-A1-H	2 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL5M-A1-H	5 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL10M-A1-H	10 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL2M-A1-L	2 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL5M-A1-L	5 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL10M-A1-L	10 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
Servo motor power cable (opposite to load-side lead, lead-out)	MR-PWS1CBL2M-A2-H	2 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL5M-A2-H	5 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL10M-A2-H	10 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL2M-A2-L	2 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL5M-A2-L	5 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-PWS1CBL10M-A2-L	10 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
Servo motor power cable (load-side lead, lead-out)	MR-PWS2CBL03M-A1-L	0.3 m	Standard	IP55	For HG-KR/HG-MR (junction type)
Servo motor power cable (opposite to load-side lead, lead-out)	MR-PWS2CBL03M-A2-L	0.3 m	Standard	IP55	For HG-KR/HG-MR (junction type)

Servo motor power connector sets

Item	Model	Description	IP rating	Application
Servo motor power connector set EN compliant	MR-PWCNF	Straight type Power connector × 1	IP67	For TM-RFM_C20/_E20
	MR-PWCNS4	Straight type Power connector × 1	IP67	For HG-SR51, 81, 52, 102, 152/ TM-RFM_G20
	MR-PWCNS5	Straight type Power connector × 1	IP67	For HG-SR121, 201, 301, 202, 352, 502/ TM-RFM040J10, 120J10
	MR-PWCNS3	Straight type Power connector × 1	IP67	For HG-SR421, 702/ TM-RFM240J10

Electromagnetic brake cables

Item	Model	Length	Bending life	IP rating	Application
Electromagnetic brake cable (load-side lead, lead-out)	MR-BKS1CBL2M-A1-H	2 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL5M-A1-H	5 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL10M-A1-H	10 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL2M-A1-L	2 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL5M-A1-L	5 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL10M-A1-L	10 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
Electromagnetic brake cable (opposite to load-side lead, lead-out)	MR-BKS1CBL2M-A2-H	2 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL5M-A2-H	5 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL10M-A2-H	10 m	Long bending life	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL2M-A2-L	2 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL5M-A2-L	5 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
	MR-BKS1CBL10M-A2-L	10 m	Standard	IP65	For HG-KR/HG-MR (direct connection type)
Electromagnetic brake cable (load-side lead, lead-out)	MR-BKS2CBL03M-A1-L	0.3 m	Standard	IP55	For HG-KR/HG-MR (junction type)
Electromagnetic brake cable (opposite to load-side lead, lead-out)	MR-BKS2CBL03M-A2-L	0.3 m	Standard	IP55	For HG-KR/HG-MR (junction type)

Electromagnetic brake connector sets

Item	Model	Description	IP rating	Application
Electromagnetic brake connector set (one-touch connection type)	MR-BKCNS1	Straight type, Electromagnetic brake connector × 1	IP67	For HG-SR
Electromagnetic brake connector set (screw type)	MR-BKCNS2	Straight type, Electromagnetic brake connector × 1	IP67	For HG-SR
Electromagnetic brake connector set (one-touch connection type)	MR-BKCNS1A	Angle type, Electromagnetic brake connector × 1	IP67	For HG-SR
Electromagnetic brake connector set (screw type)	MR-BKCNS2A	Angle type, Electromagnetic brake connector × 1	IP67	For HG-SR

SSCNET III cables/connector set

Item	Model	Length	Bending life	IP rating	Application
SSCNET III cable (standard cord for inside cabinet) compatible with SSCNET III(/H)	MR-J3BUS015M	0.15 m	Standard	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS03M	0.3 m	Standard	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS05M	0.5 m	Standard	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS1M	1 m	Standard	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS3M	3 m	Standard	-	For MR-J4-B and MR-J4W_-B
SSCNET III cable (standard cable for outside cabinet) compatible with SSCNET III(/H)	MR-J3BUS5M-A	5 m	Standard	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS10M-A	10 m	Standard	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS20M-A	20 m	Standard	-	For MR-J4-B and MR-J4W_-B
SSCNET III cable (long distance cable) compatible with SSCNET III(/H)	MR-J3BUS30M-B	30 m	Long bending life	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS40M-B	40 m	Long bending life	-	For MR-J4-B and MR-J4W_-B
	MR-J3BUS50M-B	50 m	Long bending life	-	For MR-J4-B and MR-J4W_-B
SSCNET III connector set compatible with SSCNET III(/H)	MR-J3BCN1	-	-	-	For MR-J4-B and MR-J4W_-B

