DRIVE PRODUCTS

AC Servos-MELSERVO

Inverters-FREQROL

Designed to enhance the overall manufacturing and production system capabilities

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSER*V*O

AC Servos-MELSERVO

From rotary servo motors to liner servo motors and to direct-drive motors, we have a wide range of products to meet various needs and to significantly enhance the equipment performance.

FREQROL

Inverters-FREQROL

Our inverters with adjustable frequency power supply are designed to easily change the rotation speed of the three-phase induction motor.

AC Servo

Leading the World with the industry's Top Class Technology.

"MELSERVO" products are playing critical role in the success of manufacturers all over the world.

Welcome to the world's leading-edge drive platform.

MR-J4 Series

100VAC/200VAC/400VAC specifications
48VDC/24VDC specifications

The latest MELSERVO design brings harmony among machine, people, and environment.

Built with advanced features of industry-leading basic performance, safety standards, Easy-to-Use designs, energy saving functions, and much more.

▶ **P.270**

MR-JE Series

200VAC specifications

Operation has never been easier with features including the built-in one touch adjustment and positioning function.

In addition, other cutting edge functions will further enhance your production lines with optimized drive.

▶ **P.408**

Model	Specification
MR-J4-GF(-RJ)	200V: 0.1kW - 7kW
	400V: 0.6kW - 7kW
MR-J4-B(-RJ)　MR-J4-A(-RJ)	100V: 0.1kW - 0.4kW
	200V: 0.1kW - 37kW
	400V: 0.6kW - 55kW
MR-J4W2-B	200V: 0.2kW - 1kW
MR-J4W3-B	200V: 0.2kW - 0.4kW
MR-J4W2-0303B6　MR-J4-03A6(-RJ)	48VDC/24VDC: 30W
MR-JE-B　MR-JE-A	200V: 0.1kW - 3kW
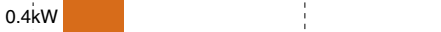
0.1kW　　1kW

- 22kW (Coming soon)
- 22kW (Coming soon)

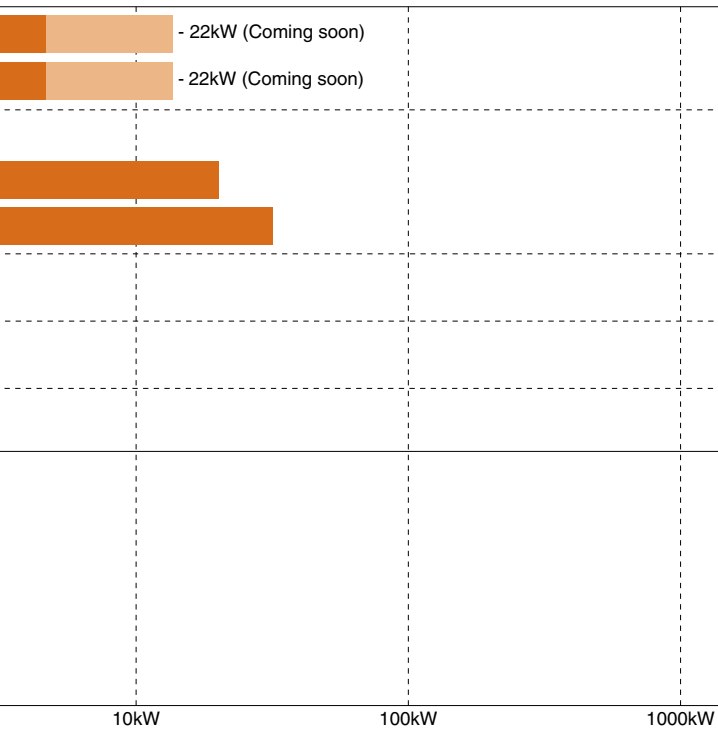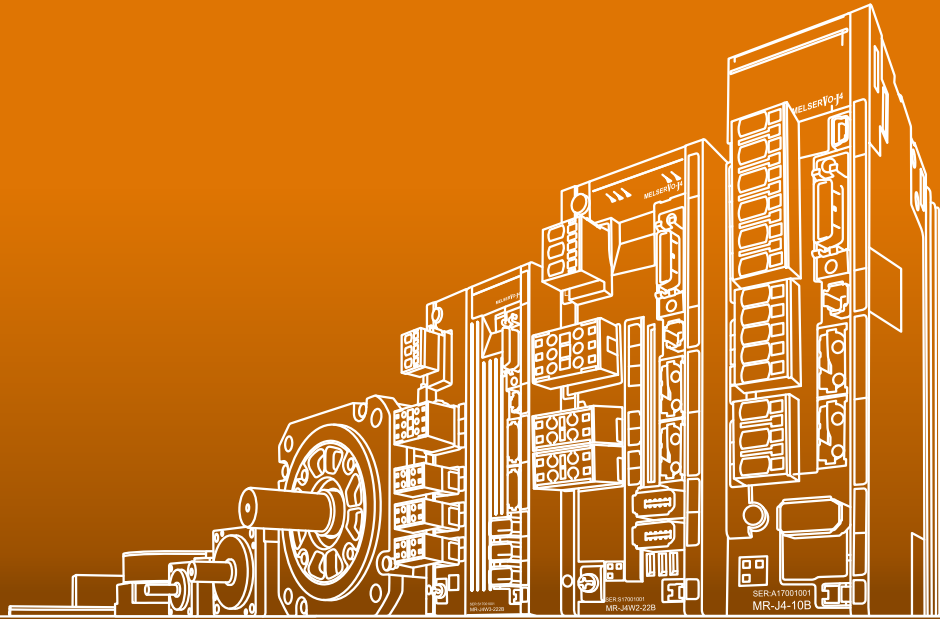10kW   100kW   1000kW

Rotary Servo Motor
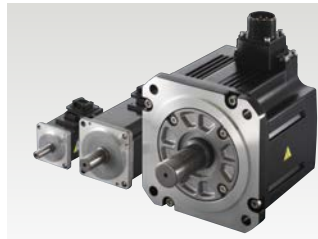
High speed and high torque deliver shorter positioning time and faster performance.

| J4 | ⮞ **P.336** |
| JE | ⮞ **P.426** |

Linear Servo Motor

Optimized for linear motion system with high-speed and high-precision demands.

| J4 | ⮞ **P.378** |

Direct Drive Motor

With downsized and simplified rotating and driving parts, this device is a perfect choice for high-precision control.

| J4 | ⮞ **P.400** |

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-J4

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 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.

Machine

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.

Man

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.

The Environment

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.
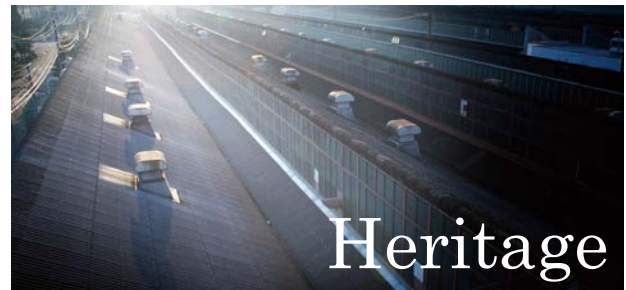
Heritage

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.

Drive Product

Please refer to the catalog for details on the MELSERVO-J4 series.

SERVO AMPLIFIERS & MOTORS MELSERVO-J4 L(NA)03058

Mitsubishi Servo System Family Catalog L(NA)03055

Machine

Industry-Leading Level of Servo Amplifier Basic Performance
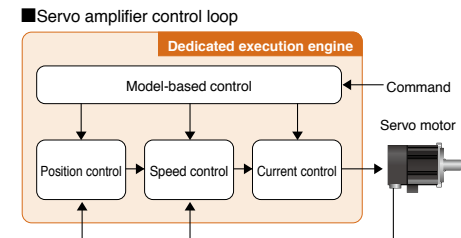
Our original high-speed servo control architecture is evolved from the conventional two-degrees-of-freedom model adaptive control and applied to the dedicated execution engine. **Speed frequency response is increased to 2.5 kHz.** Compatible servo motors are equipped with **a high-resolution absolute position encoder of 4,194,304 pulses/rev (22-bit)**, enabling high-speed and high-accuracy operation. The performance of the high-end machine is utilized to the fullest.

[Settling time comparison with the prior model]

[MR-J3] Settling time reduced by 40%* [MR-J4]

Settling time   Settling time

— Command — Torque — Droop pulses — In-position
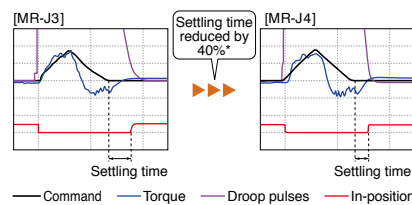
* The result is based on our evaluation condition.

[Dedicated execution engine]

■Servo amplifier control loop

Dedicated execution engine

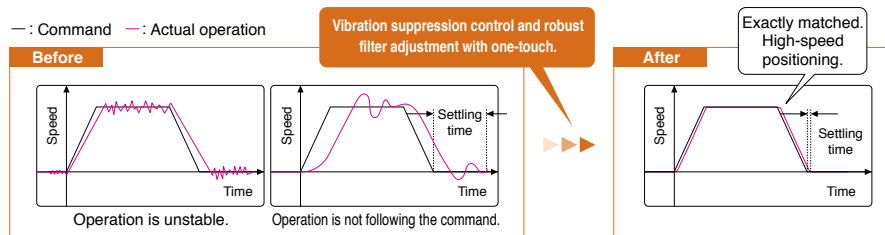Model-based control ← Command

Position control | Speed control | Current control → Servo motor

One-touch Tuning

Servo gain adjustment is complete just by turning on the one-touch tuning function. With this function, machine resonance filter, advanced vibration suppression control II*, and robust filter are automatically adjusted to maximize your machine performance. This function also sets responsivity automatically while the real-time auto tuning requires manual setting.
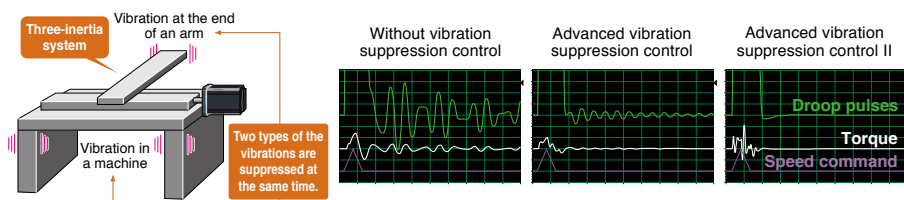
* The advanced vibration suppression control II automatically adjusts one frequency.

— : Command — : Actual operation

Vibration suppression control and robust filter adjustment with one-touch.

Before

Speed / Time — Operation is unstable.

Speed / Time — Settling time — Operation is not following the command.

After Exactly matched. High-speed positioning.

Speed / Time — Settling time

Advanced Vibration Suppression Control II [Patented]

The advanced vibration suppression control II suppresses two types of low frequency vibrations owing to vibration suppression algorithm which supports three-inertia system. This function is effective in suppressing residual vibration with relatively low frequency of approximately 100 Hz or less generated at the end of an arm and in a machine, enabling a shorter settling time. Adjustment is easily performed on MR Configurator2.

Three-inertia system

Vibration at the end of an arm

Vibration in a machine

Two types of the vibrations are suppressed at the same time.

Without vibration suppression control | Advanced vibration suppression control | Advanced vibration suppression control II

Droop pulses Torque Speed command

Built-in positioning function

The MR-J4-A-RJ with a built-in positioning function (point table mode, program mode, indexer positioning operation) brings simple & easy a positioning system without the use of other controllers such as a positioning unit.

servo motor

MR-J4-A-RJ
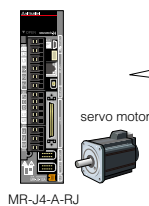
Built-in positioning function! No need for other controllers such as a positioning unit!

■**Point table mode**

Point table No.	Position data	Rotation speed	Acceleration time constant	Deceleration time constant	Dwell time	Auxiliary function
1	1000	2000	200	200	0	1
2	2000	1600	100	100	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮

Settings for positioning data (target position), motor rotation speed, acceleration and deceleration times can be made in the point table, just like when handling parameters.

■**Indexer (turret) method**
Determines positioning by specifying the station position.

■**Program mode**

Program No.1

SPN(3000)
STC(20)
MOV(1000)
TIM(100)
FOR(3)·············①
MOVI(100)·········②
TIM(100)··········③
NEXT
STOP

Positioning operation is made according to the preprogrammed details.

Drive Product

Man

Functions According to IEC/EN 61800-5-2

STO (Safe torque off) and SS1[*1] (Safe stop 1) are integrated as standard, enabling the safety system to be configured easily in the machine.

● 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. For MR-J4 series servo amplifier, magnetic contactors are not required to meet the STO requirements. However this figure has a magnetic contactor installed to prevent the short circuit of servo amplifier or electric shock.

[Shut-off by STO]   [Shut-off by STO and SS1]
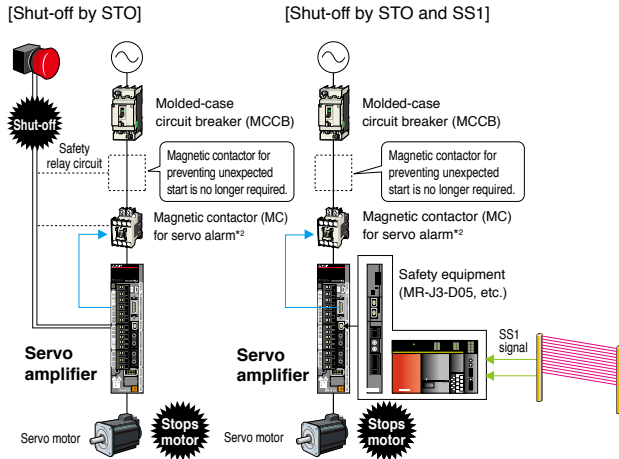
Large Capacity Drive Recorder

Patent pending

● Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of the servo amplifier. Reading the servo data on MELSOFT MR Configurator2 helps you analyze the cause of the alarm.

● Check the waveform ((analog 16 bits × 7 channels + digital 8 channels) × 256 points) and the monitor values of 16 alarms in the alarm history.
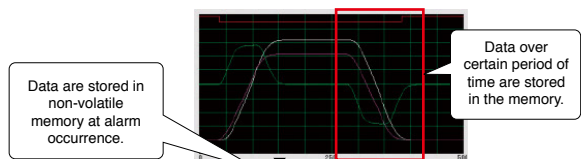
Waveform display   Monitor value display

Tough Drive Function

Detects changes in use environment and automatically adjusts the servo control status.

● Vibration tough drive

The servo amplifier detects changes in the machine resonant frequency and automatically readjusts the machine resonant suppression filter during oscillation. This will reduce losses from device halt due to aging and degradation.
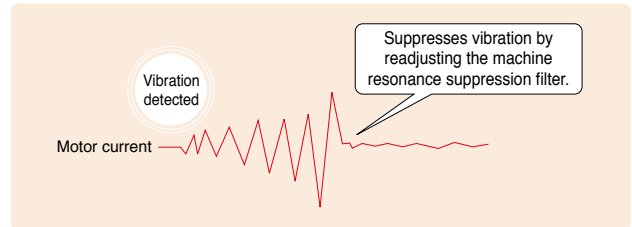
● Instantaneous power failure tough drive

Detects instantaneous power failure to reduce device halt due to undervoltage.
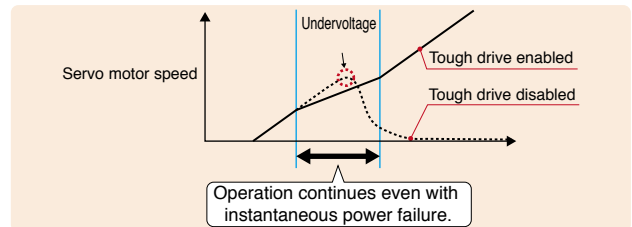
Machine Diagnosis Function

Patent pending

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.
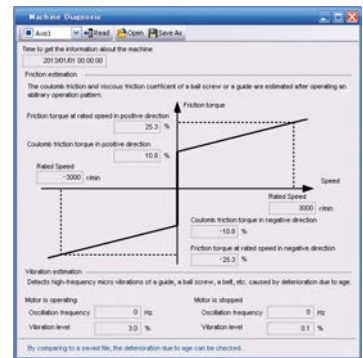
Machine diagnosis function window on MR Configurator2

Servo setup software
MELSOFT MR Configurator2

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

Chart screen

AC Servo
P.268

Inverter
P.436

273

Drive Product
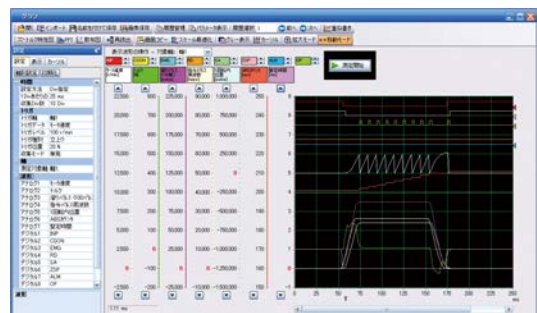
The Environment

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>

MR-J4W3-B
(3-axis type)

(Depth 195 mm)

85		
100W×2 200W×1	200W×1 400W×2	750W×2

168 mm

Installation space reduced by 30%

Industry's smallest

255 mm = 85 mm (unit width) × 3

MR-J4W2-B
(2-axis type)

(Depth 195 mm)

60			85
100W ×2	200W ×2	400W ×2	750W ×2

168 mm

Installation space reduced by 26%

265 mm = 60 mm (unit width) × 3 + 85 mm (unit width) × 1

MR-J4-B

(Depth 135 mm, 170 mm, 185 mm)

40						60	
100W	100W	200W	200W	400W	400W	750W	750W

168 mm

360 mm = 40 mm (unit width) × 6 + 60 mm (unit width) × 2

* Based on Mitsubishi Electric research as of September 2014.

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 for MR-J4W2-B/MR-J4W3-B as compared to the prior model. Regenerative option is no longer required[1].

*1. Regenerative option may be required depending on the conditions.

Regenerative energy

A-axis motor

Regenerative energy is temporarily stored and used as driving power energy.

Driving power energy

B-axis motor

Driving power energy

C-axis motor

■A-axis motor speed
Deceleration
Time

■B-axis motor speed
Acceleration
Time

■C-axis motor speed
Acceleration
Time

[Reusable energy]

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

* 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.
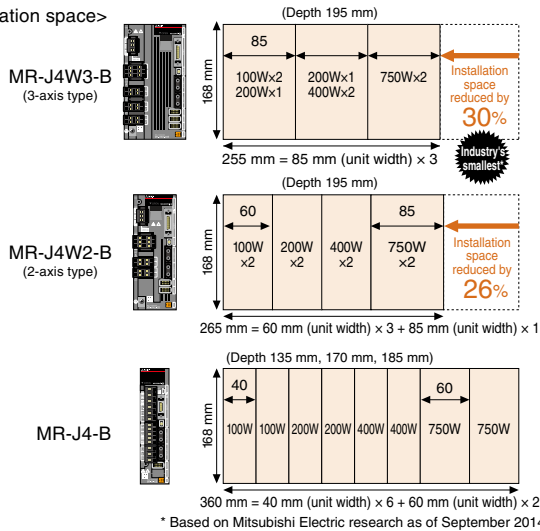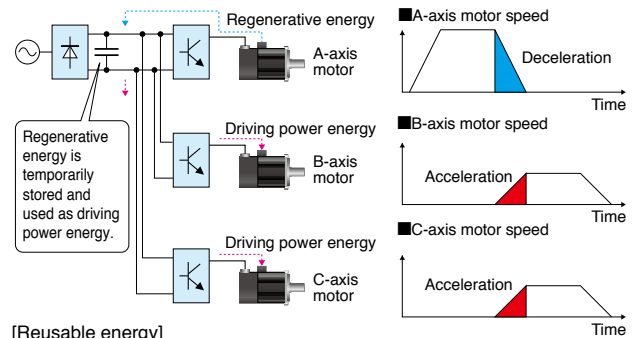
Energy-conservation Achieved by LM-H3 Linear Servo Motor Series

● Reduced motor driving power

LM-H3 has achieved a reduction of 25% in motor driving current due to a new magnetic design with optimized magnet form, contributing to power conservation for machines. The motor coil is lighter as compared to the prior model, which also contributes to saving energy for driving the moving part.

* For 720 N rated linear servo motor.

Reduced by 25%

Motor driving current

LM-H2   LM-H3
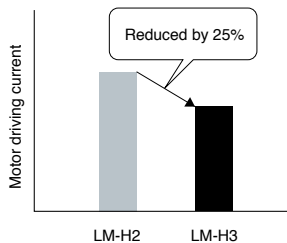
● Space saving

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).

Narrower by 10%

▶▶▶

[LM-H2 series]   [LM-H3 series]
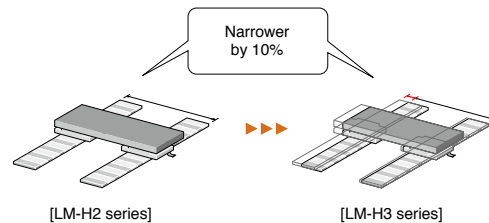
Heritage

● MR-J4-B/MR-J4-A has the same mounting dimensions[1] with MR-J3-B/MR-J3-A. HG rotary servo motor series has the same mounting dimensions[2] and uses the same optional cables for the power, the encoder[3], and the electromagnetic brake as HF series or HC-RP/HC-UP series.

*1. Mounting dimensions are smaller for 200 V 5 kW, 400 V 3.5 kW, 200 V/400 V 11 kW, and 200 V/400 V 15 kW servo amplifiers.
*2. For replacing HA-LP series to HG-JR series, contact your local sales office for more detail.
*3. HG-JR series of 11 kW ,15 kW uses a different encoder cable from HF-JP series.

Same mounting dimensions with MR-J3

Same cables with MR-J3

Servo motor power cable

Same mounting dimensions of servo motor

Encoder cable

MR-J4-B
MR-J4-A

Servo motor
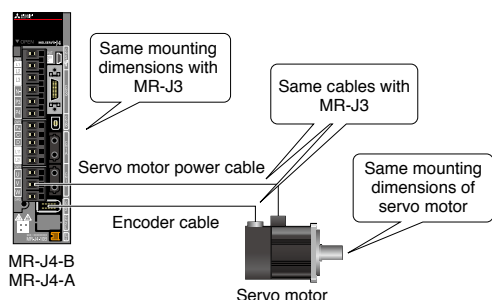
● When not changing the controller to SSCNET III/H controller

* When the SSCNET III compatible products are in the system, the communication speed is 50 Mbps, and the function and the performance are equivalent to those of MR-J3.

SSCNET III compatible controller

MR-J3_-B MR-J4_-B MR-J3_-B MR-J4_-B

SSCNET III
SERVO SYSTEM CONTROLLER NETWORK
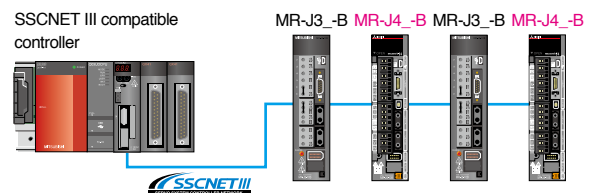
● Parameters are automatically converted by changing MR-J3-B to MR-J4-B with MELSOFT MT Works2

Our total solution for your satisfaction

The servo system controller brings out peak performance and functionality from servo amplifier, rotary servo motor, linear servo motor, and direct drive motor.
Mitsubishi Electric offer total solution to site issues.

Introducing the MELSERVO solutions for problems in production sites.
We offer the optimal solutions for various problems in various production sites.

Vertical Form, Fill & Seal   For food/beverage bag filling and packing
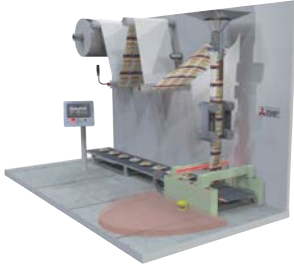
Solution 01	Stabilizing the packing quality **Synchronous Control**
Solution 02	Shorter tact time without increasing shock to a machine **Cam Control**
Solution 03	Creating a safety system **Safety Observation Function**

Rotary Knife   For steel & paper cutting, stamping and labeling
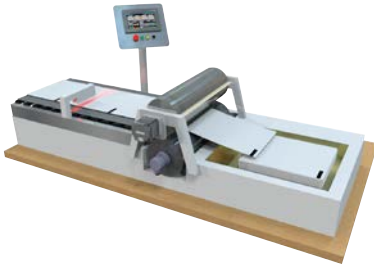
Solution 01	Cam creation on HMI screen **Cam Auto-generation Function**
Solution 02	Cutting the sheet using the registration mark as a reference **Mark Detection Function**

Motion Alignment(X-Y-θ)   For equipment requiring more accurate positioning
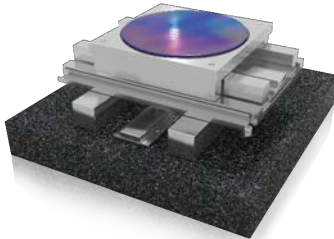
Solution 01	More accurate positioning **COGNEX Vision System**
Solution 02	More precise drive operation **Direct Drive Motor**
Solution 03	Shorter tact time **Target Position Change Function**

Gantry Application   For material handling, automatic assembly and scanning
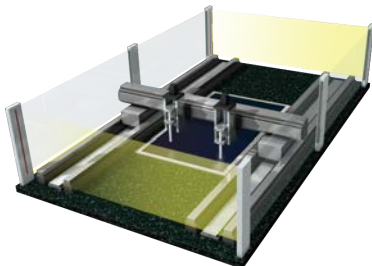
Solution 01	Suppression of the machine vibration **Vibration Suppression Functions**
Solution 02	Simpler multi-head configuration **Linear Servo Motor**
Solution 03	Synchronized movement of axis-1 and axis-2 **Tandem Configuration**

Pick and Place Robot   For material loading/unloading and sealing

Solution 01	Suppression of the machine vibration **Advanced Vibration Suppression Control II**
Solution 02	Simpler setting of the suppression function **Machine Analyzer and Machine Resonance Suppression Filter**
Solution 03	Smaller size machine **3-axis Type Servo Amplifier**

Drive Product

Press-fit Machine — For pressing, bonding, clamping, and cap tightening

| Solution 01 | Pressing of the material with less shock to a machine
Tightening & Press-fit Control |
| Solution 02 | Monitoring of the machine movement
Safety Signal Comparison Function |

Conveyor System Utilizing Safety Observation Function — For safety observation of printing, packing, and other lines
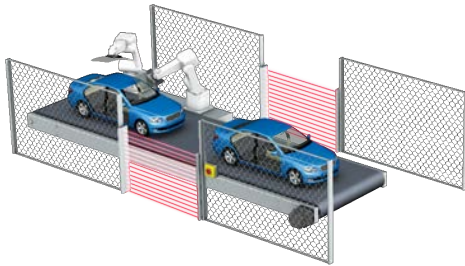
| Solution 01 | Safety measures in case of a person entering in a restricted area
Shut-off Function |
| Solution 02 | Ensuring safe speed for manned assembly line
Speed Monitoring Function (SLS) |

Eco-friendly Conveyors and Product Handling Equipment — For conveyors, Motion alignment, packing, and robots
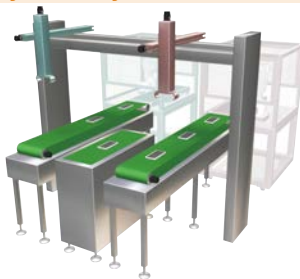
Solution 01	Managing of total power consumption **Power Monitor Function**
Solution 02	Reduction of power consumption **Multi-axis Servo Amplifier**
Solution 03	Minimizing waste of power **Capacity Selection Software**

Film Slitting Machine — For equipment with rollers
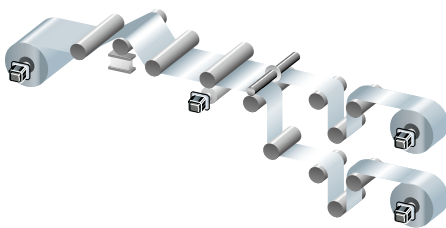
| Solution 01 | Sending film with a constant speed or tension
Speed Control, Torque Control |
| Solution 02 | Utilizing regenerative energy
**PN Bus Voltage Connection +
Power Regeneration Common Converter** |

Screw Tightening Machine — For tightening, pressing, and clamping
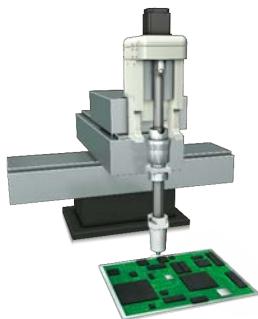
| Solution 01 | Tightening screws without using a torque sensor
Tightening & Press-fit Control |
| Solution 02 | Repeated accuracy in screw tightening operation
Reduced Torque Ripple During Conduction |

Features/Summary
Specifications/Characteristics
Outline Drawings
MR-J4 Series
MR-JE Series

Every production site has unique problems that require unique and innovative solutions. MELSERVO offers the best solutions you have been looking for.

Exceptional Solutions for All of Your Production Needs
Refer to "MELSERVO SOLUTIONS catalog (L(NA)03094)" for details.

MITSUBISHI ELECTRIC
Changes for the Better
Servo Amplifiers & Motors
Servo System Controllers

MELSERVO SOLUTIONS
For your all production needs

Drive Product
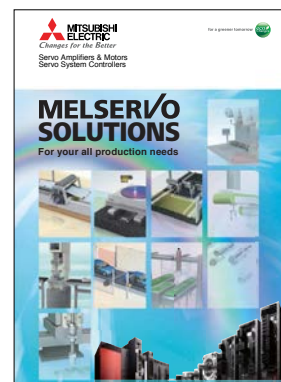
Product Line-up

Servo Amplifier

CC-Link IE Field

MR-J4-GF
CC-Link IE Field Network compatible servo amplifier

The command interface is the CC-Link IE Field Network. This supports point table method positioning control and motion control on Ethernet-based open networks.

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

MR-J4-B
SSCNET III/H compatible servo amplifier

SSCNET III/H is the command I/F. Enables building of a full-synchronization system with the use of a high-speed serial optical communication. Brings peak performance and functionality of the servo system by combining with the servo system controller.

MR-J4-GF-RJ/MR-J4-B-RJ This is a special specification MR-J4-GF/MR-J4-B / MR-J4-A product. MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ are required when using a 4-wire serial or A/B/Z-phase differential output type external encoder in a
MR-J4-A-RJ fully closed loop control or a scale measurement function. Also, MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ are required when using an A/B/Z-phase differential output type external encoder for a linear servo system.

Servo Motor

HG-KR/HG-MR series
Small capacity, low inertia/small capacity, ultra-low inertia
Suitable for general industrial machines/high-frequency operation.

HG-SR series
Medium capacity, medium inertia
Compatible with devices having a large load inertia.
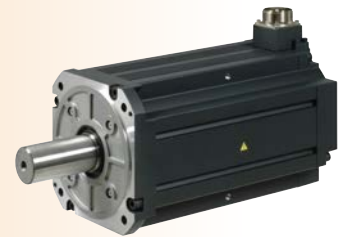
HG-JR series
Medium/large capacity, low inertia
Ideal for high-frequency positioning and high acceleration and deceleration operations.

Linear Servo Motor
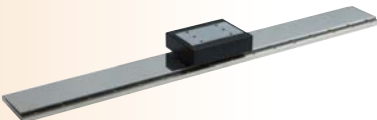
LM-H3 series
Capable of 3 m/s maximum speed. Core type with magnetic attraction saves space and comes with high-rigidity.

LM-F series
Delivers two times more continuous thrust with liquid cooling and reduced in size. A core type with magnetic attraction and high-rigidity.
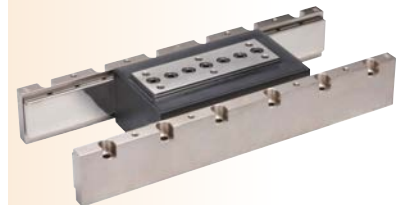
LM-K2 series
An offset type with a core delivers improved thrust density. The magnetic attraction offset structure prolongs service life of the linear guide. Low noise design.

Compatible with various standards around the world   Complies with EN, UL, CSA (c-UL) standards.

Drive Product

Features/
Summary

Specifications/
Characteristics

Outline
Drawings

MR-J4
Series

MR-JE
Series

MR-J4W2-B
SSCNET III/H compatible
2-axis servo amplifier

MR-J4W3-B
SSCNET III/H compatible
3-axis servo amplifier

SSCNET III/H is the command I/F. These multi-axis integrated servo amplifiers can drive multiple servo motors with a single unit, and come with the same high-performance, high-functionality, and ease-of-use of the MR-J4-B. Use less energy, space, wiring, and realize cost reduction.

MR-J4-A
General-purpose interface compatible servo amplifier

Built with a general purpose pulse train and analog voltage input as command I/F. Enables position control by pulse train command and speed/torque control by analog voltage command.

HG-AK series
Ultra-compact servo motor with the flange size of 25 mm ✕ 25 mm is suitable for small machines and machine heads.

HG-RR series
Medium capacity, ultra-low inertia
Suitable for high-frequency operation.

HG-UR series
Medium capacity, flat type
Ideal use for restricted mounting spaces.

Direct Drive Motor

LM-U2 series
A coreless type with no cogging and minimum speed variation. No magnetic attraction prolongs the linear guide service life.

TM-RFM series
Smaller and simplified device rotary drive is suitable for high precision control needs. Realized high-torque density by using the latest magnetic design technology and winding technology. Delivers a very smooth rotation by miniaturizing the torque ripple. Without the need for transmission mechanism component, it can be built with less number of parts.

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.
* For corresponding standards and models, contact your local sales office.

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Product Line-up

Wide selection of power supply capacity lineup are also designed to drive rotary, linear, and direct drive motors.

The standard servo amplifiers are compatible with various controlled drive systems.
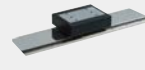
■Servo amplifier   ●: Compatible   –: Not compatible

Servo amplifier (Note 7)	Number of control axes	Power supply specifications	Rated output [kW] (Note 1, 4)	CC-Link IE Field	SSCNET III/H	Pulse train	Analog voltage	RS-422/MODBUS-RTU	Position	Speed	Torque	Positioning function	Fully closed loop control (Note 2)	HG-KR	HG-MR	HG-SR	HG-JR	HG-AK	HG-RR	HG-UR	LM-H3	LM-F	LM-K2	LM-U2	TM-RFM
MR-J4-GF(-RJ) (Note 6)	1 axis	3-phase 200 V AC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7	●	–	–	–	–	●	●	●	●	●	●	●	●	●	–	●	●	●	●	●	●	●
		3-phase 400 V AC	0.6, 1, 2, 3.5, 5, 7	●	–	–	–	–	●	●	●	●	●	–	–	●	●	–	–	–	–	–	–	–	–
MR-J4-B(-RJ)	1 axis	1-phase 100 V AC	0.1, 0.2, 0.4	–	●	–	–	–	●	●	●	–	●	●	●	–	–	–	–	–	●	–	●	●	●
		3-phase 200 V AC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37	–	●	–	–	–	●	●	●	–	●	●	●	●	●	–	●	●	●	●	●	●	●
		3-phase 400 V AC	0.6, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37, 45, 55	–	●	–	–	–	●	●	●	–	●	–	–	●	●	–	–	–	–	●	–	–	–
MR-J4W2-B	2 axes	3-phase 200 V AC	0.2, 0.4, 0.75, 1	–	●	–	–	–	●	●	●	–	●	●	●	●	●	–	●	–	●	–	●	●	–
		48 V DC 24 V DC	0.03	–	●	–	–	–	●	●	●	–	–	–	–	–	–	●	–	–	–	–	–	–	–
MR-J4W3-B	3 axes	3-phase 200 V AC	0.2, 0.4	–	●	–	–	–	●	●	●	–	–	●	●	–	–	–	●	–	●	–	●	●	–
MR-J4-A(-RJ)	1 axis	1-phase 100 V AC	0.1, 0.2, 0.4	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	–	●	–	–	–	–	–	–	●	–	●	●	●
		3-phase 200 V AC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	–	●	●	●	●	–	●	●	●	●	●	●	●
		3-phase 400 V AC	0.6, 1, 2, 3.5, 5, 7, 11, 15, 22, 30, 37, 45, 55	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	–	–	–	●	●	–	–	–	–	●	–	–	–
		48 V DC 24 V DC	0.03	–	–	●	●	● (Note 3)	●	●	●	● (Note 3)	–	–	–	–	–	●	–	–	–	–	–	–	–

Notes: 1. The listed are the rated output of the servo amplifier. For the compatible servo motor capacities, refer to p. 244 to 285 in this catalog.
2. MR-J4-GF/B/A servo amplifier is compatible with two-wire type serial linear encoder. For four-wire type serial and pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ/B-RJ/A-RJ servo amplifier.
3. Only MR-J4-A-RJ is compatible with positioning function and MODBUS®-RTU. MR-J4-03A6-RJ is not compatible with MODBUS®-RTU.
4. Capacity of 30 kW or larger is available with drive unit. One unit of converter unit is required for each drive unit.
5. MR-J4-GF/B/A servo amplifier is compatible with two-wire type and four-wire type serial linear encoders. For pulse train interface (A/B/Z-phase differential output type) linear encoder, use MR-J4-GF-RJ/B-RJ/A-RJ servo amplifier.
6. MR-J4-GF(-RJ) servo amplifiers of 11 kW or larger will be available in the future.
7. Some functions are available only with the servo amplifier with specific versions. Refer to relevant Servo Amplifier Instruction Manual for details.

■Linear servo motor

	Linear servo motor series	Maximum speed [m/s]	Continuous thrust [N]	Maximum thrust [N]	Cooling method	Features	Application examples
Core type	**LM-H3 series**	3.0	9 types 70, 120, 240, 360, 480, 720, 960	175, 300, 600, 900, 1200, 1800, 2400	Natural cooling	Suitable for space-saving. Compact size and high thrust. Maximum speed: 3 m/s.	•Semiconductor mounting systems •Wafer cleaning systems •LCD assembly machines •Material handlings
	LM-F series	2.0	8 types 300, 600, 900, 1200, 1800, 2400, 3000	1800, 3600, 5400, 7200, 10800, 14400, 18000	Natural cooling	Compact size. The integrated liquid-cooling system doubles the continuous thrust.	•Press feeders •NC machine tools •Material handlings
		2.0	8 types 600, 1200, 1800, 2400, 3600, 4800, 6000	1800, 3600, 5400, 7200, 10800, 14400, 18000	Liquid cooling		
	LM-K2 series	2.0	7 types 120, 240, 360, 720, 1200, 1440, 2400	300, 600, 900, 1800, 3000, 3600, 6000	Natural cooling	High thrust density. Magnetic attraction counter-force structure enables longer life of the linear guides and lower audible noise.	•Semiconductor mounting systems •Wafer cleaning systems •LCD assembly machines
Coreless type	**LM-U2 series**	2.0	9 types 50, 75, 100, 150, 225, 400, 600, 800	150, 225, 300, 450, 675, 1600, 2400, 3200	Natural cooling	No cogging and small speed fluctuation. No magnetic attraction force structure extends life of the linear guides.	•Screen printing systems •Scanning exposure systems •Inspection systems •Material handlings

Note: 1. ▢ : For 400 V.

■Rotary servo motor

●: Available –: Not available

Rotary servo motor series		Rated speed (maximum speed) [r/min]	Rated output [kW] (Note 1)	Servo motor type			IP rating (Note 3)	Replaceable series	Features	Application examples
				With electro-magnetic brake (B)	With reducer (G1) (Note 2)	With reducer (G5, G7) (Note 2)				
Small capacity	HG-KR series	3000 (6000)	5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	●	●	IP65	HF-KP series	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
	HG-MR series	3000 (6000)	5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	–	–	IP65	HF-MP series	Ultra-low inertia Well suited for high-throughput operations.	•Inserters •Mounters
Medium capacity	HG-SR series	1000 (1500)	6 types 0.5, 0.85, 1.2, 2.0, 3.0, 4.2	●	–	–	IP67	HF-SP series	Medium inertia This series is available with two rated speeds.	•Material handling systems •Robots •X-Y tables
		2000 (3000)	14 types 0.5, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0 0.5, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0	●	●	●	IP67			
Medium/large capacity	HG-JR series	3000: 0.5 to 5 kW 6000: 0.5 to 5 kW 5000: 7, 9 kW	18 types 0.5, 0.75, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0, 9.0 0.5, 0.75, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0, 9.0	●	–	–	IP67	HF-JP series	Low inertia Well suited for high-throughput and high-acceleration/ deceleration operations.	•Food packaging machines •Printing machines
		1500: 7 to 15 kW 3000: 7 to 15 kW 2500: 22 to 55 kW	14 types 7.0, 11, 15, 22, 30, 37 7.0, 11, 15, 22, 30, 37, 45, 55	● (Note 5)	–	–	IP67/ IP44 (Note 4)	HF-JP HA-LP series		•Injection molding machines •Press machines
		1000: 6 to 12 kW 2000: 6 to 12 kW 1500: 15 to 37 kW	16 types 6.0, 8.0, 12, 15, 20, 25, 30, 37 6.0, 8.0, 12, 15, 20, 25, 30, 37	● (Note 5)	–	–	IP67/ IP44 (Note 4)	HA-LP series		
Ultra-small capacity	HG-AK series	3000 (6000)	3 types 0.01, 0.02, 0.03	●	–	–	IP55	HC-AQ series	Ultra-compact size Suitable for small machines.	•Mounters •Semiconductor manufacturing equipment •Compact robot •Electric component manufacturing machines •Compact actuators •Screw tightening system
Medium capacity	HG-RR series	3000 (4500)	5 types 1.0, 1.5, 2.0, 3.5, 5.0	●	–	–	IP65	HC-RP series	Ultra-low inertia Well suited for high-throughput operations.	•Ultra-high-throughput material handling systems
Medium capacity, flat type	HG-UR series	2000 3000: 0.75 to 2 kW 2500: 3.5, 5 kW	5 types 0.75, 1.5, 2.0, 3.5, 5.0	●	–	–	IP65	HC-UP series	Flat type The flat design makes this unit well suited for situations where the installation space is limited.	•Robots •Food processing machines

Notes: 1. ▭ : For 400 V.
2. G1 for general industrial machines. G5 and G7 for high precision applications.
3. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion. For geared servo motor, IP rating of the reducer portion is equivalent to IP44.
4. For HG-JR1500 r/min series, 15 kW or smaller is rated IP67, and 22 kW or larger is rated IP44. For HG-JR 1000 r/min series, 12 kW or smaller is rated IP67, and 15 kW or lager is rated IP44.
5. The servo motor with electromagnetic brake is not available for HG-JR 1500 r/min series 22 kW or larger, and 1000 r/min series 15 kW or larger.

■Direct drive motor

Direct drive motor series	Motor outer diameter [mm]	Hollow shaft diameter [mm]	Rated speed [r/min]	Maximum speed [r/min]	Rated torque [N·m]	Maximum torque [N·m]	IP rating (Note 1)	Features	Application examples
TM-RFM series	ø130	ø20	200	500	3 types 2, 4, 6	6, 12, 18	IP42	•Suitable for low-speed and high-torque operations. •Smooth operation with less audible noise. •The motor's low profile design contributes to compact construction and a low center of gravity for enhanced machine stability. •Clean room compatible.	•Semiconductor manufacturing devices •Liquid crystal manufacturing devices •Machine tools
	ø180	ø47	200	500	3 types 6, 12, 18	18, 36, 54	IP42		
	ø230	ø62	200	500	3 types 12, 48, 72	36, 144, 216	IP42		
	ø330	ø104	100	200	3 types 40, 120, 240	120, 360, 720	IP42		

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

MELSERVO-J4

● Servo Amplifiers

1-Axis Servo Amplifier Model Designation

| GF | GF-RJ | B | B-RJ | A | A-RJ |

MR - J4 - 10 GF - ☐

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Interface
GF	CC-Link IE Field

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	Power supply
None	3-phase 200 V AC or 1-phase 200 V AC (Note 2)
4	3-phase 400 V AC (Note 3)

Symbol	Special specification
None	Standard
RJ	Fully closed loop control four-wire type/ load-side encoder A/B/Z-phase input compatible/ DC power input type (Note 11)
ED	Without a dynamic brake (Note 1)
RU	MR-J4-_GF_-RJ without a dynamic brake (Note 1)
EB	Special coating specification (3C2) (Note12)
KS	MR-J4-_-RJ with a special coating specification (3C2) (Note12)

MR - J4 - 10 B - ☐

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Interface
B	SSCNET III/H
A	General-purpose

Symbol	Rated output [kW]
03	0.03
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
11K	11
15K	15
22K	22

Symbol	Power supply
None	3-phase 200 V AC or 1-phase 200 V AC (Note 2)
1	1-phase 100 V AC (Note 5)
4	3-phase 400 V AC (Note 3)
6	48 V DC/24 V DC (Note 9)

Symbol	Special specification
None	Standard
RJ (Note 10)	Fully closed loop control four-wire type/ load-side encoder A/B/Z-phase input compatible/ Functional safety unit compatible (Note 7)/ Positioning mode compatible (Note 8)/ DC power input type (Note 11)
RU	MR-J4-_-RJ without a dynamic brake (Note 1)
ED	Without a dynamic brake (Note 1)
PX	Without an enclosed regenerative resistor (Note 4)
RZ	MR-J4-_-RJ without an enclosed regenerative resistor (Note 4)
EG	DC power input type
LL	Pressure control type (Note 6)
EB	Special coating specification (3C2) (Note12)
KS	MR-J4-_-RJ with a special coating specification (3C2) (Note12)

Notes: 1. Dynamic brake which is built in 7 kW or smaller servo amplifiers is removed. 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. Refer to relevant Servo Amplifier Instruction Manual for details.
2. Servo amplifiers of 2 kW or smaller are available for 1-phase 200 V AC.
3. Servo amplifiers of 0.6 kW, and 1 kW or larger are available.
4. Available in 11 kW to 22 kW servo amplifiers. A regenerative resistor (standard accessory) is not enclosed. Refer to relevant Servo Amplifier Instruction Manual for details.
5. Servo amplifiers of 0.4 kW or smaller are available.
6. MR-J4-_B_-LL is available. Contact your local sales office for the pressure control compatible servo amplifiers.
7. When using MR-D30 functional safety unit, use MR-J4-B-RJ servo amplifier with software version B3 or later, or MR-J4-A-RJ servo amplifier with software version B5 or later.
8. The positioning mode is available with MR-J4-A-RJ servo amplifiers. Use MR-J4-A-RJ servo amplifiers with software version B3 or later.
9. Servo amplifiers of 0.03 kW are available for 48 V DC/24 V DC.
10. MR-J4-03A6-RJ is compatible only with positioning mode. It is not compatible with fully closed loop control, load-side encoder A/B/Z-phase input, and the functional safety unit.
11. Only 200 V is available. For MR-J4-B-RJ/MR-J4-A-RJ, servo amplifiers with software version C2 or later are compatible with DC power supply input.
12. The special coating (JIS C60721-3-3/IEC 60721-3-3 classification 3C2) is applied to the circuit board. Refer to relevant Servo Amplifier Instruction Manual for details.

GF MR-J4-GF **GF-RJ** MR-J4-GF-RJ **B** MR-J4-B/MR-J4-DU_B **B-RJ** MR-J4-B-RJ/MR-J4-DU_B-RJ **WB** MR-J4W2-B/MR-J4W3-B
A MR-J4-A/MR-J4-DU_A **A-RJ** MR-J4-A-RJ/MR-J4-DU_A-RJ

Multi-Axis Servo Amplifier Model Designation

WB

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

Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Special specification
None	Standard
ED	Without a dynamic brake [Note 1]
EG	DC power input type
EB	Special coating specification (3C2) [Note4]
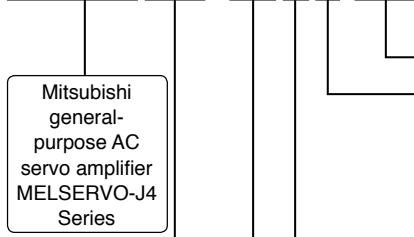
Symbol	Main circuit power supply
None	3-phase 200 V AC or 1-phase 200 V AC [Note 10]
6	48 V DC/24 V DC [Note 3]

Symbol	Interface
B	SSCNET III/H

Symbol	Rated output [kW]		
	A-axis [Note 2]	B-axis [Note 2]	C-axis [Note 2]
0303	0.03	0.03	-
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	Number of axes
W2	2 axes
W3	3 axes

Drive Unit Model Designation [Note 8]

B **B-RJ** **A** **A-RJ**

M R - J 4 - D U 3 0 K B -
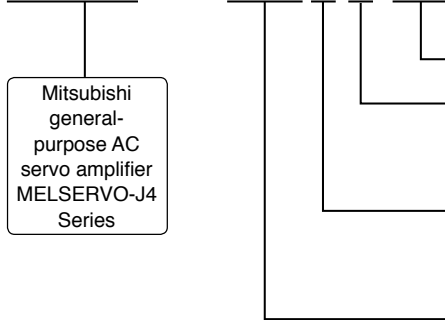
Mitsubishi general-purpose AC servo amplifier MELSERVO-J4 Series

Symbol	Special specification
None	Standard
RJ [Note 6]	Fully closed loop control four-wire type/ load-side encoder A/B/Z-phase input compatible/ Positioning mode compatible [Note 7]
LL	Pressure control type [Note 9]
EB	Special coating specification (3C2) [Note4]
KS	MR-J4-DU_-RJ with a special coating specification (3C2) [Note 4]

Symbol	Power supply
None	3-phase 200 V AC [Note 5]
4	3-phase 400 V AC

Symbol	Interface
B	SSCNET III/H
A	General-purpose

Symbol	Rated output [kW]
30K	30
37K	37
45K	45
55K	55

Converter Unit Model Designation [Note 8]

B **B-RJ** **A** **A-RJ**

M R - C R 5 5 K -

Symbol	Special specification
EB	Special coating specification (3C2) [Note4]
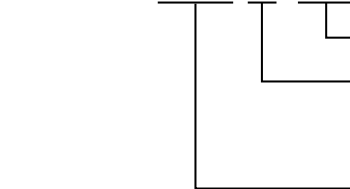
Symbol	Power supply
None	3-phase 200 V AC
4	3-phase 400 V AC

Symbol	Rated output [kW]
55K	55

Notes: 1. Dynamic brake which is built in servo amplifiers is removed. 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. Refer to relevant Servo Amplifier Instruction Manual for details.
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.
3. Servo amplifiers of 0.03 kW are available for 48 V DC/24 V DC.
4. The special coating (JIS C60721-3-3/IEC 60721-3-3 classification 3C2) is applied to the circuit board. Refer to relevant Servo Amplifier Instruction Manual for details.
5. Drive units of 37 kW or smaller are available in 3-phase 200 V AC.
6. MR-D30 functional safety unit is not compatible with the drive unit.
7. Positioning mode is available with MR-J4-DU_A_-RJ drive unit.
8. One unit of converter unit is required for each drive unit.
9. MR-J4-DU_B_-LL is available. Contact your local sales office for the pressure control compatible drive units.
10. Servo amplifiers of 0.75 kW or smaller are available for 1-phase 200 V AC.

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Combinations of 1-Axis Servo Amplifier and Servo Motor

| GF | GF-RJ | B | B-RJ | A | A-RJ |

MR-J4-GF/MR-J4-GF-RJ/MR-J4-B/MR-J4-B-RJ/MR-J4-A/MR-J4-A-RJ (200 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) [Note 1]	Direct drive motor
MR-J4-10GF(-RJ) MR-J4-10B(-RJ) MR-J4-10A(-RJ)	HG-KR053, 13 HG-MR053, 13	-	-
MR-J4-20GF(-RJ) MR-J4-20B(-RJ) MR-J4-20A(-RJ)	HG-KR23 HG-MR23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4-40GF(-RJ) MR-J4-40B(-RJ) MR-J4-40A(-RJ)	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-J4-60GF(-RJ) MR-J4-60B(-RJ) MR-J4-60A(-RJ)	HG-SR51, 52 HG-JR53	LM-U2PBD-15M-1SS0	TM-RFM006C20 TM-RFM006E20
MR-J4-70GF(-RJ) MR-J4-70B(-RJ) MR-J4-70A(-RJ)	HG-KR73 HG-MR73 HG-JR73 HG-UR72	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-J4-100GF(-RJ) MR-J4-100B(-RJ) MR-J4-100A(-RJ)	HG-SR81, 102 HG-JR53 [Note 2, 3], 103	-	TM-RFM018E20
MR-J4-200GF(-RJ) MR-J4-200B(-RJ) MR-J4-200A(-RJ)	HG-SR121, 201, 152, 202 HG-JR73 [Note 2, 3], 103 [Note 2, 3], 153, 203 HG-RR103, 153 HG-UR152	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-J4-350GF(-RJ) MR-J4-350B(-RJ) MR-J4-350A(-RJ)	HG-SR301, 352 HG-JR153 [Note 2], 203 [Note 2], 353 HG-RR203 HG-UR202	LM-H3P7D-96P-ASS0 LM-K2P2C-07M-1SS1 LM-K2P3C-14M-1SS1 LM-U2P2C-60M-2SS0	TM-RFM048G20 TM-RFM072G20 TM-RFM120J10
MR-J4-500GF(-RJ) MR-J4-500B(-RJ) MR-J4-500A(-RJ)	HG-SR421, 502 HG-JR353 [Note 2], 503 HG-RR353, 503 HG-UR352, 502	LM-FP2D-12M-1SS0 LM-FP4B-12M-1SS0 LM-K2P2E-12M-1SS1 LM-K2P3E-24M-1SS1 LM-U2P2D-80M-2SS0	TM-RFM240J10
MR-J4-700GF(-RJ) MR-J4-700B(-RJ) MR-J4-700A(-RJ)	HG-SR702 HG-JR503 [Note 2], 703, 601, 701M	LM-FP2F-18M-1SS0 LM-FP4D-24M-1SS0	-
MR-J4-11KB(-RJ) MR-J4-11KA(-RJ)	HG-JR903, 801, 12K1, 11K1M	LM-FP4F-36M-1SS0	-
MR-J4-15KB(-RJ) MR-J4-15KA(-RJ)	HG-JR15K1, 15K1M	LM-FP4H-48M-1SS0	-
MR-J4-22KB(-RJ) MR-J4-22KA(-RJ)	HG-JR20K1, 25K1, 22K1M	-	-

MR-J4-DU_B/MR-J4-DU_B-RJ/MR-J4-DU_A/MR-J4-DU_A-RJ (200 V)

Drive unit	Rotary servo motor	Linear servo motor (primary side)	Direct drive motor
MR-J4-DU30KB(-RJ) MR-J4-DU30KA(-RJ)	HG-JR30K1 HG-JR30K1M	-	-
MR-J4-DU37KB(-RJ) MR-J4-DU37KA(-RJ)	HG-JR37K1 HG-JR37K1M	-	-

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.
2. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.
3. When 1-phase 200 V AC input is used, increasing the maximum torque to 400% is not possible with HG-JR servo motor series.

Combinations of 1-Axis Servo Amplifier and Servo Motor

`GF` `GF-RJ` `B` `B-RJ` `A` `A-RJ`

MR-J4-B1/MR-J4-B1-RJ/MR-J4-A1/MR-J4-A1-RJ (100 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4-10B1(-RJ) MR-J4-10A1(-RJ)	HG-KR053, 13 HG-MR053, 13	-	-
MR-J4-20B1(-RJ) MR-J4-20A1(-RJ)	HG-KR23 HG-MR23	LM-U2PAB-05M-0SS0 LM-U2PBB-07M-1SS0	TM-RFM002C20
MR-J4-40B1(-RJ) MR-J4-40A1(-RJ)	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-GF4/MR-J4-GF4-RJ/MR-J4-B4/MR-J4-B4-RJ/MR-J4-A4/MR-J4-A4-RJ (400 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side) (Note 1)	Direct drive motor
MR-J4-60GF4(-RJ) MR-J4-60B4(-RJ) MR-J4-60A4(-RJ)	HG-SR524 HG-JR534	-	-
MR-J4-100GF4(-RJ) MR-J4-100B4(-RJ) MR-J4-100A4(-RJ)	HG-SR1024 HG-JR534 (Note 2), 734, 1034	-	-
MR-J4-200GF4(-RJ) MR-J4-200B4(-RJ) MR-J4-200A4(-RJ)	HG-SR1524, 2024 HG-JR734 (Note 2), 1034 (Note 2), 1534, 2034	-	-
MR-J4-350GF4(-RJ) MR-J4-350B4(-RJ) MR-J4-350A4(-RJ)	HG-SR3524 HG-JR1534 (Note 2), 2034 (Note 2), 3534	-	-
MR-J4-500GF4(-RJ) MR-J4-500B4(-RJ) MR-J4-500A4(-RJ)	HG-SR5024 HG-JR3534 (Note 2), 5034	-	-
MR-J4-700GF4(-RJ) MR-J4-700B4(-RJ) MR-J4-700A4(-RJ)	HG-SR7024 HG-JR5034 (Note 2), 7034, 6014, 701M4	-	-
MR-J4-11KB4(-RJ) MR-J4-11KA4(-RJ)	HG-JR9034, 8014, 12K14, 11K1M4	-	-
MR-J4-15KB4(-RJ) MR-J4-15KA4(-RJ)	HG-JR15K14, 15K1M4	-	-
MR-J4-22KB4(-RJ) MR-J4-22KA4(-RJ)	HG-JR20K14, 25K14, 22K1M4	LM-FP5H-60M-1SS0	-

MR-J4-DU_B4/MR-J4-DU_B4-RJ/MR-J4-DU_A4/MR-J4-DU_A4-RJ (400 V)

Drive unit	Rotary servo motor	Linear servo motor (primary side)	Direct drive motor
MR-J4-DU30KB4(-RJ) MR-J4-DU30KA4(-RJ)	HG-JR30K14 HG-JR30K1M4	-	-
MR-J4-DU37KB4(-RJ) MR-J4-DU37KA4(-RJ)	HG-JR37K14 HG-JR37K1M4	-	-
MR-J4-DU45KB4(-RJ) MR-J4-DU45KA4(-RJ)	HG-JR45K1M4	-	-
MR-J4-DU55KB4(-RJ) MR-J4-DU55KA4(-RJ)	HG-JR55K1M4	-	-

MR-J4-03A6 (48 V/24 V)

Servo amplifier	Rotary servo motor	Linear servo motor (primary side)	Direct drive motor
MR-J4-03A6(-RJ)	HG-AK0136, 0236, 0336	-	-

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.
2. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.

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MR-J4
Series

MR-JE
Series

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Combinations of 1-Axis Servo Amplifier and Servo Motor with Functional Safety `B-RJ` `A-RJ`

The safety observation function can be expanded with a combination of the servo motor with functional safety, MR-J4-B-RJ/MR-J4-A-RJ servo amplifiers, and MR-D30 functional safety unit.

MR-J4-B-RJ/MR-J4-A-RJ (200 V)

Servo amplifier	Servo motor with functional safety
MR-J4-10B-RJ MR-J4-10A-RJ	HG-KR053W0C, 13W0C
MR-J4-20B-RJ MR-J4-20A-RJ	HG-KR23W0C
MR-J4-40B-RJ MR-J4-40A-RJ	HG-KR43W0C
MR-J4-60B-RJ MR-J4-60A-RJ	HG-SR51W0C, 52W0C HG-JR53W0C
MR-J4-70B-RJ MR-J4-70A-RJ	HG-KR73W0C HG-JR73W0C
MR-J4-100B-RJ MR-J4-100A-RJ	HG-SR81W0C, 102W0C HG-JR53W0C [Note 1], 103W0C
MR-J4-200B-RJ MR-J4-200A-RJ	HG-SR121W0C, 201W0C, 152W0C, 202W0C HG-JR73W0C [Note 1], 103W0C [Note 1], 153W0C, 203W0C
MR-J4-350B-RJ MR-J4-350A-RJ	HG-SR301W0C, 352W0C HG-JR153W0C [Note 1], 203W0C [Note 1], 353W0C
MR-J4-500B-RJ MR-J4-500A-RJ	HG-SR421W0C, 502W0C HG-JR353W0C [Note 1], 503W0C
MR-J4-700B-RJ MR-J4-700A-RJ	HG-SR702W0C HG-JR503W0C [Note 1], 703W0C, 701MW0C
MR-J4-11KB-RJ MR-J4-11KA-RJ	HG-JR903W0C, 11K1MW0C
MR-J4-15KB-RJ MR-J4-15KA-RJ	HG-JR15K1MW0C
MR-J4-22KB-RJ MR-J4-22KA-RJ	HG-JR22K1MW0C

MR-J4-B1-RJ/MR-J4-A1-RJ (100 V)

Servo amplifier	Servo motor with functional safety
MR-J4-10B1-RJ MR-J4-10A1-RJ	HG-KR053W0C, 13W0C
MR-J4-20B1-RJ MR-J4-20A1-RJ	HG-KR23W0C
MR-J4-40B1-RJ MR-J4-40A1-RJ	HG-KR43W0C

MR-J4-B4-RJ/MR-J4-A4-RJ (400 V)

Servo amplifier	Servo motor with functional safety
MR-J4-60B4-RJ MR-J4-60A4-RJ	HG-SR524W0C HG-JR534W0C
MR-J4-100B4-RJ MR-J4-100A4-RJ	HG-SR1024W0C HG-JR534W0C [Note 1], 734W0C, 1034W0C
MR-J4-200B4-RJ MR-J4-200A4-RJ	HG-SR1524W0C, 2024W0C HG-JR734W0C [Note 1], 1034W0C [Note 1], 1534W0C, 2034W0C
MR-J4-350B4-RJ MR-J4-350A4-RJ	HG-SR3524W0C HG-JR1534W0C [Note 1], 2034W0C [Note 1], 3534W0C
MR-J4-500B4-RJ MR-J4-500A4-RJ	HG-SR5024W0C HG-JR3534W0C [Note 1], 5034W0C
MR-J4-700B4-RJ MR-J4-700A4-RJ	HG-SR7024W0C HG-JR5034W0C [Note 1], 7034W0C, 701M4W0C
MR-J4-11KB4-RJ MR-J4-11KA4-RJ	HG-JR9034W0C, 11K1M4W0C
MR-J4-15KB4-RJ MR-J4-15KA4-RJ	HG-JR15K1M4W0C
MR-J4-22KB4-RJ MR-J4-22KA4-RJ	HG-JR22K1M4W0C

Notes: 1. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.

Drive Product

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MR-J4 Series

MR-JE Series

Combinations of Multi-Axis Servo Amplifier and Servo Motors [WB]

MR-J4W2-B

Any combination of the servo motors with different series and capacities is possible as long as the servo motors are compatible with the 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 HG-JR53, 73 HG-UR72	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 HG-JR53 (Note 2), 73, 103 HG-UR72	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
MR-J4W2-0303B6	HG-AK0136, 0236, 0336	-	-

MR-J4W3-B

Any combination of the servo motors with different series and capacities is possible as long as the servo motors are compatible with the 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.
2. The maximum torque can be increased from 300% to 400% of the rated torque with this combination.

Drive Product

MR-J4-GF/MR-J4-GF-RJ Connections with Peripheral Equipment (Note 1)

GF   GF-RJ

Peripheral equipment is connected to MR-J4-GF/MR-J4-GF-RJ 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.

Display (Note 2)
Servo amplifier status and alarm number are displayed.

Station number setting part (Note 2)
Select the station with the station number selection rotary switches (SW2 and SW3).

Molded-case circuit breaker (MCCB)
This protects the power supply line.

USB communication connector (CN5)
Connect with a personal computer, and use MR Configurator2. Parameter setting and monitoring are possible. Use an optional USB cable (MR-J3USBCBL3M).

Magnetic contactor (MC)
This turns off the power to the servo amplifier when an alarm is triggered.

STO I/O signal connector (CN8)
Connect MR-J3-D05 safety logic unit or an external safety relay. Use an optional STO cable (MR-D05UDL3M-B).

Power factor improving DC reactor (optional)
This boosts the power factor of servo amplifier and reduces the power supply capacity.

I/O signal connector (CN3)
Connect the forced stop input, the in-position, the electromagnetic brake interlock, and the malfunction signals.

Regenerative option (optional)

Servo motor power cable (optional)

Ethernet cable (Note 3)

Charge lamp
The lamp lights when the main circuit power supply is charged.

CC-Link IE Field Network Simple Motion module

RD77GF   QD77GF

Encoder connector (CN2)
Connect the servo motor encoder using an optional cable or a connector set.

Load-side encoder connector (CN2L)
CN2L connector is available only on MR-J4-GF-RJ servo amplifier.

Ethernet cable (Note 3)

Battery connector (CN4)
Connect MR-BAT6V1SET-A battery when configuring absolute position detection system.

Battery

Encoder cable (optional)

CC-Link IE Field Network communication connector (CN10A/CN10B)
Connect to a CC-Link IE Field Network compatible device.

Servo motor
(The picture is that of HG-KR053.)

Notes: 1. The connection with the peripheral equipment is an example for MR-J4-350GF/MR-J4-350GF-RJ or smaller servo amplifiers. Refer to "MR-J4-_GF Servo Amplifier Instruction Manual (Motion Mode)" for the actual connections.
2. This picture shows when the display cover is open.
3. For specifications of the Ethernet cable, refer to "Ethernet Cable Specifications" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.

Drive Product

MR-J4-GF/MR-J4-GF-RJ (CC-Link IE Field Network Interface) Specifications (200 V) GF GF-RJ

Servo amplifier model MR-J4-_(-RJ)			10GF	20GF	40GF	60GF	70GF	100GF	200GF	350GF	500GF	700GF
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 input	Voltage/ frequency (Note 1)	AC input	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz					3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 10)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz		
		DC input (Note 12)	283 V DC to 340 V DC									
	Rated current (Note 9) [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	AC input	3-phase or 1-phase 170 V AC to 264 V AC					3-phase or 1-phase 170 V AC to 264 V AC (Note 10)		3-phase 170 V AC to 264 V AC		
		DC input (Note 12)	241 V DC to 374 V DC									
	Permissible frequency fluctuation		±5% maximum									
Control circuit power supply input	Voltage/ frequency	AC input	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz									
		DC input (Note 12)	283 V DC to 340 V DC									
	Rated current [A]		0.2							0.3		
	Permissible voltage fluctuation	AC input	1-phase 170 V AC to 264 V AC									
		DC input (Note 12)	241 V DC to 374 V DC									
	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 signals))									
Control method			Sine-wave PWM control/current control method									
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3) [W]		-	10	10	10	20	20	100	100	130	170
Dynamic brake			Built-in (Note 4)									
CC-Link IE Field communication cycle (Note 14)			0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms									
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)									
Encoder output pulse			Compatible (A/B/Z-phase pulse)									
Analog monitor			2 channels									
Positioning mode			Point table method									
Fully closed loop control	MR-J4-GF		Two-wire type communication method									
	MR-J4-GF-RJ		Two-wire/four-wire type communication method									
Load-side encoder interface	MR-J4-GF		Mitsubishi high-speed serial communication									
	MR-J4-GF-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal									
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, scale measurement function, super trace control, lost motion compensation									
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									

Drive Product

MR-J4-GF/MR-J4-GF-RJ (CC-Link IE Field Network Interface) Specifications (200 V)   `GF` `GF-RJ`

Servo amplifier model MR-J4-_(-RJ)		10GF	20GF	40GF	60GF	70GF	100GF	200GF	350GF	500GF	700GF
Functional safety		STO (IEC/EN 61800-5-2)									
Safety performance	Standards certified by CB (Note 13)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2									
	Response performance	8 ms or less (STO input OFF → energy shut-off)									
	Test pulse input (STO) (Note 7)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum									
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)									
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]									
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4×10^{-9} [1/h]									
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.									
Structure (IP rating)		Natural cooling, open (IP20)				Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)	
Close mounting	3-phase power input	Possible (Note 6)								Not possible	
	1-phase power input	Possible (Note 6)				Not possible		-			
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)									
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)									
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust									
	Altitude	2000 m or less above sea level (Note 11)									
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)									
Mass [kg]		1.0	1.0	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 continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_GF_(-RJ) Servo Amplifier Instruction Manual (Motion Mode)" 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 the servo amplifiers with 75% or less of the effective load ratio.
7. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
8. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
9. This value is applicable when a 3-phase power supply is used.
10. Use the servo amplifier with 75% or less of the effective load ratio when a 1-phase 200 V AC to 240 V AC power supply is used.
11. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
12. MR-J4-_GF-RJ servo amplifiers are available for DC power input. For a connection example of power circuit with DC input, refer to relevant Servo Amplifier Instruction Manual.
13. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.
14. The command communication cycle depends on the controller specifications and the number of axes connected.

Drive Product

MR-J4-GF4/MR-J4-GF4-RJ (CC-Link IE Field Network Interface) Specifications (400 V) `GF` `GF-RJ`

Servo amplifier model MR-J4-_(-RJ)			60GF4	100GF4	200GF4	350GF4	500GF4	700GF4
Output	Rated voltage		3-phase 323 V AC					
	Rated current	[A]	1.5	2.8	5.4	8.6	14.0	17.0
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz					
	Rated current	[A]	1.4	2.5	5.1	7.9	10.8	14.4
	Permissible voltage fluctuation		3-phase 323 V AC to 528 V AC					
	Permissible frequency fluctuation		±5% maximum					
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz					
	Rated current	[A]	0.1			0.2		
	Permissible voltage fluctuation		1-phase 323 V AC to 528 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 signals))					
Control method			Sine-wave PWM control/current control method					
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3)	[W]	15	15	100	100	130 (Note 7)	170 (Note 7)
Dynamic brake			Built-in (Note 4)					
CC-Link IE Field communication cycle (Note 10)			0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms					
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)					
Encoder output pulse			Compatible (A/B/Z-phase pulse)					
Analog monitor			2 channels					
Positioning mode			Point table method					
Fully closed loop control	MR-J4-GF4		Two-wire type communication method					
	MR-J4-GF4-RJ		Two-wire/four-wire type communication method					
Load-side encoder interface	MR-J4-GF4		Mitsubishi high-speed serial communication					
	MR-J4-GF4-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal					
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, scale measurement function, super trace control, lost motion compensation					
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					
Functional safety			STO (IEC/EN 61800-5-2)					
Safety performance	Standards certified by CB (Note 9)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2					
	Response performance		8 ms or less (STO input OFF → energy shut-off)					
	Test pulse input (STO) (Note 6)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum					
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)					
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]					
	Probability of dangerous Failure per Hour (PFH)		$PFH = 6.4 \times 10^{-9}$ [1/h]					
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Structure (IP rating)			Natural cooling, open (IP20)		Force cooling, open (IP20)		Force cooling, open (IP20) (Note 5)	
Close mounting			Not possible					
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)					
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Altitude		2000 m or less above sea level (Note 8)					
	Vibration resistance		5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)					
Mass		[kg]	1.7	1.7	2.1	3.6	4.3	6.5

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

MR-J4-GF4/MR-J4-GF4-RJ (CC-Link IE Field Network interface) Specifications (400 V)　GF　GF-RJ

Notes: 1. Rated output and speed of a rotary servo motor; and continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_GF_(-RJ) Servo Amplifier Instruction Manual (Motion Mode)" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Terminal blocks are excluded.
6. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
7. The servo amplifier built-in regenerative resistor is compatible with the maximum torque deceleration when the servo motor is used within the rated speed and the recommended load to motor inertia ratio. Contact your local sales office if the operating motor speed or the load to motor inertia ratio exceeds the rated speed or the recommended ratio.
8. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
9. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.
10. The command communication cycle depends on the controller specifications and the number of axes connected.

Drive Product

MR-J4-GF/MR-J4-GF-RJ Dimensions
`GF` `GF-RJ`

● MR-J4-10GF, MR-J4-10GF-RJ
● MR-J4-20GF, MR-J4-20GF-RJ
● MR-J4-40GF, MR-J4-40GF-RJ
● MR-J4-60GF, MR-J4-60GF-RJ

Terminal arrangement

CNP1	L1
	L2
	L3
	N-
	P3
	P4

PE — Screw size: M4
Mounting screw size: M5

CNP2	P+
	C
	D
	L11
	L21

CNP3	U
	V
	W
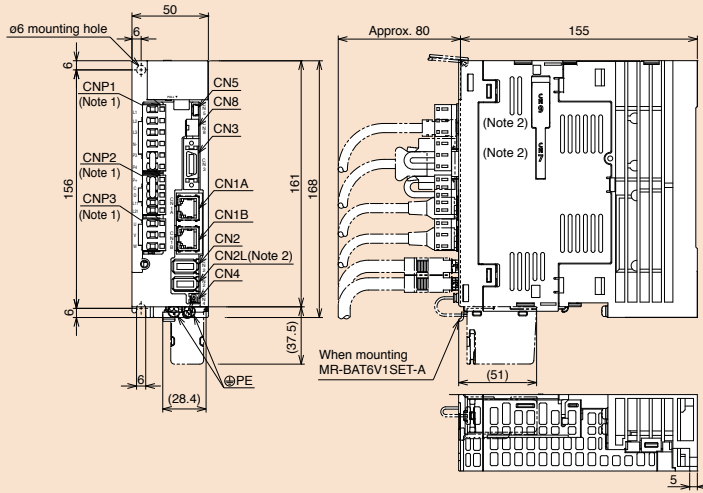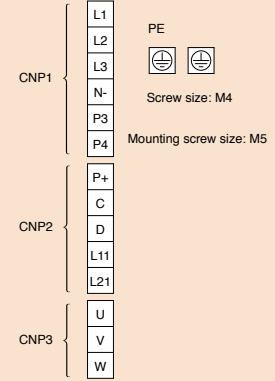
[Unit: mm]

● MR-J4-70GF, MR-J4-70GF-RJ
● MR-J4-100GF, MR-J4-100GF-RJ

Terminal arrangement

CNP1	L1
	L2
	L3
	N-
	P3
	P4

PE — Screw size: M4
Mounting screw size: M5

CNP2	P+
	C
	D
	L11
	L21

CNP3	U
	V
	W

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
　　　 2. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

MR-J4-GF/MR-J4-GF-RJ Dimensions   **GF** **GF-RJ**

● MR-J4-60GF4, MR-J4-60GF4-RJ
● MR-J4-100GF4, MR-J4-100GF4-RJ

Terminal arrangement

CNP1: N-, L1, L2, L3, P3, P4
PE — Screw size: M4
Mounting screw size: M5
CNP2: P+, C, D, L11, L21
CNP3: U, V, W
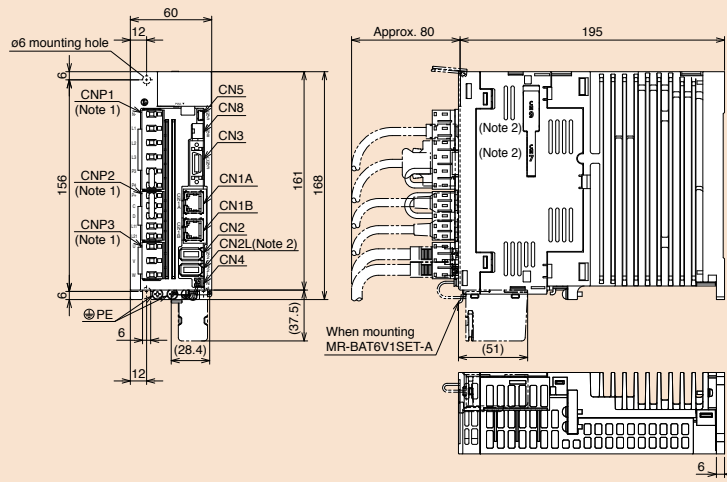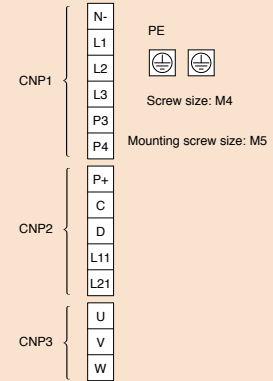
[Unit: mm]

● MR-J4-200GF, MR-J4-200GF-RJ

Terminal arrangement

CNP1: L1, L2, L3, N-, P3, P4
PE — Screw size: M4
Mounting screw size: M5
CNP2: P+, C, D, L11, L21
CNP3: U, V, W
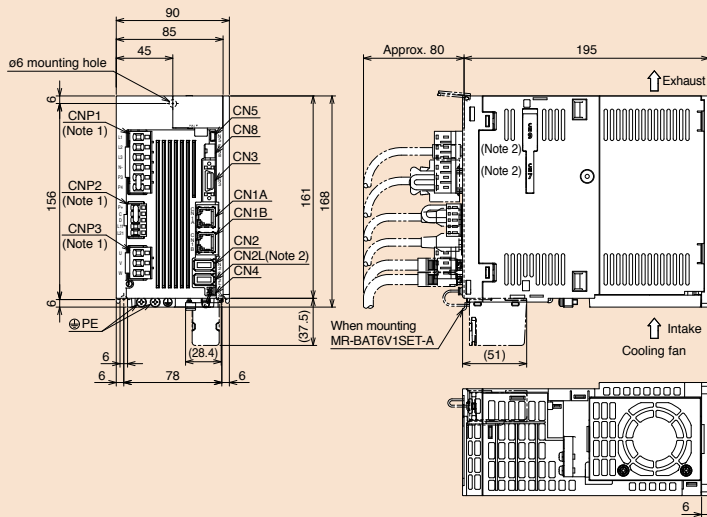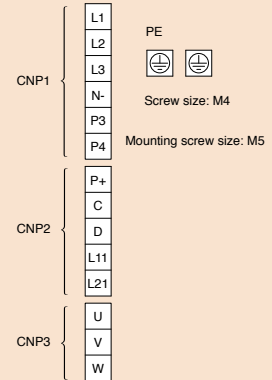
[Unit: mm]

● MR-J4-200GF4, MR-J4-200GF4-RJ

Terminal arrangement

CNP1: N-, L1, L2, L3, P3, P4
PE — Screw size: M4
Mounting screw size: M5
CNP2: P+, C, D, L11, L21
CNP3: U, V, W

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

Drive Product

MR-J4-GF/MR-J4-GF-RJ Dimensions   `GF` `GF-RJ`

● MR-J4-350GF, MR-J4-350GF-RJ

Terminal arrangement

CNP1: L1, L2, L3, N-, P3, P4
CNP2: P+, C, D, L11, L21
CNP3: U, V, W
PE
Screw size: M4
Mounting screw size: M5
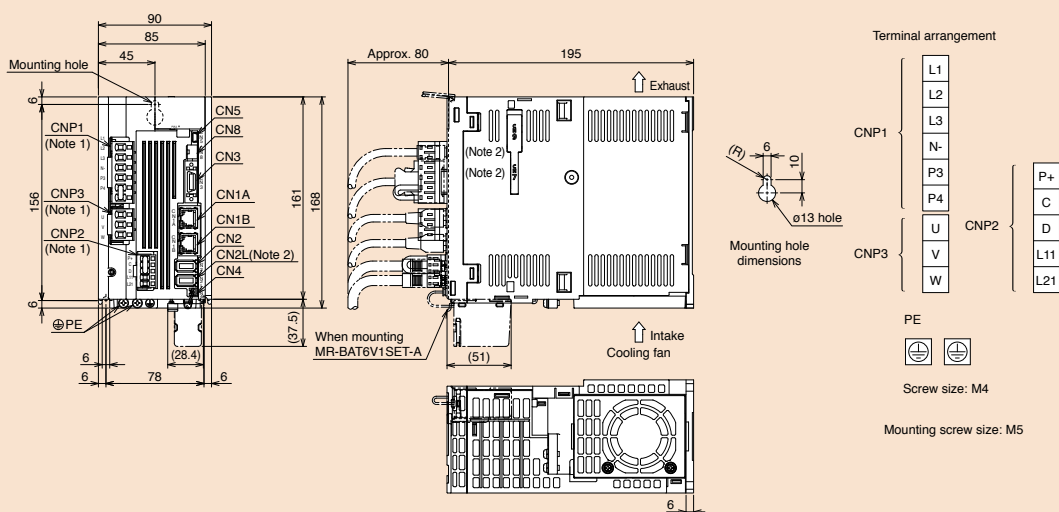
[Unit: mm]

● MR-J4-350GF4, MR-J4-350GF4-RJ

Terminal arrangement

CNP1: N-, L1, L2, L3, P3, P4
PE — Screw size: M4 — Mounting screw size: M5
CNP2: P+, C, D, L11, L21
CNP3: U, V, W
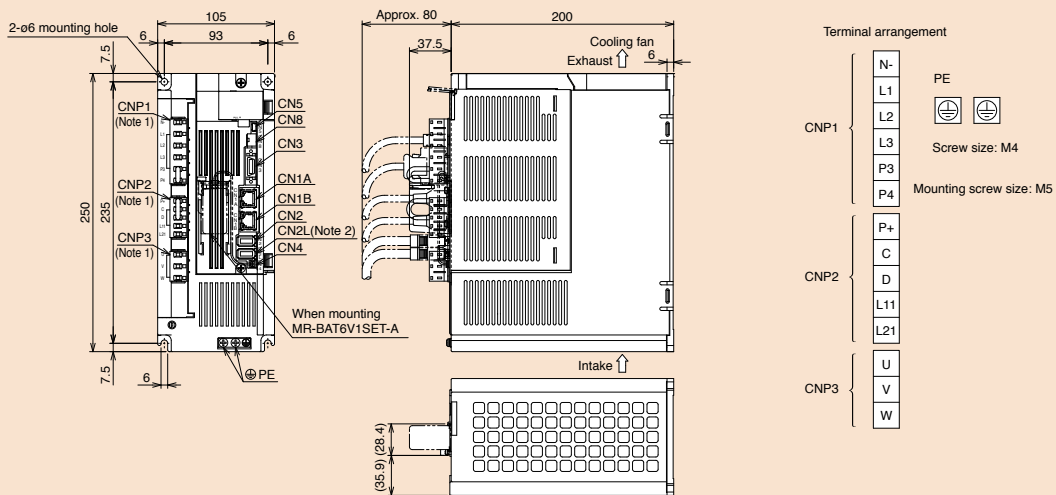
[Unit: mm]

● MR-J4-500GF, MR-J4-500GF-RJ
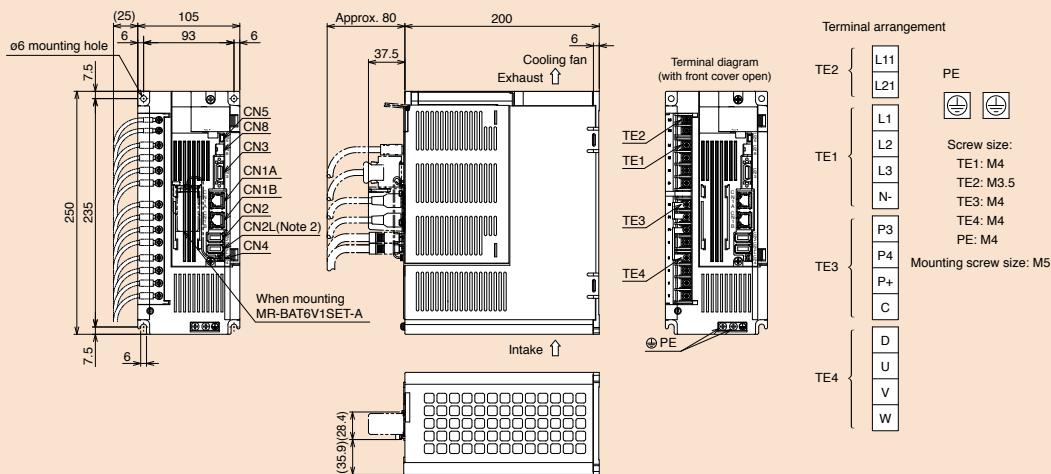
Terminal arrangement

TE2: L11, L21
TE1: L1, L2, L3, N-
TE3: P3, P4, P+, C
TE4: D, U, V, W
PE
Screw size: TE1: M4, TE2: M3.5, TE3: M4, TE4: M4, PE: M4
Mounting screw size: M5

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

MR-J4-GF/MR-J4-GF-RJ Dimensions

GF **GF-RJ**

● MR-J4-500GF4, MR-J4-500GF4-RJ

130
118
6
2-ø6 mounting hole
7.5
CN5
CN8
CN3
CN1A
CN1B
CN2
CN2L(Note 1)
CN4
250
235
When mounting MR-BAT6V1SET-A
7.5

Approx. 80
200
37.5
Cooling fan
Exhaust
6
Intake
(28.4)
(60.9)

Terminal diagram
(with front cover open)
TE2
TE1
TE3
PE
Built-in regenerative resistor lead terminal fixing screw

Screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4
Mounting screw size: M5

Terminal arrangement

TE2			TE3		
L11	L21		N-	P3	P4

TE1							
L1	L2	L3	P+	C	U	V	W

PE
⊕ ⊕

[Unit: mm]

● MR-J4-700GF, MR-J4-700GF-RJ
● MR-J4-700GF4, MR-J4-700GF4-RJ
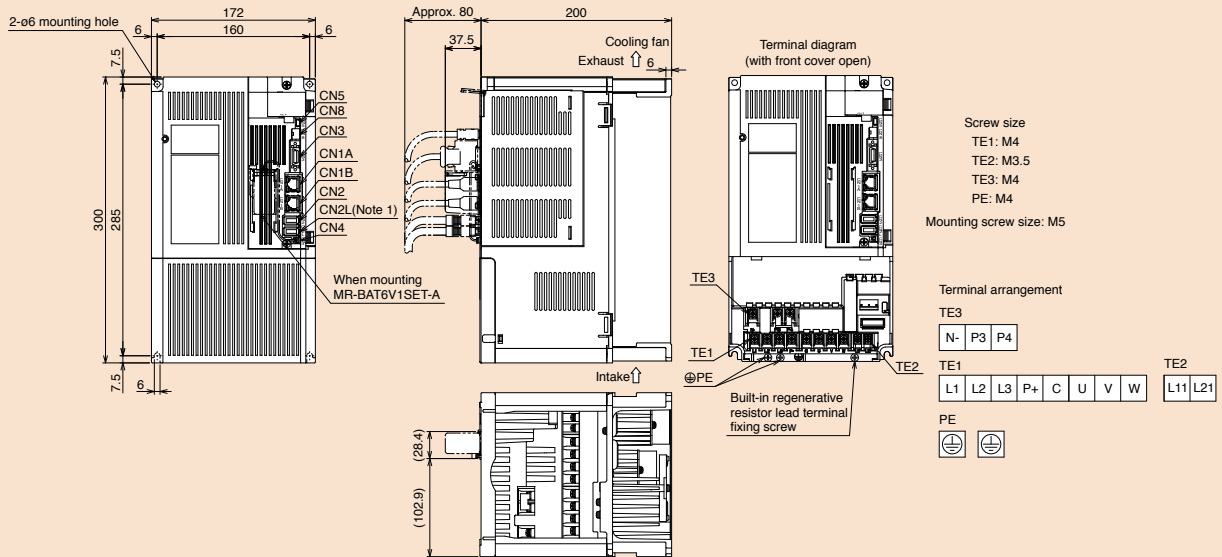
172
160
6
6
2-ø6 mounting hole
7.5
CN5
CN8
CN3
CN1A
CN1B
CN2
CN2L(Note 1)
CN4
300
285
When mounting MR-BAT6V1SET-A
7.5
6

Approx. 80
200
37.5
Cooling fan
Exhaust
6
Intake
(28.4)
(102.9)

Terminal diagram
(with front cover open)
TE3
TE1
PE
TE2
Built-in regenerative resistor lead terminal fixing screw

Screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4
Mounting screw size: M5

Terminal arrangement

TE3		
N-	P3	P4

TE1									TE2	
L1	L2	L3	P+	C	U	V	W		L11	L21

PE
⊕ ⊕

[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-GF servo amplifier.

Drive Product

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

Peripheral equipment is connected to MR-J4-B/MR-J4-B-RJ 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.

Molded-case circuit breaker (MCCB)
This protects the power supply line.

Magnetic contactor (MC)
This turns off the power to the servo amplifier when an alarm is triggered.

Power factor improving DC reactor (optional)
This boosts the power factor of servo amplifier and reduces the power supply capacity.

Regenerative option (optional)

Servo motor power cable (optional)

Charge lamp
The lamp lights when the main circuit power supply is charged.

Encoder connector (CN2)
Connect the servo motor encoder using an optional cable or a connector set.

Load-side encoder connector (CN2L)
CN2L connector is available only on MR-J4-B-RJ servo amplifier.

Battery connector (CN4)
Connect MR-BAT6V1SET battery when configuring absolute position detection system.

Encoder cable (optional)

Servo motor
(The picture is that of HG-KR053.)

Display (Note 2)
Servo amplifier status and alarm number are displayed.

Axis setting part (Note 2)
Select an axis with the axis selection rotary switch (SW1) and auxiliary axis number setting switches (SW2-3 and SW2-4).

USB communication connector (CN5)
Connect with a personal computer, and use MR Configurator2. Parameter setting and monitoring are possible. Use an optional USB cable (MR-J3USBCBL3M).

I/O signal connector (CN3)
Connect the forced stop input, the in-position, the electromagnetic brake interlock, and the malfunction signals.

STO I/O signal connector (CN8)
Connect MR-J3-D05 safety logic unit or an external safety relay. Use an optional STO cable (MR-D05UDL3M-B).

SSCNET III cable (optional)

SSCNET III/H compatible servo system controller
R32MTCPU/R16MTCPU Q173DSCPU/Q172DSCPU   Q170MSCPU   RD77MS/QD77MS
LD77MS

SSCNET III cable (optional)

SSCNET III/H connector (CN1A)
Connect the servo system controller or the previous servo amplifier axis.

SSCNET III/H connector (CN1B)
Connect the next servo amplifier axis. Be sure to attach a cap to CN1B connector of the final axis.

Battery

Notes: 1. The connection with the peripheral equipment is an example for MR-J4-350B/MR-J4-350B-RJ or smaller servo amplifiers. Refer to "MR-J4-_B_(-RJ) Servo Amplifier Instruction Manual" for the actual connections.
2. This picture shows when the display cover is open.