Junction terminal blocks/Junction terminal block cables

Item	Model	Length	Application
Junction terminal block (26 pins)	MR-TB26A	-	For MR-J4W_-B
Junction terminal block cable (for MR-TB26A)	MR-TBNATBL05M	0.5 m	For connecting MR-J4W_-B and MR-TB26A
	MR-TBNATBL1M	1 m	For connecting MR-J4W_-B and MR-TB26A
Junction terminal block (50 pins)	MR-TB50	-	For MR-J4-A
Junction terminal block cable (for MR-TB50)	MR-J2M-CN1TBL05M	0.5 m	For connecting MR-J4-A and MR-TB50
	MR-J2M-CN1TBL1M	1 m	For connecting MR-J4-A and MR-TB50

Batteries/Battery case/Battery cables

Item	Model	Length	Application
Battery	MR-BAT6V1SET	-	For MR-J4-B/A
	MR-BAT6V1	-	For MR-BT6VCASE
Battery case	MR-BT6VCASE	-	For MR-J4W_-B
Battery cable	MR-BT6V1CBL03M	0.3 m	For connecting MR-J4W_-B and MR-BT6VCASE
	MR-BT6V1CBL1M	1 m	For connecting MR-J4W_-B and MR-BT6VCASE
Junction battery cable	MR-BT6V2CBL03M	0.3 m	For connecting MR-J4W_-B and MR-BT6V1CBL_M
	MR-BT6V2CBL1M	1 m	For connecting MR-J4W_-B and MR-BT6V1CBL_M

Peripheral units

Item	Model	Specifications	Application
Regenerative option	MR-RB032	Tolerable regenerative power: 30 W, Resistance value: 40 Ω	For MR-J4-10B/A to MR-J4-100B/A
	MR-RB12	Tolerable regenerative power: 100 W, Resistance value: 40 Ω	For MR-J4-20B/A to MR-J4-100B/A
	MR-RB30	Tolerable regenerative power: 300 W, Resistance value: 13 Ω	For MR-J4-200B/A
	MR-RB3N	Tolerable regenerative power: 300 W, Resistance value: 9 Ω	For MR-J4-350B/A and MR-J4W2-77B/1010B
	MR-RB31	Tolerable regenerative power: 300 W, Resistance value: 6.7 Ω	For MR-J4-500B/A and MR-J4-700B/A
	MR-RB32	Tolerable regenerative power: 300 W, Resistance value: 40 Ω	For MR-J4-70B/A and MR-J4-100B/A
	MR-RB50	Tolerable regenerative power: 500 W, Resistance value: 13 Ω	For MR-J4-200B/A
	MR-RB5N	Tolerable regenerative power: 500 W, Resistance value: 9 Ω	For MR-J4-350B/A
	MR-RB51	Tolerable regenerative power: 500 W, Resistance value: 6.7 Ω	For MR-J4-500B/A and MR-J4-700B/A
	MR-RB14	Tolerable regenerative power: 100 W, Resistance value: 26 Ω	For MR-J4W2-22B/44B and MR-J4W3-222B/444B
	MR-RB34	Tolerable regenerative power: 300 W, Resistance value: 26 Ω	For MR-J4W3-222B/444B
Absolute position storage unit	MR-BTAS01	-	For MR-J4-B and MR-J4W_-B
Safety logic unit	MR-J3-D05	-	For MR-J4-B/A and MR-J4W_-B

Peripheral cables/connector sets

Item	Model	Length	Application
STO cable	MR-D05UDL3M-B	3 m	For connecting MR-J4-B/A or MR-J4W_-B with MR-J3-D05 or other safety control devices
Monitor cable	MR-J3CN6CBL1M	1 m	For analog monitor output of MR-J4-A
Personal computer communication cable (USB cable)	MR-J3USBCBL3M	3 m	For MR-J4-B/A and MR-J4W_-B
Connector set	MR-J3CN1	-	For I/O signals of MR-J4-A
	MR-CCN1	-	For I/O signals of MR-J4-B
	MR-J2CMP2	-	For MR-J4W_-B (Qty: 1 pc)
	MR-ECN1	-	For MR-J4W_-B (Qty: 20 pcs)

Servo Support Software

Item	Model	Application
MR Configurator2 (Note 1)	SW1DNC-MRC2-E	Setup software for AC servo

Notes:

1. MR Configurator2 is included in MT Works2 with software version 1.34L or later.
   If you have GX Works2 or MT Works2 with software version earlier than 1.34L, you can download MR Configurator2 from website.