MR-J4-B(1)/MR-J4-B(1)-RJ (SSCNET III/H Interface) Specifications (200 V/100 V) — B | B-RJ

Servo amplifier model MR-J4-_(-RJ)			10B	20B	40B	60B	70B	100B	200B	350B	500B	700B	11KB	15KB	22KB	10B1	20B1	40B1
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	68.0	87.0	126.0	1.1	1.5	2.8
Main circuit power supply input	Voltage/ frequency (Note 1)	AC input	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz					3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 17)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz						1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current (Note 15) [A]		0.9	1.5	2.6	3.2 (Note 8)	3.8	5.0	10.5	16.0	21.7	28.9	46.0	64.0	95.0	3.0	5.0	9.0
	Permissible voltage fluctuation	AC input	3-phase or 1-phase 170 V AC to 264 V AC					3-phase or 1-phase 170 V AC to 264 V AC (Note 17)		3-phase 170 V AC to 264 V AC						1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
Control circuit power supply input	Voltage/ frequency	AC input	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz												1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current [A]		0.2							0.3						0.4		
	Permissible voltage fluctuation	AC input	1-phase 170 V AC to 264 V AC												1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
	Power consumption [W]		30							45						30		
Interface power supply			24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))															
Control method			Sine-wave PWM control/current control method															
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3) [W]		-	10	10	10	20	20	100	100	130	170	-	-	-	-	10	10
	External regenerative resistor (standard accessory) (Note 2, 3, 11, 12) [W]		-	-	-	-	-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)	-	-	-
Dynamic brake			Built-in (Note 4)										External option (Note 13)			Built-in (Note 4)		
SSCNET III/H command communication cycle (Note 10)			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	MR-J4-B(1) (Note 9)		Two-wire type communication method															
	MR-J4-B(1)-RJ		Two-wire/four-wire type communication method															
Load-side encoder interface	MR-J4-B(1)		Mitsubishi high-speed serial communication															
	MR-J4-B(1)-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal															
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function (Note 14), scale measurement function (Note 14), J3 compatibility mode, super trace control (Note 16), lost motion compensation (Note 16)															
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															

Drive Product

MR-J4-B(1)/MR-J4-B(1)-RJ (SSCNET III/H Interface) Specifications (200 V/100 V) B B-RJ

Servo amplifier model MR-J4-_(-RJ)		10B	20B	40B	60B	70B	100B	200B	350B	500B	700B	11KB	15KB	22KB	10B1	20B1	40B1
Functional safety		STO (IEC/EN 61800-5-2)															
Safety performance	Standards certified by CB (Note 20)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2															
	Response performance	8 ms or less (STO input OFF → energy shut-off)															
	Test pulse input (STO) (Note 7)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum															
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)															
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]															
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4×10^{-9} [1/h]															
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.															
Structure (IP rating)		Natural cooling, open (IP20)			Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)				Natural cooling, open (IP20)			
Close mounting	3-phase power input	Possible (Note 6)								Not possible				-			
	1-phase power input	Possible (Note 6)				Not possible		-						Possible (Note 6)			
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)															
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)															
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust															
	Altitude	2000 m or less above sea level (Note 18)															
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)															
Mass	[kg]	0.8	0.8	1.0	1.0	1.4	1.4	2.1	2.3	4.0	6.2	13.4	13.4	18.2	0.8	0.8	1.0

Notes: 1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_B_(-RJ) 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 the servo amplifiers with 75% or less of the effective load ratio.
7. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
8. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
9. Fully closed loop control is available with the servo amplifiers with software version A3 or later.
10. The command communication cycle depends on the controller specifications and the number of axes connected.
11. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m³/min) are installed, and then [Pr. PA02] is changed.
12. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
13. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
14. This function is available with the servo amplifiers with software version A8 or later.
15. This value is applicable when a 3-phase power supply is used.
16. This function is available with the servo amplifiers with software version B4 or later.
17. Use the servo amplifier with 75% or less of the effective load ratio when a 1-phase 200 V AC to 240 V AC power supply is used.
18. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
19. MR-J4-_B-RJ and MR-J4-_B-EG servo amplifiers are available for DC power input. For a connection example of power circuit with DC input, refer to relevant Servo Amplifier Instruction Manual.
20. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-DU_B/MR-J4-DU_B-RJ (SSCNET III/H Interface) Specifications (200 V)   B   B-RJ

Drive unit model MR-J4-_(-RJ)		DU30KB	DU37KB
Compatible converter unit model		MR-CR55K (Note 5)	
Output	Rated voltage	3-phase 170 V AC	
	Rated current [A]	174	204
Main circuit power supply input		Main circuit power is supplied from the converter unit to the drive unit. (Note 5)	
Control circuit power supply input	Voltage/frequency	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current [A]	0.3	
	Permissible voltage fluctuation	1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation	±5% maximum	
	Power consumption [W]	45	
Interface power supply		24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))	
Control method		Sine-wave PWM control/current control method	
Dynamic brake		External option (Note 4)	
SSCNET III/H command communication cycle (Note 3)		0.222 ms, 0.444 ms, 0.888 ms	
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)	
Encoder output pulse		Compatible (A/B/Z-phase pulse)	
Analog monitor		2 channels	
Fully closed loop control	MR-J4-DU_B	Two-wire type communication method	
	MR-J4-DU_B-RJ	Two-wire/four-wire type communication method	
Load-side encoder interface	MR-J4-DU_B	Mitsubishi high-speed serial communication	
	MR-J4-DU_B-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal	
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function, scale measurement function, J3 compatibility mode, super trace control, lost motion compensation	
Protective functions		Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection,	
Functional safety		STO (IEC/EN 61800-5-2)	
Safety performance	Standards certified by CB (Note 7)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2	
	Response performance	8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 2)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)	
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]	
	Probability of dangerous Failure per Hour (PFH)	$PFH = 6.4 \times 10^{-9}$ [1/h]	
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)		Force cooling, open (IP20) (Note 1)	
Close mounting		Not possible	
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude	2000 m or less above sea level (Note 6)	
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass [kg]		21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. The command communication cycle depends on the controller specifications and the number of axes connected.
4. Use an optional external dynamic brake with the drive unit. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
5. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
6. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
7. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

MR-J4-B4/MR-J4-B4-RJ (SSCNET III/H Interface) Specifications (400 V)

B **B-RJ**

Servo amplifier model MR-J4-_(-RJ)			60B4	100B4	200B4	350B4	500B4	700B4	11KB4	15KB4	22KB4
Output	Rated voltage		3-phase 323 V AC								
	Rated current [A]		1.5	2.8	5.4	8.6	14.0	17.0	32.0	41.0	63.0
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current [A]		1.4	2.5	5.1	7.9	10.8	14.4	23.1	31.8	47.6
	Permissible voltage fluctuation		3-phase 323 V AC to 528 V AC								
	Permissible frequency fluctuation		±5% maximum								
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current [A]		0.1			0.2					
	Permissible voltage fluctuation		1-phase 323 V AC to 528 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 signals))								
Control method			Sine-wave PWM control/current control method								
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3) [W]		15	15	100	100	130 (Note 11)	170 (Note 11)	-	-	-
	External regenerative resistor (standard accessory) (Note 2, 3, 8, 9) [W]		-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)
Dynamic brake			Built-in (Note 4)						External option (Note 10)		
SSCNET III/H command communication cycle (Note 7)			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	MR-J4-B4		Two-wire type communication method								
	MR-J4-B4-RJ		Two-wire/four-wire type communication method								
Load-side encoder interface	MR-J4-B4		Mitsubishi high-speed serial communication								
	MR-J4-B4-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal								
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function (Note 12), scale measurement function (Note 12), J3 compatibility mode, super trace control (Note 13), lost motion compensation (Note 13)								
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								
Functional safety			STO (IEC/EN 61800-5-2)								
Safety performance	Standards certified by CB (Note 15)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2								
	Response performance		8 ms or less (STO input OFF → energy shut-off)								
	Test pulse input (STO) (Note 6)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum								
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)								
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]								
	Probability of dangerous Failure per Hour (PFH)		PFH = 6.4 $\times$ 10^{-9} [1/h]								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Structure (IP rating)			Natural cooling, open (IP20)	Force cooling, open (IP20)	Force cooling, open (IP20) (Note 5)						
Close mounting			Not possible								
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)								
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		2000 m or less above sea level (Note 14)								
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)								
Mass [kg]			1.7	1.7	2.1	3.6	4.3	6.5	13.4	13.4	18.2

Drive Product

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

MR-J4-B4/MR-J4-B4-RJ (SSCNET III/H Interface) Specifications (400 V)   `B`   `B-RJ`

Notes: 1. Rated output and speed of a rotary servo motor, and continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_B_(-RJ) 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. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
7. The command communication cycle depends on the controller specifications and the number of axes connected.
8. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m³/min) are installed, and then [Pr. PA02] is changed.
9. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
10. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
11. The servo amplifier built-in regenerative resistor is compatible with the maximum torque deceleration when the servo motor is used within the rated speed and the recommended load to motor inertia ratio. Contact your local sales office if the operating motor speed or the load to motor inertia ratio exceeds the rated speed or the recommended ratio.
12. This function is available with the servo amplifiers with software version A8 or later.
13. This function is available with the servo amplifiers with software version B4 or later.
14. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
15. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

Drive Product

MR-J4-DU_B4/MR-J4-DU_B4-RJ (SSCNET III/H Interface) Specifications (400 V) [B] [B-RJ]

Drive unit model MR-J4-_(-RJ)		DU30KB4	DU37KB4	DU45KB4	DU55KB4
Compatible converter unit model		MR-CR55K4 (Note 5)			
Output	Rated voltage	3-phase 323 V AC			
	Rated current [A]	87	102	131	143
Main circuit power supply input		Main circuit power is supplied from the converter unit to the drive unit. (Note 5)			
Control circuit power supply input	Voltage/frequency	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			
	Rated current [A]	0.2			
	Permissible voltage fluctuation	1-phase 323 V AC to 528 V AC			
	Permissible frequency fluctuation	±5% maximum			
	Power consumption [W]	45			
Interface power supply		24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))			
Control method		Sine-wave PWM control/current control method			
Dynamic brake		External option (Note 4)			
SSCNET III/H command communication cycle (Note 3)		0.222 ms, 0.444 ms, 0.888 ms			
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)			
Encoder output pulse		Compatible (A/B/Z-phase pulse)			
Analog monitor		2 channels			
Fully closed loop control	MR-J4-DU_B4	Two-wire type communication method			
	MR-J4-DU_B4-RJ	Two-wire/four-wire type communication method			
Load-side encoder interface	MR-J4-DU_B4	Mitsubishi high-speed serial communication			
	MR-J4-DU_B4-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal			
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, master-slave operation function, scale measurement function, J3 compatibility mode, super trace control, lost motion compensation			
Protective functions		Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection			
Functional safety		STO (IEC/EN 61800-5-2)			
Safety performance	Standards certified by CB (Note 7)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2			
	Response performance	8 ms or less (STO input OFF → energy shut-off)			
	Test pulse input (STO) (Note 2)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum			
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)			
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]			
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4×10^{-9} [1/h]			
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.			
Structure (IP rating)		Force cooling, open (IP20) (Note 1)			
Close mounting		Not possible			
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)			
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)			
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude	2000 m or less above sea level (Note 6)			
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)			
Mass [kg]		16		21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. The command communication cycle depends on the controller specifications and the number of axes connected.
4. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
5. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
6. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
7. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

MR-CR Converter Unit Specifications (200 V/400 V) | B | B-RJ | A | A-RJ

	Converter unit model		MR-CR55K	MR-CR55K4
Output	Rated voltage		270 V DC to 324 V DC	513V DC to 648 V DC
	Rated current	[A]	215.9	113.8
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz
	Rated current	[A]	191.3	100.7
	Permissible voltage fluctuation		3-phase 170 V AC to 264 V AC	3-phase 323 V AC to 528 V AC
	Permissible frequency fluctuation		±5% maximum	
Control circuit power supply input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz
	Rated current	[A]	0.3	0.2
	Permissible voltage fluctuation		1-phase 170 V AC to 264 V AC	1-phase 323 V AC to 528 V AC
	Permissible frequency fluctuation		±5% maximum	
	Power consumption	[W]	45	
Interface power supply			24 V DC ± 10% (required current capacity: 0.15 A)	
Rated output		[kW]	55	
Regenerative power (when regenerative option is used)			1300 W (one unit of MR-RB139) 3900 W (three units of MR-RB137)	1300 W (one unit of MR-RB137-4) 3900 W (three units of MR-RB13V-4)
Protective functions			Regenerative overvoltage shut-off, overload shut-off (electronic thermal), regenerative error protection, undervoltage protection, instantaneous power failure protection	
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)			Force cooling, open (IP20) (Note 2)	
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude		2000 m or less above sea level (Note 3)	
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass		[kg]	22	

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. Terminal blocks are excluded.
3. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.

Drive Product

MR-J4-B/MR-J4-B-RJ Dimensions　B　B-RJ

● MR-J4-10B, MR-J4-10B-RJ, MR-J4-10B1, MR-J4-10B1-RJ
● MR-J4-20B, MR-J4-20B-RJ, MR-J4-20B1, MR-J4-20B1-RJ

ø6 mounting hole

Terminal arrangement　Terminal arrangement

CNP1	L1
	L2
	N-

CNP1	L1
	L2
	L3
	N-
	P3
	P4

PE
Screw size: M4
Mounting screw size: M5

CNP2	P+
	C
	D
	L11
	L21

CNP2	P+
	C
	D
	L11
	L21

CNP3	U
	V
	W

CNP3	U
	V
	W

For 1-phase 100 V AC　For 3-phase 200 V AC or 1-phase 200 V AC

[Unit: mm]
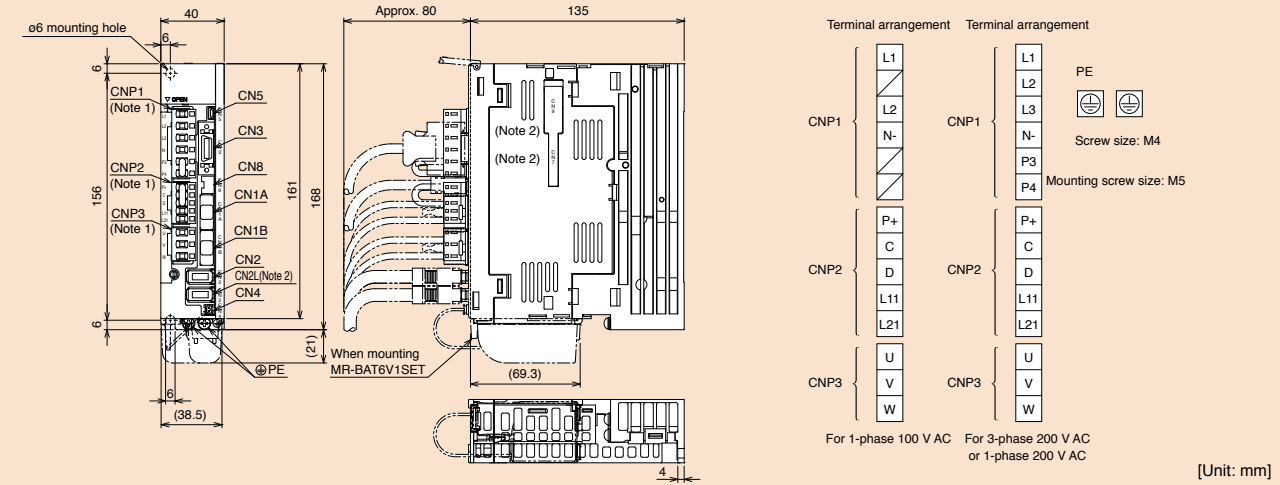
● MR-J4-40B, MR-J4-40B-RJ, MR-J4-40B1, MR-J4-40B1-RJ
● MR-J4-60B, MR-J4-60B-RJ

ø6 mounting hole

Terminal arrangement　Terminal arrangement

CNP1	L1
	L2
	N-

CNP1	L1
	L2
	L3
	N-
	P3
	P4

PE
Screw size: M4
Mounting screw size: M5

CNP2	P+
	C
	D
	L11
	L21

CNP2	P+
	C
	D
	L11
	L21

CNP3	U
	V
	W

CNP3	U
	V
	W

For 1-phase 100 V AC　For 3-phase 200 V AC or 1-phase 200 V AC

[Unit: mm]
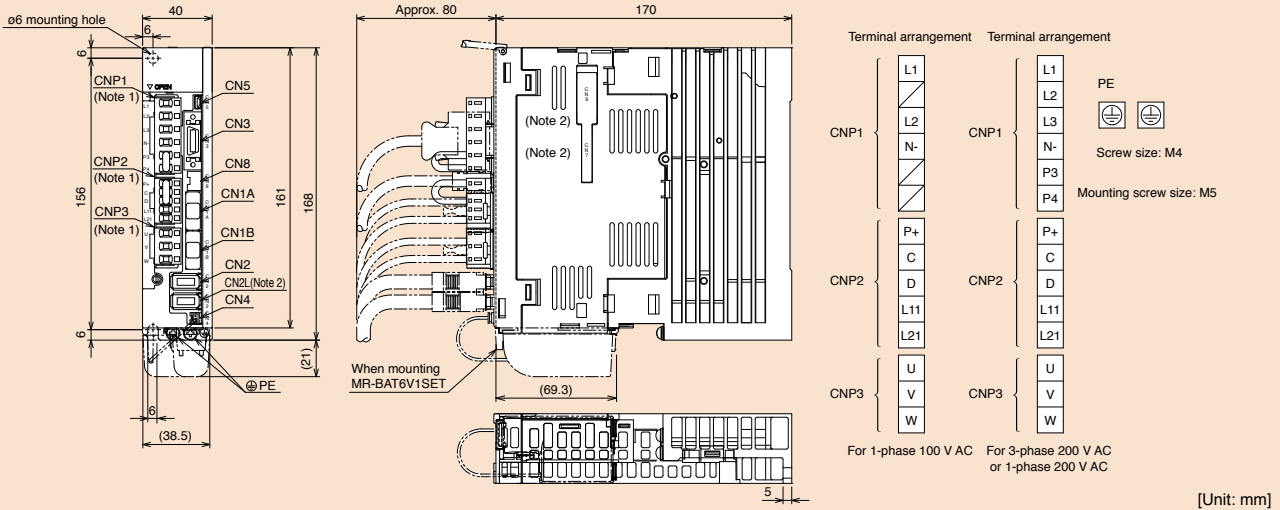
● MR-J4-70B, MR-J4-70B-RJ
● MR-J4-100B, MR-J4-100B-RJ
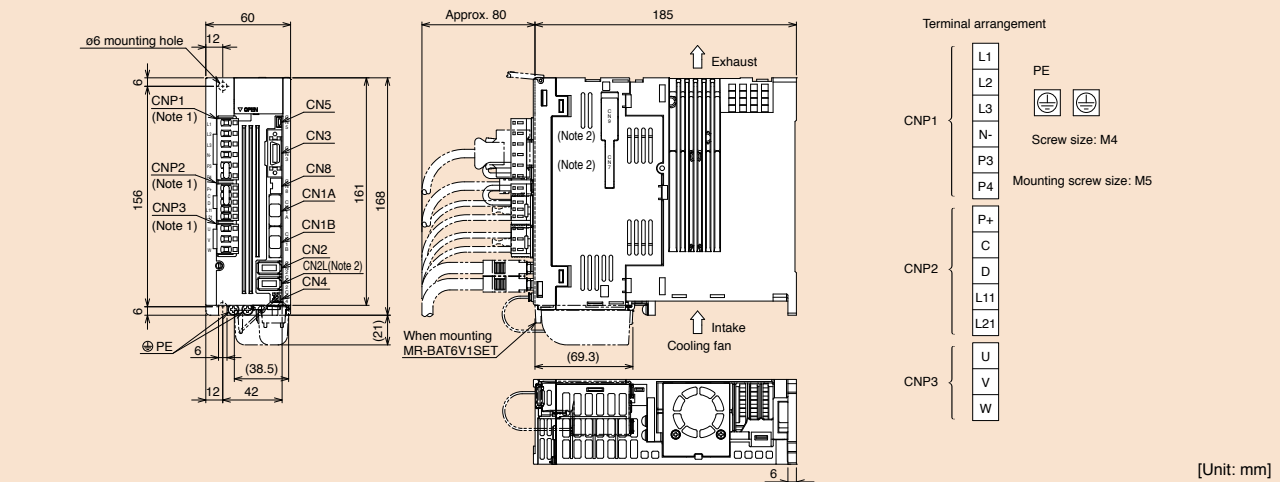
ø6 mounting hole

Terminal arrangement

CNP1	L1
	L2
	L3
	N-
	P3
	P4

PE
Screw size: M4
Mounting screw size: M5

CNP2	P+
	C
	D
	L11
	L21

CNP3	U
	V
	W

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

Features/Summary
Specifications/Characteristics
Outline Drawings
MR-J4 Series
MR-JE Series

MR-J4-B/MR-J4-B-RJ Dimensions   B   B-RJ

● MR-J4-60B4, MR-J4-60B4-RJ
● MR-J4-100B4, MR-J4-100B4-RJ
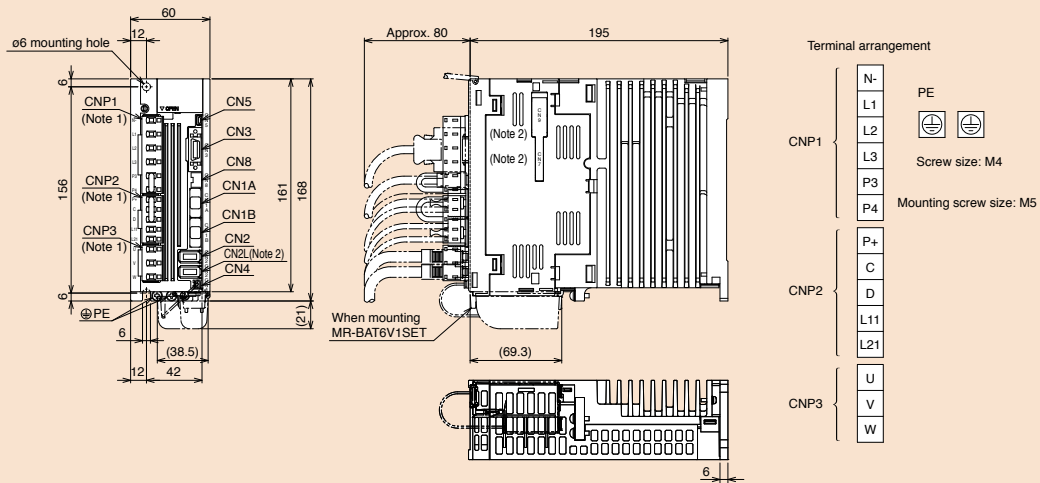
[Unit: mm]

● MR-J4-200B, MR-J4-200B-RJ
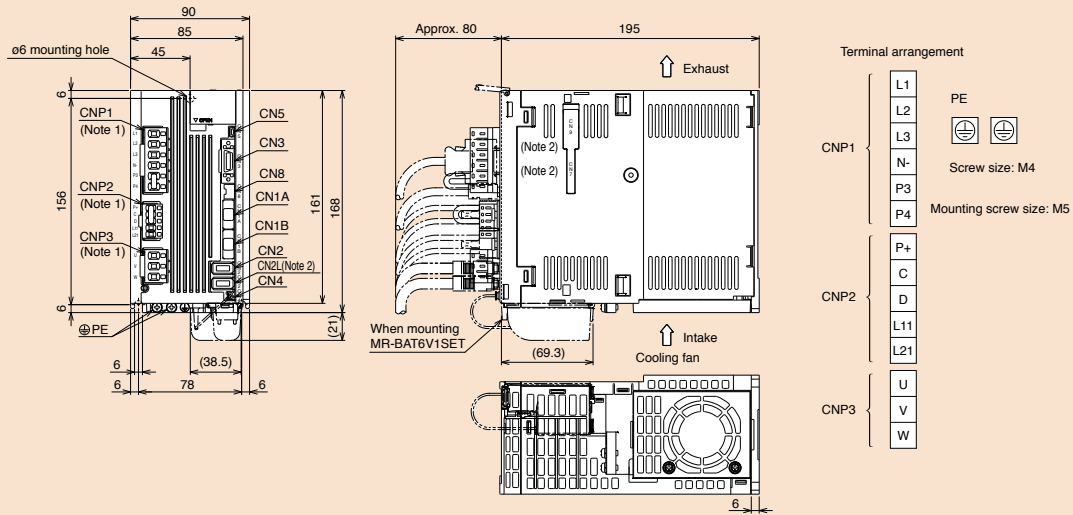
[Unit: mm]

● MR-J4-200B4, MR-J4-200B4-RJ
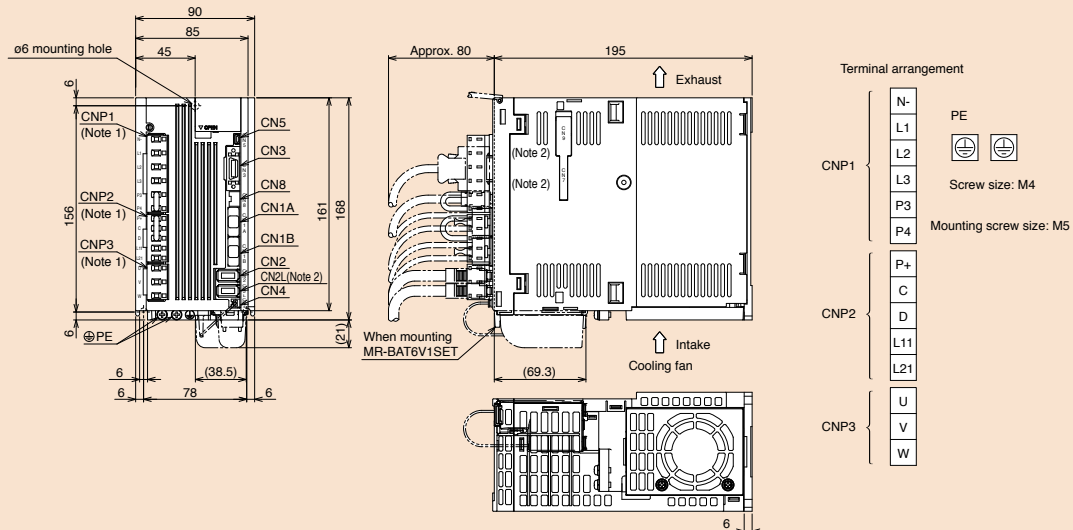
[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

MR-J4-B/MR-J4-B-RJ Dimensions `B` `B-RJ`

● MR-J4-350B, MR-J4-350B-RJ
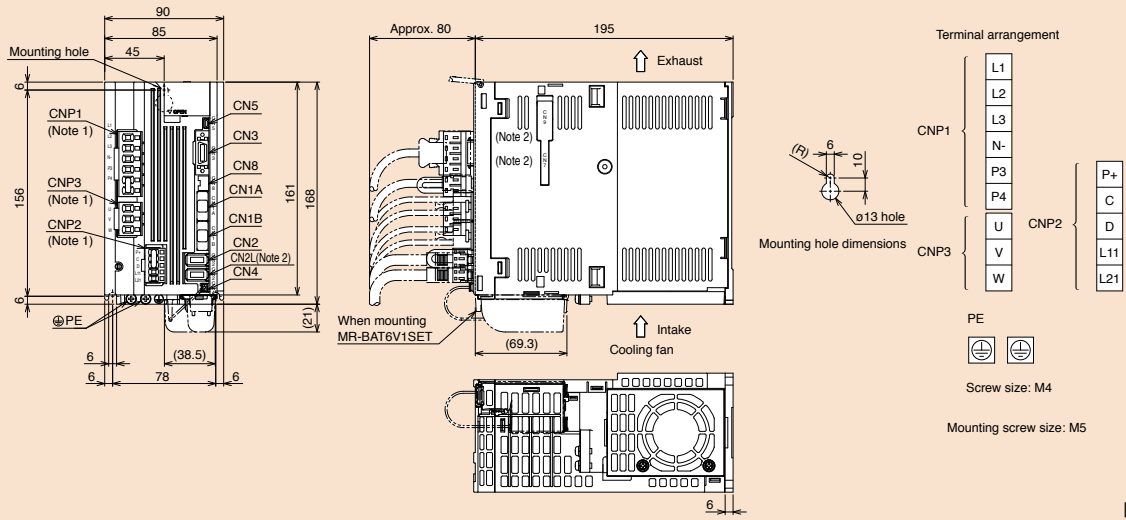
● MR-J4-350B4, MR-J4-350B4-RJ
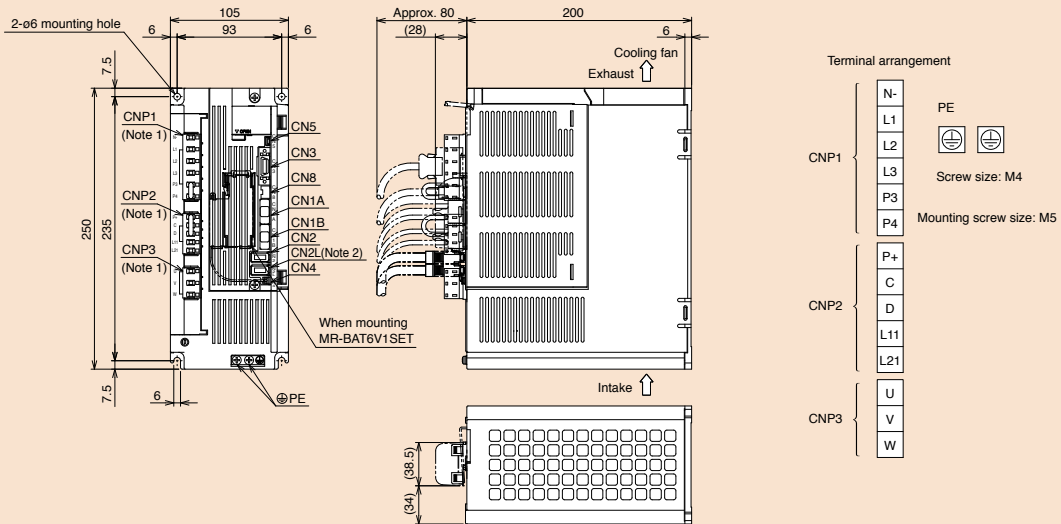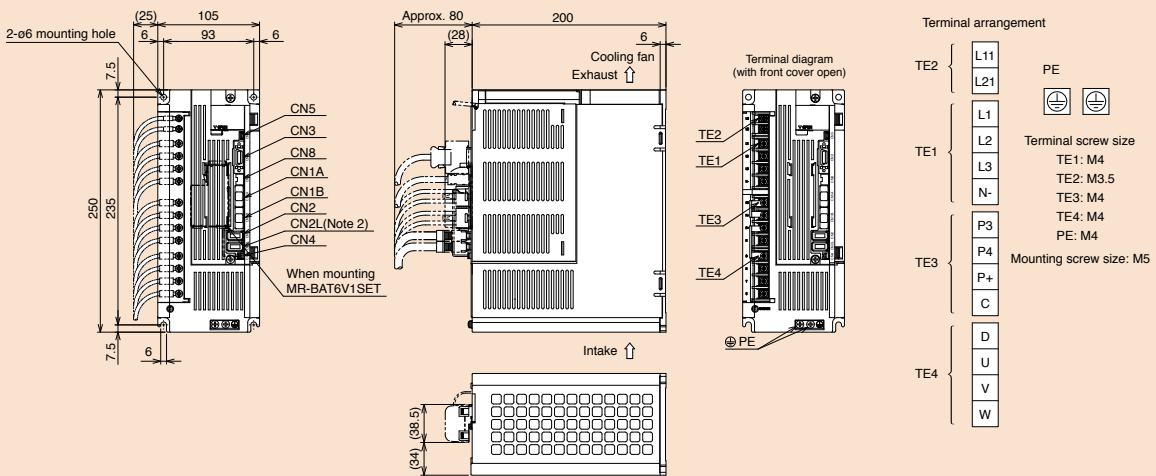
● MR-J4-500B, MR-J4-500B-RJ

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

MR-J4-B/MR-J4-B-RJ Dimensions

B B-RJ

●MR-J4-500B4, MR-J4-500B4-RJ

Terminal screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4

Mounting screw size: M5

Terminal arrangement

TE2			TE3		
L11	L21		N-	P3	P4

TE1							
L1	L2	L3	P+	C	U	V	W

PE
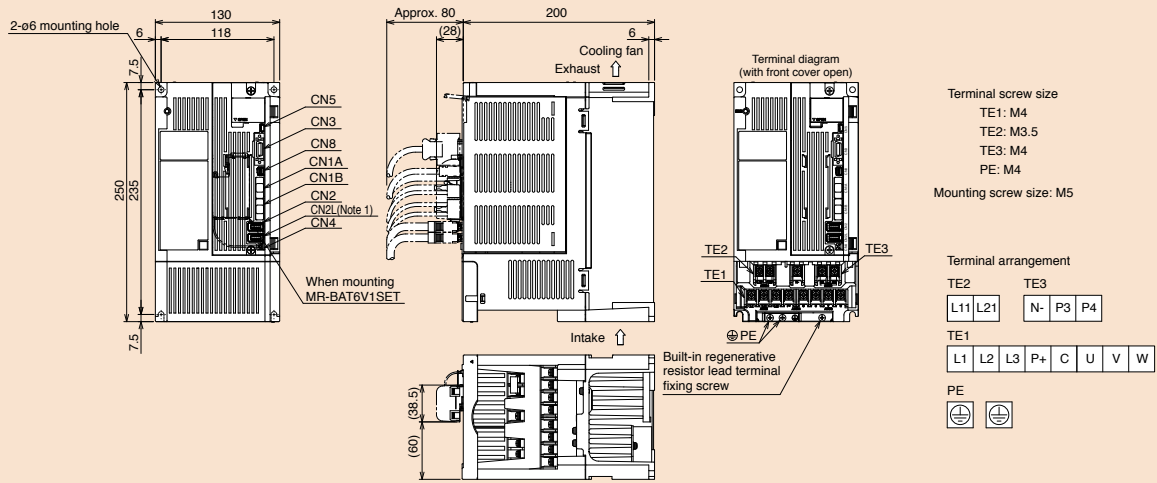
[Unit: mm]

●MR-J4-700B, MR-J4-700B-RJ, MR-J4-700B4, MR-J4-700B4-RJ
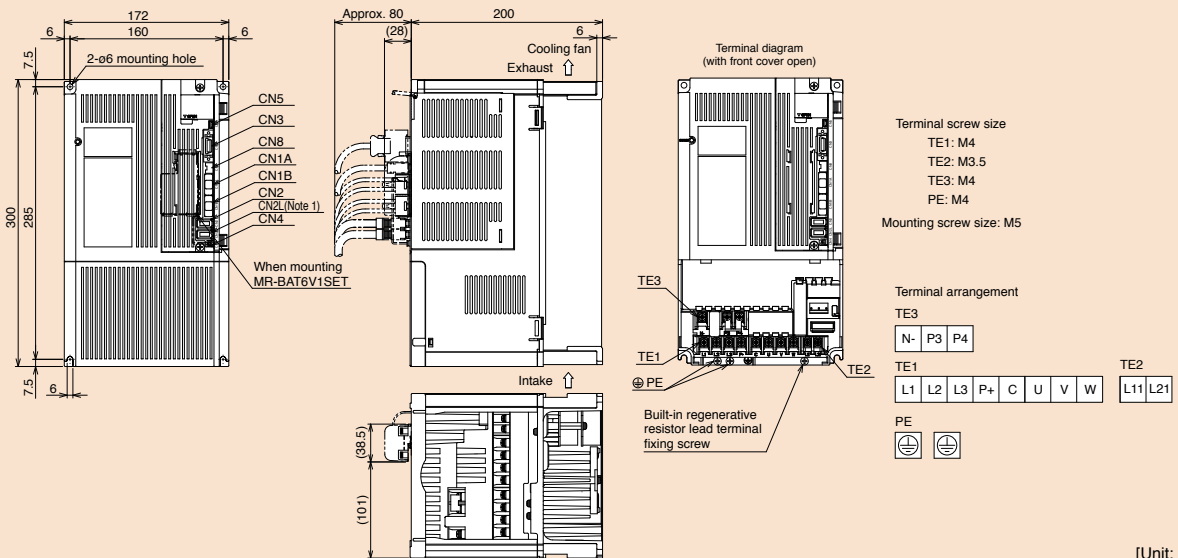
Terminal screw size
TE1: M4
TE2: M3.5
TE3: M4
PE: M4

Mounting screw size: M5

Terminal arrangement

TE3		
N-	P3	P4

TE1									TE2	
L1	L2	L3	P+	C	U	V	W		L11	L21

PE

[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

MR-J4-B/MR-J4-B-RJ Dimensions

B   B-RJ

● MR-J4-11KB, MR-J4-11KB-RJ, MR-J4-11KB4, MR-J4-11KB4-RJ
● MR-J4-15KB, MR-J4-15KB-RJ, MR-J4-15KB4, MR-J4-15KB4-RJ

220
196
12
12
10
2-ø6 mounting hole
400
380
10
6
CN5
CN3
CN8
CN1A
CN1B
CN2
CN2L(Note 1)
CN4
When mounting
MR-BAT6V1SET

Approx. 80
(28)
260
10.5
Cooling fan
Exhaust
Intake
188
224.2
237.4

(38.5)
(139.5)

Terminal diagram
(with front cover open)

Terminal screw size
TE1-1: M6
TE1-2: M6
TE2: M4
PE: M6

⊕ PE Mounting screw size: M5
TE1-1
TE1-2
TE2

Terminal arrangement

TE1-1
| L1 | L2 | L3 | U | V | W |

TE1-2
| P3 | P4 | P+ | C | / | N- |

TE2
| L11 | L21 |

PE
⊕ ⊕

[Unit: mm]

● MR-J4-22KB, MR-J4-22KB-RJ, MR-J4-22KB4, MR-J4-22KB4-RJ

260
236
12
12
12
2-ø12 mounting hole
400
376
12
12
CN5
CN3
CN8
CN1A
CN1B
CN2
CN2L(Note 1)
CN4
When mounting
MR-BAT6V1SET

Approx. 80
(28)
260
Cooling fan
Exhaust
Intake
188.5
223.4
235.4

(38.5)
(179)

Terminal diagram
(with front cover open)

Terminal screw size
TE1-1: M8
TE1-2: M8
TE2: M4
PE: M8
Mounting screw size: M10

TE2
TE1-1
TE1-2
⊕ PE

Terminal arrangement

TE1-1
| L1 | L2 | L3 | U | V | W |

TE1-2
| P3 | P4 | P+ | C | / | N- |

TE2
| L11 | L21 |

PE
⊕ ⊕

[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-B servo amplifier.

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MR-J4-DU_B/MR-J4-DU_B-RJ Dimensions `B` `B-RJ`

- MR-J4-DU30KB, MR-J4-DU30KB-RJ
- MR-J4-DU37KB, MR-J4-DU37KB-RJ
- MR-J4-DU45KB4, MR-J4-DU45KB4-RJ
- MR-J4-DU55KB4, MR-J4-DU55KB4-RJ

Terminal screw size
TE1: M10
TE2-1: M6
TE2-2: M6
TE3: M4
PE: M10

Mounting screw size: M6
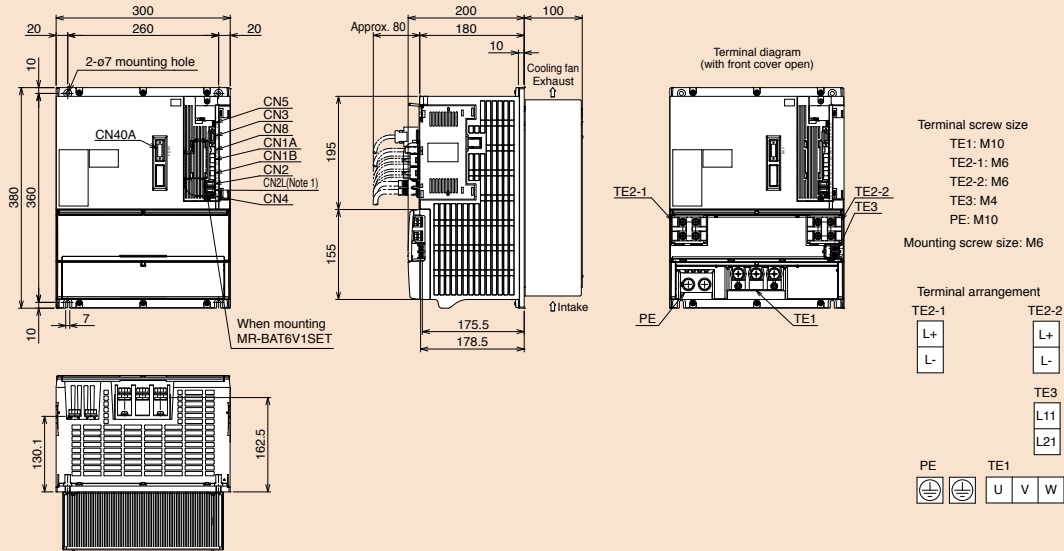
[Unit: mm]

- MR-J4-DU30KB4, MR-J4-DU30KB4-RJ
- MR-J4-DU37KB4, MR-J4-DU37KB4-RJ

Terminal screw size
TE1: M8
TE2: M6
TE3: M4
PE: M8

Mounting screw size: M5
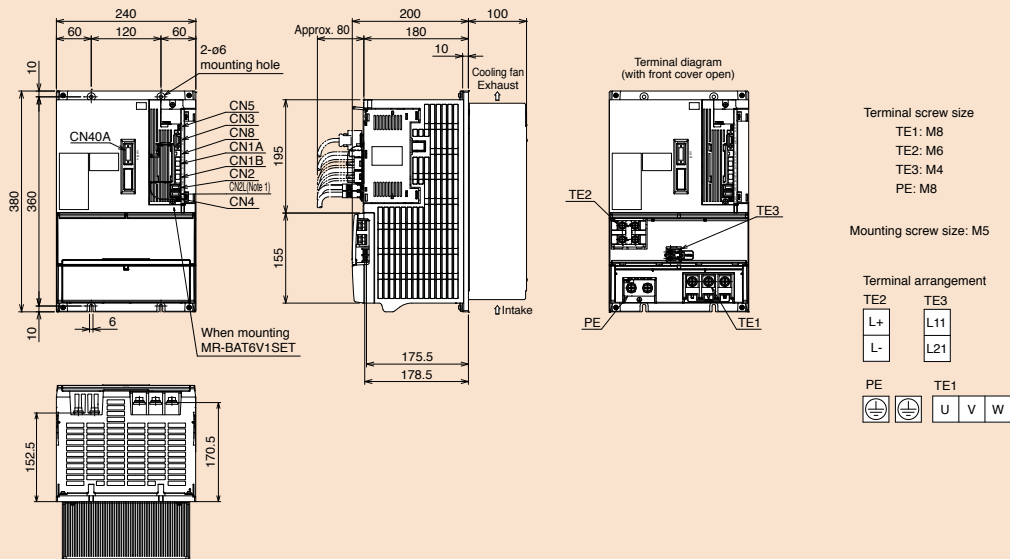
[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-DU_B_ drive unit. MR-J4-DU-B_-RJ is equipped with CN7 and CN9 connectors; however, these connectors are not for use.

MR-CR Dimensions

| B | B-RJ | A | A-RJ |

● MR-CR55K, MR-CR55K4

300
260
20
20
10
2-ø7 mounting hole

CN6
CN40
CN1
CN3
CNP1

380
360

10
7

162.5
130.3

200
180
100

195
155

Cooling fan
Exhaust

⇧Intake

2.3
175.5
178.5

Terminal diagram
(with front cover open)
192
98.6

TE2-1
TE2-2
TE3

PE   TE1-1   TE1-2   PE

Terminal screw size
TE1: M10
TE2: M6
TE3: M4
PE: M10

Mounting screw size: M6

Terminal arrangement

TE2-1
L+
L-

TE2-2
L+
L-

TE3
L11
L21

PE   TE1-1   TE1-2   PE
⊕   L1 L2 L3   C P2 P1   ⊕
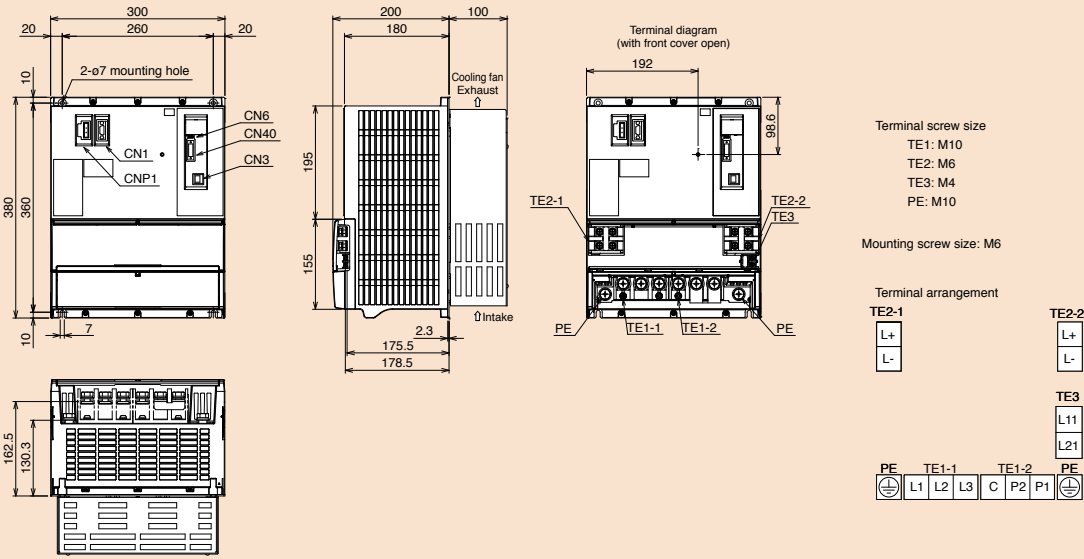
[Unit: mm]

Panel Cut Dimensions for Converter Unit and Drive Unit (Note 1)

300
281
(9.5)   W5
260±0.5   (20)

W1
W4
W3   W2±0.5   (W3)   (W5)

9.5
20
10
19

Converter unit   Drive unit

Hole   Hole

380
360±0.5
342

342
360±0.5
19 10

(10)
(19)

4-M6 screw   4-A screw

(19)
(10)

Drive unit model	Variable dimensions					
	W1	W2	W3	W4	W5	A
MR-J4-DU30KB/A, 37KB/A, 45KB4/A4, 55KB4/A4	300	260	20	281	9.5	M6
MR-J4-DU30KB4/A4, 37KB4/A4	240	120	60	222	9	M5

[Unit: mm]

Notes:1. The panel cut dimensions for converter unit and drive unit are applicable for MR-J4-DU_B_/MR-J4-DU_B_-RJ/MR-J4-DU_A_/MR-J4-DU_A_-RJ.

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AC Servo MELSERVO-J4

MR-J4W2-B/MR-J4W3-B Connections with Peripheral Equipment (Note 1)   WB

Peripheral equipment is connected to MR-J4W2-B/MR-J4W3-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.

Charge lamp
The lamp lights when the main circuit power supply is charged.

Molded-case circuit breaker (MCCB)
This protects the power supply line.

Magnetic contactor (MC)
This turns off the power to the servo amplifier when an alarm is triggered.

Power factor improving AC reactor (optional)
This boosts the power factor of servo amplifier and reduces the power supply capacity.

Regenerative option (optional)

Display (Note 2)
Servo amplifier status and alarm number are displayed.

Axis setting part (Note 2)
Select an axis with the axis selection rotary switch (SW1) and the auxiliary axis number setting switches (SW2-5 and SW2-6).

USB communication connector (CN5)
Connect with a personal computer and use MR Configurator2. Parameter setting and monitoring are possible. Use an optional USB cable (MR-J3USBCBL3M).

I/O signal connector (CN3)
Connect the forced stop input, the in-position, the electromagnetic brake interlock, and the malfunction signals.

STO I/O signal connector (CN8)
Connect MR-J3-D05 safety logic unit or an external safety relay. Use an optional STO cable (MR-D05UDL3M-B).

Servo motor power cable (optional)

Encoder cable (optional)

Rotary servo motor (The picture is that of HG-KR053.)

Linear servo motor

Direct drive motor

Encoder connector (CN2A/B)
Connect the servo motor encoder using an optional cable or a connector set.

Battery connector (CN4)
Battery case (MR-BT6VCASE) and batteries (MR-BAT6V1) are required when configuring absolute position detection system with a rotary servo motor or a direct drive motor.

Battery

Battery case

SSCNET III cable (optional)

SSCNET III/H compatible servo system controller
R32MTCPU/R16MTCPU Q173DSCPU/Q172DSCPU   Q170MSCPU   RD77MS/QD77MS

LD77MS

SSCNET III cable (optional)

SSCNET III/H connector (CN1A)
Connect the servo system controller or the previous servo amplifier axis.

SSCNET III/H connector (CN1B)
Connect the next servo amplifier axis. Be sure to attach a cap to CN1B connector of the final axis.

(PE) (Note 3)

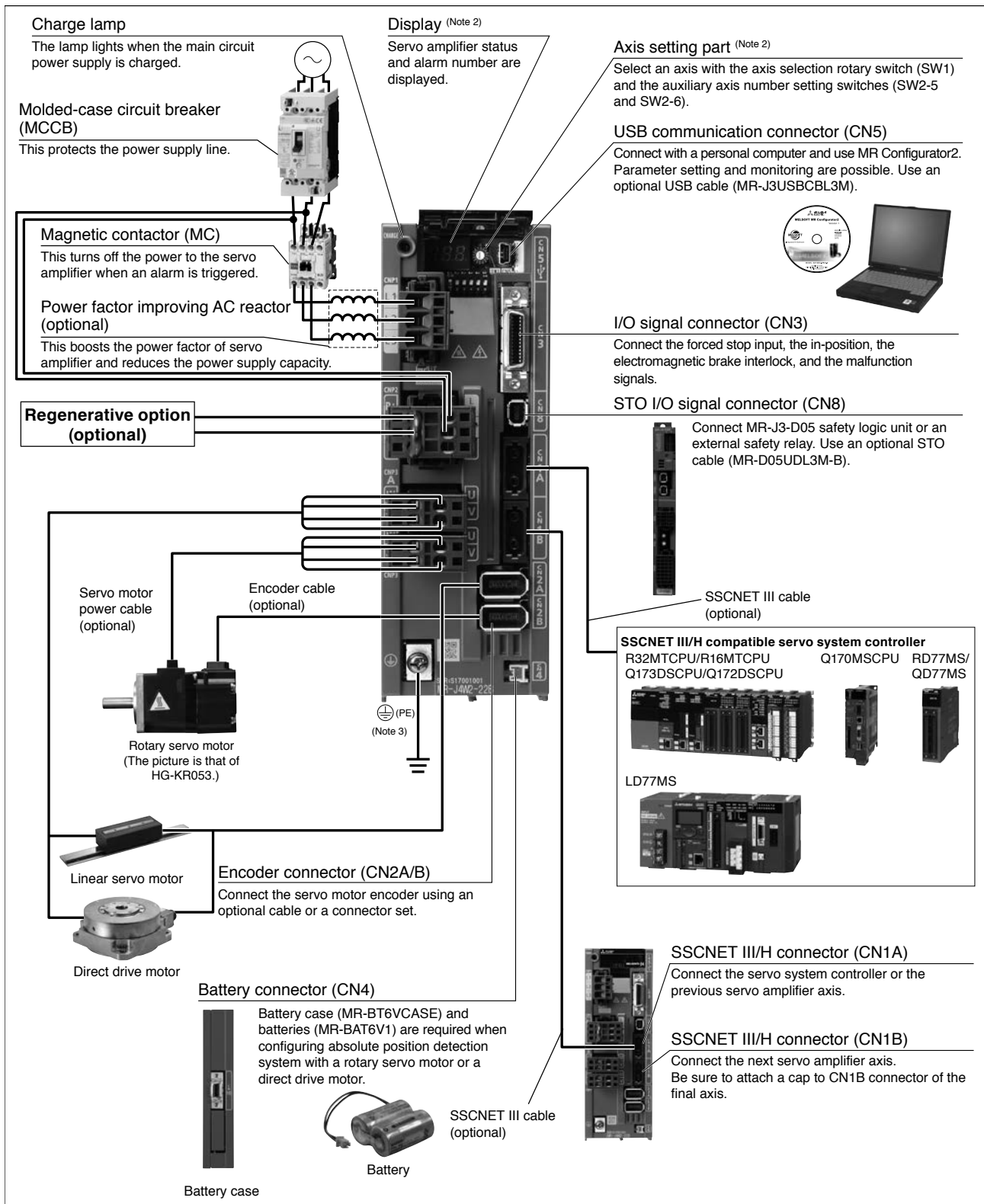Notes: 1. The connection with the peripheral equipment is an example for MR-J4W2-22B. CNP3C and CN2C connectors are available for MR-J4W3-B servo amplifier. Refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the actual connections of the multi-axis servo amplifier.
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).

Drive Product

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

Servo amplifier model MR-J4W2-			22B	44B	77B	1010B
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 input	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz			3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 15) [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 input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/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 signals))			
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·m²]		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	
Permissible 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 12)			Available (Note 11)			
Load-side encoder interface (Note 9)			Mitsubishi high-speed serial communication			
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, scale measurement function (Note 14), J3 compatibility mode			
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			

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

Servo amplifier model MR-J4W2-		22B	44B	77B	1010B
Functional safety		STO (IEC/EN 61800-5-2) (Note 10)			
Safety performance	Standards certified by CB (Note 17)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2			
	Response performance	8 ms or less (STO input OFF → energy shut-off)			
	Test pulse input (STO) (Note 8)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum			
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)			
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]			
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]			
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.			
Structure (IP rating)		Natural cooling, open (IP20)	Force cooling, open (IP20)		
Close mounting		Possible			
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)			
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)			
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude	2000 m or less above sea level (Note 16)			
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)			
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 continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Reusable regenerative energy is equivalent to the energy generated under the following conditions.
For rotary servo motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
For linear servo motor: the energy that is generated when the machine, whose mass is equivalent to the permissible charging amount, decelerates from the maximum speed to a stop.
For direct drive motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
6. This value is the moment of inertia when the rotary servo motor decelerates from the rated speed to a stop. 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. The value also applies to the direct drive motor.
7. This value is the mass when the linear servo motor decelerates from maximum speed to a stop. 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. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
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 available 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.
14. This function is available with the servo amplifiers with software version A8 or later.
15. This value is applicable when a 3-phase power supply is used.
16. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
17. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

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

Servo amplifier model MR-J4W3-			222B	444B
Output	Rated voltage		3-phase 170 V AC	
	Rated current (each axis) [A]		1.5	2.8
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current (Note 12) [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 input	Voltage/frequency		1-phase 200 V AC to 240 V AC, 50 Hz/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 signals))	
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·m²]		4.26	6.08
	Mass equivalent to permissible charging amount (Note 7) [kg]	LM-H3	4.7	6.7
		LM-K2 LM-U2	10.5	15.0
Permissible 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 available	
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, J3 compatibility mode	
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	

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MR-JE Series

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

Servo amplifier model MR-J4W3-		222B	444B
Functional safety		STO (IEC/EN 61800-5-2) (Note 9)	
Safety performance	Standards certified by CB (Note 14)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2	
	Response performance	8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 8)	Test pulse interval: 1 Hz to 25 Hz Test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)	
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]	
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4×10^{-9} [1/h]	
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)		Force cooling, open (IP20)	
Close mounting		Possible	
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude	2000 m or less above sea level (Note 13)	
	Vibration resistance	5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass	[kg]	1.9	1.9

Notes:
1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. Reusable regenerative energy is equivalent to the energy generated under the following conditions.
   For rotary servo motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
   For linear servo motor: the energy that is generated when the machine, whose mass is equivalent to the permissible charging amount, decelerates from the maximum speed to a stop.
   For direct drive motor: the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
6. This value is the moment of inertia when the rotary servo motor decelerates from the rated speed to a stop. 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. The value also applies to the direct drive motor.
7. This value is the mass when the linear servo motor decelerates from maximum speed to a stop. 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. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
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.
12. This value is applicable when a 3-phase power supply is used.
13. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
14. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

Drive Product

MR-J4W2-0303B6 (2-axis, SSCNET III/H Interface) Specifications `WB`

Servo amplifier model			MR-J4W2-0303B6
Output	Rated voltage		3-phase 13 V AC
	Rated current (each axis) [A]		2.4
Main circuit power supply input	Voltage (Note 1)		48 V DC/24 V DC (Note 4)
	Rated current [A]		For 48 V DC: 2.4 A For 24 V DC: 4.8 A
	Permissible voltage fluctuation		For 48 V DC: 40.8 V DC to 55.2 V DC For 24 V DC: 21.6 V DC to 26.4 V DC
Control circuit power supply input	Voltage		24 V DC
	Rated current [A]		0.5
	Permissible voltage fluctuation		21.6 V DC to 26.4 V DC
	Power consumption [W]		10
Interface power supply			24 V DC ± 10% (required current capacity: 0.25 A)
Control method			Sine-wave PWM control/current control method
Capacitor regeneration	Reusable regenerative energy [J] (Note 2)		0.9
	Moment of inertia (J) equivalent to permissible charging amount (Note 3) [× 10^{-4} kg·m^2]		0.18
Permissible regenerative power of the built-in regenerative resistor [W]			1.3
Dynamic brake			Built-in (Note 5, 6)
SSCNET III/H command communication cycle (Note 8)			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			2 channels
Fully closed loop control			Not compatible
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, vibration tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, J3 compatibility mode
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.
Structure (IP rating)			Natural cooling, open (IP20)
Close mounting			Possible (Note 7)
DIN rail mounting (35 mm wide)			Possible
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust
	Altitude		1000 m or less above sea level
	Vibration resistance		5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)
Mass [kg]			0.3

Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage.
2. Reusable regenerative energy is equivalent to the energy that is generated when the machine, whose moment of inertia is equivalent to the permissible charging amount, decelerates from the rated speed to a stop.
3. This value is the moment of inertia when the rotary servo motor decelerates from the rated speed to a stop. 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.
4. Initial value is 48 V DC. For 24 V DC, set [Pr. PC05] to "_ 1 _ _." Servo motor characteristics vary depending whether the voltage is 48 V DC or 24 V DC. Refer to "HG-AK Series (Ultra-compact Size, Ultra-small Capacity) Specifications" and "HG-AK Series Torque Characteristics" in this catalog.
5. The dynamic brake is electronic. The electronic dynamic brake does not operate when the control circuit power is off. It may not operate depending on alarms and warnings. Refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for details.
6. When using the built-in dynamic brake, refer to "MR-J4W2-_B MR-J4W3-_B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
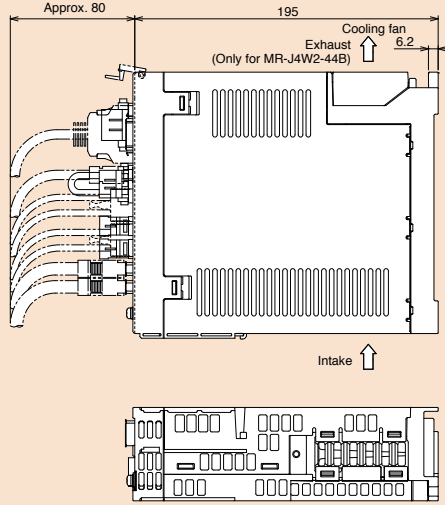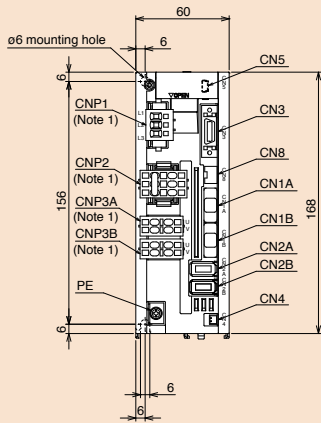7. When the servo amplifiers are closely mounted, keep the ambient temperature at 45 °C or lower, or keep the total load of the two axes at 45 W or lower.
8. The command communication cycle depends on the controller specifications and the number of axes connected.

MR-J4W2-B Dimensions

WB

● MR-J4W2-22B
● MR-J4W2-44B

Terminal arrangement

CNP1			CNP2		
L1	1		P+	L11	1
L2	2		C	L21	2
L3	3		D	N-	3
			A	B	

CNP3A			CNP3B		
W	U	1	W	U	1
⏚	V	2	⏚	V	2
A	B		A	B	

PE
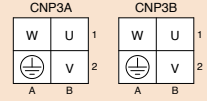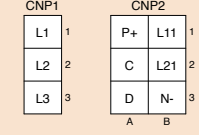
Screw size: M4

Mounting screw size: M5

[Unit: mm]

● MR-J4W2-77B
● MR-J4W2-1010B

Terminal arrangement

CNP1			CNP2		
L1	1		P+	L11	1
L2	2		C	L21	2
L3	3		D	N-	3
			A	B	

CNP3A			CNP3B		
W	U	1	W	U	1
⏚	V	2	⏚	V	2
A	B		A	B	

PE
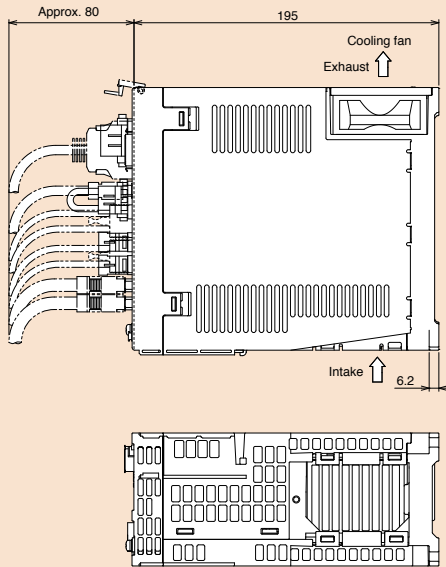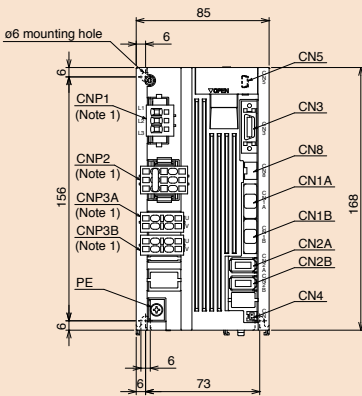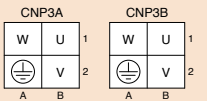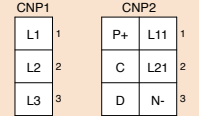
Screw size: M4

Mounting screw size: M5

[Unit: mm]

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

Drive Product

MR-J4W3-B Dimensions

WB

● MR-J4W3-222B
● MR-J4W3-444B

[Unit: mm]
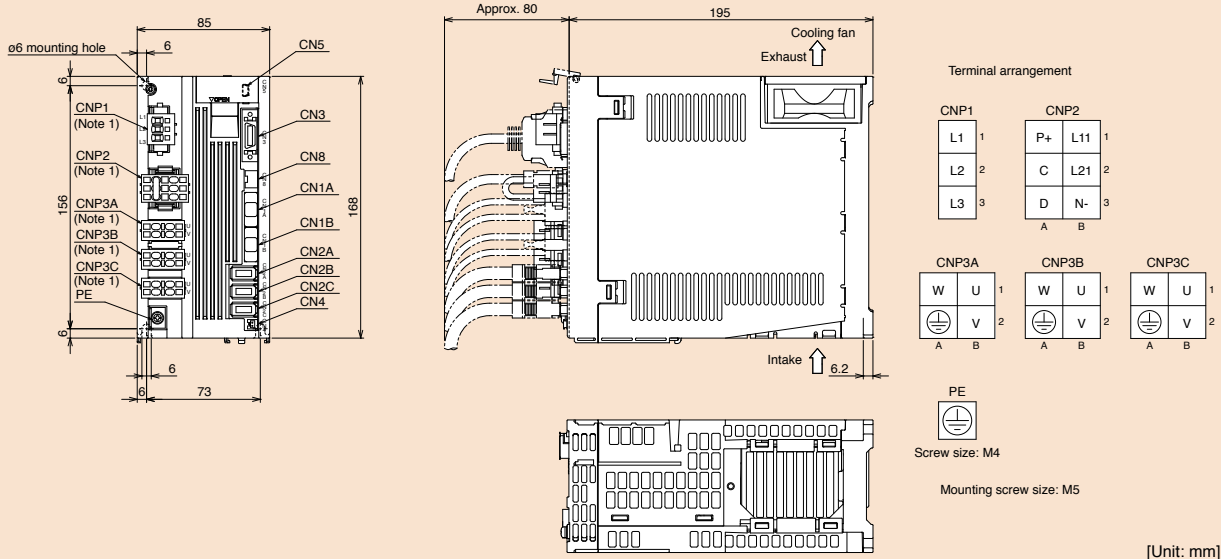
MR-J4W2-0303B6 Dimensions

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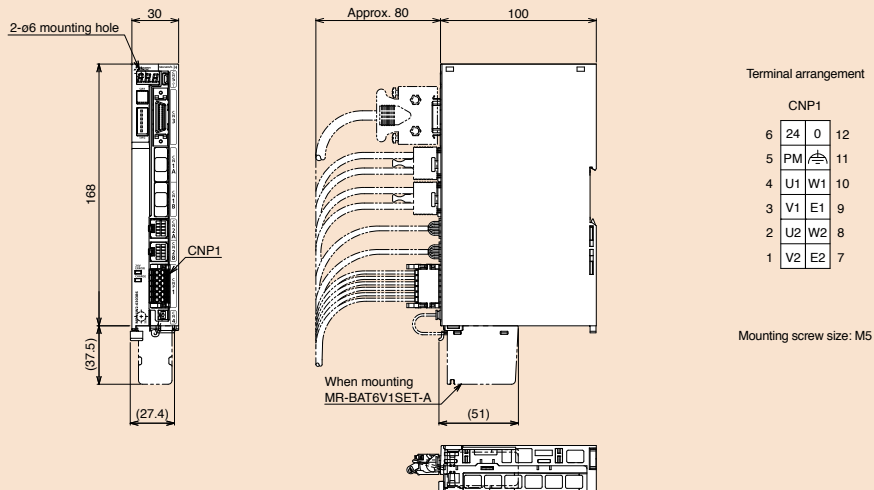
Notes: 1. CNP1, CNP2, CNP3A, CNP3B and CNP3C connectors (insertion type) are supplied with the servo amplifier.

Drive Product

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

Peripheral equipment is connected to MR-J4-A/MR-J4-A-RJ 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.

Display (Note 2)
Servo amplifier status, parameter, and alarm number are displayed.

Setting section (Note 2)
Parameter settings and monitoring etc. are executed with push buttons.

Molded-case circuit breaker (MCCB)
This protects the power supply line.

USB communication connector (CN5)
Connect a personal computer and perform monitoring, batch parameter writing and saving, graph display, and test operation with MR Configurator2. Use an optional USB cable (MR-J3USBCBL3M).

Magnetic contactor (MC)
This turns off the power to the servo amplifier when an alarm is triggered.

Analog monitor output connector (CN6)
Speed and torque are output with analog voltage signals. (ch2)

Power factor improving DC reactor (optional)
This boosts the power factor of servo amplifier and reduces the power supply capacity.

RS-422/RS-485 communication connector (CN3)
Connect GOT or parameter unit.

Regenerative option (optional)

GOT

Parameter unit
MR-PRU03

Servo motor power cable (optional)
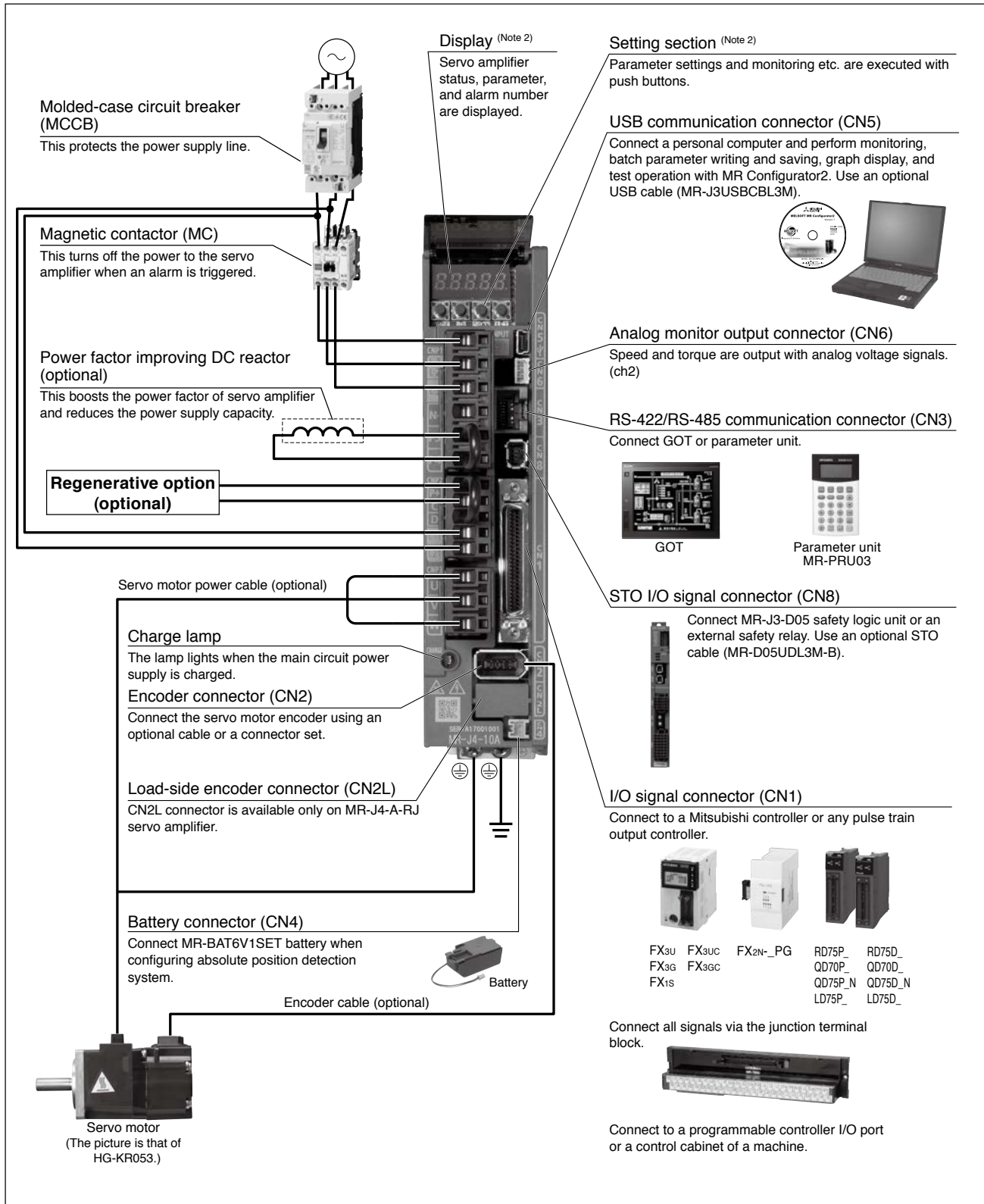
STO I/O signal connector (CN8)
Connect MR-J3-D05 safety logic unit or an external safety relay. Use an optional STO cable (MR-D05UDL3M-B).

Charge lamp
The lamp lights when the main circuit power supply is charged.

Encoder connector (CN2)
Connect the servo motor encoder using an optional cable or a connector set.

Load-side encoder connector (CN2L)
CN2L connector is available only on MR-J4-A-RJ servo amplifier.

I/O signal connector (CN1)
Connect to a Mitsubishi controller or any pulse train output controller.

FX3U
FX3G
FX1S

FX3UC
FX3GC

FX2N-_PG

RD75P_
QD70P_
QD75P_N
LD75P_

RD75D_
QD70D_
QD75D_N
LD75D_

Connect all signals via the junction terminal block.

Battery connector (CN4)
Connect MR-BAT6V1SET battery when configuring absolute position detection system.

Battery

Encoder cable (optional)

Connect to a programmable controller I/O port or a control cabinet of a machine.

Servo motor
(The picture is that of HG-KR053.)

Notes: 1. The connection with the peripheral equipment is an example for MR-J4-350A/MR-J4-350A-RJ or smaller servo amplifiers. Refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for the actual connections.
     2. This picture shows when the display cover is open.

Drive Product

MR-J4-A(1)/MR-J4-A(1)-RJ (General-purpose Interface) Specifications (200 V/100 V) A A-RJ

Servo amplifier model MR-J4-_(-RJ)			10A	20A	40A	60A	70A	100A	200A	350A	500A	700A	11KA	15KA	22KA	10A1	20A1	40A1
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	68.0	87.0	126.0	1.1	1.5	2.8
Main circuit power supply input	Voltage/ frequency (Note 1)	AC input	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz					3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 16)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz						1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current (Note 14) [A]		0.9	1.5	2.6	3.2 (Note 8)	3.8	5.0	10.5	16.0	21.7	28.9	46.0	64.0	95.0	3.0	5.0	9.0
	Permissible voltage fluctuation	AC input	3-phase or 1-phase 170 V AC to 264 V AC					3-phase or 1-phase 170 V AC to 264 V AC (Note 16)		3-phase 170 V AC to 264 V AC						1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
Control circuit power supply input	Voltage/ frequency	AC input	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz													1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz		
		DC input (Note 19)	283 V DC to 340 V DC															
	Rated current [A]		0.2							0.3						0.4		
	Permissible voltage fluctuation	AC input	1-phase 170 V AC to 264 V AC													1-phase 85 V AC to 132 V AC		
		DC input (Note 19)	241 V DC to 374 V DC															
	Permissible frequency fluctuation		±5% maximum															
	Power consumption [W]		30							45						30		
Interface power supply			24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signals))															
Control method			Sine-wave PWM control/current control method															
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3) [W]		-	10	10	10	20	20	100	100	130	170	-	-	-	-	10	10
	External regenerative resistor (standard accessory) (Note 2, 3, 11, 12) [W]		-	-	-	-	-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)	-	-	-
Dynamic brake			Built-in (Note 4)										External option (Note 13)			Built-in (Note 4)		
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)															
			RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 10)															
Encoder output pulse			Compatible (A/B/Z-phase pulse)															
Analog monitor			2 channels															
Position control mode	Maximum input pulse frequency		4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)															
	Positioning feedback pulse		Encoder resolution: 22 bits															
	Command pulse multiplying factor		Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000															
	Positioning complete width setting		0 pulse to ±65535 pulses (command pulse unit)															
	Error excessive		±3 rotations															
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)															
Speed control mode	Speed control range		Analog speed command 1:2000, internal speed command 1:5000															
	Analog speed command input		0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)															
	Speed fluctuation rate		±0.01% maximum (load fluctuation: 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command															
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)															
Torque control mode	Analog torque command input		0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)															
	Speed limit		Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)															
Positioning mode (Note 17)	MR-J4-A(1)		Not available															
	MR-J4-A(1)-RJ		Point table method, program method, indexer (turret) method															
Fully closed loop control	MR-J4-A(1) (Note 9)		Two-wire type communication method															
	MR-J4-A(1)-RJ		Two-wire/four-wire type communication method															
Load-side encoder interface	MR-J4-A(1)		Mitsubishi high-speed serial communication															
	MR-J4-A(1)-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal															
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control (Note 15), lost motion compensation (Note 15)															
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															

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

MR-J4-A(1)/MR-J4-A(1)-RJ (General-purpose Interface) Specifications (200 V/100 V) A A-RJ

Servo amplifier model MR-J4-_(-RJ)			10A	20A	40A	60A	70A	100A	200A	350A	500A	700A	11KA	15KA	22KA	10A1	20A1	40A1
Functional safety			STO (IEC/EN 61800-5-2)															
Safety performance	Standards certified by CB (Note 20)		EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2															
	Response performance		8 ms or less (STO input OFF → energy shut-off)															
	Test pulse input (STO) (Note 7)		Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum															
	Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)															
	Diagnostic coverage (DC)		DC = Medium, 97.6 [%]															
	Probability of dangerous Failure per Hour (PFH)		PFH = 6.4×10^{-9} [1/h]															
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.															
Structure (IP rating)			Natural cooling, open (IP20)			Force cooling, open (IP20)				Force cooling, open (IP20) (Note 5)					Natural cooling, open (IP20)		
Close mounting	3-phase power input		Possible (Note 6)							Not possible					-		
	1-phase power input		Possible (Note 6)			Not possible			-						Possible (Note 6)		
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)															
	Ambient humidity		Operation/storage: 90 %RH maximum (non-condensing)															
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust															
	Altitude		2000 m or less above sea level (Note 18)															
	Vibration resistance		5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)															
Mass		[kg]	0.8	0.8	1.0	1.0	1.4	1.4	2.1	2.3	4.0	6.2	13.4	13.4	18.2	0.8	0.8	1.0

Notes: 1. Rated output and speed of a rotary servo motor and a direct drive motor; and continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) 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 the servo amplifier with 75% or less of the effective load ratio.
7. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
8. The rated current is 2.9 A when the servo amplifier is used with UL or CSA compliant servo motor.
9. Fully closed loop control is available with the servo amplifiers with software version A5 or later.
10. RS-422/RS-485 communication function is available with the servo amplifiers with software version A3 or later.
11. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m³/min) are installed, and then [Pr. PA02] is changed.
12. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
13. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
14. This value is applicable when a 3-phase power supply is used.
15. This function is available with the servo amplifiers with software version B4 or later.
16. Use the servo amplifier with 75% or less of the effective load ratio when servo amplifiers are used with a 1-phase 200 V AC to 240 V AC power supply.
17. The positioning mode is available with MR-J4-A-RJ servo amplifier with software version B3 or later.
18. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
19. MR-J4-_A-RJ and MR-J4-_A-EG servo amplifiers are available with DC power input. For a connection example of power circuit with DC input, refer to relevant Servo Amplifier Instruction Manual.
20. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

Drive Product

MR-J4-DU_A/MR-J4-DU_A-RJ (General-purpose Interface) Specifications (200 V)   A   A-RJ

Drive unit model MR-J4-_(-RJ)		DU30KA	DU37KA
Compatible converter unit model		MR-CR55K (Note 4)	
Output	Rated voltage	3-phase 170 V AC	
	Rated current [A]	174	204
Main circuit power supply input		Main circuit power is supplied from the converter unit to the drive unit. (Note 4)	
Control circuit power supply input	Voltage/frequency	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current [A]	0.3	
	Permissible voltage fluctuation	1-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation	±5% maximum	
	Power consumption [W]	45	
Interface power supply		24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signals))	
Control method		Sine-wave PWM control/current control method	
Dynamic brake		External option (Note 3)	
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)	
		RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 5)	
Encoder output pulse		Compatible (A/B/Z-phase pulse)	
Analog monitor		2 channels	
Position control mode	Maximum input pulse frequency	4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)	
	Positioning feedback pulse	Encoder resolution: 22 bits	
	Command pulse multiplying factor	Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000	
	Positioning complete width setting	0 pulse to ±65535 pulses (command pulse unit)	
	Error excessive	±3 rotations	
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Speed control mode	Speed control range	Analog speed command 1:2000, internal speed command 1:5000	
	Analog speed command input	0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)	
	Speed fluctuation rate	±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command	
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Torque control mode	Analog torque command input	0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)	
	Speed limit	Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)	
Positioning mode (Note 6)	MR-J4-DU_A	Not available	
	MR-J4-DU_A-RJ	Point table method, program method, indexer (turret) method	
Fully closed loop control	MR-J4-DU_A	Two-wire type communication method	
	MR-J4-DU_A-RJ	Two-wire/four-wire type communication method	
Load-side encoder interface	MR-J4-DU_A	Mitsubishi high-speed serial communication	
	MR-J4-DU_A-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal	
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control, lost motion compensation	
Protective functions		Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection	

MR-J4-DU_A/MR-J4-DU_A-RJ (General-purpose Interface) Specifications (200 V)　A　A-RJ

Drive unit model MR-J4-_(-RJ)		DU30KA	DU37KA
Functional safety		STO (IEC/EN 61800-5-2)	
Safety performance	Standards certified by CB (Note 8)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2	
	Response performance	8 ms or less (STO input OFF → energy shut-off)	
	Test pulse input (STO) (Note 2)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)	
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]	
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]	
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)		Force cooling, open (IP20) (Note 1)	
Close mounting		Not possible	
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude	2000 m or less above sea level (Note 7)	
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass [kg]		21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
4. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
5. RS-485 communication function is available with the drive units manufactured in January 2015 or later. Refer to "MR-J4-DU_(-RJ) MR-CR-55K_Servo Amplifier Instruction Manual" for checking procedure of manufacture data.
6. The positioning mode is available with MR-J4-DU_A-RJ drive unit with software version B3 or later.
7. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
8. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

Drive Product

MR-J4-A4/MR-J4-A4-RJ (General-purpose Interface) Specifications (400 V) [A] [A-RJ]

Servo amplifier model MR-J4-_(-RJ)			60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4
Output	Rated voltage		3-phase 323 V AC								
	Rated current [A]		1.5	2.8	5.4	8.6	14.0	17.0	32.0	41.0	63.0
Main circuit power supply input	Voltage/frequency (Note 1)		3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current [A]		1.4	2.5	5.1	7.9	10.8	14.4	23.1	31.8	47.6
	Permissible voltage fluctuation		3-phase 323 V AC to 528 V AC								
	Permissible frequency fluctuation		±5% maximum								
Control circuit power supply input	Voltage/frequency		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz								
	Rated current [A]		0.1		0.2						
	Permissible voltage fluctuation		1-phase 323 V AC to 528 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 signals))								
Control method			Sine-wave PWM control/current control method								
Permissible regenerative power	Built-in regenerative resistor (Note 2, 3) [W]		15	15	100	100	130 (Note 10)	170 (Note 10)	-	-	-
	External regenerative resistor (standard accessory) (Note 2, 3, 7, 8) [W]		-	-	-	-	-	-	500 (800)	850 (1300)	850 (1300)
Dynamic brake			Built-in (Note 4)						External option (Note 9)		
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)								
			RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 12)								
Encoder output pulse			Compatible (A/B/Z-phase pulse)								
Analog monitor			2 channels								
Position control mode	Maximum input pulse frequency		4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)								
	Positioning feedback pulse		Encoder resolution: 22 bits								
	Command pulse multiplying factor		Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000								
	Positioning complete width setting		0 pulse to ±65535 pulses (command pulse unit)								
	Error excessive		±3 rotations								
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)								
Speed control mode	Speed control range		Analog speed command 1:2000, internal speed command 1:5000								
	Analog speed command input		0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)								
	Speed fluctuation rate		±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command								
	Torque limit		Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)								
Torque control mode	Analog torque command input		0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)								
	Speed limit		Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)								
Positioning mode (Note 13)	MR-J4-A4		Not available								
	MR-J4-A4-RJ		Point table method, program method, indexer (turret) method								
Fully closed loop control	MR-J4-A4		Two-wire type communication method								
	MR-J4-A4-RJ		Two-wire/four-wire type communication method								
Load-side encoder interface	MR-J4-A4		Mitsubishi high-speed serial communication								
	MR-J4-A4-RJ		Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal								
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control (Note 11), lost motion compensation (Note 11)								
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								

MR-J4-A4/MR-J4-A4-RJ (General-purpose Interface) Specifications (400 V)　　A　A-RJ

Servo amplifier model MR-J4-_(-RJ)		60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4
Functional safety		STO (IEC/EN 61800-5-2)								
Safety performance	Standards certified by CB (Note 15)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2								
	Response performance	8 ms or less (STO input OFF → energy shut-off)								
	Test pulse input (STO) (Note 6)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum								
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)								
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]								
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]								
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Structure (IP rating)		Natural cooling, open (IP20)	Force cooling, open (IP20)	Force cooling, open (IP20) (Note 5)						
Close mounting		Not possible								
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)								
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)								
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude	2000 m or less above sea level (Note 14)								
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)								
Mass [kg]		1.7	1.7	2.1	3.6	4.3	6.5	13.4	13.4	18.2

Notes: 1. Rated output and speed of a rotary servo motor, and continuous 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. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
4. When using the built-in dynamic brake, refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) 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. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
7. The value in brackets is applicable when cooling fans (two units of 92 mm × 92 mm, minimum air flow: 1.0 m³/min) are installed, and then [Pr. PA02] is changed.
8. Servo amplifiers without an enclosed regenerative resistor are also available. Refer to "1-Axis Servo Amplifier Model Designation" in this catalog for details.
9. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
10. The servo amplifier built-in regenerative resistor is compatible with the maximum torque deceleration when the servo motor is used within the rated speed and the recommended load to motor inertia ratio. Contact your local sales office if the operating motor speed or the load to motor inertia ratio exceeds the rated speed or the recommended ratio.
11. This function is available with the servo amplifiers with software version B4 or later.
12. RS-485 communication function is available with the servo amplifiers manufactured in November 2014 or later. Refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for checking procedure of manufacture data.
13. The positioning mode is available with MR-J4-A4-RJ servo amplifier with software version B3 or later.
14. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
15. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

Drive Product

MR-J4-DU_A4/MR-J4-DU_A4-RJ (General-purpose Interface) Specifications (400 V) `A` `A-RJ`

Drive unit model MR-J4-_(-RJ)		DU30KA4	DU37KA4	DU45KA4	DU55KA4
Compatible converter unit model		MR-CR55K4 (Note 4)			
Output	Rated voltage	3-phase 323 V AC			
	Rated current [A]	87	102	131	143
Main circuit power supply input		Main circuit power is supplied from the converter unit to the drive unit. (Note 4)			
Control circuit power supply input	Voltage/frequency	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			
	Rated current [A]	0.2			
	Permissible voltage fluctuation	1-phase 323 V AC to 528 V AC			
	Permissible frequency fluctuation	±5% maximum			
	Power consumption [W]	45			
Interface power supply		24 V DC ± 10% (required current capacity: 0.5 A (including CN8 connector signals))			
Control method		Sine-wave PWM control/current control method			
Dynamic brake		External option (Note 3)			
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)			
		RS-422/RS-485: 1 : n communication (up to 32 axes) (Note 5)			
Encoder output pulse		Compatible (A/B/Z-phase pulse)			
Analog monitor		2 channels			
Position control mode	Maximum input pulse frequency	4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)			
	Positioning feedback pulse	Encoder resolution: 22 bits			
	Command pulse multiplying factor	Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000			
	Positioning complete width setting	0 pulse to ±65535 pulses (command pulse unit)			
	Error excessive	±3 rotations			
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)			
Speed control mode	Speed control range	Analog speed command 1:2000, internal speed command 1:5000			
	Analog speed command input	0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)			
	Speed fluctuation rate	±0.01% maximum (load fluctuation 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command			
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)			
Torque control mode	Analog torque command input	0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)			
	Speed limit	Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)			
Positioning mode (Note 6)	MR-J4-DU_A4	Not available			
	MR-J4-DU_A4-RJ	Point table method, program method, indexer (turret) method			
Fully closed loop control	MR-J4-DU_A4	Two-wire type communication method			
	MR-J4-DU_A4-RJ	Two-wire/four-wire type communication method			
Load-side encoder interface	MR-J4-DU_A4	Mitsubishi high-speed serial communication			
	MR-J4-DU_A4-RJ	Mitsubishi high-speed serial communication, A/B/Z-phase differential input signal			
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, super trace control, lost motion compensation			
Protective functions		Overcurrent shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection,			

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MR-J4-DU_A4/MR-J4-DU_A4-RJ (General-purpose Interface) Specifications (400 V)   A   A-RJ

Drive unit model MR-J4-_(-RJ)		DU30KA4	DU37KA4	DU45KA4	DU55KA4
Functional safety		STO (IEC/EN 61800-5-2)			
Safety performance	Standards certified by CB (Note 8)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2			
	Response performance	8 ms or less (STO input OFF → energy shut-off)			
	Test pulse input (STO) (Note 2)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum			
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)			
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]			
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4 × 10^{-9} [1/h]			
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.			
Structure (IP rating)		Force cooling, open (IP20) (Note 1)			
Close mounting		Not possible			
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)			
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)			
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude	2000 m or less above sea level (Note 7)			
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)			
Mass [kg]		16		21	

Notes: 1. Terminal blocks are excluded.
2. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the drive unit instantaneously at regular intervals.
3. Use an optional external dynamic brake with the servo amplifier. Without the external dynamic brake, a servo motor does not stop immediately at emergency stop and falls in free-run status, causing an accident such as machine collision, etc. Take measures to ensure safety on the entire system when not using the dynamic brake.
4. One unit of converter unit is required for each drive unit. Refer to "MR-CR Converter Unit Specifications (200 V/400 V)" on p. 302 in this catalog for the specifications of the converter unit.
5. RS-485 communication function is available with the drive units manufactured in January 2015 or later. Refer to "MR-J4-DU_(-RJ) MR-CR-55K_Servo Amplifier Instruction Manual" for checking procedure of manufacture data.
6. The positioning mode is available with MR-J4-DU_A4-RJ drive unit with software version B3 or later.
7. Refer to relevant Servo Amplifier Instruction Manual for the restrictions when using the servo amplifiers at altitude exceeding 1000 m and up to 2000 m above sea level.
8. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to relevant Servo Amplifier Instruction Manual for details.