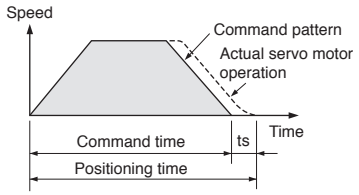
MEMO

To ensure safe use

- To use the products given in this catalog properly, always read the "Installation Guide" and "Instruction Manual" before starting to use them.

Cautions for model selection

- Select a rotary servo motor or a direct drive motor which has the rated torque equal to or higher than the continuous effective torque.
- Select a linear servo motor which has the continuous thrust equal to or higher than the continuous effective load thrust.
- When the linear servo motor is used for vertical axis, it is necessary to have anti-drop mechanism such as spring and counter balance in the machine side.
- When unbalanced torque is generated, such as in a vertical lift machine, it is recommended that the unbalanced torque of the machine be kept under 70% of the servo motor rated torque.
- Create the operating pattern by considering the settling time (ts).
- Load to motor inertia ratio or load to mass ratio must be below the recommended ratio. If the ratio is too large, the expected performance may not be achieved, and the dynamic brake may be damaged.



General safety precautions

1. Transportation/installation

- Combinations of the servo motor and the servo amplifier are predetermined. Confirm the models of the servo motor and the servo amplifier to be used before installation.
- Do not drop or apply strong impact on the servo amplifier and the servo motor as they are precision devices. They may be damaged from such stress or shock.
- Do not get on or place heavy objects on the servo amplifier or the servo motor. Doing so may result in injury or damage.
- The system must withstand high speeds and high acceleration/deceleration.
- To enable high-accuracy positioning, ensure the machine rigidity, and keep the machine resonance point at a high level.
- Mount the servo amplifier and the servo motor on nonflammable material. Mounting them directly on or near flammable material may result in fires.
- The regenerative option becomes hot (the temperature rise of 100 °C or higher) with frequent use. Do not install within flammable objects or objects subject to thermal deformation. Make sure that wires do not come into contact with the unit.
- Securely fix the servo motor onto the machine. Insufficient fixing may cause the servo motor to dislocate during operation.
- Install electrical and mechanical stoppers at the stroke end.
- Mount the servo amplifier vertically on a wall.
- Do not block intake and exhaust areas of the servo amplifier. Doing so may cause the servo amplifier to malfunction.
- When installing multiple servo amplifiers in a row in a sealed cabinet, leave space around the servo amplifiers as described in Servo Amplifier Instruction Manual. To ensure the life and reliability of the servo amplifiers, prevent heat accumulation by keeping space as open as possible toward the top plate.

2. Environment

- Use the servo amplifier and the servo motor in the designated environment.
- Avoid installing the servo amplifier and the servo motor in areas with oil mist or dust. When installing in such areas, be sure to enclose the servo amplifier in a sealed cabinet, and protect the servo motor by furnishing a cover or by taking similar measures.
- Do not use in areas where the servo motor may be constantly subject to cutting fluid or lubricant oil, or where dew could condense because of oil mist, overcooling or excessive humidity. Doing so may deteriorate the insulation of the servo motor.

3. Grounding

- Securely ground to prevent electric shocks and to stabilize the potential in the control circuit.
- Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal for the servo motor grounding.
- Faults such as a position mismatch may occur if the grounding is insufficient.