Drive Product

MR-J4-03A6/MR-J4-03A6-RJ (General-purpose Interface) Specifications A A-RJ

Servo amplifier model		MR-J4-03A6	MR-J4-03A6-RJ
Output	Rated voltage	3-phase 13 V AC	
	Rated current [A]	2.4	
Main circuit power supply input	Voltage (Note 1)	48 V DC/24 V DC (Note 2)	
	Rated current [A]	For 48 V DC: 1.2 A For 24 V DC: 2.4 A	
	Permissible voltage fluctuation	For 48 V DC: 40.8 V DC to 55.2 V DC For 24 V DC: 21.6 V DC to 26.4 V DC	
Control circuit power supply input	Voltage	24 V DC	
	Rated current [A]	0.2	
	Permissible voltage fluctuation	21.6 V DC to 26.4 V DC	
	Power consumption [W]	5.0	
Interface power supply		24 V DC ± 10% (required current capacity: 0.3 A)	
Control method		Sine-wave PWM control/current control method	
Permissible regenerative power of the built-in regenerative resistor [W]		0.7	
Dynamic brake		Built-in (Note 3, 4)	
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)	
		RS-422: 1 : n communication (up to 32 axes)	
Encoder output pulse		Compatible (A/B/Z-phase pulse)	
Analog monitor		2 channels	
Position control mode	Maximum input pulse frequency	4 Mpulses/s (when using differential receiver), 200 kpulses/s (when using open collector)	
	Positioning feedback pulse	Encoder resolution: 18 bits	
	Command pulse multiplying factor	Electronic gear A/B multiple, A: 1 to 16777215, B: 1 to 16777215, 1/10 < A/B < 4000	
	Positioning complete width setting	0 pulse to ±65535 pulses (command pulse unit)	
	Error excessive	±3 rotations	
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Speed control mode	Speed control range	Analog speed command 1:2000, internal speed command 1:5000	
	Analog speed command input	0 V DC to ±10 V DC/rated speed (Speed at 10 V is changeable with [Pr. PC12].)	
	Speed fluctuation rate	±0.01% maximum (load fluctuation: 0% to 100%), 0% (power fluctuation: ±10%) ±0.2% maximum (ambient temperature: 25 °C ± 10 °C) only when using analog speed command	
	Torque limit	Set by parameters or external analog input (0 V DC to +10 V DC/maximum torque)	
Torque control mode	Analog torque command input	0 V DC to ±8 V DC/maximum torque (input impedance: 10 kΩ to 12 kΩ)	
	Speed limit	Set by parameters or external analog input (0 V DC to ± 10 V DC/rated speed)	
Positioning mode		Not available	Point table method, program method, indexer (turret) method
Fully closed loop control		Not compatible	
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, vibration tough drive function, drive recorder function, machine diagnosis function, power monitoring function	
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection	
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.	
Structure (IP rating)		Natural cooling, open (IP20)	
Close mounting		Possible (Note 5)	
DIN rail mounting (35 mm wide)		Possible	
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)	
	Ambient humidity	Operation/storage: 90 %RH maximum (non-condensing)	
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
	Altitude	1000 m or less above sea level	
	Vibration resistance	5.9 m/s^2 at 10 Hz to 55 Hz (directions of X, Y and Z axes)	
Mass [kg]		0.2	

Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier, combined with the servo motor, is operated within the specified power supply voltage.
2. Initial value is 48 V DC. For 24 V DC, set [Pr. PC27] to "_ _ 1 _." Servo motor characteristics vary depending on whether the voltage is 48 V DC or 24 V DC. Refer to "HG-AK Series (Ultra-compact Size, Ultra-small Capacity) Specifications" and "HG-AK Series Torque Characteristics" in this catalog.
3. The dynamic brake is electronic. The electronic dynamic brake does not operate when the control circuit power is off. It may not operate depending on alarms and warnings. Refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for details.
4. When using the built-in dynamic brake, refer to "MR-J4-_A_(-RJ) MR-J4-03A6(-RJ) Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
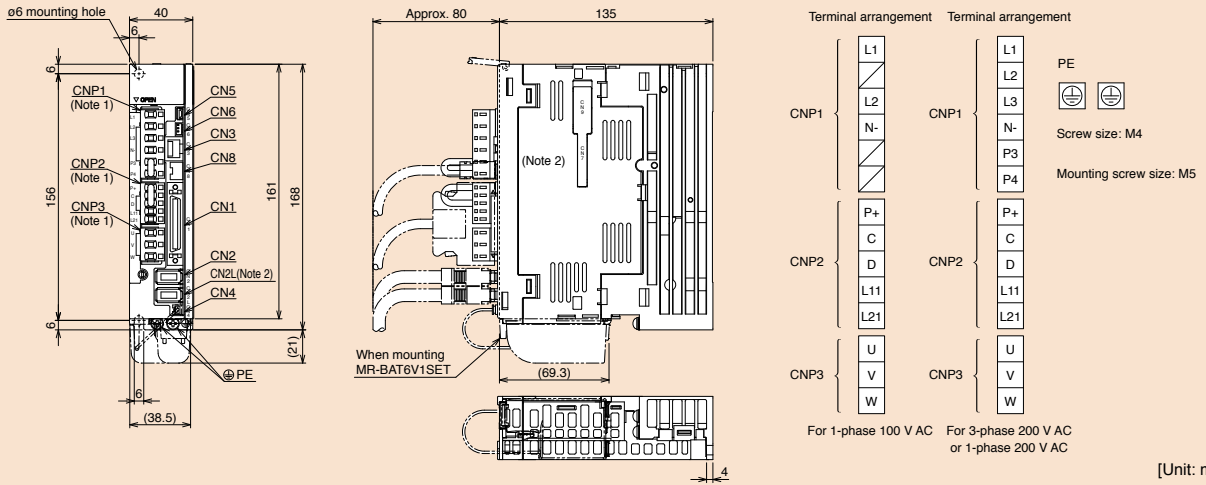5. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C.

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MR-JE Series
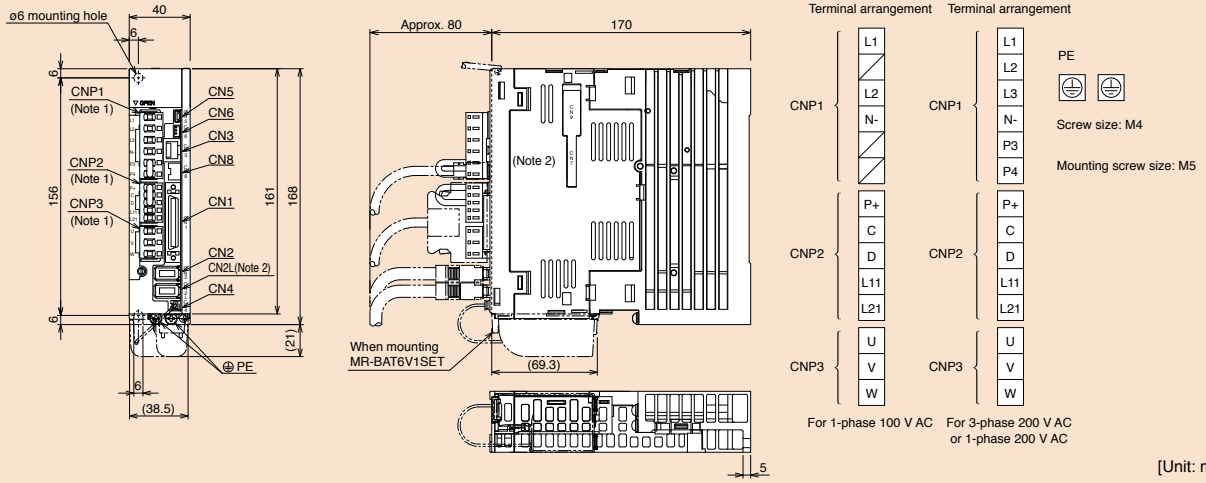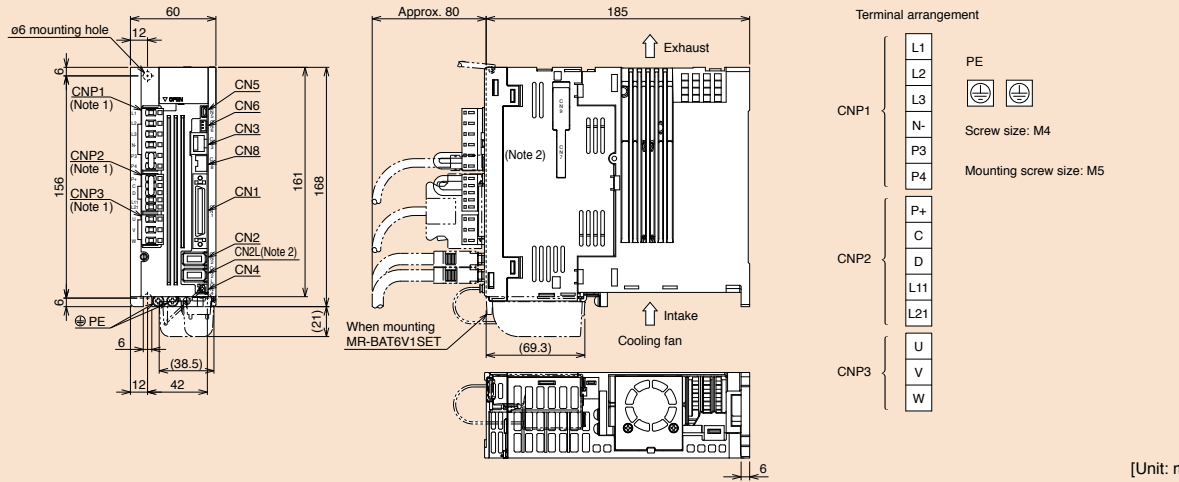
MR-J4-A/MR-J4-A-RJ Dimensions

A   A-RJ

● MR-J4-10A, MR-J4-10A-RJ, MR-J4-10A1, MR-J4-10A1-RJ
● MR-J4-20A, MR-J4-20A-RJ, MR-J4-20A1, MR-J4-20A1-RJ

[Unit: mm]

● MR-J4-40A, MR-J4-40A-RJ, MR-J4-40A1, MR-J4-40A1-RJ
● MR-J4-60A, MR-J4-60A-RJ

[Unit: mm]

● MR-J4-70A, MR-J4-70A-RJ
● MR-J4-100A, MR-J4-100A-RJ

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
   2. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.

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MR-J4-A/MR-J4-A-RJ Dimensions   A   A-RJ

● MR-J4-60A4, MR-J4-60A4-RJ
● MR-J4-100A4, MR-J4-100A4-RJ

[Unit: mm]

● MR-J4-200A, MR-J4-200A-RJ

[Unit: mm]

● MR-J4-200A4, MR-J4-200A4-RJ
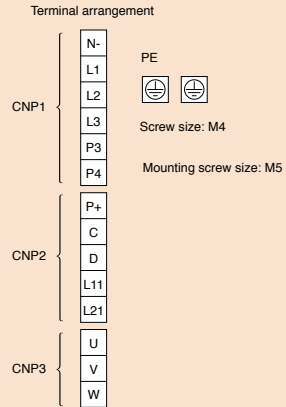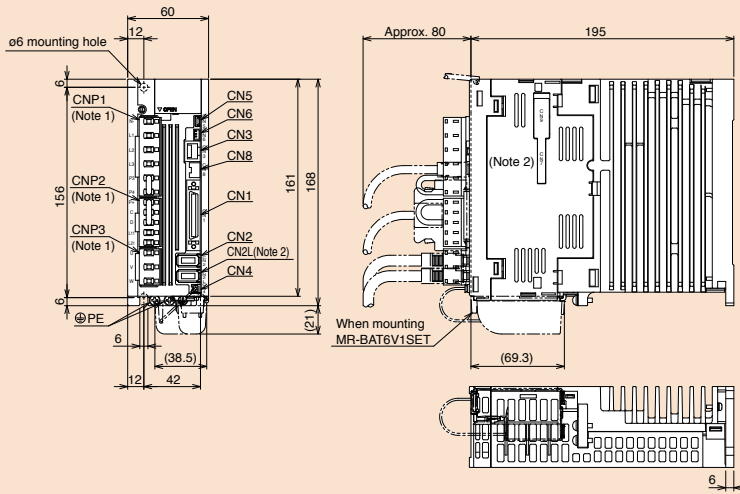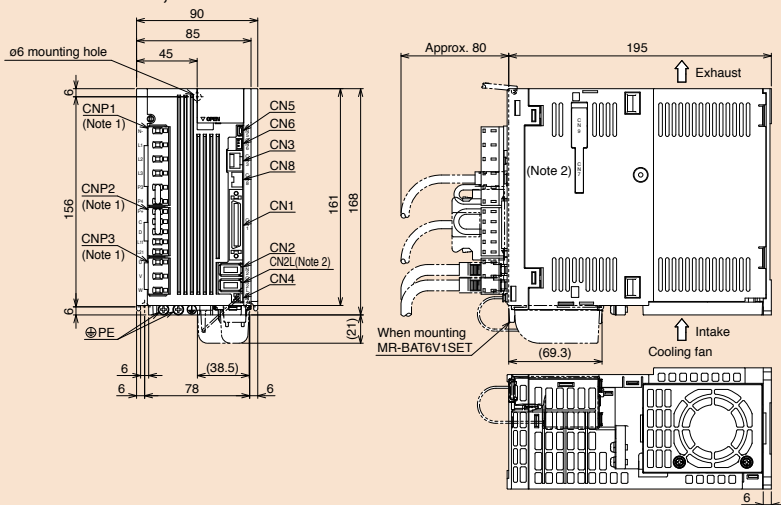

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.
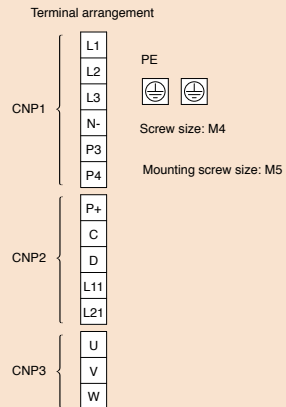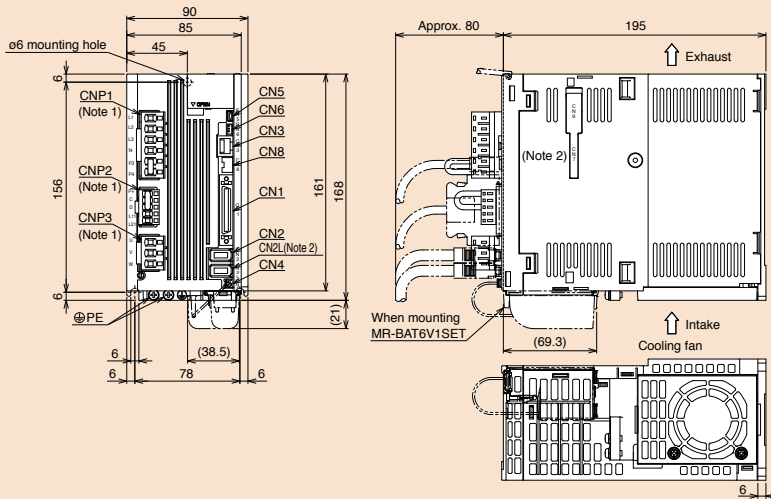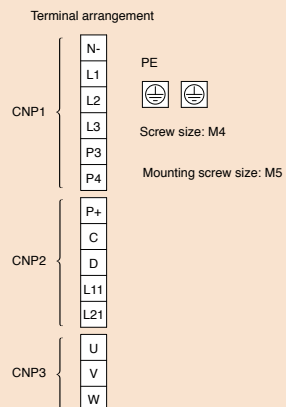
MR-J4-A/MR-J4-A-RJ Dimensions

A   A-RJ

● MR-J4-350A, MR-J4-350A-RJ

Mounting hole

Terminal arrangement

CNP1
L1
L2
L3
N-
P3
P4

CNP2
P+
C
D
L11
L21

CNP3
U
V
W

PE

Screw size: M4

Mounting screw size: M5

[Unit: mm]

● MR-J4-350A4, MR-J4-350A4-RJ

Terminal arrangement

CNP1
N-
L1
L2
L3
P3
P4

PE

Screw size: M4

Mounting screw size: M5

CNP2
P+
C
D
L11
L21

CNP3
U
V
W

[Unit: mm]

● MR-J4-500A, MR-J4-500A-RJ

Terminal diagram
(with front cover open)

Terminal arrangement

TE2
L11
L21

PE

TE1
L1
L2
L3
N-

Terminal screw size
TE1: M4
TE2: M3.5
TE3: M4
TE4: M4
PE: M4

Mounting screw size: M5

TE3
P3
P4
P+
C

TE4
D
U
V
W

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.
2. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.

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MR-J4-A/MR-J4-A-RJ Dimensions

A　A-RJ

● MR-J4-500A4, MR-J4-500A4-RJ

Terminal screw size
　TE1: M4
　TE2: M3.5
　TE3: M4
　PE: M4
Mounting screw size: M5

Terminal arrangement

TE2		TE3		
L11	L21	N-	P3	P4

TE1							
L1	L2	L3	P+	C	U	V	W

PE
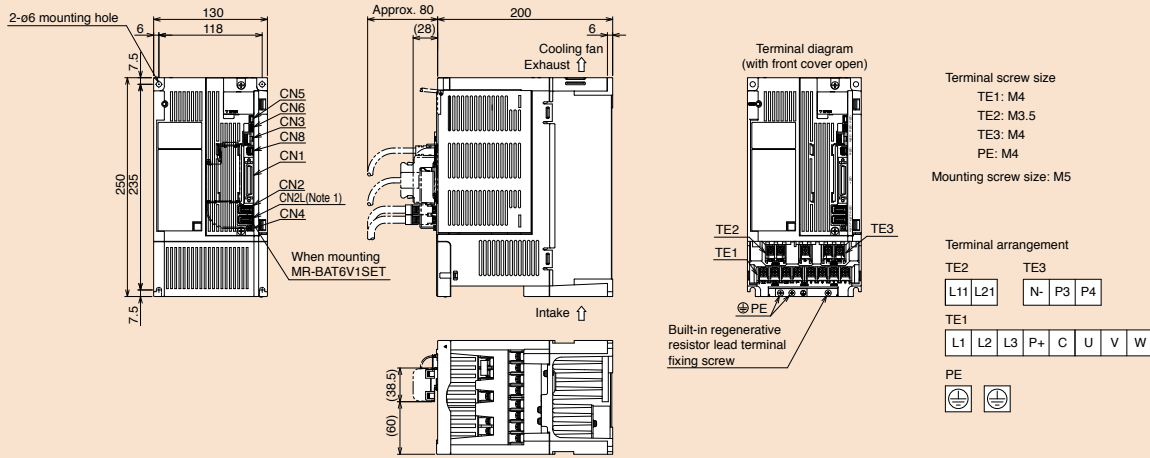
[Unit: mm]

● MR-J4-700A, MR-J4-700A-RJ, MR-J4-700A4, MR-J4-700A4-RJ

Terminal screw size
　TE1: M4
　TE2: M3.5
　TE3: M4
　PE: M4
Mounting screw size: M5

Terminal arrangement

TE3		
N-	P3	P4

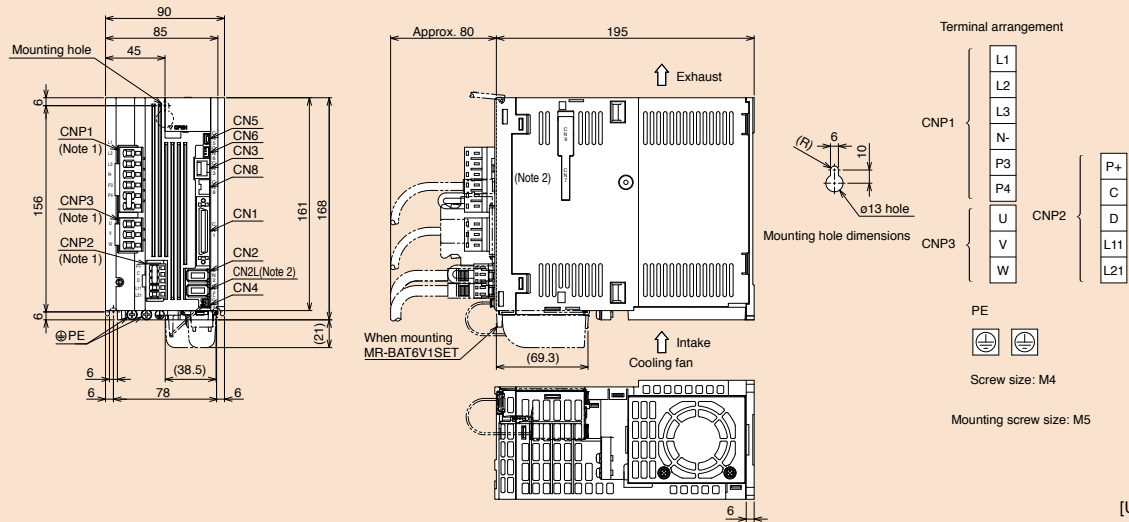| TE1								TE2	
L1	L2	L3	P+	C	U	V	W	L11	L21

PE

[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.
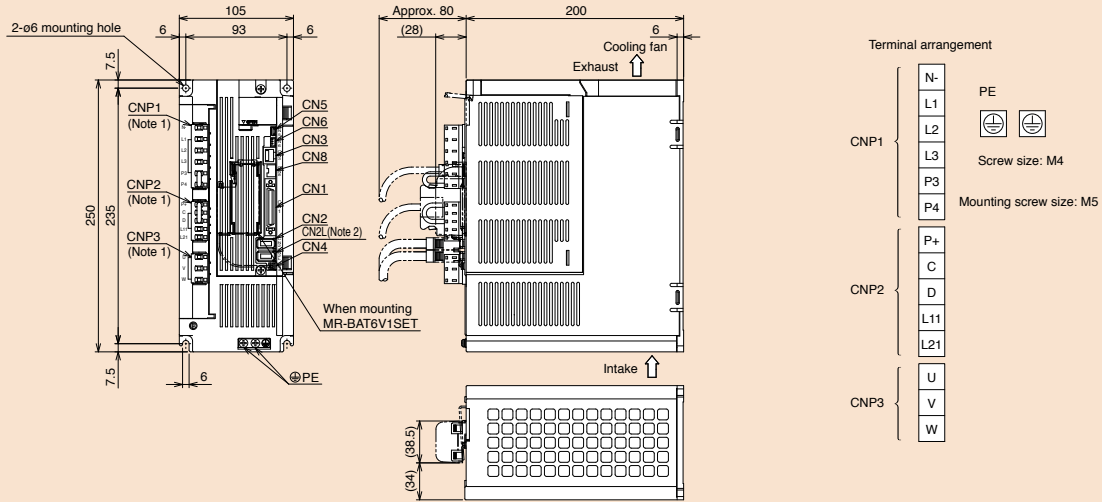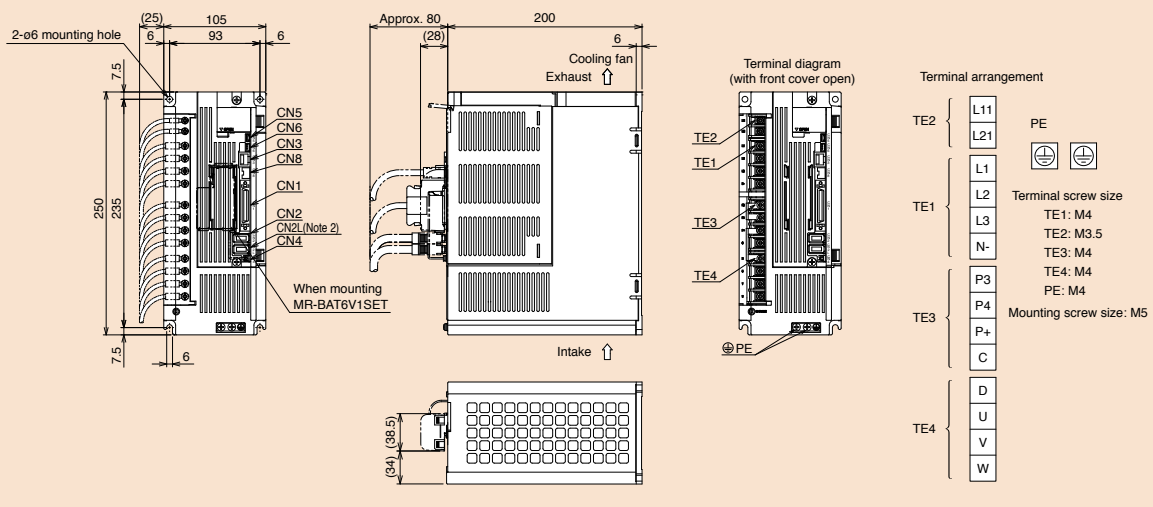
MR-J4-A/MR-J4-A-RJ Dimensions

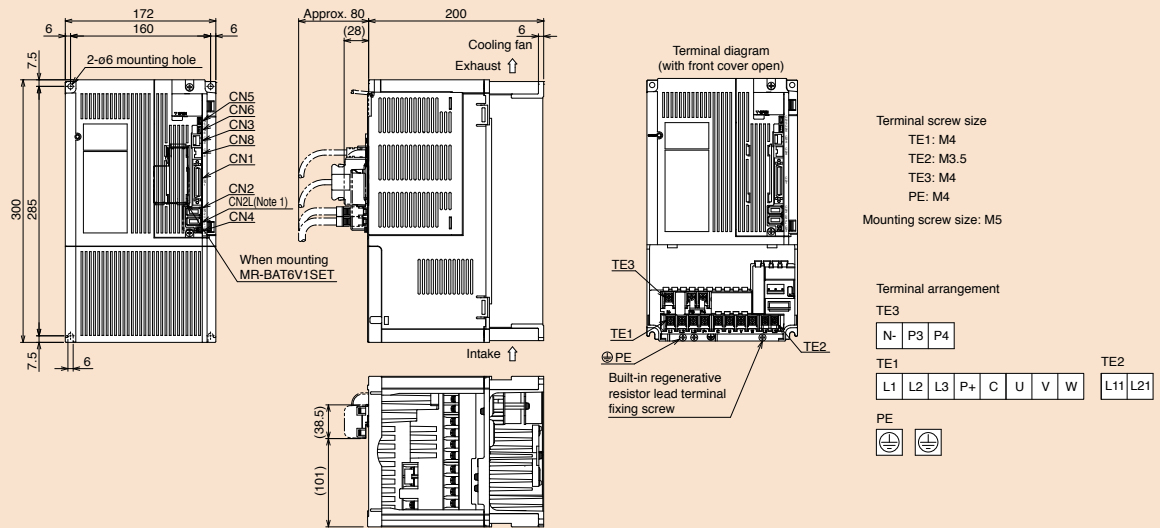● MR-J4-11KA, MR-J4-11KA-RJ, MR-J4-11KA4, MR-J4-11KA4-RJ
● MR-J4-15KA, MR-J4-15KA-RJ, MR-J4-15KA4, MR-J4-15KA4-RJ

Terminal screw size
TE1-1: M6
TE1-2: M6
TE2: M4
PE: M6
Mounting screw size: M5

Terminal arrangement
TE1-1

L1	L2	L3	U	V	W

TE1-2

P3	P4	P+	C	/	N-

TE2

L11	L21

PE

[Unit: mm]

● MR-J4-22KA, MR-J4-22KA-RJ, MR-J4-22KA4, MR-J4-22KA4-RJ

Terminal screw size
TE1-1: M8
TE1-2: M8
TE2: M4
PE: M8
Mounting screw size: M10

Terminal arrangement
TE1-1

L1	L2	L3	U	V	W

TE1-2

P3	P4	P+	C	/	N-

TE2

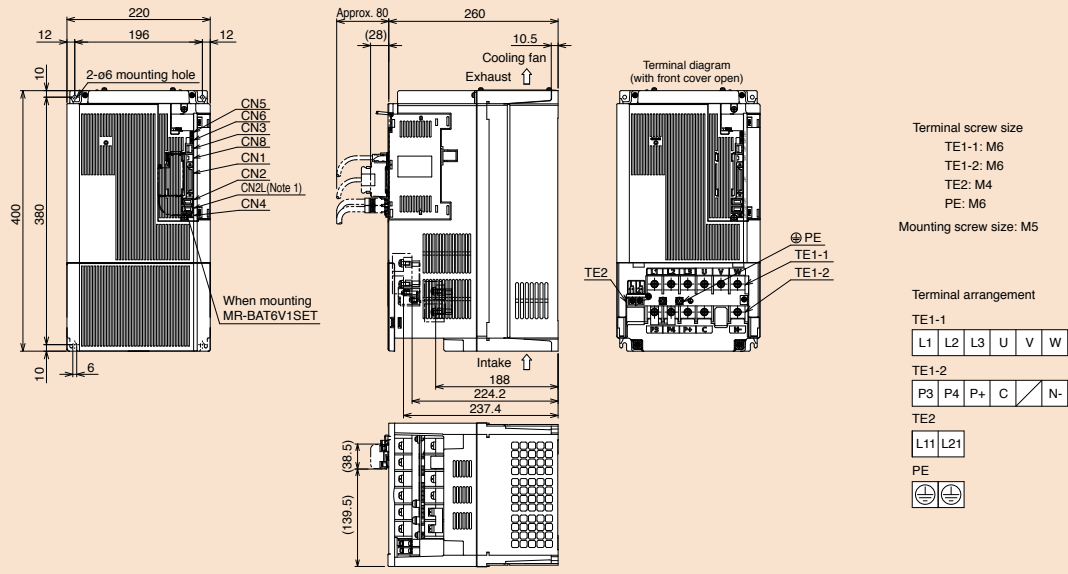| L11	L21

PE

[Unit: mm]

Notes: 1. CN2L, CN7, and CN9 connectors are not available for MR-J4-A servo amplifier. CN9 connector is available with MR-J4-A-RJ servo amplifiers manufactured in November 2014 or later.
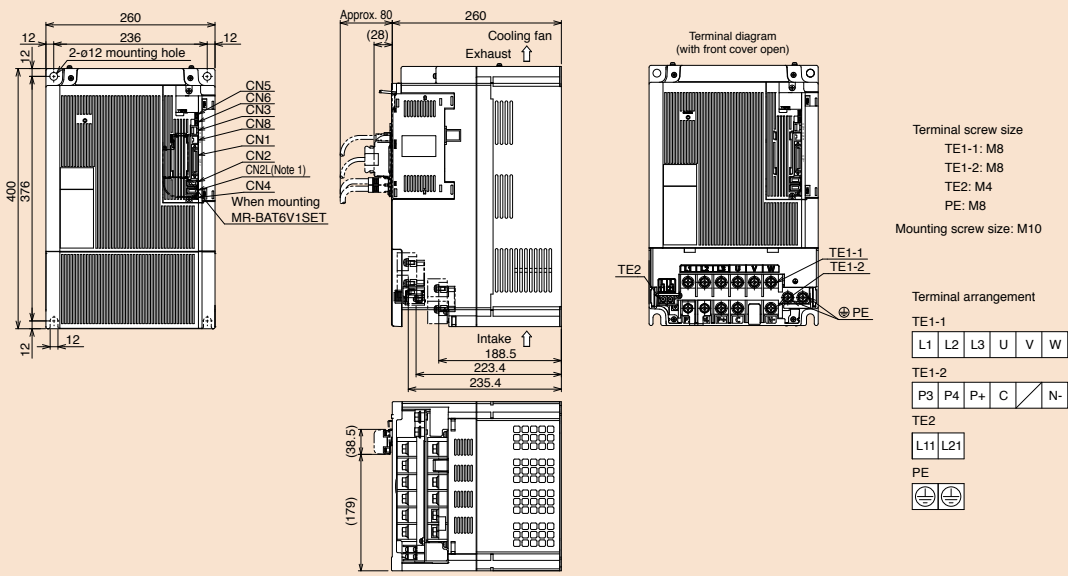
MR-J4-DU_A/MR-J4-DU_A-RJ Dimensions (Note 1)　A　A-RJ

● MR-J4-DU30KA, MR-J4-DU30KA-RJ
● MR-J4-DU37KA, MR-J4-DU37KA-RJ
● MR-J4-DU45KA4, MR-J4-DU45KA4-RJ
● MR-J4-DU55KA4, MR-J4-DU55KA4-RJ

Terminal screw size
TE1: M10
TE2-1: M6
TE2-2: M6
TE3: M4
PE: M10

Mounting screw size: M6

Terminal arrangement

[Unit: mm]
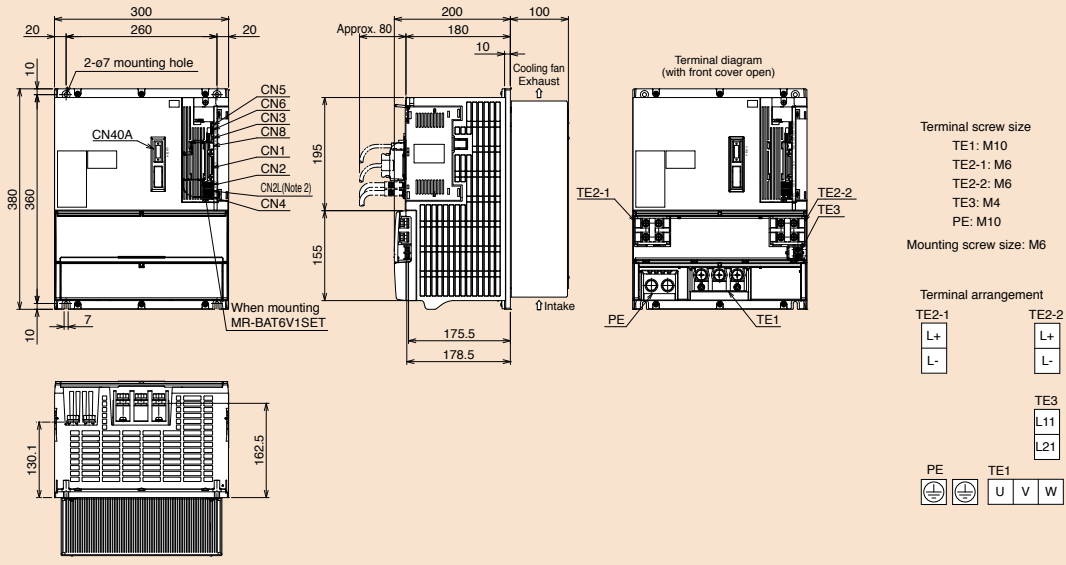
● MR-J4-DU30KA4, MR-J4-DU30KA4-RJ
● MR-J4-DU37KA4, MR-J4-DU37KA4-RJ

Terminal screw size
TE1: M8
TE2: M6
TE3: M4
PE: M8

Mounting screw size: M5
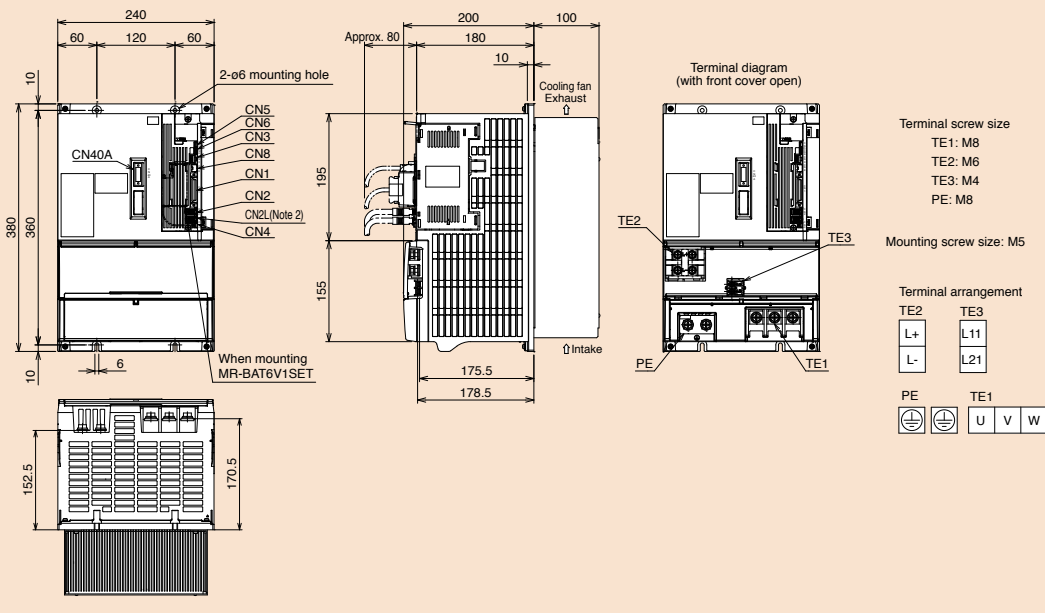
[Unit: mm]

Notes: 1. For the panel cut dimensions, refer to "Panel Cut Dimensions for Converter Unit and Drive Unit" in this catalog.
　　2. CN2L, CN7, and CN9 connectors are not available for MR-J4-DU_A_ drive unit. MR-J4-DU_A_-RJ is equipped with CN7 and CN9 connectors; however, these connectors are not for use.

AC Servo MELSERVO-J4

MR-J4-03A6/MR-J4-03A6-RJ Dimensions

A A-RJ
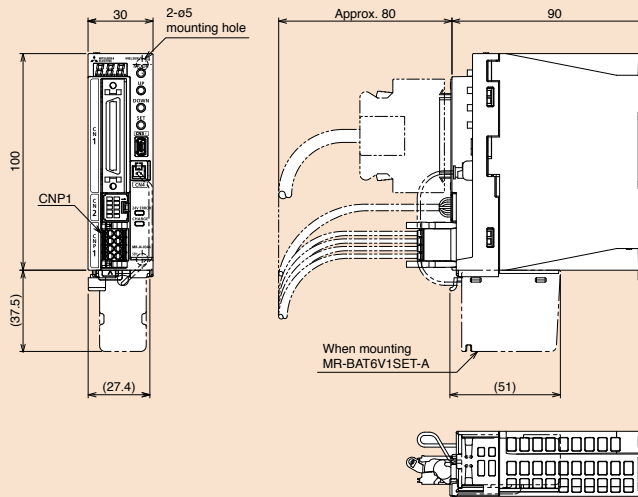
Terminal arrangement

CNP1

5	0	24	1
6	⏚	PM	2
7	W	U	3
8	E	V	4

Mounting screw size: M4

[Unit: mm]

AC Servo
P.268

Inverter
P.436

335

Drive Product

MEMO

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

● Rotary Servo Motors

Model Designation

● For 200 V class

H G - K R 0 5 3 B

Symbol	Special specifications
None	Standard
W0C	Servo motors with functional safety

Symbol	Shaft end
None	Standard (Straight shaft) (Note 6)
K	Key shaft (with/without key) (Note 7)
D	D-cut shaft (Note 7)

Symbol	Reducer (Note 5)
None	None
G1	With reducer for general industrial machines, flange mounting
G1H	With reducer for general industrial machines, foot mounting
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	Oil seal
None	None (Note 8)
J	Installed (Note 2, 3, 4)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

Symbol	Rated speed [r/min]
1	1000
1M	1500
2	2000
3	3000

Symbol	Rated output [kW]	Symbol	Rated output [kW]
05	0.05	50	5.0
1	0.1	60	6.0
2	0.2	70	7.0
4	0.4	80	8.0
5	0.5	90	9.0
7	0.75	11K	11
8	0.85	12K	12
10	1.0	15K	15
12	1.2	20K	20
15	1.5	22K	22
20	2.0	25K	25
30	3.0	30K	30
35	3.5 (Note 9)	37K	37
42	4.2		

Symbol	Inertia/capacity
HG-KR	Low inertia, small capacity
HG-MR	Ultra-low inertia, small capacity
HG-SR	Medium inertia, medium capacity
HG-JR	Low inertia, medium-large capacity
HG-RR	Ultra-low inertia, medium capacity
HG-UR	Flat type, medium capacity

Notes: 1. Refer to electromagnetic brake specifications of each servo motor series in this catalog for the available models and detailed specifications.
2. 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 oil seal are different from those without oil seal. Contact your local sales office for more details. For HG-SR series, dimensions are the same regardless of whether or not oil seal is installed.
5. Refer to "Geared Servo Motor Specifications" in this catalog for the available models and detailed specifications.
6. Standard HG-SR G1/G1H has a key shaft (with key).
7. Refer to special shaft end specifications of each servo motor series in this catalog for the available models and detailed specifications.
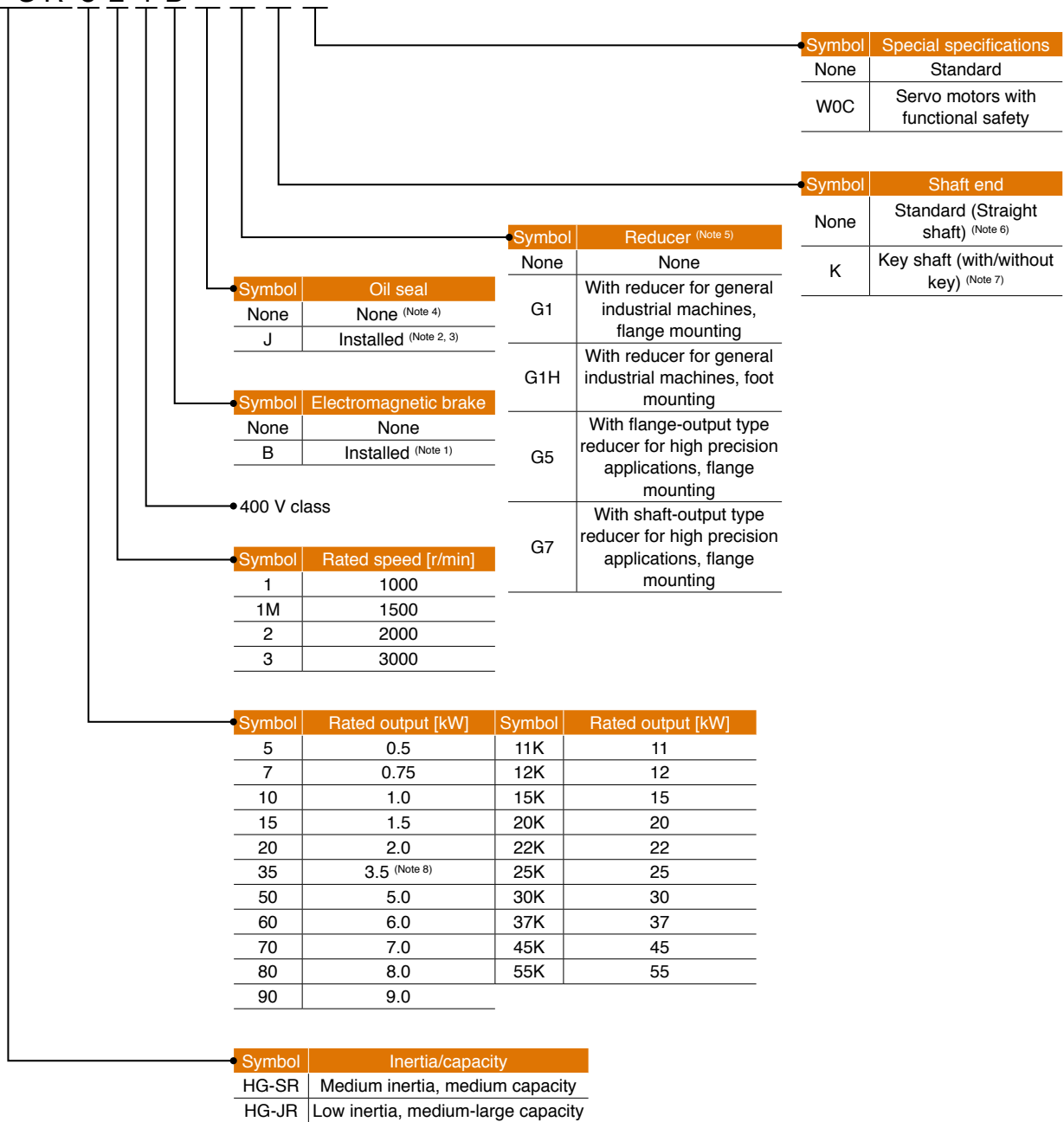8. Oil seal is installed in HG-JR, HG-RR, and HG-UR series as a standard.
9. For HG-JR353(B), the rated output varies depending on the servo amplifier to be combined. Refer to "HG-JR 3000 r/min Series (Low Inertia, Medium Capacity) (200 V Class) Specifications" for details.

Drive Product

Model Designation

● For 400 V class

H G - S R 5 2 4 B

Symbol	Special specifications
None	Standard
W0C	Servo motors with functional safety

Symbol	Shaft end
None	Standard (Straight shaft) (Note 6)
K	Key shaft (with/without key) (Note 7)

Symbol	Reducer (Note 5)
None	None
G1	With reducer for general industrial machines, flange mounting
G1H	With reducer for general industrial machines, foot mounting
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	Oil seal
None	None (Note 4)
J	Installed (Note 2, 3)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

● 400 V class

Symbol	Rated speed [r/min]
1	1000
1M	1500
2	2000
3	3000

Symbol	Rated output [kW]	Symbol	Rated output [kW]
5	0.5	11K	11
7	0.75	12K	12
10	1.0	15K	15
15	1.5	20K	20
20	2.0	22K	22
35	3.5 (Note 8)	25K	25
50	5.0	30K	30
60	6.0	37K	37
70	7.0	45K	45
80	8.0	55K	55
90	9.0		

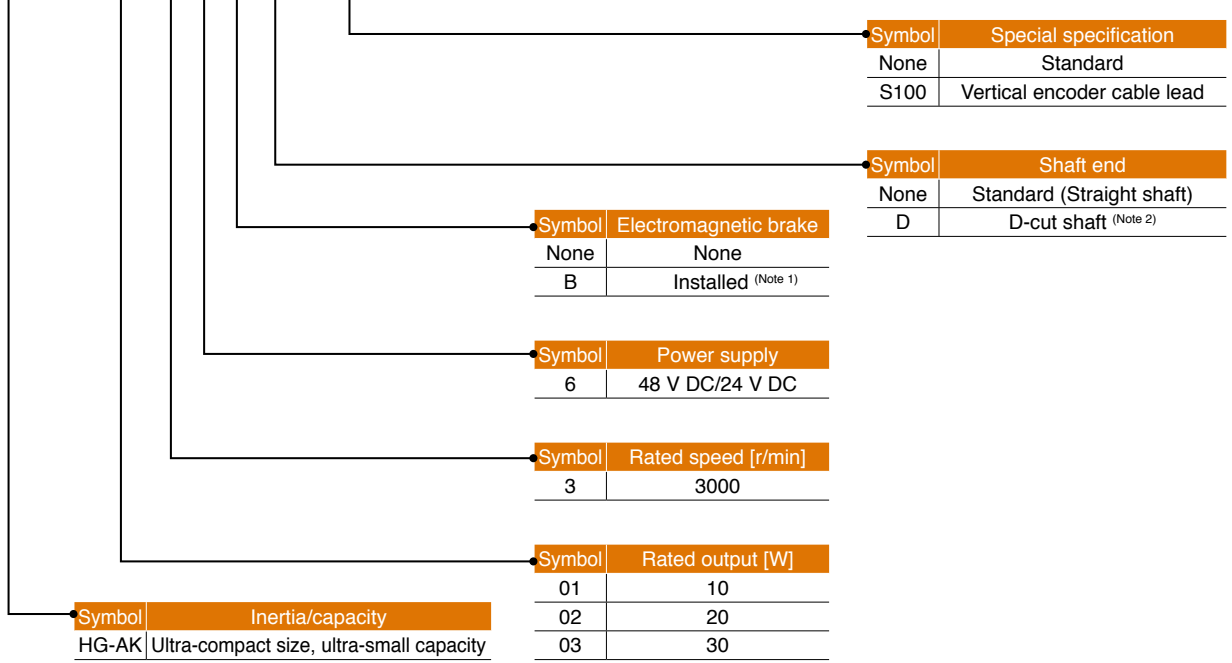| Symbol	Inertia/capacity
HG-SR	Medium inertia, medium capacity
HG-JR	Low inertia, medium-large capacity

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 HG-SR series.
3. Oil seal is not installed in the geared servo motor.
4. Oil seal is installed in HG-JR series as a standard.
5. Refer to "Geared Servo Motor Specifications" in this catalog for the available models and detailed specifications.
6. Standard HG-SR G1/G1H has a key shaft (with key).
7. Refer to special shaft end specifications of each servo motor series in this catalog for the available models and detailed specifications.
8. For HG-JR3534(B), the rated output varies depending on the servo amplifier to be combined. Refer to "HG-JR 3000 r/min Series (Low Inertia, Medium Capacity) (400 V Class) Specifications" for details.
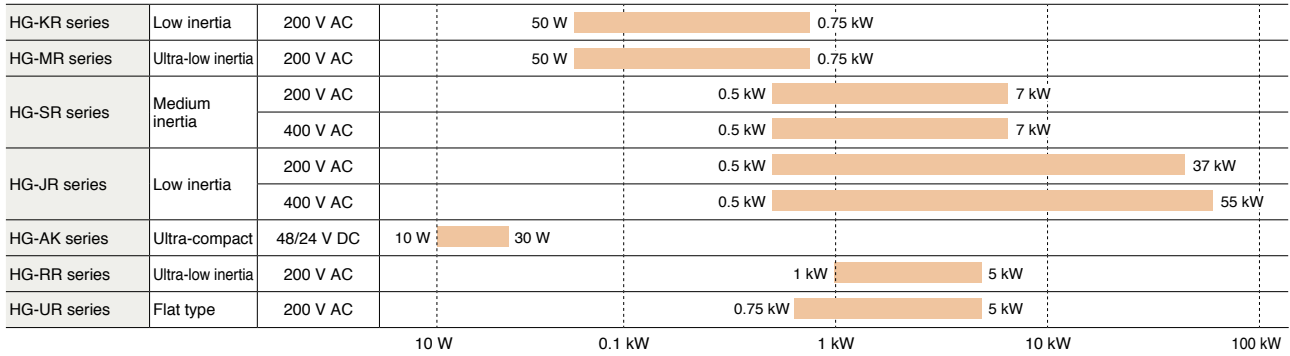
Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Model Designation

● For 48 V DC/24 V DC

H G - A K 0 1 3 6 B   -

Symbol	Special specification
None	Standard
S100	Vertical encoder cable lead

Symbol	Shaft end
None	Standard (Straight shaft)
D	D-cut shaft (Note 2)

Symbol	Electromagnetic brake
None	None
B	Installed (Note 1)

Symbol	Power supply
6	48 V DC/24 V DC

Symbol	Rated speed [r/min]
3	3000

Symbol	Inertia/capacity
HG-AK	Ultra-compact size, ultra-small capacity

Symbol	Rated output [W]
01	10
02	20
03	30

Notes: 1. Refer to "HG-AK Series Electromagnetic Brake Specifications" in this catalog for the available models and detailed specifications.
　　　 2. Refer to "HG-AK Series Special Shaft End Specifications" in this catalog for details.

Drive Product

Product Lines

Series	Inertia	Voltage	Power range
HG-KR series	Low inertia	200 V AC	50 W – 0.75 kW
HG-MR series	Ultra-low inertia	200 V AC	50 W – 0.75 kW
HG-SR series	Medium inertia	200 V AC	0.5 kW – 7 kW
		400 V AC	0.5 kW – 7 kW
HG-JR series	Low inertia	200 V AC	0.5 kW – 37 kW
		400 V AC	0.5 kW – 55 kW
HG-AK series	Ultra-compact	48/24 V DC	10 W – 30 W
HG-RR series	Ultra-low inertia	200 V AC	1 kW – 5 kW
HG-UR series	Flat type	200 V AC	0.75 kW – 5 kW

Scale: 10 W · 0.1 kW · 1 kW · 10 kW · 100 kW

Servo motor lineup with a reduction gear (Note 3)

Rotary servo motor series	Built-in reduction gear compatible with general industrial machineries (G1)										Flange-mounting output type with a built-in reduction gear for high precision applications (G5)						Flange-mounting shaft output type with a built-in reduction gear for high precision applications (G7)					
	1/6	1/11	1/17	1/29	1/35	1/43	1/59	1/5 (Note 1)	1/12 (Note 1)	1/20 (Note 1)	1/5	1/9	1/11	1/21	1/33	1/45	1/5	1/9	1/11	1/21	1/33	1/45
HG-KR	–	–	–	–	–	–	–	●	●	●	● □40 (Note 2) □60 (Note 2)	●	●	●	●	●	● □40 (Note 2) □60 (Note 2)	●	●	●	●	●
HG-MR	–										–						–					
HG-SR 1000 r/min series	–										–						–					
HG-SR 2000 r/min series	●	●	●	●	●	●	●	–	–	–	●	–	●	●	●	●	●	–	●	●	●	●
HG-JR	–										–						–					
HG-RR	–										–						–					
HG-UR	–										–						–					

Notes: 1. This reduction ratio is the nominal value and may differ slightly from the actual reduction ratio.
2. Indicate the flange dimensions.
3. Refer to the "MELSERVO-J4 Catalogue (L (NA) 03056)" for available capacity options.

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Drive Product

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 "SERVO AMPLIFIERS & MOTORS L(NA)03058" 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
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·m²]	0.0450	0.0777	0.221	0.371	1.26
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	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		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		2000 m or less above sea level (Note 5)				
	Vibration resistance *4		X: 49 m/s² Y: 49 m/s²				
Vibration rank			V10 *6				
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited 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.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

Drive Product

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 brakings [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

HG-KR053(B) (Note 1, 2, 3, 4)
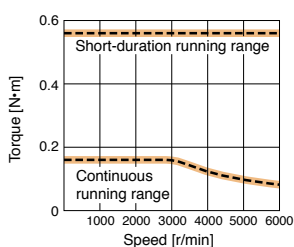
HG-KR13(B) (Note 1, 2, 3, 4)
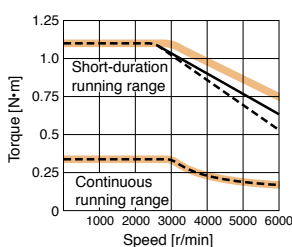
HG-KR23(B) (Note 1, 2, 3, 4)
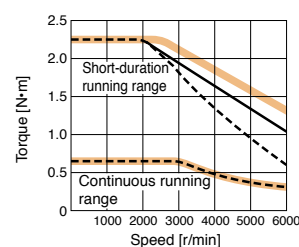
HG-KR43(B) (Note 1, 2, 3, 4)
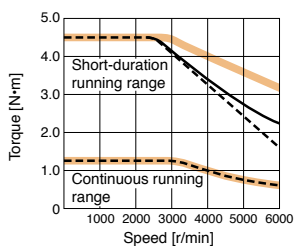
HG-KR73(B) (Note 1, 3, 4)
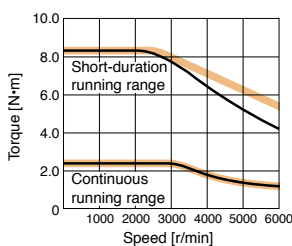
Notes: 1. ▬▬ : For 3-phase 200 V AC or 1-phase 230 V AC.
2. ----- : For 1-phase 100 V AC.
3. ——— : For 1-phase 200 V AC. This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.

HG-KR Series Special Shaft End Specifications

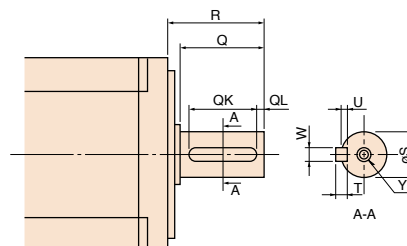**Motors with the following specifications are also available.**

D-cut shaft (Note 1): 50 W and 100 W
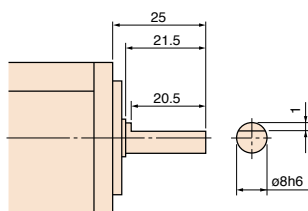
[Unit: mm]

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-KR23(B)K, 43(B)K	5	14h6	30	26	5	20	3	3	M4 screw Depth: 15
HG-KR73(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 "SERVO AMPLIFIERS & MOTORS L(NA)03058" 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·m²]	0.0162	0.0300	0.0865	0.142	0.586
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	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		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		2000 m or less above sea level (Note 5)				
	Vibration resistance *4		X: 49 m/s² Y: 49 m/s²				
Vibration rank			V10 *6				
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited 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.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

Drive Product

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$_{-10}^{\ 0}$%				
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 brakings [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.
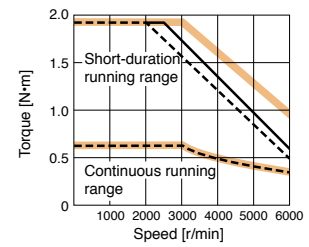
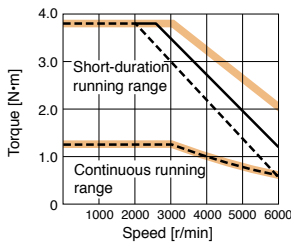## HG-MR Series Torque Characteristics

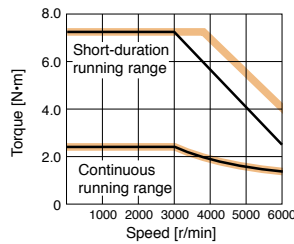### HG-MR053(B) (Note 1, 2, 3, 4)
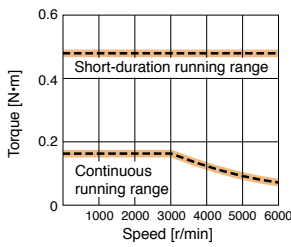
HG-MR13(B) (Note 1, 2, 3, 4)
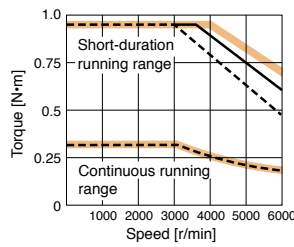
HG-MR23(B) (Note 1, 2, 3, 4)

### HG-MR43(B) (Note 1, 2, 3, 4)

HG-MR73(B) (Note 1, 3, 4)

Notes: 1. ▬▬ : For 3-phase 200 V AC or 1-phase 230 V AC.
2. ---- : For 1-phase 100 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-MR Series Special Shaft End Specifications

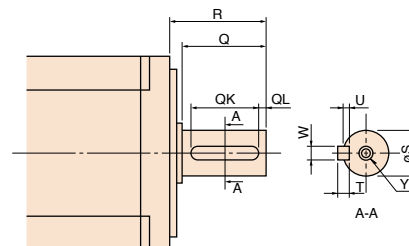**Motors with the following specifications are also available.**

D-cut shaft (Note 1): 50 W and 100 W
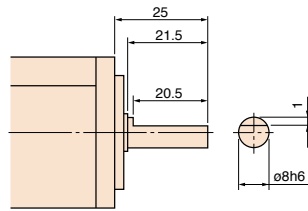
[Unit: mm]

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-MR23(B)K, 43(B)K	5	14h6	30	26	5	20	3	3	M4 screw Depth: 15
HG-MR73(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.

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

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-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
	MR-J4W_-							
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	17	23	30	42	61
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·m²]	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake	[× 10^{-4} kg·m²]	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		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Altitude		2000 m or less above sea level (Note 4)					
	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]					
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

Drive Product

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 $_{-10}^{0}$%					
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 brakings [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.
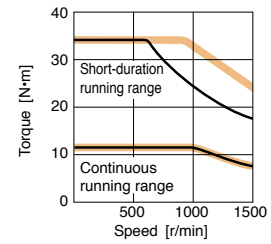
HG-SR 1000 r/min Series Torque Characteristics
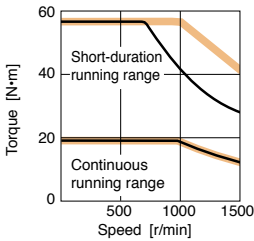
HG-SR51(B) (Note 1, 2, 3, 4)
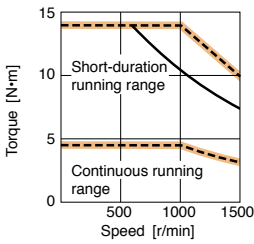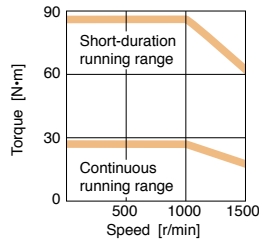

HG-SR81(B) (Note 1, 4)
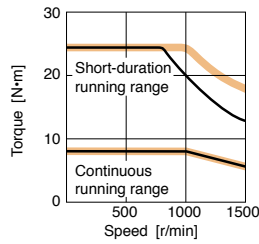
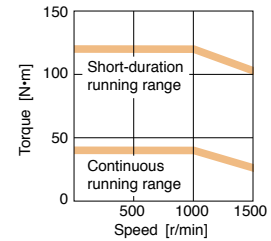### HG-SR121(B) (Note 1, 4)

HG-SR201(B) (Note 1, 4)

HG-SR301(B) (Note 1, 4)

HG-SR421(B) (Note 1, 4)

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-SR51(B)K, 81(B)K	24h6	55	50	8 $_{-0.036}^{0}$	36	5	4 $_{0}^{+0.2}$	4	M8 screw Depth: 20
HG-SR121(B)K, 201(B)K, 301(B)K, 421(B)K	35 $_{0}^{+0.010}$	79	75	10 $_{-0.036}^{0}$	55	5	5 $_{0}^{+0.2}$	5	M8 screw Depth: 20

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]

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

HG-SR 2000 r/min Series (Medium Inertia, Medium Capacity) (200 V Class) 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-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
	MR-J4W_-								
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	29	31	45	70	83
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·m²]	7.26	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	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		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)						
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude		2000 m or less above sea level (Note 4)						
	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						
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Drive Product

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

HG-SR 2000 r/min Series (200 V Class) 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 $_{-10}^{0}$%						
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 brakings [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 (200 V Class) Torque Characteristics

HG-SR52(B) (Note 1, 2, 3, 4)
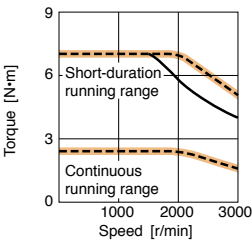
HG-SR102(B) (Note 1, 3, 4)
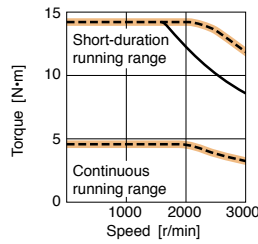
HG-SR152(B) (Note 1, 3, 4)
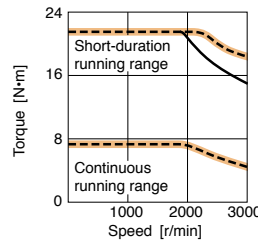
HG-SR202(B) (Note 1, 3, 4)
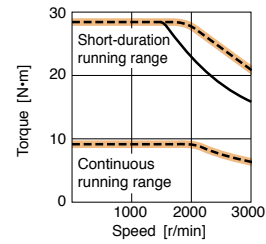
HG-SR352(B) (Note 1, 4)
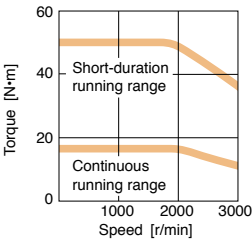
HG-SR502(B) (Note 1, 4)

HG-SR702(B) (Note 1, 4)

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 (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-SR52(B)K, 102(B)K, 152(B)K	24h6	55	50	8 $_{-0.036}^{0}$	36	5	4 $_{0}^{+0.2}$	4	M8 screw Depth: 20
HG-SR202(B)K, 352(B)K, 502(B)K, 702(B)K	35 $_{0}^{+0.010}$	79	75	10 $_{-0.036}^{0}$	55	5	5 $_{0}^{+0.2}$	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]

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

HG-SR 2000 r/min Series (Medium Inertia, Medium Capacity) (400 V Class) Specifications

Rotary servo motor model	HG-SR		524(B)	1024(B)	1524(B)	2024(B)	3524(B)	5024(B)	7024(B)
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" 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]	1.5	2.8	4.7	4.9	7.0	11	13
Maximum current		[A]	4.5	8.9	17	17	27	42	59
Regenerative braking frequency *2	MR-J4-	[times/min]	46	29	139	47	34	29	25
Moment of inertia J	Standard	[× 10⁻⁴ kg·m²]	7.26	11.6	16.0	46.8	78.6	99.7	151
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	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		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)						
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude		2000 m or less above sea level (Note 4)						
	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						
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

HG-SR 2000 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

Model HG-SR		524B	1024B	1524B	2024B	3524B	5024B	7024B
Type		Spring actuated type safety brake						
Rated voltage		24 V DC$_{-10}^{0}$%						
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 brakings [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 (400 V Class) Torque Characteristics
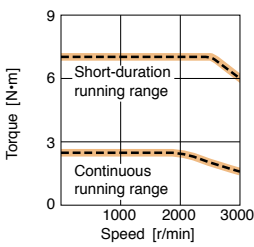
HG-SR524(B) (Note 1, 2, 3)   **HG-SR1024(B)** (Note 1, 2, 3)   **HG-SR1524(B)** (Note 1, 2, 3)   **HG-SR2024(B)** (Note 1, 2, 3)
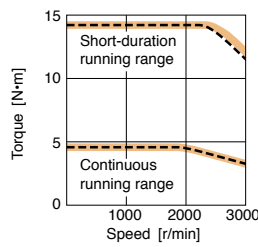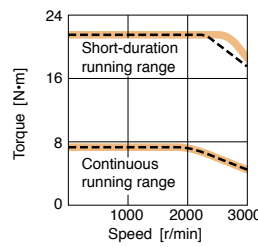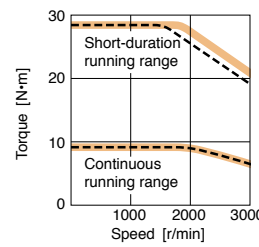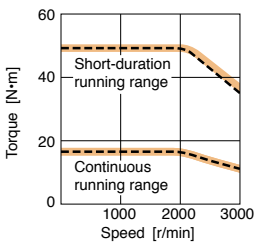
HG-SR3524(B) (Note 1, 2, 3)   **HG-SR5024(B)** (Note 1, 2, 3)   **HG-SR7024(B)** (Note 1, 2, 3)
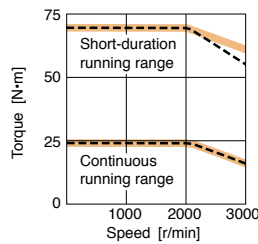
Notes: 1. ▬▬▬ : For 3-phase 400 V AC.
2. ----- : For 3-phase 380 V AC.
3. Torque drops when the power supply voltage is below the specified value.

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

Motors with the following specifications are also available.

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

Model	Variable dimensions							
	S	R	Q	W	QK	QL	U	r	Y
HG-SR524(B)K, 1024(B)K, 1524(B)K	24h6	55	50	8 $_{-0.036}^{0}$	36	5	4 $_{0}^{+0.2}$	4	M8 screw Depth: 20
HG-SR2024(B)K, 3524(B)K, 5024(B)K, 7024(B)K	35 $_{0}^{+0.010}$	79	75	10 $_{-0.036}^{0}$	55	5	5 $_{0}^{+0.2}$	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-JR 3000 r/min Series (Low Inertia, Medium Capacity) (200 V Class) Specifications

Rotary servo motor model HG-JR			53(B)	73(B)	103(B)	153(B)	203(B)	353(B)	503(B)	703(B)	903(B)
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
	MR-J4W_-										
Power supply capacity *1		[kVA]	1.0	1.3	1.7	2.5	3.5	5.5	7.5	10	13
Continuous running duty	Rated output	[kW]	0.5	0.75	1.0	1.5	2.0	3.3 <3.5> (Note 4)	5.0	7.0	9.0
	Rated torque (Note 3)	[N·m]	1.6	2.4	3.2	4.8	6.4	10.5 <11.1> (Note 4)	15.9	22.3	28.6
Maximum torque (Note 5)		[N·m]	4.8 <6.4>	7.2 <9.6>	9.6 <12.7>	14.3 <19.1>	19.1 <25.5>	32.0 <44.6>	47.7 <63.7>	66.8	85.8
Rated speed		[r/min]	3000								
Maximum speed		[r/min]	6000							5000	
Permissible instantaneous speed		[r/min]	6900							5750	
Power rate at continuous rated torque	Standard	[kW/s]	16.7	27.3	38.2	60.2	82.4	83.5	133	115	147
	With electromagnetic brake	[kW/s]	12.5	22.0	32.2	53.1	74.8	71.6	119	93.9	125
Rated current		[A]	3.0	5.6	5.6	11	11	17 <18> (Note 4)	27	34	41
Maximum current (Note 5)		[A]	9.0 <12>	17 <23>	17 <23>	32 <43>	32 <43>	51 <71>	81 <108>	103	134
Regenerative braking frequency *2 (Note 5)	MR-J4-	[times/min]	67 <137>	98 <511>	76 <396>	271 <271>	206 <206>	73 <98>	68 <89>	56	204 (Note 6)
	MR-J4W_-	[times/min]	328 <328>	237	186	-	-	-	-	-	-
Moment of inertia J	Standard	[× 10⁻⁴ kg·m²]	1.52	2.09	2.65	3.79	4.92	13.2	19.0	43.3	55.8
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	2.02	2.59	3.15	4.29	5.42	15.4	21.2	52.9	65.4
Recommended load to motor inertia ratio (Note 1)			10 times or less								
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)								
Oil seal			Attached								
Insulation class			155 (F)								
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)								
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		2000 m or less above sea level (Note 7)								
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²							X: 24.5 m/s² Y: 29.4 m/s²	
Vibration rank			V10 *6								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Permissible load for the shaft *5	L	[mm]	40	40	40	40	40	55	55	79	79
	Radial	[N]	323	323	323	323	323	980	980	2450	2450
	Thrust	[N]	284	284	284	284	284	490	490	980	980
Mass	Standard	[kg]	3.0	3.7	4.5	5.9	7.5	13	18	29	36
	With electromagnetic brake	[kg]	4.4	5.1	5.9	7.3	8.9	15	20	35	42

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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value in angle brackets is applicable when the servo motor is used with MR-J4-500GF/MR-J4-500GF-RJ/MR-J4-500B/MR-J4-500B-RJ/MR-J4-500A/MR-J4-500A-RJ.
5. The value in angle brackets is applicable when the maximum torque is increased. The maximum torque will be increased by changing the servo amplifier to be combined. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (200 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog for the available combinations.
6. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m³/min). Note that [Pr. PA02] must be changed.
7. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

HG-JR 3000 r/min Series (200 V Class) Electromagnetic Brake Specifications (Note 1)

Model	HG-JR		53B	73B	103B	153B	203B	353B	503B	703B	903B
Type			Spring actuated type safety brake								
Rated voltage			24 V DC$_{-10}^{0}$%								
Power consumption	[W] at 20 °C		11.7	11.7	11.7	11.7	11.7	23	23	34	34
Electromagnetic brake static friction torque		[N•m]	6.6	6.6	6.6	6.6	6.6	16	16	44	44
Permissible braking work	Per braking	[J]	64	64	64	64	64	400	400	4500	4500
	Per hour	[J]	640	640	640	640	640	4000	4000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings [Times]		5000	5000	5000	5000	5000	5000	5000	20000	20000
	Work per braking [J]		64	64	64	64	64	400	400	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-JR 3000 r/min Series (200 V Class) Torque Characteristics
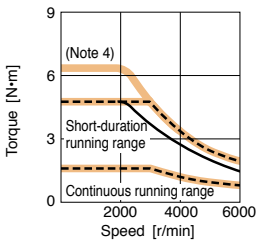
HG-JR53(B) (Note 1, 2, 3, 5, 6)   **HG-JR73(B)** (Note 1, 3, 5, 6)   **HG-JR103(B)** (Note 1, 3, 5, 6, 7)   **HG-JR153(B)** (Note 1, 3, 5, 6, 7)
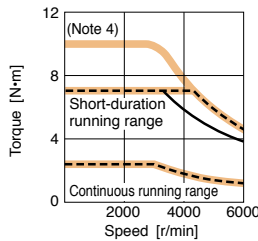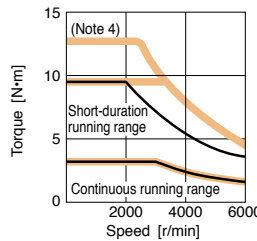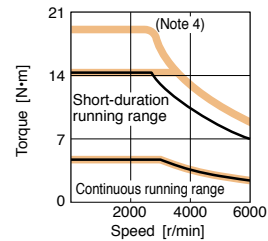
HG-JR203(B) (Note 1, 3, 5, 6, 7)   **HG-JR353(B)** (Note 1, 5)   **HG-JR503(B)** (Note 1, 5)   **HG-JR703(B)** (Note 1, 5)
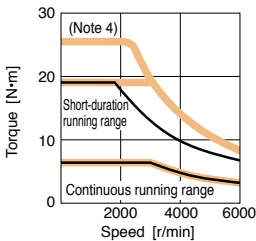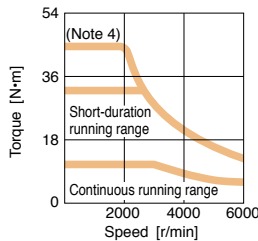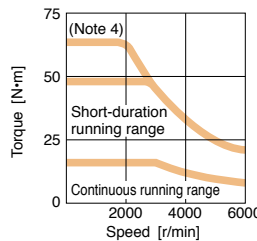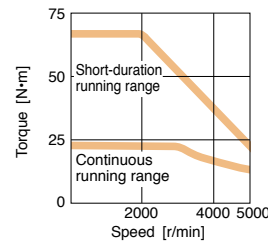
HG-JR903(B) (Note 1, 5)
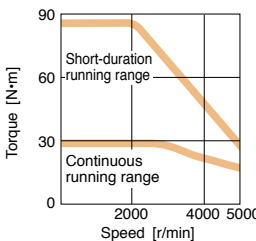
Notes: 1. ▬▬ : For 3-phase 200 V AC.
2. - - - : For 1-phase 230 V AC.
3. ——— : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. This value is applicable when the torque is maximally increased. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (200 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.
5. Torque drops when the power supply voltage is below the specified value.
6. When 1-phase 200 V AC input is used, increasing the maximum torque to 400% is not possible with HG-JR servo motor series.
7. Contact your local sales office for the torque characteristics when using the servo amplifier with 1-phase 200 V AC input.

HG-JR 3000 r/min Series (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-JR53(B)K, 73(B)K, 103(B)K, 153(B)K, 203(B)K	16h6	40	30	5 $_{-0.030}^{0}$	25	2	3 $_{0}^{+0.1}$	2.5	M4 screw Depth: 15
HG-JR353(B)K, 503(B)K	28h6	55	50	8 $_{-0.036}^{0}$	36	5	4 $_{0}^{+0.2}$	4	M8 screw Depth: 20
HG-JR703(B)K, 903(B)K	35 $_{0}^{+0.010}$	79	75	10 $_{-0.036}^{0}$	55	5	5 $_{0}^{+0.2}$	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-JR 3000 r/min Series (Low Inertia, Medium Capacity) (400 V Class) Specifications

Rotary servo motor model	HG-JR		534(B)	734(B)	1034(B)	1534(B)	2034(B)	3534(B)	5034(B)	7034(B)	9034(B)
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Power supply capacity *1		[kVA]	1.0	1.3	1.7	2.5	3.5	5.5	7.5	10	13
Continuous running duty	Rated output	[kW]	0.5	0.75	1.0	1.5	2.0	3.3 <3.5> (Note 4)	5.0	7.0	9.0
	Rated torque (Note 3)	[N·m]	1.6	2.4	3.2	4.8	6.4	10.5 <11.1> (Note 4)	15.9	22.3	28.6
Maximum torque (Note 5)		[N·m]	4.8 <6.4>	7.2 <9.6>	9.6 <12.7>	14.3 <19.1>	19.1 <25.5>	32.0 <44.6>	47.7 <63.7>	66.8	85.8
Rated speed		[r/min]	3000								
Maximum speed		[r/min]	6000							5000	
Permissible instantaneous speed		[r/min]	6900							5750	
Power rate at continuous rated torque	Standard	[kW/s]	16.7	27.3	38.2	60.2	82.4	83.5	133	115	147
	With electromagnetic brake	[kW/s]	12.5	22.0	32.2	53.1	74.8	71.6	119	93.9	125
Rated current		[A]	1.5	2.8	2.8	5.4	5.4	8.3 <8.8> (Note 4)	14	17	21
Maximum current (Note 5)		[A]	4.5 <6.0>	8.4 <12>	8.4 <12>	17 <22>	17 <22>	26 <36>	41 <54>	52	67
Regenerative braking frequency *2 (Note 5)	MR-J4-	[times/min]	99 <100>	72 <489>	56 <382>	265 <275>	203 <209>	75 <98>	68 <89>	56	205 (Note 6)
Moment of inertia J	Standard	[× 10⁻⁴ kg·m²]	1.52	2.09	2.65	3.79	4.92	13.2	19.0	43.3	55.8
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	2.02	2.59	3.15	4.29	5.42	15.4	21.2	52.9	65.4
Recommended load to motor inertia ratio (Note 1)			10 times or less								
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)								
Oil seal			Attached								
Insulation class			155 (F)								
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)								
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		2000 m or less above sea level (Note 7)								
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²							X: 24.5 m/s² Y: 29.4 m/s²	
Vibration rank			V10 *6								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
Permissible load for the shaft *5	L	[mm]	40	40	40	40	40	55	55	79	79
	Radial	[N]	323	323	323	323	323	980	980	2450	2450
	Thrust	[N]	284	284	284	284	284	490	490	980	980
Mass	Standard	[kg]	3.0	3.7	4.5	5.9	7.5	13	18	29	36
	With electromagnetic brake	[kg]	4.4	5.1	5.9	7.3	8.9	15	20	35	42

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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value in angle brackets is applicable when the servo motor is used with MR-J4-500GF4/MR-J4-500GF4-RJ/MR-J4-500B4/MR-J4-500B4-RJ/MR-J4-500A4/ MR-J4-500A4-RJ.
5. The value in angle brackets is applicable when the maximum torque is increased. The maximum torque will be increased by changing the servo amplifier to be combined. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (400 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog for the available combinations.
6. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m³/min). Note that [Pr. PA02] must be changed.
7. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

Drive Product

HG-JR 3000 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

Model HG-JR			534B	734B	1034B	1534B	2034B	3534B	5034B	7034B	9034B
Type						Spring actuated type safety brake					
Rated voltage						24 V DC.$_{-10}^{0}$%					
Power consumption		[W] at 20 °C	11.7	11.7	11.7	11.7	11.7	23	23	34	34
Electromagnetic brake static friction torque		[N·m]	6.6	6.6	6.6	6.6	6.6	16	16	44	44
Permissible braking work	Per braking	[J]	64	64	64	64	64	400	400	4500	4500
	Per hour	[J]	640	640	640	640	640	4000	4000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings [Times]		5000	5000	5000	5000	5000	5000	5000	20000	20000
	Work per braking [J]		64	64	64	64	64	400	400	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-JR 3000 r/min Series (400 V Class) Torque Characteristics

HG-JR534(B) (Note 1, 2, 4)
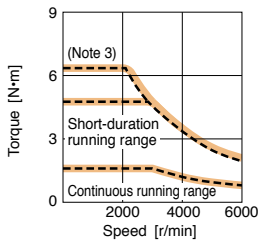
HG-JR734(B) (Note 1, 2, 4)
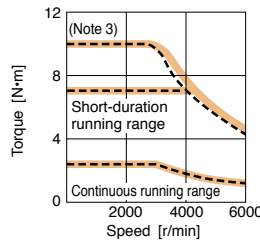
HG-JR1034(B) (Note 1, 2, 4)
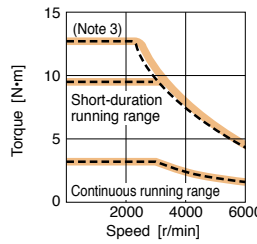
HG-JR1534(B) (Note 1, 2, 4)
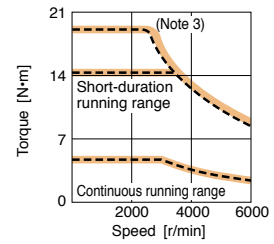
HG-JR2034(B) (Note 1, 2, 4)
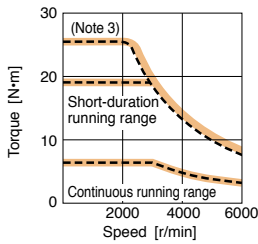
HG-JR3534(B) (Note 1, 2, 4)
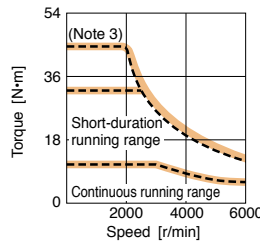
HG-JR5034(B) (Note 1, 2, 4)
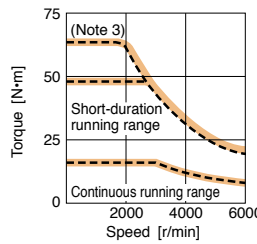
HG-JR7034(B) (Note 1, 2, 4)
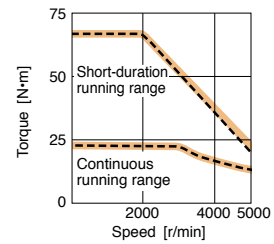
HG-JR9034(B) (Note 1, 2, 4)
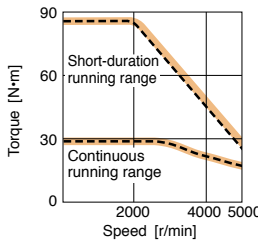
Notes: 1. ▬▬▬ : For 3-phase 400 V AC.
2. - - - - : For 3-phase 380 V AC.
3. This value is applicable when the torque is maximally increased. Refer to "Combinations of HG-JR Servo Motor Series and Servo Amplifier (400 V Class) for Increasing the Maximum Torque to 400% of the Rated Torque" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.
4. Torque drops when the power supply voltage is below the specified value.

HG-JR 3000 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-JR534(B)K, 734(B)K, 1034(B)K, 1534(B)K, 2034(B)K	16h6	40	30	5 $_{-0.030}^{0}$	25	2	3 $_{0}^{+0.1}$	2.5	M4 screw Depth: 15
HG-JR3534(B)K, 5034(B)K	28h6	55	50	8 $_{-0.036}^{0}$	36	5	4 $_{0}^{+0.2}$	4	M8 screw Depth: 20
HG-JR7034(B)K, 9034(B)K	35 $_{0}^{+0.010}$	79	75	10 $_{-0.036}^{0}$	55	5	5 $_{0}^{+0.2}$	5	

[Unit: mm]

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.

Drive Product

HG-JR 1000 r/min Series (Low Inertia, Medium/Large Capacity) (200 V Class) Specifications

Rotary servo motor model	HG-JR		601(B)	801(B)	12K1(B)	15K1	20K1	25K1	30K1	37K1
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity *1		[kVA]	8.6	12	18	22	30	38	48	59
Continuous running duty	Rated output	[kW]	6.0	8.0	12	15	20	25	30	37
	Rated torque (Note 3)	[N·m]	57.3	76.4	115	143	191	239	286	353
Maximum torque		[N·m]	172	229	345	429	573	717	858	1059
Rated speed		[r/min]	1000							
Maximum speed		[r/min]	2000			1500				
Permissible instantaneous speed		[r/min]	2300			1725				
Power rate at continuous rated torque	Standard	[kW/s]	187	265	420	418	582	748	594	761
	With electromagnetic brake	[kW/s]	167	243	394	-	-	-	-	-
Rated current		[A]	31	47	60	67	94	95	121	152
Maximum current		[A]	108	165	208	231	318	313	399	495
Regenerative braking frequency *2	MR-J4-	[times/min]	82	322 (Note 4)	224 (Note 4)	234 (Note 4)	183 (Note 4)	150 (Note 4)	-	-
Moment of inertia J	Standard	[× 10⁻⁴ kg·m²]	176	220	315	489	627	764	1377	1637
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	196	240	336	-	-	-	-	-
Recommended load to motor inertia ratio (Note 1)			10 times or less							
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)							
Oil seal			Attached							
Insulation class			155 (F)							
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			Totally enclosed, force cooling (IP rating: IP44) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude		2000 m or less above sea level (Note 5)							
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²					X: 9.8 m/s² Y: 9.8 m/s²		
Vibration rank			V10 *6							
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Permissible load for the shaft *5	L	[mm]	85	116	116	140	140	140	140	140
	Radial	[N]	2450	2940	2940	3234	3234	3234	4900	4900
	Thrust	[N]	980	980	980	1470	1470	1470	1960	1960
Mass	Standard	[kg]	53	62	86	120	145	165	215	240
	With electromagnetic brake	[kg]	65	74	97	-	-	-	-	-
Cooling fan	Power supply	Voltage/ frequency	-	-	-	3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				
		Input [W]	-	-	-	65 (50 Hz)/85 (60 Hz)			120 (50 Hz)/175 (60 Hz)	
	Rated current	[A]	-	-	-	0.20 (50 Hz)/0.22 (60 Hz)			0.39 (50 Hz)/0.52 (60 Hz)	

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m³/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

HG-JR 1000 r/min Series (200 V Class) Electromagnetic Brake Specifications (Note 1)

Model	HG-JR	601B	801B	12K1B
Type		Spring actuated type safety brake		
Rated voltage		24 V DC $_{-10}^{0}$%		
Power consumption [W] at 20 °C		32	32	32
Electromagnetic brake static friction torque [N·m]		126	126	126
Permissible braking work	Per braking [J]	5000	5000	5000
	Per hour [J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000
	Work per braking [J]	400	400	400

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-JR 1000 r/min Series (200 V Class) Torque Characteristics
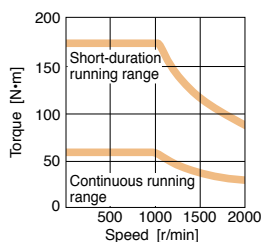
**HG-JR601(B)** (Note 1, 2)
HG-JR801(B) (Note 1, 2)
HG-JR12K1(B) (Note 1, 2)
HG-JR15K1 (Note 1, 2)
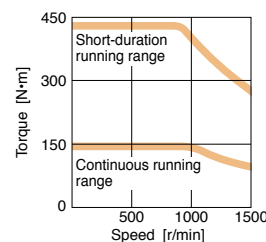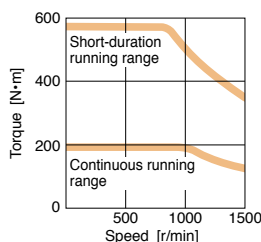
HG-JR20K1 (Note 1, 2)
HG-JR25K1 (Note 1, 2)
HG-JR30K1 (Note 1, 2)
HG-JR37K1 (Note 1, 2)
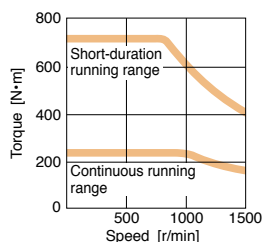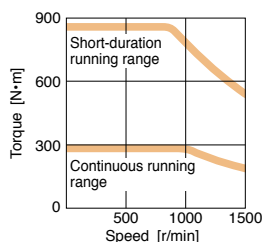
Notes: 1. ▬ : For 3-phase 200 V AC.
2. Torque drops when the power supply voltage is below the specified value.
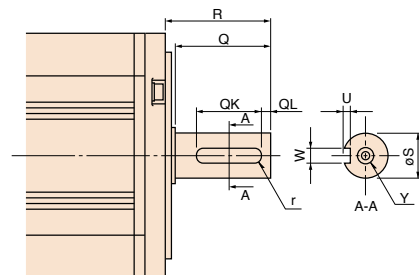
HG-JR 1000 r/min Series (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions									Fig.
	S	R	Q	W	QK	QL	U	r	Y	
HG-JR601(B)K	42h6	85	79	12 $_{-0.040}^{0}$	70	5	5 $_{0}^{+0.2}$	6	M8 screw Depth: 19.8	A
HG-JR801(B)K, 12K1(B)K	55m6	116	110	16 $_{-0.040}^{0}$	90	5	6 $_{0}^{+0.2}$	8	M10 screw Depth: 27	
HG-JR15K1K, 20K1K, 25K1K	65m6	140	130	18 $_{-0.040}^{0}$	120	5	7 $_{0}^{+0.2}$	9	M12 screw Depth: 25	
HG-JR30K1K, 37K1K	80m6	140	140	22 $_{-0.040}^{0}$	132	7	9 $_{0}^{+0.2}$	11	M16 screw Depth: 30	B

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.

Fig. A

Fig. B

[Unit: mm]

Drive Product
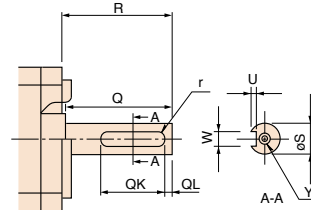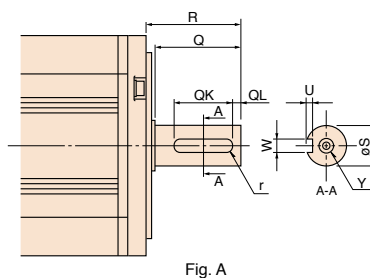
HG-JR 1000 r/min Series (Low Inertia, Medium/Large Capacity) (400 V Class) Specifications

Rotary servo motor model	HG-JR		6014(B)	8014(B)	12K14(B)	15K14	20K14	25K14	30K14	37K14
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity *1		[kVA]	8.6	12	18	22	30	38	48	59
Continuous running duty	Rated output	[kW]	6.0	8.0	12	15	20	25	30	37
	Rated torque (Note 3)	[N·m]	57.3	76.4	115	143	191	239	286	353
Maximum torque		[N·m]	172	229	345	429	573	717	858	1059
Rated speed		[r/min]	1000							
Maximum speed		[r/min]	2000			1500				
Permissible instantaneous speed		[r/min]	2300			1725				
Power rate at continuous rated torque	Standard	[kW/s]	187	265	420	418	582	748	594	761
	With electromagnetic brake	[kW/s]	167	243	394	-	-	-	-	-
Rated current		[A]	16	23	30	33	47	48	60	76
Maximum current		[A]	54	80	104	114	161	160	202	248
Regenerative braking frequency *2	MR-J4-	[times/min]	83	331 (Note 4)	229 (Note 4)	239 (Note 4)	187 (Note 4)	152 (Note 4)	-	-
Moment of inertia J	Standard	[× 10^-4 kg·m²]	176	220	315	489	627	764	1377	1637
	With electromagnetic brake	[× 10^-4 kg·m²]	196	240	336	-	-	-	-	-
Recommended load to motor inertia ratio (Note 1)			10 times or less							
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)							
Oil seal			Attached							
Insulation class			155 (F)							
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			Totally enclosed, force cooling (IP rating: IP44) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude		2000 m or less above sea level (Note 5)							
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²						X: 9.8 m/s² Y: 9.8 m/s²	
Vibration rank			V10 *6							
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Permissible load for the shaft *5	L	[mm]	85	116	116	140	140	140	140	140
	Radial	[N]	2450	2940	2940	3234	3234	3234	4900	4900
	Thrust	[N]	980	980	980	1470	1470	1470	1960	1960
Mass	Standard	[kg]	53	62	86	120	145	165	215	240
	With electromagnetic brake	[kg]	65	74	97	-	-	-	-	-
Cooling fan	Power supply	Voltage/frequency	-	-	-	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			3-phase 380 V AC to 460 V AC, 50 Hz/60 Hz	
		Input [W]	-	-	-	65 (50 Hz)/85 (60 Hz)			110 (50 Hz)/150 (60 Hz)	
	Rated current	[A]	-	-	-	0.12 (50 Hz)/0.14 (60 Hz)			0.20 (50 Hz)/0.22 (60 Hz)	

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m³/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

HG-JR 1000 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

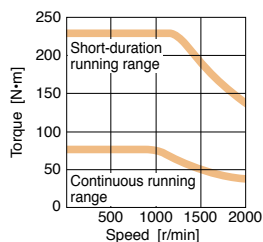| Model　　　　　　　HG-JR		6014B	8014B	12K14B
Type		Spring actuated type safety brake		
Rated voltage		24 V DC $_{-10}^{0}$%		
Power consumption　　　　[W] at 20 °C		32	32	32
Electromagnetic brake static friction torque　　　[N·m]		126	126	126
Permissible braking work	Per braking　　[J]	5000	5000	5000
	Per hour　　　[J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000
	Work per braking　[J]	400	400	400

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.