4. Wiring

- Do not supply power to the output terminals (U, V, and W) of the servo amplifier or the input terminals (U, V, and W) of the servo motor. Doing so damages the servo amplifier and the servo motor.
- Connect the servo motor to the output terminals (U, V, and W) of the servo amplifier.
- Match the phase of the input terminals (U, V, and W) of the servo motor to the output terminals (U, V, and W) of the servo amplifier when connecting them. If they do not match, the servo motor does not operate properly.
- Check the wiring and sequence program thoroughly before switching the power on.
- Carefully select the cable clamping method, and make sure that bending stress and the stress of the cable's own weight are not applied on the cable connection section.
- In an application where the servo motor moves, determine the cable bending radius according to the cable bending life and wire type.

5. Factory settings

- For MR-J4-A, select a control mode from position, speed or torque by [Pr. PA01]. Position control mode is set as default. Change the parameter setting value when using the other control modes. For MR-J4-B or MR-J4W_-B, the control mode is set by the controller.
- When using the regenerative option, change [Pr. PA02]. The regenerative option is disabled as default.

6. Operation

- Do not use a product which is damaged or has missing parts. In that case, replace the product.
- Turn on FLS and RLS (Upper/Lower stroke limit), or LSP and LSN (Forward/Reverse rotation stroke end) in position or speed control mode. The servo motor will not start if the signals are off.
- When a magnetic contactor is installed on the primary side of the servo amplifier, do not perform frequent starts and stops with the magnetic contactor. Doing so may damage the servo amplifier.
- When an error occurs, the servo amplifier stops outputting the power with activation of the protective function, and the servo motor stops immediately with the dynamic brake. Servo amplifiers without dynamic brake are also available for free-running the servo motor. Contact your local sales office for more details.
- The dynamic brake is a function for emergency stop. Do not use it to stop the servo motor in normal operations.

- As a rough guide, the dynamic brake withstands 1000 times of use when a machine which has load to motor inertia ratio equals to or lower than the recommended ratio stops from the rated speed every 10 minutes.
- If the protective functions of the servo amplifier activate, turn the power off immediately. Remove the cause before turning the power on again. If operation is continued without removing the cause of the error, the servo motor may malfunction, resulting in injury or damage.
- The servo amplifier, the regenerative resistor, and the servo motor can be very hot during or after operation. Take safety measures such as covering them to prevent your hand and/or parts including cables from coming in contact with them.

7. Others

- Do not touch the servo amplifier or the servo motor with wet hands.
- Do not modify the servo amplifier or the servo motor.

Cautions for SSCNET III cables

- Do not apply excessive tension on the SSCNET III cable when cabling.
- The minimum bending radius of the SSCNET III cable is 25 mm for MR-J3BUS_M and 50 mm for MR-J3BUS_M-A/-B. If using these cables under the minimum bending radius, performance cannot be guaranteed.
- If the ends of the SSCNET III cable are dirty, the light will be obstructed, causing malfunctions. Keep the ends clean.
- Do not tighten the SSCNET III cable with cable ties, etc.
- Do not look at the light directly when the SSCNET III cable is not connected.

Cautions for rotary servo motors and direct drive motors

- Do not hammer the shaft of the rotary servo motor and the rotor of the direct drive motor when installing a pulley or a coupling. Doing so may damage the encoder. When installing the pulley or the coupling to the key shaft servo motor, use the screw hole on the shaft end. Use a pulley extractor when removing the pulley.
- Do not apply a load exceeding the tolerable load onto the rotary servo motor shaft or the direct drive motor rotor. The shaft or the rotor may break.
- When the rotary servo motor is mounted with the shaft vertical (shaft up), take measures on the machine side so that oil from the gear box does not get into the servo motor.
- Mount the geared servo motor in a direction described in "Servo Motor Instruction Manual (Vol. 3)."
- When the direct drive motor is used in a machine such as vertical axis which generates unbalanced torque, be sure to use it in absolute position detection system.
- Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
- Do not apply the electromagnetic brake when the servo is on. Doing so may cause the servo amplifier overload or shorten the brake life. Apply the electromagnetic brake when the servo is off.
- Torque may drop due to temperature increase of the rotary servo motor or the direct drive motor. Be sure to use the motor within the specified ambient temperature.

Cautions for linear encoders

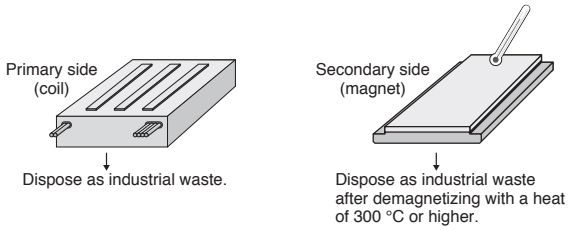
- If the linear encoder is improperly mounted, an alarm or a positioning deviation may occur. Refer to the following general inspections of linear encoder to verify the mounting state. Contact the relevant linear encoder manufacturers for more details.
- General inspections of linear encoder
  - (a) Verify that the gap between the linear encoder head and the linear encoder is appropriate.
  - (b) Check for any rolling or yawing (looseness) on the linear encoder head.
  - (c) Check for contaminations and scratches on the linear encoder head and scale surface.
  - (d) Verify that vibration and temperature are within the specified range.
  - (e) Verify that the speed is within the tolerable range even when overshooting.

Cautions for linear servo motors

- The linear servo system uses powerful magnets on the secondary side. Magnetic force is inversely proportional to the square of the distance from the magnetic material. Therefore, the magnetic force will be drastically stronger as closer to the magnetic material. Persons installing the linear servo motor as well as operating the machine must be fully cautious. Persons with pacemakers or other medical devices must keep away from the machine.
- Keep cell phones, watches, calculators and other products which may malfunction or fail due to the magnetic force away from the machine. Avoid wearing metals including earrings and necklaces when handling the machine.
- Give a marking such as "CAUTION! POWERFUL MAGNET" to give warning against the machine.
- Use non-magnetic tools, when installing or working near the linear servo motor.
  e.g., explosion-proof beryllium copper alloy safety tools (BEALON manufactured by NGK Insulators, Ltd.)
- The permanent magnets on the secondary side generate attraction force, and there is a risk that your hand may be caught. Handle the linear servo motor carefully to avoid serious injury especially when installing the primary side after installing the secondary side.
- If the linear servo motor is used in such an environment where there is magnetic powder, the powder may adhere to the permanent magnets of the secondary side and cause a damage. In that case, take measures to prevent the magnetic powder or pieces from being attracted to the permanent magnets of the secondary side or from going into the gap between primary side and secondary side.
- The linear servo motor is rated IP00. Provide protection measures to prevent dust and oil, etc., as necessary.
- Install the moving part in such manner that the center of gravity of the moving part comes directly above the center of the primary side.
- Lead wires or cables led from the primary side do not have a long bending life. Fix the lead wires or cables to a moving part to prevent the lead wires or cables from repetitive bending.
- Thrust may drop due to temperature increase of the linear servo motor. Be sure to use the motor within the specified ambient temperature.

Disposal of linear servo motors

- Dispose the primary side as industrial waste.
- Demagnetize the secondary side with a heat of 300 °C or higher, and dispose as industrial waste. If not possible to demagnetize, return the secondary side to us in an appropriate package.
- Do not leave the product unattended.



For safety standard certification

Even though the MR-J4 series servo amplifier and MR-J3-D05 safety logic unit are certified to various safety standards, this does not guarantee that the systems in which they are installed will also be certified. The entire system shall observe the following:

(1) For safety circuits, use parts and/or devices whose safety are confirmed or which satisfy safety standards.
(2) For details regarding the use of safety functions and other cautionary information, refer to relevant Servo Amplifier Instruction Manual.
(3) Perform risk assessment on the entire machine/system. It is recommended to use a Certification Body for final safety certification.

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is repaired or replaced.

[Term]

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[Limitations]

(1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.

(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;

(i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem

(ii) a failure caused by any alteration, etc. to the Product made on your side without our approval

(iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry

(iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced

(v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)

(vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters

(vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company

(viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA Center for details.

4. Exclusion of responsibility for compensation against loss of opportunity, secondary loss, etc.

Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

(1) For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.

(2) Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at general industries. Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.

In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.