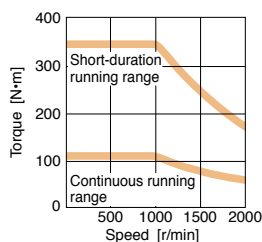## HG-JR 1000 r/min Series (400 V Class) Torque Characteristics

HG-JR6014(B) (Note 1, 2, 3)
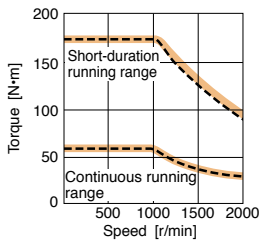
HG-JR8014(B) (Note 1, 2, 3)
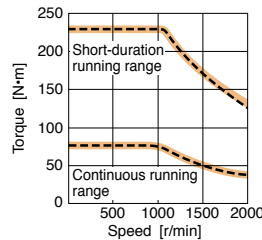
HG-JR12K14(B) (Note 1, 2, 3)
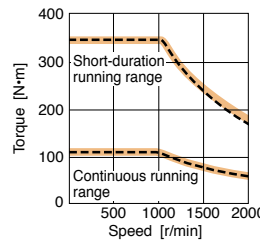
HG-JR15K14 (Note 1, 2, 3)
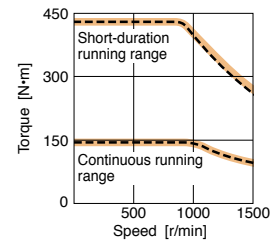
HG-JR20K14 (Note 1, 2, 3)
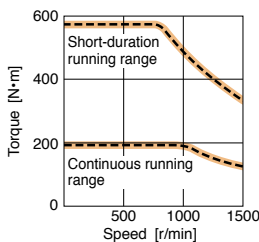
HG-JR25K14 (Note 1, 2, 3)
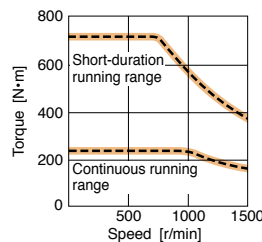
HG-JR30K14 (Note 1, 2, 3)
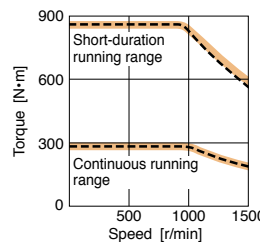
HG-JR37K14 (Note 1, 2, 3)

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

HG-JR 1000 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions								Fig.
	S	R	Q	W	QK	QL	U	r	Y	
HG-JR6014(B)K	42h6	85	79	12 $_{-0.040}^{0}$	70	5	5 $_{0}^{+0.2}$	6	M8 screw Depth: 19.8	A
HG-JR8014(B)K, 12K14(B)K	55m6	116	110	16 $_{-0.040}^{0}$	90	5	6 $_{0}^{+0.2}$	8	M10 screw Depth: 27	A
HG-JR15K14K, 20K14K, 25K14K	65m6	140	130	18 $_{-0.040}^{0}$	120	5	7 $_{0}^{+0.2}$	9	M12 screw Depth: 25	A
HG-JR30K14K, 37K14K	80m6	140	140	22 $_{-0.040}^{0}$	132	7	9 $_{0}^{+0.2}$	11	M16 screw Depth: 30	B

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.

Fig. A

Fig. B
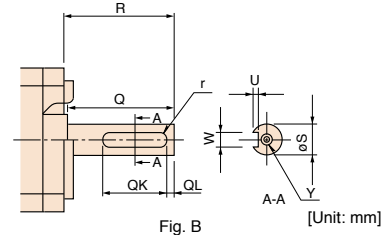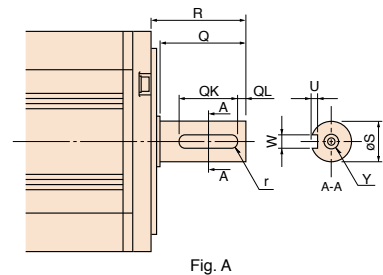
[Unit: mm]

HG-JR 1500 r/min Series (Low Inertia, Medium/Large Capacity) (200 V Class) Specifications

Rotary servo motor model	HG-JR		701M(B)	11K1M(B)	15K1M(B)	22K1M	30K1M	37K1M
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Power supply capacity [*1]		[kVA]	10	16	22	33	48	59
Continuous running duty	Rated output	[kW]	7.0	11	15	22	30	37
	Rated torque [(Note 3)]	[N·m]	44.6	70.0	95.5	140	191	236
Maximum torque		[N·m]	134	210	286	420	573	707
Rated speed		[r/min]	1500					
Maximum speed		[r/min]	3000			2500		
Permissible instantaneous speed		[r/min]	3450			2875		
Power rate at continuous rated torque	Standard	[kW/s]	113	223	289	401	582	726
	With electromagnetic brake	[kW/s]	101	204	271	-	-	-
Rated current		[A]	34	61	76	99	139	151
Maximum current		[A]	111	200	246	315	479	561
Regenerative braking frequency [*2]	MR-J4-	[times/min]	36	143 (Note 4)	162 (Note 4)	104 (Note 4)	-	-
Moment of inertia J	Standard	[× 10^{-4} kg·m²]	176	220	315	489	627	764
	With electromagnetic brake	[× 10^{-4} kg·m²]	196	240	336	-	-	-
Recommended load to motor inertia ratio [(Note 1)]			10 times or less					
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)					
Oil seal			Attached					
Insulation class			155 (F)					
Structure			Totally enclosed, natural cooling (IP rating: IP67) [(Note 2)]			Totally enclosed, force cooling (IP rating: IP44) [(Note 2)]		
Environment [*3]	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust					
	Altitude		2000 m or less above sea level [(Note 5)]					
	Vibration resistance [*4]		X: 24.5 m/s² Y: 24.5 m/s²					
Vibration rank			V10 [*6]					
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
Permissible load for the shaft [*5]	L	[mm]	85	116	116	140	140	140
	Radial	[N]	2450	2940	2940	3234	3234	3234
	Thrust	[N]	980	980	980	1470	1470	1470
Mass	Standard	[kg]	53	62	86	120	145	165
	With electromagnetic brake	[kg]	65	74	97	-	-	-
Cooling fan	Power supply	Voltage/ frequency	-	-	-	3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz		
		Input [W]	-	-	-	65 (50 Hz)/85 (60 Hz)		
	Rated current	[A]	-	-	-	0.20 (50 Hz)/0.22 (60 Hz)		

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m³/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

Drive Product

Features/
Summary

Specifications/
Characteristics

Outline
Drawings

MR-J4
Series

MR-JE
Series

HG-JR 1500 r/min Series (200 V Class) Electromagnetic Brake Specifications (Note 1)

Model HG-JR			701MB	11K1MB	15K1MB
Type			Spring actuated type safety brake		
Rated voltage			24 V DC$_{-10}^{0}$%		
Power consumption [W] at 20 °C			32	32	32
Electromagnetic brake static friction torque [N·m]			126	126	126
Permissible braking work	Per braking	[J]	5000	5000	5000
	Per hour	[J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings [Times]		20000	20000	20000
	Work per braking [J]		400	400	400

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-JR 1500 r/min Series (200 V Class) Torque Characteristics

HG-JR701M(B) (Note 1, 2)
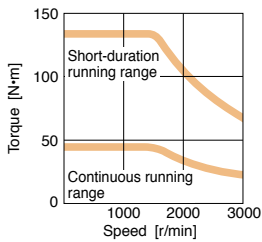
HG-JR11K1M(B) (Note 1, 2)
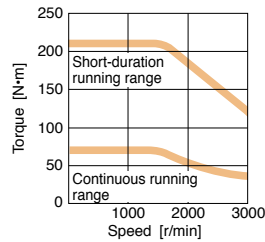
HG-JR15K1M(B) (Note 1, 2)

HG-JR22K1M (Note 1, 2)

HG-JR30K1M (Note 1, 2)
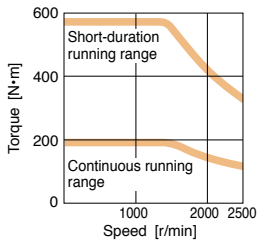
HG-JR37K1M (Note 1, 2)

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

HG-JR 1500 r/min Series (200 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-JR701M(B)K	42h6	85	79	12 $_{-0.040}^{0}$	70	5	5 $_{0}^{+0.2}$	6	M8 screw Depth: 19.8
HG-JR11K1M(B)K, 15K1M(B)K	55m6	116	110	16 $_{-0.040}^{0}$	90	5	6 $_{0}^{+0.2}$	8	M10 screw Depth: 27
HG-JR22K1MK, 30K1MK, 37K1MK	65m6	140	130	18 $_{-0.040}^{0}$	120	5	7 $_{0}^{+0.2}$	9	M12 screw Depth: 25

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]

AC Servo MELSERVO-J4

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

HG-JR 1500 r/min Series (Low Inertia, Medium/Large Capacity) (400 V Class) Specifications

Rotary servo motor model	HG-JR		701M4(B)	11K1M4(B)	15K1M4(B)	22K1M4	30K1M4	37K1M4	45K1M4	55K1M4
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity [*1]		[kVA]	10	16	22	33	48	59	71	80
Continuous running duty	Rated output	[kW]	7.0	11	15	22	30	37	45	55
	Rated torque (Note 3)	[N·m]	44.6	70.0	95.5	140	191	236	286	350
Maximum torque		[N·m]	134	210	286	420	573	707	859	1050
Rated speed		[r/min]	1500							
Maximum speed		[r/min]	3000			2500				
Permissible instantaneous speed		[r/min]	3450			2875				
Power rate at continuous rated torque	Standard	[kW/s]	113	223	289	401	582	726	596	749
	With electromagnetic brake	[kW/s]	101	204	271	-	-	-	-	-
Rated current		[A]	17	31	38	50	68	79	85	110
Maximum current		[A]	56	100	123	170	235	263	288	357
Regenerative braking frequency [*2]	MR-J4-	[times/min]	36	143 (Note 4)	162 (Note 4)	104 (Note 4)	-	-	-	-
Moment of inertia J	Standard	[× 10⁻⁴ kg·m²]	176	220	315	489	627	764	1377	1637
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	196	240	336	-	-	-	-	-
Recommended load to motor inertia ratio (Note 1)			10 times or less							
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)							
Oil seal			Attached							
Insulation class			155 (F)							
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			Totally enclosed, force cooling (IP rating: IP44) (Note 2)				
Environment [*3]	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude		2000 m or less above sea level (Note 5)							
	Vibration resistance [*4]		X: 24.5 m/s² Y: 24.5 m/s²						X: 9.8 m/s² Y: 9.8 m/s²	
Vibration rank			V10 [*6]							
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Permissible load for the shaft [*5]	L	[mm]	85	116	116	140	140	140	140	140
	Radial	[N]	2450	2940	2940	3234	3234	3234	4900	4900
	Thrust	[N]	980	980	980	1470	1470	1470	1960	1960
Mass	Standard	[kg]	53	62	86	120	145	165	215	240
	With electromagnetic brake	[kg]	65	74	97	-	-	-	-	-
Cooling fan	Power supply	Voltage/ frequency	-	-	-	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz			3-phase 380 V AC to 460 V AC, 50 Hz/60 Hz	
		Input [W]	-	-	-	65 (50 Hz)/85 (60 Hz)			110 (50 Hz)/150 (60 Hz)	
	Rated current	[A]	-	-	-	0.12 (50 Hz)/0.14 (60 Hz)			0.20 (50 Hz)/0.22 (60 Hz)	

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. The value is applicable when the external regenerative resistors, GRZG400-_Ω (standard accessory) are used with cooling fans (two units of 92 mm × 92 mm, minimum airflow: 1.0 m³/min). Note that [Pr. PA02] must be changed.
5. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

HG-JR 1500 r/min Series (400 V Class) Electromagnetic Brake Specifications (Note 1)

Model	HG-JR	701M4B	11K1M4B	15K1M4B
Type		Spring actuated type safety brake		
Rated voltage		24 V DC $_{-10}^{0}$%		
Power consumption [W] at 20 °C		32	32	32
Electromagnetic brake static friction torque [N·m]		126	126	126
Permissible braking work	Per braking [J]	5000	5000	5000
	Per hour [J]	45200	45200	45200
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000
	Work per braking [J]	400	400	400

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-JR 1500 r/min Series (400 V Class) Torque Characteristics

HG-JR701M4(B) (Note 1, 2, 3) **HG-JR11K1M4(B)** (Note 1, 2, 3) **HG-JR15K1M4(B)** (Note 1, 2, 3) **HG-JR22K1M4** (Note 1, 2, 3)
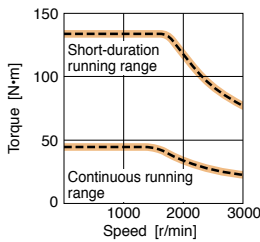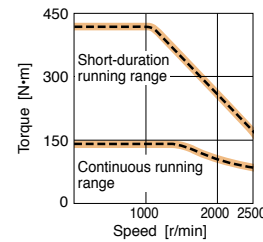
HG-JR30K1M4 (Note 1, 2, 3) **HG-JR37K1M4** (Note 1, 2, 3) **HG-JR45K1M4** (Note 1, 2, 3) **HG-JR55K1M4** (Note 1, 2, 3)
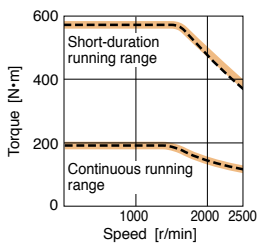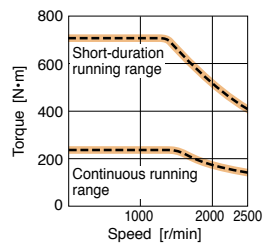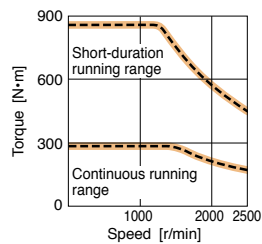
Notes: 1. ▬▬▬ : For 3-phase 400 V AC.
    2. ‑ ‑ ‑ ‑ : For 3-phase 380 V AC.
    3. Torque drops when the power supply voltage is below the specified value.

HG-JR 1500 r/min Series (400 V Class) Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions								Fig.
	S	R	Q	W	QK	QL	U	r	Y	
HG-JR701M4(B)K	42h6	85	79	12 $_{-0.040}^{0}$	70	5	5 $_{0}^{+0.2}$	6	M8 screw Depth: 19.8	A
HG-JR11K1M4(B)K, 15K1M4(B)K	55m6	116	110	16 $_{-0.040}^{0}$	90	5	6 $_{0}^{+0.2}$	8	M10 screw Depth: 27	A
HG-JR22K1M4K, 30K1M4K, 37K1M4K	65m6	140	130	18 $_{-0.040}^{0}$	120	5	7 $_{0}^{+0.2}$	9	M12 screw Depth: 25	A
HG-JR45K1M4K, 55K1M4K	80m6	140	140	22 $_{-0.040}^{0}$	132	7	9 $_{0}^{+0.2}$	11	M16 screw Depth: 30	B

Fig. A

Fig. B

[Unit: mm]

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.
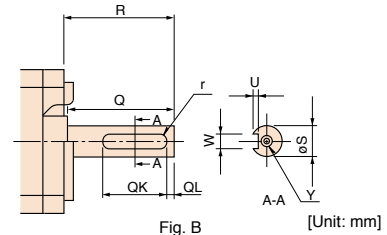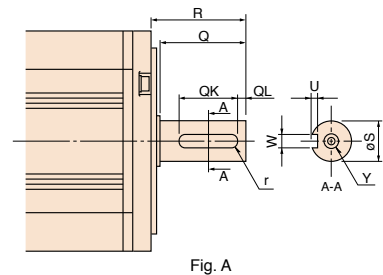
HG-RR Series (Ultra-low Inertia, Medium Capacity) Specifications

Rotary servo motor model	HG-RR		103(B)	153(B)	203(B)	353(B)	503(B)
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Power supply capacity *1		[kVA]	1.7	2.5	3.5	5.5	7.5
Continuous running duty	Rated output	[kW]	1.0	1.5	2.0	3.5	5.0
	Rated torque (Note 3)	[N·m]	3.2	4.8	6.4	11.1	15.9
Maximum torque		[N·m]	8.0	11.9	15.9	27.9	39.8
Rated speed		[r/min]	3000				
Maximum speed		[r/min]	4500				
Permissible instantaneous speed		[r/min]	5175				
Power rate at continuous rated torque	Standard	[kW/s]	67.4	120	176	150	211
	With electromagnetic brake	[kW/s]	54.8	101	153	105	163
Rated current		[A]	6.1	8.8	14	23	28
Maximum current		[A]	18	23	37	58	70
Regenerative braking frequency *2	MR-J4-	[times/min]	1090	860	710	174	125
Moment of inertia J	Standard	[× 10⁻⁴ kg·m²]	1.50	1.90	2.30	8.30	12.0
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	1.85	2.25	2.65	11.8	15.5
Recommended load to motor inertia ratio (Note 1)			5 times or less				
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal			Attached				
Insulation class			155 (F)				
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		2000 m or less above sea level (Note 4)				
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²				
Vibration rank			V10 *6				
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Permissible load for the shaft *5	L	[mm]	45	45	45	63	63
	Radial	[N]	686	686	686	980	980
	Thrust	[N]	196	196	196	392	392
Mass	Standard	[kg]	3.9	5.0	6.2	12	17
	With electromagnetic brake	[kg]	6.0	7.0	8.3	15	21

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. 368 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 1 to 6.

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

HG-RR Series Electromagnetic Brake Specifications (Note 1)

Model	HG-RR	103B	153B	203B	353B	503B
Type		spring	Spring actuated type safety brake			
Rated voltage		24 V DC$_{-10}^{\ 0}$%				
Power consumption [W] at 20 °C		19	19	19	23	23
Electromagnetic brake static friction torque [N·m]		7.0	7.0	7.0	17	17
Permissible braking work	Per braking [J]	400	400	400	400	400
	Per hour [J]	4000	4000	4000	4000	4000
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000	20000	20000
	Work per braking [J]	200	200	200	200	200

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-RR Series Torque Characteristics

HG-RR103(B) (Note 1, 2, 3)
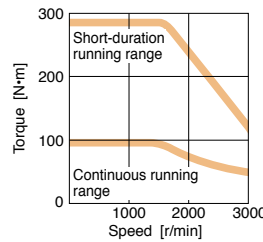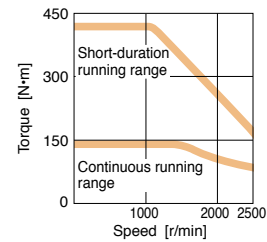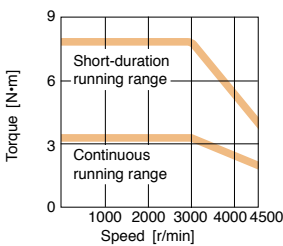

HG-RR153(B) (Note 1, 2, 3)
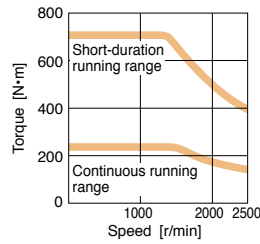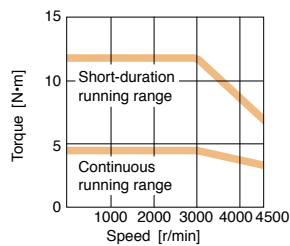

HG-RR203(B) (Note 1, 2)
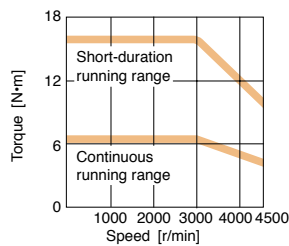
HG-RR353(B) (Note 1, 2)
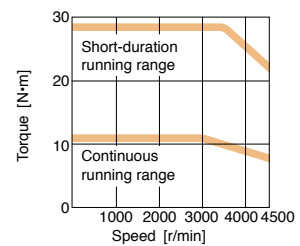
HG-RR503(B) (Note 1, 2)
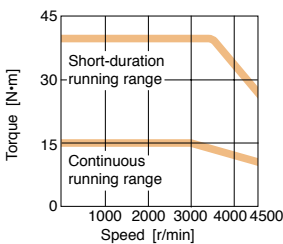
Notes: 1. ▬ : For 3-phase 200 V AC.
2. Torque drops when the power supply voltage is below the specified value.
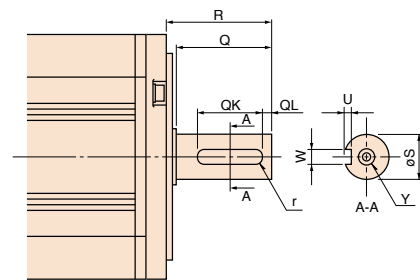3. Contact your local sales office for the torque characteristics when using the servo amplifier with 1-phase 200 V AC input.

HG-RR 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-RR103(B)K, 153(B)K, 203(B)K	24h6	45	40	8 $_{-0.036}^{\ 0}$	25	5	4 $_{0}^{+0.2}$	4	M8 screw Depth: 20
HG-RR353(B)K, 503(B)K	28h6	63	58	8 $_{-0.036}^{\ 0}$	53	3	4 $_{0}^{+0.2}$	4	

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.
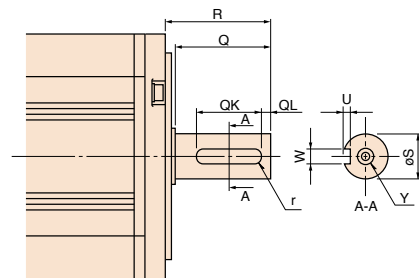
[Unit: mm]

HG-UR Series (Flat Type, Medium Capacity) Specifications

Rotary servo motor model	HG-UR		72(B)	152(B)	202(B)	352(B)	502(B)
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
	MR-J4W_-						
Power supply capacity *1		[kVA]	1.3	2.5	3.5	5.5	7.5
Continuous running duty	Rated output	[kW]	0.75	1.5	2.0	3.5	5.0
	Rated torque (Note 3)	[N·m]	3.6	7.2	9.5	16.7	23.9
Maximum torque		[N·m]	10.7	21.5	28.6	50.1	71.6
Rated speed		[r/min]	2000				
Maximum speed		[r/min]		3000		2500	
Permissible instantaneous speed		[r/min]		3450		2875	
Power rate at continuous rated torque	Standard	[kW/s]	12.3	23.2	23.9	36.5	49.6
	With electromagnetic brake	[kW/s]	10.3	21.2	19.5	32.8	46.0
Rated current		[A]	5.4	9.7	14	23	28
Maximum current		[A]	16	29	42	69	84
Regenerative braking frequency *2	MR-J4-	[times/min]	53	124	68	44	31
	MR-J4W_-	[times/min]	107	-	-	-	-
Moment of inertia J	Standard	[× 10⁻⁴ kg·m²]	10.4	22.1	38.2	76.5	115
	With electromagnetic brake	[× 10⁻⁴ kg·m²]	12.5	24.2	46.8	85.1	124
Recommended load to motor inertia ratio (Note 1)			15 times or less				
Speed/position detector			Absolute/incremental 22-bit encoder (resolution: 4194304 pulses/rev)				
Oil seal			Attached				
Insulation class			155 (F)				
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)				
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)				
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)				
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust				
	Altitude		2000 m or less above sea level (Note 4)				
	Vibration resistance *4		X: 24.5 m/s² Y: 24.5 m/s²		X: 24.5 m/s² Y: 49 m/s²		
Vibration rank			V10 *6				
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.				
Permissible load for the shaft *5	L	[mm]	55	55	65	65	65
	Radial	[N]	637	637	882	1176	1176
	Thrust	[N]	490	490	784	784	784
Mass	Standard	[kg]	8.0	11	16	20	24
	With electromagnetic brake	[kg]	10	13	22	26	30

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. 368 in this catalog for the shaft-through portion.
   3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
   4. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the restrictions when using the servo motors at altitude exceeding 1000 m and up to 2000 m above sea level.

Drive Product

HG-UR Series Electromagnetic Brake Specifications (Note 1)

Model HG-UR		72B	152B	202B	352B	502B
Type		Spring actuated type safety brake				
Rated voltage		24 V DC $_{-10}^{0}$%				
Power consumption [W] at 20 °C		19	19	34	34	34
Electromagnetic brake static friction torque [N·m]		8.5	8.5	44	44	44
Permissible braking work	Per braking [J]	400	400	4500	4500	4500
	Per hour [J]	4000	4000	45000	45000	45000
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000	20000	20000	20000	20000
	Work per braking [J]	200	200	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-UR Series Torque Characteristics

HG-UR72(B) (Note 1, 2, 3, 4)
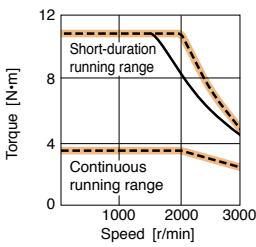
HG-UR152(B) (Note 1, 4, 5)
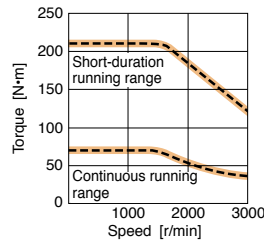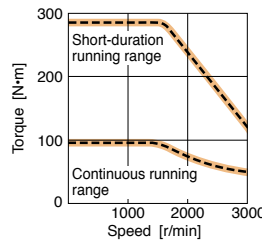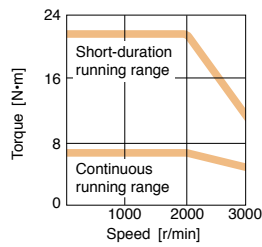

HG-UR202(B) (Note 1, 4)
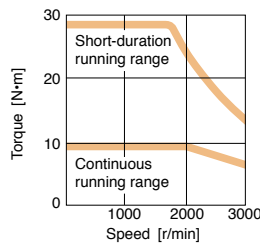
HG-UR352(B) (Note 1, 4)
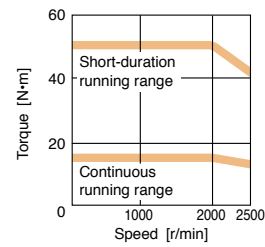
HG-UR502(B) (Note 1, 4)
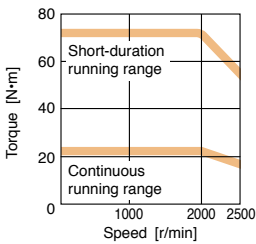
Notes: 1. ▬▬ : For 3-phase 200 V AC.
2. ---- : For 1-phase 230 V AC.
3. ─── : For 1-phase 200 V AC.
This line is drawn only where differs from the other two lines.
4. Torque drops when the power supply voltage is below the specified value.
5. Contact your local sales office for the torque characteristics when using the servo amplifier with 1-phase 200 V AC input.

HG-UR 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-UR72(B)K	22h6	55	50	6 $_{-0.036}^{0}$	42	3	3.5 $_{0}^{+0.1}$	3	M8 screw Depth: 20
HG-UR152(B)K	28h6	55	50	8 $_{-0.036}^{0}$	40	3	4 $_{0}^{+0.2}$	4	
HG-UR202(B)K, 352(B)K, 502(B)K	35 $_{0}^{+0.010}$	65	60	10 $_{-0.036}^{0}$	50	5	5 $_{0}^{+0.2}$	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]

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Drive Product
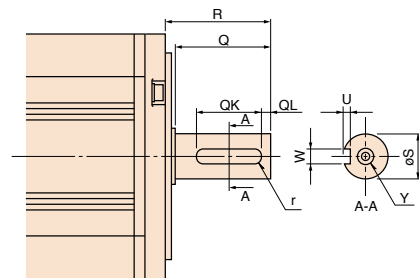
HG-AK Series (Ultra-compact Size, Ultra-small Capacity) Specifications (Note 4)

Servo motor model HG-AK			0136(B)	0236(B)	0336(B)
Compatible servo amplifier model			Refer to "Combinations of Rotary Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.		
Power supply capacity *8		[W]	230	360	480
Continuous running duty	Rated output	[W]	10	20	30
	Rated torque (Note 3)	[N·m]	0.032	0.064	0.095
Maximum torque		[N·m]	0.095	0.191	0.286
Rated speed		[r/min]	3000		
Maximum speed	48 V DC	[r/min]	6000		
	24 V DC	[r/min]	6000		5000
Permissible instantaneous speed	48 V DC	[r/min]	6900		
	24 V DC	[r/min]	6900		5750
Power rate at continuous rated torque	Standard	[kW/s]	3.54	9.01	14.95
	With electromagnetic brake	[kW/s]	2.41	6.99	12.32
Rated current		[A]	2.1	2.1	2.2
Maximum current		[A]	6.3	6.3	6.6
Regenerative braking frequency *2		[times/min]	1700	1200	900
Moment of inertia J	Standard	[$\times 10^{-4}$ kg·m^2]	0.0029	0.0045	0.0061
	With electromagnetic brake	[$\times 10^{-4}$ kg·m^2]	0.0042	0.0058	0.0074
Recommended load to motor inertia ratio (Note 1)			30 times or less		
Speed/position detector			Absolute/incremental 18-bit encoder (resolution: 262144 pulses/rev)		
Oil seal			None		
Insulation class			130 (B)		
Structure			Totally enclosed, natural cooling (IP rating: IP55) (Note 2)		
Environment *3	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)		
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)		
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust		
	Altitude		1000 m or less above sea level		
	Vibration resistance *4		X: 49 m/s^2 Y: 49 m/s^2		
Vibration rank			V10 *6		
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.		
Permissible load for the shaft *5	L	[mm]	16	16	16
	Radial	[N]	34	44	49
	Thrust	[N]	14	14	14
Mass	Standard	[kg]	0.12	0.14	0.16
	With electromagnetic brake	[kg]	0.22	0.24	0.26

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, the connector, and the power cable leading part are excluded. Refer to the asterisk 7 of "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the shaft-through portion.
   3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
   4. Specifications of HG-AK_-S100 are the same as those of HG-AK_ except for the dimensions.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 368 in this catalog for the asterisks 2 to 6 and 8.

HG-AK Series Electromagnetic Brake Specifications (Note 1)

Model HG-AK		0136B	0236B	0336B
Type		Spring actuated type safety brake		
Rated voltage		24 V DC$_{-10}^{0}$%		
Power consumption [W] at 20 °C		1.8		
Electromagnetic brake static friction torque [N·m]		0.095		
Permissible braking work	Per braking [J]	4.6		
	Per hour [J]	46		
Electromagnetic brake life (Note 2)	Number of brakings [Times]	20000		
	Work per braking [J]	1		

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-AK Series Torque Characteristics

HG-AK0136(B) (Note 1, 2, 3, 4)
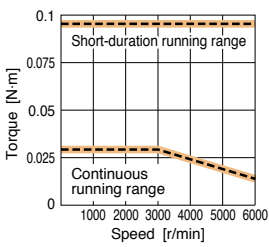
HG-AK0236(B) (Note 1, 2, 3, 4)
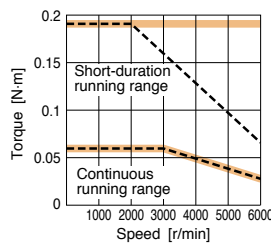
HG-AK0336(B) (Note 1, 2, 3, 4)
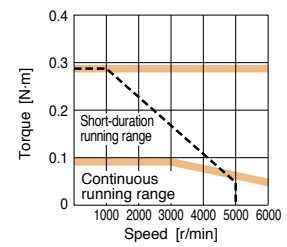
Notes: 1. ▬▬ : For 48 V DC.
2. ---- : For 24 V DC.
3. Torque drops when the power supply voltage is below the specified value.
4. The torque characteristics are applicable when optional MR-J4W03PWCBL5M-H or MR-J4W03PWBRCBL5M-H is used between the servo amplifier and the servo motor. When an option cable longer than 5 m is used, the torque characteristics in the short-duration running range may be lower because of voltage drop.

HG-AK Series Special Shaft End Specifications (Note 1)

Motors with the following specifications are also available.

D-cut shaft

[Unit: mm]

Notes: 1. Specifications of HG-AK_-S100 are the same as those of HG-AK_ except for the dimensions.

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MR-JE
Series

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 permissible 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 permissible regenerative power [W] when regenerative option is used.
* 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
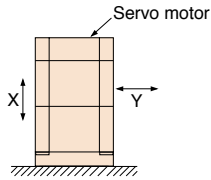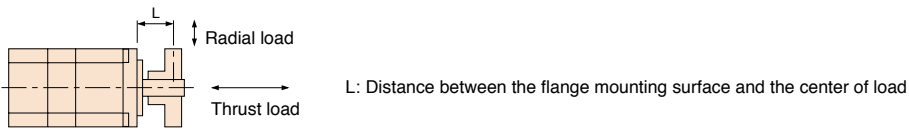
* 6. V10 indicates that the amplitude of the servo motor itself is 10 μm or less. The following shows mounting posture and measuring position of the servo motor during the measurement:
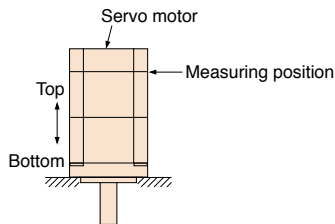
* 7. Refer to the diagram below for shaft-through portion.
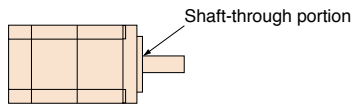
* 8. The power supply capacity varies depending on the DC power supply and the wiring impedance.

Drive Product

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

● HG-KR053(B), HG-KR13(B)
● HG-MR053(B), HG-MR13(B)
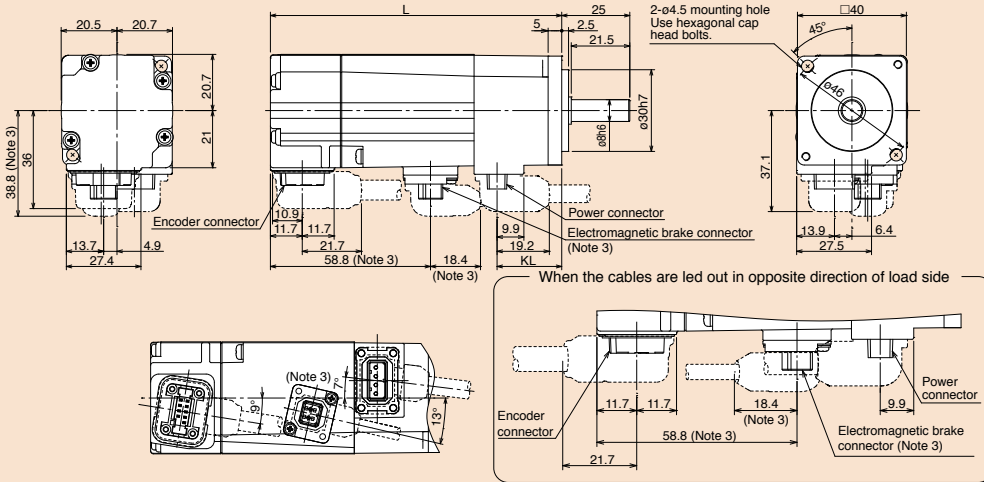
2-ø4.5 mounting hole
Use hexagonal cap head bolts.

When the cables are led out in opposite direction of load side

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)
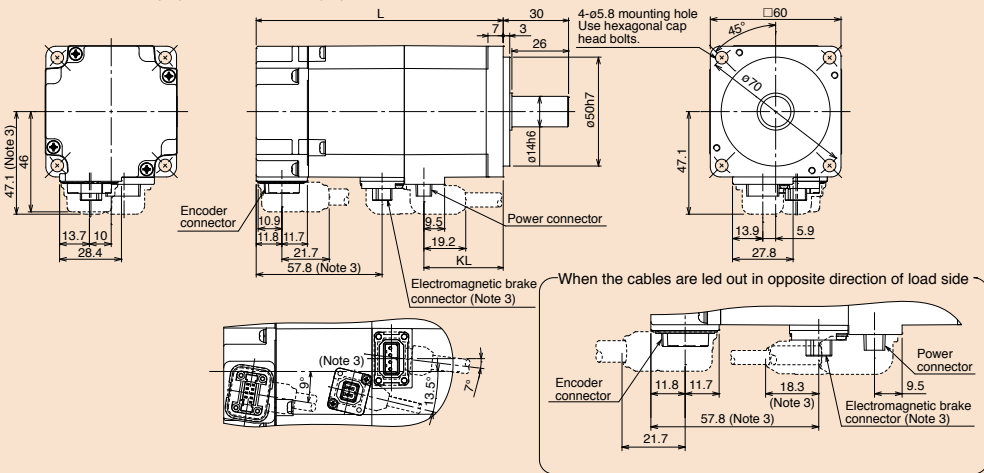
4-ø5.8 mounting hole
Use hexagonal cap head bolts.

When the cables are led out in opposite direction of load side

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)

4-ø6.6 mounting hole
Use hexagonal cap head bolts.

When the cables are led out in opposite direction of load side

Power connector

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

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. The electromagnetic brake terminals (B1, B2) do not have polarity.
3. Only for the models with electromagnetic brake.
4. Dimensions in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.
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),
  HG-SR524(B), HG-SR1024(B), HG-SR1524(B)

Encoder connector CMV1-R10P
Electromagnetic brake connector CMV1-R2P (Note 3)
Power connector MS3102A18-10P

Main key Position mark
(Note 2) Electromagnetic brake

4-ø9 mounting hole Use hexagonal cap head bolts.

Electromagnetic brake connector
Servo motor flange direction →

Power connector
Servo motor flange direction →
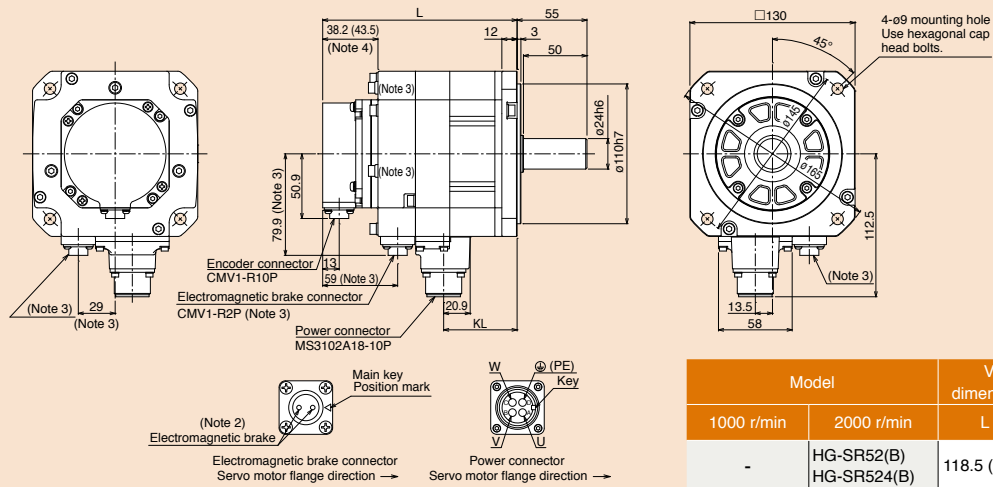
Model		Variable dimensions (Note 4)	
1000 r/min	2000 r/min	L	KL
-	HG-SR52(B) HG-SR524(B)	118.5 (153)	57.8
HG-SR51(B)	HG-SR102(B) HG-SR1024(B)	132.5 (167)	71.8
HG-SR81(B)	HG-SR152(B) HG-SR1524(B)	146.5 (181)	85.8

[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),
  HG-SR2024(B), HG-SR3524(B), HG-SR5024(B), HG-SR7024(B)

Encoder connector CMV1-R10P
Electromagnetic brake connector CMV1-R2P (Note 3)
Power connector
MS3102A22-22P (3.5 kW or smaller, and 5 kW)
MS3102A32-17P (4.2 kW and 7 kW)

4-ø13.5 mounting hole Use hexagonal cap head bolts.

Main key Position mark
(Note 2) Electromagnetic brake

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

Electromagnetic brake connector
Servo motor flange direction →

Power connector
Servo motor flange direction →

Model		Variable dimensions (Note 4)			
1000 r/min	2000 r/min	L	KL	KA	KB
HG-SR121(B)	HG-SR202(B) HG-SR2024(B)	138.5 (188)	74.8	24.8	140.9
HG-SR201(B)	HG-SR352(B) HG-SR3524(B)	162.5 (212)	98.8	24.8	140.9
HG-SR301(B)	HG-SR502(B) HG-SR5024(B)	178.5 (228)	114.8	24.8	140.9
HG-SR421(B)	HG-SR702(B) HG-SR7024(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 in brackets are for the models with electromagnetic brake.
5. Use a friction coupling to fasten a load.

Drive Product

HG-JR Series Dimensions (Note 1, 5)

● HG-JR53(B), HG-JR73(B), HG-JR103(B), HG-JR153(B), HG-JR203(B),
HG-JR534(B), HG-JR734(B), HG-JR1034(B), HG-JR1534(B), HG-JR2034(B)

Model	Variable dimensions (Note 4)	
	L	KL
HG-JR53(B) HG-JR534(B)	127.5 (173)	76
HG-JR73(B) HG-JR734(B)	145.5 (191)	94
HG-JR103(B) HG-JR1034(B)	163.5 (209)	112
HG-JR153(B) HG-JR1534(B)	199.5 (245)	148
HG-JR203(B) HG-JR2034(B)	235.5 (281)	184
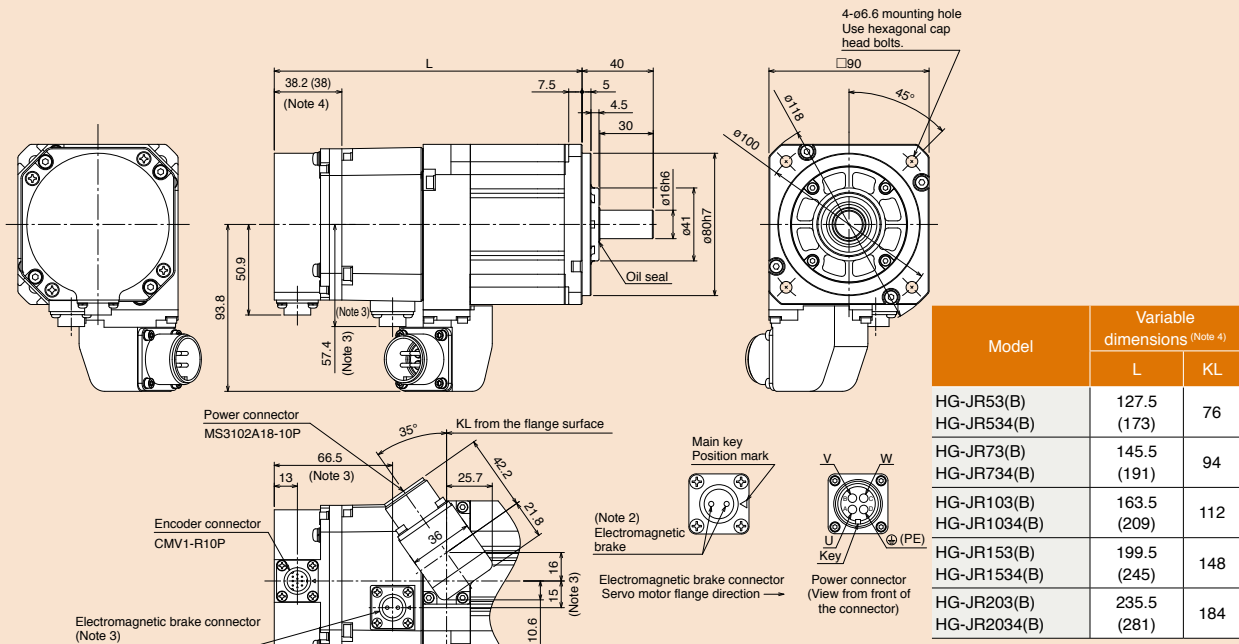
[Unit: mm]

● HG-JR353(B), HG-JR503(B)
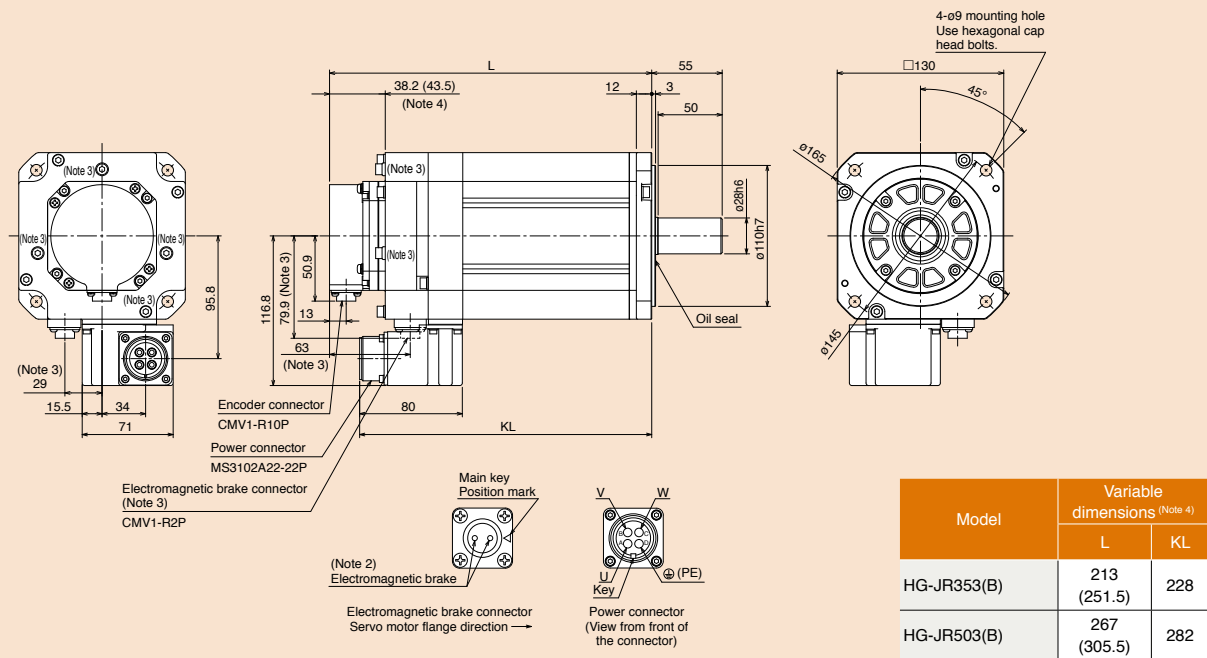
Model	Variable dimensions (Note 4)	
	L	KL
HG-JR353(B)	213 (251.5)	228
HG-JR503(B)	267 (305.5)	282

[Unit: mm]

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

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HG-JR Series Dimensions (Note 1, 5)

● HG-JR3534(B), HG-JR5034(B)

4-ø9 mounting hole
Use hexagonal cap head bolts.

□130

45°

ø165

ø145

L

38.2 (43.5)
(Note 4)

55

12

3

50

ø28h6

ø110h7

Oil seal

114.8

79.9 (Note 3)

50.9

(Note 3)

KL from the flange surface

35°

63

13 (Note 3)

25.7

42.2

21.8

36

13.5

29 (Note 3)

13.1

Power connector
MS3102A18-10P

Encoder connector
CMV1-R10P

Electromagnetic brake connector
(Note 3)
CMV1-R2P

Main key
Position mark

(Note 2)
Electromagnetic brake

Electromagnetic brake connector
Servo motor flange direction →

V W

U (PE)
Key

Power connector
(View from front of the connector)

Model	Variable dimensions (Note 4)	
	L	KL
HG-JR3534(B)	213 (251.5)	161
HG-JR5034(B)	267 (305.5)	215

[Unit: mm]

● HG-JR703(B), HG-JR903(B), HG-JR7034(B), HG-JR9034(B)

4-ø13.5 mounting hole
Use hexagonal cap head bolts.

□176

45°

ø200

ø230

44

102.3

L

38.5 (45.5)
(Note 4)

79

18

3

75

ø35

ø114.3

Oil seal

133.5

163.3

96.9 (Note 3)

50.9

13

66.5 (Note 3)

92.1

KL

44

28.5
(Note 3)

Encoder connector
CMV1-R10P

Electromagnetic brake connector (Note 3)
CMV1-R2P

Power connector
MS3102A32-17P

*1

*2

*3

*4

Main key
Position mark

(Note 2)
Electromagnetic brake

Electromagnetic brake connector
Servo motor flange direction →

V W

U (PE)
Key

Power connector
(View from front of the connector)

*1, *2, *3, and *4 are screw holes (M8) for eyebolt.

Model	Variable dimensions (Note 4)	
	L	KL
HG-JR703(B) HG-JR7034(B)	263.5 (313)	285.4
HG-JR903(B) HG-JR9034(B)	303.5 (353)	325.4

[Unit: mm]

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

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HG-JR Series Dimensions (Note 1, 5)

● HG-JR601(B), HG-JR701M(B), HG-JR6014(B), HG-JR701M4(B)

299.5 (372) (Note 4) 85 20 4 79 40 25 ø42h6 □220 37.5° 45°
2-M8 screw 4-ø13.5 mounting hole Use hexagonal cap head bolts.
ø250 ø270 ø235 ø200h7
171.1
M8 screw Oil seal
81 136.2 (Note 3) (Note 3) *1,2 (Note 3) *3,4
19.5 130 (Note 3) 32 225.5 4 54 82 (Note 3)

Encoder connector MS3102A20-29P
Electromagnetic brake connector (Note 3) MS3102A10SL-4P
Power connector MS3102A32-17P

*1, *2, and *3 are (Note 3)

Key W ⊕ (PE) Key
(Note 2) Electromagnetic brake V U
Electromagnetic brake connector Power connector
Servo motor flange direction → Servo motor flange direction →

*1, *2, *3, and *4 are screw holes (M10) for eyebolt.

[Unit: mm]

● HG-JR801(B), HG-JR12K1(B), HG-JR8014(B), HG-JR12K14(B)
● HG-JR11K1M(B), HG-JR15K1M(B), HG-JR11K1M4(B), HG-JR15K1M4(B)

L 116 20 4 110 40 27 ø55m6 □220 4-ø13.5 mounting hole Use hexagonal cap head bolts.
37.5° 45°
2-M8 screw ø250 ø270 ø235 ø200h7
171.1
M10 screw Oil seal
81 136.2 (Note 3) (Note 3) *1,2 (Note 3) *3,4
19.5 130 (Note 3) 32 KL 4 54 82 (Note 3)

Encoder connector MS3102A20-29P
Electromagnetic brake connector (Note 3) MS3102A10SL-4P
Power connector MS3102A32-17P

Key W ⊕ (PE) Key
(Note 2) Electromagnetic brake V U
Electromagnetic brake connector Power connector
Servo motor flange direction → Servo motor flange direction →
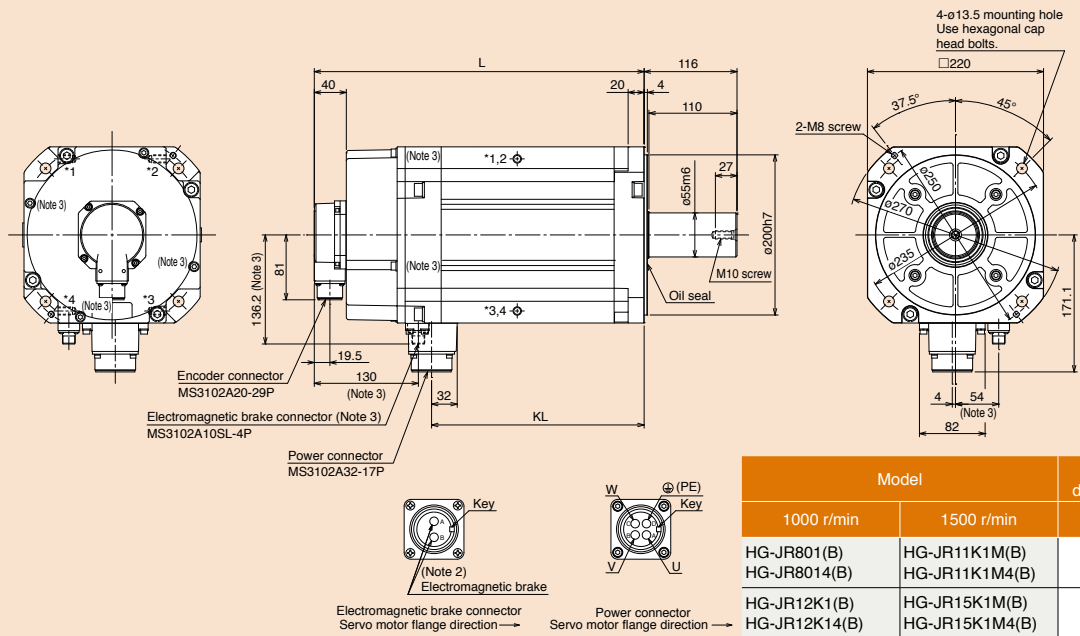
Model		Variable dimensions (Note 4)	
1000 r/min	1500 r/min	L	KL
HG-JR801(B) HG-JR8014(B)	HG-JR11K1M(B) HG-JR11K1M4(B)	339.5 (412)	265.5
HG-JR12K1(B) HG-JR12K14(B)	HG-JR15K1M(B) HG-JR15K1M4(B)	439.5 (512)	365.5

*1, *2, *3, and *4 are screw holes (M10) for eyebolt.

[Unit: mm]

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

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

● HG-JR15K1, HG-JR20K1, HG-JR25K1, HG-JR15K14, HG-JR20K14, HG-JR25K14
● HG-JR22K1M (Note 7), HG-JR30K1M, HG-JR37K1M, HG-JR22K1M4 (Note 7), HG-JR30K1M4, HG-JR37K1M4

Power lead hole (Note 4)
Cooling fan connector CE05-2A14S-2P
Encoder connector MS3102A20-29P
Cooling fan rotating direction
Intake (Note 3)
Exhaust
Eyebolt (Note 5, 8)
4-ø24 mounting hole Use hexagonal cap head bolts.
M12 screw
Oil seal
Key
Do not use.
Cooling fan connector Servo motor flange direction

*1, *2, *3, and *4 are screw holes (M12) for eyebolt.
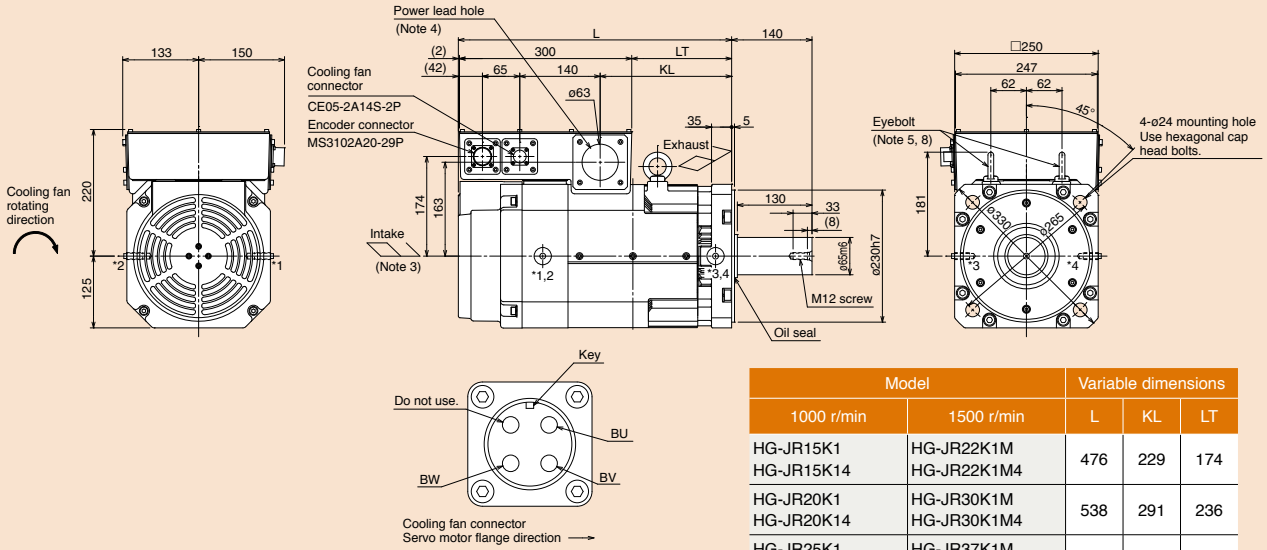
Model		Variable dimensions		
1000 r/min	1500 r/min	L	KL	LT
HG-JR15K1 HG-JR15K14	HG-JR22K1M HG-JR22K1M4	476	229	174
HG-JR20K1 HG-JR20K14	HG-JR30K1M HG-JR30K1M4	538	291	236
HG-JR25K1 HG-JR25K14	HG-JR37K1M HG-JR37K1M4	600	353	298

[Unit: mm]

● HG-JR30K1, HG-JR37K1, HG-JR30K14, HG-JR37K14
● HG-JR45K1M4, HG-JR55K1M4

Power lead hole (Note 4)
Cooling fan connector CE05-2A14S-2P
Encoder connector MS3102A20-29P
Cooling fan rotating direction
Intake (Note 3)
Exhaust
Oil seal
Eyebolt (Note 5, 9)
4-ø24 mounting hole Use hexagonal cap head bolts.
M16 screw
Key
Do not use.
Cooling fan connector Servo motor flange direction

*1, *2, *3, and *4 are screw holes (M16) for eyebolt.
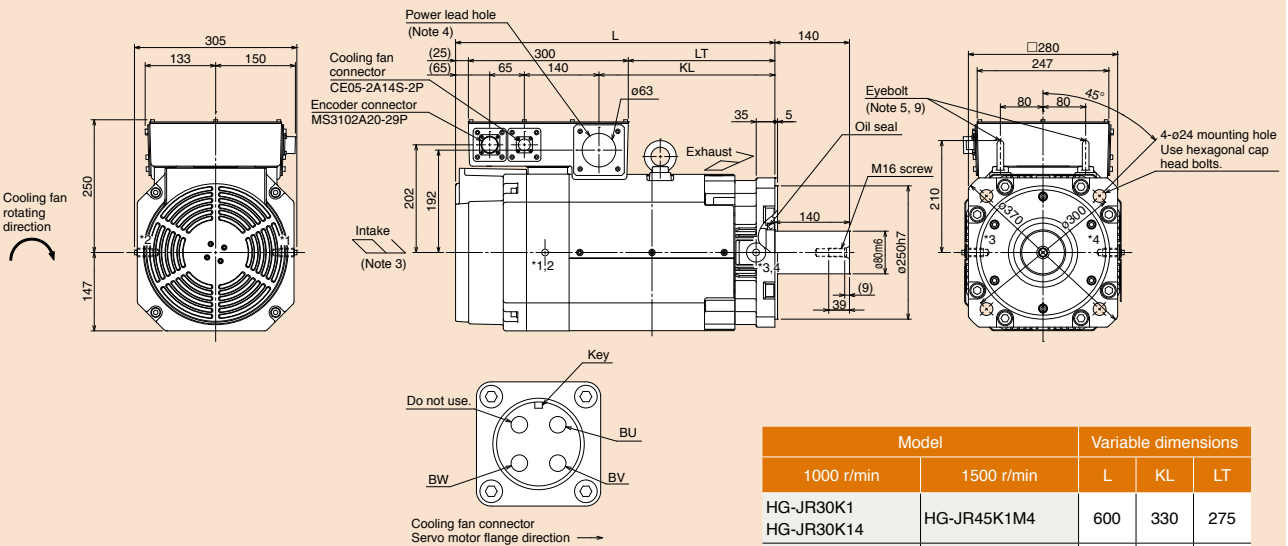
Model		Variable dimensions		
1000 r/min	1500 r/min	L	KL	LT
HG-JR30K1 HG-JR30K14	HG-JR45K1M4	600	330	275
HG-JR37K1 HG-JR37K14	HG-JR55K1M4	664	394	339

[Unit: mm]

Notes: 1. For dimensions without tolerance, general tolerance applies.
2. Use a friction coupling to fasten a load.
3. Leave a clearance of at least 150 mm between the intake side of the servo motor and wall.
4. Prevent oil, water, dust, and other foreign matter from entering the servo motor through the lead hole.
5. A washer is placed between the eyebolt and the servo motor to adjust the bolt angle.
6. The terminal block in the terminal box consists of M10 screws for the motor power input (U, V, and W).
7. HG-JR22K1M/HG-JR22K1M4 have been modified from September 2014 production. Refer to "Servo Motor Instruction Manual (Vol. 3)" for the previous dimensions.
8. When using the servo motor without the eyebolt, plug the threaded hole with a bolt of M12 × 20 or shorter.
9. When using the servo motor without the eyebolt, plug the threaded hole with a bolt of M16 × 20 or shorter.

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HG-RR Series Dimensions (Note 1, 5)

● HG-RR103(B), HG-RR153(B), HG-RR203(B)

4-ø9 mounting hole
Use hexagonal cap head bolts.

(Note 3)
(Note 3)
(Note 3)
(Note 3)

38
L
45
10 3
40
50.9
(Note 3)
(Note 3)
ø24h6
ø95h7
Oil seal
□100
45°
ø115
ø135
94.8
44

Encoder connector
CMV1-R10P
13

Power connector
CE05-2A22-23P
KL

Electromagnetic brake (Note 2)
Key
(PE)
U
W
V
Power connector
Servo motor flange direction
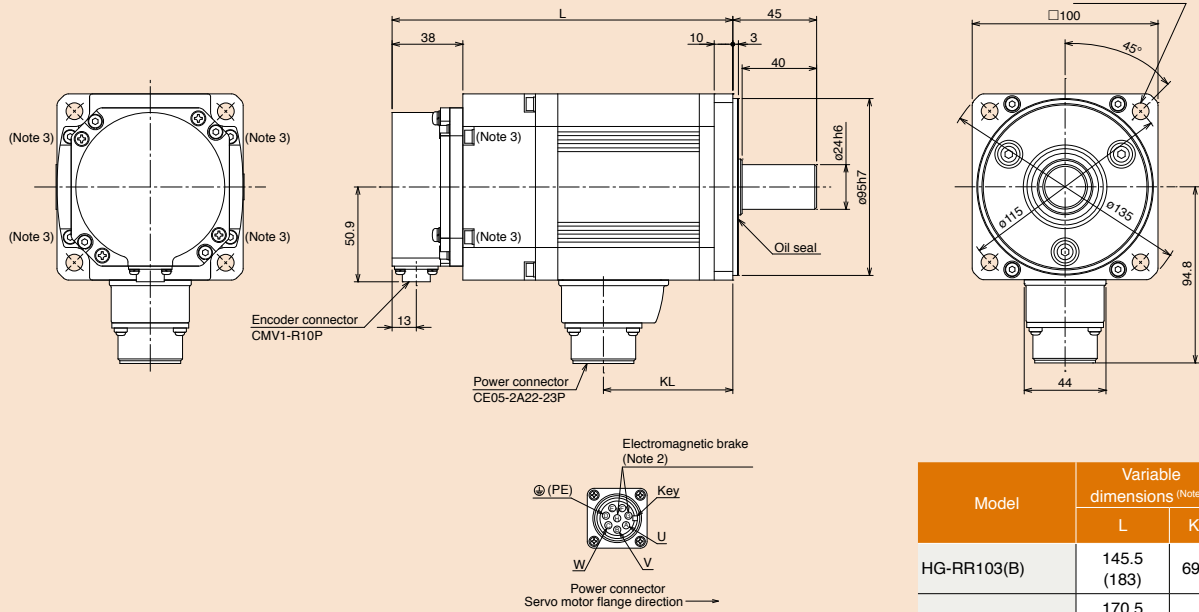
Model	Variable dimensions (Note 4)	
	L	KL
HG-RR103(B)	145.5 (183)	69.5
HG-RR153(B)	170.5 (208)	94.5
HG-RR203(B)	195.5 (233)	119.5

[Unit: mm]

● HG-RR353(B), HG-RR503(B)

4-ø9 mounting hole
Use hexagonal cap head bolts.

(Note 3)
(Note 3)
(Note 3)
(Note 3)

38.2 (42)
L
63
12 3
58
50.9
(Note 3)
(Note 3)
ø28h6
ø110h7
Oil seal
□130
45°
ø145
ø165
117.4
46

Encoder connector
CMV1-R10P
13

Power connector
CE05-2A24-10P
KL

Electromagnetic brake (Note 2)
Key
(PE)
U
W
V
Power connector
Servo motor flange direction
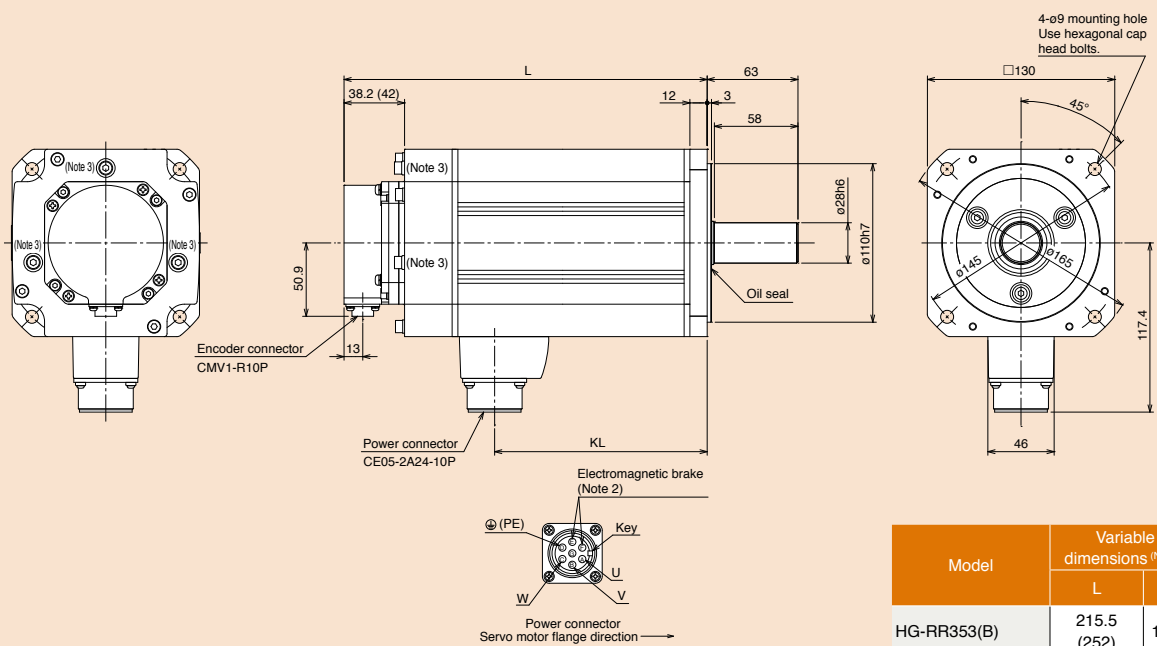
Model	Variable dimensions (Note 4)	
	L	KL
HG-RR353(B)	215.5 (252)	147.5
HG-RR503(B)	272.5 (309)	204.5

[Unit: mm]

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

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

HG-UR Series Dimensions (Note 1, 5)

● HG-UR72(B), HG-UR152(B)

Model	Variable dimensions (Note 4)		
	L	KL	S
HG-UR72(B)	109 (142.5)	38	22
HG-UR152(B)	118.5 (152)	47.5	28
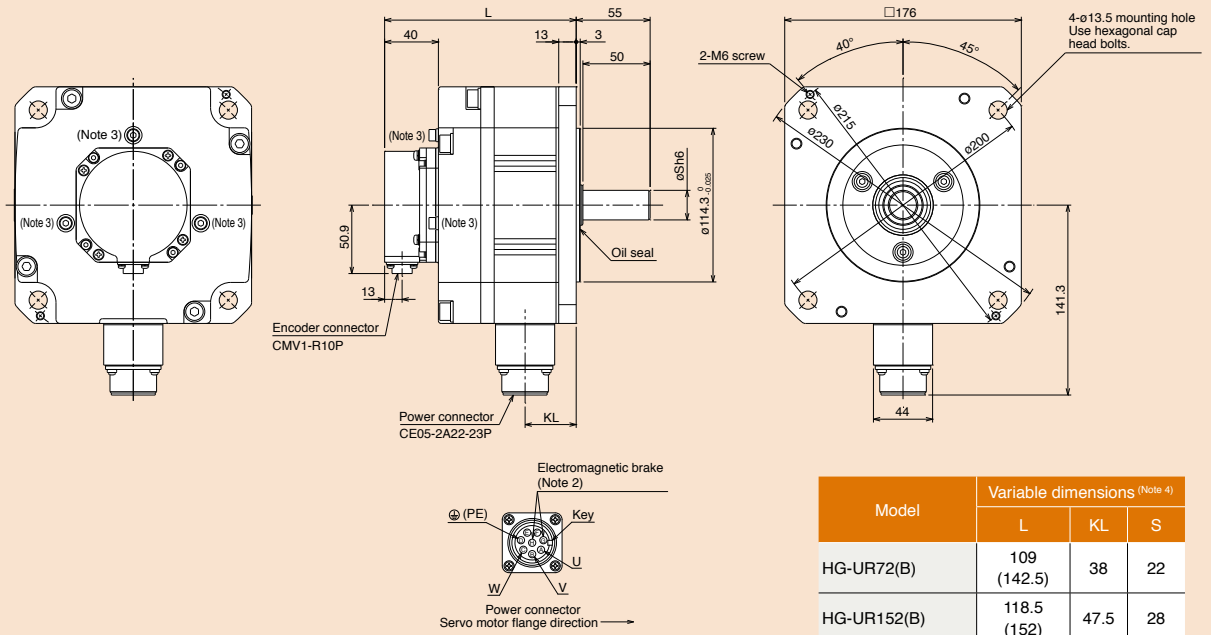
[Unit: mm]

● HG-UR202(B), HG-UR352(B), HG-UR502(B)
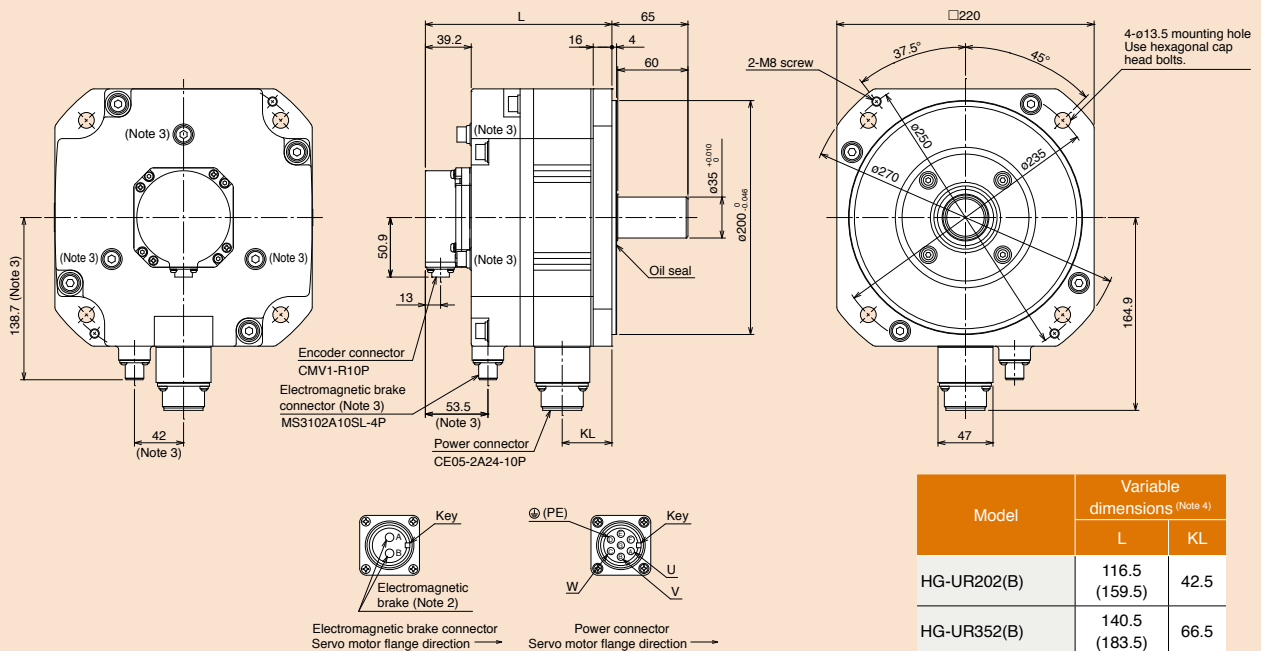
Model	Variable dimensions (Note 4)	
	L	KL
HG-UR202(B)	116.5 (159.5)	42.5
HG-UR352(B)	140.5 (183.5)	66.5
HG-UR502(B)	164.5 (207.5)	90.5

[Unit: mm]

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

Drive Product

HG-AK Series Dimensions (Note 1, 4)

● HG-AK0136(B), HG-AK0236(B), HG-AK0336(B)

For servo motor without electromagnetic brake

For servo motor with electromagnetic brake

Encoder cable
Housing: J21DF-10V-KX-L
Terminal: SJ2F-002GF-P1.0

Power cable
Housing: J21DF-06V-KX-L
Terminal: SJ2F-01GF-P1.0
(Power lead 4-AWG 24)
Terminal: SJ2F-002GF-P1.0
(Brake lead 2-AWG 26)

Power connector

* The encoder cable leading portion has been modified from April 2013 production.

	Pin No.	Signal name
A	1	⏚ (E)
	2	U
	3	B1 (Note 2)
B	1	V
	2	W
	3	B2 (Note 2)

Model	Variable dimensions (Note 3)		
	L	KL	CL
HG-AK0136(B)	54 (86)	30.7 (42.7)	225 +20/0 (245 +20/0)
HG-AK0236(B)	61 (93)	37.7 (49.7)	
HG-AK0336(B)	68 (100)	44.7 (56.7)	

[Unit: mm]

● HG-AK0136(B)-S100, HG-AK0236(B)-S100, HG-AK0336(B)-S100
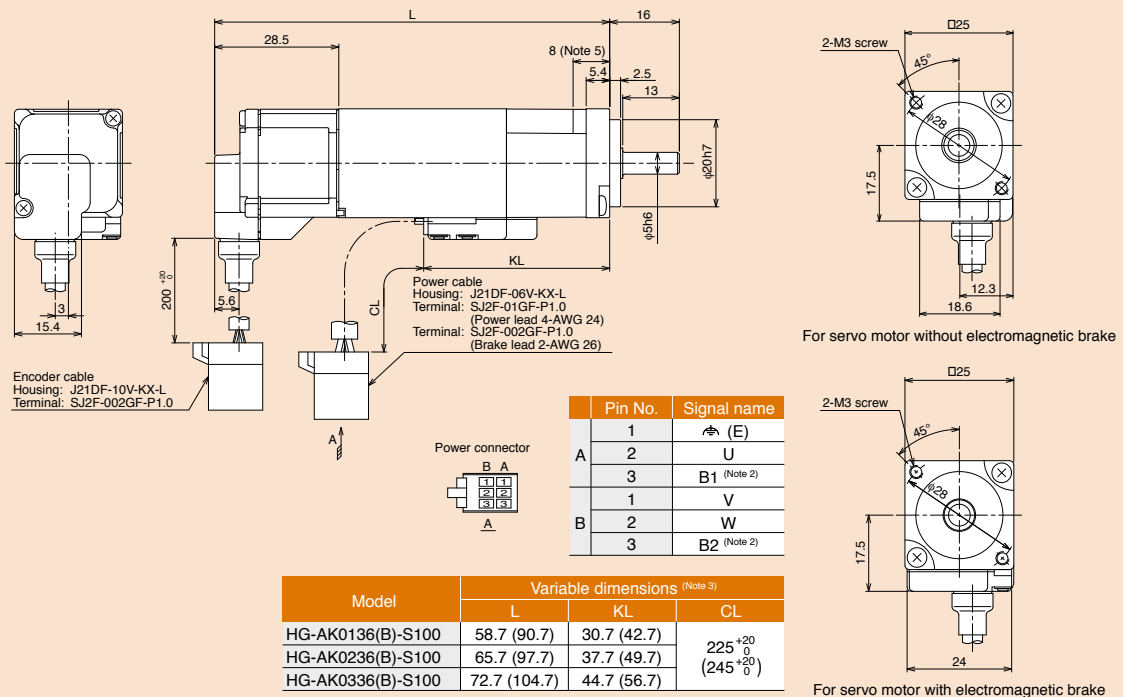
For servo motor without electromagnetic brake

For servo motor with electromagnetic brake

Encoder cable
Housing: J21DF-10V-KX-L
Terminal: SJ2F-002GF-P1.0

Power cable
Housing: J21DF-06V-KX-L
Terminal: SJ2F-01GF-P1.0
(Power lead 4-AWG 24)
Terminal: SJ2F-002GF-P1.0
(Brake lead 2-AWG 26)

Power connector

	Pin No.	Signal name
A	1	⏚ (E)
	2	U
	3	B1 (Note 2)
B	1	V
	2	W
	3	B2 (Note 2)

Model	Variable dimensions (Note 3)		
	L	KL	CL
HG-AK0136(B)-S100	58.7 (90.7)	30.7 (42.7)	225 +20/0 (245 +20/0)
HG-AK0236(B)-S100	65.7 (97.7)	37.7 (49.7)	
HG-AK0336(B)-S100	72.7 (104.7)	44.7 (56.7)	

[Unit: mm]

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

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

● Linear Servo Motors

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 - □ (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
36	1800	3600
48	2400	4800
60	3000	6000

Symbol	Linear servo motor model
1SS0	LM-FP2B-06M
	LM-FP2D-12M
	LM-FP2F-18M
	LM-FP4B-12M
	LM-FP4D-24M
	LM-FP4F-36M
	LM-FP4H-48M
	LM-FP5H-60M

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

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

Primary side (coil)

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

Symbol	Linear servo motor model
1SS0	LM-FS20-480
	LM-FS20-576
	LM-FS40-480
	LM-FS40-576
	LM-FS50-480
	LM-FS50-576

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

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

Secondary side (magnet)

Drive Product

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series
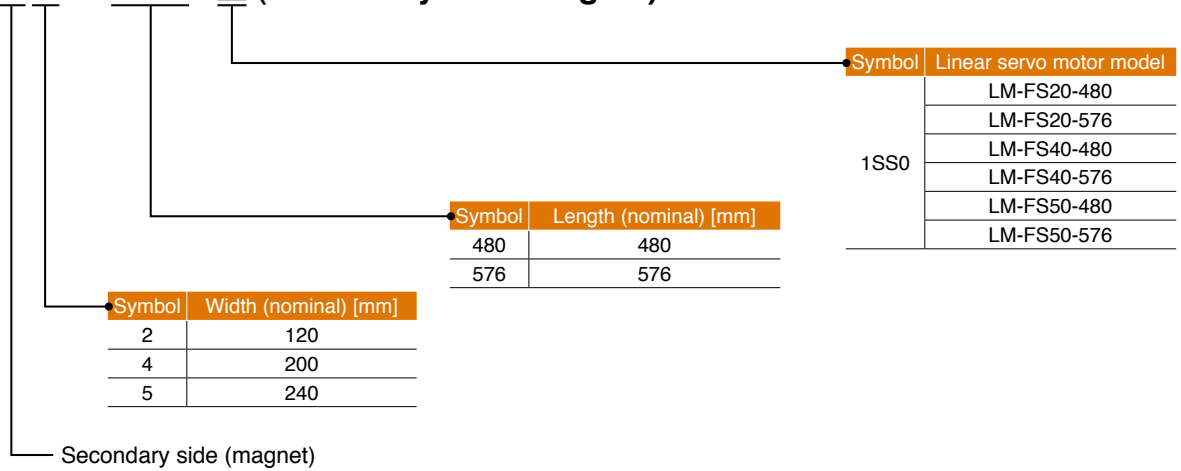
Model Designation

● 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
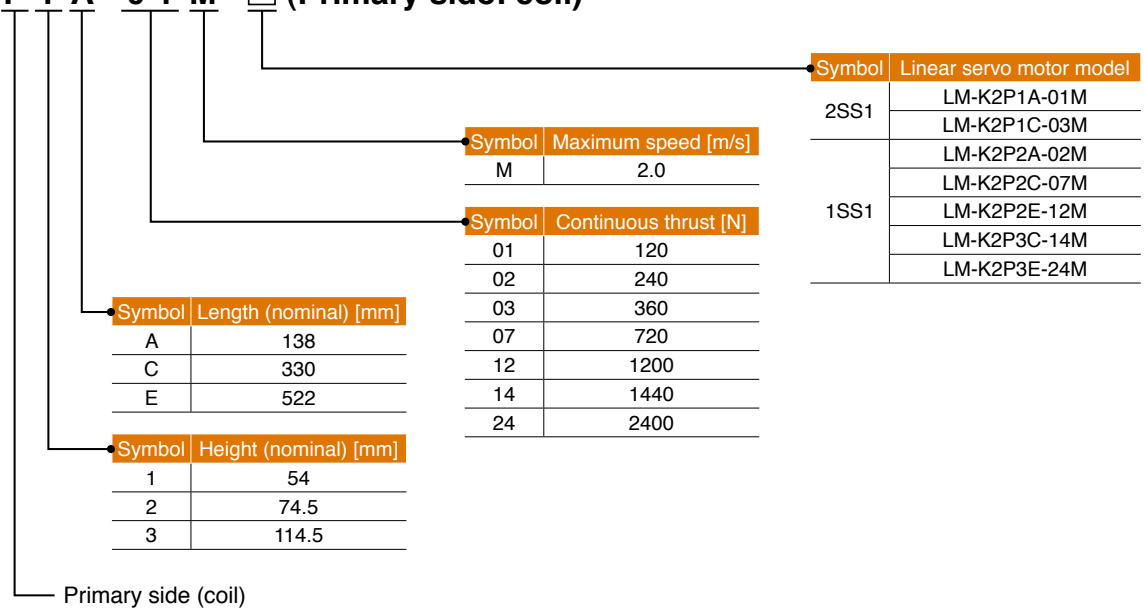
Primary side (coil)

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)

Drive Product

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Model Designation

● LM-U2 (medium thrust) series

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

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)

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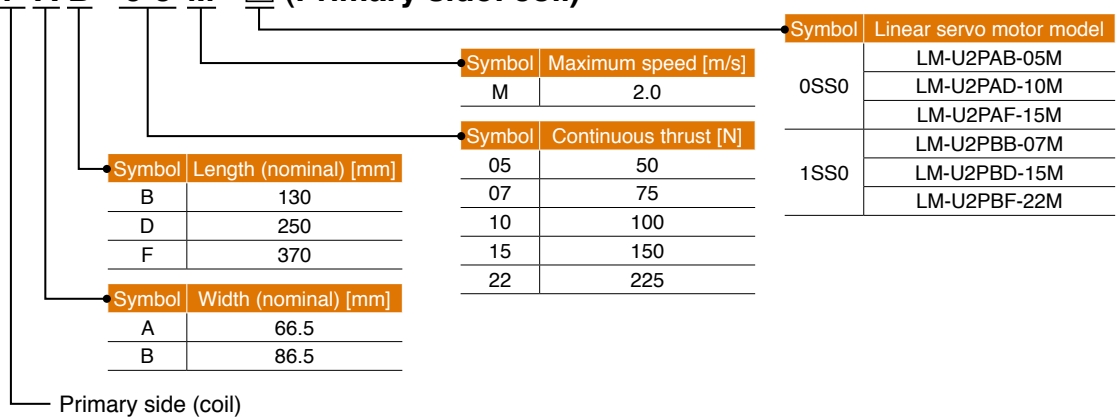
L M - U 2 S A 0 - 2 4 0 - ☐ (Secondary side: magnet)

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

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

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

● LM-U2 (large thrust) series

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

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)

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

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

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

Secondary side (magnet)

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

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 "SERVO AMPLIFIERS & MOTORS L(NA)03058" 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 (Note 5)	[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								
Insulation class			155 (F)								
Structure			Open (IP rating: IP00)								
Environment	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		1000 m or less above sea level								
	Vibration resistance		49 m/s^2								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
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 permissible 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 permissible regenerative power [W] when regenerative option is used.
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.
5. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-H3 Series Thrust Characteristics

LM-H3P2A-07P-BSS0 (Note 1, 2, 4)

Thrust [N] / Speed [m/s]
175, 140, 70, 0
Short-duration running range
Continuous running range
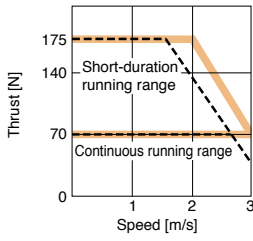
LM-H3P3A-12P-CSS0 (Note 1, 2, 4)

Thrust [N] / Speed [m/s]
300, 240, 120, 0
Short-duration running range
Continuous running range

LM-H3P3B-24P-CSS0 (Note 1, 3, 4)

Thrust [N] / Speed [m/s]
600, 480, 240, 0
Short-duration running range
Continuous running range

LM-H3P3C-36P-CSS0 (Note 1, 3, 4)

Thrust [N] / Speed [m/s]
900, 720, 360, 0
Short-duration running range
Continuous running range
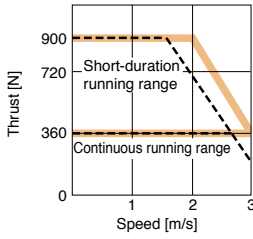
LM-H3P3D-48P-CSS0 (Note 1, 3, 4)

Thrust [N] / Speed [m/s]
1200, 960, 480, 0
Short-duration running range
Continuous running range
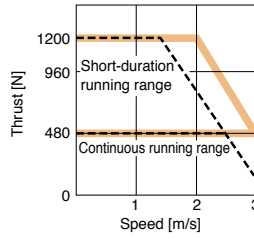
LM-H3P7A-24P-ASS0 (Note 1, 3, 4)

Thrust [N] / Speed [m/s]
600, 480, 240, 0
Short-duration running range
Continuous running range
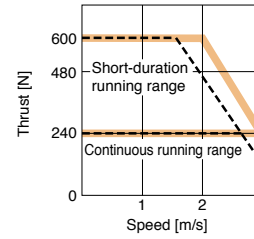
LM-H3P7B-48P-ASS0 (Note 1, 3, 4)

Thrust [N] / Speed [m/s]
1200, 960, 480, 0
Short-duration running range
Continuous running range
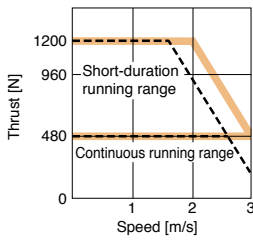
LM-H3P7C-72P-ASS0 (Note 1, 3, 4)
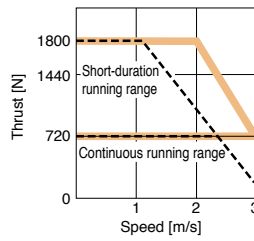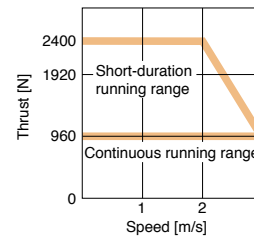
Thrust [N] / Speed [m/s]
1800, 1440, 720, 0
Short-duration running range
Continuous running range

LM-H3P7D-96P-ASS0 (Note 1, 4)

Thrust [N] / Speed [m/s]
2400, 1920, 960, 0
Short-duration running range
Continuous running range

Notes: 1. ▬▬▬ : For 3-phase 200 V AC.
2. ---- : For 1-phase 200 V AC or 1-phase 100 V AC.
3. ---- : For 1-phase 200 V AC.
4. Thrust drops when the power supply voltage is below the specified value.

Drive Product

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Drive Product

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	P4F-36M-1SS0	P4H-48M-1SS0	P5H-60M-1SS0 (Note 3)
	Secondary side (magnet)	LM-F		S20-480-1SS0 S20-576-1SS0			S40-480-1SS0 S40-576-1SS0				S50-480-1SS0 (Note 3) S50-576-1SS0 (Note 3)
Compatible servo amplifier model		MR-J4-		Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Power supply capacity			[kVA]	3.5	7.5	10	7.5	10	14	18	22
Cooling method				Natural cooling or liquid cooling							
Thrust	Continuous (natural cooling) (Note 4)		[N]	300	600	900	600	1200	1800	2400	3000
	Continuous (liquid cooling) (Note 4)		[N]	600	1200	1800	1200	2400	3600	4800	6000
	Maximum		[N]	1800	3600	5400	3600	7200	10800	14400	18000
Maximum speed (Note 1)			[m/s]	2.0							
Magnetic attraction force			[N]	4500	9000	13500	9000	18000	27000	36000	45000
Rated current	Natural cooling		[A]	4.0	7.8	12	7.8	15	21	28	22
	Liquid cooling		[A]	7.8	16	23	17	31	44	59	45
Maximum current			[A]	30	58	87	57	109	159	212	157
Regenerative braking frequency (Note 2)	MR-J4-	Natural cooling	[times/min]	348	264	318	393	169	577	715	4230
		Liquid cooling	[times/min]	671	396	No limit	366	224	859	1050	No limit
Recommended load to motor mass ratio				Maximum of 15 times the mass of the linear servo motor primary side							
Insulation class				155 (F)							
Structure				Open (IP rating: IP00)							
Environment	Ambient temperature			Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity			Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)							
	Ambience			Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude			1000 m or less above sea level							
	Vibration resistance			49 m/s²							
Compliance to global standards				Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.							
Mass	Primary side (coil)		[kg]	9.0	18	27	14	28	42	56	67
	Secondary side (magnet)		[kg]	480 mm/pc: 7.0 576 mm/pc: 9.0			480 mm/pc: 12 576 mm/pc: 15				480 mm/pc: 20 576 mm/pc: 24

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 permissible 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 permissible regenerative power [W] when regenerative option is used.
3. Use 400 V AC type servo amplifier for this linear servo motor.
4. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-F Series Thrust Characteristics

LM-FP2B-06M-1SS0 (Note 1, 3, 4)

Thrust [N] — 1800, 1200, 600, 300
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

LM-FP2D-12M-1SS0 (Note 1, 4)

Thrust [N] — 3600, 2400, 1200, 600, 0
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

LM-FP2F-18M-1SS0 (Note 1, 4)

Thrust [N] — 5400, 3600, 1800, 900, 0
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

LM-FP4B-12M-1SS0 (Note 1, 4)

Thrust [N] — 3600, 2400, 1200, 600, 0
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

LM-FP4D-24M-1SS0 (Note 1, 4)

Thrust [N] — 7200, 4800, 2400, 1200, 0
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

LM-FP4F-36M-1SS0 (Note 1, 4)

Thrust [N] — 10800, 7200, 3600, 1800, 0
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

LM-FP4H-48M-1SS0 (Note 1, 4)

Thrust [N] — 14400, 9600, 4800, 2400, 0
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

LM-FP5H-60M-1SS0 (Note 2, 4)

Thrust [N] — 18000, 12000, 6000, 3000, 0
Short-duration running range
Cont. running range (Note 5)
Cont. running range (Note 6)
Speed [m/s] — 1, 2

Notes: 1. ▬ : For 3-phase 200 V AC.
2. ▬ : For 3-phase 400 V AC.
3. ---- : For 1-phase 200 V AC.
4. Thrust drops when the power supply voltage is below the specified value.
5. Continuous running range (liquid cooling)
6. Continuous running range (natural cooling)

Drive Product
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MR-J4 Series
MR-JE Series

Drive Product

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MR-J4 Series

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LM-K2 Series Specifications

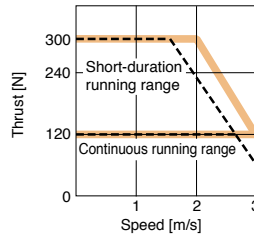| Linear servo motor model	Primary side (coil)	LM-K2	P1A-01M-2SS1	P1C-03M-2SS1	P2A-02M-1SS1	P2C-07M-1SS1	P2E-12M-1SS1	P3C-14M-1SS1	P3E-24M-1SS1
	Secondary side (magnet) (Note 4)	LM-K2	S10-288-2SS1 S10-384-2SS1 S10-480-2SS1 S10-768-2SS1		S20-288-1SS1 S20-384-1SS1 S20-480-1SS1 S20-768-1SS1			S30-288-1SS1 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 "SERVO AMPLIFIERS & MOTORS L(NA)03058" 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 (Note 5)	[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 (Note 6)		[N]	0						
Magnetic attraction force (one side) (Note 7)			800	2400	1100	3200	5300	6400	10700
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						
Insulation class			155 (F)						
Structure			Open (IP rating: IP00)						
Environment	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)						
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)						
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude		1000 m or less above sea level						
	Vibration resistance		49 m/s^2						
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.						
Mass	Primary side (coil)	[kg]	2.5	6.5	4.0	10	16	18	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 permissible 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 permissible regenerative power [W] when regenerative option is used.
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).
5. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.
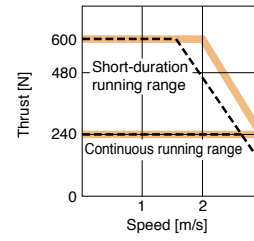6. Magnetic attraction force is caused by assembly precision, etc.
7. Magnetic attraction force which occurs on one side of the secondary side is shown.

Drive Product

LM-K2 Series Thrust Characteristics

LM-K2P1A-01M-2SS1 (Note 1, 3, 5)
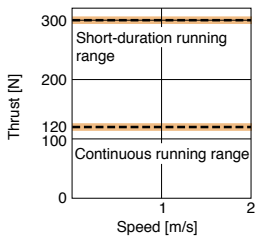
LM-K2P1C-03M-2SS1 (Note 2, 4, 5)
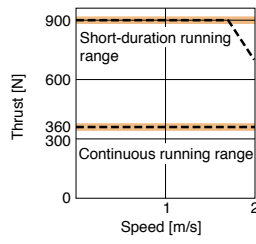
LM-K2P2A-02M-1SS1 (Note 1, 5)
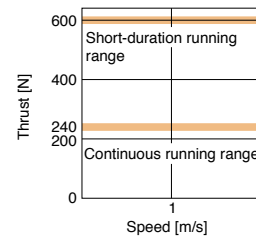
LM-K2P2C-07M-1SS1 (Note 2, 5)
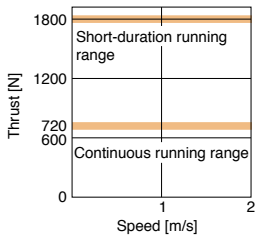
LM-K2P2E-12M-1SS1 (Note 2, 5)
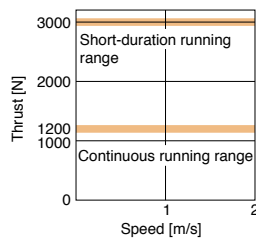
LM-K2P3C-14M-1SS1 (Note 2, 5)
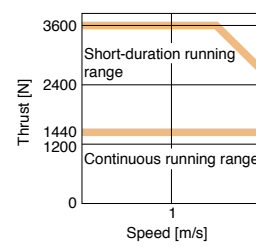
LM-K2P3E-24M-1SS1 (Note 2, 5)
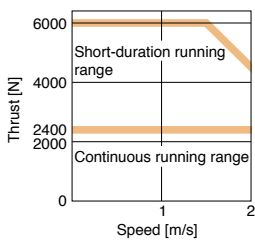
Notes: 1. ▬▬▬ : For 3-phase 200 V AC or 1-phase 200 V AC.
2. ▬▬▬ : For 3-phase 200 V AC.
3. ---- : For 1-phase 100 V AC.
4. ---- : For 1-phase 200 V AC.
5. Thrust drops when the power supply voltage is below the specified value.

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MR-J4 Series

MR-JE Series

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 "SERVO AMPLIFIERS & MOTORS L(NA)03058" 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 (Note 3)	[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]	0.9	1.9	2.7	1.5	3.0	4.6	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								
Insulation class			155 (F)								
Structure			Open (IP rating: IP00)								
Environment	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)								
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)								
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Altitude		1000 m or less above sea level								
	Vibration resistance		49 m/s^2								
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.								
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 permissible 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 permissible regenerative power [W] when regenerative option is used.
3. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-U2 Series Thrust Characteristics

LM-U2PAB-05M-0SS0 (Note 1, 3, 5)
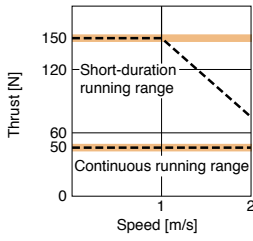
LM-U2PAD-10M-0SS0 (Note 1, 3, 5)
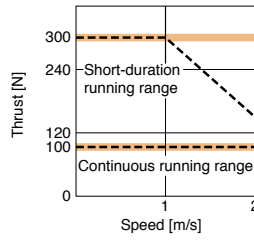
LM-U2PAF-15M-0SS0 (Note 1, 3, 5)
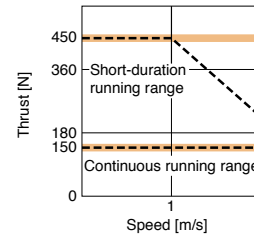
LM-U2PBB-07M-1SS0 (Note 1, 3, 5)
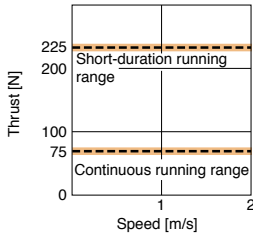
LM-U2PBD-15M-1SS0 (Note 1, 5)
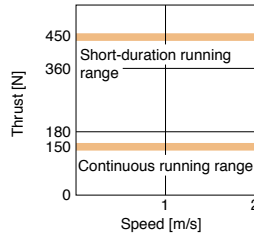
LM-U2PBF-22M-1SS0 (Note 1, 5)

LM-U2P2B-40M-2SS0 (Note 2, 4, 5)

LM-U2P2C-60M-2SS0 (Note 2, 5)

LM-U2P2D-80M-2SS0 (Note 2, 5)

Notes: 1. ▬ : For 3-phase 200 V AC or 1-phase 200 V AC.
2. ▬ : For 3-phase 200 V AC.
3. ---- : For 1-phase 100 V AC.
4. ---- : For 1-phase 200 V AC.
5. 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

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
4 wires-AWG 20 (standard OD: 2.12 mm)
Effective length: 400 mm

128
(32) 32±0.3 32±0.3 32
25
(25)
3-M5 screw depth 9
(for primary-side mounting)

400 +40/0
(Effective lead wire length)
210±10
(40)
(40)
210±10
400 +40/0
(Effective lead wire length)

Round crimp terminal (1.25-4)
Protective tube Wire mark
Round crimp terminal (1.25-4)
Thermistor lead wire (G1, G2): blue
2 wires-AWG 20 (standard OD: 2.12 mm)
Effective length: 400 mm

43±0.1
(0.7)
32
(25) (10.3)
(4.9)
2 or longer
Structure
50 20 10
(20)
2 or longer
Structure
(42)
Secondary side

[Unit: mm]

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

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
4 wires-AWG 16 (standard OD: 2.7 mm)
Effective length: 400 mm

L
(A)   M (cumulative pitch error: ±0.3)   32
64±0.3
13±0.3 28
(26)
B-M5 screw depth 9
(for primary-side mounting)

400 +40/0
(Effective lead wire length)
210±10
(40)
(40)
210±10
400 +40/0
(Effective lead wire length)

Round crimp terminal (1.25-4)
Protective tube Wire mark
Round crimp terminal (1.25-4)
Thermistor lead wire (G1, G2): blue
2 wires-AWG 20
(standard OD: 2.12 mm)
Effective length: 400 mm

43±0.1
(0.7)
32
(25) (10.3)
(4.9)
2 or longer
Structure
65 20 25
(20)
2 or longer
Structure
(60)
Secondary side

[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

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
4 wires-AWG 14 (standard OD: 3.12 mm)
Effective length: 400 mm

L
(A)   M (cumulative pitch error: ±0.3)   32
26
24±0.3
24±0.3
(26)
B-M5 screw depth 9
(for primary-side mounting)

400 +40/0
(Effective lead wire length)
210±10
(40)
(40)
210±10
400 +40/0
(Effective lead wire length)

Round crimp terminal (2-4)
Wire mark
Protective tube
Protective tube
Wire mark
Round crimp terminal (1.25-4)
Thermistor lead wire (G1, G2): blue
2 wires-AWG 20 (standard OD: 2.12 mm)
Effective length: 400 mm

48±0.1
(0.7)
32
(25) (15.3)
(9.9)
2 or longer
Structure
100 20 60
(20)
2 or longer
Structure
(95)
Secondary side

[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.

Drive Product

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
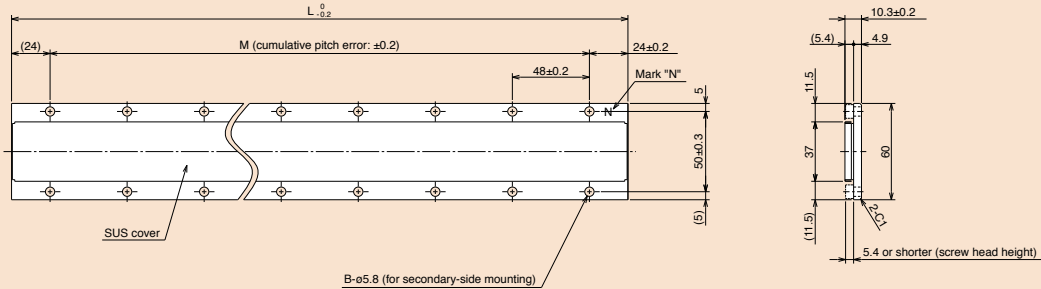
[Unit: mm]

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
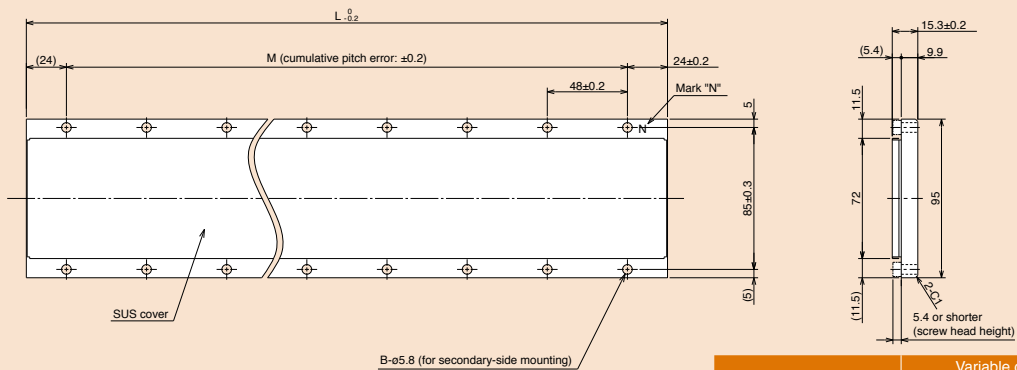
[Unit: mm]

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

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

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

Power connector
D/MS3106A18-10P

Thermistor connector
D/MS3106A14S-9P

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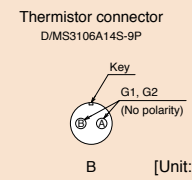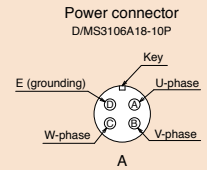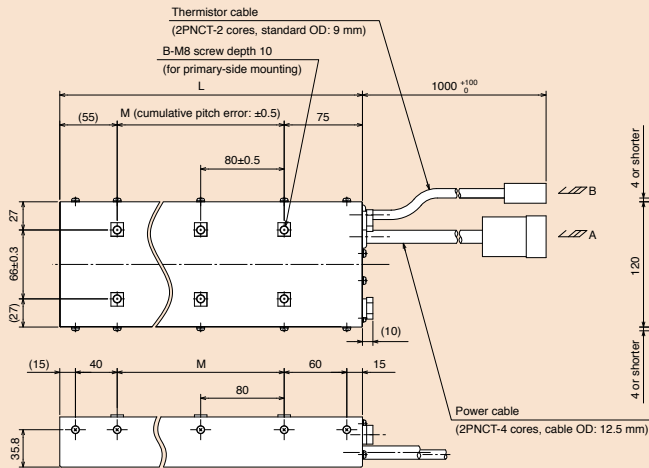
Model	Variable dimensions		
	L	M	B
LM-FP2B-06M-1SS0	290	2 × 80 = 160	2 × 3
LM-FP2D-12M-1SS0	530	5 × 80 = 400	2 × 6
LM-FP2F-18M-1SS0	770	8 × 80 = 640	2 × 9

● LM-FP4B-12M-1SS0   ● LM-FP4D-24M-1SS0   ● LM-FP4F-36M-1SS0   ● LM-FP4H-48M-1SS0

Power connector
D/MS3106A24-22P

Thermistor connector
D/MS3106A14S-9P
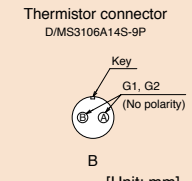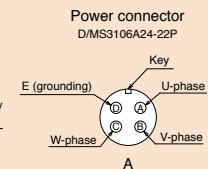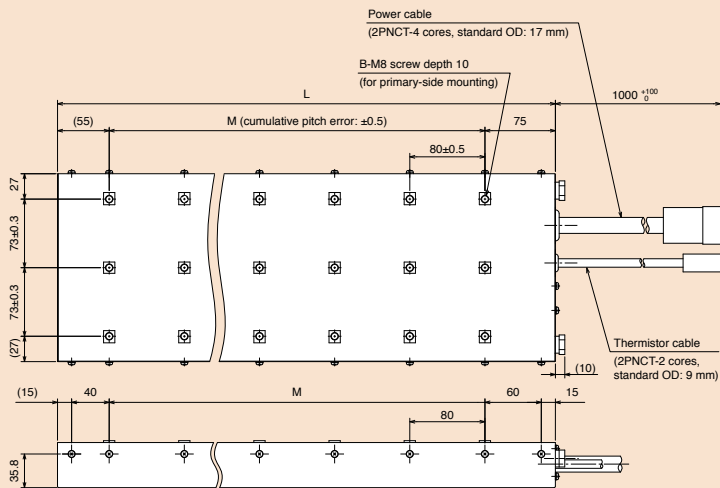
[Unit: mm]

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
LM-FP4F-36M-1SS0	770	8 × 80 = 640	3 × 9
LM-FP4H-48M-1SS0	1010	11 × 80 = 880	3 × 12

● LM-FP5H-60M-1SS0

Power connector
D/MS3106A24-22P

Thermistor connector
D/MS3106A14S-9P
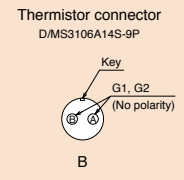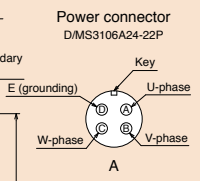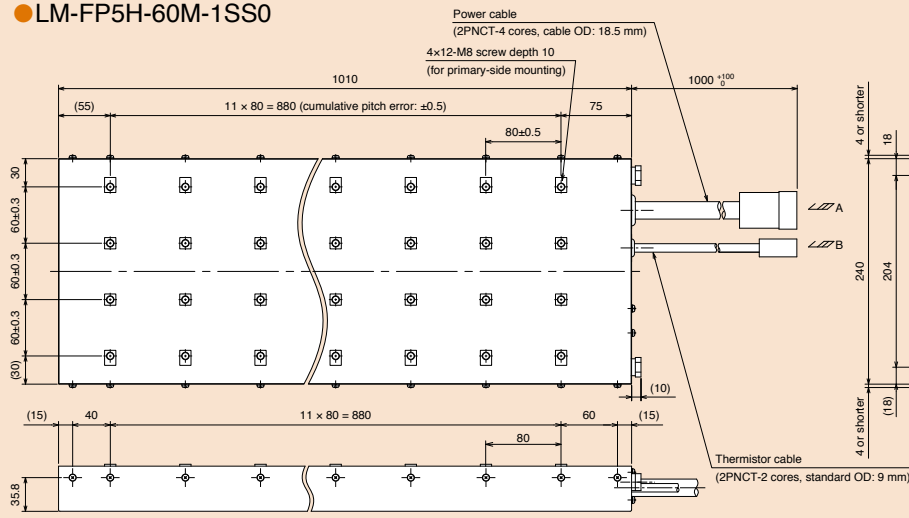
[Unit: mm]

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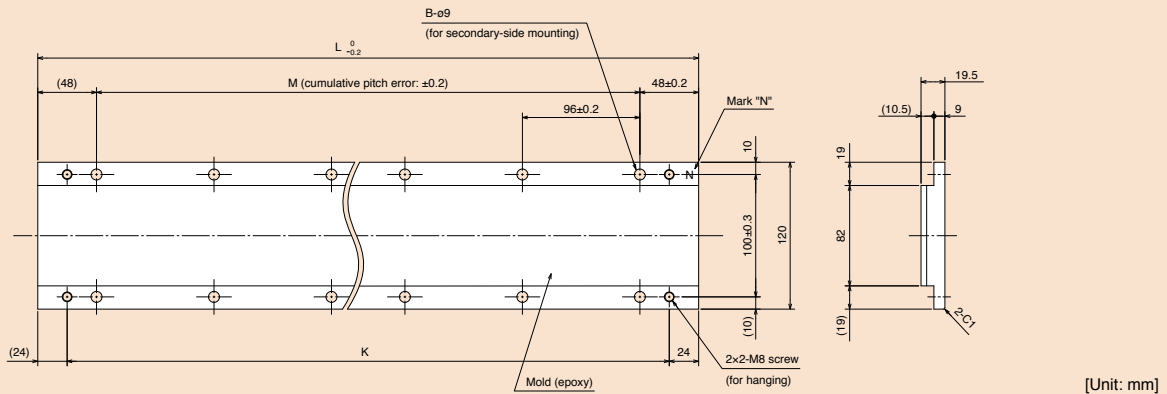
| Model | L | Variable dimensions | | |
		M	B	K
LM-FS20-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS20-576-1SS0	576	5 × 96 = 480	2 × 6	528

● LM-FS40-480-1SS0   ● LM-FS40-576-1SS0

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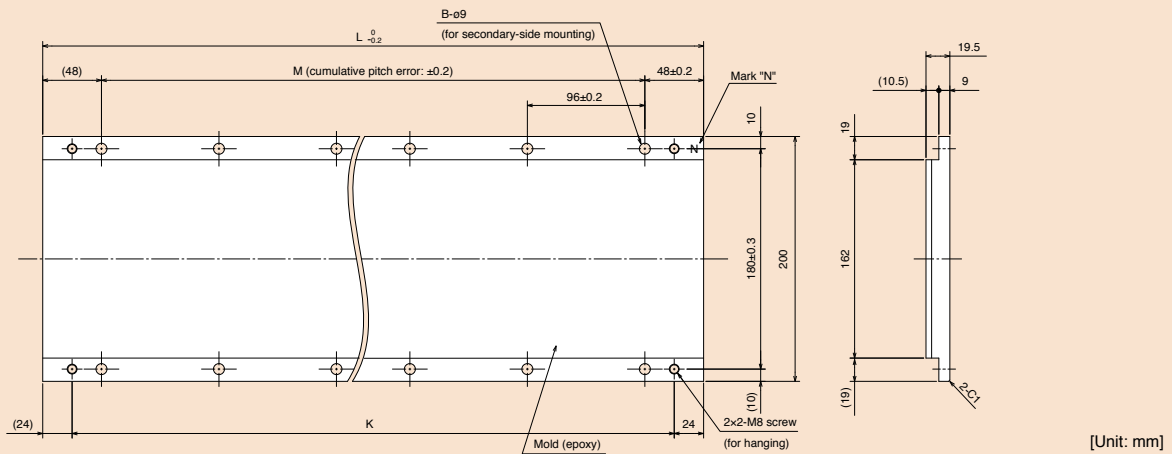
| Model | L | Variable dimensions | | |
		M	B	K
LM-FS40-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS40-576-1SS0	576	5 × 96 = 480	2 × 6	528

● LM-FS50-480-1SS0   ● LM-FS50-576-1SS0

[Unit: mm]
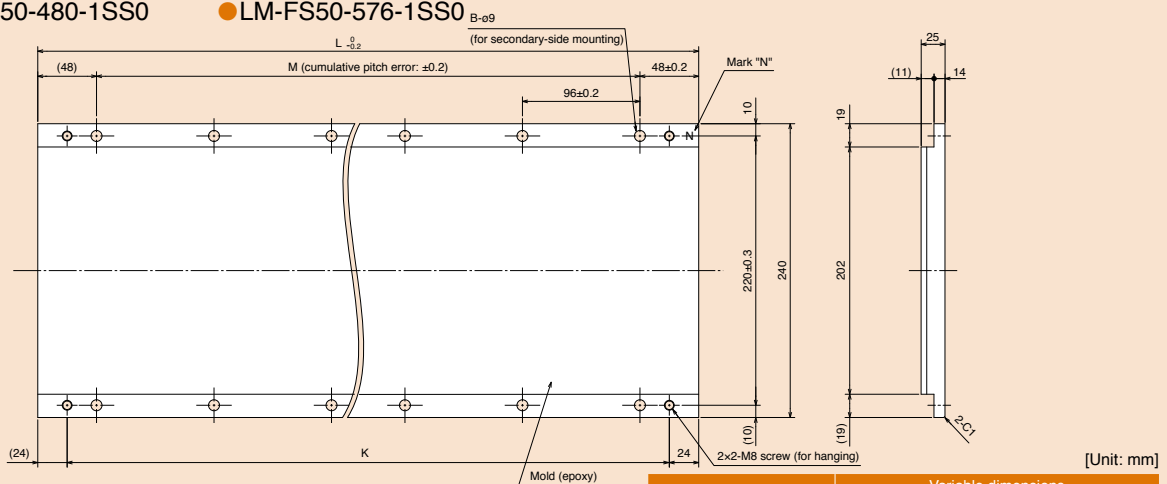
| Model | L | Variable dimensions | | |
		M	B	K
LM-FS50-480-1SS0	480	4 × 96 = 384	2 × 5	432
LM-FS50-576-1SS0	576	5 × 96 = 480	2 × 6	528

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

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

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

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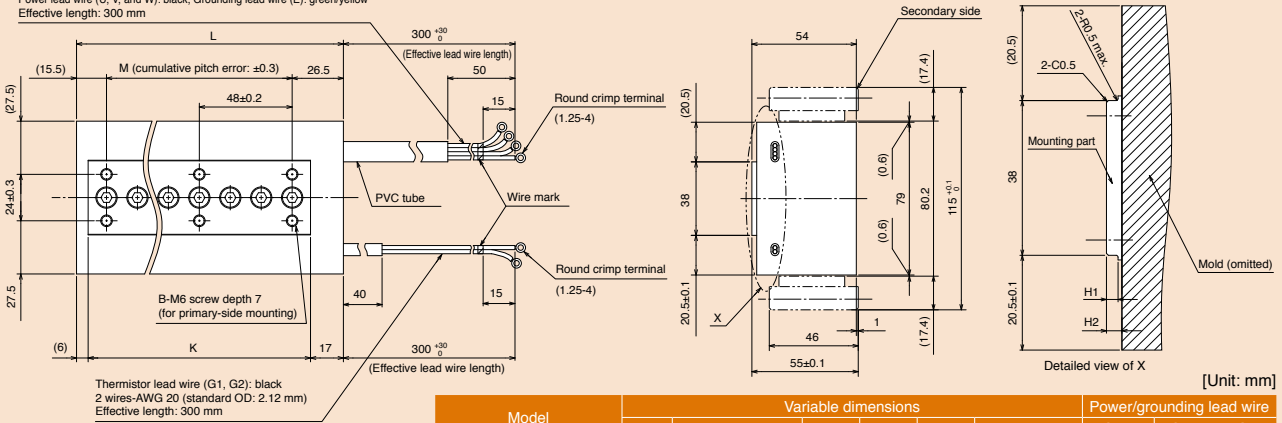
Model	Variable dimensions						Power/grounding lead wire	
	L	M	K	B	H1	H2	Size	Standard OD
LM-K2P1A-01M-2SS1	138	2 × 48 = 96	115	2 × 3	3	3.5 or longer	AWG 20	2.12
LM-K2P1C-03M-2SS1	330	6 × 48 = 288	307	2 × 7	1.5	2.5 or longer	AWG 16	2.7

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

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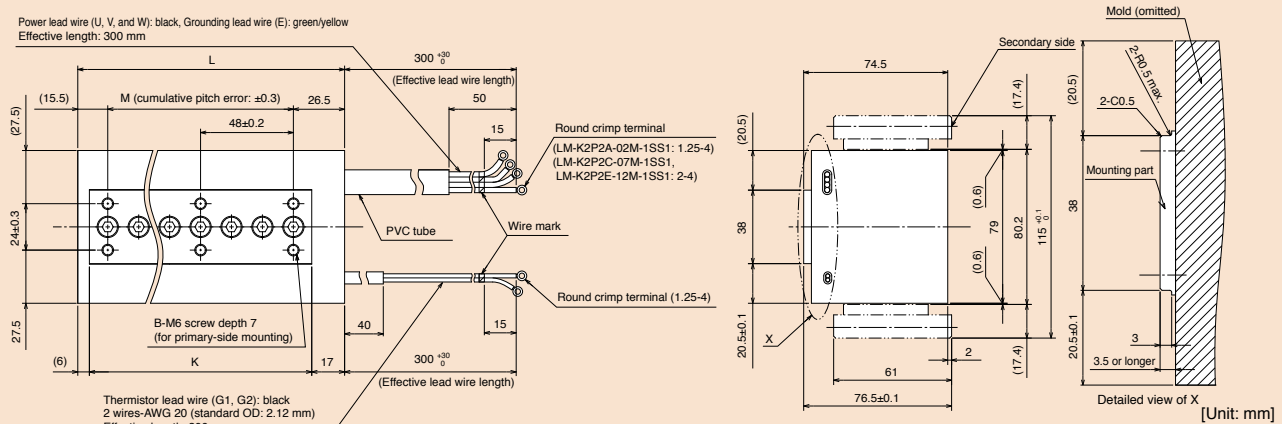
Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P2A-02M-1SS1	138	2 × 48 = 96	115	2 × 3	AWG 16	2.7
LM-K2P2C-07M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P2E-12M-1SS1	522	10 × 48 = 480	499	2 × 11		

● LM-K2P3C-14M-1SS1   ● LM-K2P3E-24M-1SS1

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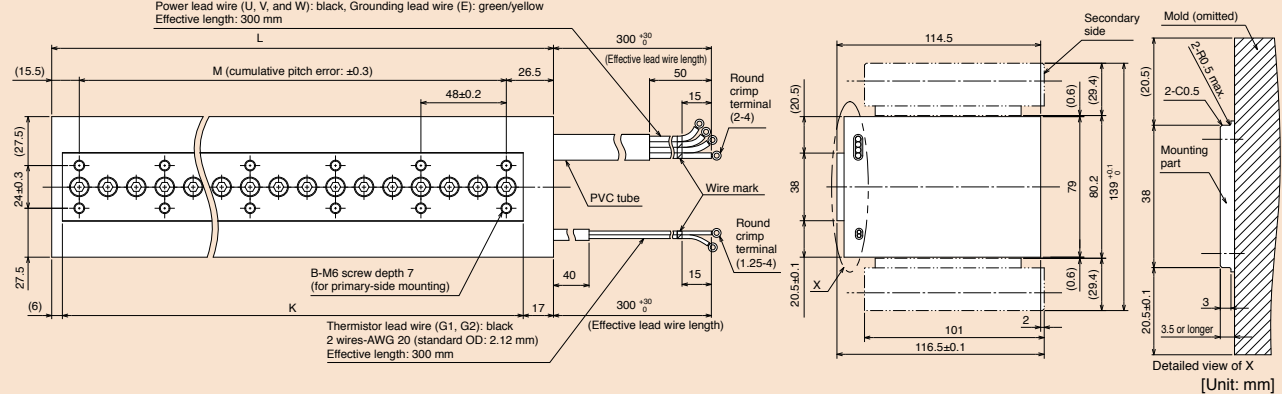
Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P3C-14M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P3E-24M-1SS1	522	10 × 48 = 480	499	2 × 11		

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.

Drive Product

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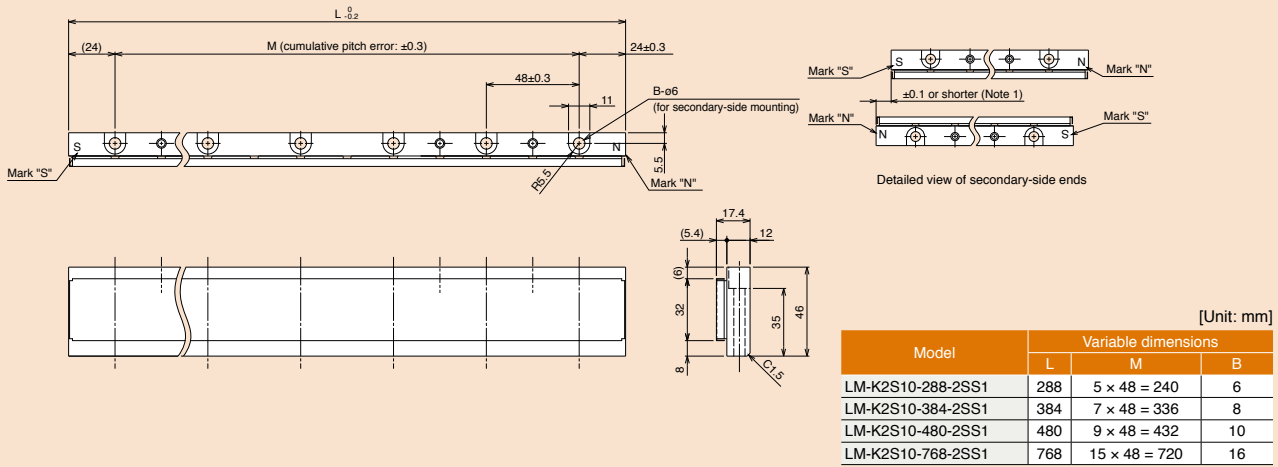
● LM-K2S20-288-1SS1　　● LM-K2S20-384-1SS1　　● LM-K2S20-480-1SS1
● LM-K2S20-768-1SS1

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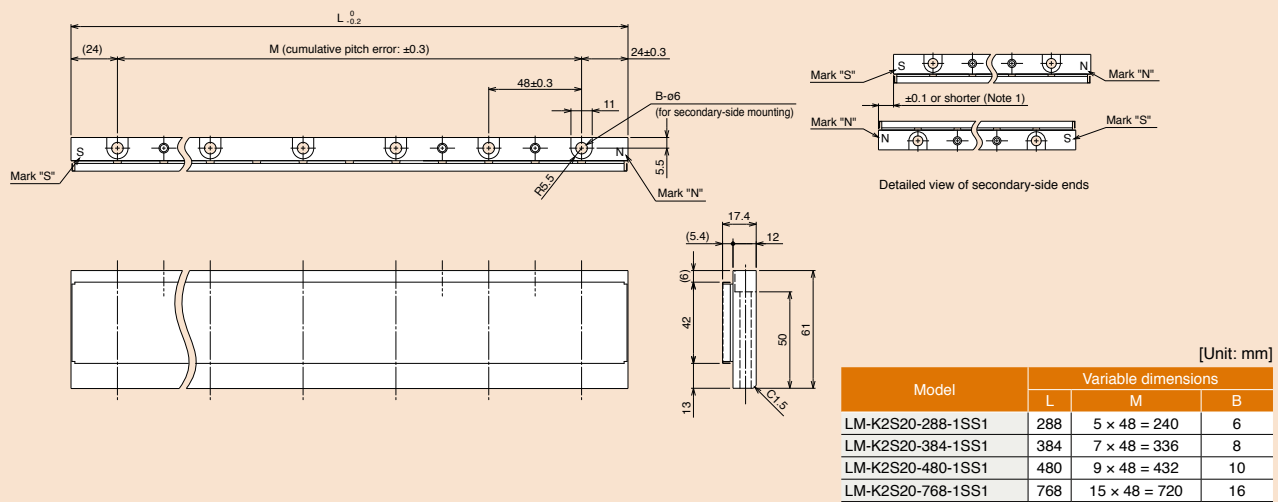
● LM-K2S30-288-1SS1　　● LM-K2S30-384-1SS1　　● LM-K2S30-480-1SS1
● LM-K2S30-768-1SS1

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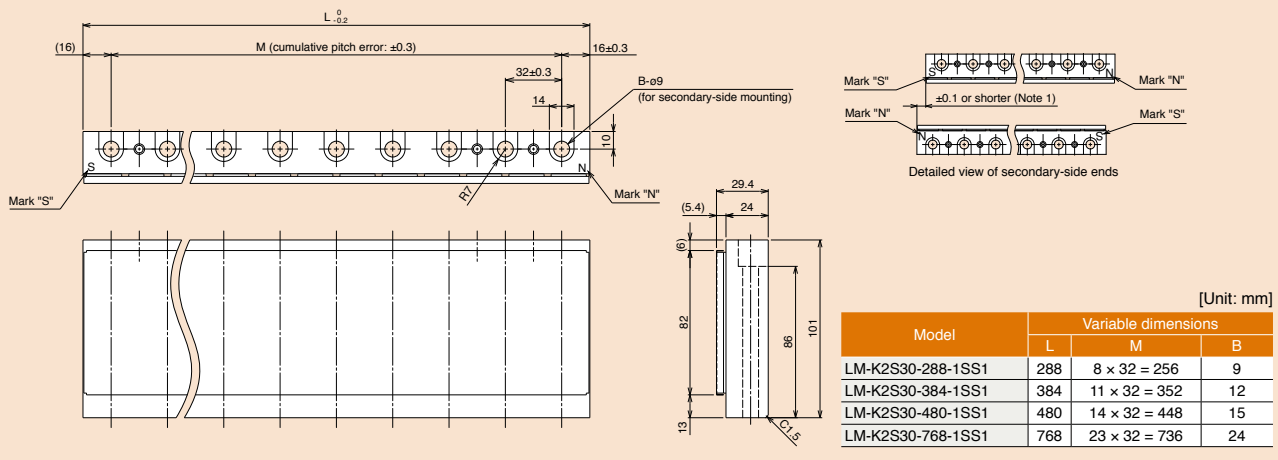
Notes: 1. Longitudinal deviation of the secondary side must be within ±0.1 mm.

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

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

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
Effective length: 400 mm, Round crimp terminal (0.5-4)

Thermistor lead wire (G1, G2): black
2 wires-AWG 26 (standard OD: 1.58 mm)
Effective length: 400 mm, Round crimp terminal (0.5-4)
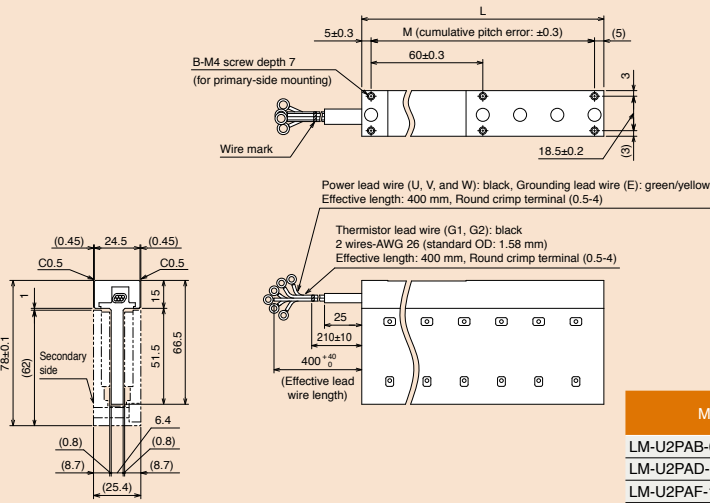
[Unit: mm]

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

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
Effective length: 400 mm, Round crimp terminal (0.5-4)

Thermistor lead wire (G1, G2): black
2 wires-AWG 26 (standard OD: 1.58 mm)
Effective length: 400 mm, Round crimp terminal (0.5-4)
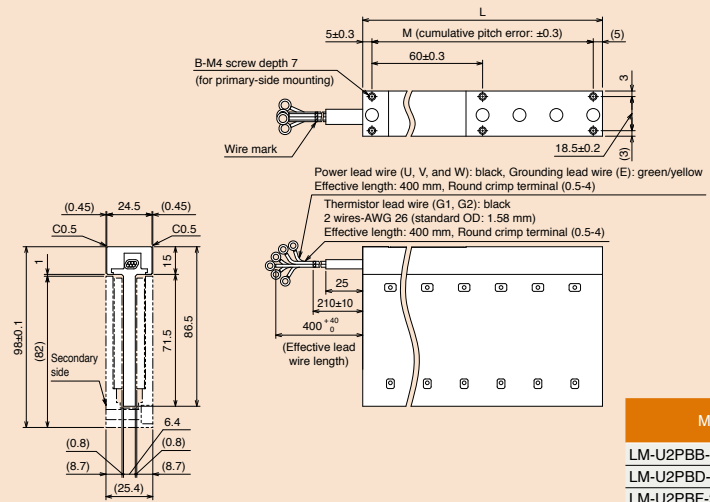
[Unit: mm]

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

Power lead wire (U, V, and W): black,
Grounding lead wire (E): green/yellow
Effective length: 400 mm,
Round crimp terminal (LM-U2P2B-40M-2SS0): 1.25-4)
(LM-U2P2C-60M-2SS0): 2-4)
(LM-U2P2D-80M-2SS0): 2-4)

Thermistor lead wire (G1, G2): black
2 wires-AWG 24 (standard OD: 1.74 mm)
Effective length: 400 mm,
Round crimp terminal (1.25-4)
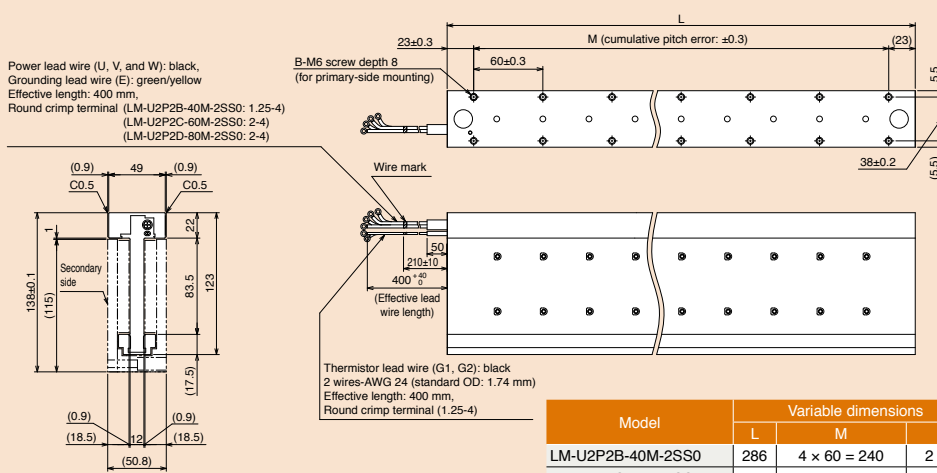
[Unit: mm]

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.

Drive Product

LM-U2 Series Secondary Side (Magnet) Dimensions

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

Mark "N"
B-M5 screw depth 8 (back side)
(for secondary-side mounting)
Mark "S"
12.7±0.3
Mark "S"
Mark "N"
60±0.3
15   M (cumulative pitch error: ±0.3)   (45)

8.7   8   (8.7)
62
2-M5 screw depth 6
(for grounding)
(55)
C1
25.4
B-6 drill through,
10 counter boring, depth 6.2
(for secondary-side mounting)
45
60±0.3
30   N (cumulative pitch error: ±0.3)   (30)
K
(15)
7±0.3
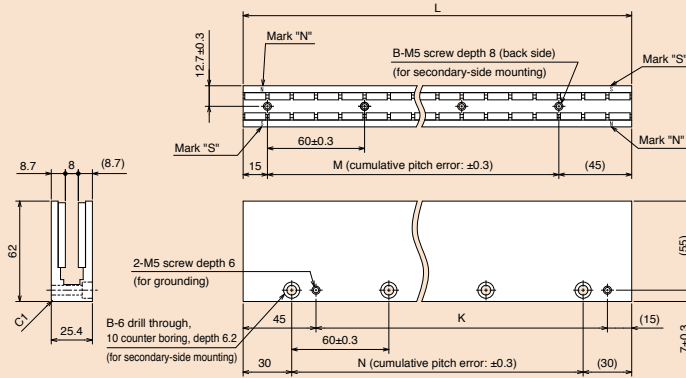
[Unit: mm]

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

Mark "N"
B-M5 screw depth 8 (back side)
(for secondary-side mounting)
Mark "S"
12.7±0.3
Mark "S"
Mark "N"
60±0.3
15   M (cumulative pitch error: ±0.3)   (45)

8.7   8   (8.7)
82
2-M5 screw depth 6
(for grounding)
(75)
C1
25.4
B-6 drill through,
10 counter boring, depth 6.2
(for secondary-side mounting)
45
60±0.3
30   N (cumulative pitch error: ±0.3)   (30)
K
(15)
7±0.3
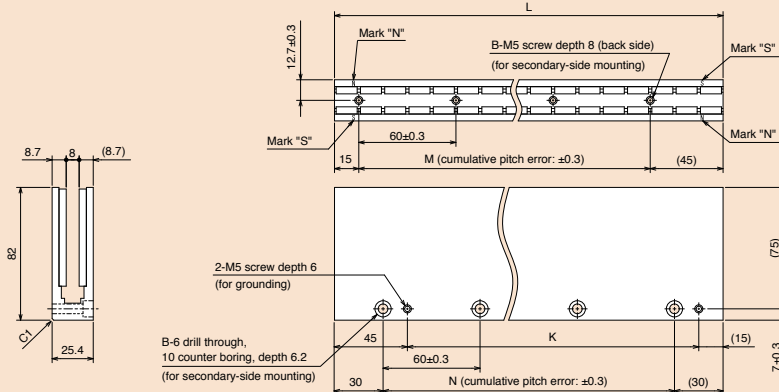
[Unit: mm]

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

Mark "N"
Mark "S"
N
S
S
N
Mark "S"
Mark "N"

18.5   13.8   (18.5)
115
50.8
C1
2-M6 screw depth 6
(for grounding)
B-6.6 drill through, 11 counter boring, depth 25
(for secondary-side mounting)
(108)
60±0.3
15
60   N (cumulative pitch error: ±0.3)   (60)
K
(15)
7±0.3
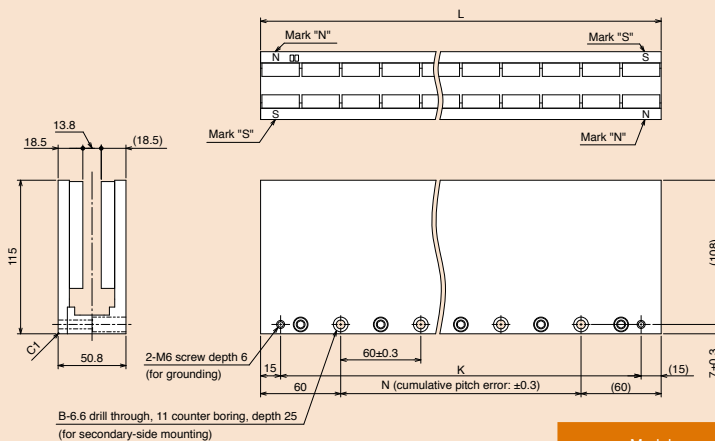
[Unit: mm]

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

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

List of Linear Encoders (Note 1)

Linear encoder type		Manufacturer	Model		Resolution	Rated speed (Note 2)	Maximum effective measurement length (Note 3)	Communication method
Mitsubishi serial interface compatible	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					
			ST748A					
		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	
			LIC 4193M		0.01 μm	4.0 m/s	3040 mm	Two-wire/ Four-wire type (Note 4)
			LIC 4195M				28440 mm	
			LIC 4197M				6040 mm	
			LIC 4199M				1020 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	
		Heidenhain	LIDA 483	+ EIB 392M (/16384)	20 μm/16384 (Approx. 1.22 nm)	4.0 m/s	3040 mm	Four-wire type (Note 4)
			LIDA 485				30040 mm	
			LIDA 487				6040 mm	
			LIDA 489				1020 mm	
			LIDA 287	+ EIB 392M (/16384)	200 μm/16384 (Approx. 12.2 nm)		10000 mm	
			LIDA 289					
			LIF 481	+ EIB 392M (/4096)	4 μm/4096 (Approx. 0.977 nm)	1.2 m/s	1020 mm	
			LIP 581				1440 mm	
		Nidec Sankyo Corporation	PSLH041 (Note 7)		0.1 μm	5.0 m/s	2400 mm	Two-wire type
A/B/Z-phase differential output type (Note 5, 8)		Not designated	-		0.001 μm to 5 μm (Note 6)	Depends on the linear encoder	Depends on the linear encoder	A/B/Z-phase differential output method

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. When using the four-wire type linear encoder in fully closed loop control system, use MR-J4-_B_-RJ or MR-J4-_A_-RJ servo amplifier. When using four-wire type linear encoder with the scale measurement function, use MR-J4-_B_-RJ servo amplifier.
5. When using the A/B/Z-phase differential output type linear encoder, use MR-J4-_B_-RJ or MR-J4-_A_-RJ servo amplifier.
6. Select the linear encoder within this range.
7. Use MR-J4-_B_(-RJ)/MR-J4W_-_B/MR-J4-_A_(-RJ) servo amplifier with software version B3 or later.
8. Output A-phase, B-phase, and Z-phase signals in the differential line driver. The phase difference of the A-phase pulse and the B-phase pulse, and the width of the Z-phase pulse must be 200 ns or wider. The output pulse of A-phase and B-phase of the A/B/Z-phase differential output linear encoder is in the multiply-by-four count method. Home position return is not possible with a linear encoder without Z-phase.
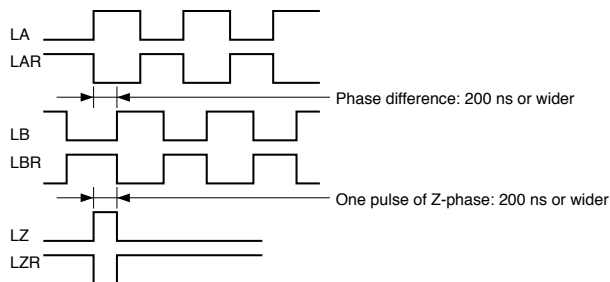
LA
LAR
Phase difference: 200 ns or wider
LB
LBR
One pulse of Z-phase: 200 ns or wider
LZ
LZR

Drive Product

MEMO

● Direct Drive Motors

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
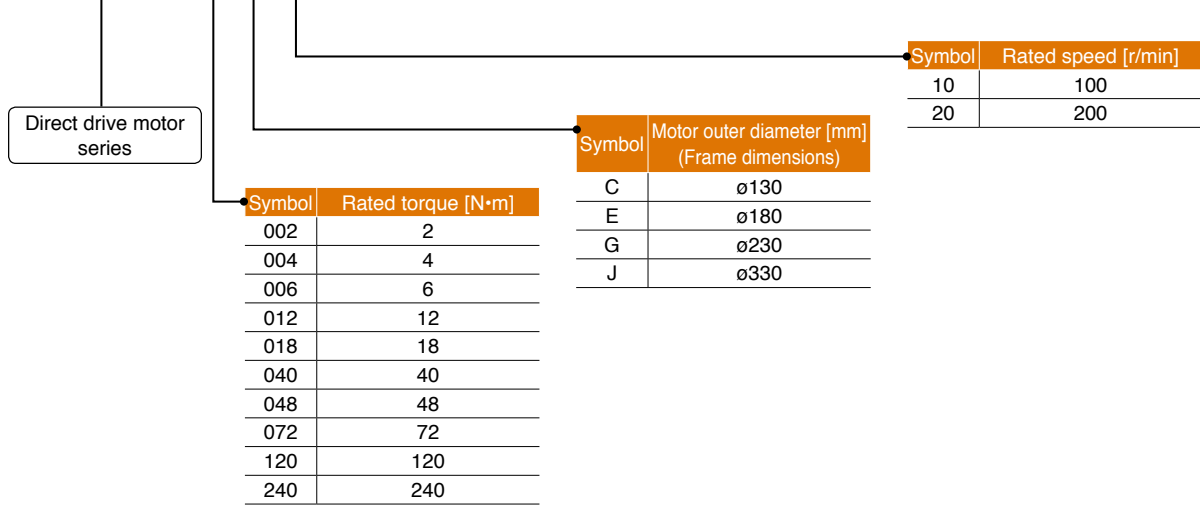
Combinations of Direct Drive Motor and Servo Amplifier

Direct drive motor		Servo amplifier		
		MR-J4	MR-J4W2 [Note 1]	MR-J4W3 [Note 1]
TM-RFM series	TM-RFM002C20	MR-J4-20GF(-RJ), MR-J4-20B(-RJ), MR-J4-20B1(-RJ), MR-J4-20A(-RJ), MR-J4-20A1(-RJ)	MR-J4W2-22B, MR-J4W2-44B	MR-J4W3-222B, MR-J4W3-444B
	TM-RFM004C20	MR-J4-40GF(-RJ), MR-J4-40B(-RJ), MR-J4-40B1(-RJ), MR-J4-40A(-RJ), MR-J4-40A1(-RJ)	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	MR-J4W3-444B
	TM-RFM006C20	MR-J4-60GF(-RJ), MR-J4-60B(-RJ), MR-J4-60A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM006E20	MR-J4-60GF(-RJ), MR-J4-60B(-RJ), MR-J4-60A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM012E20	MR-J4-70GF(-RJ), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM018E20	MR-J4-100GF(-RJ), MR-J4-100B(-RJ), MR-J4-100A(-RJ)	MR-J4W2-1010B	-
	TM-RFM012G20	MR-J4-70GF(-RJ), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM048G20	MR-J4-350GF(-RJ), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	TM-RFM072G20	MR-J4-350GF(-RJ), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	TM-RFM040J10	MR-J4-70GF(-RJ), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	TM-RFM120J10	MR-J4-350GF(-RJ), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	TM-RFM240J10	MR-J4-500GF(-RJ), MR-J4-500B(-RJ), MR-J4-500A(-RJ)	-	-

Notes: 1. Any combination of the servo motors is available. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motors" on p. 285 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-	Refer to "Combinations of Direct Drive Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
	MR-J4W_-						
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 (Note 3) [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•m²]		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	Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity	Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, dust or splash of oil or water					
	Altitude	1000 m or less above sea level					
	Vibration resistance *5	X: 49 m/s² Y: 49 m/s²					
Vibration rank		V10 *7					
Compliance to global standards		Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
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.
   3. When unbalanced torque is generated, such as in a vertical lift machine, be sure to use the absolute position detection system, and keep the unbalanced torque under 70% of the servo motor rated torque.

Refer to "Annotations for Direct Drive Motor Specifications" on p. 404 in this catalog for the asterisks 1 to 7.

Drive Product

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MR-J4 Series

MR-JE Series

Drive Product

TM-RFM Series Specifications

Direct drive motor model TM-RFM			012G20	048G20	072G20	040J10	120J10	240J10
Compatible servo amplifier model	MR-J4-		Refer to "Combinations of Direct Drive Motor and Servo Amplifier" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
	MR-J4W_-							
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 [(Note 3)]	[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·m²]	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		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)					
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)					
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, dust or splash of oil or water					
	Altitude		1000 m or less above sea level					
	Vibration resistance [*5]		X: 49 m/s² Y: 49 m/s²			X: 24.5 m/s² Y: 24.5 m/s²		
Vibration rank			V10 [*7]					
Compliance to global standards			Refer to "Conformity with Global Standards and Regulations" on "SERVO AMPLIFIERS & MOTORS L(NA)03058" catalog.					
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.
3. When unbalanced torque is generated, such as in a vertical lift machine, be sure to use the absolute position detection system, and keep the unbalanced torque under 70% of the servo motor rated torque.

Refer to "Annotations for Direct Drive Motor Specifications" on p. 404 in this catalog for the asterisks 1 to 7.

Drive Product

TM-RFM Series Torque Characteristics

TM-RFM002C20 (Note 1, 2, 4)
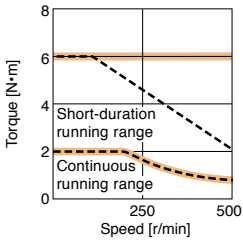
TM-RFM004C20 (Note 1, 2, 4)
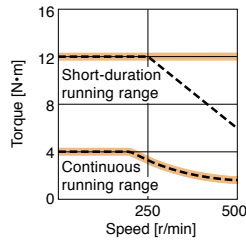
TM-RFM006C20 (Note 1, 3, 4)
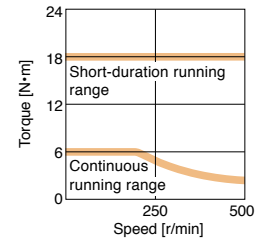
TM-RFM006E20 (Note 1, 3, 4)
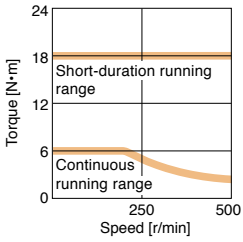
TM-RFM012E20 (Note 1, 3, 4)
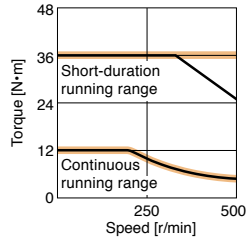
TM-RFM018E20 (Note 1, 3, 4)
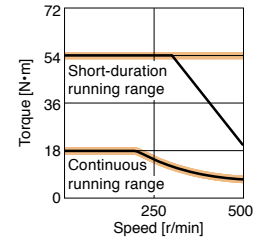
TM-RFM012G20 (Note 1, 3, 4)
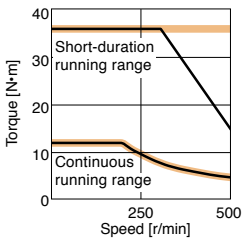
TM-RFM048G20 (Note 1, 4)
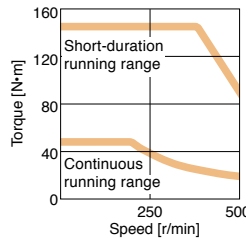
TM-RFM072G20 (Note 1, 4)
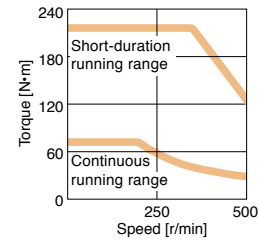
TM-RFM040J10 (Note 1, 3, 4)
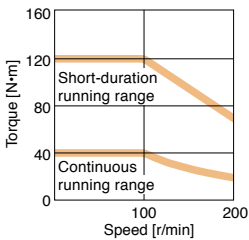
TM-RFM120J10 (Note 1, 4)
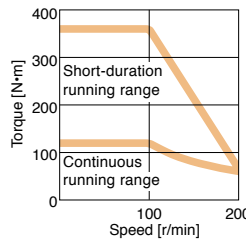
TM-RFM240J10 (Note 1, 4)
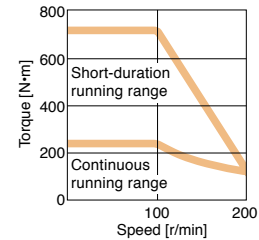
Notes: 1. ▬▬▬ : For 3-phase 200 V AC or 1-phase 230 V AC.
　　　　　The following direct drive motors are compatible with 1-phase 230 V AC:
　　　　　TM-RFM002C20, TM-RFM004C20, TM-RFM006C20, TM-RFM006E20, TM-RFM012E20, TM-RFM018E20, TM-RFM012G20, TM-RFM040J10
　　　2. - - - - : For 1-phase 200 V AC or 1-phase 100 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.

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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
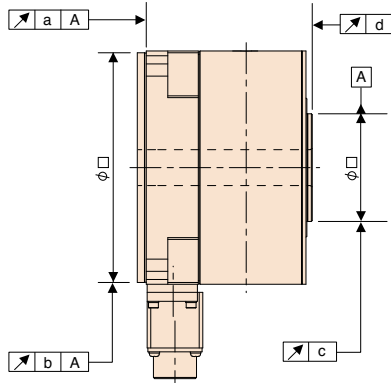
Annotations for Direct Drive Motor Specifications

* 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 permissible 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 permissible regenerative power [W] when regenerative option is used.
* 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 relevant 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.
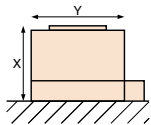
* 6. The following is calculation examples of axial and moment loads to the rotor (output shaft) of the direct drive motor. The axial and moment loads must be maintained equal to or below the permissible value.

Axial load = F + Load mass

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

Axial load = Load mass
Moment load = F × (L + A)
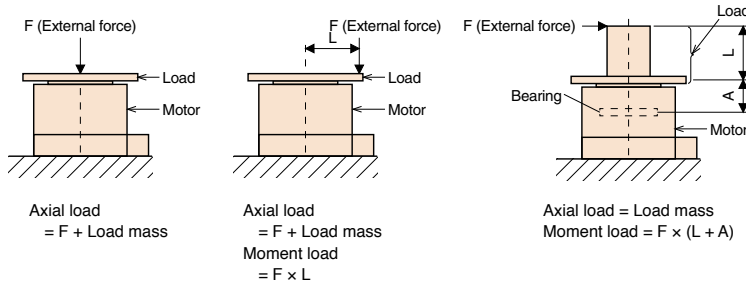
Motor outer diameter [mm] (Frame dimensions)	Dimension A [mm]
ø130	19.1
ø180	20.2
ø230	24.4
ø330	32.5

* 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:

Measuring position

Drive Product
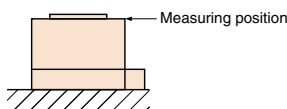
TM-RFM Series Dimensions (Note 1, 2)

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

□130
ø170
111.5
116.9
B →

Encoder connector
RM15WTRZB-12P(72)

Power connector
CE05-2A14S-2PD-D

16 15
62

16
B

5 29 L 3.5
12 3

ø128h7
ø20
ø60h7
ø77.5
ø130

A

W ⊕ (PE)
V U
Power connector
Output shaft side →

6-M5 screw depth 8

4-ø9 mounting hole
Use hexagonal cap head bolts.

45° 60°
ø150
ø50±0.1

17
Detailed view of A

Model	Variable dimension L
TM-RFM002C20	58.5
TM-RFM004C20	75.5
TM-RFM006C20	92.5
	[Unit: mm]

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

□180
ø235
136.5
141.9
B →

Encoder connector
RM15WTRZB-12P(72)

Power connector
CE05-2A14S-2PD-D

16 15
62

16
B

5 29 L 3.5
18 3

ø178h7
ø47
ø100h7
ø124
ø180

A

W ⊕ (PE)
V U
Power connector
Output shaft side →

6-M5 screw depth 8

4-ø14 mounting hole
Use hexagonal cap head bolts.

45° 60°
ø205
ø90±0.1

17
Detailed view of A

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

2×2-M10 screw depth 19.5

6-M6 screw depth 10

4-ø14 mounting hole
Use hexagonal cap head bolts.

Encoder connector
RM15WTRZB-12P(72)

Power connector
CE05-2A18-10PD-D

Power connector
Output shaft side ⟶

Detailed view of A

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

[Unit: mm]
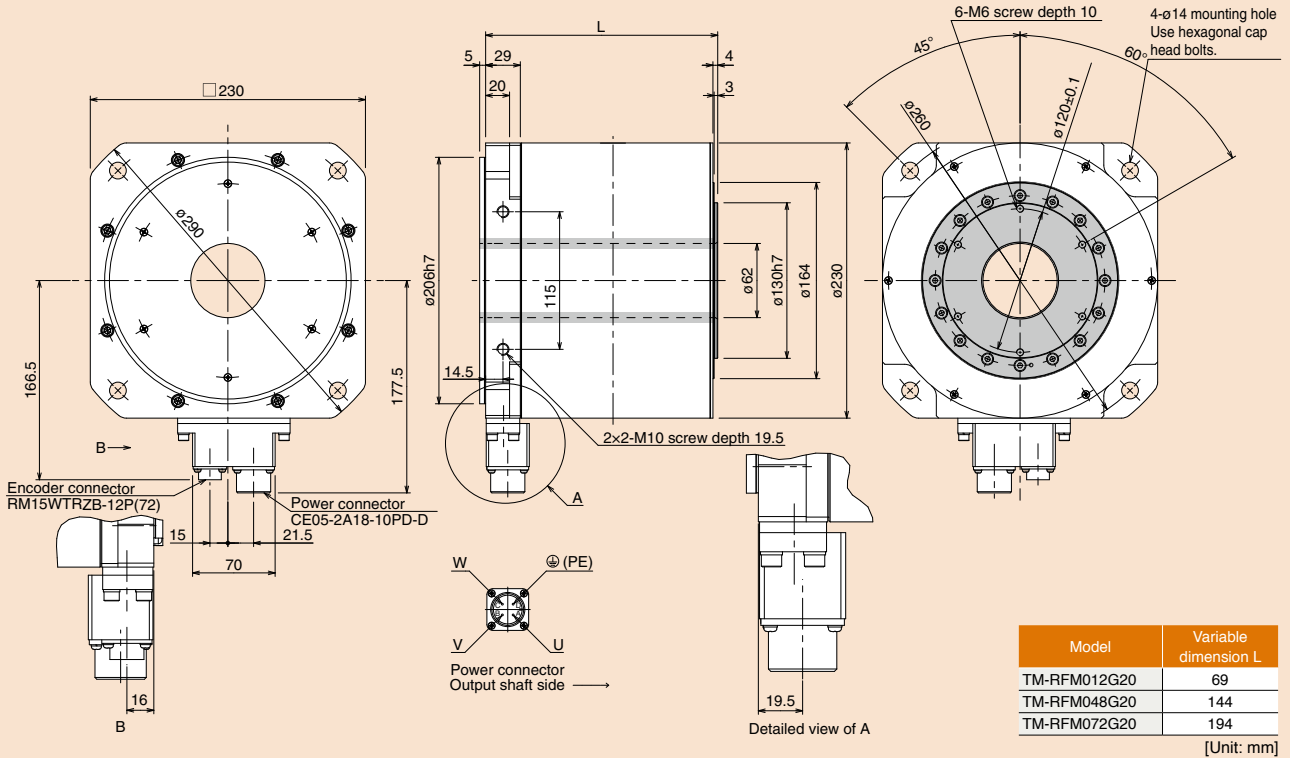
● TM-RFM040J10, TM-RFM120J10, TM-RFM240J10
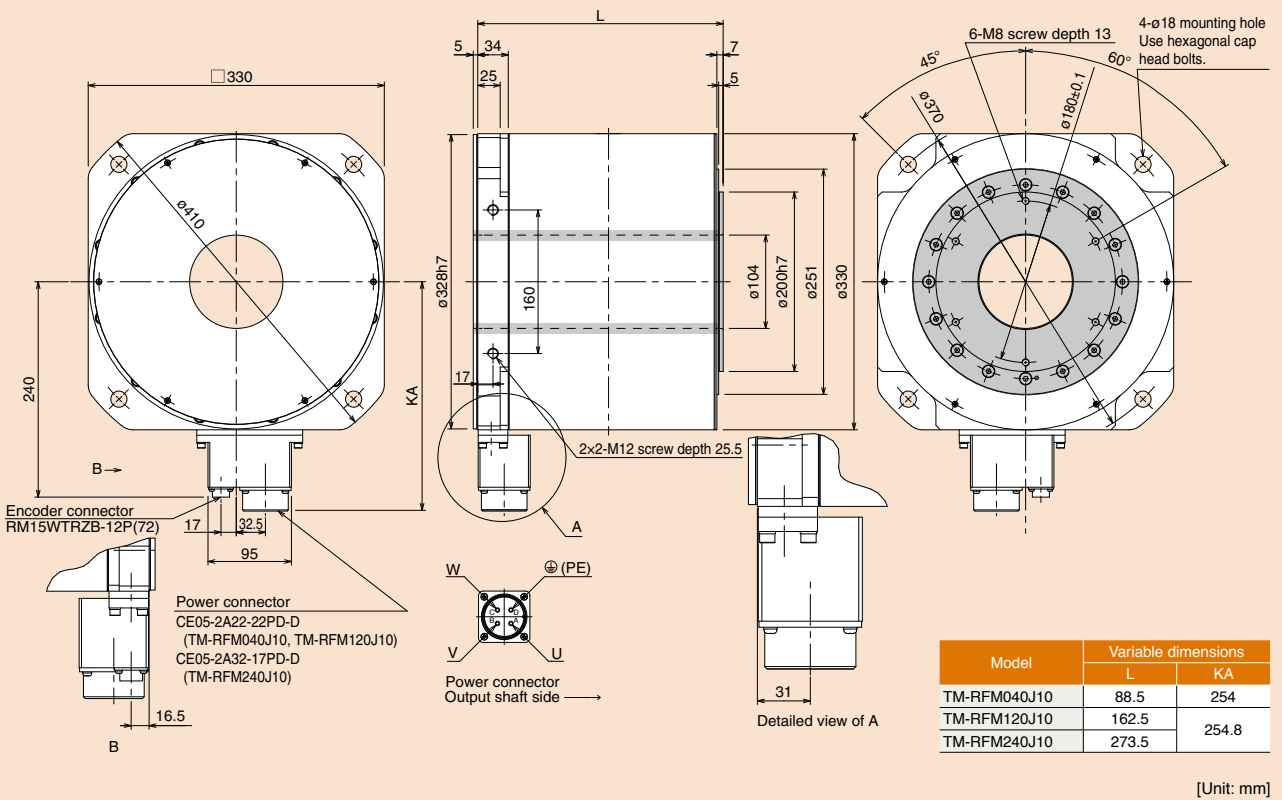
2×2-M12 screw depth 25.5

6-M8 screw depth 13

4-ø18 mounting hole
Use hexagonal cap head bolts.

Encoder connector
RM15WTRZB-12P(72)

Power connector
CE05-2A22-22PD-D
(TM-RFM040J10, TM-RFM120J10)
CE05-2A32-17PD-D
(TM-RFM240J10)

Power connector
Output shaft side ⟶

Detailed view of A

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.

MEMO

Drive Product

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MR-JE
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Drive Product

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-JE

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

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

Fast, Trouble-Free Setup

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

High-Precision Tuning

Servo gain adjustment with one-touch ease　　　　　`JE-B` `JE-A`

Advanced One-Touch Tuning Function

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

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

■ MR-JE-B
Adjust the servo gain just by pressing the "Start" button on one-touch tuning window of MR Configurator2.

■ MR-JE-A
Adjust the servo gains just by pressing the buttons on the front of the servo amplifier.

— : Command — : Actual operation

Before — Operation is unstable. / Operation is not following the command.

Vibration suppression control and robust filter adjustment with one-touch.

After — Exactly matched. High-speed positioning.
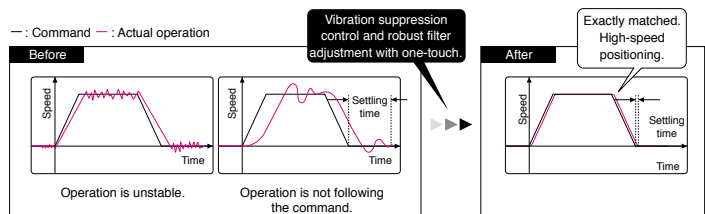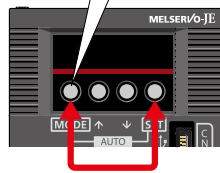
Suppress two types of low frequency vibrations at once　　`JE-B` `JE-A` `Patent pending`

Advanced Vibration Suppression Control II

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

Three-inertia system / Vibration at the end of an arm / Vibration in a machine / Two types of the vibrations are suppressed at the same time.

Without vibration suppression control / Advanced vibration suppression control / Advanced vibration suppression control II

Droop pulses / Torque / Speed command

Drive Product
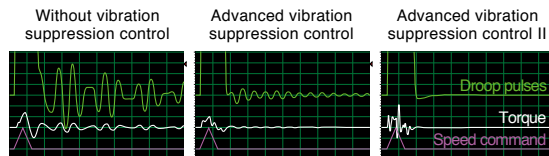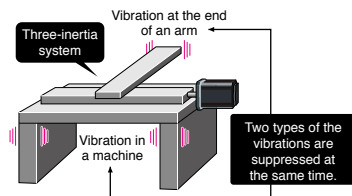
Wide frequency range   JE-B JE-A
Machine Resonance Suppression Filter

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

Applicable frequency range

Five filters are settable in a range of 10 Hz to 4500 Hz.

10   100   4500 [Hz]
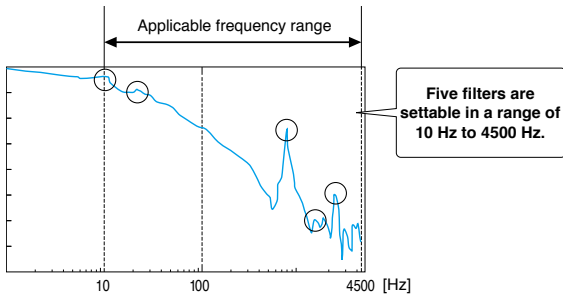
High responsivity and stability   JE-B JE-A   Patent pending
Robust Filter

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

■ Machine with a high-inertia ratio

■ Robust filter

Gain | Conventional low-pass filter | Robust filter | Frequency

Conventional control — Speed command, Droop pulses, Torque — Vibrating

With robust filter — Stable
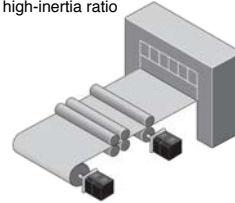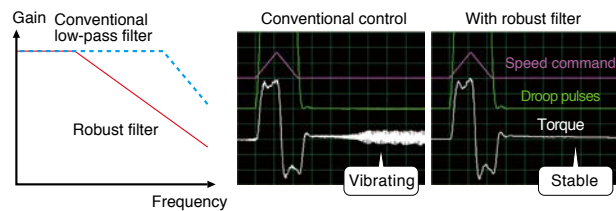
For Changes in Power Supply Environment

Reduce machine downtime   JE-B JE-A
Large Capacity Main Circuit Capacitor

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

Enlarged capacity of main circuit capacitor increases the tolerance against instantaneous power failure.

Previous model   ▶▶▶   MR-JE series
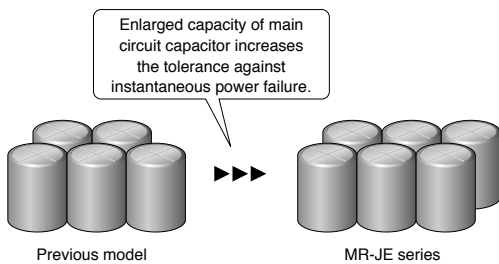
Reduce undervoltage alarms   JE-B JE-A
Instantaneous Power Failure Tough Drive

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

Instantaneous power failure | Recovered
Power supply ON / OFF
Servo motor speed | Undervoltage | Tough drive enabled | Tough drive disabled

Operation continues even after an instantaneous power failure occurs.
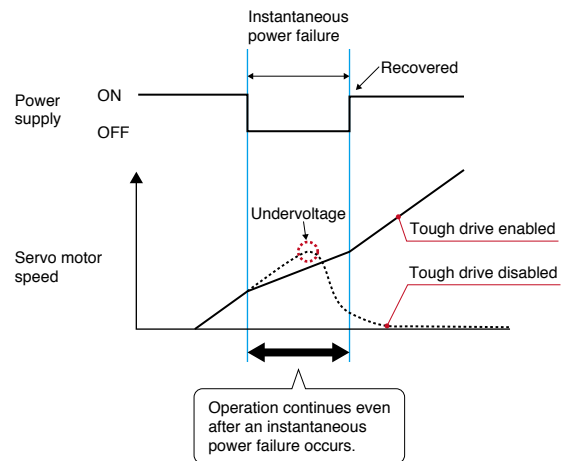
Wide power supply voltage input range   JE-B JE-A
Compatible with 1-phase 200 to 240 V AC Input

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

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

Features/ Summary | Specifications/ Characteristics | Outline Drawings | MR-J4 Series | MR-JE Series

Features/
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MR-JE
Series

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

Positioning operation with point table and program based methods became capable by built-in positioning function in MR-JE-A[1], allowing to configure positioning system without controller such as Positioning module.

Features:
- Equipped with simple cam, encoder following, and mark detection functions, making it possible to increase machine functionality.
- Command interface compatible with DIO or RS-422/RS-485 serial communication (maximum 32 axes)
- Easy setting of positioning data from MR Configurator2.

Example of a setting display (point table)

Easy setting of positioning data from MR Configurator2.

Personal computer

MR-JE-A

Built-in positioning function
● Point table method
● Program method
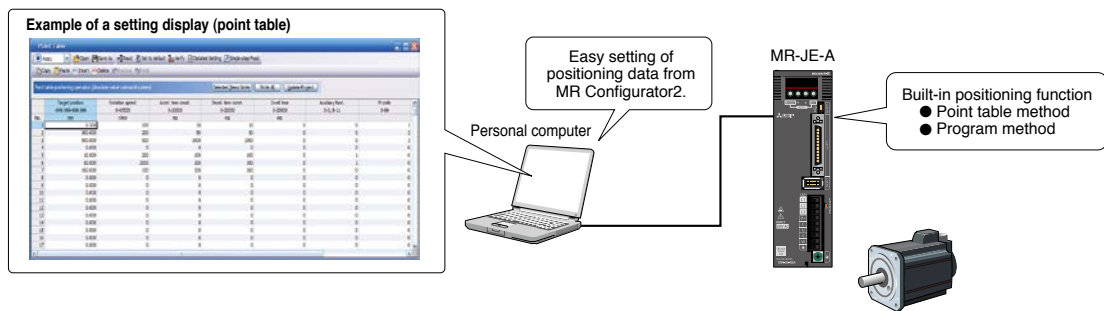
*1. Use MR-JE-A servo amplifiers with software version B7 or later when using the positioning function.

A Variety of Positioning Functions

Easy to set a positioning data　　　　JE-A

Point Table Method

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

Point table example

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

Operation

Speed
2000
1600

Point table No. 1　　　Point table No. 2

Position address　　0　　　1000　　　2000
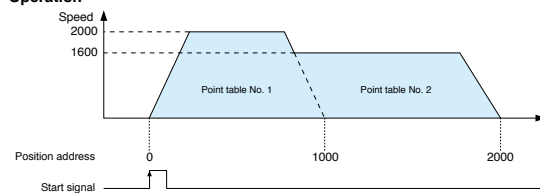
Start signal

Easy operation by program　　　　JE-A

Program Method*

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

Program example

16 programs max

Program No. 1

SPN (3000)
STC (20)
MOV (1000)
TIM (100)
FOR (3) ·············· (1)
MOVI (100) ·········· (2)
TIM (100) ············ (3)
NEXT
STOP

Operation

Acceleration time constant (20 ms)

Deceleration time constant (20 ms)

Repeats (2) and (3) for the number of times specified by (1).

Speed
3000

Dwell (100 ms)　Dwell (100 ms)　Dwell (100 ms)　Dwell (100 ms)

Position address　0　　　1000　1100　1200　1300

Start signal

Program No.　　　　　　1
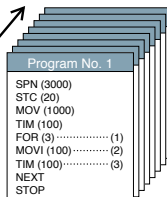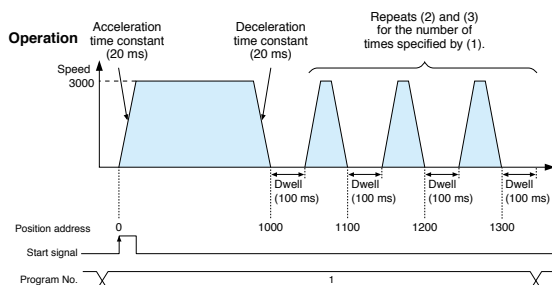
* MR Configurator2 is required to create programs.

Drive Product

Easy to create electronic cam

`JE-A`

Simple Cam Function

Various patterns of cam data* can be created easily by using MR Configurator2. Command pulse or point table/program start signal can be used as input to the simple cam. The input command will be outputted to the servo motor according to the cam data.
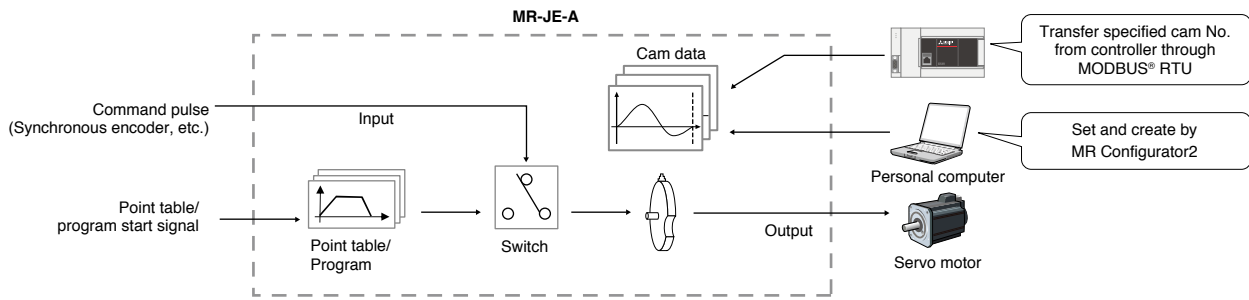
* Cam curve can be selected from 12 types (constant speed/constant acceleration/5th curve/single hypotenuse/cycloid/distorted trapezoid/distorted sine/distorted constant speed/trapecloid/reverse trapecloid/double hypotenuse/reverse double hypotenuse).

Synchronous operation by encoder signal input

`JE-A`

Encoder Following Function/Command Pulse Input Through Function

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

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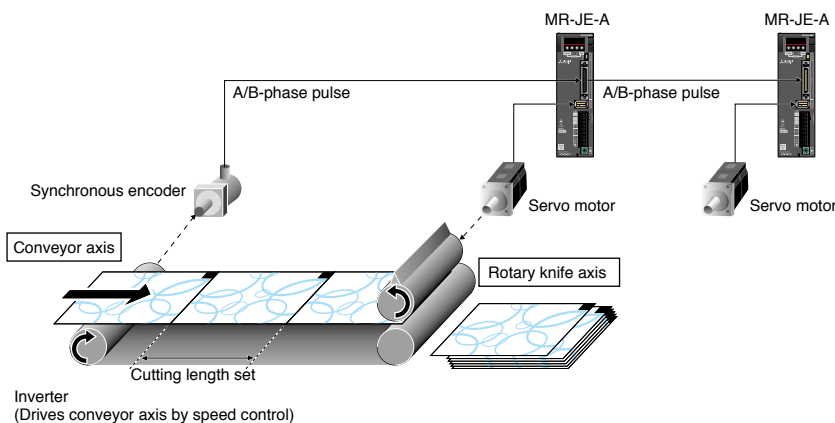
Compensating a position gap by sensor input

`JE-A`

Mark Sensor Input Compensation Function

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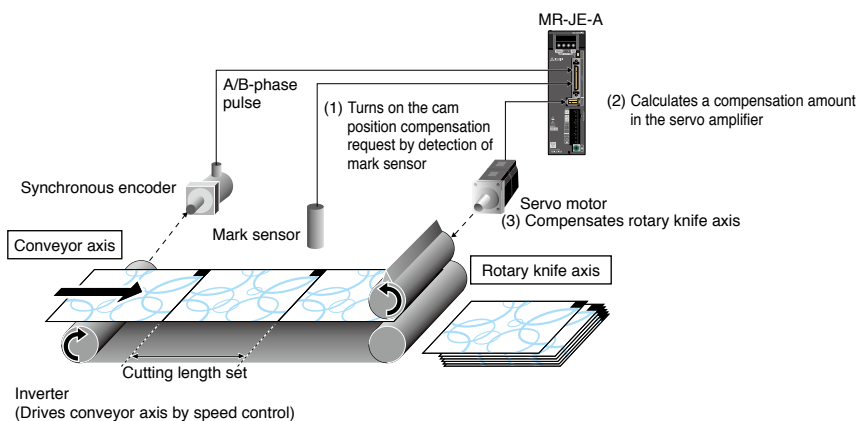
Positioning Using Communication Function

Compatible with MODBUS® protocol

JE-A

Communication Function (MODBUS® RTU)

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

Master device such as PLC

MODBUS® RTU

Slave device

MR-JE-A | Display (GOT2000) | Inverter (FR-A800) | Hydrostat | Measuring device

Compatible function code

03h	Read holding registers
08h	Diagnostics
10h	Preset multiple registers
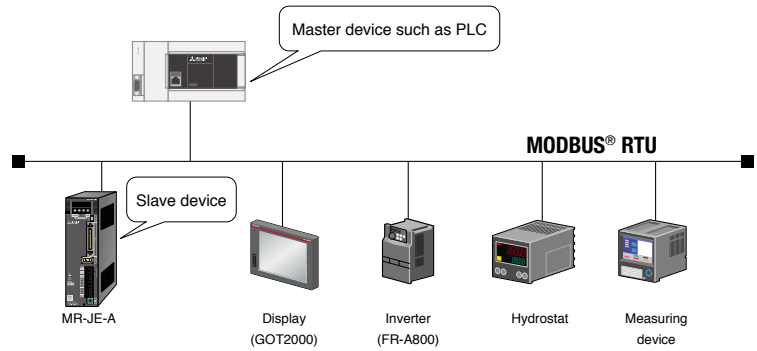
Point to Point positioning

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

Current position latch

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

Easy Monitoring and Maintenance

Analyze cause of alarm

JE-B   JE-A

Patent pending

Large Capacity Drive Recorder

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

Data are stored in non-volatile memory at alarm occurrence.

Data over certain period of time are stored in the memory.

Alarm No., waveform, and monitor value at alarm occurrence are displayed in MR Configurator2.

Monitor value display

Waveform display

Lowered bus voltage
It is revealed that the main circuit power is turned off.
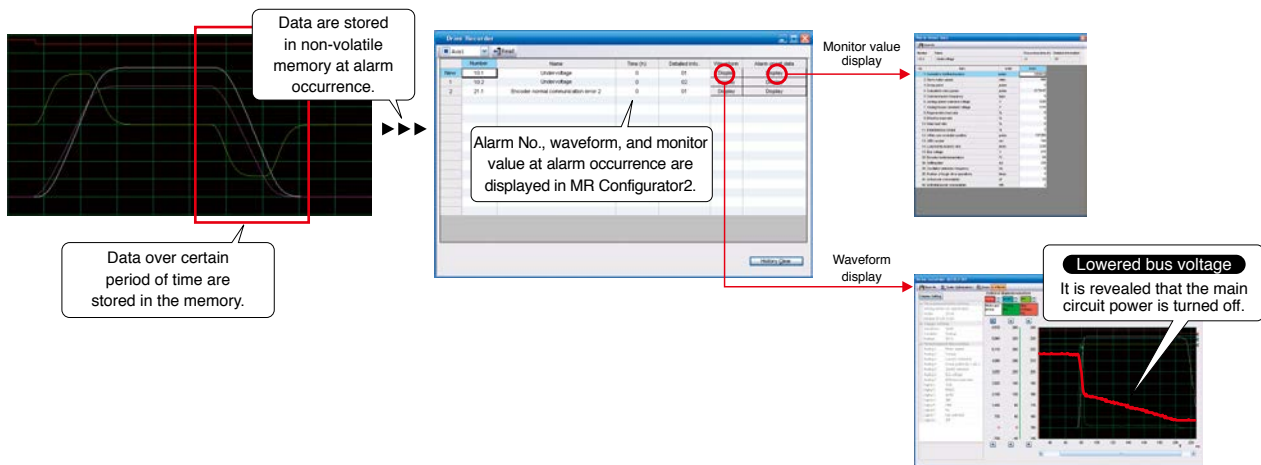
Reduce machine downtime incurred by age-related deterioration

JE-B   JE-A

Vibration Tough Drive

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

Vibration detected

Suppresses vibration by readjusting the machine resonance suppression filter.

Motor current

Drive Product
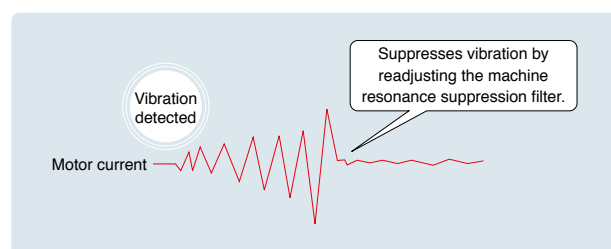
Support optimal maintenance of driving parts

JE-B   JE-A

Patent pending

Machine Diagnosis Function

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

[Machine diagnosis function window of MR Configurator2]

Machine information is displayed and monitored.

Servo amplifier

Changes are detected by automatically estimating friction and vibration inside the servo amplifier. Particular measurement and adjustment are not required.

Displays estimated friction value

Displays estimated vibration value

Personal computer

Encoder

Servo motor

Ball screw
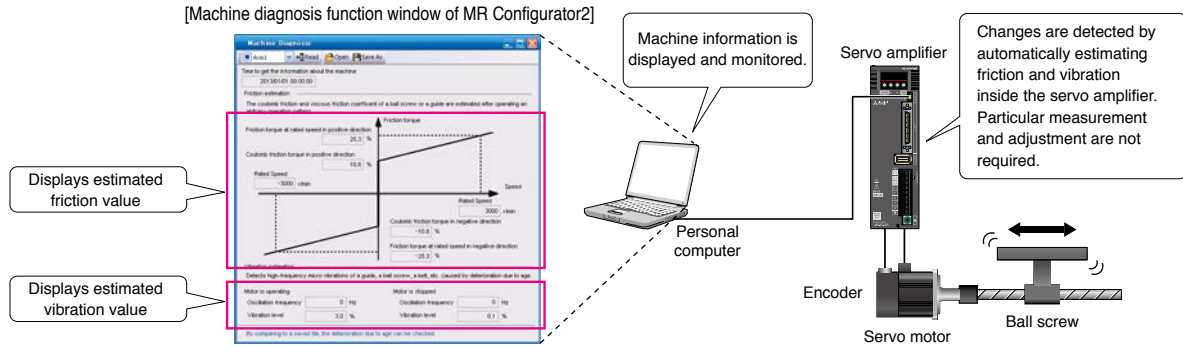
Easy troubleshooting

JE-B   JE-A

Three-Digit Alarm

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

[Example of an alarm window on MR Configurator2]

[Three-digit alarm display]

AL.10.1

This display is of MR-JE-A.
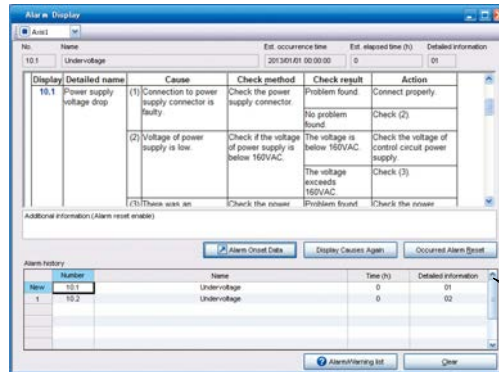
The alarm No. shows whether the undervoltage alarm was caused by instantaneous power failure or by lowered bus voltage in the servo amplifier.

User-Friendly Motors

Even in severe environment

Improved Environment Safety

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

* The shaft-through portion is excluded.
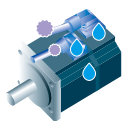
Protected from water and dust.

Cable leading in both ways

Selectable Cable Leading Direction

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

Selectable mounting direction

In direction of load side

In opposite direction of load side

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Drive Product

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Servo Adjustment

Tuning is just one click away   JE-B   JE-A
One-Touch Tuning Function

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

Easy adjustment

Display adjustment results.

Click

▼

Adjustment completed
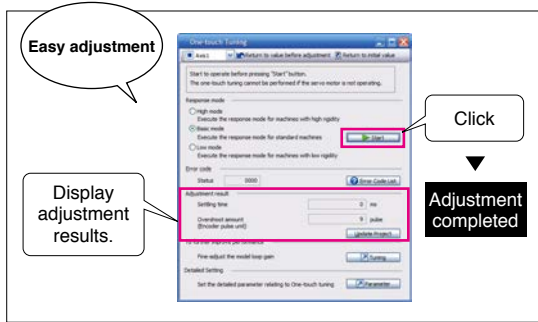
Fine tuning of loop gain   JE-B   JE-A
Tuning Function

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

Pursue higher performance with manual setting.

Display adjustment results.

Adjust gains finely.

▶▶▶
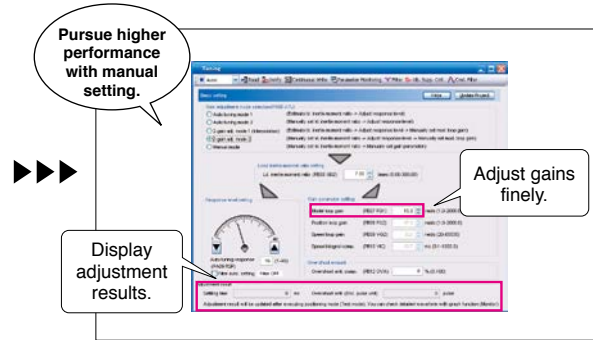
Convenient with overwrite and graph history functions   JE-B   JE-A
Graph Function

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

Check the servo operation in waveform.
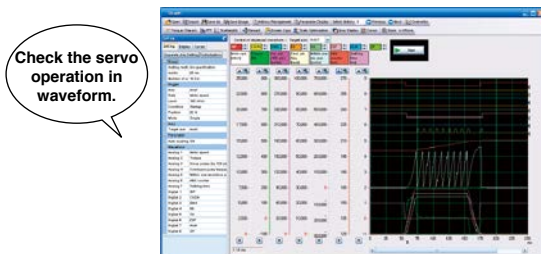
Analyze the frequency characteristics   JE-B   JE-A
Machine Analyzer Function

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

Measure mechanical characteristics.
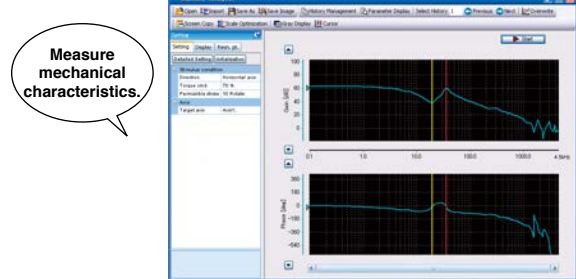
Maintenance

For timely parts replacement   JE-B   JE-A
Servo Amplifier Life Diagnosis Function

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

Support the preventive maintenance of the servo amplifier.
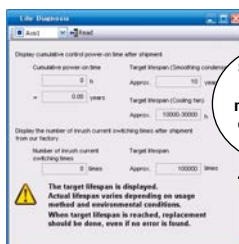
Find out the aging deterioration of machines   JE-B   JE-A
Machine Diagnosis Function

Patent pending

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

Prevent machine failure with advanced preventive maintenance beforehand.
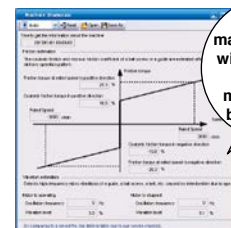
Further Reduction of Cycle Time

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

Fast and Accurate

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

2.0 kHz Speed Frequency Response

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

[Settling time comparison with the prior model]

Exact positioning　　JE-B　　JE-A

High-Resolution Encoder

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

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

Equipped with high-resolution incremental encoder.

Further smooth operation　　JE-A

Max Command Pulse Frequency of 4 Mpulses/s

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

Controller

Compatible with 4 Mpulses/s.