We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

MEMO

Global FA Centers

China

Shanghai FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Shanghai FA Center
3F, No.1386 Hongqiao Road, Mitsubishi Electric Automation Center, Changning District, Shanghai, China
Tel: 86-21-2322-3030 Fax: 86-21-2322-3000

Beijing FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Beijing FA Center
9F, Office Tower 1, Henderson Centre, 18 Jianguomennei Avenue, Dongcheng District, Beijing, China
Tel: 86-10-6518-8830 Fax: 86-10-6518-3907

Tianjin FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Tianjin FA Center
Unit 2003-2004B, Tianjin City Tower, No.35, You Yi Road, He Xi District, Tianjin, China
Tel: 86-22-2813-1015 Fax: 86-22-2813-1017

Guangzhou FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Guangzhou FA Center
Room.1609, North Tower, The Hub Center, No.1068, Xin Gang East Road, Haizhu District, Guangzhou,China
Tel: 86-20-8923-6730 Fax: 86-20-8923-6715

Taiwan

Taiwan FA Center
SETSUYO ENTERPRISE CO., LTD.
3F., No.105, Wugong 3rd, Wugu Dist, New Taipei City 24889, Taiwan, R.O.C
Tel: 886-2-2299-9917 Fax: 886-2-2299-9963

Korea

Korean FA Center
MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (Service)
B1F, 2F, 1480-6, Gayang-Dong, Gangseo-Gu, Seoul, 157-200, Korea
Tel: 82-2-3660-9630 Fax: 82-2-3663-0475

Thailand

Thailand FA Center
MITSUBISHI ELECTRIC AUTOMATION (THAILAND) CO., LTD.
Bang-Chan Industrial Estate No.111, Soi Serithai 54, T.Kannayao, A.Kannayao, Bangkok 10230, Thailand
Tel: 66-2906-3238 Fax: 66-2906-3239

Asean

ASEAN FA Center
MITSUBISHI ELECTRIC ASIA PTE. LTD.
ASEAN Factory Automation Centre
307 Alexandra Road #05-01/02, Mitsubishi Electric Building, Singapore
Tel: 65-6470-2480 Fax: 65-6476-7439

India

India FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
India Factory Automation Centre
2nd Floor, Tower A & B, Cyber Greens, DLF Cyber City, DLF Phase-III, Gurgaon - 122 002 Haryana, India
Tel: 91-124-4630300 Fax: 91-124-4630399

America

North American FA Center
MITSUBISHI ELECTRIC AUTOMATION, INC.
500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A
Tel: 1-847-478-2100 Fax: 1-847-478-2253

Brazil

Brazil FA Center
MELCO-TEC Representacao Comercial e Assessoria Tecnica Ltda.
Av. Paulista, 1439, cj74, Bela Vista, Sao Paulo CEP: 01311-200 - SP Brazil
Tel: 55-11-3146-2200 Fax: 55-11-3146-2217

Europe

European FA Center
MITSUBISHI ELECTRIC EUROPE B.V. Polish Branch
Krakowska 50, 32-083 Balice, Poland
Tel: 48-12-630-47-00 Fax: 48-12-630-47-01

German FA Center
MITSUBISHI ELECTRIC EUROPE B.V. - German Branch
Gothaer Strasse 8, D-40880 Ratingen, Germany
Tel: 49-2102-486-0 Fax: 49-2102-486-1120

UK FA Center
MITSUBISHI ELECTRIC EUROPE B.V. UK Branch
Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, UK.
Tel: 44-1707-27-6100 Fax: 44-1707-27-8695

Czech Republic FA Center
MITSUBISHI ELECTRIC EUROPE B.V. - o.s. Czech office
Avenir Business Park, Radicka 714/113a, 158 00 Praha5, Czech Republic
Tel: 420-251-551-470 Fax: 420-251-551-471

Russian FA Center
MITSUBISHI ELECTRIC EUROPE B.V. Russian Branch St.Petersburg office
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Tel: 7-812-633-3497 Fax: 7-812-633-3499

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

Empowering Industries
SSCNET III/H SERVO SYSTEM CONTROLLER NETWORK
MELSOFT
ISO 14001 EC97J1113 UKAS MANAGEMENT SYSTEMS 051
ISO 9001 BUREAU VERITAS Certification UKAS MANAGEMENT SYSTEMS