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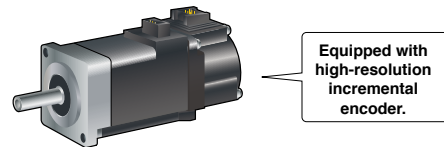
Smooth, constant-speed operation　　JE-B　　JE-A

Reduced Torque Ripple during Conduction

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

■ Torque ripple

Prior servo motor　　　　1/4　　　　HG-KN series
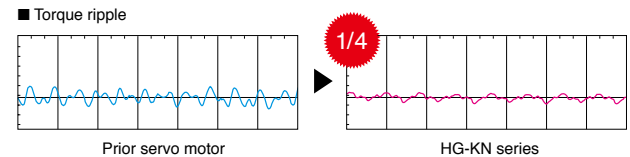
Compatible with pulse train and analog　　JE-A

Flexible Command Interface

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

Eco-Friendly Performance

Reduce waste in energy consumption

Efficient Utilization of Regenerative Energy

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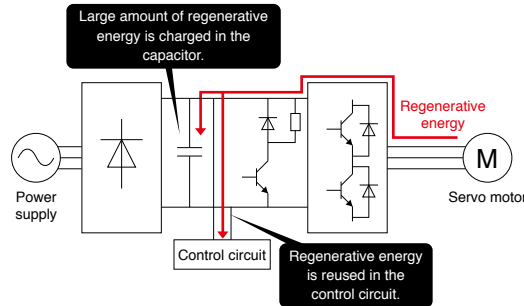
Visualize power consumption

Power Monitor

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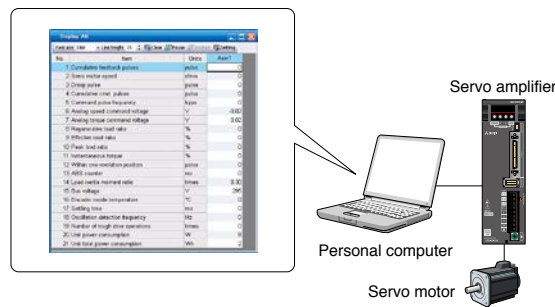
Achieve further energy saving

Saving Energy with Advanced Technologies

Reducing energy loss of the servo amplifier

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

Reduced loss

Saving energy by improving machine performance

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

Reduced machine operation time

Features/
Summary

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Outline
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MR-J4
Series
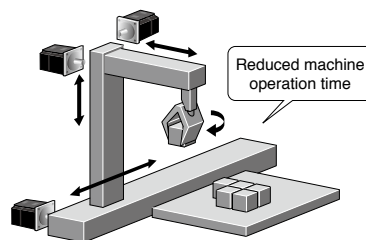
MR-JE
Series

Fully Compliant Worldwide

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

Global Servo Meets Global Standards

Best quality all over the world   JE-B   JE-A

Conformity with Global Standards and Regulations

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

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

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

Flexible connections for the global use   JE-B   JE-A

Sink and Source Connections

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

■ Example of digital input

Sink input

Compatible with sink and source type connections.

Source input

Drive Product
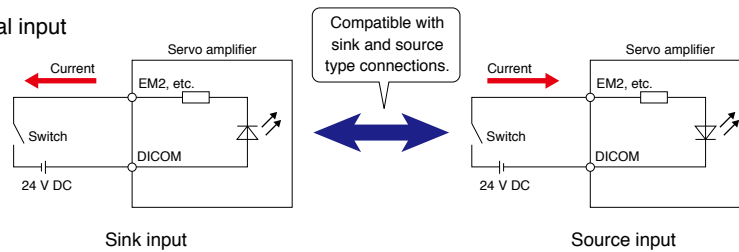
MELSERVO-JE

● Servo Amplifiers

Servo Amplifier Model Designation `B` `A`

M R - J E - 1 0 B

Mitsubishi general-purpose AC servo amplifier MELSERVO-JE Series

Symbol	Interface
B	SSCNET III/H
A	General-purpose

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

Combinations of Servo Amplifier and Servo Motor `B` `A`

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

Features/
Summary

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MR-J4
Series

MR-JE
Series

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

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

Molded-case circuit breaker (MCCB)

This protects the power supply line.

Magnetic contactor (MC)

This turns off the power to the servo amplifier when an alarm is triggered.

Power factor improving AC reactor(optional)

This boosts the power factor of servo amplifier and reduces the power supply capacity.

Regenerative option (optional)

Install this unit in situations involving frequent regeneration and large moment of inertia of load.

Encoder connector (CN2)

Connect the servo motor encoder using an optional cable or a connector set.

Charge lamp

The lamp lights when the main circuit power supply is charged.

Battery connector (CN4)

Connect MR-BAT6V1SET-A battery when configuring absolute position detection system.

Display

Servo amplifier status and alarm number are displayed.

USB communication connector (CN5)

Connect with a personal computer and use MR Configurator2. Parameter setting and monitoring are possible. Use an optional USB cable (MR-J3USBCBL3M).

Axis setting part

Select an axis with the axis selection rotary switch (SW1).

I/O signal connector (CN3)

This connector is used for forced stop input and electromagnetic brake interlock signal.

SSCNET III/H compatible Simple Motion module

FX5U

LD77MS

QD77MS

RD77MS

SSCNET III/H connector (CN1A)

Connect the servo system controller or the previous servo amplifier axis.

SSCNET III/H connector (CN1B)

Connect the next servo amplifier axis. Be sure to attach a cap to CN1B connector of the final axis.

Servo motor power cable (optional)

Encoder cable (optional)

Servo motor
(The picture is as of HG-KN13J.)

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

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

Servo amplifier model MR-JE-			10B	20B	40B	70B	100B	200B	300B
Output	Rated voltage		3-phase 170 V AC						
	Rated current [A]		1.1	1.5	2.8	5.8	6.0	11.0	11.0
Power supply input	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 8)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 7) [A]		0.9	1.5	2.6	3.8	5.0	10.5	14.0
	Permissible voltage fluctuation		3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC (Note 8)		3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation		±5% maximum						
Interface power supply			24 V DC ± 10% (required current capacity: 0.1 A)						
Control method			Sine-wave PWM control/current control method						
Tolerable regenerative power of the built-in regenerative resistor (Note 2, 3) [W]			-	-	10	20	20	100	100
Dynamic brake			Built-in (Note 4)						
SSCNET III/H command communication cycle (Note 6)			0.444 ms, 0.888 ms						
Communication function			USB: Connect a personal computer (MR Configurator2 compatible)						
Servo function			Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit function, machine diagnosis function, power monitoring function, lost motion compensation function						
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, hotline forced stop function (Note 9)						
Compliance to global standards			Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.						
Structure (IP rating)			Natural cooling, open (IP20)					Force cooling, open (IP20)	
Close mounting (Note 5)	3-phase power supply input		Possible						
	1-phase power supply input		Possible			Not possible			-
Environment	Ambient temperature		Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)						
	Ambient humidity		Operation/Storage: 90 %RH maximum (non-condensing)						
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust						
	Altitude		1000 m or less above sea level						
	Vibration resistance		5.9 m/s² at 10 Hz to 55 Hz (directions of X, Y and Z axes)						
Mass [kg]			0.8	0.8	0.8	1.5	1.5	2.1	2.1

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

Drive Product

MR-JE-B Dimensions **B**

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

50
6
ø6 mounting hole
CN5
CN4
CN3
CN1A
CN1B
CN2
156
168
CNP1
PE
6
6

Approx. 80   135

When mounting
MR-BAT6V1SET-A

Built-in regenerative resistor
(lead wires) is mounted in
MR-JE-40A only.

2.9

Terminal arrangement
CNP1
L1
L2
L3
P+
C
U
V
W

PE Screw size: M4

Mounting screw size: M5

[Unit: mm]
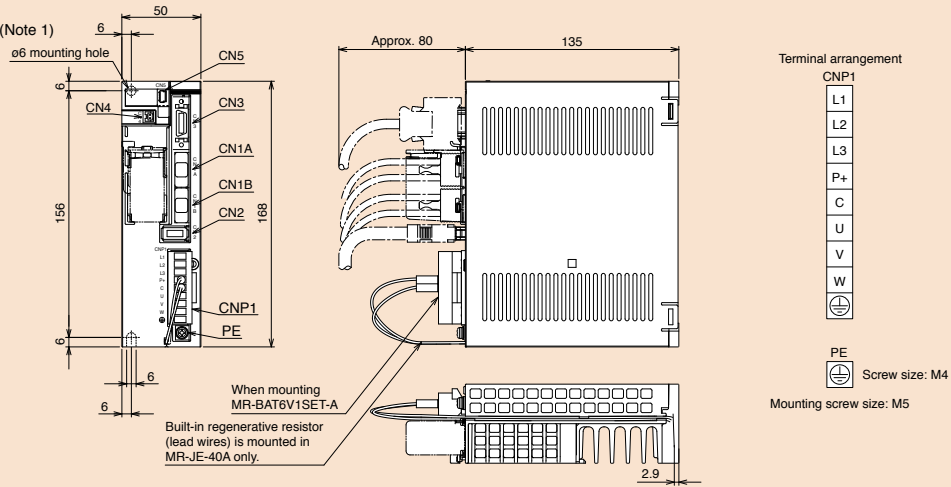
● MR-JE-70B (Note 1)
● MR-JE-100B (Note 1)

70
22
ø6 mounting hole
CN5
CN3
CN4
CN1A
CN1B
CN2
156
168
CNP1
PE
6
6
22   42

Approx. 80   185

When mounting
MR-BAT6V1SET-A

3.3

Terminal arrangement
CNP1
L1
L2
L3
P+
C
U
V
W

PE Screw size: M4

Mounting screw size: M5

[Unit: mm]
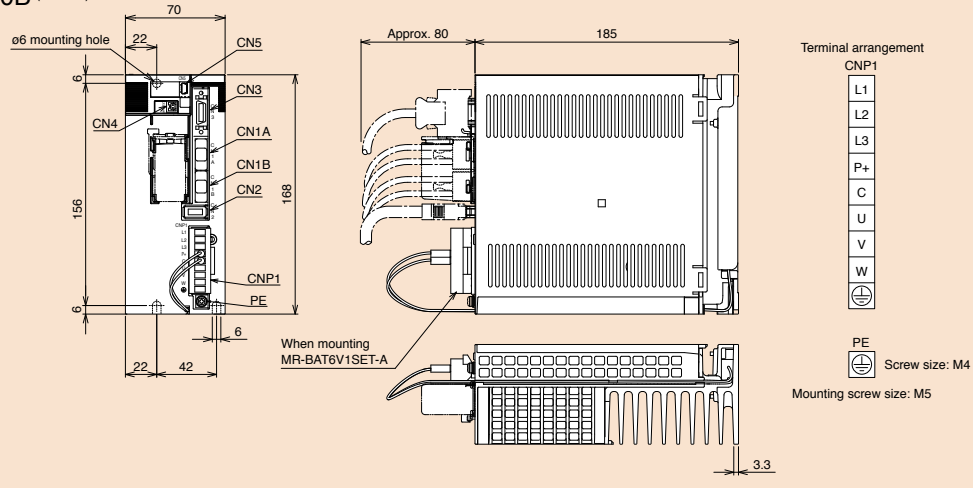
● MR-JE-200B (Note 2)
● MR-JE-300B (Note 2)
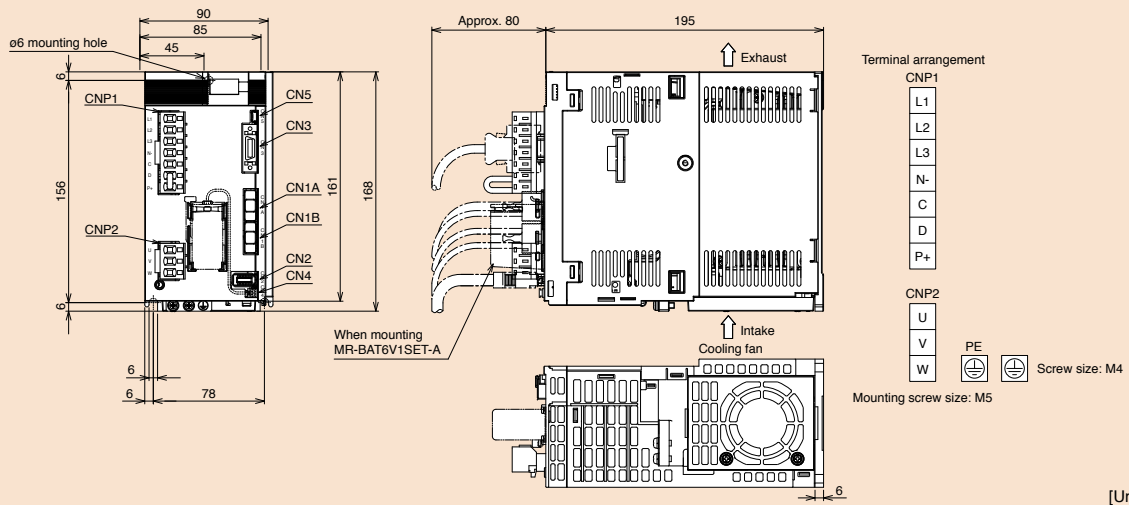
90
85
45
ø6 mounting hole
CNP1
CN5
CN3
CN1A
CN1B
CNP2
CN2
CN4
156
161
168
6
6
78

Approx. 80   195

Exhaust

When mounting
MR-BAT6V1SET-A

Intake
Cooling fan

6

Terminal arrangement
CNP1
L1
L2
L3
N-
C
D
P+

CNP2
U
V
W

PE Screw size: M4

Mounting screw size: M5

[Unit: mm]

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

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

Drive Product

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

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

Molded-case circuit breaker (MCCB)
This protects the power supply line.

Magnetic contactor (MC)
This turns off the power to the servo amplifier when an alarm is triggered.

Power factor improving AC reactor (optional)
This boosts the power factor of servo amplifier and reduces the power supply capacity.

R S T
X Y Z

Regenerative option (optional)
Install this unit in situations involving frequent regeneration and large moment of inertia of load.

Encoder connector (CN2)
Connect the servo motor encoder using an optional cable or a connector set.

Charge lamp
The lamp lights when the power supply is charged.

Display
Servo amplifier status, parameter, and alarm number are displayed.

Setting section
Parameter settings and monitoring etc. are executed with push buttons. Push the MODE and SET buttons for 3 s or more to switch to the one-touch tuning mode.

USB communication connector (CN3)
Connect a personal computer and perform monitoring, batch parameter writing and saving, graph display, and test operation with MR Configurator2. Use an optional USB cable (MR-J3USBCBL3M).

I/O signal connector (CN1)
Connect to a Mitsubishi controller or any pulse train output controller.

FX5U

FX3U FX3UC
FX3G FX3GC
FX3S

LD75P_
LD75D_

FX3U-1PG

FX2N-10PG

RD75P_
QD70P_
QD75P_N

RD75D_
QD70D_
QD75D_N

Connect all signals via the junction terminal block.

Connect to a programmable controller IO port or a control cabinet of a machine.

Encoder cable (optional)

Servo motor power cable (optional)

Servo motor
(The picture is as of HG-KN13J.)

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

Features/ Summary

Specifications/ Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

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

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

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

MR-JE-A Dimensions   A

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

50
6
ø6 mounting hole
156
168
6
6
6
CN3
CN1
CN2
CNP1
PE
Built-in regenerative resistor (lead wires) is mounted in MR-JE-40A only.

Approx. 80   135

2.9

Terminal arrangement
CNP1
L1
L2
L3
P+
C
U
V
W

PE
Screw size: M4
Mounting screw size: M5
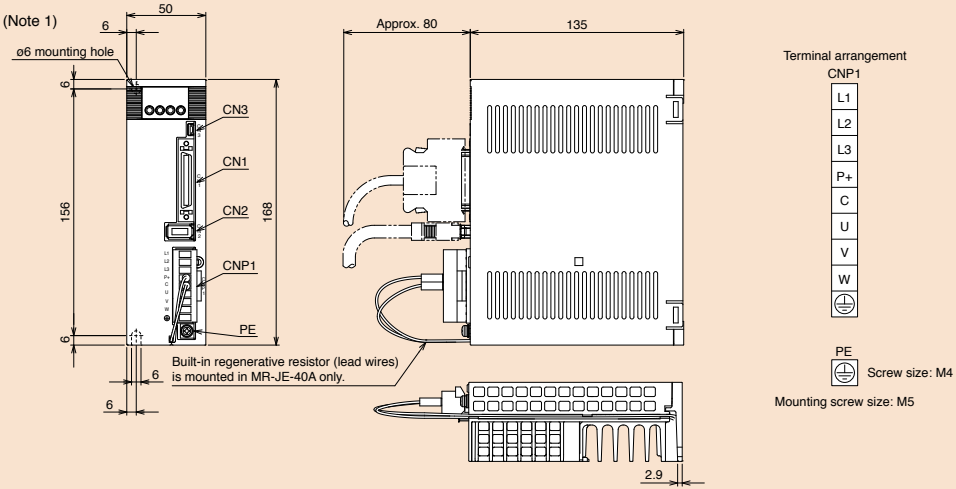
[Unit: mm]

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

70
22
6
ø6 mounting hole
156
168
6
6
22   42
CN3
CN1
CN2
CNP1
PE

Approx. 80   185

3.3

Terminal arrangement
CNP1
L1
L2
L3
P+
C
U
V
W

PE
Screw size: M4
Mounting screw size: M5
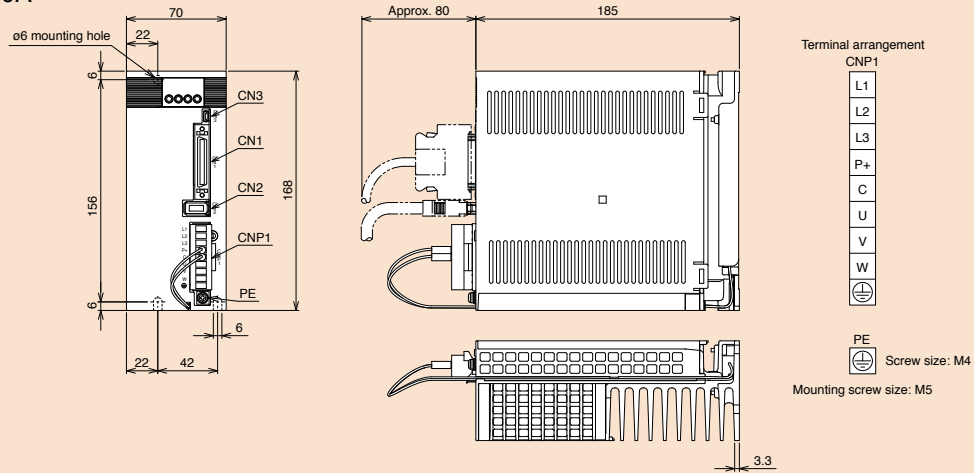
[Unit: mm]

● MR-JE-200A (Note 2)
● MR-JE-300A (Note 2)
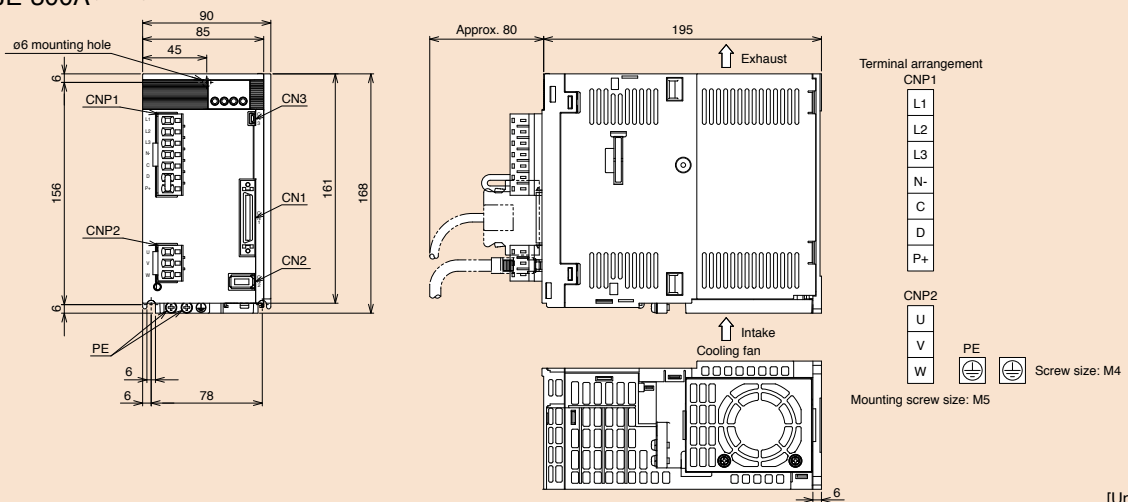
90
85
45
6
ø6 mounting hole
156
161
168
6
6
6
78
CNP1
CN3
CN1
CN2
CNP2
PE

Approx. 80   195
Exhaust
Intake
Cooling fan
6

Terminal arrangement
CNP1
L1
L2
L3
N-
C
D
P+

CNP2
U
V
W
PE
Screw size: M4
Mounting screw size: M5

[Unit: mm]

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

Drive Product

Features/
Summary

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MR-J4
Series

MR-JE
Series

● Servo Motors

Model Designation

H G - K N 1 3 B J □
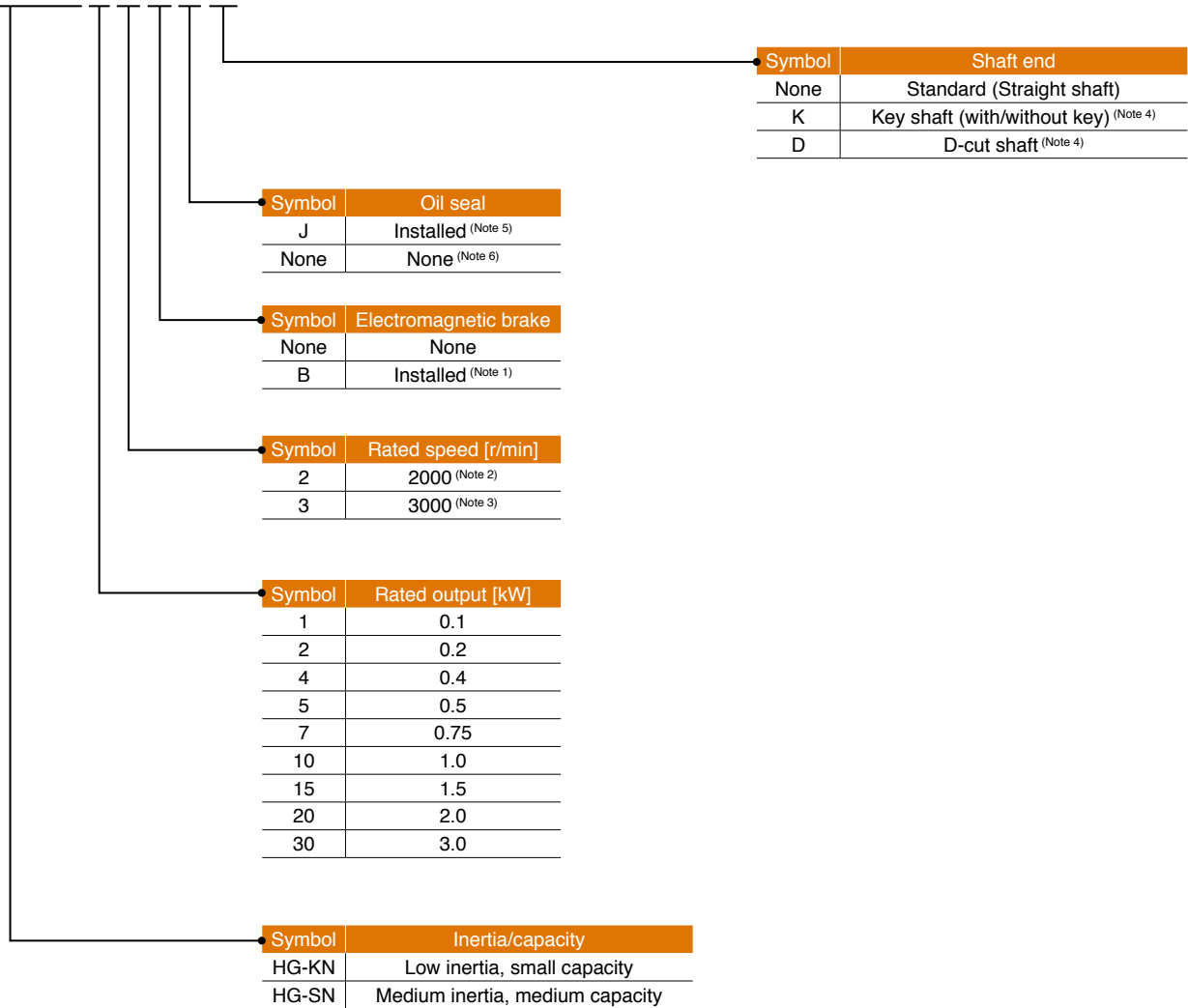
Symbol	Shaft end
None	Standard (Straight shaft)
K	Key shaft (with/without key) [Note 4]
D	D-cut shaft [Note 4]

Symbol	Oil seal
J	Installed [Note 5]
None	None [Note 6]

Symbol	Electromagnetic brake
None	None
B	Installed [Note 1]

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

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

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

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

Combinations of Servo Motor and Servo Amplifier

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

Drive Product

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

Servo motor model HG-KN			13(B)J	23(B)J	43(B)J	73(B)J
Compatible servo amplifier model			Refer to "Combinations of Servo Motor and Servo Amplifier" on p. 426 in this catalog.			
Power supply capacity *1		[kVA]	0.3	0.5	0.9	1.3
Continuous running duty	Rated output	[W]	100	200	400	750
	Rated torque (Note 3)	[N•m]	0.32	0.64	1.3	2.4
Maximum torque		[N•m]	0.95	1.9	3.8	7.2
Rated speed		[r/min]	3000			
Maximum speed		[r/min]	5000			
Permissible instantaneous speed		[r/min]	5750			
Power rate at continuous rated torque	Standard	[kW/s]	12.9	18.0	43.2	44.5
	With electromagnetic brake	[kW/s]	12.0	16.4	40.8	41.0
Rated current		[A]	0.8	1.3	2.6	4.8
Maximum current		[A]	2.4	3.9	7.8	14
Regenerative braking frequency *2, *3		[times/min]	(Note 4)	(Note 5)	276	159
Moment of inertia J	Standard	[× 10⁻⁴ kg•m²]	0.0783	0.225	0.375	1.28
	With electromagnetic brake	[× 10⁻⁴ kg•m²]	0.0843	0.247	0.397	1.39
Recommended load to motor inertia ratio (Note 1)			15 times or less			
Speed/position detector	Combination with MR-JE-B		Absolute/incremental 17-bit encoder (resolution: 131072 pulses/rev)			
	Combination with MR-JE-A		Incremental 17-bit encoder (resolution: 131072 pulses/rev)			
Oil seal			Installed. Without oil seal is also available.			Installed
Insulation class			130 (B)			
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)			
Environment *4	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)			
	Ambient humidity		Operation: 80 %RH maximum (non-condensing), storage: 90 %RH maximum (non-condensing)			
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust			
	Altitude		1000 m or less above sea level			
	Vibration resistance *5		X: 49 m/s² Y: 49 m/s²			
Vibration rank			V10 *7			
Compliance to global standards			Refer to "Conformity with global standards and regulations" on p. 418 in this catalog.			
Permissible load for the shaft *6	L	[mm]	25	30	30	40
	Radial	[N]	88	245	245	392
	Thrust	[N]	59	98	98	147
Mass	Standard	[kg]	0.6	0.98	1.5	3.0
	With electromagnetic brake	[kg]	0.8	1.4	1.9	4.0

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 8 of "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.
4. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 11 times or less.
5. When the servo motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 9 times or less. When the servo motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load to motor inertia ratio is 3 times or less.

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

Features/ Summary

Specifications/ Characteristics

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MR-J4 Series

MR-JE Series

HG-KN Series Electromagnetic Brake Specifications (Note 1)

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

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

HG-KN Series Torque Characteristics

HG-KN13(B)J (Note 1, 2, 3)
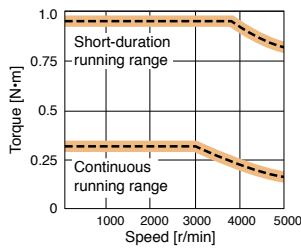
HG-KN23(B)J (Note 1, 2, 3)
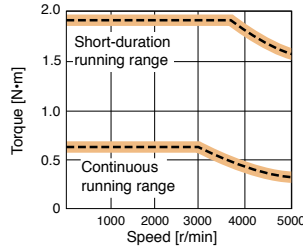
HG-KN43(B)J (Note 1, 2, 3)
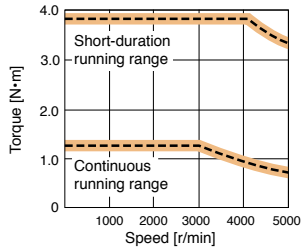
HG-KN73(B)J (Note 1, 2, 3)
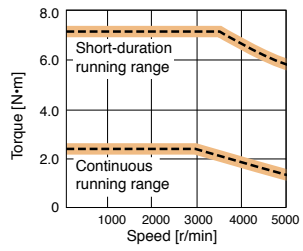
Notes: 1. ▬▬ : For 3-phase 200 V AC.
　　　 2. ---- : For 1-phase 230 V AC.
　　　 3. Torque drops when the power supply voltage is below the specified value.

HG-KN Series Special Shaft End Specifications

Motors with the following specifications are also available.

D-cut shaft (Note 1): 100 W
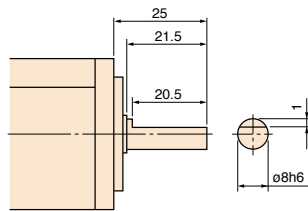
[Unit: mm]

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

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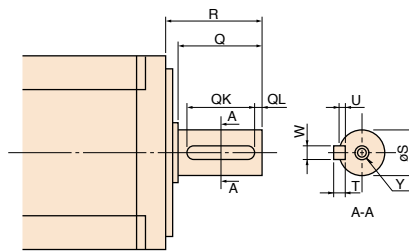
[Unit: mm]

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

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

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

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 8 of "Annotations for Servo Motor Specifications" on p. 431 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70% of the servo motor rated torque.

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

HG-SN Series Electromagnetic Brake Specifications (Note 1)

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

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

HG-SN Series Torque Characteristics

HG-SN52(B)J (Note 1, 2, 3)
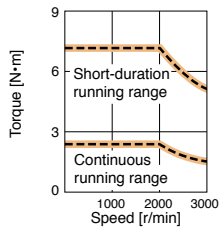
HG-SN102(B)J (Note 1, 2, 3)
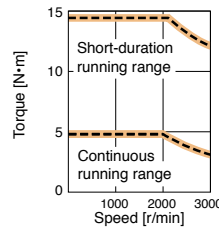
HG-SN152(B)J (Note 1, 2, 3)
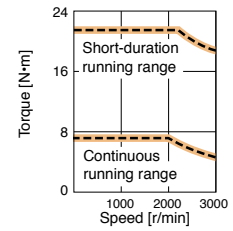
HG-SN202(B)J (Note 1, 2, 3)
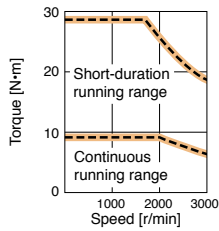
HG-SN302(B)J (Note 1, 3)
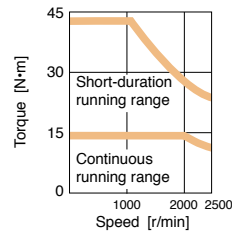
Notes: 1. ▬▬▬ : For 3-phase 200 V AC.
      2. ---- : For 1-phase 230 V AC.
      3. Torque drops when the power supply voltage is below the specified value.

HG-SN Series Special Shaft End Specifications

Motors with the following specifications are also available.

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

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-SN52(B)JK, 102(B)JK, 152(B)JK	24h6	55	50	8 $_{-0.036}^{0}$	36	5	4 $_{0}^{+0.2}$	4	M8 screw Depth: 20
HG-SN202(B)JK, 302(B)JK	35 $_{0}^{+0.010}$	79	75	10 $_{-0.036}^{0}$	55	5	5 $_{0}^{+0.2}$	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]

Drive Product

Annotations for Servo Motor Specifications

*1. The power supply capacity varies depending on the power supply impedance.

*2. The regenerative braking frequency shows the permissible frequency when the servo motor, without a load and a regenerative option, decelerates from the rated speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Moment of inertia of load/Moment of inertia of servo motor.
When the operating speed exceeds the rated speed, the regenerative braking frequency is inversely proportional to the square of (operating speed/rated speed). Take measures to keep the regenerative power [W] during operation below the tolerable regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the tolerable regenerative power [W] when regenerative option is used.

*3. For 400 W or smaller servo amplifiers, the regenerative braking frequency may change affected by the power supply voltage due to the large ratio of the energy charged into the electrolytic capacitor in the servo amplifier.

*4. In the environment where the servo motor is exposed to oil mist, oil and/or water, a standard specification servo motor may not be usable. Contact your local sales office for more details.

*5. The vibration direction is shown in the diagram below. The numerical value indicates the maximum value of the component (commonly the bracket in the opposite direction of the servo motor shaft).
Fretting more likely occurs on the bearing when the servo motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.

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

L: Distance between the flange mounting surface and the center of load
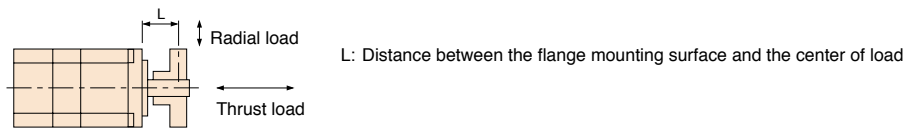
*7. V10 indicates that the amplitude of the servo motor itself is 10 μm or less. The following shows mounting posture and measuring position of the servo motor during the measurement:

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

Features/
Summary

Specifications/
Characteristics

Outline
Drawings

MR-J4
Series

MR-JE
Series
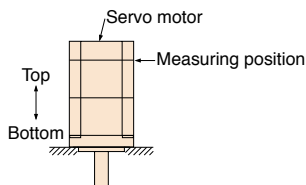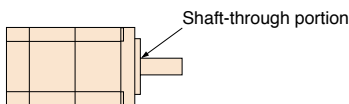
HG-KN Series Dimensions (Note 1, 5)
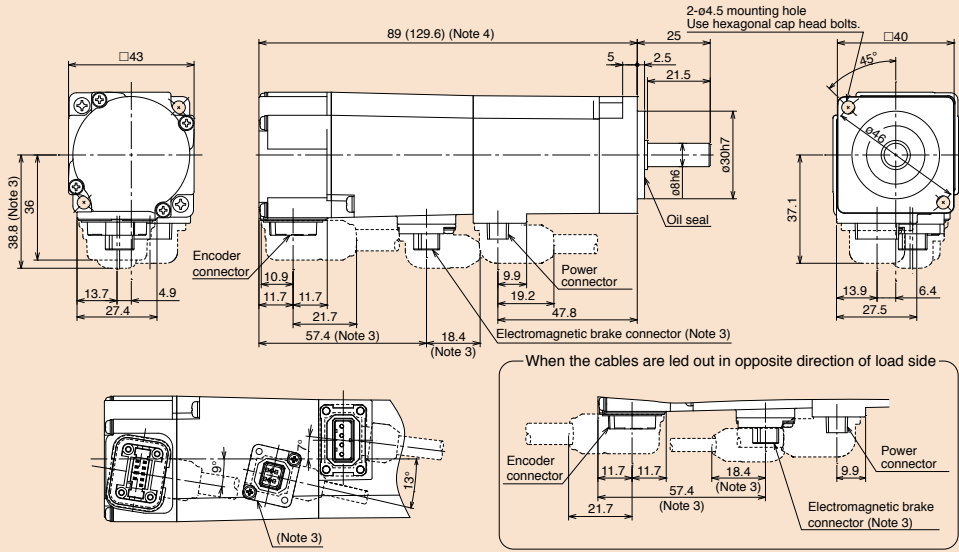
● HG-KN13(B)J

Power connector

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

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

● HG-KN13(B)

Power connector

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

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

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

Drive Product

HG-KN Series Dimensions (Note 1, 5)

● HG-KN23(B)J, HG-KN43(B)J
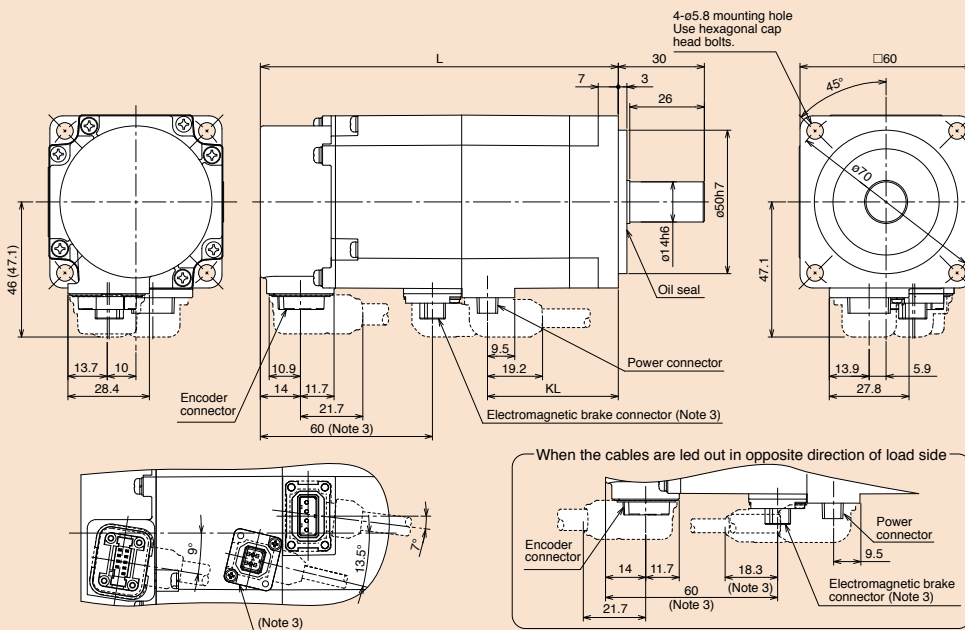
Power connector

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

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

Model	Variable dimensions (Note 4)	
	L	KL
HG-KN23(B)J	88 (124.8)	45.6
HG-KN43(B)J	109.7 (146.5)	67.3
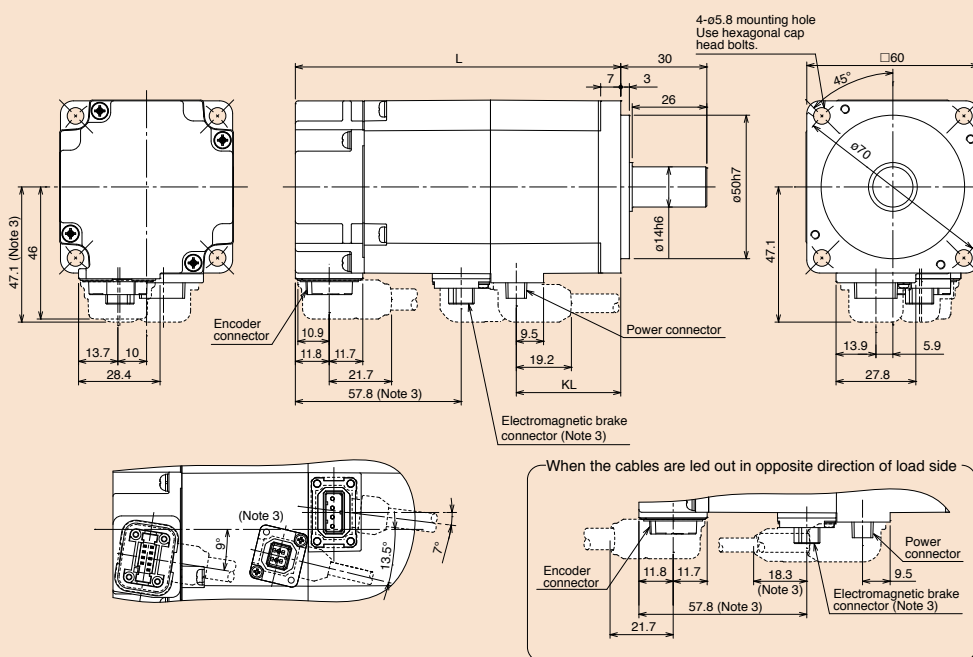
When the cables are led out in opposite direction of load side

[Unit: mm]

● HG-KN23(B), HG-KN43(B)

Power connector

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

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

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

When the cables are led out in opposite direction of load side

[Unit: mm]

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

Features/Summary

Specifications/Characteristics

Outline Drawings

MR-J4 Series

MR-JE Series

HG-KN Series Dimensions (Note 1, 5)

●HG-KN73(B)J

4-ø6.6 mounting hole
Use hexagonal cap head bolts.

Oil seal

When the cables are led out in opposite direction of load side

Power connector

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

Electromagnetic brake connector (Note 2)

Pin No.	Signal name
1	B1
2	B2

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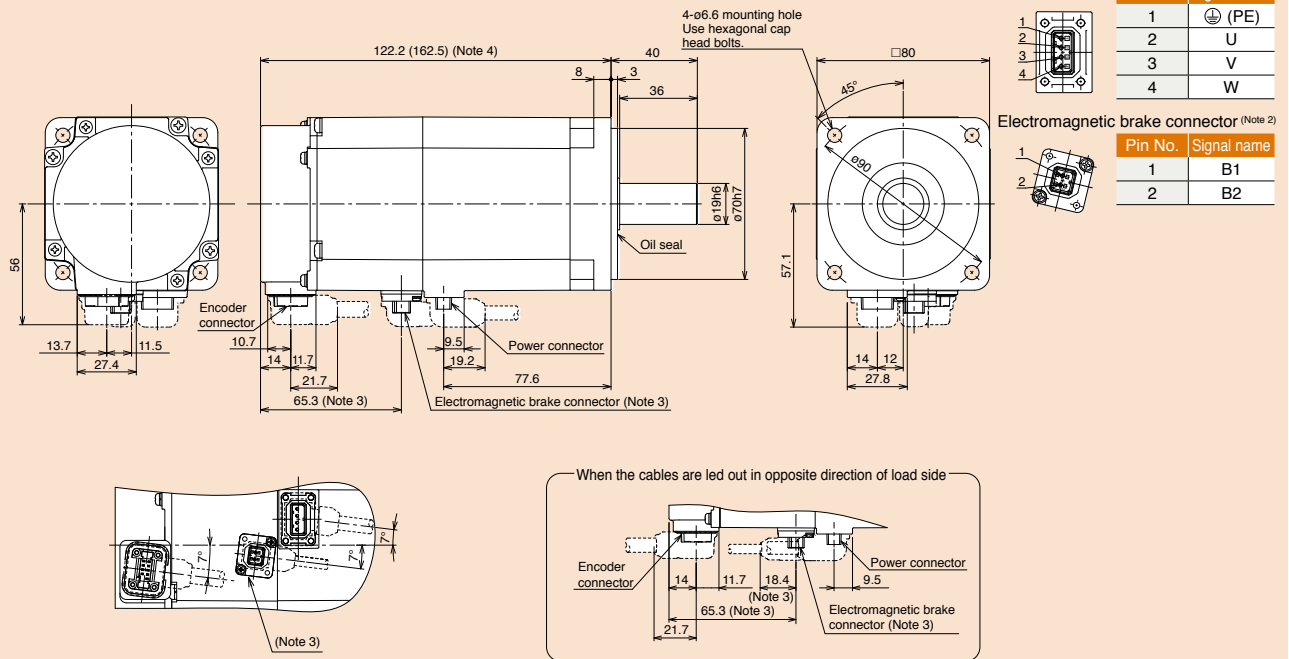
Notes: 1. For dimensions without tolerance, general tolerance applies.
     2. The electromagnetic brake terminals (B1, B2) do not have polarity.
     3. Only for the models with electromagnetic brake.
     4. Dimensions in brackets are for the models with electromagnetic brake.
     5. Use a friction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

HG-SN Series Dimensions (Note 1, 5)

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

4-ø9 mounting hole
Use hexagonal cap head bolts.

□130

45°

L

55

38.2 (43.5) (Note 4)

12   3

50

(Note 3)

79.9 (Note 3)

50.9

(Note 3)

Ø24h6

Ø35

Ø110h7

Oil seal

13

59 (Note 3)

Encoder connector CMV1-R10P

Electromagnetic brake connector (Note 3) CMV1-R2P

20.9

KL

Power connector MS3102A18-10P

29 (Note 3)

(Note 3)

112.5

13.5

58

Main key Position mark

W   ⊕ (PE)

Key

Electromagnetic brake (Note 2)

V   U

Electromagnetic brake connector
Servo motor flange direction →

Power connector
Servo motor flange direction →

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

[Unit: mm]

● HG-SN202(B)J, HG-SN302(B)J
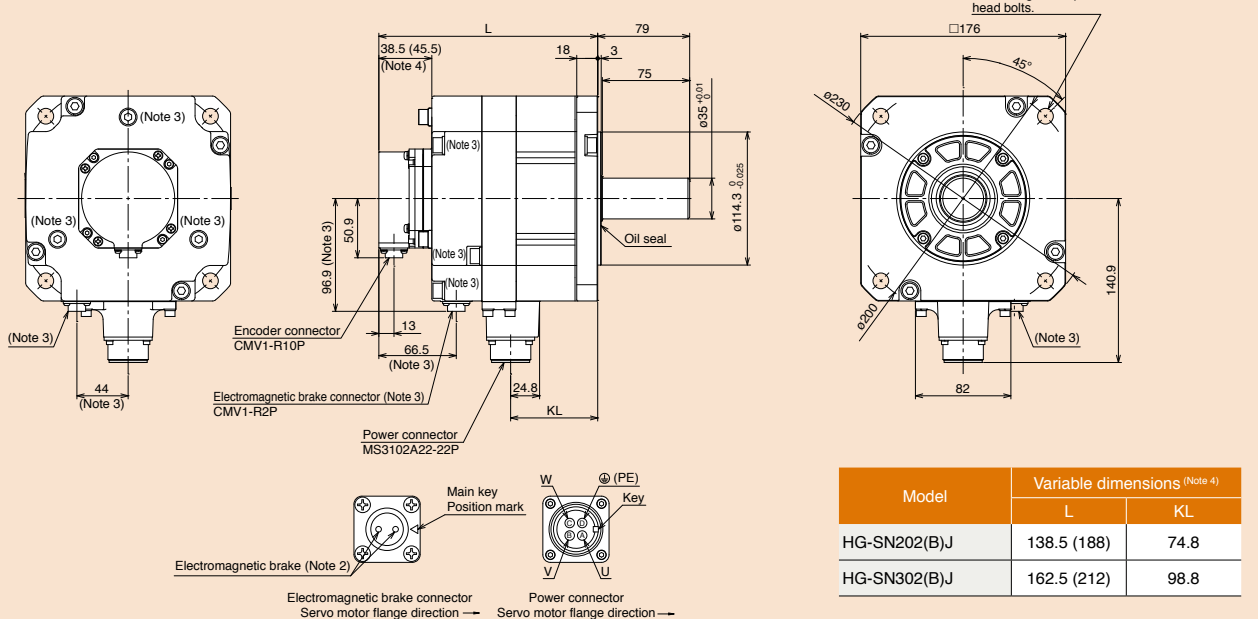
4-ø13.5 mounting hole
Use hexagonal cap head bolts.

□176

45°

L

79

38.5 (45.5) (Note 4)

18   3

75

(Note 3)

96.9 (Note 3)

50.9

(Note 3)

ø35 +0.01 0

ø114.3 0 -0.025

Oil seal

ø230

ø200

13

66.5 (Note 3)

Encoder connector CMV1-R10P

Electromagnetic brake connector (Note 3) CMV1-R2P

24.8

KL

Power connector MS3102A22-22P

44 (Note 3)

(Note 3)

140.9

82

Main key Position mark

W   ⊕ (PE)

Key

Electromagnetic brake (Note 2)

V   U

Electromagnetic brake connector
Servo motor flange direction →

Power connector
Servo motor flange direction →

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

[Unit: mm]

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

Inverter

Offers best choices that cover all needs

Our inverters with adjustable frequency power supply are designed to easily change the rotation speed of three-phase induction motors.

High-performance, environmental friendly, and complies with global standards. Select from our product lineup for different applications.

Inverter FREQROL

A800 Series

New & high standard inverter with high-performance and high-quality. Enhanced drive performance and easy use while complying with safety standards.

Features	Line up	Specifications
P.438	P.444	P.448

A800Plus Series

The FR-A800 advanced-function, high-performance inverter has been enhanced with features that make it ideal for use in special fields.

● A800 Plus Series for CRANES

Features	Line up	Specifications
P.466	P.468	P.469

● A800 Plus Series for Roll to Roll

Features	Line up	Specifications
P.476	P.482	P.483

F800 Series

Enhanced next-generation energy-saving inverter with functions ideal for fans and pumps.

Features	Line up	Specifications
P.490	P.498	P.500

E700 Series

Top level performer among compact inverters with more persistence and power.

| Features P.522 | Line up P.526 | Specifications P.528 |

F700PJ Series

Capable of operating both general-purpose and IPM motors, and built with various functions to fully meet the needs for fan and pumps.

| Features P.542 | Line up P.547 | Specifications P.549 |

D700 Series

Enhanced reliability and integrity with simplified operation and stronger performance.

| Features P.556 | Line up P.560 | Specifications P.562 |

Capacity table

Model	Inverter Capacity*1																															
	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315	355	400	450	500	560
FR-A820-□K																																
FR-A840-□K																																
FR-A842-□K*2																																
FR-A846-□K*3																																
FR-F820-□K																																
FR-F840-□K																																
FR-F842-□K*2																																
FR-E720-□K*4*5*6																																
FR-E740-□K*4*5*6																																
FR-E720S-□K*4																																
FR-E710W-□K																																
FR-F720PJ-□K(F)*7																																
FR-F740PJ-□K(F)*7																																
FR-D720-□K																																
FR-D740-□K																																
FR-D720S-□K																																
FR-D710W-□K																																

Voltage class

- Three-phase 200 V
- Three-phase 400 V
- Single-phase 200 V (Note)
- Single-phase 100 V (Note)

(Note) The output is three-phase 200 V.

(dashed) To be released soon

*1 ND rated capacity for the FR-A800 series, and LD rated capacity for the FR-F800 series.
*2 Separated converter type. Always install the converter unit (FR-CC2).
   (Not required when a high power factor converter (FR-HC2) is used.)
*3 IP55 compatible model.
*4 SC at the end of the model name indicates the safety stop function model.
*5 NF at the end of the model name indicates the FL remote communication model.
*6 NC at the end of the model name indicates the CC-Link communication model.
*7 Filterpack (FR-BFP2) is enclosed for the inverter with Filterpack.
   ("F" is marked at the end of its model names on the packaging box.)

Inverter FREQROL·A800 Series
Unparalleled high-performance; Promising high-quality

Approach to the Leading Drive Performance ——— Swift, Smooth, yet Robust

The enhanced Real sensorless vector control and vector control serve the needs for all machinery types.

The vector control is available when a vector control compatible option is installed.

High-Quality Products

High response

Response speed Real sensorless vector control 50Hz[1]   A700:20Hz
Vector control 130Hz[2]   A700:50Hz

Improved speed response ensures minimal speed fluctuation due to load changes.

170 ms
80 ms
FR-A800
FR-A700

FR-A800
FR-A700
80 ms
170 ms

Actual rotation speed

Load torque

Torque (%)
Speed (r/min)
900
100
0
0
Time (s)
100 ms/div
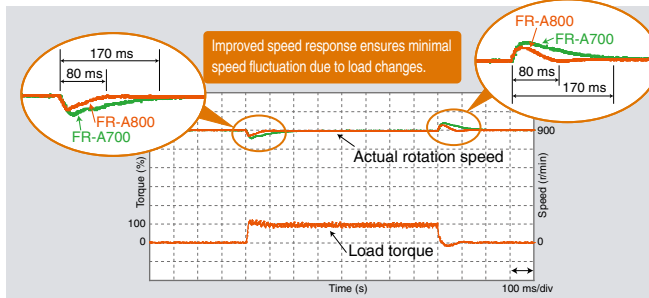
[Example of changes in actual rotation speed with impact load]
(With Real sensorless vector control, SF-JR 4P motor (3.7 kW))

Fast response terminal
The response delay time is reduced.

• Terminal response
A700: 5 to 20 ms ➡ A800: 2 to 3 ms

Line control
Line control is necessary for the machining of elongated products such as paper, thread, wires, all kinds of sheet, and tape. This will respond rapidly to changes in line speed and suppress the occurrences of winding unevenness. This contributes to a steady supply of high-quality products.

[1]: At 3.7 kW with no load. Differs depending on the load conditions and motor capacity.
[2]: The option (FR-A8AP, FR-A8AL, or FR-A8TP) is required.
Speed response: The speed response indicates how fast the inverter follows the change in the speed command. (The larger value indicates the better speed trackability.)

Ultra-Fine Processing

High-speed rotation

Operating frequency Real sensorless vector control and vector control 400Hz   A700:120Hz
V/F control 590Hz[3]   A700:400Hz

FR-A700
FR-A800

Real sensorless vector control, vector control

120 Hz
400 Hz
approx. 3.3 times

V/F control
400 Hz
590 Hz
approx. 1.5 times

Running frequency
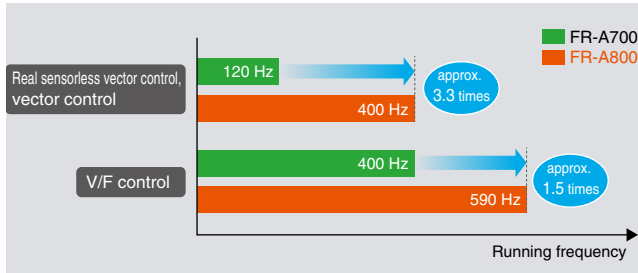
Machine tool
Cutting-edge machine tools are harder and thinner than ever before to be applicable to diverse new materials.
High-speed rotation is required more than ever before in order to be applicable for fine and precise cutting on hard and difficult-to-grind materials.

[3]: According to the review result of the export control order about frequency changers, the upper limit of output frequency was determined to be 590 Hz for standard models.

Swiftly Move Heavy Weights

High torque at low speed

Starting torque (When at 0.3 Hz)
Real sensorless vector control 200% (ND rating)[4],
Vector control 200% (ND rating)[4]
(150% of initial setting for 5.5K and higher)

Zero-speed torque
Vector control 200%
(Select HD rating.)[4]

Speed control range
V/F control 1:10 (6 to 60 Hz: Driving)
Advanced magnetic flux vector control 1:120 (0.5 to 60 Hz: Driving)
Real sensorless vector control 1:200 (0.3 to 60 Hz: Driving)
Vector control 1:1500 (1 to 1500 r/min: Both driving/regeneration)

Low speed area enlarged

Torque (%)
200
150
80
0
-80
-150
-200

150

Torque (%)
200
150
80
0
-80
-150
-200

Speed (r/min)
0 200 400 600 800 1000 1200 1400 1600 1800 2000

[Example of speed-torque characteristics with Real sensorless vector control]
When offline auto tuning is performed for the SF-PR 4P motor (15 kW). In the low-speed range, the torque increases by the increased magnetic excitation. Torque characteristics in the low-speed range can be set in the parameters.

Cranes
Cranes are in operation daily at ports carrying fully-laden containers in response to strong demand from all over the world. Our new inverter realizes smooth cargo handling work at low speed and high torque for the slow and stable movements required for heavy objects.

[4]: Refer to page 442 for the multiple rating setting.

AC Servo P.268 | Inverter P.436 | **439**

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

For Accurate and Stable Transport between Machines

PM sensorless vector control

● **What is a permanent magnet (PM) motor?**

A PM motor is a synchronous motor with strong permanent magnets embedded in its rotor. The two major PM motor types are: the interior permanent magnet (IPM) motor with its magnets embedded inside the rotor, and the surface permanent magnet (SPM) motor with its permanent magnets attached on the rotor surface.

● **What is PM sensorless vector control?**

The speed and magnetic pole positions, the two essential bits of information to control a PM motor, are detected without a sensor (encoder). The speed detection internally-performed in an inverter enables highly accurate control of a PM motor, almost as accurate as an AC servo system, without the need of a sensor (encoder)*5.
Combining with Mitsubishi MM-CF series IPM motors facilitates aspects of high-level control with no encoder such as "simple positioning"*6 and "zero speed torque".

PM sensorless vector control
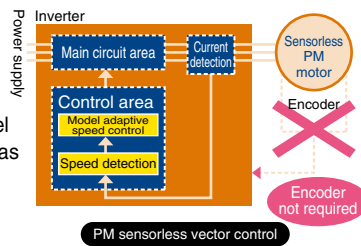
● **Easy maintenance for sensor (encoder)-less motor**

・No additional cables means less wiring space required.
・Improved reliability is obtained in unfavorable operating environments. (e.g. high vibration)
・PM motors are usually smaller and lighter than induction motors.
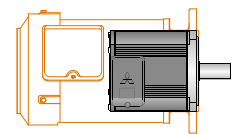
Comparison of
SF-PRF 1.5 kW 4P and MM-CF152

Transfer of circuit boards

The simple positioning control delivers a precision workpiece, such as a printed substrate, to a precise position.
Transfer of fragile glass substrates can be performed with a highly accurate driving system.

*5: Speed fluctuation ratio: ±0.05% (digital input)

$$\text{Speed fluctuation ratio} = \frac{\text{Speed under no load} - \text{Speed under rated load}}{\text{Rated speed}} \times 100(\%)$$

*6: Positional accuracy (with no load) of 1.5K and lower: ±1.8°, 2K and higher: ±3.6°

Taking Motor Performance to the Max

Induction motors and magnet motors can be combined freely

● **The cutting-edge auto tuning function**

The PM motor auto tuning function, which has been newly developed, enables sensorless operation of other manufacturers' permanent magnet (PM) motors.
Operation with all Mitsubishi induction motors and PM motors, in addtion to induction motors and PM motors from other manufacturers*7, is possible. That means you need less motors for spare and stocks.

(With IPM motors other than MM-CF and PM motors manufactured by other companies, starting torque is limited to 50%, and simple positioning control and zero speed torque cannot be used even if tuned.)

*7: Tuning may not be available depending on its motor characteristics.

PM motor by other manufacturers

Mitsubishi general-purpose (induction) motor SF-PR

Induction motor by other manufacturers

Mitsubishi vector control dedicated motor SF-V5RU

Mitsubishi IPM motor MM-CF

Mitsubishi IPM motor MM-EFS
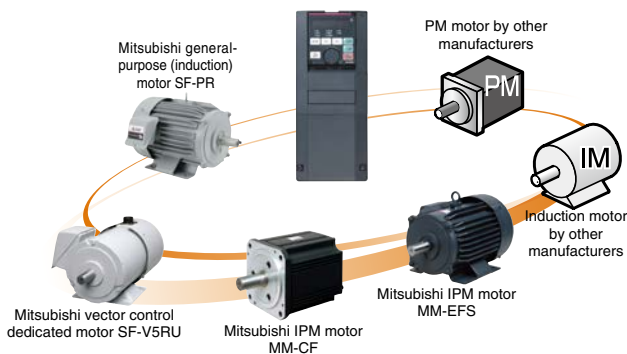
● **Low speed, high torque realized with SF-PR motor**

By combining with Mitsubishi's high-performance, energy-saving motor SF-PR, 100% continuous operation is possible from a low speed of 0.3 Hz for inverters of any capacity.
(when using Real sensorless vector control)
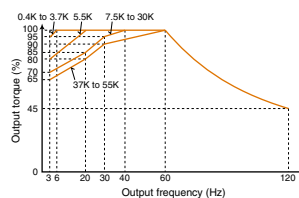
SF-JR continuous operation torque characteristics
(Motor input voltage: 200 V)
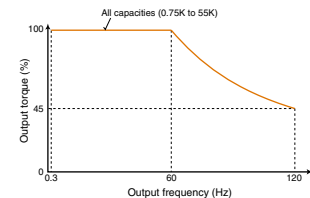
SF-PR continuous operation torque characteristics
(Motor input voltage: 200 V)

● **Sharing the spare inverter**

One spare inverter is enough for the two types of motors (IM and PM).

Before | After

Induction motor

PM motor
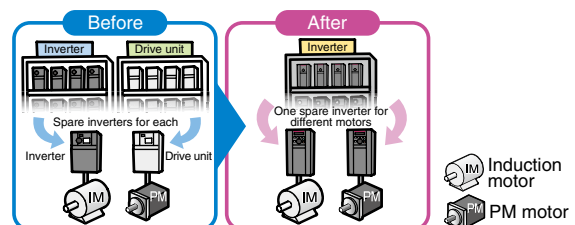
Security & Safety —— For Improved Equipment Reliability

Rapid response is obtained when an unexpected trouble occurs.

Improved Safety System

Safety standards compliance NEW

Controls with safety functions can be easily performed.
- PLd and SIL2 are supported as standard. (STO)
  - ・EN ISO 13849-1 PLd / Cat.3
  - ・EN 61508, EN61800-5-2 SIL2
- Compatible with PLe and SIL3 using a built-in option (to be released soon).
  - ・EN ISO 13849-1 PLe / Cat.4(to be supported soon)
  - ・EN 61508, EN61800-5-2 SIL3
  In addition to STO, also compatible with SS1, SS2, SLS, and SOS by using an option (to be released soon).

Functions for IEC/EN 61800-5-2:2007
STO (Safe Torque Off)
SS1 (Safe Stop 1)
SS2 (Safe Stop 2)
SOS (Safe Operating Stop)
SLS (Safely Limited Speed)

- Safety communication networks will be also supported by using an option (to be released soon)
  - ・CC-Link IE Safety communication function
  - ・PROFIsafe
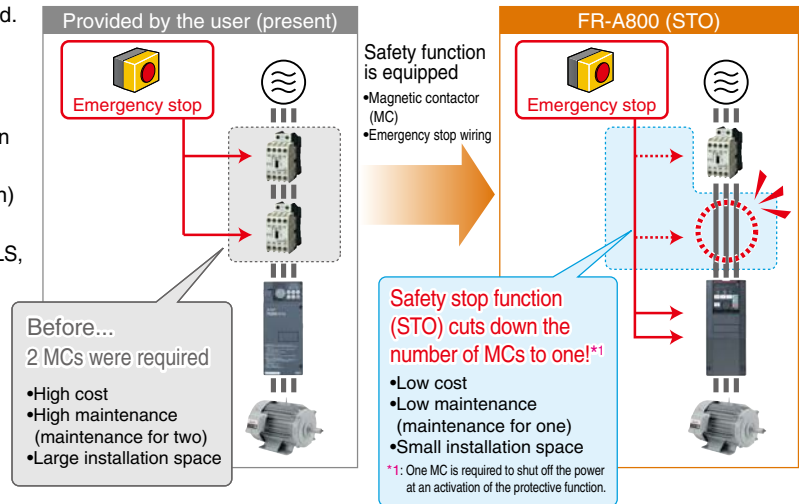
Provided by the user (present)

Emergency stop

Safety function is equipped
- Magnetic contactor (MC)
- Emergency stop wiring

FR-A800 (STO)

Emergency stop

Before...
2 MCs were required
- High cost
- High maintenance (maintenance for two)
- Large installation space

Safety stop function (STO) cuts down the number of MCs to one!*1
- Low cost
- Low maintenance (maintenance for one)
- Small installation space

*1: One MC is required to shut off the power at an activation of the protective function.

Reliable and Secure Maintenance

Standard 24 VDC power supply for the control circuit NEW

In addition to the existing power supply input terminals (R1 and S1) of the control circuit, 24 VDC input is equipped as standard. The 24 VDC power supplied from outside can be fed to the control circuit locally, enabling the parameter settings, communication operation and safety maintenance without turning ON the main power.

OFF

24 VDC

24 V external power supply input indication
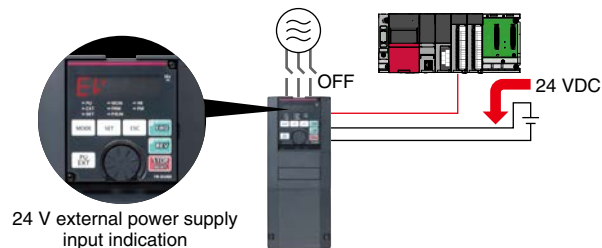
Quick Reaction to Malfunction

Easy fault diagnosis NEW

- The operating status (output frequency, etc.) immediately before the protection function activates can be stored in the inverter built-in RAM with the trace function. Stored data (trace data) can be copied to a USB memory device, facilitating easy malfunction analysis at a separate location by reading into the Inverter Setup Software (FR Configurator2).

Trace data stored in the built-in RAM is deleted when the power is turned OFF or the inverter is reset.
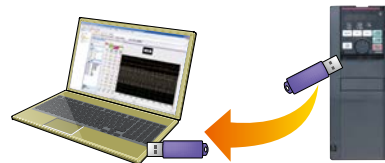
Renewal Assurance

Enhanced life diagnosis function

- An internal thermal sensor is equipped to all inverters as standard, which enables monitoring of the installation environment. Use this function as a guide for the life diagnosis. NEW
- Maintenance timers are available for up to three peripheral devices, such as motor and bearing.

"Maintenance 1 output" warning

Intercompatibility with existing models

- The inverter installation method is the same as that for the FR-A700 series, eliminating any concerns over replacement.
  Furthermore, FR-A700 series control circuit terminal blocks can be installed with the use of an option (FR-A8TAT).
- The terminal response adjustment function allows a user to adjust the response speed in accordance with the existing facility. NEW
- The conversion function of Inverter Setup Software (FR Configurator2) enables parameter copy from an FR-A700 and even from an FR-A500 (to be supported soon).

Easy Setup & Easy to Use —— From Startup to Maintenance

Fully equipped with a variety of simple functions and equipment to improve work efficiency.

Streamlining the Startup Process

Parameter copying with USB memory `NEW`

● A USB host connecter (A type), which allows external device connections, has been added.
 Parameters can be copied to commercial USB memory devices.
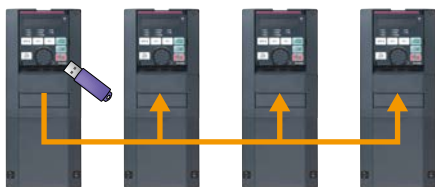
USB 2.0 (full speed) supported

Easy setup with the Inverter Setup Software
(FR Configurator2)

● It is a software which is easy to use and has unity as Mitsubishi FA products with MELSOFT common design and good operability.
● Easy plug-and-play connection to USB terminal equipped as standard
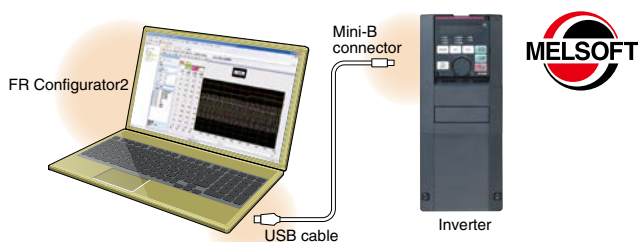
FR Configurator2

Mini-B connector

MELSOFT

USB cable

Inverter

● Free trial version, which contains start-up functions, is available. It can be downloaded at Mitsubishi Electric FA Global Website.

☞ For FR Configurator2, please refer to page 446.

Easy wiring to the control circuit `NEW`

Spring clamp terminals have been adopted for control circuit terminals. Wires can be protected against loosening under vibrations during transportation of the inverter. Ten additional terminals are used as compared to the FR-A700 series. Round crimping terminals can also be used by employing a control terminal option (FR-A8TR).

Easy wiring. Just insert.

Assures the tensile strength of the DIN standards.

Easy-to-Follow Display Improves the Operability

Easy operation with GOT `NEW`

● Automatic communication is possible without specifying any parameter settings simply by connecting to the GOT2000 series.
● The PLC function device monitor can be displayed at the GOT2000 series. Batch control of multiple inverter device monitors is possible with a single GOT unit.

GOT2000

● The sample screen data for the A800 can be found in the screen design software of the GOT2000 series. The newest version of the screen design software can be downloaded from the Mitsubishi Electric FA Global Website.

Easy-to-follow parameter configuration `NEW`

One of the selectable mode by the operation panel is the Group parameter mode, which provides intuitive and simple parameter settings.
(The conventional parameter setting mode is selected by default.)

Conventional parameter (A700)   Pr. 8 1 8

New parameter (A800)   Pr. C + 1 + 1 2

Major division Minor division

Group number   Parameter number

Major division	Name
E	Environment
F	Acceleration/deceleration
D	Start and frequency commands
H	Protective function
M	Monitor
T	Multi function I/O terminal
C	Motor constant
A	Applications
B	Applications (position control)
N	Communication
G	Control

Easy-to-read operation panel `NEW`

A 5-digit, 12-seg display has been adopted for the operation panel (FR-DU08) for a more natural character display. Furthermore, an optional LCD operation panel (FR-LU08) adopting an LCD panel capable of displaying text and menus is also available.

FR-DU08 (12-segment type)

FR-LU08 (LCD type) (option)

Maintenance

Reduced wiring check time

Split-type covers are adapted for all capacity models.
Maintenance is now easy because all an operator has to do is to remove the cover for the target wiring area.

Maintenance and control of multiple inverters (Option) `NEW`

Serial number reading is possible using the optional LCD operation panel (FR-LU08) or the Inverter Setup Software (FR Configurator2). Administration of different inverters has become much more simple.

System Support (Function) ——— High Equipment Functionality

Numerous functions and the extensive lineup of models are ready to support various systems.

Various Network Compatibility Brings All the Control in Your Hand

Compatibility to various open networks

● A controller can control and monitor an inverter via networks. RS-485 communication (Mitsubishi inverter protocol, MODBUS®RTU protocol), which is supported as standard, conveys data up to 115200 bps.

● A function block (FB) programming for CC-Link communication is available for the MELSEC-Q/L series. Inverter control sequence programs can be created easily. (An FB library (FB part library) can be downloaded from the Mitsubishi Electric FA Global Website.)

● The FR-A800-GF series inverter has a built-in CC-Link IE Network communication function. The CC-Link IE Network communication is ready for immediate operation.

Grouped as an FB

FB
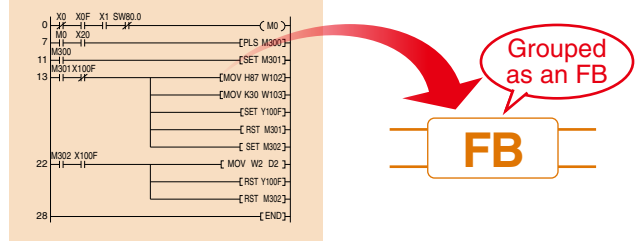
● Communication options are also available for the major network protocols such as CC-Link and SSCNET III(/H) as well as DeviceNet™, PROFIBUS-DPV0, and LONWORKS® (to be supported soon). Other Ethernet networks are also supported.
· CC-Link IE Field Network communication
· FL remote communication

GOT

Programmable controller

Ethernet cable

Inverter

Up to 120 units can be connected

(When only inverters are connected)

FR-A800-GF or FR-A800 & FR-A8NCE

Inverter

FR-A800-GF or FR-A800 & FR-A8NCE

CC-Link IE Network
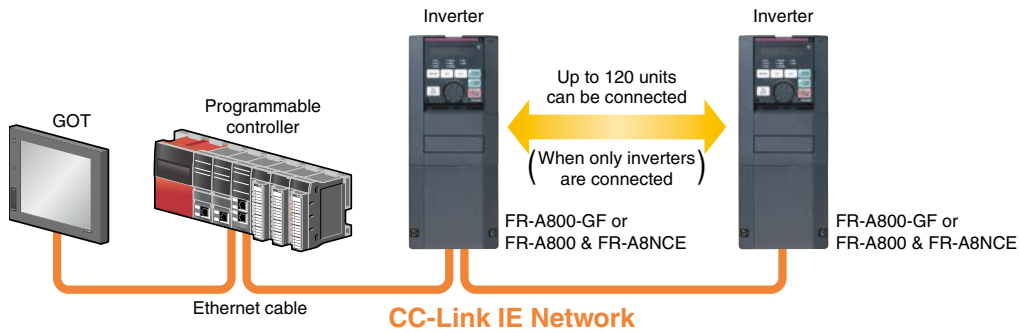
Selection of Optimum Capacity to Suit the Application

Multiple rating [NEW]

Rated current and four different overload capacity ratings (SLD rating (super light duty), LD rating (light duty), ND rating (normal duty), HD rating (heavy duty)) can be selected with parameters. The optimum inverter can be selected to suit the application, and by selecting an inverter with SLD or LD rating, equipment size can be reduced when compared with the FR-A700 series. The HD rating is best suited for applications requiring low speed and high torque.

If using an inverter with capacity of 75K or higher, or motor with capacity of 75 kW or higher, always select and install the inverter based on the capacity of the motor with DC reactor.

With FR-A700　　**With FR-A800**

Space saving

Inverter 15K

Inverter 11K (LD rating example)

Motor 15 kW　　Motor 15 kW
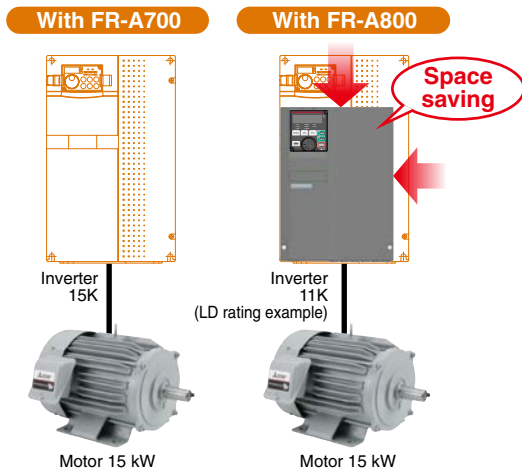
Rating	SLD	LD	ND	HD
	Super light duty	Light duty	Normal duty	Heavy duty
Application	Fan and Pump			
	Shield Machines, Winding and Unwinding, Printing Machines			
			Cranes, Press	
	Conveyor			
Pr.570 (E301) setting	0	1	2 (Initial value)	3
Overload current rating (inverse-time characteristics)	110% 60 s, 120% 3 s	120% 60 s, 150% 3 s	150% 60 s, 200% 3 s	200% 60 s, 250% 3 s
Surrounding air temperature	40°C	50°C	50°C	50°C

System Support (Environment Adaptability) ——— Installation Anywhere

Compliant with a variety of standards, our extensive range of the FR-A800 series inverter covers various applications.

Comprehensive Noise Countermeasures

Compliance with EU EMC Directive with inverter alone

Troublesome acquisition of standards is unnecessary.
- The FR-A800 series is equipped with an EMC filter as standard for compliance with EMC Directive with the inverter alone. (EN 61800-3 2nd Environment Category C3)
- The newly developed drive technology and the power supply technology minimize the EMI emitted from inverters.

	Capacitive filter (radio noise filter)	Input-side common mode choke (line noise filter)	DC reactor
55K or lower	Standard (built-in)	Standard (built-in)	Option (sold separately)
75K or higher	Standard (built-in)	Option (sold separately)	Option (sold separately)

[dBµV/m]

EN 61800-3 Category C3 QP level
FR-A700 QP value
FR-A800 QP value

Frequency [MHz]
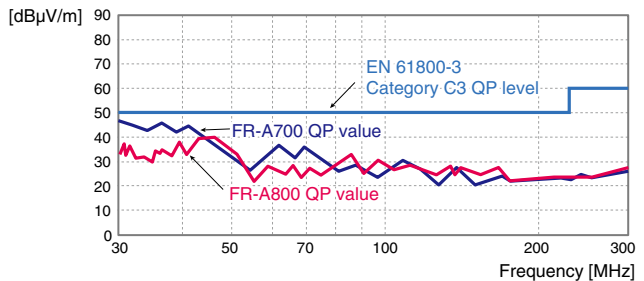
Global Compatibility

Compliance with a variety of standards

- Complies with UL, cUL, and EC Directives (CE marking), and the Radio Waves Act (South Korea) (KC marking). It is also certified as compliant with the Eurasian Conformity (EAC).
- Being RoHS compliant, the FR-A800 series inverters are friendly to people and to the environment.
- For the 400 V class[*1], compliance with various countries ship classifications allows use on ship equipment. (A noise filter is required for the FR-A840 inverter and the FR-CC2 converter unit, and a ferrite core is required for the FR-A846 inverter.)

Certification body	
NK	(Nippon Kaiji Kyokai)
ABS	(American Bureau of Shipping)
BV	(Bureau Veritas)
LR	(Lloyd's Register of British and Foreign Shipping)
DNV GL	(DNV GL AS)
CCS	(China Classification Society)[*2]
KR	(Korean Register of Shipping)[*2]

*1: The IP55 compatible model with a built-in C3 filter is not compliant with the ship classification standards.
*2: The IP55 compatible model will be certified as compliant with the ship classification standards soon.

Protected in Hazardous Environments

Circuit board coating

The inverters with PCB coating (IEC60721-3-3 3C2/3S2) and conductive plating are available for improved environmental resistance. ("-60" or "-06" is affixed to the end of the inverter model name.)

Wire Saving, Space Saving

Built-in brake transistor NEW

In addition to the 22K and lower, 400 V class 30 to 55K models have also been equipped with a built-in brake transistor. In an application where the motor is hardly decelerated, connecting a brake resistor can shorten the deceleration time; no brake unit or power regeneration converter is required. Wiring, space, and ultimately the cost will be all saved.

Direct Installation by the Machine

IP55 compatible NEW

- Inverters can be installed nearby the machine, minimizing cable length between the inverter and motor.
- Support is available for use even in high-humidity or dusty environments, facilitating a more flexible choice of installation locations.
- By enclosing a DC reactor, it requires less wiring and less space.
- Compatible with cable glands to meet the IP55 specification at the wiring section.

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Drive Product

Extensive lineup

•Standard model

F R - A 8 2 0 - 0.4K - 1 - ▢ ▢

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure, functionality
0	Standard model

Symbol*1	Description
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type*2
1	FM
2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06*3	With	With

Symbol	Function
None	Standard type
GF	With built-in CC-Link IE Field Network function

Three-phase 200V class FR-A820-▢*4	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Three-phase 400V class FR-A840-▢*4	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

	110K	132K	160K	185K	220K	250K	280K
	03250	03610	04320	04810	05470	06100	06830
	●	●	●	●	●	●	●

•Separated converter type

[Inverter]

F R - A 8 4 2 - 315K - 1 - ▢ ▢

Symbol	Voltage class
4	400 V class

Symbol	Structure, functionality
2	Separated converter type

Symbol*1	Description
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type*2
1	FM
2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06	With	With

Symbol	Function
None	Standard type
GF	With built-in CC-Link IE Field Network function

Three-phase 400V class FR-A842-▢*5	315K	355K	400K	450K	500K
	07700	08660	09620	10940	12120
	●	●	●	●	●

•Converter unit

F R - C C 2 - H 315K - 60

Symbol	Voltage class
H	400 V class

Symbol	Description
315K to 630K	Applicable motor capacity (kW)

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Three-phase 400V class FR-CC2-H▢ (with a built-in DC reactor)	315K	355K	400K	450K	500K	560K	630K
	●	●	●	●	●	●	●

•IP55 compatible model

F R - A 8 4 6 - 7.5K - 1 - 60 C3

Symbol	Voltage class
4	400 V class

Symbol	Structure, functionality
6	IP55 compatible model

Symbol*1	Description
0.4K to 132K	Inverter ND rated capacity (kW)

Symbol	Type*2
1	FM
2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Symbol	EMC filter
C2	Built-in C2 filter
C3	Built-in C3 filter

Three-phase 400V class FR-A846-▢ (with a built-in DC reactor)	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

	110K	132K
	03250	03610
	●	●

*1: Models can be alternatively indicated with the rated inverter current (SLD rating).
(IP55 compatible models have LD and ND rating types only. However, the SLD rated current of standard models is used to represent the model.)
*2: Specification differs by the type as follows.

Type	Motor output	Initial setting			
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage
FM (terminal FM equipped model)	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to ±10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA (analog current output (0 to 20 mADC)) Terminal AM (analog voltage output (0 to ±10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

*3: Available for the 5.5K or higher.
*4: For using the 75K or higher inverter and a 75 kW or higher motor, always install a DC reactor (FR-HEL), which is available as an option.
*5: Always install the converter unit (FR-CC2). (Not required when a high power factor converter (FR-HC2) is used.)

●: Released model

Drive Product

PLC function

Freely Control Machines

The PLC function will help you to provide the control sequence best suited for the machine specifications.

Inverter Operation Sequence Customized for the Machine

● A set of operations (operation at different signal inputs, signal and monitor outputs at different inverter status, etc.) can be freely programmed in accordance with the machine specifications. For example, a shutter opening/closing can be performed based on a signal from a sensor, or based on the opening/closing times.
Control programs can be created in sequence ladders using the inverter setup software (FR Configurator2).

Realizes the Decentralized Control

● The control of the whole system is decentralized to inverters that mange their subordinating devices individually.

● A group of dedicated sequence programs is created and saved in each inverter. The master controller no longer has to process all the sequence programs, and the decentralized system accepts program changes more flexibly.

Automatic Operation in Accordance with the Time

● With the real-time clock, automatic operation can be performed at certain times (when the optional LCD operation panel (FR-LU08) is used).

Parameter Setting, Protection, and Monitoring Functions can be Set

● User parameter
Up to 50 parameters, which are linked with the data registers, can be saved. The variables (data registers) used in the PLC function can be saved as inverter parameters. Furthermore, parameter settings can be saved in the EEPROM of inverter. When results of calculation using the PLC function are saved in the parameters, the data can be retained after the power is turned OFF.

● User initiated fault
Inverter output can be shut off under conditions other than those of the existing protective functions. Up to five specific fault-initiating conditions can be set to activate a protective function and shut off the inverter output.

● Monitored item for the user
Special register values can be displayed for monitoring on the operation panel. Arbitrary data designated by the user such as results of calculation using the PLC function can be displayed.

Useful Functions

● Inverter parameter read/write
Parameter settings can be changed using sequence programs. The acceleration/deceleration patterns can also be set with sequence programs to be changed at certain operation statuses. You can choose RAM or EEPROM to save the parameter settings.
When the settings are changed frequently, choose RAM.

● PID function
Two different loops of PID inverter operations can be preset, and those can be controlled using sequence programs.

● Inverter operation lock
The inverter operation can be restricted for the command sources other than the sequence programs.

PLC function

Item	Description
I/O	
General-purpose I/O	Sequence programs enable I/O signal transmission to/from the inverter and its plug-in options.
Analog I/O	Sequence programs enable reading of analog input values or analog output transmission by the inverter, and analog output transmission to the plug-in options.
Pulse train I/O	Sequence programs enable pulse train inputs (to terminal JOG) and pulse train outputs (from terminal F/C(FM)).
Inverter parameter read/write	Sequence programs enable inverter parameter write/read.
User parameter	Fifty user parameters (Pr.1150 to Pr.1199) are available and are linked with the data registers D206 to D255, which accept direct access by sequence programs.
CC-Link	A plug-in option (FR-A8NC) enables handling of remote registers as arbitrary data in the sequence programs.
Special function	
PID operation	Inverter's PID operations can be set (up to two loops).
User initiated fault	Up to five fault-initiating conditions can be set to activate a protective function.
Fault clear	The protective function occurring in the inverter can be reset.
Inverter operation lock	Inverters can start up while the PLC function is running.
Monitored item for the user	Desired data is displayable on the operation panel.

Inverter FREQROL-A800 Series

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Inverter setup software

FR Configurator2 (SW1DND-FRC2)

Delivering a Comfortable Inverter Operating Environment

From inverter startup to maintenance, this versatile software allows the user to specify settings easily with the computer.

[Compatible operating systems]
Windows® 7, Windows® 8, Windows® 8.1/Pro/Enterprise (32-bit, 64-bit),
Windows Vista® (32-bit), Windows® XP Professional SP3 or later,
Windows® XP Home Edition SP3 or later

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

Easy connection with a USB cable

A USB connector (Mini-B connector) is provided as standard. Easy connection to the computer without the need for a converter.

FR Configurator2

Mini-B connector

Computer   USB cable   Inverter
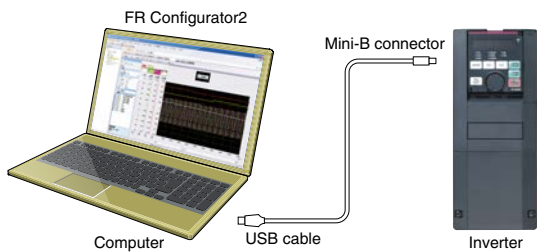
Intuitive user interface

Connected inverters are displayed in tree view format. Windows for each function can be accessed by changing the tab for maximum efficiency.

Tree view   Tab change

Work can be carried out away from the equipment using a USB memory device

By loading trace data and parameter settings copied to a USB memory device into FR Configurator2, analysis and adjustments can be carried out with ease away from the equipment.

USB memory device

Graph function   USB parameter copy file editing
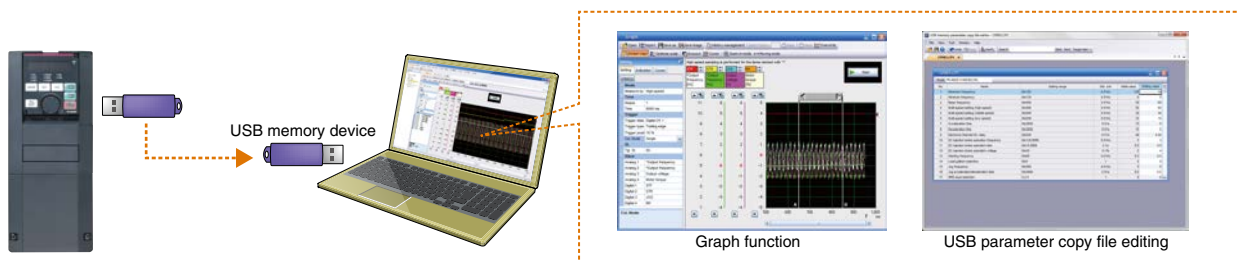
Sequence control (Developer function)

The Developer function is used for creating sequence programs and writing them to the inverter to enable the use of the PLC function of the inverter.
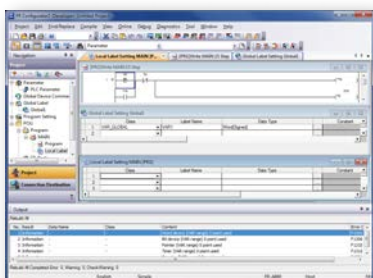
Free trial version Supported

The function with the marking above is available in the free trial version (usable free of charge with limited functions). It can be downloaded at Mitsubishi Electric FA Global Website.

Function	Free trial version	Function	Free trial version
Parameter list	○	Convert	○
Diagnosis	○	Developer	×
Graph	×	USB memory parameter copy file edit	×
Batch monitor	×		
Test operation	○	Help	○
I/O terminal monitor	×		

○ : Available, × : Not available

The try-and-buy version (usable free of charge for a limited period of 20 days with the same functions as the release version) is also offered.

Drive Product

■Installation Example

Three-phase AC power supply
Must be within the permissible power supply specifications of the inverter. (Refer to page 448)

Inverter

Moulded case circuit breaker (MCCB) or earth leakage current breaker (ELB), fuse
Must be selected carefully since an inrush current flows in the inverter at power ON.

USB connector
USB host (A connector)
Communication status indicator (LED)(USB host)

USB

USB devuce (Mini B connector)

Personal computer (FR Configurator2)

Magnetic contactor (MC)
Install this to ensure safety.
Do not use this to start and stop the inverter. Doing so will shorten the life of the inverter.

A800

High-duty brake resistor (FR-ABR)

P/+(P3)

PR

AC reactor (FR-HAL)

DC reactor (FR-HEL)

For the FR-A820-03800(75K) or higher, the FR-A840-02160(75K) or higher, and when a 75 kW or higher motor is used, always connect a DC reactor. (IP55 compatible models are equipped with the DC reactor.)

Line noise filter (FR-BLF)
The FR-A820-03160(55K) or lower and the FR-A840-01800(55K) or lower are equipped with the common mode choke.

P/+ P1

R/L1 S/L2 T/L3

P/+ N/-

IM connection

U V W

PM connection

U V W

EMC filter (ferrite core) (FR-BSF01, FR-BLF)

Contactor Example)
No-fuse switch (DSN type)
Connect this for an application where a PM motor is driven by the load even while the inverter power is OFF. Do not open or close the contactor while the inverter is running (outputting).

Earth (Ground)

Induction motor

Earth (Ground)

IPM motor (MM-CF)

Earth (Ground)

High power factor converter (FR-HC2)

Power regeneration common converter (FR-CV)
Power regeneration converter (MT-RC)

Brake unit (FR-BU2)

P/+ PR
P/+
PR

Resistor unit (FR-BR, MT-BR5)

: Install these options as required.

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Drive Product

■Standard Specifications

●Rating (Standard model)

200 V class

Model FR-A820-[ ](GF)			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW)*1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA)*3	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage*5		Three-phase 200 to 240 V																
	Regenerative braking	Brake transistor	Built-in								FR-BU2 (Option)								
		Maximum brake torque*7	150% torque/3%ED*6				100% torque/3%ED*6			100% torque/2%ED*6	20% torque/continuous							10% torque/continuous	
		FR-ABR (when the option is used)	150% torque/10%ED		100% torque/10%ED				100% torque/6%ED		–	–	–	–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A)*8	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA)*9	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529)*10			Enclose type (IP20)										Open type (IP00)						
Cooling system			Self-cooling	Forced air cooling															
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The 0.2 kW motor capacity is applicable under V/F control only.
*3: The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*4: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6: Value for the built-in brake resistor
*7: Value for the ND rating
*8: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*10: FR-DU08: IP40 (except for the PU connector section)

Drive Product

400 V class

Model FR-A840-[ ](GF)			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Output	Applicable motor capacity (kW)*1	SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
	Rated capacity (kVA)*3	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
		LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
		HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
	Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
		LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
		HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
	Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	Rated voltage*5		Three-phase 380 to 500 V																							
	Regenerative braking	Brake transistor	Built-in															FR-BU2(Option)								
		Maximum brake torque*7	100% torque/2%ED*6					20% torque/continuous									10% torque/continuous									
		FR-ABR (when the option is used)	100% torque/10%ED					100% torque/6%ED			—*12		–	–	–	–	–	–	–	–	–					
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500 V 50 Hz/60 Hz*11																							
	Permissible AC voltage fluctuation		323 to 550 V 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current (A)*8	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
		LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
		HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
	Power supply capacity (kVA)*9	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
		LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
		HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529)*10			Enclose type (IP20)														Open type (IP00)									
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass (kg)			2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

*2: The 0.2 kW motor capacity is applicable under V/F control only.

*3: The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.

*4: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

*5: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.

*6: Value for the built-in brake resistor

*7: Value for the ND rating

*8: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.

*9: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).

*10: FR-DU08: IP40 (except for the PU connector section).

*11: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

*12: The braking capability of the inverter built-in brake can be improved with a commercial brake resistor. For the details, please contact your sales representative.

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

●Rating (separated converter types)

400 V class
• Inverter

Model FR-A842-[ ](GF)		07700	08660	09620	10940	12120
		315K	355K	400K	450K	500K
Applicable motor capacity (kW)*1	SLD	400	450	500	560	630
	LD	355	400	450	500	560
	ND (initial setting)	315	355	400	450	500
	HD	280	315	355	400	450
Output	Rated capacity (kVA)*2	SLD	587	660	733	834	924
		LD	521	587	660	733	834
		ND (initial setting)	465	521	587	660	733
		HD	417	465	521	587	660
	Rated current (A)	SLD	770	866	962	1094	1212
		LD	683	770	866	962	1094
		ND (initial setting)	610	683	770	866	962
		HD	547	610	683	770	866
	Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C
	Rated voltage*4		Three-phase 380 to 500 V
	Regenerative braking torque*5 (When the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous
Input power	DC power supply voltage		430 to 780 VDC
	Control power supply auxiliary input		Single phase 380 to 500 V 50 Hz/60 Hz*7
	Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%
Protective structure (IEC 60529)*6		Open type (IP00)
Cooling system		Forced air cooling
Approx. mass (kg)		163	163	243	243	243

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: ND rating reference value
*6: FR-DU08: IP40 (except for the PU connector section)
*7: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

• Converter unit (FR-CC2)

Model FR-CC2-H[ ]		315K	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		315	355	400	450	500	560	630
Output	Overload current rating*1	200% 60 s, 250% 3 s				150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
	Rated voltage*2	430 to 780 VDC*4
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 500 V 50 Hz/60 Hz
	Permissible AC voltage fluctuation	Three-phase 323 to 550 V 50 Hz/60 Hz
	Permissible frequency fluctuation	±5%
	Rated input current (A)	610	683	770	866	962	1094	1212
	Power supply capacity (kVA)*3	465	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)
Cooling system		Forced air cooling
DC reactor		Built-in
Approx. mass (kg)		210	213	282	285	288	293	294

*1: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
*2: The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
*3: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*4: The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

●Rating (IP55 compatible model)

400 V class

Model FR-A846-[ ]		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610
		0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K
Applicable motor capacity (kW)*1	LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
	ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132
Output — Rated capacity (kVA)*2	LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248
	ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198
Output — Rated current (A)	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325
	ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260
Output — Overload current rating*3	LD	120% 60s, 150% 3s (inverse-time characteristics) at surrounding air temperature 40°C																		
	ND (initial setting)	150% 60s, 200% 3s (inverse-time characteristics) at surrounding air temperature 40°C																		
Output — Rated voltage*4		Three-phase 380 to 500V																		
Regenerative braking torque — Maximum brake torque*5		10% torque/continuous																		
Power supply — Rated input AC voltage/frequency		Three-phase 380 to 500V 50Hz/60Hz*8																		
Power supply — Permissible AC voltage fluctuation		323 to 550V 50Hz/60Hz																		
Power supply — Permissible frequency fluctuation		±5%																		
Power supply — Rated input current (A)*6	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325
	ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260
Power supply — Power supply capacity (kVA)*7	LD	1.6	2.7	3.7	5.8	9	12	18	22	27	33	43	53	65	81	110	137	165	198	248
	ND (initial setting)	1.1	1.9	3	4.6	6.9	9	13	18	24	29	34	43	54	66	102	110	137	165	198
Protective structure	IEC60529	Dust- and water-proof type (IP55)*10																		
	UL50	UL Type12*9																		
Cooling system		Self cooling + internal fan						Forced-air-cooling + internal fan												
DC reactor		Built-in																		
Approx. mass (kg)		15	15	15	15	16	17	26	26	27	27	59	60	63	64	147	150	153	189	193

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: Value for the ND rating
*6: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*7: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*8: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.
*9: UL Type 12 Enclosure-Suitable for Installation in a Compartment Handling Conditioned Air (Plenum)
*10: For compliance with IP55, remove the protective bushes and install the recommended cable glands.

●Common specifications

<table>
<tr><td rowspan="11">Control specifications</td><td colspan="2">Control method</td><td>Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control, Optimum excitation control), vector control*1, and PM sensorless vector control</td></tr>
<tr><td colspan="2">Output frequency range</td><td>0.2 to 590 Hz (The upper-limit frequency is 400 Hz under Advanced magnetic flux vector control, Real sensorless vector control, vector control*1, and PM sensorless vector control.)</td></tr>
<tr><td rowspan="2">Frequency setting resolution</td><td>Analog input</td><td>0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4)
0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1)
0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)</td></tr>
<tr><td>Digital input</td><td>0.01Hz</td></tr>
<tr><td rowspan="2">Frequency accuracy</td><td>Analog input</td><td>Within ±0.2% of the max. output frequency (25°C ± 10°C)</td></tr>
<tr><td>Digital input</td><td>Within 0.01% of the set output frequency</td></tr>
<tr><td colspan="2">Voltage/frequency characteristics</td><td>Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.</td></tr>
<tr><td colspan="2">Starting torque*2</td><td>SLD Rating:120% 0.3 Hz, LD Rating:150% 0.3 Hz, ND Rating:200% 0.3 Hz*3, HD Rating:250% 0.3 Hz*3
(Real sensorless vector control, vector control*1)</td></tr>
<tr><td colspan="2">Torque boost</td><td>Manual torque boost</td></tr>
<tr><td colspan="2">Acceleration/deceleration time setting</td><td>0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.</td></tr>
<tr><td colspan="2">DC injection brake (induction motor)</td><td>Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable</td></tr>
</table>

<table>
<tr><td colspan="2">Stall prevention operation level</td><td>Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected. (V/F control, Advanced magnetic flux vector control)</td></tr>
<tr><td colspan="2">Torque limit level</td><td>Torque limit value can be set (0 to 400% variable). (Real sensorless vector control, vector control*1, PM sensorless vector control)</td></tr>
</table>

<table>
<tr><td rowspan="11">Operation specifications</td><td rowspan="2">Frequency setting signal</td><td>Analog input</td><td>Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available.
Terminal 1: -10 to +10 V, -5 to +5 V are available.</td></tr>
<tr><td>Digital input</td><td>Input using the setting dial of the operation panel or parameter unit
Four-digit BCD or 16-bit binary (when used with option FR-A8AX)</td></tr>
<tr><td colspan="2">Start signal</td><td>Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.</td></tr>
<tr><td colspan="2">Input signals (twelve terminals)</td><td>Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset</td></tr>
<tr><td colspan="2">Pulse train input</td><td>100kpps</td></tr>
<tr><td colspan="2">Operational functions</td><td>Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding*4, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, automatic acceleration/deceleration, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, load torque high-speed frequency control, speed smoothing control, traverse, auto tuning, applied motor selection, gain tuning, RS-485 communication, PID control, PID pre-charge function, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function, stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, orientation control*1, speed control, torque control, position control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function, anti-sway control, CC-Link IE Field Network communication*11</td></tr>
<tr><td rowspan="2">Output signal</td><td>Open collector output (five terminals)
Relay output (two terminals)</td><td>Inverter running, Up to frequency, Instantaneous power failure/undervoltage, Overload warning, Output frequency detection, Fault
Fault codes of the inverter can be output (4 bits) from the open collector.</td></tr>
<tr><td>Pulse train output (FM type)</td><td>50kpps</td></tr>
</table>

<table>
<tr><td rowspan="6">Indication</td><td rowspan="3">For meter</td><td>Pulse train output (FM type)</td><td>Max. 2.4 kHz: one terminal (output frequency)
The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.</td></tr>
<tr><td>Current output (CA type)</td><td>Max. 20 mADC: one terminal (output current)
The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.</td></tr>
<tr><td>Voltage output</td><td>Max. 10 VDC: one terminal (output voltage)
The monitored item can be changed using **Pr.158 AM terminal function selection**.</td></tr>
<tr><td rowspan="2">Operation panel (FR-DU08)</td><td>Operating status</td><td>Output frequency, Output current, Output voltage, Frequency setting value
The monitored item can be changed using **Pr.52 Operation panel main monitor selection**.</td></tr>
<tr><td>Fault record</td><td>A fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/current/frequency/cumulative energization time/year/month/date/time) are saved.</td></tr>
</table>

<table>
<tr><td rowspan="2">Protective/warning function</td><td>Protective function</td><td>Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip, Motor overload trip, Heatsink overheat, Instantaneous power failure*4, Undervoltage*4, Input phase loss*4*5, Stall prevention stop, Loss of synchronism detection*5, Brake transistor alarm detection*6, Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation*5, PTC thermistor operation*5, Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess*5, Parameter storage device fault, CPU fault, Operation panel power supply short circuit, 24 VDC power fault, Abnormal output current detection*5, Inrush current limit circuit fault*4, Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence*5, Speed deviation excess detection*1*5, Signal loss detection*1*5, Excessive position fault*1*5, Brake sequence fault*5, Encoder phase fault*1*5, 4 mA input fault*5, Pre-charge fault*5, PID signal fault*5, Option fault, Opposite rotation deceleration fault*5, Internal circuit fault, Abnormal internal temperature*7, Magnetic pole position unknown*1</td></tr>
<tr><td>Warning function</td><td>Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm*5*6, Electronic thermal relay function pre-alarm, PU stop, Speed limit indication*5, Parameter copy, Safety stop, Maintenance signal output*5, USB host error, Home position return setting error*5, Home position return uncompleted*5, Home position return parameter setting error*5, Operation panel lock*5, Password locked*5, Parameter write error, Copy operation error, 24 V external power supply operation, Internal fan alarm*7</td></tr>
</table>

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Environment	Surrounding air temperature	-10°C to +50°C (0°C to +50°C for the FR-A800-GF) (non-freezing) (LD, ND, HD ratings) -10°C to +40°C (0°C to +40°C for the FR-A800-GF) (non-freezing) (SLD rating, IP55 compatible model)
	Surrounding air humidity	95% RH or less (non-condensing) (With circuit board coating (conforming to IEC60721-3-3 3C2/3S2), IP55 compatible model) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature[*8]	-20°C to +65°C
	Atmosphere	Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration	Maximum 1000 m above sea level[*9], 5.9 m/s²[*10] or less at 10 to 55 Hz (directions of X, Y, Z axes)

[*1]: Available only when a vector control compatible option is installed.
[*2]: For PM sensorless vector control, refer to FREQROL-A800 catalog.
[*3]: In the initial setting of the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, it is limited to 150% by the torque limit level.
[*4]: Enabled only for standard models and IP55 compatible models.
[*5]: This protective function is not available in the initial status.
[*6]: Enabled only for standard models.
[*7]: Available for the IP55 compatible model only.
[*8]: Temperature applicable for a short time, e.g. in transit.
[*9]: For the installation at an altitude above 1,000 m up to 2,500 m, derate the rated current 3% per 500 m.
[*10]: 2.9m/s² or less for the FR-A840-04320(160K) or higher.
[*11]: Available only for the FR-A800-GF series.

●PLC function specifications

Item		A800 PLC function specifications
Control method		Repeated operation (by stored program)
I/O control mode		Refresh
Programming language		Relay symbolic language (ladder) Function block
No. of instructions	Sequence instructions	25
	Basic instructions	84
	Application instructions	37
Processing speed		Sequence instructions 1.9 μs to 12 μs/step[*1]
Number of I/O device points		128 (input: 64 points, output: 64 points) 19 points built-in (input: 12 points, output: 7 points)[*2] FR-A8AX (input: 16 points) FR-A8AY (output: 7 points) FR-A8AR (output: 3 points)
Number of analog I/O points		3 input points built-in (Terminals 1, 2, and 4), FR-A8AZ: 1 input point (Terminal 6) 2 output points built-in (Terminals F/C(FM/CA) and AM), FR-A8AY: 2 output points (Terminals AM0 and AM1), FR-A8AZ: 1 output point (Terminal DA1)
Pulse train I/O	Input	Terminal JOG maximum input pulse: 100k pulses/s[*3]
	Output	Terminal FM maximum output pulse: 50k pulses/s[*3]
Watchdog timer		10 to 2000 (ms)
Program capacity		6K steps (24k bytes) (0 to 6144 steps can be set) Contained in one program
Device	Internal relay (M)	128 (M0 to M127)
	Latch relay (L)	Not used (Can be set with parameters but will not latch)[*4]
	Timer (T) — Number of points	16 (T0 to T15)
	Timer (T) — Specifications	100 ms timer: 0.1 to 3276.7 s can be set 10 ms timer: 0.01 to 327.67 s can be set
	Retentive timer (ST) — Number of points	0 (up to 16 by parameter assignment)
	Retentive timer (ST) — Specifications	100 ms retentive timer: 0.1 to 3276.7 s can be set 10 ms retentive timer: 0.01 to 327.67 s can be set
	Counter (C) — Number of points	16 (C0 to C15)
	Counter (C) — Specifications	Normal counter: Setting range 1 to 32767 Interrupt program counter: Not used
	Data register (D)	256 (D0 to D255)
	Special relay (SM)	2048 (SM0 to SM2047) with limited functions
	Special register (SD)	2048 (SD0 to SD2047) with limited functions

[*1]: The scan time is approximately 40 ms for 1K steps as inverter control is also performed in actual operations.
[*2]: The signals same as the ones assigned to the inverter I/O terminals are used.
     One point is always required for a sequence start (RUN/STOP).
[*3]: **Pr.291 Pulse train I/O selection** must be set.
[*4]: There is no device latch function for power failures.
     Use the **Pr.1150 to Pr.1199 PLC function user parameters 1 to 50** (D206 to D255) to store device values in the EEPROM.

There is no buffer memory.

■Standard model

Outline Dimension Drawings

● FR-A820-00046(0.4K), FR-A820-00077(0.75K)(GF)

● FR-A820-00105(1.5K), 00167(2.2K), 00250(3.7K)(GF)
● FR-A840-00023(0.4K), 00038(0.75K), 00052(1.5K), 00083(2.2K), 00126(3.7K)(GF)
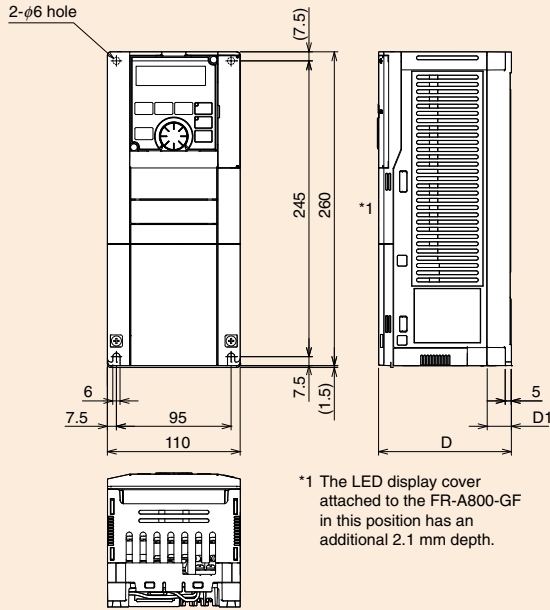
*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.
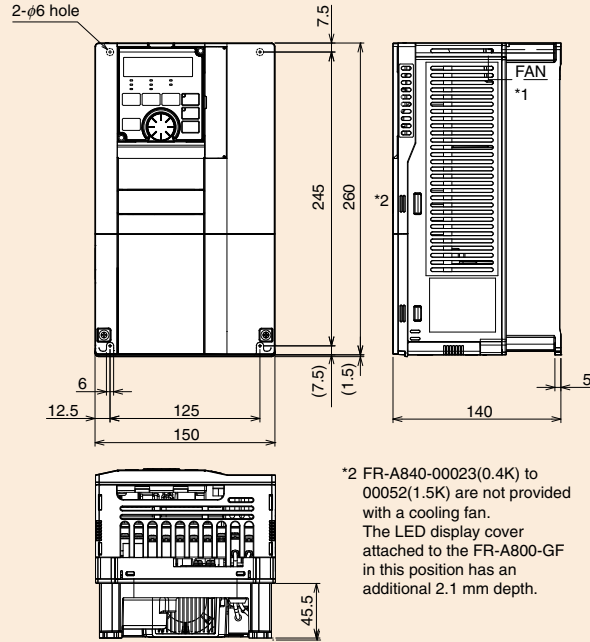
*2 FR-A840-00023(0.4K) to 00052(1.5K) are not provided with a cooling fan.
The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

Inverter Model	D	D1
FR-A820-00046(0.4K)	110	20
FR-A820-00077(0.75K)	125	35

(Unit: mm)

● FR-A820-00340(5.5K), 00490(7.5K), 00630(11K)(GF)
● FR-A840-00170(5.5K), 00250(7.5K), 00310(11K), 00380(15K)(GF)

● FR-A820-00770(15K), 00930(18.5K), 01250(22K)(GF)
● FR-A840-00470(18.5K), 00620(22K)(GF)
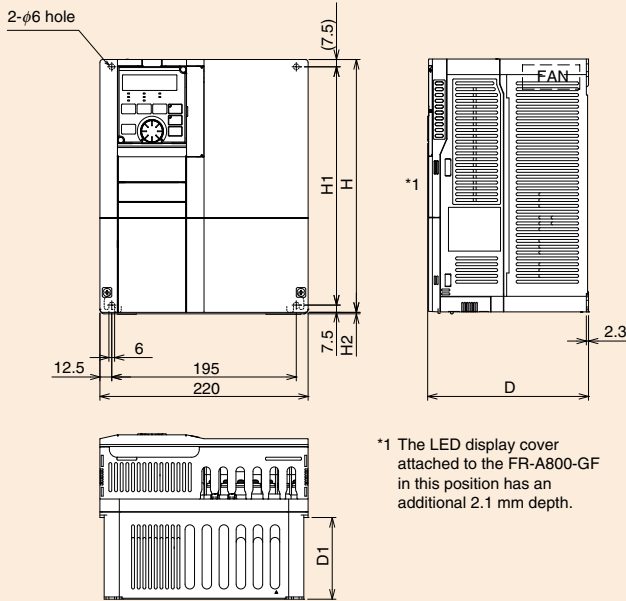
*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.
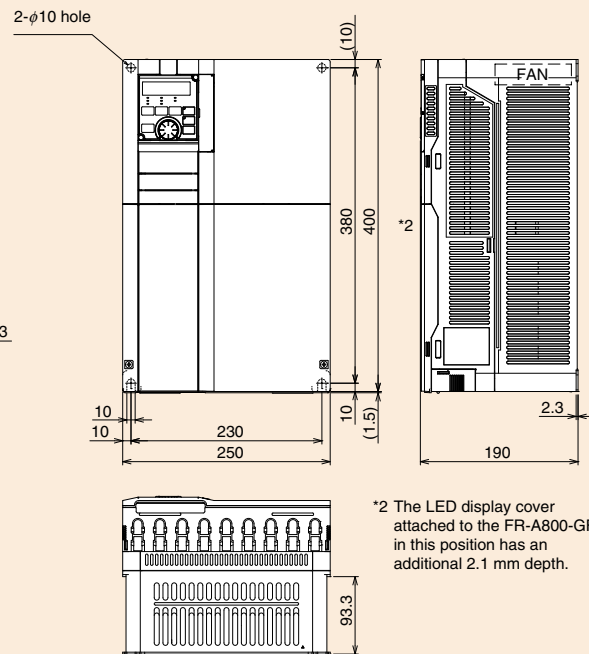
*2 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

Inverter Model	H	H1	H2	D	D1
FR-A820-00340(5.5K), 00490(7.5K) FR-A840-00170(5.5K), 00250(7.5K)	260	245	1.5	170	84
FR-A820-00630(11K) FR-A840-00310(11K), 00380(15K)	300	285	3	190	101.5

(Unit: mm)

Outline Dimension Drawings

● FR-A820-01540(30K)(GF)
● FR-A840-00770(30K)(GF)

● FR-A820-01870(37K), 02330(45K), 03160(55K), 03800(75K), 04750(90K)(GF)
● FR-A840-00930(37K), 01160(45K), 01800(55K), 02160(75K), 02600(90K), 03250(110K), 03610(132K)(GF)

2-φd hole
4-φ20 hole for hanging
17
(10)
(15)
FAN
530
550
*1
520
10
270
10
325
195
3.2
15

*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

2-φ12 hole
(15)
4-φd hole
D1
(18)
FAN
H1
H
*2
H2
12
W1
W
10
D
3.2
18
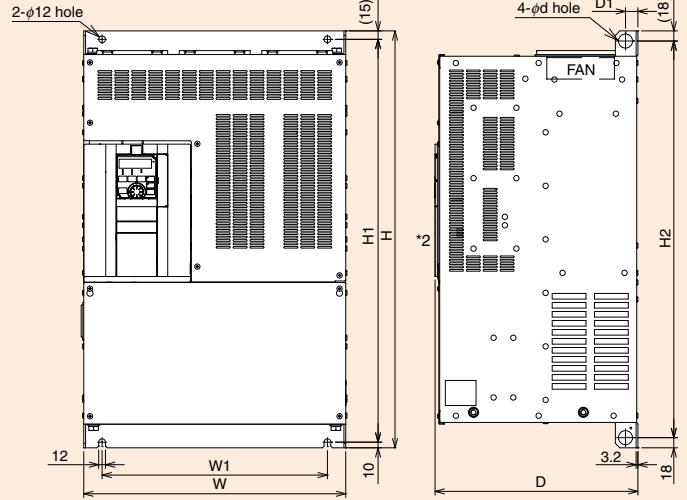
*2 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

(Unit: mm)

Inverter Model	W	W1	H	H1	H2	d	D	D1
FR-A820-01870(37K), 02330(45K) FR-A840-00930(37K), 01160(45K), 01800(55K)*3	435	380	550	525	514	25	250	24
FR-A820-03160(55K)*3	465	410	700	675	664	25	250	22
FR-A820-03800(75K)*3, 04750(90K)*3	465	400	740	715	704	24	360	22
FR-A840-02160(75K)*3, 02600(90K)*3	465	400	620	595	584	24	300	22
FR-A840-03250(110K)*3, 03610(132K)*3	465	400	740	715	704	25	360	22

*3: When using a motor with a capacity of 75 kW or higher, always connect a DC reactor (FR-HEL), which is available as an option.

● FR-A840-04320(160K), 04810(185K)(GF)

● FR-A840-05470(220K), 06100(250K), 06830(280K)(GF)

3-φ12 hole
(15)
22
(13)
4-φ16 hole
FAN
985
1010
*1
984
12
200
200
10
498
380
3.2
13

3-φ12 hole
(13)
22
4-φ16 hole
(13)
FAN
984
1010
*1
984
12
300
300
13
680
380
3.2
13
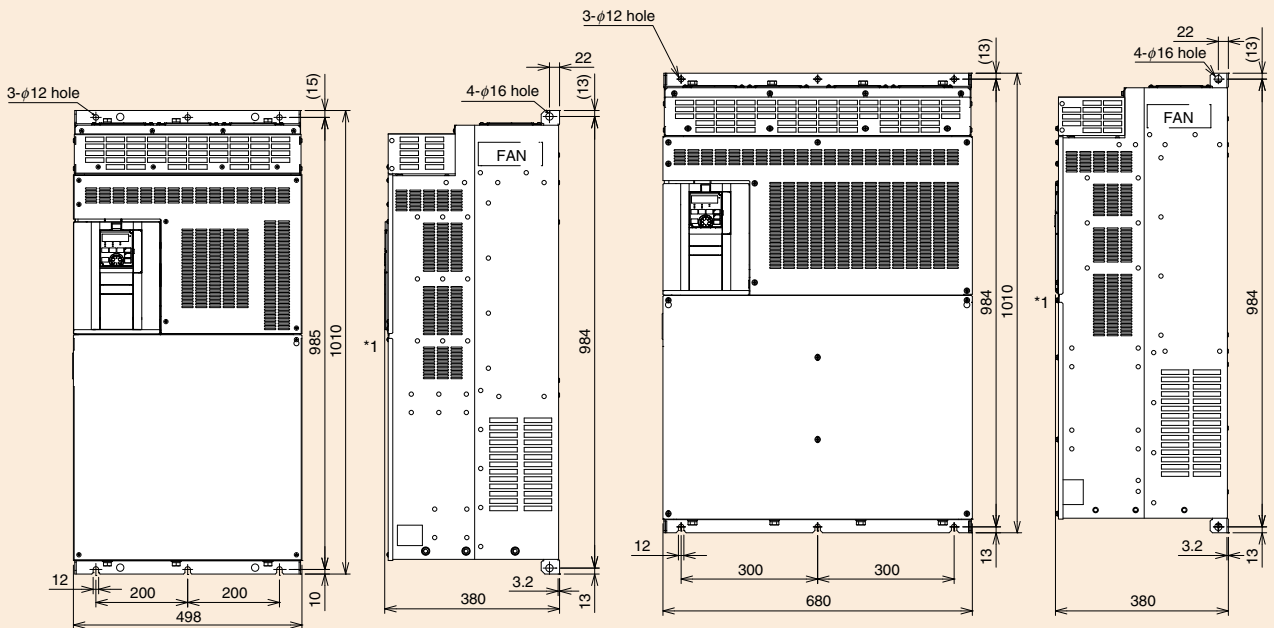
Always connect a DC reactor (FR-HEL), which is available as an option.

*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

(Unit: mm)

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Drive Product

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Separated converter type

Outline Dimension Drawings

• Inverter

●FR-A842-07700(315K), 08660(355K)(GF)　　　　　●FR-A842-09620(400K), 10940(450K), 12120(500K)(GF)
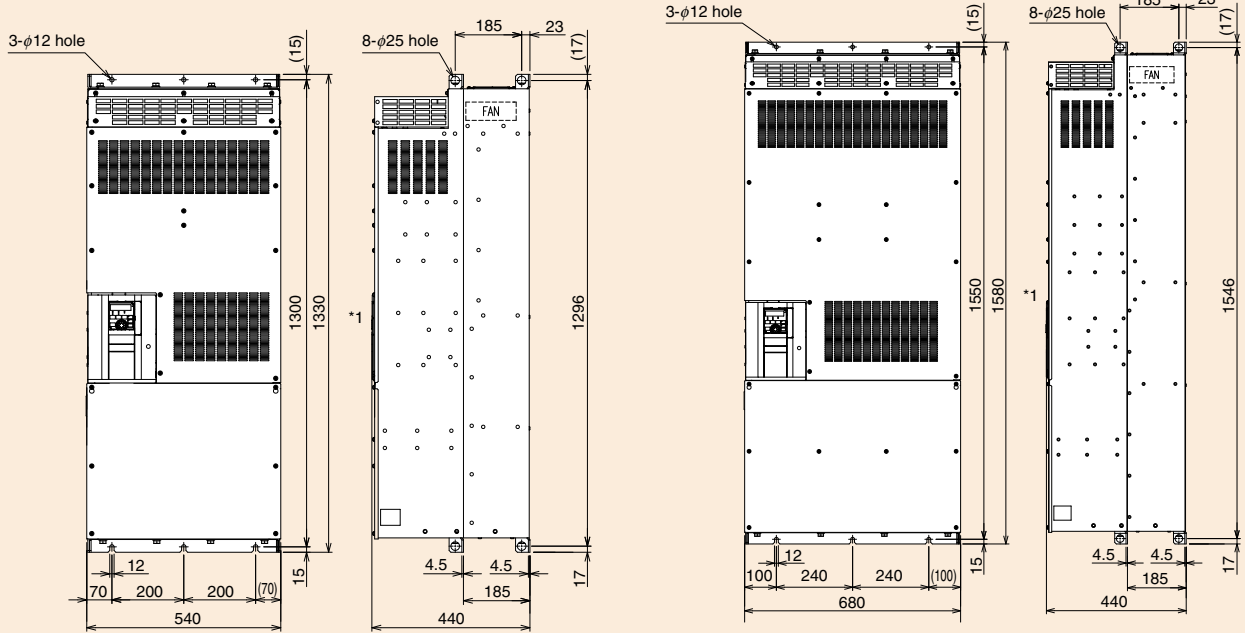
*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

(Unit: mm)

• Converter unit
Equipped with a DC reactor.

●FR-CC2-H315K, H355K　　　　　　　　　　　●FR-CC2-H400K, H450K, H500K, H560K, H630K
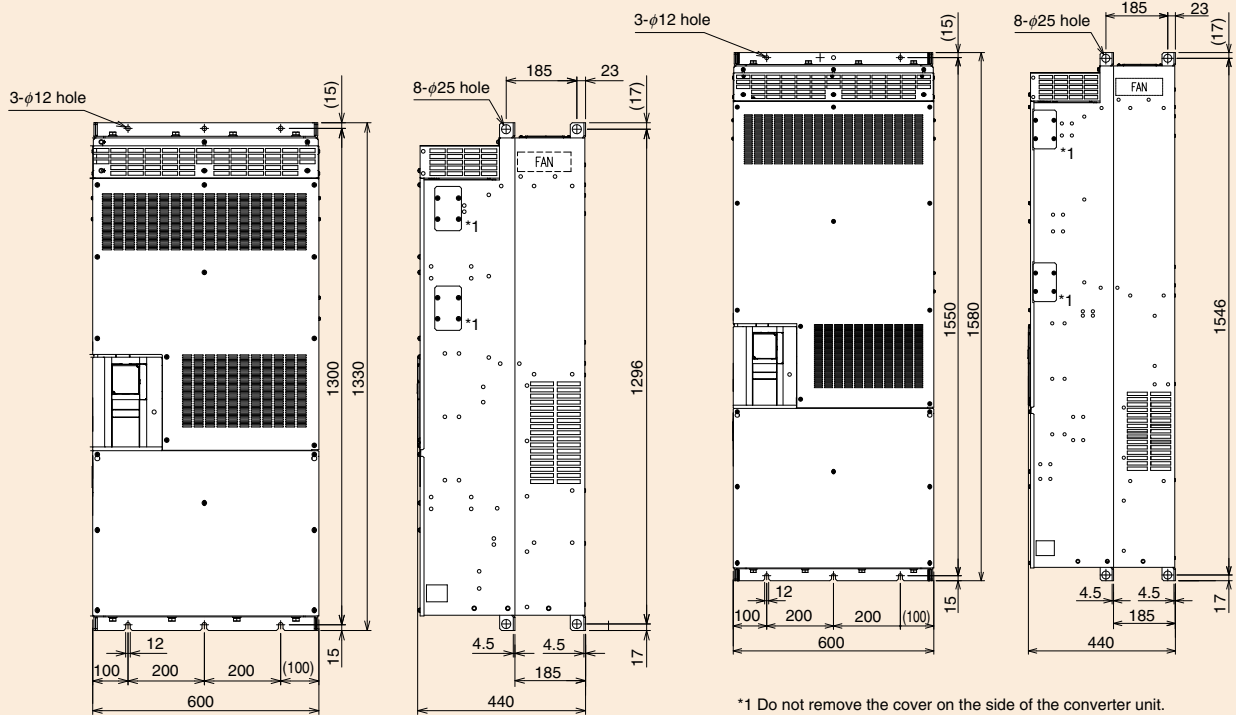
*1 Do not remove the cover on the side of the converter unit.

(Unit: mm)

■IP55 compatible mode
Equipped with a DC reactor.

Outline Dimension Drawings

●FR-A846-00023(0.4K), 00038(0.75K), 00052(1.5K), 00083(2.2K), 00126(3.7K), 00170(5.5K)

2-φ8 hole
4-φ15 hole
20
(20)
(7)
508
520
480
16 8 206 (16) 5
238
271
2.3
20

●FR-A846-00250(7.5K), 00310(11K), 00380(15K), 00470(18.5K)

2-φ10 hole
4-φ20 hole
23
(20)
FAN
(9)
632.5
650
610
18.5 10 201 (18.5) 8.5
238
285
2.3
20
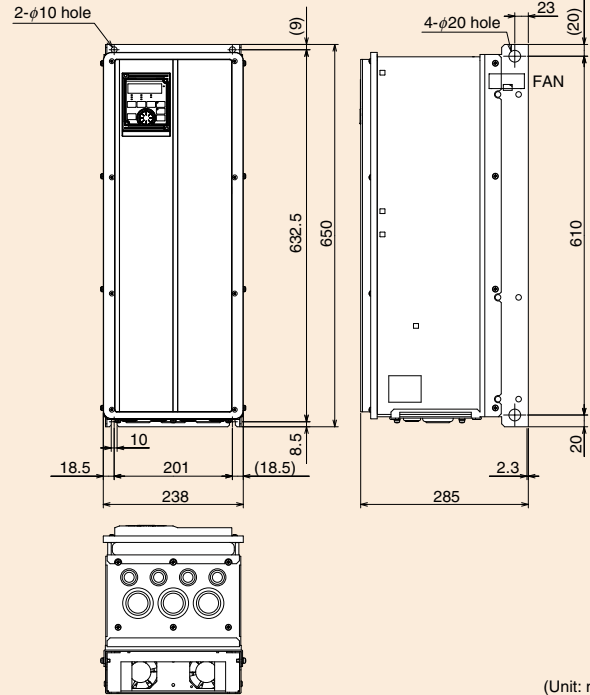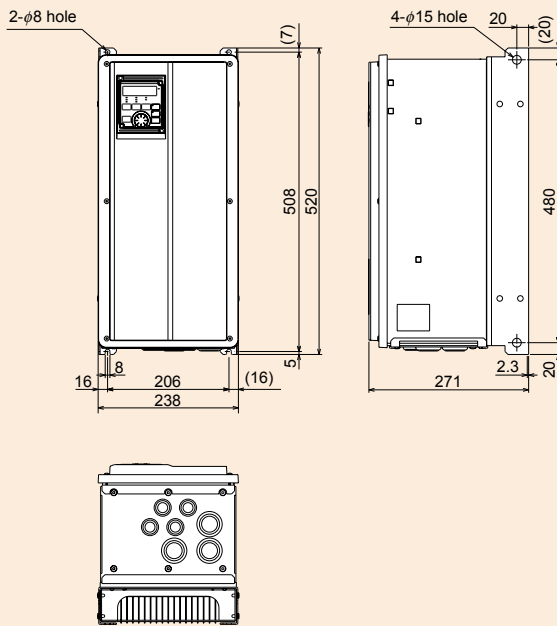
(Unit: mm)

●FR-A846-00620(22K), 00770(30K), 00930(37K), 01160(45K)

2-φ12 hole
4-φ25 hole
24
(18)
FAN
(10)
770
790
754
22.5 12 300 (22.5) 10
345
357
2.3
18
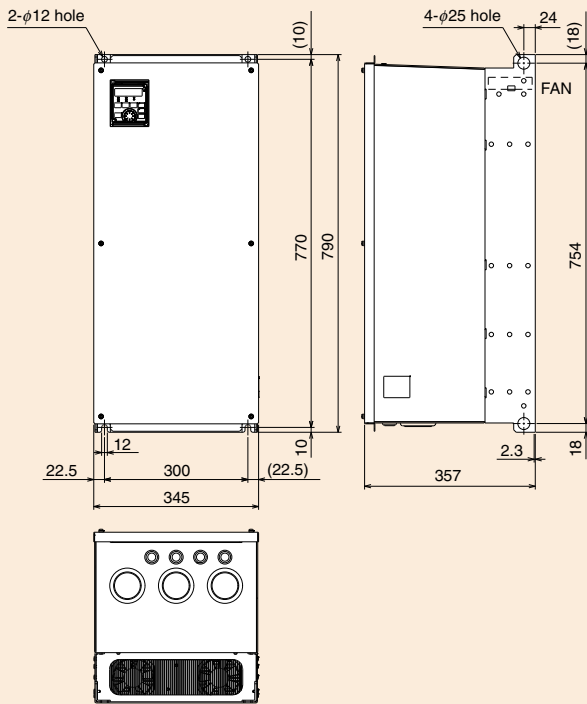
●FR-A846-01800(55K), 02160(75K), 02600(90K), 03250(110K), 03610(132K)

3-φ15 hole
4-φ25 hole
24
(23)
FAN
(H2)
H1
H
H3
35 15 175 175 (35) 10
420
456.6
2.3
23
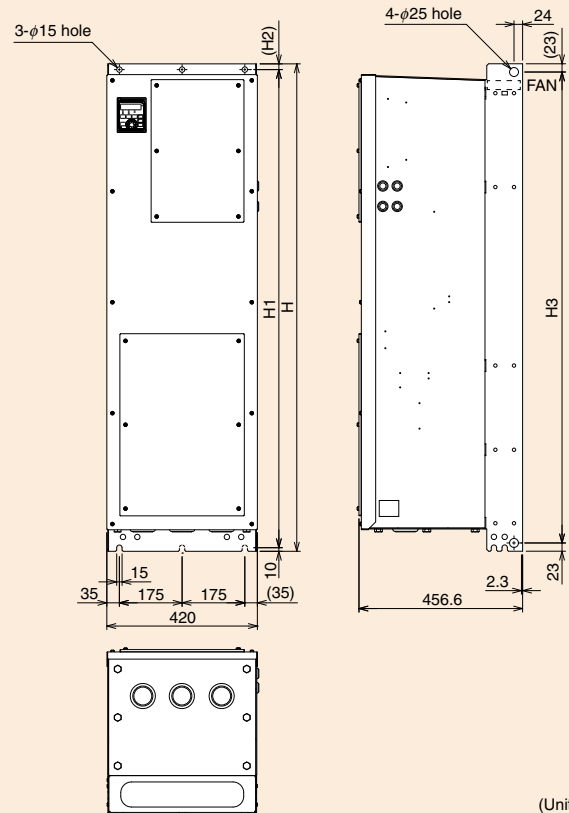
(Unit: mm)

Inverter model	H	H1	H2	H3
FR-A846-01800(55K) to 02600(90K)	1360	1334	16	1314
FR-A846-03250(110K), 03610(132K)	1510	1482	18	1464

Drive Product

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■IP55 compatible model

Outline Dimension Drawings

■Operation panel (FR-DU08, FR-LU08)
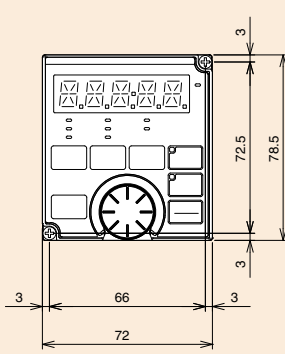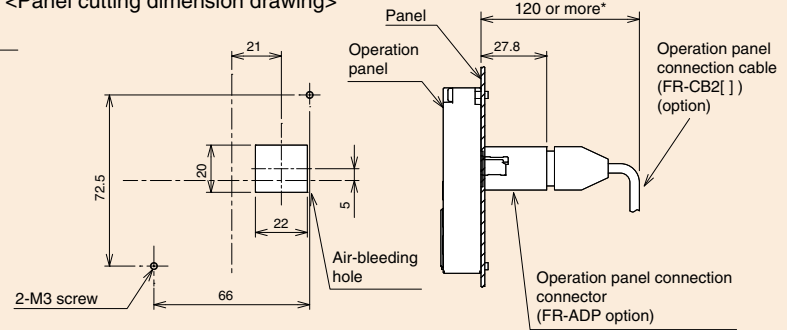
<Outline drawing>

3.2max

3
72.5
78.5
3

3   66   3

72

16

17

<Panel cutting dimension drawing>

21

72.5

20

22

5

2-M3 screw

66

Air-bleeding hole

Panel

Operation panel

120 or more*

27.8

Operation panel connection cable (FR-CB2[ ]) (option)

Operation panel connection connector (FR-ADP option)

* Denotes the space required to connect an optional operation panel connection cable (FR-CB2[ ]). When using another cable, leave the space required for the cable specification.

(Unit: mm)

AC Servo
P.268

Inverter
P.436

459

Drive Product

■Standard models and IP55 compatible models

●FM type

Sink logic
◎Main circuit terminal
○Control circuit terminal

FR-A820-00770(15K) to 01250(22K),
FR-A840-00470(18.5K) to 01800(55K)

DC reactor (FR-HEL)*1 — Brake resistor*8
Brake unit (Option)
Earth (Ground) Jumper *9
P1 P/+ P3 PR N/-
Inrush current limit circuit

DC reactor (FR-HEL)*1 — Brake resistor (FR-ABR)*7*8
Brake unit (Option)
Earth (Ground) Jumper Jumper
P1 P/+ PX PR N/-
R
Inrush current limit circuit

Three-phase AC power supply
MCCB MC
R/L1 S/L2 T/L3
R1/L11 S1/L21
Jumper *2
Earth (Ground)

ON OFF *14 EMC filter ON/OFF connecter
Main circuit

U V W
Motor M
Earth (Ground)

Control circuit

Control input signals (No voltage input allowed)*3
Forward rotation start — STF
Reverse rotation start — STR
Start self-holding selection — STP(STOP)
Multi-speed selection
High speed — RH
Middle speed — RM
Low speed — RL
Jog operation — JOG *4
Second function selection — RT
Output stop — MRS
Reset — RES
Terminal 4 input selection (Current input selection) — AU
Selection of automatic restart after instantaneous power failure — CS
Contact input common — SD
24VDC power supply (Common for external power supply transistor) — PC

SOURCE SINK 24V

Relay output*10
C1 B1 A1 Relay output 1 (Fault output)
C2 B2 A2 Relay output 2

Open collector output*11
RUN Running
SU Up to frequency
IPF Instantaneous power failure
OL Overload
FU Frequency detection
SE Open collector output common / Sink/source common

24V external power supply input — +24
Common terminal — SD

Frequency setting signals (Analog)
10E(+10V)
10(+5V)

*5 Voltage/current input switch
ON OFF 2 4

Frequency setting potentiometer 1/2W1kΩ*6
3 2 1
2

DC0 to 5V (DC0 to 10V / DC0 to 20mA) Initial value selectable*5 (Analog common)

Auxiliary input (+)(-) — 1
DC0 to ±10V (DC0 to ±5V selectable) Initial value*5

Terminal 4 input (Current input) (+)(-) — 4
DC4 to 20mA (DC0 to 5V / DC0 to 10V selectable) Initial value*5

Connector for plug-in option connection
Connector 1 Connector 2 Connector 3

Safety stop signal
Shorting wire
24V
PC
Safety stop input (Channel 1) — S1
Safety stop input (Channel 2) — S2
Safety stop input common — SIC
SD
Output shutoff circuit

PU connector
USB A connector
USB mini B connector

F/C (FM)*12
SD
AM
5

Calibration resistor *13
+ - Indicator (Frequency meter, etc.)
Moving-coil type 1mA full-scale

Analog signal output (0 to ±10VDC) (+)(-)

RS-485 terminals
TXD+ TXD- Data transmission
RXD+ RXD- Data reception
GND (SG) GND
Terminating resistor
VCC 5V (Permissible load current 100mA)

So Safety monitor output
SOC Safety monitor output common

*1: For the FR-A820-03800(75K) or higher, the FR-A840-02160(75K) or higher, and when a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option. (To select a DC reactor, refer to **page 448**, and select one according to the applicable motor capacity.)
When connecting a DC reactor to the FR-A820-03160(55K) or lower or the FR-A840-01800(55K) or lower, remove the jumper across the terminals P1 and P/+ before connecting the DC reactor. The IP55 compatible model has a built-in DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21. IP55 compatible models do not have terminals R/L11, S/L21, and jumpers.
*3: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*4: Terminal JOG is also used as a pulse train input terminal. Use Pr.291 to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON.
*6: It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.
*7: If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)).
*8: Connect a brake resistor across terminals P/+ (P3) and PR. (The terminal PR is equipped in FR-A820-00046(0.4K) to 01250(22K), FR-A840-00023(0.4K) to 01800(55K).) Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual (Detailed).)
*9: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*10: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*11: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*12: The terminal FM can be used to output pulse trains as open collector output by setting Pr.291.
*13: Not required when calibrating the scale with the operation panel.
*14: Do not change the initially set ON (enabled) position of the EMC filter ON/OFF connector in the case of the inverter with a built-in C2 filter (IP55 compatible model). The Class C2 compatibility condition is not satisfied with the EMC filter OFF. The FR-A846-00250(7.5K)-C2 to FR-A846-00470(18.5K)-C2 are not provided with the EMC filter ON/OFF connector. The EMC filter is always ON.

● CA type

FR-A820-00770(15K) to 01250(22K),
FR-A840-00470(18.5K) to 01800(55K)

DC reactor (FR-HEL)*1   Brake resistor*8

Brake unit (Option)

Earth (Ground)   Jumper   *9   R

P1   P/+   P3   PR   N/-

Inrush current limit circuit

Sourse logic
⊚ Main circuit terminal
◯ Control circuit terminal

DC reactor (FR-HEL)*1   Brake resistor (FR-ABR)*7*8

Brake unit (Option)

Earth (Ground)   Jumper   Jumper   R

P1   P/+   PX   PR   N/-

R

Inrush current limit circuit

Three-phase AC power supply

MCCB   MC

R/L1
S/L2
T/L3

R1/L11
S1/L21

Jumper *2

Earth (Ground)

ON   *12
OFF   EMC filter ON/OFF connecter

Main circuit

U
V
W

U
V
W

Motor   M

Earth (Ground)

Control circuit

Control input signals (No voltage input allowed)*3

Forward rotation start   STF
Reverse rotation start   STR
Start self-holding selection   STP(STOP)

Multi-speed selection
High speed   RH
Middle speed   RM
Low speed   RL

Jog operation   JOG *4
Second function selection   RT
Output stop   MRS
Reset   RES
Terminal 4 input selection (Current input selection)   AU
Selection of automatic restart after instantaneous power failure   CS
Common for external power supply transistor   SD
Contact input common 24VDC power supply   PC

SOURCE   SINK
24V

Relay output*10

C1
B1   Relay output 1
A1   (Fault output)

C2
B2   Relay output 2
A2

Open collector output*11

RUN   Running
SU   Up to frequency
IPF   Instantaneous power failure
OL   Overload
FU   Frequency detection
SE   Open collector output common Sink/source common

24V external power supply input   +24
Common terminal   SD

*5   Voltage/current input switch

Frequency setting signals (Analog)   10E(+10V)
10(+5V)

Frequency setting potentiometer 1/2W1kΩ*6

2

ON
OFF
2 4

DC0 to 5V   Initial value
DC0 to 10V   selectable)*5
DC0 to 20mA

5   (Analog common)

Auxiliary input (+)(-)   1
DC0 to ±10V   Initial value
(DC0 to ±5V selectable)*5

Terminal 4 input (Current input) (+)(-)   4
DC4 to 20mA   Initial value
DC0 to 5V   selectable)*5
DC0 to 10V

PU connector
USB A connector
USB mini B connector

F/C (CA)
(+) Analog current output (0 to 20mADC)
(-)

AM
(+) Analog signal output (DC0 to ±10V)
(-)
5

Connector for plug-in option connection

Connector 1   Connector 2
Connector 3

RS-485 terminals

TXD+
TXD-   Data transmission
RXD+
RXD-   Data reception
GND (SG)   GND
Terminating resistor
VCC   5V
(Permissible load current 100mA)

Safety stop signal   Shorting wire
24V
PC

Safety stop input (Channel 1)   S1
Safety stop input (Channel 2)   S2
Safety stop input common   SIC
SD

Output shutoff circuit

So   Safety monitor output
SOC   Safety monitor output common

*1: For the FR-A820-03800(75K) or higher, the FR-A840-02160(75K) or higher, and when a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option. (To select a DC reactor, refer to **page 448**, and select one according to the applicable motor capacity.)
When connecting a DC reactor to the FR-A820-03160(55K) or lower or the FR-A840-01800(55K) or lower, remove the jumper across the terminals P1 and P/+ before connecting the DC reactor.
The IP55 compatible model has a built-in DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21. IP55 compatible models do not have terminals R/L11, S1/L21, and jumpers.
*3: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*4: Terminal JOG is also used as a pulse train input terminal. Use Pr.291 to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON.
*6: It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.
*7: If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)).
*8: Connect a brake resistor across terminals P/+ (P3) and PR. (The terminal PR is equipped in FR-A820-00046(0.4K) to 01250(22K), FR-A840-00023(0.4K) to 01800(55K).) Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual (Detailed).)
*9: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*10: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*11: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*12: Do not change the initially set ON (enabled) position of the EMC filter ON/OFF connector in the case of the inverter with a built-in C2 filter (IP55 compatible model). The Class C2 compatibility condition is not satisfied with the EMC filter OFF. The FR-A846-00250(7.5K)-C2 to FR-A846-00470(18.5K)-C2 are not provided with the EMC filter ON/OFF connector. The EMC filter is always ON.

Drive Product

●Separated converter type

• Inverter (FM type)

Sink logic
◎Main circuit terminal
○Control circuit terminal

Brake unit (Option)

Converter unit

R/L1
S/L2
T/L3

P/+
N/-

Jumper *1

R1/L11
S1/L21

Earth (Ground)

Main circuit

Control circuit

Motor
Earth (Ground)

RDI
OH
RES
SD
PC
+24

C1
B1
A1
RDB
RDA
RSO
IPF
FAN
SE

Control input signals (No voltage input allowed) *2

Forward rotation start — STF
Reverse rotation start — STR
Start self-holding selection — STP(STOP)
Multi-speed selection — High speed — RH
Middle speed — RM
Low speed — RL
Jog operation — JOG *3
Second function selection — RT
Output stop — MRS X10 *4
Reset — RES
Terminal 4 input selection — AU
Selection of automatic restart after instantaneous power failure — CS
Contact input common — SD

SOURCE / SINK

24V

24VDC power supply (Common for external power supply transistor) — PC

Relay output *7

C1
B1
A1
Relay output 1 (Fault output)

C2
B2
A2
Relay output 2

Open collector output *8

RUN Running
SU Up to frequency
IPF *9
OL Overload
FU Frequency detection
SE Open collector output common / Sink/source common

24V external power supply input — +24
Common terminal — SD

Voltage/current input switch *5

PU connector

USB A connector

F/C (FM) *10
SD

Indicator (Frequency meter, etc.)
Calibration resistor *11
Moving-coil type 1mA full-scale

Frequency setting signals (Analog)

10E(+10V)
10(+5V)

ON / OFF
2 4

Frequency setting potentiometer 1/2W1kΩ *6

2 — 0 to 5VDC Initial value / 0 to 10VDC / 0 to 20mADC selectable *5
5 — (Analog common)

USB mini B connector

AM
5
Analog signal output (0 to ±10VDC)
(+) (-)

Auxiliary input (+) (-) — 1 — 0 to ±10VDC Initial value / 0 to ±5VDC selectable *5

Terminal 4 input (Current input) (+) (-) — 4 — 4 to 20mADC Initial value / 0 to 5VDC / 0 to 10VDC selectable *5

RS-485 terminals

TXD+ / TXD- Data transmission
RXD+ / RXD- Data reception
GND (SG)
Terminating resistor
VCC

GND
5V (Permissible load current 100mA)

Connector for plug-in option connection

Connector 1   Connector 2
Connector 3

Safety stop signal

Shorting wire

24V
PC
S1
S2
SIC
SD

Safety stop input (Channel 1)
Safety stop input (Channel 2)
Safety stop input common

Output shutoff circuit

So Safety monitor output
SOC Safety monitor output common

*1: The terminals R1/L11 and S1/L21 are connected to the terminals P/+ and N/- with a jumper respectively. When using separate power supply for the control circuit, remove the jumpers from R1/L11 and S1/L21.
*2: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*3: Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.
*4: The X10 signal (NC contact input specification) is assigned to the terminal MRS in the initial setting. Set Pr.599 = "0" to change the input specification of the X10 signal to NO contact.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch
OFF. To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. **(Pr.561)**
*6: It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.
*7: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*8: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*9: No function is assigned in the initial setting. Use **Pr.192** for function assignment.
*10: The terminal FM can be used to output pulse trains as open collector output by setting **Pr.291**.
*11: Not required when calibrating the scale with the operation panel.

Drive Product

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Position control

Vector control dedicated motor (SF-V5RU, SF-THY), 12 V complementary

Positioning unit
MELSEC-Q QD75P[ ]N/QD75P[ ]
MELSEC-L LD75P[ ]
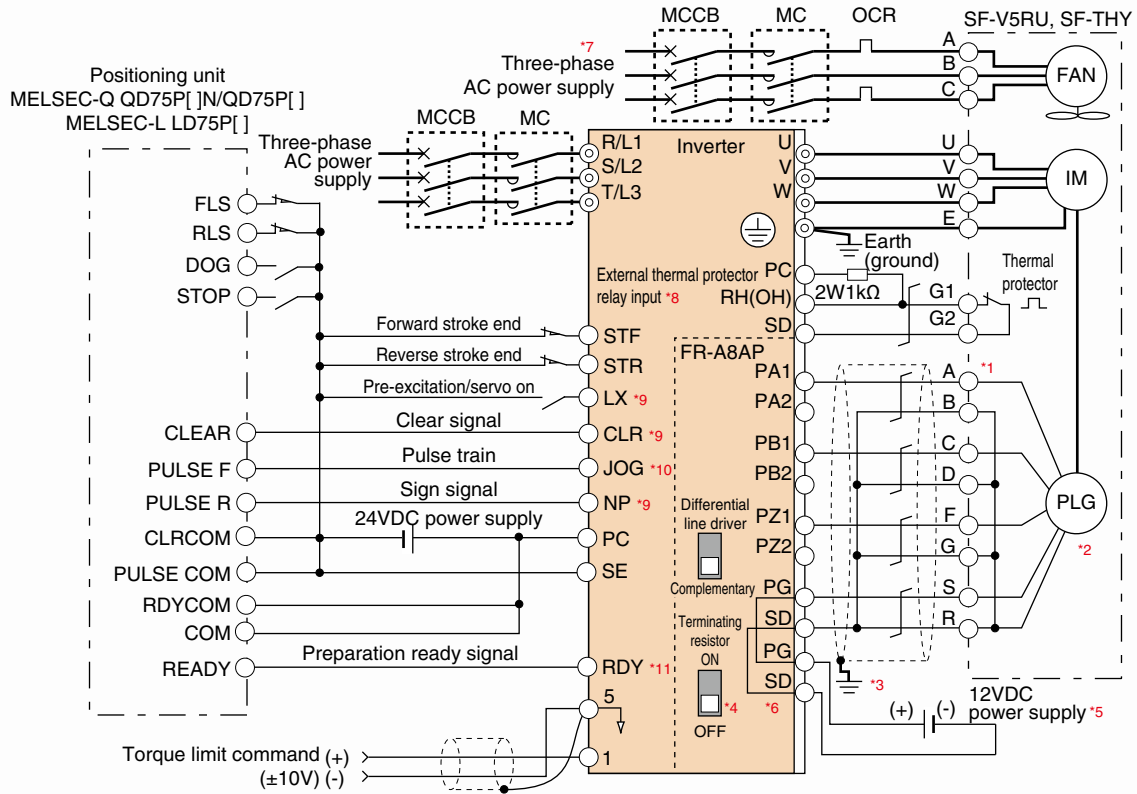
*1: The pin number differs according to the encoder used.
Speed, control, torque control, and position control by pulse train input are available with or without the Z-phase being connected.
*2: Connect the encoder so that there is no looseness between the motor and motor shaft. Speed ratio must be 1:1.
*3: Earth (ground) the shield of the encoder cable to the enclosure using a tool such as a P-clip. (Refer to the Instruction Manual (Detailed).)
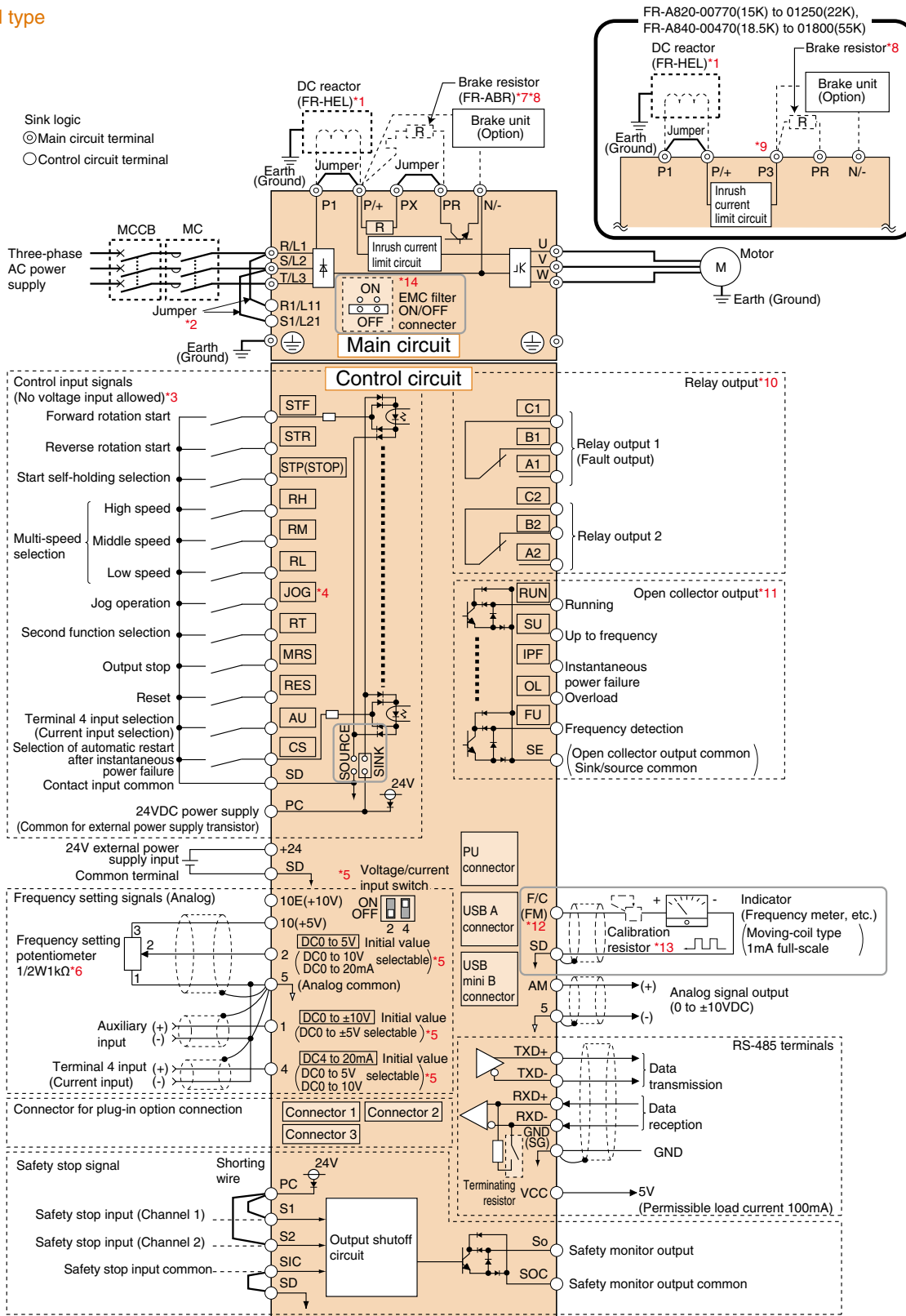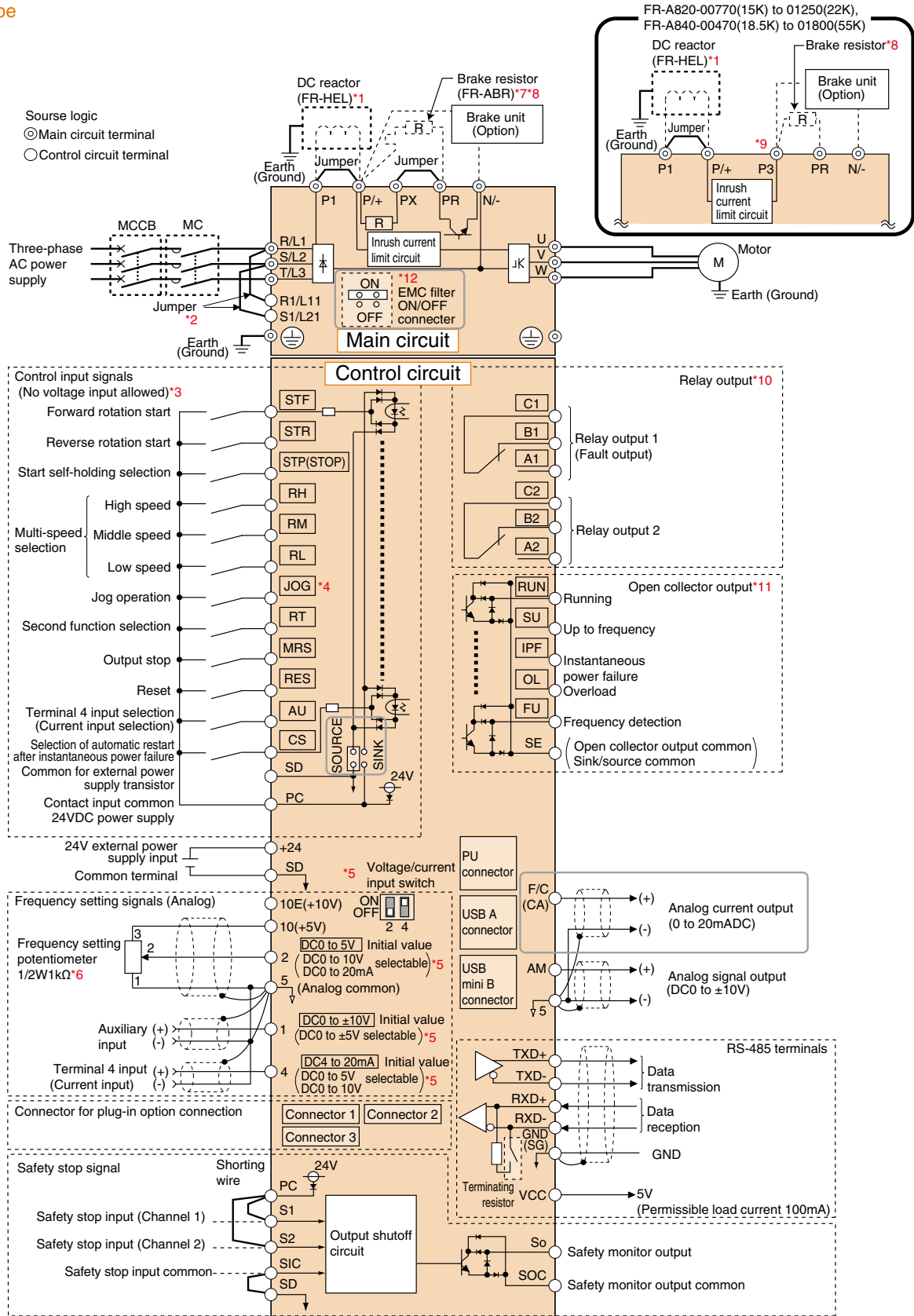*4: For the complementary, set the terminating resistor selection switch to OFF position. (Refer to the Instruction Manual (Detailed).)
*5: A separate power supply of 5 V/12 V/15 V/24 V is necessary according to the encoder power specification.
When the encoder output is the differential line driver type, only 5 V can be input.
Make the voltage of the external power supply the same as the encoder output voltage, and connect the external power supply across PG and SD.
*6: For terminal compatibility of the FR-JCBL, FR-V7CBL, and FR-A8AP, refer to the Instruction Manual (Detailed).
*7: For the fan of the 7.5 kW or lower dedicated motor, the power supply is single phase. (200 V/50 Hz, 200 to 230 V/60 Hz)
*8: Connect the recommended 2W1kΩ resistor between the terminal PC and OH. (Recommended product: MOS2C102J 2W1kΩ by KOA Corporation)
Insert the input line and the resistor to a 2-wire blade terminal, and connect the blade terminal to the terminal OH.
Insulate the lead wire of the resistor, for example by applying a contraction tube, and shape the wires so that the resistor and its lead wire will not touch other cables. Caulk the lead wire securely together with the thermal protector input line using a 2-wire blade terminal.
(Do not subject the lead wire's bottom area to an excessive pressure.)
To use a terminal as the terminal OH, assign the OH (external thermal O/L relay input) signal to an input terminal. (Set "7" in any of **Pr.178 to Pr.189**.)
*9: Assign the function using **Pr.178 to Pr.184, Pr.187 to Pr.189 (input terminal function selection)**.
*10: When position control is selected, terminal JOG function is invalid and simple position pulse train input terminal becomes valid.
*11: Assign the function using **Pr.190 to Pr.194 (output terminal function selection)**.

When OH signal is assigned to terminal RH
(**Pr.182** = "7")

Drive Product
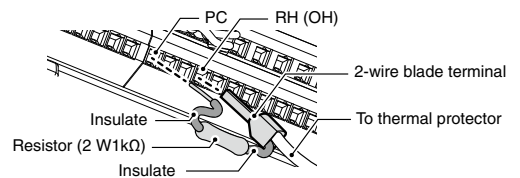
■Standard models, IP55 compatible models, and Separated converter type

Type	Terminal Symbol	Terminal Name	Description	
Main circuit	R/L1, S/L2, T/L3*1	AC power input	Connect to the commercial power supply.	
	U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or PM motor.	
	R1/L11, S1/L21*2	Power supply for control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain alarm display and alarm output, apply external power to this terminal.	
	P/+, PR*1*2	Brake resistor connection	Connect an optional brake resistor across the terminals P/+ and PR. Remove the jumper across the terminals PR and PX for the inverter capacity that has the terminal PX. (FR-A820-00630 (11K) or lower, FR-A840-00380 (15K) or lower)	
	P3, PR*1*2	Brake resistor connection	Connect an optional brake resistor across the terminals P3 and PR. (FR-A820-00770 (15K) to 01250 (22K), FR-A840-00470 (18.5K) to 01800 (55K))	
	P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or regeneration common converter (MT-RC) and high power factor converter (FR-HC2).	
	P3, N/-	Brake unit connection*3	Do not connect the DC power supply between terminals P3 and N/-. Use terminals P/+ and N/- for DC feeding. Connect the separated converter type to the terminals P/+ and N/- of the converter unit.	
	P/+, P1*1	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. For the FR-A820-03800 (75K) or higher, the FR-A840-02160 (75K) or higher, and when a 75 kW or higher motor is used, always connect a DC reactor, which is available as an option.	
	PR, PX*1*2	Built-in brake circuit connection	When the jumper is connected across terminals PX and PR (initial status), the built-in brake circuit is valid. The built-in brake circuit is equipped in the FR-A820-00490 (7.5K) or lower and FR-A840-00250 (7.5K) or lower.	
	⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal — Contact input	STF	Forward rotation start	Turn on the STF signal to start forward rotation and turn it off to stop.	When the STF and STR signals are turned on simultaneously, the stop command is given.
	STR	Reverse rotation start	Turn on the STR signal to start reverse rotation and turn it off to stop.	
	STP (STOP)	Start self-holding selection	Turn on the STOP signal to self-hold the start signal.	
	RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
	JOG	Jog mode selection	Turn on the JOG signal to select Jog operation (initial setting) and turn on the start signal (STF or STR) to start Jog operation.	
		Pulse train input	JOG terminal can be used as pulse train input terminal. To use as pulse train input terminal, the **Pr.291** setting needs to be changed. (maximum input pulse: 100kpulses/s)	
	RT	Second function selection	Turn on the RT signal to select second function selection. When the second function such as "Second torque boost" and "Second V/F (base frequency)" are set, turning on the RT signal selects these functions.	
	MRS	Output stop	Turn on the MRS signal (2ms or more) to stop the inverter output. Use to shut off the inverter output when stopping the motor by electromagnetic brake.	
	MRS (X10)*8	Output stop (Inverter operation enable)	Connect to the terminal RDA of the converter unit (FR-CC2). When the RDA signal is turned OFF, the inverter output is shut off. The X10 signal (NC contact) is assigned to the terminal MRS in the initial setting. Use **Pr.599** to change the specification to NO contact.	
	RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn on the RES signal for more than 0.1s, then turn it off. Recover about 1s after reset is cancelled.	
	AU	Terminal 4 input selection	Terminal 4 is made valid only when the AU signal is turned on. Turning the AU signal on makes terminal 2 invalid	
	CS	Selection of automatic restart after instantaneous power failure	When the CS signal is left on, the inverter restarts automatically at power restoration. Note that restart setting is necessary for this operation. In the initial setting, a restart is disabled.	
	SD	Contact input common (sink)*4	Common terminal for the contact input terminal (sink logic) and terminal FM.	
		External transistor common (source)*5	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
		24 VDC power supply common	Common terminal for the 24 VDC power supply (terminal PC, terminal +24) Isolated from terminals 5 and SE.	
	PC	External transistor common (sink)*4	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable currents.	
		Contact input common (source)*5	Common terminal for contact input terminal (source logic).	
		24 VDC power supply	Can be used as 24 VDC 0.1 A power supply.	
Frequency setting	10E	Frequency setting power supply	When connecting a frequency setting potentiometer at an initial status, connect it to terminal 10. Change the input specifications of terminal 2 when connecting it to terminal 10E.	10 VDC, permissible load current 10 mA
	10			5 VDC, permissible load current 10 mA
	2	Frequency setting (voltage)	Inputting 0 to 5 VDC (or 0 to 10 V, 4 to 20 mA) provides the maximum output frequency at 5 V (10 V, 20 mA) and makes input and output proportional. Use **Pr.73** to switch from among input 0 to 5 VDC (initial setting), 0 to 10 VDC, and 4 to 20 mA. Set the voltage/current input switch in the ON position to select current input (0 to 20 mA).	Voltage input: Input resistance 10 kΩ ± 1 kΩ Maximum permissible voltage 20 VDC Current input: Input resistance 245 Ω ± 5 Ω Maximum permissible current 30 mA
	4	Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). Use **Pr.267** to switch from among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the OFF position to select voltage input (0 to 5 V/0 to 10 V). Use **Pr.858** to switch terminal functions.	
	1	Frequency setting auxiliary	Inputting 0 to ±5 VDC or 0 to ±10 VDC adds this signal to terminal 2 or 4 frequency setting signal. Use **Pr.73** to switch between input 0 to ±5 VDC and 0 to ±10 VDC (initial setting) input.	Input resistance 10 kΩ ±1 kΩ Maximum permissible voltage ±20 VDC
	5	Frequency setting common	Common terminal for frequency setting signal (terminal 2, 1 or 4) and analog output terminal AM, CA. Do not earth (ground).	
Thermistor	10 2	PTC thermistor input	For receiving PTC thermistor outputs. When PTC thermistor is valid (**Pr.561** ≠ "9999"), the terminal 2 is not available for frequency setting.	Applicable PTC thermistor specification Overheat detection resistance:500 Ω to 30 kΩ (Set by **Pr.561**)

☐ indicates that terminal functions can be selected from **Pr.178 to Pr.196 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

Type		Terminal Symbol	Terminal Name	Description	
Control circuit/output signal	Power supply input	+24	24 V external power supply input	For connecting 24 V external power supply. If the 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.	Input voltage 23 to 25.5 VDC Input current 1.4 A or less
	Relay	A1, B1, C1	Relay output 1 (alarm output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Alarm: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C)	Contact capacity 230 VAC 0.3 A (power factor =0.4) 30 VDC 0.3 A
		A2, B2, C2	Relay output 2	1 changeover contact output	
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5 Hz). Switched high during stop or DC injection brake operation.	Permissible load 24 VDC maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF not conducted).
		SU	Up to frequency	Switched low when the output frequency reaches within the range of ±10% (initial value) of the set frequency. Switched high during acceleration/deceleration and at a stop.	
		OL	Overload alarm	Switched low when stall prevention is activated by the stall prevention function. Switched high when stall prevention is cancelled.	
		IPF	Instantaneous power failure	Switched low when an instantaneous power failure and under voltage protections are activated.	
		IPF*8	Open collector output	No function is assigned in the initial setting. The function can be assigned setting **Pr.192**.	
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.	
		SE	Open collector output common	Common terminal for terminals RUN, SU, OL, IPF, FU	
	Pulse	FM*6	For meter	Select one e.g. output frequency from monitor items. (The signal is not output during an inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item.	Output item: output frequency (initial setting), permissible load current 2 mA, For full scale1440 pulses/s
			NPN open collector output		Signals can be output from the open collector terminals by setting **Pr.291**. (maximum output pulse: 50kpulses/s)
	Analog	AM	Analog voltage output	The output signal is proportional to the magnitude of the corresponding monitoring item.Use **Pr.55**, **Pr.56**, and **Pr.866** to set full scales for the monitored output frequency, output current, and torque.	Output item: output frequency (initial setting), output signal 0 to ±10 VDC, permissible load current 1 mA (load impedance 10 kΩ or more), resolution 8 bit
		CA*7	Analog current output		Output item: output frequency (initial setting), Load impedance 200 Ω to 450 Ω Output signal 0 to 20 mADC
Communication		–	PU connector	With the PU connector, communication can be made through RS-485. (1:1 connection only) •Conforming standard: EIA-485(RS-485) •Communication speed: 4800 to 115200bps •Transmission format: Multi-drop link •Wiring length: 500 m	
	RS-485 terminals	TXD+, TXD-	Inverter transmission terminal	With the RS-485 terminals, communication can be made through RS-485. •Conforming standard: EIA-485(RS-485) •Communication speed: 300 to 115200bps •Transmission format: Multi-drop link •Overall extension: 500 m	
		RXD+, RXD-	Inverter reception terminal		
		GND (SG)	Earth (Ground)		
		–	USB A connector	A connector (receptacle). A USB memory device enables parameter copies and the trace function.	Interface: Conforms to USB1.1 (USB2.0 full-speed compatible). Transmission speed: 12 Mbps
			USB B connector	Mini B connector (receptacle). Connected to a personal computer via USB to enable setting, monitoring, test operations of the inverter by FR Configurator2.	
Safety stop signal		S1	Safety stop input (Channel 1)	The terminals S1 and S2 are used for the safety stop input signal for the safety relay module. The terminals S1 and S2 are used at the same time (dual channel). Inverter output is shutoff by shortening/opening between terminals S1 and SIC, or between S2 and SIC. In the initial status, terminals S1 and S2 are shorted with the terminal PC by shorting wires. The terminal SIC is shorted with the terminal SD. Remove the shorting wires and connect the safety relay module when using the safety stop function.	Input resistance 4.7 kΩ Input current 4 to 6 mADC (with 24 VDC input)
		S2	Safety stop input (Channel 2)		
		SIC	Safety stop input terminal common	Common terminal for terminals S1 and S2.	–
		SO	Safety monitor output (open collector output)	Indicates the safety stop input signal status. Switched to LOW when the status is other than the internal safety circuit failure. Switched to HIGH during the internal safety circuit failure status. (LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).) Refer to the Safety stop function instruction manual (BCN-A23228-001) when the signal is switched to HIGH while both terminals S1 and S2 are open.	Permissible load 24 VDC (27 VDC at maximum), 0.1 A (The voltage drop is 3.4 V at maximum while the signal is ON.)
		SOC	Safety stop input terminal common	Common terminal for terminal SO.	–

*1: Terminals R/L1, S/L2, T/L3, PR, P3, P1, and PX are not provided in the separated converter type.
*2: Terminals R1/L11, S1/L21, PR, P3, and PX are not provided for the IP55 compatible model.
*3: Available for the FR-A820-00770(15K) to FR-A820-01250(22K), and the FR-A840-00470(18.5K) to FR-A840-01800(55K).
*4: The sink logic is initially set for the FM-type inverter.
*5: The source logic is initially set for the CA-type inverter.
*6: Terminal FM is provided in the FM-type inverter.
*7: Terminal CA is provided in the CA-type inverter.
*8: Function and name of the separated converter type.

Drive Product

■Major difference from and comparison with the FR-A700 series

Item	FR-A700	FR-A800
Control method	V/F control Advanced magnetic flux vector control Real sensorless vector control Vector control (with plug-in option) PM sensorless vector control (IPM motor)	V/F control Advanced magnetic flux vector control Real sensorless vector control Vector control (with plug-in option/control terminal option) PM sensorless vector control (IPM motor/SPM motor)
Added functions	–	USB host function Safety stop function PLC function etc.
Brake transistor (brake resistor usable)	Built in for the FR-A720-0.4K to 22K Built in for the FR-A740-0.4K to 22K	Built in for the FR-A820-00046(0.4K) to 01250(22K) Built in for the FR-A840-00023(0.4K) to 01800(55K)
Maximum output frequency — V/F control	400 Hz	590 Hz
Maximum output frequency — Advanced magnetic flux vector control	120 Hz	400 Hz
Maximum output frequency — Real sensorless vector control	120 Hz	400 Hz
Maximum output frequency — vector control	120 Hz	400 Hz
Maximum output frequency — PM sensorless vector control	300 Hz	400 Hz
PID control	Turn the X14 signal ON to enable PID control.	When the X14 signal is not assigned, just set a value other than "0" in **Pr.128** to enable PID control. When the X14 signal is assigned, turn the X14 signal ON while **Pr.128** ≠ "0" to enable PID control. The PID pre-charge function and dancer control are added.
Automatic restart after instantaneous power failure	Turn the CS signal ON to enable restart.	CS signal assignment not required. (Restart is enabled with the **Pr.57** setting only.)
Number of motor poles V/F control switching	The V/F switching signal (X18) is valid when **Pr.81** = "12 to 20 (2 to 10 poles)".	**Pr.81** = "12 (12 poles)" X18 is valid regardless of the **Pr.81** setting. (The Pr.81 settings "14 to 20" are not available.)
PTC thermistor input	Input from the terminal AU (The function of the terminal AU is switched by a switch.)	Input from the terminal 2. (The function of the terminal 2 is switched by the **Pr.561** setting.)
USB connector	B connector	Mini B connector
Control circuit terminal block	Removable terminal block (screw type)	Removable terminal block (spring clamp type)
Terminal response level	The FR-A800's I/O terminals have better response level than the FR-A700's terminals. By setting **Pr.289 Inverter output terminal filter and Pr.699 Input terminal filter**, the terminal response level can be compatible with that of FR-A700. Set to approximately 5 to 8 ms and adjust the setting according to the system.	
PU	FR-DU07 (4-digit LED) FR-PU07	FR-DU08 (5-digit LED) FR-LU08 (LCD operation panel) FR-PU07 (Some functions, such as parameter copy, are unavailable.) FR-DU07 is not supported.
Plug-in option	Dedicated plug-in options (not interchangeable)	
Communication option	Connected to the connector 3	Connected to the connector 1
Installation size	For standard models, installation size is compatible for all capacities. (Replacement between the same capacities does not require new mounting holes.) For separated converter types, installation size is not compatible. (New mounting holes are required.)	
Converter	Built-in for all capacities	An optional converter unit (FR-CC2) is required for separated converter types.
DC reactor	The 75K or higher comes with a DC reactor (FR-HEL).	For the FR-A820-03800(75K) or higher, the FR-A840-02160(75K) or higher, and when a 75 kW or higher motor is used, select a DC reactor suitable for the applicable motor capacity. (A DC reactor is not included.) Separated converter types (converter unit FR-CC2) and IP55 compatible models have a built-in DC reactor.
Brake unit (75 kW or higher)	FR-BU2, MT-BU5	FR-BU2

Drive Product

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FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Inverter FREQROL-A800 Plus Series for CRANES

The optimum functions for cranes are added.

Suited for various cranes to achieve fast, robust, and smooth operations

Reduction in tact time

Anti-sway control

By using the Mitsubishi's original anti-sway control technology, the swinging of an object moved by a crane is suppressed at the time of stopping, even without operator's input adjustment.
This control cuts down the tact time and facilitates efficient operation.

Without anti-sway control
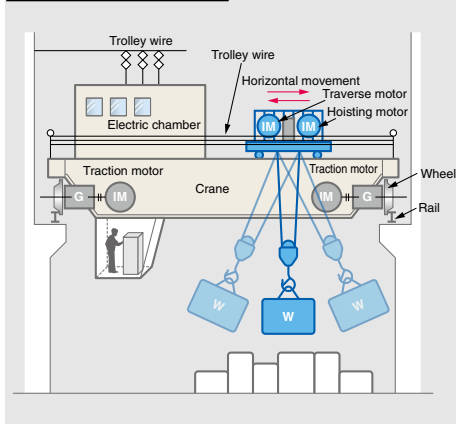
With anti-sway control
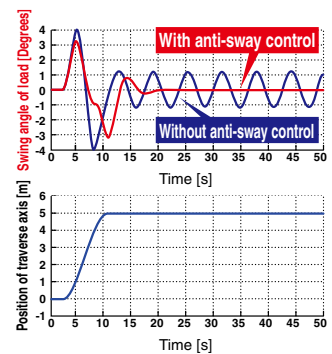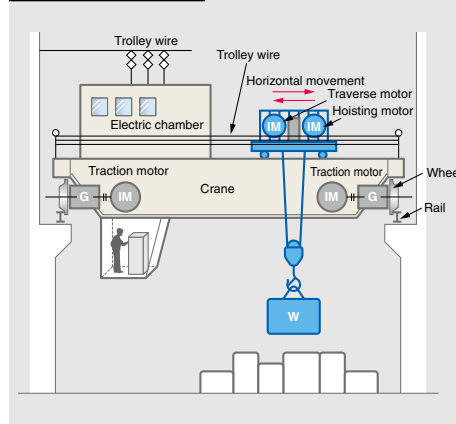
Load torque high-speed frequency control (mode 2)

When there is a light-load (when light loads are moved up or down by a crane), the speed will automatically be increased. This reduces the tact time and facilitates efficient operation.
The possible operation speed is set automatically according to the load.
After starting the inverter, the inverter runs at high speed with a light load.

Shortest-time torque startup function

The time from the start command to when the brake opens is shortened.
This will contributes to reduction in tact time.

● **Shortest-time torque startup function**
The optimum distribution of the excitation current and torque current enables rapid startup of the torque.

● **Magnetic flux command during pre-excitation**
Decreasing the pre-excitation current during a motor stop reduces power consumption during standby, and enables rapid startup of the torque.
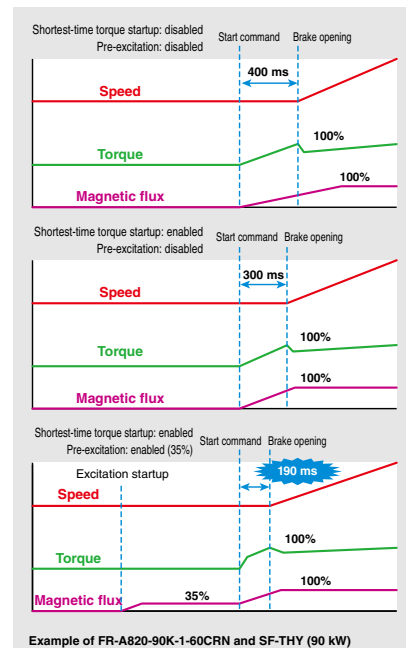
Example of FR-A820-90K-1-60CRN and SF-THY (90 kW)

Load slippage prevention

Brake sequence function

The highly scalable brake sequence function enables the output of a brake opening signal for the optimum brake operation calculated from the load torque or the speed.
The function enables setting of the brake opening level individually for forward rotation and reverse rotation.

Falling detection

Slippage during the start of a lift can be checked.

When the commanded direction differs from the actual motor rotation direction, the falling detection signal is output.

Low-speed range speed control P gain

When an inverter is connected to a lift, the inverter has a load immediately after the lift brake is released. Adjusting the speed control P gain in the low-speed range improves the response at low speed, and shortens the time from startup to brake opening.

Dedicated monitoring functions

Overload detection function

By outputting an overload detection signal when too much load (overload) is applied to a crane, this information can be transmitted to the superordinate controller.
During constant speed operation, when the motor torque is equal to or higher than the torque setting for the time setting or longer, the overload detection signal is turned ON.

Start count monitor

The inverter starting times can be counted.
Confirming the starting times can be used to determinate the timing of the maintenance, or can be used as a reference for system inspection or parts replacement.

Start count monitor

Wide range applications

Compliance with ship classification standards

Using the recommended noise filter in combination with the inverter supports compliance with various countries ship classifications, such as NK, LR, DNV, ABS, BV, CCS, and KR.
The FR-A800-CRN can be used for electric deck cranes on ship.

Lineup

● Standard model

$$\text{F R - A 8 } \boxed{2}\ \boxed{0}\ \text{-}\ \boxed{0.4K}\ \boxed{-1}\ \text{-}\ \boxed{60}\ \boxed{CRN}$$

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure/function
0	Standard model

Capacity*1	Description
00023 to 06830	Inverter SLD rated current (A)
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type
-1	FM
-2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06*3	With	With

Symbol	Dedicated function
CRN	Dedicated to crane

Three-phase 200 V class FR-A820-□ *4	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Three-phase 400 V class FR-A840-□ *4	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	03250	03610	04320	04810	05470	06100	06830										
	110K	132K	160K	185K	220K	250K	280K										
	●	●	●	●	●	●	●										

● Separated converter type

$$\text{F R - A 8 } \boxed{4}\ \boxed{2}\ \text{-}\ \boxed{315K}\ \boxed{-1}\ \text{-}\ \boxed{60}\ \boxed{CRN}$$

Symbol	Voltage class
4	400 V class

Symbol	Structure/function
2	Separated converter type

Capacity*1	Description
07700 to 12120	Inverter SLD rated current (A)
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type
-1	FM
-2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

Symbol	Dedicated function
CRN	Dedicated to crane

Three-phase 400 V class FR-A842-□	07700	08660	09620	10940	12120
	315K	355K	400K	450K	500K
	●	●	●	●	●

*1 Models can be alternatively indicated with the inverter rated current(SLD rating).
*2 Specification differs by the type as follows.

Symbol	Type	Motor output	Built-in EMC filter	Initial setting		
				Control logic	Rated frequency	Base frequency voltage (Pr.19)
-1	FM	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to 10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
-2	CA	Terminal CA (analog current output (0 to 20 mA)) Terminal AM (analog voltage output (0 to 10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

*3 Available for the 5.5K or higher.
*4 For the 75K or higher inverter, or whenever a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option.

■Standard specifications

●**Rating (Standard model)**

200 V class

Model FR-A820-□ CRN			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW)[*1]		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2[*2]	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA)[*3]	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating[*4]	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage[*5]		Three-phase 200 to 240 V																
	Regenerative braking	Built-in brake transistor	Built-in											FR-BU2 (option)					
		Maximum brake torque[*7]	150% torque/ 3%ED[*6]			100% torque/ 3%ED[*6]		100% torque/ 2%ED[*6]		20% torque/continuous								10% torque/ continuous	
		FR-ABR (when the option is used)	150% torque/ 10%ED		100% torque/10%ED			100% torque/6%ED		–	–	–	–	–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V, 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V, 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A)[*8]	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA)[*9]	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529)[*10]			Enclosed type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1   The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2   0.2 kW motors can be used only under V/F control.
*3   The rated output capacity indicated assumes that the output voltage is 220 V.
*4   The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5   The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6   With the built-in brake resistor
*7   ND rating reference value
*8   The rated input current is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9   The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the power supply capacity.
*10   FR-DU08: IP40 (except for the PU connector)

Drive Product

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FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Drive Product

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Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

400 V class

Model FR-A840-□ CRN		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
		0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW)*1	SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
	LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
	ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
	HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output — Rated capacity (kVA)*3	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
	LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
	ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
	HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
	ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
	HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
Overload current rating*4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
Rated voltage*5		Three-phase 380 to 500 V																							
Regenerative braking	Built-in brake transistor	Built-in													FR-BU2 (option)										
	Maximum brake torque*7	100% torque/ 2%ED*6							20% torque/continuous							10% torque/ continuous									
	FR-ABR (when the option is used)	100% torque/10%ED							100% torque/6%ED			–*12				–	–	–	–	–	–	–	–	–
Power supply — Rated input AC voltage/frequency		Three-phase 380 to 500 V, 50 Hz/60 Hz*11																							
Permissible AC voltage fluctuation		323 to 550 V, 50 Hz/60 Hz																							
Permissible frequency fluctuation		±5%																							
Rated input current (A)*8	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
	LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
	ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
	HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
Power supply capacity (kVA)*9	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
	LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
	ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
	HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529)*10		Enclosed type (IP20)														Open type (IP00)									
Cooling system		Self-cooling			Forced air cooling																				
Approx. mass (kg)		2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 0.2 kW motors can be used only under V/F control.
*3 The rated output capacity indicated assumes that the output voltage is 440 V.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 With the built-in brake resistor
*7 ND rating reference value
*8 The rated input current is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the power supply capacity.
*10 FR-DU08: IP40 (except for the PU connector)
*11 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection.**
*12 A commercial brake resistor can be used to improve the braking capability of the inverter built-in brake. Please contact your sales representative for details.