SERVO AMPLIFIERS & MOTORS

⚠ Safety Warning

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

Country/Region	Sales office	Tel/Fax
USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A	Tel : +1-847-478-2100 Fax : +1-847-478-2253
Brazil	MELCO-TEC Representacao Comercial e Assessoria Tecnica Ltda. Av. Paulista, 1439, cj74, Bela Vista, Sao Paulo CEP: 01311-200 - SP Brazil	Tel : +55-11-3146-2200 Fax : +55-11-3146-2217
Germany	MITSUBISHI ELECTRIC EUROPE B.V. - German Branch Gothaer Strasse 8, D-40880 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-1120
UK	MITSUBISHI ELECTRIC EUROPE B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, UK.	Tel : +44-1707-27-6100 Fax : +44-1707-27-8695
Italy	MITSUBISHI ELECTRIC EUROPE B.V. - Italian Branch VIALE COLLEONI 7 - 20041 Agrate Brianza (Milano), Italy	Tel : +39-039-60531 Fax : +39-039-6053-312
Spain	MITSUBISHI ELECTRIC EUROPE, B.V. - Spanish Branch Carretera de Rubí 76-80, E-08190 Sant Cugat del Vallés (Barcelona), Spain	Tel : +34-935-65-3131 Fax : +34-935-89-2948
France	MITSUBISHI ELECTRIC EUROPE B.V. - French Branch 25, Boulevard des Bouvets, F-92741 Nanterre Cedex, France	Tel : +33-1-55-68-55-68 Fax : +33-1-55-68-57-57
Czech Republic	MITSUBISHI ELECTRIC EUROPE B.V. -o.s. Czech office Avenir Business Park, Radicka 714/113a, 158 00 Praha5, Czech Republic	Tel : +420-251-551-470 Fax : +420-251-551-471
Poland	MITSUBISHI ELECTRIC EUROPE B.V. Polish Branch Krakowska 50, 32-083 Balice, Poland	Tel : +48-12-630-47-00 Fax : +48-12-630-47-01
Russia	MITSUBISHI ELECTRIC EUROPE B.V. Russian Branch St.Petersburg office Piskarevsky pr. 2, bld 2, lit "Sch", BC "Benua", office 720; 195027, St.Petersburg, Russia	Tel : +7-812-633-3497 Fax : +7-812-633-3499
South Africa	Circuit Breaker Industries Ltd. 9 Derrick Road, Spartan, Gauteng PO Box 100, Kempton Park 1620, South Africa	Tel : +27-11-977-0770 Fax : +27-11-977-0761
China	MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. No.1386 Hongqiao Road, Mitsubishi Electric Automation Center, Changning District, Shanghai, China	Tel : +86-21-2322-3030 Fax : +86-21-2322-3000
Taiwan	SETSUYO ENTERPRISE CO., LTD. 6F., No.105, Wugong 3rd, Wugu Dist, New Taipei City 24889, Taiwan, R.O.C.	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509
Korea	MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (Sales) 3F, 1480-6, Gayang-Dong, Gangseo-Gu, Seoul, 157-200, Korea	Tel : +82-2-3660-9510 Fax : +82-2-3664-8372/8335
Singapore	MITSUBISHI ELECTRIC ASIA PTE. LTD -Industrial Division 307 Alexandra Road #05-01/02, Mitsubishi Electric Building, Singapore	Tel : +65-6470-2480 Fax : +65-6476-7439
Thailand	MITSUBISHI ELECTRIC AUTOMATION (THAILAND) CO., LTD. Bang-Chan Industrial Estate No.111, Soi Serithai 54, T.Kannayao, A.Kannayao, Bangkok 10230, Thailand	Tel : +66-2906-3238 Fax : +66-2906-3239
Indonesia	P. T. Autoteknindo Sumber Makmur Muara Karang Selatan, Block A / Utara No.1 Kav. No. 11, Kawasan Industri Pergudangan, Jakarta- Utara 14440, P.O.Box 5045, Indonesia	Tel : +62-21-663-0833 Fax : +62-21-663-0832
India	MITSUBISHI ELECTRIC INDIA PVT. LTD. 2nd Floor, Tower A & B, Cyber Greens, DLF Cyber City, DLF Phase-III, Gurgaon - 122 002 Haryana, India	Tel : +91-124-4630300 Fax : +91-124-4630399
Australia	MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD. 348 Victoria Road PO BOX11, Rydalmere, N.S.W 2116, Australia	Tel : +61-2-9684-7777 Fax : +61-2-9684-7245

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