●Rating (Separated converter type)

400 V class

• Inverter

Model FR-A842-□ CRN		07700	08660	09620	10940	12120
		315K	355K	400K	450K	500K
Applicable motor capacity (kW)*1	SLD	400	450	500	560	630
	LD	355	400	450	500	560
	ND (initial setting)	315	355	400	450	500
	HD	280	315	355	400	450
Output	Rated capacity (kVA)*2 SLD	587	660	733	834	924
	LD	521	587	660	733	834
	ND (initial setting)	465	521	587	660	733
	HD	417	465	521	587	660
	Rated current (A) SLD	770	866	962	1094	1212
	LD	683	770	866	962	1094
	ND (initial setting)	610	683	770	866	962
	HD	547	610	683	770	866
	Overload current rating*3 SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	Rated voltage*4	Three-phase 380 to 500 V				
	Regenerative braking torque*5 (when the converter unit (FR-CC2) is used) Maximum brake torque	10% torque/continuous				
Input Power	Power supply voltage	430 to 780 VDC				
	Control power supply auxiliary input	Single-phase 380 to 500 V, 50 Hz/60 Hz*7				
	Permissible control power supply auxiliary input fluctuation	Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529)*6		Open type (IP00)				
Cooling system		Forced air cooling				
Approx. mass (kg)		163	163	243	243	243

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 440 V.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about √2.
*5 ND rating reference value
*6 FR-DU08: IP40 (except for the PU connector)
*7 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection.**

• Converter unit (FR-CC2)

Model FR-CC2-H□		315K	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		315	355	400	450	500	560	630
Output	Overload current rating*1	200% 60 s, 250% 3 s				150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
	Rated voltage*2	430 to 780 VDC*4						
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 500 V, 50 Hz/60 Hz						
	Permissible AC voltage fluctuation	Three-phase 323 to 550 V, 50 Hz/60 Hz						
	Permissible frequency fluctuation	±5%						
	Rated input current (A)	610	683	770	866	962	1094	1212
	Power supply capacity (kVA)*3	465	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)						
Cooling system		Forced air cooling						
DC reactor		Built-in						
Approx. mass (kg)		210	213	282	285	288	293	294

*1 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
*2 The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by √2.
*3 The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*4 The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

Drive Product

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Drive Product

●Common specifications

Control specifications	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control), Optimum excitation control, vector control*1, and PM sensorless vector control
	Output frequency range		0.2 to 590 Hz (The upper frequency limit is 400 Hz under Advanced magnetic flux vector control, Real sensorless vector control, vector control*1, PM sensorless vector control.)
	Frequency setting resolution	Analog Input	0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01 Hz
	Frequency accuracy	Analog Input	Within ±0.2% of the max. output frequency (25°C±10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque		SLD rating: 120% 0.3 Hz, LD rating: 150% 0.3 Hz, ND rating: 200%*2 0.3 Hz, HD rating: 250%*2 0.3 Hz (under Real sensorless vector control or vector control*1)
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected (V/F control, Advanced magnetic flux vector control).
	Torque limit level		Torque limit value can be set (0 to 400% variable). (Real sensorless vector control / vector control*1 / PM sensorless vector control)
Operation specifications	Frequency setting signal	Analog Input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to +5 V are available.
		Digital input	Input using the setting dial of the operation panel or parameter unit Four-digit BCD or 16-bit binary (when used with option FR-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		The following signals can be assigned to **Pr.178 to Pr.189 (input terminal function selection)**: Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command,Inverter reset
		Pulse train input	100 kpps
	Operational functions		Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding*3, frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, automatic acceleration/deceleration, intelligent mode, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, load torque high-speed frequency control, speed smoothing control, traverse, auto tuning, applied motor selection, gain tuning, RS-485 communication, PID control, PID pre-charge function, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power failure time deceleration-to-stop function, stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, orientation control*1, speed control, torque control, position control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function, anti-sway control, low-speed range speed control P gain, shortest-time torque startup, inching time adjustment function, brake sequence function
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, Up to frequency, Instantaneous power failure/undervoltage*3, Overload warning, Output frequency detection, Fault The output signal can be changed using **Pr.190 to Pr.196 (output terminal function selection).** Fault codes of the inverter can be output (4 bits) from the open collector.
		Pulse train output (FM type)	50 kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection.**
		Current output (CA type)	Max. 20 mADC: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection.**
		Voltage output	Max. 10 VDC: one terminal (output frequency) The monitored item can be changed using **Pr.158 AM terminal function selection.**
	Operation panel (FR-DU08)	Operating status	Output frequency, Output current, Output voltage,Frequency setting value The monitored item can be changed using **Pr.52 Operation panel main monitor selection.**
		Fault record	Fault record is displayed when a protective function is activated. Past 8 fault records and output voltage/current/frequency/ cumulative energization time / year/month/date/time immediately before the protective function is activated are stored.
	Protective/warning function	Protective function	Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip, Motor overload trip, Heatsink overheat, Instantaneous power failure*3, Undervoltage*3, Input phase loss*3*4, Stall prevention stop, Loss of synchronism detection*4, Brake transistor alarm detection, Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation*4, PTC thermistor operation*4, Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess*4, Parameter storage device fault, CPU fault, Operation panel power supply short circuit/RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection*4, Inrush current limit circuit fault*3, Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence*4, Speed deviation excess detection*1*4, Signal loss detection*1*4, Excessive position fault*1*4, Brake sequence fault*4, Encoder phase fault*1*4, 4 mA input fault*4, Pre-charge fault*4, PID signal fault*4, Option fault, Opposite rotation deceleration fault*4, Internal circuit fault, Magnetic pole position unknown*1
		Warning function	Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm*3*4, Electronic thermal relay function pre-alarm, PU stop, Speed limit indication*4, Parameter copy, Safety stop, Maintenance signal output*4, USB host error, Home position return setting error*4, Home position return uncompleted*4, Home position return parameter setting error*4, Operation panel lock*4, Password locked*4, Parameter write error, Copy operation error, 24 V external power supply operation
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing) (LD, ND, and HD ratings) -10°C to +40°C (non-freezing) (SLD rating)
	Surrounding air humidity		95% RH or less (non-condensing) (With circuit board coating (IEC60721-3-3 3C2/3S2 compatible)) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature*5		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000 m above sea level*6, 5.9 m/s² or less*7 at 10 to 55 Hz (directions of X, Y, Z axes)

*1 The vector control is available only when a vector control compatible option is installed.
*2 In the initial setting for the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, the starting torque is limited to 150% by the torque limit level.
*3 Available only for the standard model.
*4 This protective function is not available in the initial status.
*5 Temperature applicable for a short time, e.g. in transit.
*6 For the installation in an altitude above 1000 m (up to 2500 m), derate the rated current 3% per 500 m.
*7 2.9 m/s² or less for the FR-A840-160K(04320) or higher.

Drive Product

■Standard Model

Outline Dimension Drawings

● FR-A820-00046(0.4K) to 04750(90K)
● FR-A840-00023(0.4K) to 03610(132K)

● FR-A840-04320(160K) to 06830(280K)

2-φC   H1   H   W1   W   D   3-φC
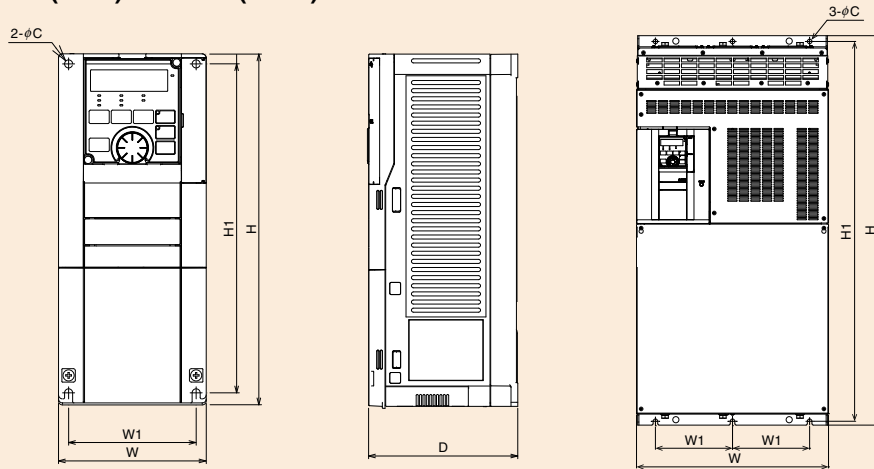
(Unit: mm)

200 V class

Inverter model	W	W1	H	H1	D	C
FR-A820-00046(0.4K)	110	95	260	245	110	6
FR-A820-00077(0.75K)	110	95	260	245	125	6
FR-A820-00105(1.5K)	150	125	260	245	140	6
FR-A820-00167(2.2K)	150	125	260	245	140	6
FR-A820-00250(3.7K)	150	125	260	245	140	6
FR-A820-00340(5.5K)	220	195	260	245	170	6
FR-A820-00490(7.5K)	220	195	260	245	170	6
FR-A820-00630(11K)	220	195	300	285	190	6
FR-A820-00770(15K)	250	230	400	380	190	10
FR-A820-00930(18.5K)	250	230	400	380	190	10
FR-A820-01250(22K)	250	230	400	380	190	10
FR-A820-01540(30K)	325	270	550	530	195	10
FR-A820-01870(37K)	435	380	550	525	250	12
FR-A820-02330(45K)	435	380	550	525	250	12
FR-A820-03160(55K)	465	410	700	675	250	12
FR-A820-03800(75K)	465	400	740	715	360	12
FR-A820-04750(90K)	465	400	740	715	360	12

400 V class

Inverter model	W	W1	H	H1	D	C
FR-A840-00023(0.4K)	150	125	260	245	140	6
FR-A840-00038(0.75K)	150	125	260	245	140	6
FR-A840-00052(1.5K)	150	125	260	245	140	6
FR-A840-00083(2.2K)	150	125	260	245	140	6
FR-A840-00126(3.7K)	150	125	260	245	140	6
FR-A840-00170(5.5K)	220	195	260	245	170	6
FR-A840-00250(7.5K)	220	195	260	245	170	6
FR-A840-00310(11K)	220	195	300	285	190	6
FR-A840-00380(15K)	220	195	300	285	190	6
FR-A840-00470(18.5K)	250	230	400	380	190	10
FR-A840-00620(22K)	250	230	400	380	190	10
FR-A840-00770(30K)	325	270	550	530	195	10
FR-A840-00930(37K)	435	380	550	525	250	12
FR-A840-01160(45K)	435	380	550	525	250	12
FR-A840-01800(55K)	435	380	550	525	250	12
FR-A840-02160(75K)	465	400	620	595	300	12
FR-A840-02600(90K)	465	400	620	595	300	12
FR-A840-03250(110K)	465	400	740	715	360	12
FR-A840-03610(132K)	465	400	740	715	360	12
FR-A840-04320(160K)	498	200	1010	985	380	12
FR-A840-04810(185K)	498	200	1010	985	380	12
FR-A840-05470(220K)	680	300	1010	984	380	12
FR-A840-06100(250K)	680	300	1010	984	380	12
FR-A840-06830(280K)	680	300	1010	984	380	12

■Separated converter type

Outline Dimension Drawings

●**FR-A842-07700(315K), 08660(355K)**

3-φ12 hole · 8-φ25 hole · FAN · (15) · 1300 · 1330 · 1296 · (17) · 185 · 23 · 12 · 15 · 70 · 200 · 200 · (70) · 540 · 4.5 · 4.5 · 185 · 17 · 440

(Unit: mm)

●**FR-A842-09620(400K), 10940(450K), 12120(500K)**

3-φ12 hole · 8-φ25 hole · FAN · (15) · 1550 · 1580 · 1546 · (17) · 185 · 23 · 12 · 15 · 100 · 240 · 240 · (100) · 680 · 4.5 · 4.5 · 185 · 17 · 440
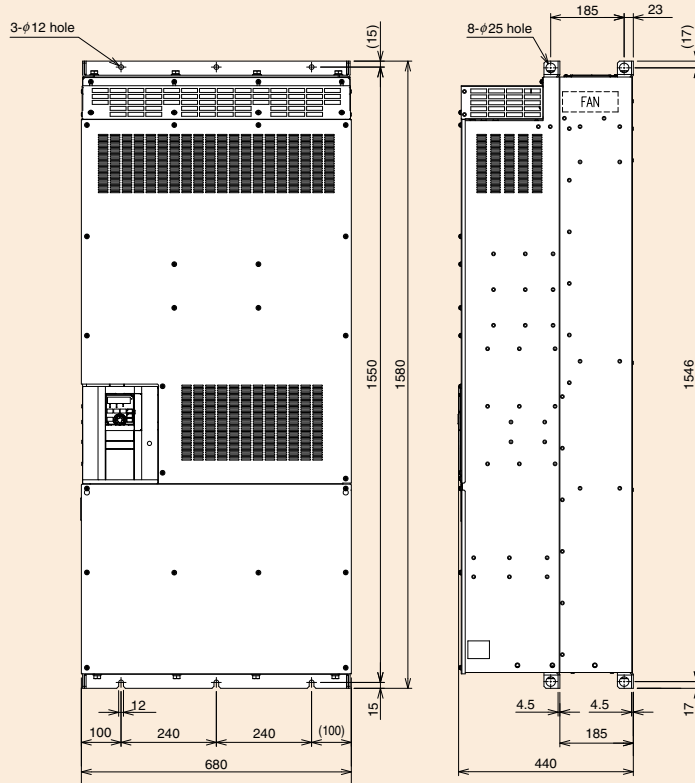
(Unit: mm)

MEMO

Features/
Outline

Lineup/Functions
Connectivity
Examples

Specifications/
Outline Drawing

FREQROL-A800
Series

FREQROL-F800
Series

FREQROL-E700
Series

FREQROL-F700PJ
Series

FREQROL-D700
Series

Inverter FREQROL-A800 Plus Series for Roll to Roll
The optimum functions for roll to roll applications are added.

Features

In roll to roll applications, control is necessary for machining of elongated products such as paper, film, and thread. Processing types include printing, slitting, coating, and twisting. High productivity can be achieved by stable tension control.
The FR-A800-R2R inverter can be used in a wide variety of systems with various dedicated functions.

Roll to roll dedicated model with functions optimum for winding/unwinding

System simplification

Stable winding/unwinding can be achieved by the inverter alone.

Wide range of applications

The FR-A800-R2R inverter enables the use in various system applications such as winding/unwinding in the wire drawing machines and printers.

Easy startup and adjustment

Parameters can be used for mechanical adjustment according to applications.

● **Intermediate shaft**
The line speed is controlled by driving the intermediate shafts such as a reference shaft with a constant winding diameter or the feeding shaft.
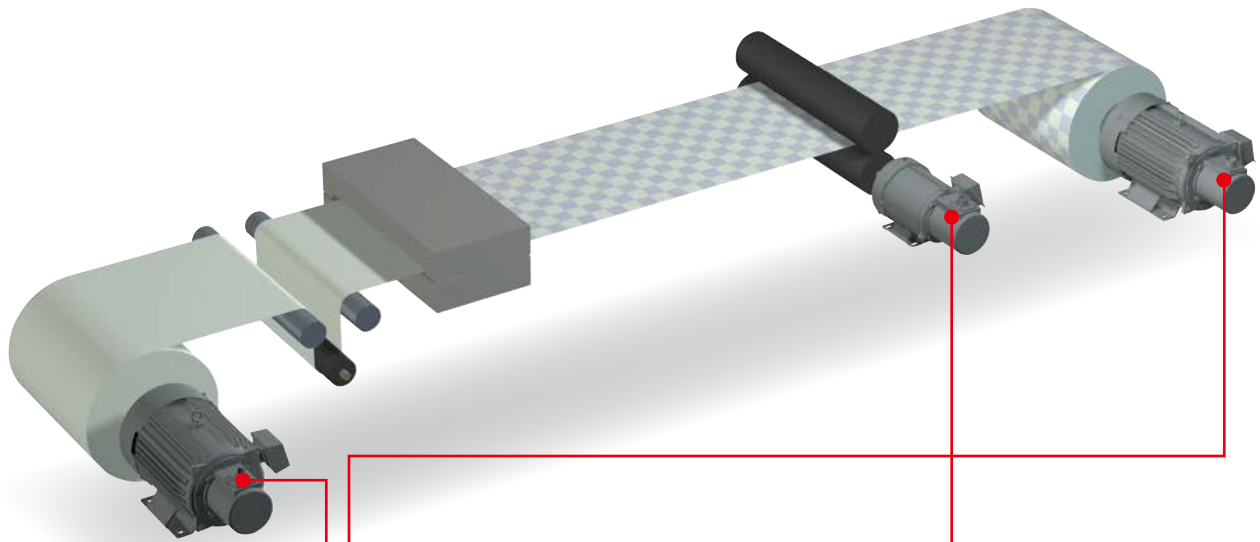
● **Winding/unwinding shaft**
Tension control (speed control / torque control) is enabled by inputting the dancer roll position or the feedback from the tension sensor.
Stable control can be achieved by winding diameter calculation, even with a large difference between the maximum and minimum diameters.

System simplification

The FR-A800-R2R inverter has various dedicated functions such as winding diameter calculation, providing stable winding/unwinding control independently.

Winding diameter calculation

The present winding diameter for the winding/unwinding shaft is calculated from the actual line speed or the actual motor speed.

Line speed command input selection / actual line speed input selection

The line speed command and actual line speed required for calculating the winding diameter can be input through the analog input terminal or plug-in option.

Winding diameter calculation function selection

The winding diameter calculation method can be selected in order to improve the tension control performance.

● **Actual line speed calculation method**
The winding diameter is calculated from the line speed and the main speed (actual motor speed).

$$D = \frac{V}{\pi \times n \times Z}$$

● **Thickness calculation method**
The material thickness is added up to find the overall winding diameter.

$$D = \text{Initial diameter} \pm 2 \times d \times N \times Z$$

D: Diameter   V: Line speed
n: Motor speed   N: Number of rotations
d: Material thickness   Z: Reduction ratio
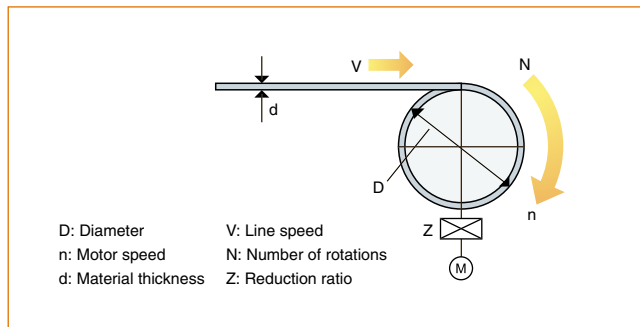
Initial winding diameter calculation

When the winding diameter changes after the material change or others, the present winding diameter is calculated in the following two ways.

● The present winding diameter is calculated based on the dancer roll movement at a start from the lower limit position to the target position.
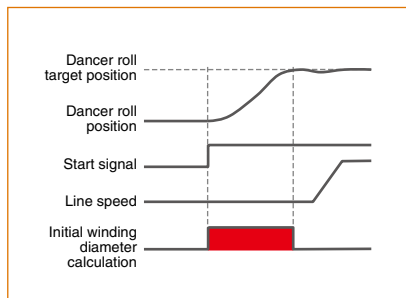
● The present winding diameter is calculated from the line speed and the actual motor speed. (The system must be started at low speed.)
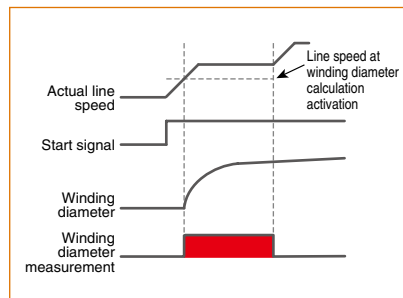
Winding diameter / winding length storage

The present value of winding diameter and winding/unwinding length can be stored.

The winding diameter and winding length values are stored in the inverter even during power-OFF.

Dancer feedback speed control / Tension sensor feedback speed control

PID control is performed using feedback of the detected dancer roll position or feedback from the tension sensor.
Stable control can be achieved in combination with the winding diameter calculation.

Speed control proportional gain compensation

By adjusting the speed control proportional gain according to the winding diameter, the response level can be kept constant.

Tension PI gain tuning

By automatically adjusting the tension PI gain for PID control, time required for adjustment is significantly cut down. Anyone can start the system easily.
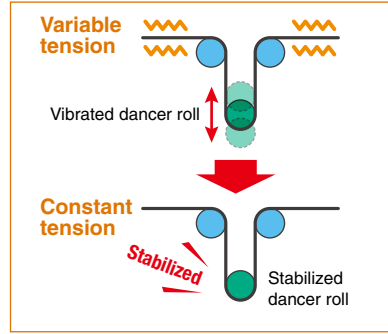
Dancer roll malposition detection

When material rupture (break) occurs and the sensor feedback value (dancer/ tension feedback) is held at the upper/ lower limit for a certain period of time, the break detection signal is output.

Example of dancer feedback control (winding)
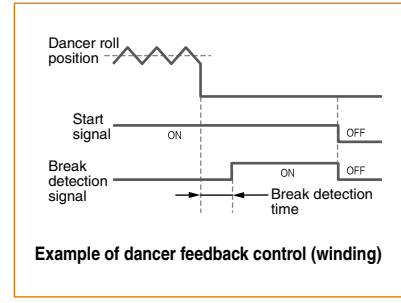
Tension sensorless torque control / Tension sensor feedback torque control

The output torque of a motor is controlled so that the tension applied to a material is constant by calculating the winding diameter of a roll.

Mechanical loss compensation function

The tension applied to the material is maintained constant by raising a commanded torque to compensate mechanical loss caused by factors such as friction on the dancer roll or winding/ unwinding shaft.

Tension command cushion time

The cushion time is set for the tension command to avoid sudden change in tension.

Inertia compensation function

During acceleration/deceleration, the tension applied to the material is maintained constant by adjusting the variable tension on the winding and unwinding sides.

Taper function

By adjusting the tension on the workpiece, it is possible to avoid imperfections such as wrinkles or deformation caused by the increase in diameter.

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Inverter
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Drive Product

Wide range of applications

The FR-A800-R2R inverter offers four types of control functions which enable the use in various system applications such as winding/unwinding in the wire drawing machines and printers.

Dancer feedback speed control	Tension sensor feedback speed control	Tension sensorless torque control	Tension sensor feedback torque control

During dancer feedback speed control, speed is controlled for keeping a constant tension on the workpiece (winding/unwinding shaft) by using the dancer roll position and line speed data.

Further stable speed control is possible by performing PID control and winding diameter calculation in the inverter.

Tension sensor feedback speed control is a control function to keep the tension constant using feedback from the tension sensor, instead of the dancer roll position.
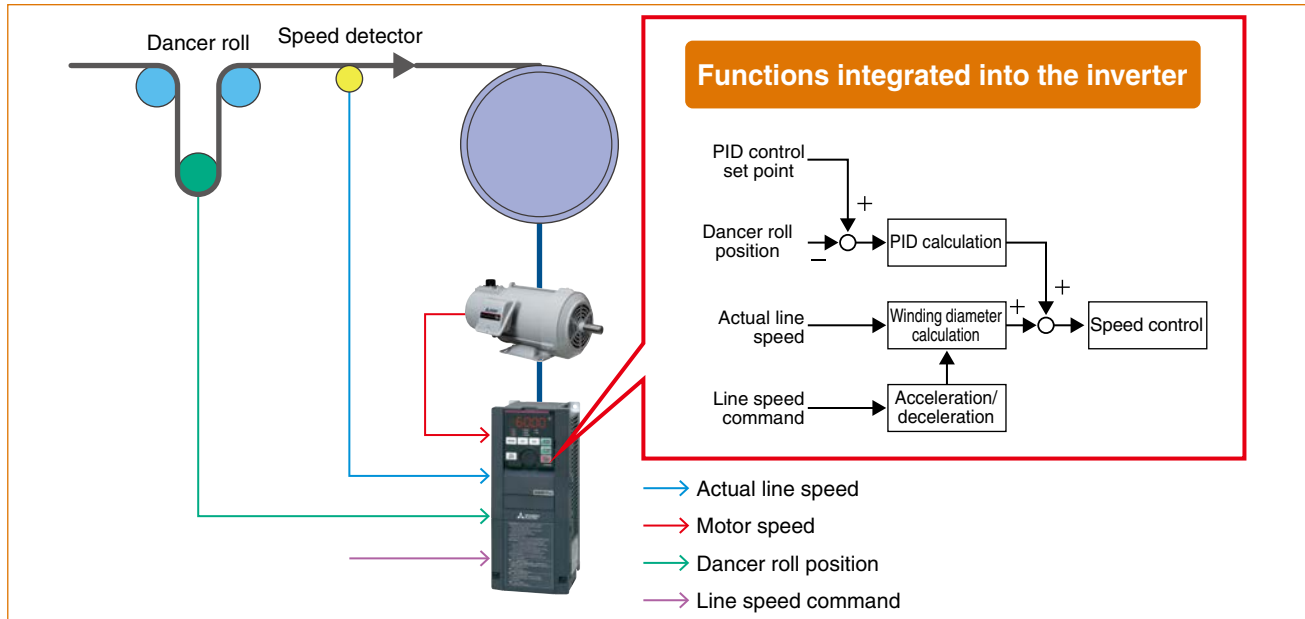
Example of dancer feedback speed control

Dancer feedback speed control	Tension sensor feedback speed control	Tension sensorless torque control	Tension sensor feedback torque control

The torque is controlled for keeping a constant tension on the workpiece (winding/unwinding shaft) by using the tension sensor and line speed information.

Further stable torque control is possible by changing the torque command according to the acceleration/deceleration torque calculation at a speed change (inertia compensation) and the mechanical loss torque compensation, as well as the compensation determined by the winding diameter calculation.

Tension sensor feedback torque control can be used when the PLC function is enabled.
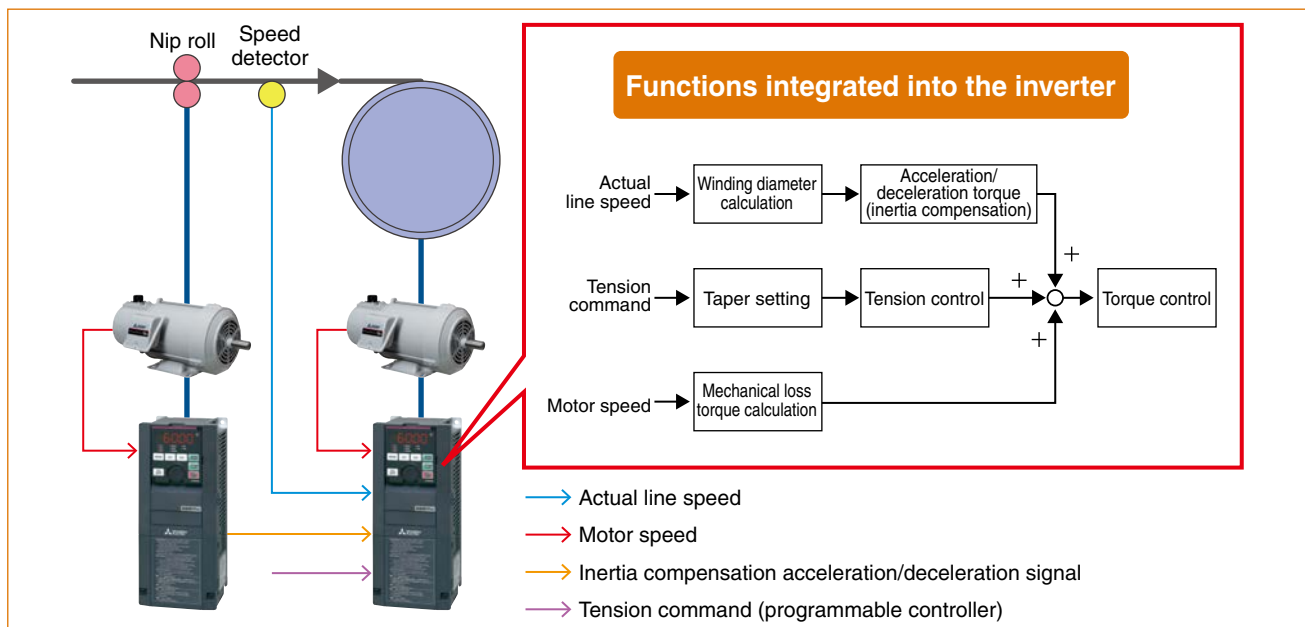
Example of tension sensorless torque control

Easy startup and adjustment

Parameters can be used for mechanical adjustment according to applications, useful for the startup and adjustment work of the system.

Before

Setting and adjusting multiple devices including controllers were required for dancer control, and it took much time to start up the system.
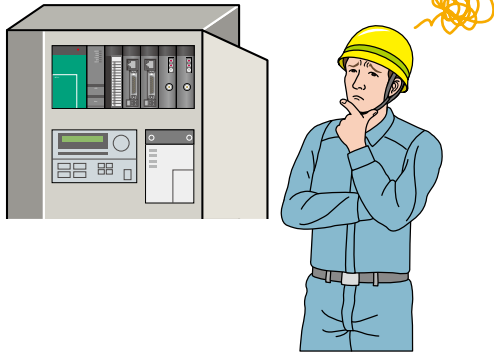
Before

There was a worry about the compatibility with the existing system.
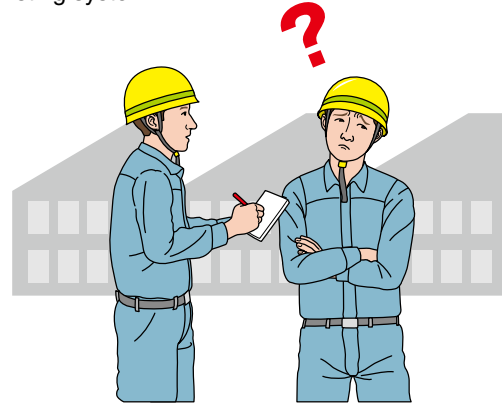
After

○ Complex position control of the dancer roll can be achieved by the inverter alone by setting parameters.
○ By setting mechanical specifications, optimum control can be performed according to the system and the application.
○ Analog/pulse signal input method is selectable at the discretion of the customer. Input via communication is also available.
○ PID control enables and simplifies complex control using only the inverter.
○ Automatic tension PI gain adjustment enables easy startup. (Tension PI gain tuning)

Drive Product
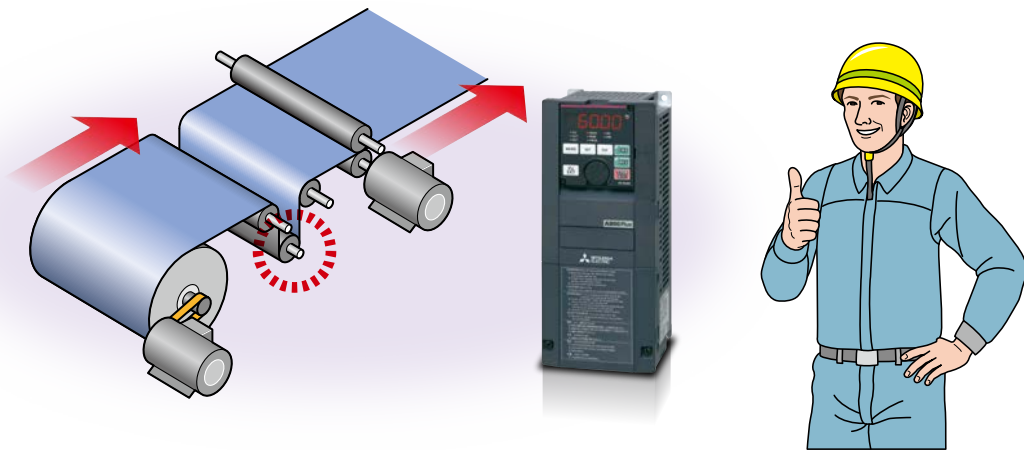
■Example of startup procedure

The following procedure shows the parameter setting example for the dancer feedback speed control.

STEP 1
Basic setting of the inverter

Perform setting according to the motor type and the control method.

Basic parameter setting and control method selection

Set the value for each parameter according to the control method and the motor type.
(Speed control gain adjustment or offline auto tuning is required according to the control method.)

Item	Pr.	Item	Pr.	Item	Pr.
Applied motor	71	Rated motor frequency	84	Motor inertia (integer)[*2]	707
Electronic thermal O/L relay	9	Control method selection[*1]	800	Motor inertia (exponent)[*2]	724
Motor capacity	80	Torque limit input method selection	810	Encoder option selection	862
Number of motor poles	81	Encoder rotation direction	359		
Rated motor voltage	83	Number of encoder pulses	369		

[*1]: For the control method, vector control is recommended. [*2]: Setting is required for a motor other than a Mitsubishi motor (the SF-PR, SF-JR, SF-HR, SF-JRCA, SF-HRCA, or SF-V5RU (1500 r/min series) motor).

STEP 2
Basic setting of mechanical specifications

Set the mechanical specifications.

Mechanical specifications setting

Set the mechanical specifications according to application.

Pr.	Name	Intermediate shaft	Winding/unwinding shaft
1235	Maximum winding diameter 1	○	○
1236	Minimum winding diameter 1	○	○
1230	Winding/unwinding selection	—	○
645	Winding diameter storage selection	—	○
1247	Winding diameter change increment amount limit	○	○
1243	Gear ratio numerator (follower side)	○	○
1244	Gear ratio denominator (driver side)	○	○
7	Acceleration time	○	○
8	Deceleration time	○	○
394	First acceleration time for line speed command	○	○
395	First deceleration time for line speed command	○	○
101	Second deceleration time for line speed command	○	○
393	Line speed command acceleration/deceleration reference	○	○
1231	Material thickness d1	—	○
1252	Dancer lower limit position	—	○
1255	Accumulated amount	—	○

Control accuracy improvement by the winding diameter calculation

By calculating the winding diameter of the winding/unwinding shaft, the tension is always optimized even if it changes along with the winding diameter change.

D: Diameter
n: Motor speed
d: Material thickness
V: Line speed
N: Number of rotations
Z: Reduction ratio

STEP 3
Analog/pulse input method selection

Select the input method and the input terminal function for the line speed command.
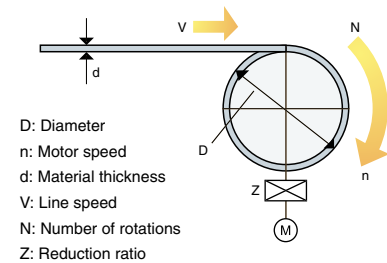
Input method selection for the line speed command, dancer signal, and actual line speed

The line speed command input method can be selected from the following: analog input through a terminal (2, 4, 1, 6, etc.), single-phase pulse train input, encoder pulse input, and input via communication (CC-Link IE Field Network communication, DeviceNet™, PROFIBUS-DPV0, etc.).

STEP 4
PID control adjustment
(Dancer roll target position, tension PI gain tuning)

Set parameters to control the dancer roll and adjust the tension PI gain.

Dancer roll target position setting

Set the target position, upper limit, and lower limit values for the dancer roll.

Item	Pr.
Set point	133
Upper limit	131
Lower limit	132
PID action selection	128

Dancer roll upper limit Pr.131
Dancer roll target position Pr.133
Dancer roll lower limit Pr.132
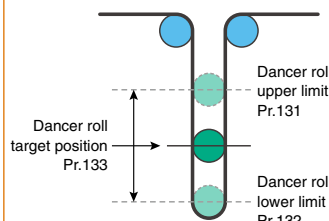
PI gain automatic adjustment

The PI gain is automatically adjusted by tension PI gain tuning. The time required for gain adjustment can be reduced.

Tuning in progress
Before tuning / After tuning
Dancer roll position fluctuates significantly
Dancer roll position fluctuates a little

Fluctuation of the dancer roll position before and after tension PI gain tuning

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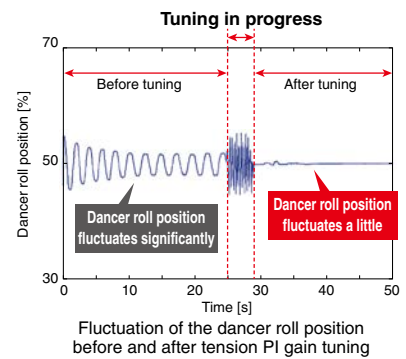
TEST RUN

Turn ON the X114 signal for using dancer feedback speed control and the winding diameter calculation function.

Lineup

●Standard model

F R - A 8 **2** **0** - **0.4K** **-1** - [ ] **R2R**

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure/function
0	Standard model

Capacity*1	Description
00023 to 06830	Inverter SLD rated current (A)
0.4K to 280K	Inverter ND rated capacity (kW)

Symbol	Type*2
-1	FM
-2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06*3	With	With

Symbol	Dedicated function
R2R	Roll to roll dedicated model

Three-phase 200 V class FR-A820-□ *4	00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Three-phase 400 V class FR-A840-□ *4	00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	03250	03610	04320	04810	05470	06100	06830										
	110K	132K	160K	185K	220K	250K	280K										
	●	●	●	●	●	●	●										

●Separated converter type

F R - A 8 **4** **2** - **315K** **-1** - [ ] **R2R**

Symbol	Voltage class
4	400 V class

Symbol	Structure/function
2	Separated converter type

Capacity*1	Description
07700 to 12120	Inverter SLD rated current (A)
315K to 500K	Inverter ND rated capacity (kW)

Symbol	Type*2
-1	FM
-2	CA

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06	With	With

Symbol	Dedicated function
R2R	Roll to roll dedicated model

Three-phase 400 V class FR-A842-□	07700	08660	09620	10940	12120
	315K	355K	400K	450K	500K
	●	●	●	●	●

*1 Models can be alternatively indicated with the inverter rated current (SLD rating).
*2 Specification differs by the type as follows.
*3 Available for the 5.5K or higher.
*4 For the 75K or higher inverter, or whenever a 75 kW or higher motor is used, always connect a DC reactor (FR-HEL), which is available as an option.

Type	Motor output	Initial setting			
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage
FM (terminal FM equipped model)	Terminal FM: pulse train output Terminal AM: analog voltage output (0 to ±10VDC)	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA: analog current output (0 to 20mADC) Terminal AM: analog voltage output (0 to ±10VDC)	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

Drive Product

■Standard specifications

●Rating (Standard model)

200 V class

Model FR-A820-□ R2R			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW)[*1]	SLD		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
	LD		0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
	SND[*2]		0.75	1.5	2.2	3.7	5.5	7.5	7.5	15	18.5	22	22	30	45	45	55	90	90
	ND (initial setting)		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
	HD		0.2[*3]	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA)[*4]	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		SND[*2]	1.6	2.7	3.7	5.8	8.8	12	14	22	27	32	39	48	65	72	99	132	148
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		SND[*2]	4.2	7	9.6	15.2	23	31	36	58	70.5	85	102	126	170	190	259	346	388
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating[*5]	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		SND[*2]	150% 60 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
	Rated voltage[*6]		Three-phase 200 to 240 V																
	Regenerative braking	Brake transistor	Built-in									FR-BU2 (option)							
		Maximum brake torque[*8]	150% torque/ 3%ED[*7]		100% torque/ 3%ED[*7]		100% torque/ 2%ED[*7]		20% torque/continuous									10% torque/ continuous	
		FR-ABR (when the option is used)	150% torque/ 10%ED		100% torque/10%ED			100% torque/6%ED			–	–	–	–	–	–	–	–
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V, 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V, 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A)[*9]	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		SND[*2]	5	8.3	12.2	18.3	28.5	41.6	49	74.8	90.9	106	130	166	207	233	304	346	388
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA)[*10]	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		SND[*2]	1.9	3.2	4.7	7	11	16	19	29	35	41	50	63	79	89	116	132	148
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529)[*11]			Enclosed type (IP20)										Open type (IP00)						
Cooling system			Self-cooling			Forced air cooling													
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 For the SND rating, the carrier frequency is always 2 kHz.
*3 The 0.2 kW motor capacity is applicable under V/F control only.
*4 The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*5 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*6 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*7 Value for the built-in brake resistor
*8 Value for the ND rating
*9 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*10 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*11 FR-DU08: IP40 (except for the PU connector section)

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

400 V class

Model FR-A840-□ R2R		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
		0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW)*1	SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
	LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
	SND*2	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	55	90	90	132	160	185	220	250	280	315
	ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
	HD	0.2*3	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output — Rated capacity (kVA)*4	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
	LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
	SND*2	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	98	137	148	198	248	275	329	367	417	465
	ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
	HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
	SND*2	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	129	180	194	260	325	361	432	481	547	610
	ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
	HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
Overload current rating*5	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	SND*2	150% 60 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
	HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
Rated voltage*6		Three-phase 380 to 500 V																							
Regenerative braking — Brake transistor		Built-in														FR-BU2 (option)									
Maximum brake torque*8		100% torque/ 2%ED*7						20% torque/continuous						10% torque/ continuous											
FR-ABR (when the option is used)		100% torque/10%ED						100% torque/6%ED				–*13		–	–	–	–	–	–	–	–	–
Power supply — Rated input AC voltage/frequency		Three-phase 380 to 500 V, 50 Hz/60 Hz*12																							
Permissible AC voltage fluctuation		323 to 550 V, 50 Hz/60 Hz																							
Permissible frequency fluctuation		±5%																							
Rated input current (A)*9	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
	LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
	SND*2	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	154	180	194	260	325	361	432	481	547	610
	ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
	HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
Power supply capacity (kVA)*10	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
	LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
	SND*2	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	117	137	148	198	248	275	329	367	417	465
	ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
	HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529)*11		Enclosed type (IP20)														Open type (IP00)									
Cooling system		Self-cooling			Forced air cooling																				
Approx. mass (kg)		2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

*2 For the SND rating, the carrier frequency is always 2 kHz.

*3 The 0.2 kW motor capacity is applicable under V/F control only.

*4 The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.

*5 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

*6 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.

*7 Value for the built-in brake resistor

*8 Value for the ND rating

*9 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.

*10 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).

*11 FR-DU08: IP40 (except for the PU connector section)

*12 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

*13 The braking capability of the inverter built-in brake can be improved with a commercial brake resistor. For the details, please contact your sales representative.

●Rating (Separated converter type)

400 V class

• Inverter

Model FR-A842-□ R2R		07700	08660	09620	10940	12120
		315K	355K	400K	450K	500K
Applicable motor capacity (kW)[*1]	SLD	400	450	500	560	630
	LD	355	400	450	500	560
	SND[*2]	355	400	450	500	560
	ND (initial setting)	315	355	400	450	500
	HD	280	315	355	400	450
Output — Rated capacity (kVA)[*3]	SLD	587	660	733	834	924
	LD	521	587	660	733	834
	SND[*2]	521	587	660	733	834
	ND (initial setting)	465	521	587	660	733
	HD	417	465	521	587	660
Rated current (A)	SLD	770	866	962	1094	1212
	LD	683	770	866	962	1094
	SND[*2]	683	770	866	962	1094
	ND (initial setting)	610	683	770	866	962
	HD	547	610	683	770	866
Overload current rating[*4]	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	SND[*2]	150% 60 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
Rated voltage[*5]		Three-phase 380 to 500 V				
Regenerative brakingtorque[*6] (When the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous				
Input Power — DC power supply voltage		430 to 780 VDC				
Control power supply auxiliary input		Single phase 380 to 500 V, 50 Hz/60 Hz[*8]				
Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529)[*7]		Open type (IP00)				
Cooling system		Forced air cooling				
Approx. mass (kg)		163	163	243	243	243

[*1] The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
[*2] For the SND rating, the carrier frequency is always 2 kHz.
[*3] The rated output capacity indicated assumes that the output voltage is 440 V.
[*4] The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
[*5] The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
[*6] ND rating reference value
[*7] FR-DU08: IP40 (except for the PU connector section)
[*8] For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

• Converter unit (FR-CC2)

Model FR-CC2-H□		315K	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)		315	355	400	450	500	560	630
Output — Overload current rating[*1]		200% 60 s, 250% 3 s				150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
Rated voltage[*2]		430 to 780 VDC[*4]						
Power supply — Rated input AC voltage/frequency		Three-phase 380 to 500 V, 50 Hz/60 Hz						
Permissible AC voltage fluctuation		Three-phase 323 to 550 V, 50 Hz/60 Hz						
Permissible frequency fluctuation		±5%						
Rated input current (A)		610	683	770	866	962	1094	1212
Power supply capacity (kVA)[*3]		465	521	587	660	733	833	924
Protective structure (IEC 60529)		Open type (IP00)						
Cooling system		Forced air cooling						
DC reactor		Built-in						
Approx. mass (kg)		210	213	282	285	288	293	294

[*1] The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
[*2] The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
[*3] The power supply capacity is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
[*4] The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

● Common specifications

Control specifications	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control), Optimum excitation control, and vector control[*1]
	Output frequency range		0.2 to 590 Hz (The upper-limit frequency is 400 Hz (200 Hz for the SND rating) under Advanced magnetic flux vector control, Real sensorless vector control, and vector control[*1].)
	Frequency setting resolution	Analog Input	0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01 Hz
	Frequency accuracy	Analog Input	Within ±0.2% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque		SLD Rating:120% 0.3 Hz, LD Rating:150% 0.3 Hz, SND Rating:150% 0.3 Hz, ND Rating:200% 0.3 Hz[*2], HD Rating:250% 0.3 Hz[*2] (Real sensorless vector control, vector control[*1])
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, SND rating: 0 to 220%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected. (V/F control, Advanced magnetic flux vector control)
	Torque limit level		Torque limit value can be set (0 to 400% variable). (Real sensorless vector control, vector control[*1])
Operation specifications	Frequency setting signal	Analog Input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to +5 V are available.
		Digital input	Input using the setting dial of the operation panel or parameter unit Four-digit BCD or 16-bit binary (when used with option FR-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, Flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset The input signal can be changed using **Pr.178 to Pr.189 (input terminal function selection)**.
		Pulse train input	100 kpps
	Operational functions		Dancer feedback speed control, tension sensor feedback speed control, tension sensorless torque control, tension sensor feedback torque control, winding diameter calculation, initial winding diameter calculation, actual line speed detection, reduction ratio setting, maximum/minimum winding diameter setting, winding diameter / winding length storage, line speed acceleration/ deceleration function, dancer roll break detection, tension PI gain tuning, speed control proportional gain compensation, reel change function, taper function, inertia compensation function, mechanical loss compensation function, maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, DC feeding[*4], frequency jump, rotation display, automatic restart after instantaneous power failure, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, speed smoothing control, auto tuning, applied motor selection, gain tuning, RS-485 communication, dancer control, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, speed control, torque control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function
	Output signal	Open collector output (five terminals) Relay output (two terminals)	Inverter running, Up to frequency, Instantaneous power failure/undervoltage[*4], Overload warning, Output frequency detection, Fault The output signal can be changed using **Pr.190 to Pr.196 (output terminal function selection)**. Fault codes of the inverter can be output (4 bits) from the open collector.
		Pulse train output (FM type)	50 kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Current output (CA type)	Max. 20 mADC: one terminal (output current) The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.
		Voltage output	Max. 10 VDC: one terminal (output voltage) The monitored item can be changed using **Pr.158 AM terminal function selection**.
	Operation panel (FR-DU08)	Operating status	Output frequency, Output current, Output voltage, Frequency setting value The monitored item can be changed using **Pr.52 Operation panel main monitor selection**.
		Fault record	A fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/ current/frequency/cumulative energization time/year/month/date/time) are saved.
Protective/warning function	Protective function		Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip (electronic thermal relay function), Motor overload trip (electronic thermal relay function), Heatsink overheat, Instantaneous power failure[*4], Undervoltage[*4], Input phase loss[*3*4], Stall prevention stop, Brake transistor alarm detection[*4], Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation[*3], PTC thermistor operation[*3], Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess[*3], Parameter storage device fault, CPU fault, Operation panel power supply short circuit/ RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection[*3], Inrush current limit circuit fault[*4], Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence[*3], Speed deviation excess detection[*3], Signal loss detection[*3], Encoder phase fault[*3], 4 mA input fault[*3], PID signal fault[*3], Option fault, Opposite rotation deceleration fault[*3], Internal circuit fault, Encoder pulse number setting error, Overload trip
	Warning function		Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm[*3*4], Electronic thermal relay function pre-alarm, PU stop, Speed limit indication[*3], Parameter copy, Safety stop, Maintenance signal output[*3], USB host error, Operation panel lock[*3], Password locked[*3], Parameter write error, Copy operation error, 24 V external power supply operation
Environment	Surrounding air temperature		−10°C to +50°C (non-freezing) (LD, SND, ND, HD ratings) −10°C to +40°C (non-freezing) (SLD rating)
	Surrounding air humidity		95% RH or less (non-condensing) (With circuit board coating (conforming to IEC60721-3-3 3C2/3S2) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature[*5]		−20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000 m above sea level [*6], 5.9 m/s² [*7] or less at 10 to 55 Hz (directions of X, Y, Z axes)

*1 Available only when a vector control compatible option is installed.
*2 In the initial setting of the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, it is limited to 150% by the torque limit level.
*3 This protective function is not available in the initial status.
*4 Enabled only for standard models.
*5 Temperature applicable for a short time, e.g. in transit.
*6 For the installation at an altitude above 1,000 m up to 2,500 m, derate the rated current 3% per 500 m.
*7 2.9m/s² or less for the FR-A840-04320(160K) or higher.

■Standard Model

Outline Dimension Drawings

● **FR-A820-00046(0.4K) to 04750(90K)-R2R**
● **FR-A840-00023(0.4K) to 03610(132K)-R2R**

● **FR-A840-04320(160K) to 06830(280K)-R2R**
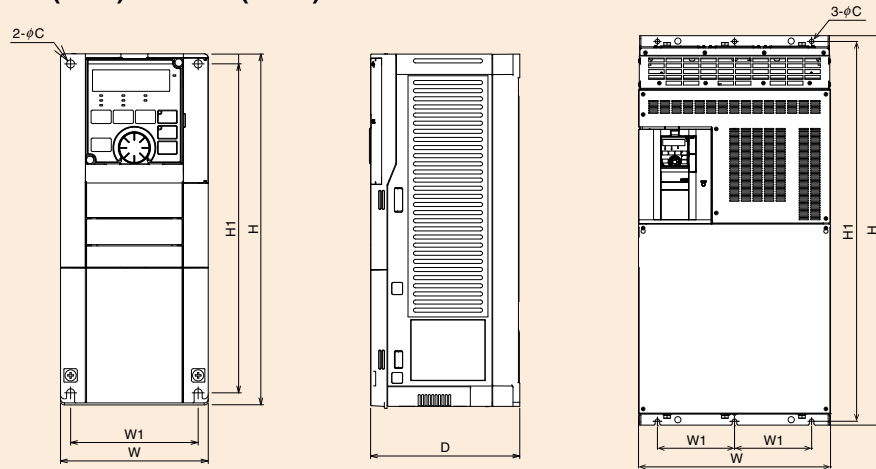
(Unit: mm)

200 V class

Inverter model	W	W1	H	H1	D	C
FR-A820-00046(0.4K)-R2R	110	95	260	245	110	6
FR-A820-00077(0.75K)-R2R	110	95	260	245	125	6
FR-A820-00105(1.5K)-R2R	150	125	260	245	140	6
FR-A820-00167(2.2K)-R2R	150	125	260	245	140	6
FR-A820-00250(3.7K)-R2R	150	125	260	245	140	6
FR-A820-00340(5.5K)-R2R	220	195	260	245	170	6
FR-A820-00490(7.5K)-R2R	220	195	260	245	170	6
FR-A820-00630(11K)-R2R	220	195	300	285	170	6
FR-A820-00770(15K)-R2R	250	230	400	380	190	10
FR-A820-00930(18.5K)-R2R	250	230	400	380	190	10
FR-A820-01250(22K)-R2R	250	230	400	380	190	10
FR-A820-01540(30K)-R2R	325	270	550	530	195	10
FR-A820-01870(37K)-R2R	435	380	550	525	250	12
FR-A820-02330(45K)-R2R	435	380	550	525	250	12
FR-A820-03160(55K)-R2R	465	410	700	675	250	12
FR-A820-03800(75K)-R2R	465	400	740	715	360	12
FR-A820-04750(90K)-R2R	465	400	740	715	360	12

400 V class

Inverter model	W	W1	H	H1	D	C
FR-A840-00023(0.4K)-R2R	150	125	260	245	140	6
FR-A840-00038(0.75K)-R2R	150	125	260	245	140	6
FR-A840-00052(1.5K)-R2R	150	125	260	245	140	6
FR-A840-00083(2.2K)-R2R	150	125	260	245	140	6
FR-A840-00126(3.7K)-R2R	150	125	260	245	140	6
FR-A840-00170(5.5K)-R2R	220	195	260	245	170	6
FR-A840-00250(7.5K)-R2R	220	195	260	245	170	6
FR-A840-00310(11K)-R2R	220	195	300	285	190	6
FR-A840-00380(15K)-R2R	220	195	300	285	190	6
FR-A840-00470(18.5K)-R2R	250	230	400	380	190	10
FR-A840-00620(22K)-R2R	250	230	400	380	190	10
FR-A840-00770(30K)-R2R	325	270	550	530	195	10
FR-A840-00930(37K)-R2R	435	380	550	525	250	12
FR-A840-01160(45K)-R2R	435	380	550	525	250	12
FR-A840-01800(55K)-R2R	435	380	550	525	250	12
FR-A840-02160(75K)-R2R	465	400	620	595	300	12
FR-A840-02600(90K)-R2R	465	400	620	595	300	12
FR-A840-03250(110K)-R2R	465	400	740	715	360	12
FR-A840-03610(132K)-R2R	465	400	740	715	360	12
FR-A840-04320(160K)-R2R	498	200	1010	985	380	12
FR-A840-04810(185K)-R2R	498	200	1010	985	380	12
FR-A840-05470(220K)-R2R	680	300	1010	984	380	12
FR-A840-06100(250K)-R2R	680	300	1010	984	380	12
FR-A840-06830(280K)-R2R	680	300	1010	984	380	12

Inverter FREQROL-A800 Plus Series for Roll to Roll

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Separated converter type

Outline Dimension Drawings

● **FR-A842-07700(315K), 08660(355K)-R2R**
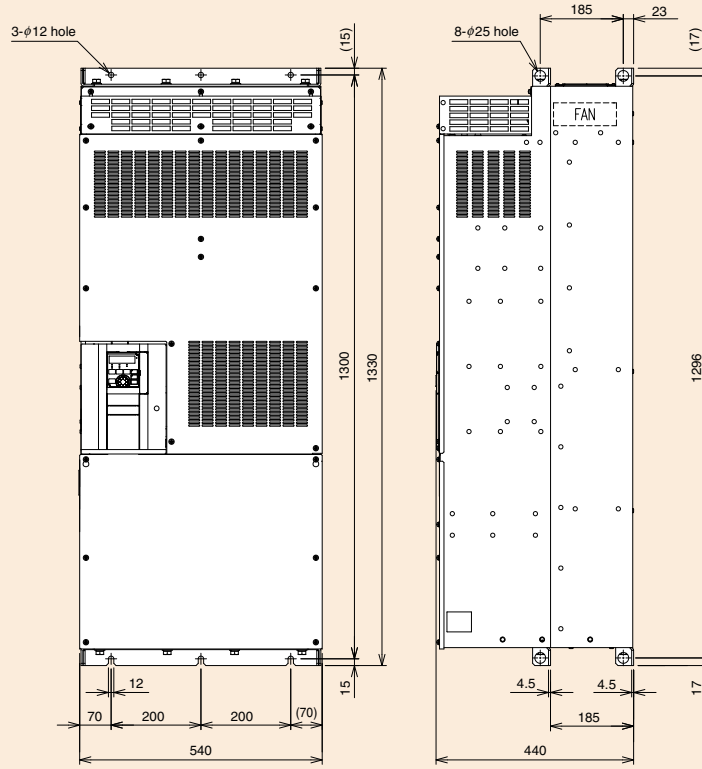
(Unit: mm)

● **FR-A842-09620(400K), 10940(450K), 12120(500K)-R2R**
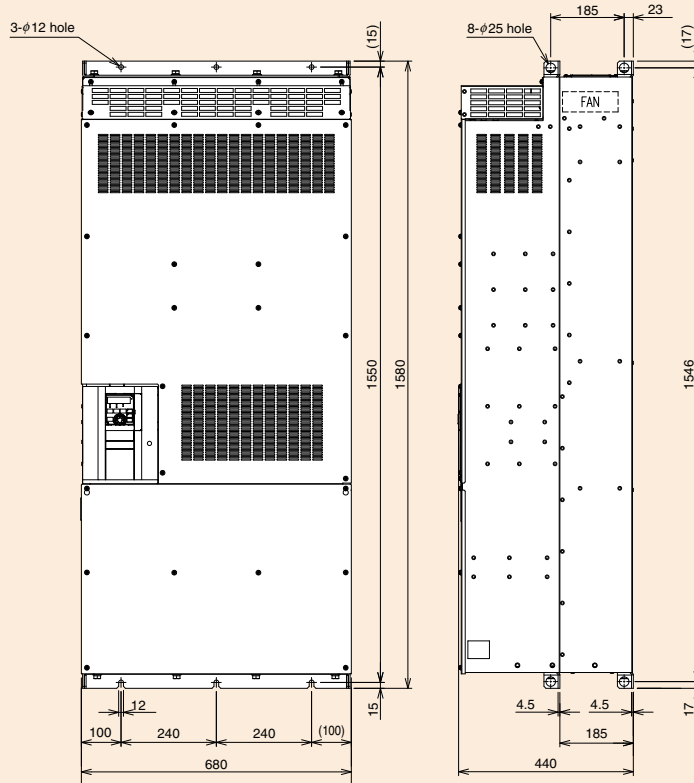
(Unit: mm)

MEMO

Drive Product

Features/
Outline

Lineup/Functions
Connectivity
Examples

Specifications/
Outline Drawing

FREQROL-A800
Series

FREQROL-F800
Series

FREQROL-E700
Series

FREQROL-F700PJ
Series

FREQROL-D700
Series

Inverter FREQROL·F800 Series

Energy Saving

Energy Saving with Inverters

The consumed power of a variable-torque load, such as fans, pumps, and blowers, is proportional to the cube of its rotation speed.

Adjusting the air volume by the inverter rotation speed control can lead to energy savings.

[Example of blower operation characteristic]

Consumed power (%)[*1]
- Damper control
- General-purpose motor (SF-PR) driven by inverter

Air volume (%)

*1: Rated motor output is 100%.

[Compared to our conventional product]
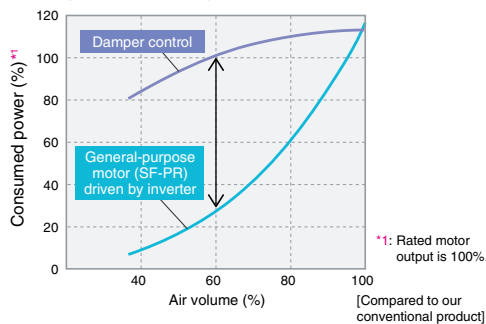
Utilizing the motor capability to the full

Optimum excitation control

● Optimum excitation control continuously adjusts the excitation current to an optimum level to provide the highest motor efficiency. With a small load torque, a substantial energy saving can be achieved.

For example, at 4% motor load torque for a general-purpose motor, the motor efficiency under Optimum excitation control is about 30% higher than the motor efficiency under V/F control.

Motor efficiency [%]
- Optimum excitation control
- More energy saving
- V/F control

Motor load factor [%]

[Compared to our conventional product]

(When the inverter running frequency is 60 Hz and the SF-PR 4P motor (15 kW) is used)
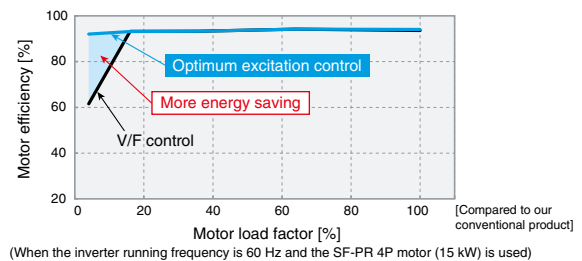
Improving starting torque and saving energy at the same time [NEW]

Advanced optimum excitation control

Advanced optimum excitation control, which has been newly developed, provides a large starting torque while maintaining the motor efficiency under the conventional Optimum excitation control.

Without the need of troublesome adjustment of parameters (acceleration/ deceleration time, torque boost, etc.), acceleration is done in a short time.

Also, energy saving operation with the utmost improved motor efficiency is performed during constant-speed operation.

Supporting operations of various motors [NEW]

Offline auto tuning

The offline auto tuning function to measure circuit constants of the motor enables optimal operation of motors even when motor constants vary, when a motor of other manufacturers is used, or when the wiring distance is long. As well as Mitsubishi general-purpose motors, Mitsubishi PM motors (MM-EFS, MM-THE4), sensorless operation can be performed for other manufacturers' general-purpose motors[*2] and other manufacturers' permanent magnet (PM) motors[*2].

The tuning function enables the Advanced optimum excitation control of other manufacturers' general-purpose motors[*2], which increases the use in the energy saving applications.

*2: Depending on the motor characteristics, tuning may not be available.

Mitsubishi general-purpose (induction) motor SF-PR

PM motor by other manufacturers

Mitsubishi IPM motor MM-EFS

General-purpose motor by other manufacturers

Drive Product
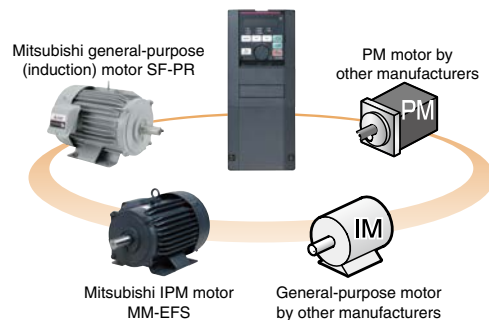
Energy Saving with High-Efficiency Motor

In the international context of global warming prevention, many countries in the world have started to introduce laws and regulations to mandate manufacturing and sales of high-efficiency motors. With the use of high-efficiency motors, further energy saving is achieved.

[IE code]
As an international standard of the efficiency, IEC60034-30 (energy-efficiency classes for single-speed, three-phase, cage-induction motors) was formulated in October 2008. The efficiency is classified into four classes from IE1 to IE4. The larger number means the higher efficiency.

Efficiency class IEC 60034-30	Mitsubishi motor efficiency	
	General-purpose motor	IPM motor
IE4 (super premium efficiency)*3	—	Premium high-efficiency IPM (MM-EFS/MM-THE4)
IE3 (premium efficiency)	Superline premium series (SF-PR)	—
IE2 (high efficiency)	Superline eco series (SF-HR)	—
IE1 (standard efficiency)	Superline series (SF-JR)	—
Below the class		—

*3: The details of IE4 are specified in IEC 60034-31.

Further energy saving with the premium high-efficiency IPM motor

MM-EFS / MM-THE4

● The IPM motor, with permanent magnets embedded in the rotor, achieves even higher efficiency as compared to the general-purpose motor (SF-PR/SF-THE3).
● The IM driving setting can be switched to IPM driving setting by only one setting. ("12" (MM-EFS/MM-THE4) in the parameter [IPM].)
Do not drive an IPM motor in the induction motor control settings.

Why is an IPM motor more efficient?

● No current flows to the rotor (secondary side), and no secondary copper loss is generated.
● Magnetic flux is generated with permanent magnets, and less motor current is required.
● Embedded magnets provide reluctance torque*4, and the reluctance torque can be applied.

*4: Reluctance torque occurs due to magnetic imbalance on the rotor.

[Comparison of efficiency]

[Compared to our conventional product]

[Comparison of motor losses]
* Example of 22 kW motors
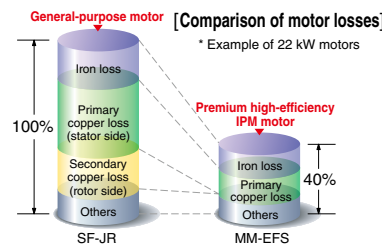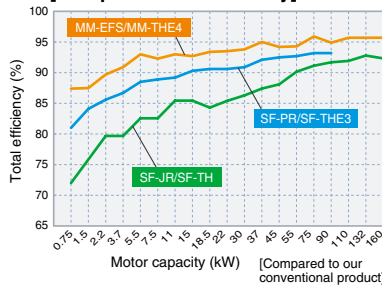
Excellent compatibility with the high-performance energy-saving motor

SF-PR

Motor constants are stored in the inverter. Energy-saving operation can be started just by setting parameters. The SF-PR motor conforms to the Japanese domestic Top Runner Standard (IE3 equivalent). Its energy-saving operation contributes reduction in the electricity charges, which in turn lowers the running cost.
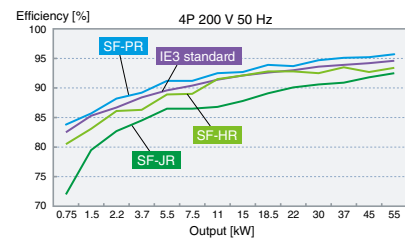
Energy-Saving Functions Suitable for Various Systems

Standby power reduction NEW

● With the 24 VDC external power supply, the input MC signal can be turned OFF after the motor is stopped, and turned ON before activating the motor. The inverter enables self power management to reduce standby power.
● The inverter cooling fan can be controlled depending on the temperature of the inverter heatsink.
Also, signals can be output in accordance with the inverter cooling fan operation. When the fan is installed on the enclosure, the enclosure fan can be synchronized with the inverter cooling fan.
Extra power consumption when the motor is stopped can be reduced.
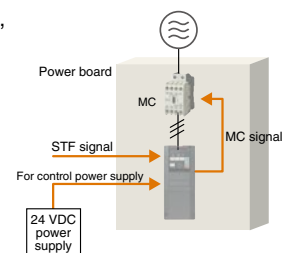
Energy saving at a glance

Energy saving monitor / Pulse train output of output power

● Energy saving monitor is available. The energy saving effect can be checked using an operation panel, output terminal, or network.
● The output power amount measured by the inverter can be output in pulses.
The cumulative power amount can be easily checked.
(This function cannot be used as a meter to certify electricity billings.)

Furthermore: With the Mitsubishi energy measuring module, the energy saving effect can be displayed, measured, and collected.
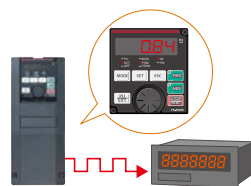
Effective use of the regenerative energy Option

FR-CV / FR-HC2

Multiple inverters can be connected to the power regeneration common converter (FR-CV) or the high power factor converter (FR-HC2) through a common PN bus. The regenerated energy is used by another inverter, and if there is still an excess, it is returned to the power supply, saving on the energy consumption. The 355K or higher models are inverter-converter separated types, which are suitable for power regeneration.
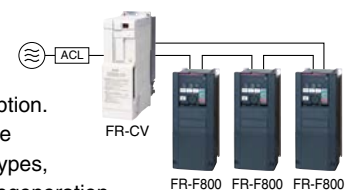
Functions Ideal for Fans and Pumps

Optimum Inverter Capacity Selection

Multiple rating **NEW**

The rating can be selected between the two types (LD (light duty) or SLD (superlight duty)) depending on the load of the fan/pump to be used. The optimum inverter capacity can be selected suitable for the motor to be used.

For the 200 V class 90K or higher and the 400 V class 75K or higher, a motor with one-rank higher capacity can be combined.

Load	Rating	Overload current rating
Superlight duty	SLD rating	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40˚C
Light duty	LD rating	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50˚C

Further Enhanced PID Control

System cost reduction [PID multiple loops (two loops)] **NEW**

Two PID operation units are available in the inverter.
The inverter can perform PID control of the motor operation and control the external equipment at the same time. The system cost can be reduced because no external PID controller is required for controlling the external equipment.
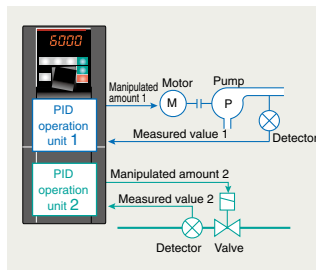
Direct setting of the PID set point

The PID set point can be set directly from the operation panel. The setting can be easily changed at hand.

Visibility improvement **Option** **NEW**

With the optional LCD operation panel (FR-LU08), the unit can be changed from "%" to other easy-to-see units. Maintenance and adjustment is facilitated by using a familiar unit of air volume, temperature, etc. for indication.

LCD operation panel (FR-LU08) (Option)

Unit conversion

Avoidance of rapid acceleration/deceleration using PID action **NEW**

PID pre-charge function

Before PID action, the water flow to the pipe is controlled by operating the motor at a constant speed until the measured value (pressure, etc.) reaches the set level. This function is used to avoid rapid acceleration/deceleration caused by starting the PID action while the pipe is empty, and prevent a water hammer action, etc.

Example of the pre-charge operation
(Ending the pre-charge operation based on the measured value)

Water volume control with multiple pumps **NEW**

Multi-pump function

By controlling the pumps connected in parallel (up to four pumps) by the PID control by one inverter, water volume, etc. can be adjusted.

One of the connected pumps is driven by the inverter. Other pumps are driven by commercial power supply. The number of pumps to be driven by commercial power supply is automatically adjusted according to the water volume.

Pump water volume control **NEW**

PID input pressure control

In order to prevent air intake and cavitation inside the pump, the pump inlet pressure can be controlled so that there is no water shortage.

Operating Status Monitoring

Detection of mechanical faults NEW

Load characteristics measurement function

The speed/torque relationship is stored while no fault occurs. By comparing the present load status with the stored load characteristics, out-of-range warnings can be output if applicable. Mechanical faults such as clogging of the filter or breakage of the belt can be easily detected, and maintenance is facilitated.

Smooth Restart

Automatic restart after instantaneous power failure / flying start function

After an instantaneous power failure, the operation is restartable from the coasting motor speed.
With the advanced flying start function, the operation can be smoothly started from low speed.

Coasts during instantaneous power failure

Automatic restart after instantaneous power failure function

Keep Running during Flying Start Operation

Regeneration avoidance function

The operation frequency is automatically increased to prevent the regenerative overvoltage fault from occurring. This function is useful when a load is forcibly rotated by another fan in the duct.

PLC Control with an Inverter

PLC function in the inverter NEW

● Parameters and setting frequency can be changed at the program. Control programs can be created in sequence ladders using the inverter setup software (FR Configurator2).
● Inverter control such as inverter operations triggered by input signals, signal output based on inverter operation status, and monitor output can be freely customized based on the machine specifications.
● All machines can be controlled by the inverter alone, and control can also be dispersed.
● Time-based operation is possible by using in combination with the real-time clock function (when using an optional LCD operation panel (FR-LU08)).

Cleaning of fans and pumps NEW

Cleaning function

Foreign matter on the impellers or fans of pumps can be removed by repeating forward/reverse rotation and stopping of the motor. (Use this function when a back flush does not pose a problem.)
This function can be also automatically started when the result of load characteristics measurement is out of range (overload).

Compatibility with Various Systems

Compatibility with various networks

It supports BACnet® MS/TP as standard, as well as Mitsubishi inverter protocol and MODBUS®RTU (binary) protocol. Communication options are also available for the major network protocols such as CC-Link, CC-Link IE Field, LONWORKS® (to be supported soon), FL-net remote I/O (to be supported soon), PROFIBUS-DPV0, and DeviceNet™.

Simplified external equipment

The CA-type inverters are available. For the CA type, the monitor output terminal FM/CA operates as terminal CA (analog current output 0 to 20 mA), not as terminal FM (pulse train output). An external converter is not required.
(The factory setting is different for the CA type and the FM type.)

Mechanical Resonance Suppression

Speed smoothing control

Vibration caused by mechanical resonance can be reduced. (Available with general-purpose motors)

Extended Functions

Support for up to three types of options NEW

Three types of plug-in options can be attached.
The functions of the inverter can be extended through network. For example, additional I/O terminals can be used.

Security & Safety

Improved System Safety

Safety standards compliance `NEW`

Controls with safety functions can be easily performed.
PLd and SIL2 are supported as standard. (STO)
- EN ISO 13849-1 PLd / Cat.3
- EN 61508, EN61800-5-2 SIL2

Provided by the user (present)

Emergency stop

Safety function is equipped.
- Magnetic contactor (MC)
- Emergency stop wiring

FR-F800 (STO)

Emergency stop

Before...
2 MCs were required.
- High cost
- High maintenance (maintenance for two)
- Large installation space

Safety stop function (STO) cuts down the number of MCs to one!*1
- Low cost
- Low maintenance (maintenance for one)
- Small installation space

*1: One MC is required to shut off the power at an activation of the protective function.
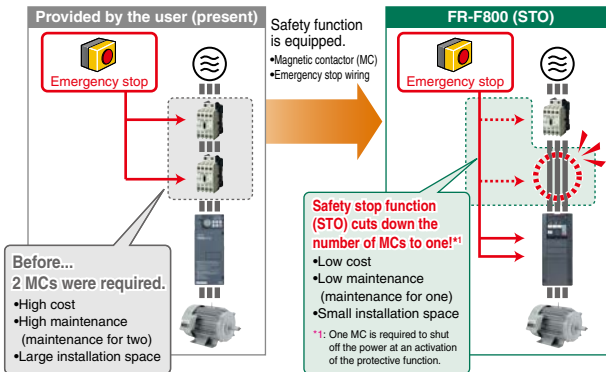
Reliable and Secure Maintenance

Standard 24 VDC power supply for the control circuit `NEW`

In addition to the existing power supply input terminals (R1 and S1) of the control circuit, 24 VDC input is equipped as standard.
The 24 VDC power supplied from outside can be fed to the control circuit locally.
The parameter setting and communication operation can be done without turning ON the main power.

OFF

24 VDC

24 V external power supply input indication
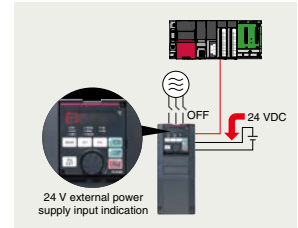
Prevention of trouble with temperature monitoring `NEW`

The inverter is equipped with an internal temperature sensor, which outputs a signal when the internal temperature is high.
This facilitates the detection of rises in temperature inside the inverter following cooling fan malfunction, or rises in the surrounding air temperature due to inverter operating conditions.

Quick Reaction to Troubles

Easy fault diagnosis `NEW`

- The operating status (output frequency, etc.) immediately before the protection function activates can be stored in the inverter built-in RAM with the trace function. Stored data (trace data) can be copied to a USB memory device, facilitating easy trouble analysis at a separate location by reading into FR Configurator2.

  Trace data stored in the built-in RAM is deleted when the power is turned OFF or the inverter is reset.

Graph function
(FR Configurator2)
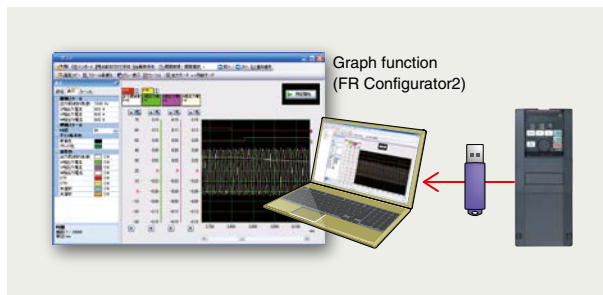
- Clock setting is now available in addition to the already-available cumulative energization time. The time and date at a protective function activation are easily identified.
(The clock is reset at power-OFF.) The date and time are also saved with the trace data, making the fault analysis easier.
By using the real-time clock function with the optional LCD operation panel (FR-LU08) (when using battery), the time is not reset even when the power supply is turned OFF.

FR-LU08 (LCD type)
(Option)

Protection of Critical Parameter Settings

Misoperation prevention by setting a password

●Setting a 4-digit password can restrict parameter reading/writing.

Long Life Components and Life Check Function

Long life components

●The service life of the cooling fans is now 10 years*1.
The service life can be further extended by ON/OFF control of the cooling fan.
●Capacitors with a design life of 10 years*1*2 are adapted.
●Life indication of life components

Components	Estimated lifespan of the FR-F800 *1	Guideline of JEMA *3
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years*2	5 years
Printed board smoothing capacitor	10 years*2	5 years

*1: Surrounding air temperature: Annual average of 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt).
    The design life is a calculated value from the LD rating and is not a guaranteed product life.
*2: Output current: 80% of the inverter rating
*3: Excerpts from "Periodic check of the transistorized inverter" of JEMA
    (Japan Electrical Manufacturer's Association).

Enhanced life check function NEW

●An internal thermal sensor is equipped to all inverters as standard, which enables monitoring of the installation environment. Use this function as a guide for the life diagnosis.
●Maintenance timers are available for up to three peripheral devices, such as a motor and bearings.

"Maintenance 1 output" warning
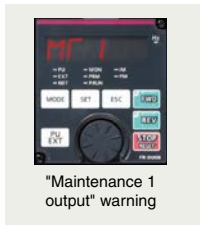
Renewal Assurance

Compatibility with existing models

●The inverter installation method is the same as that for the FR-F700(P) series, eliminating any concerns over replacement (except for some capacity models). Furthermore, the FR-F700(P) series control circuit terminal blocks can be installed with the use of an option (FR-A8TAT).

●The terminal response adjustment function allows a user to adjust the response speed in accordance with the existing facility. (The response time is shorter for the FR-F800 series.)
●In addition to the FR-F700(P) series' parameter settings, the FR-F500 series parameter settings (to be supported soon) can be easily copied to the FR-F800 series by using the conversion function of FR Configurator2. NEW

Personal computer
FR-F700 (P)   FR-F800

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series
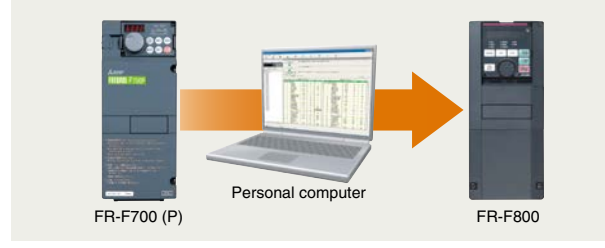
Compatibility with the Environment

Suppression of Outgoing Harmonic Current and EMI

● Harmonic current may adversely affect the power supply. To suppress such harmonic current, the power-factor-improving compact AC reactor (FR-HAL) and the DC reactor (FR-HEL) are available. (For the 75K or higher inverter, always connect a DC reactor. Select a DC reactor according to the applied motor capacity.)

AC reactor (FR-HAL)   DC reactor (FR-HEL)

● By attaching the EMC filter connector to the ON or OFF position, the built-in EMC filter can be set enabled/disabled[1][2]. When it is enabled, the inverter conforms to the EMC Directive (EN61800-3/2nd Environment Category C3[3]) by itself.
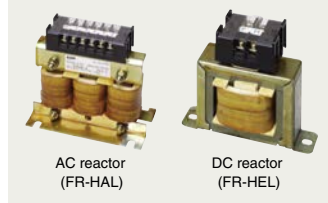
[1]: Enabling the EMC filter increases leakage current.
[2]: The input side common mode choke, which is built in the 55K or lower inverter, is always enabled regardless of the EMC filter ON/OFF connector setting.
[3]: Refer to the EMC Installation Guidelines for the required specifications.

	Capacitive filter	Common mode choke	DC reactor
55K or lower	Standard (built-in)	Standard (built-in)	Option (sold separately)
75K or higher	Standard (built-in)	Option (sold separately)	Option (sold separately)

● The F800 series inverters are equipped with built-in capacitive filters (capacitors) and common mode chokes (55K or lower). By installing a DC reactor (FR-HEL), which is available as an option, they can confirm to the Architectural Standard Specifications (Electric Installation) and the Architectural Standard Specifications (Machinery Installation) (2013 revision) supervised by the Ministry of Land, Infrastructure, Transport and Tourism of Japan.

● With a high power factor converter (FR-HC2), the inverter is equivalent to a self-excitation three-phase bridge circuit in the "Harmonic Suppression Guidelines for Specific Consumers" in Japan, and realizes the equivalent capacity conversion coefficient K5=0. For the 355K or higher, the converter is separated. Therefore, installation space can be saved when connecting the FR-HC2.

Protected in Hazardous Environments

Inverters with circuit board coating (IEC60721-3-3 3C2/3S2) and plated conductors are available for improved environmental resistance. ("-60" or "-06" is affixed to the end of the inverter model name.)

Global Compatibility

● Complies with UL, cUL, and EC Directives (CE marking), and the Radio Waves Act (South Korea) (KC marking).
● Being RoHS compliant, the FR-F800 inverters are friendly to people and the environment.

Easy Setup & Operation

Streamlining the Startup Process

Parameter copy with a USB memory device `NEW`

A USB host connecter (A type), which allows external device connections, has been added.
Parameters can be copied to commercial USB memory devices.

USB 2.0 supported (full speed)
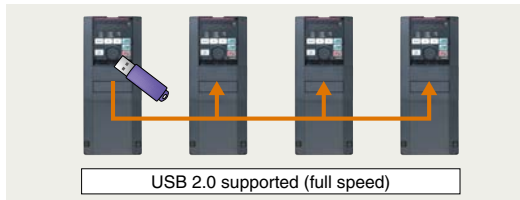
Easy setup with FR Configurator2 `NEW`

● With the sense of unity with other Mitsubishi FA products with common MELSOFT design and operability, the software is easy to use.
● Easy plug-and-play connection is available to the USB terminal equipped as standard.

FR Configurator2   Mini B connector

MELSOFT

USB cable   Inverter
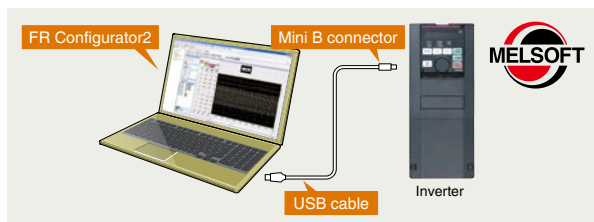
● A free trial version, which contains start-up functions, is available. It can be downloaded at Mitsubishi Electric FA Global Website.

Easy wiring to the control circuit `NEW`

Spring clamp terminals have been adopted for control circuit terminals.
Wires can be protected against loosening under vibrations during transportation of the inverter. Ten additional terminals are used as compared to the FR-F700(P) series.
Round crimping terminals can also be used by employing a control terminal option (FR-A8TR).

Easy wiring. Just insert.
Assures the tensile strength of the DIN standards.
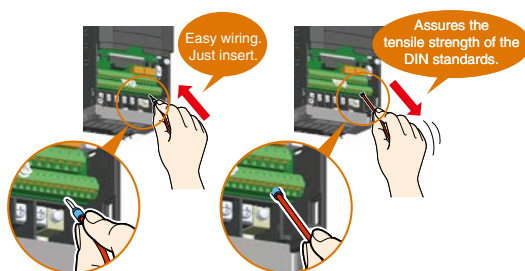
Easy-to-follow Display Improves the Operability

Easy operation with GOT `NEW`

● Automatic communication is possible without specifying any parameter settings simply by connecting to the GOT2000 series.
● The PLC function device monitor can be displayed at the GOT2000 series. Batch control of multiple inverter device monitors is possible with a single GOT unit.
● The sample screen data for the FR-F800 can be found in the screen design software of the GOT2000 series. For the latest version of the screen design software, please contact your local sales office.

Easy-to-follow parameter configuration `NEW`

With the parameter setting mode selection of the operation panel, the group parameter mode can be selected to provide intuitive and simple parameter settings. (The conventional parameter setting mode is selected by default.)

Conventional parameter (F700(P))   Pr. 1 2 7

New parameter (F800)   Pr. A + 6 + 1 2

Major division Minor division
Group number   Parameter number

Major division	Name
E	Environment
F	Acceleration/deceleration
D	Start and frequency commands
H	Protective function
M	Monitor
T	Multiple function input terminals
C	Motor constant
A	Applications
N	Communication
G	Control

Easy-to-read operation panel `NEW`

A5-digit, 12-segment display has been adopted for the operation panel (FR-DU08) for a more natural character display. Furthermore, an optional operation panel (FR-LU08) adopting an LCD panel capable of displaying text and menus is also available.

FR-DU08 (12-segment type)   FR-LU08 (LCD type) (Option)
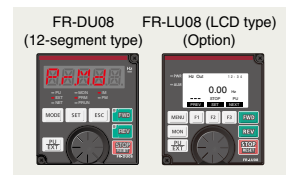
To Aid with Maintenance

Reduced wiring check time

Split-type covers are adapted for all capacity models. Maintenance is now easy because all an operator has to do is to remove the cover for the target wiring area.

Maintenance and control of multiple inverters `Option` `NEW`

Serial number reading is possible using the optional LCD operation panel (FR-LU08) or the inverter setup software (FR Configurator2). Administration of different inverters has become much more simple.

Wide range of lineup

•Standard model

FR - F 8 **2** **0** - **0.75K** - **1** - ▢

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure, functionality
0	Standard model

Symbol*1	Description
0.75K to 315K	LD rated inverter capacity (kW)

Symbol	Type
1	FM
2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06*3	With	With

		0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K
Three-phase 200 V class FR-F820-▢*4		00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400 V class FR-F840-▢*4		0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K
		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600
									●	●	●	●	●	●	●	●	●	●
		132K	160K	185K	220K	250K	280K	315K										
		03250	03610	04320	04810	05470	06100	06830										
		●	●	●	●	●	●	●									

•Separated converter type

FR - F 8 **4** **2** - **355K** - **1** - ▢

Symbol	Voltage class
4	400 V class

Symbol	Structure, functionality
2	Separated converter type

Symbol*1	Description
355K to 560K	LD rated inverter capacity (kW)

Symbol	Type
1	FM
2	CA*2

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
None	Without	Without
60	With	Without
06	With	With

	355K	400K	450K	500K	560K
Three-phase 400 V class FR-F842-▢*5	07700	08660	09620	10940	12120
	●	●	●	●	●

*1: Models can be alternatively indicated with the inverter rated current (SLD rating).
*2: Specification differs by the type as follows.

Type	Motor output	Initial setting				
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage	Pr.570 Multiple rating setting
FM (terminal FM equipped model)	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to ±10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)	1 (LD rating)
CA (terminal CA equipped model)	Terminal CA (analog current output (0 to 20 mADC)) Terminal AM (analog voltage output (0 to ±10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)	0 (SLD rating)

*3: Available for the 7.5K or higher.
*4: For the 75K or higher inverter, always connect a DC reactor (FR-HEL), which is available as an option.
    Select a DC reactor according to the applied motor capacity.
*5: Always install the converter unit (FR-CC2). (Not required when a high power factor converter (FR-HC2) is used)

Converter unit

FR - C C 2 - **H** **355K** - **60**

Symbol	Voltage class
H	400 V class

Symbol	Description
355K to 630K	Applicable motor capacity (kW)

Symbol	Circuit board coating (IEC60721-3-3 3C2/3S2 compatible)	Plated conductor
60	With	Without
06	With	With

	355K	400K	450K	500K	560K	630K
Three-phase 400 V class FR-CC2-H▢ (with the built-in DC reactor)	●	●	●	●	●	●

●: Released model

Drive Product

■Connection Example

• **Connection example for standard models**

Three-phase AC power supply
Must be within the permissible power supply specifications of the inverter.

Inverter

USB connector
USB host
(A connector)
Communication status indicator
(LED)(USB host)

USB

Moulded case circuit breaker (MCCB) or earth leakage current breaker (ELB), fuse
Must be selected carefully since an inrush current flows in the inverter at power ON.

USB device
(Mini B connector)

Personal computer
(FR Configurator2)

Magnetic contactor (MC)
Install this to ensure safety.
Do not use this to start and stop the inverter.
Doing so will shorten the life of the inverter.

AC reactor (FR-HAL)

DC reactor (FR-HEL)

Line noise filter (FR-BLF)
The FR-F820-02330(55K) or lower and the FR-F840-01160(55K) or lower are equipped with the common mode choke.

For the FR-F820-03160(75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor. (The converter unit (FR-CC2) is equipped with the DC reactor.)

P/+ P1   R/L1 S/L2 T/L3   P/+ N/-

Earth (Ground)

IM connection
U V W

PM connection
U V W

EMC filter (ferrite core)
(FR-BSF01, FR-BLF)

Contactor
Example)
No-fuse switch (DSN type) Connect this for an application where a PM motor is driven by the load even while the inverter power is OFF. Do not open or close the contactor while the inverter is running (outputting).

Induction motor

Earth (Ground)

IPM motor
(MM-EFS, MM-THE4)

Earth (Ground)

Brake unit (FR-BU2)

P/+ PR
P/+
PR

High power factor converter (FR-HC2)

Power regeneration common converter (FR-CV)
Power regeneration converter (MT-RC)

Resistor unit (FR-BR, MT-BR5)

▨ : Install these options as required.

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Standard Specifications

●Rating (Standard model)

200 V class

Model FR-F820-□		0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K
		00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
Applicable motor capacity (kW)*1	SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
	LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output Rated capacity (kVA)*2	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
	LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
	LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																
Rated voltage*4		Three-phase 200 to 240 V																
Power supply Rated input AC voltage/frequency		Three-phase 200 to 240 V 50 Hz/60 Hz																
Permissible AC voltage fluctuation		170 to 264 V 50 Hz/60 Hz																
Permissible frequency fluctuation		±5%																
Rated input current (A)*5	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
	LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
Power supply capacity (kVA)*6	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
	LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
Protective structure (IEC 60529)*7		Enclose type (IP20)											Open type (IP00)					
Cooling system		Self-cooling		Forced air cooling														
Approx. mass (kg)		1.9	2.1	3.0	3.0	3.0	6.3	6.3	8.3	15	15	15	22	42	42	54	74	74

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*6: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*7: FR-DU08: IP40 (except for the PU connector section)

400 V class

Model FR-F840-□		0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K	315K
		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
Applicable motor capacity (kW)*1	SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
	LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
Output Rated capacity (kVA)*2	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
	LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
	LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C																							
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C																							
Rated voltage*4		Three-phase 380 to 500 V																							
Power supply Rated input AC voltage/frequency		Three-phase 380 to 500 V 50 Hz/60 Hz*8																							
Permissible AC voltage fluctuation		323 to 550 V 50 Hz/60 Hz																							
Permissible frequency fluctuation		±5%																							
Rated input current (A)*5	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
	LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
Power supply capacity (kVA)*6	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
	LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
Protective structure (IEC 60529)*7		Enclose type (IP20)												Open type (IP00)											
Cooling system		Self-cooling			Forced air cooling																				
Approx. mass (kg)		2.5	2.5	2.5	3.0	3.0	6.3	6.3	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*6: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*7: FR-DU08: IP40 (except for the PU connector section)
*8: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.

● Rating (separated converter type)

400 V class

• Inverter

Model FR-F842-□		355K	400K	450K	500K	560K
		07700	08660	09620	10940	12120
Applicable motor capacity (kW)*1	SLD	400	450	500	560	630
	LD	355	400	450	500	560
Output — Rated capacity (kVA)*2	SLD	587	660	733	834	924
	LD	521	587	660	733	834
Rated current (A)	SLD	770	866	962	1094	1212
	LD	683	770	866	962	1094
Overload current rating*3	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature of 40°C				
	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
Rated voltage*4		Three-phase 380 to 500 V				
Regenerative braking torque*5 (When the converter unit (FR-CC2) is used)	Maximum brake torque	10% torque/continuous				
Input power — DC power supply voltage		430 to 780 VDC				
Control power supply auxiliary input		Single phase 380 to 500 V 50 Hz/60 Hz*7				
Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529)*6		Open type (IP00)				
Cooling system		Forced air cooling				
Approx. mass (kg)		163	163	243	243	243

*1: The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2: The rated output capacity indicated assumes that the output voltage is 440 V.
*3: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4: The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*5: LD rating reference value
*6: FR-DU08: IP40 (except for the PU connector section)
*7: For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection.**

• Converter unit (FR-CC2)

Model FR-CC2-H□	355K	400K	450K	500K	560K	630K
Applicable motor capacity (kW)	355	400	450	500	560	630
Output — Overload current rating*1	200% 60 s, 250% 3 s			150% 60 s, 200% 3 s	120% 60 s, 150% 3 s	110% 60 s, 120% 3 s
Rated voltage*2	430 to 780 VDC*4					
Power supply — Rated input AC voltage/frequency	Three-phase 380 to 500 V 50 Hz/60 Hz					
Permissible AC voltage fluctuation	Three-phase 323 to 550 V 50 Hz/60 Hz					
Permissible frequency fluctuation	±5%					
Rated input current (A)	683	770	866	962	1094	1212
Power supply capacity (kVA)*3	521	587	660	733	833	924
Protective structure (IEC 60529)	Open type (IP00)					
Cooling system	Forced air cooling					
DC reactor	Built-in					
Approx. mass (kg)	213	282	285	288	293	294

*1: The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the converter unit and the inverter to return to or below the temperatures under 100% load.
*2: The converter unit output voltage varies according to the input power supply voltage and the load. The maximum point of the voltage waveform at the converter unit output side is approximately the power supply voltage multiplied by $\sqrt{2}$.
*3: The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*4: The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines) / average voltage between three lines × 100)

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

●Common specifications

<table>
<tr><td rowspan="14">Control specifications</td><td colspan="2">Control method</td><td>Soft-PWM control, high carrier frequency PWM control (selectable among V/F control (Optimum excitation control), Advanced magnetic flux vector control (Advanced optimum excitation control) and PM motor control)</td></tr>
<tr><td colspan="2">Output frequency range</td><td>0.2 to 590 Hz (The upper-limit frequency is 400 Hz under Advanced magnetic flux vector control, and PM motor control.)</td></tr>
<tr><td rowspan="2">Frequency setting resolution</td><td>Analog input</td><td>0.015 Hz/60 Hz (terminal 2, 4: 0 to 10 V/12 bits)
0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1)
0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)</td></tr>
<tr><td>Digital input</td><td>0.01 Hz</td></tr>
<tr><td rowspan="2">Frequency accuracy</td><td>Analog input</td><td>Within ±0.2% of the max. output frequency (25°C ± 10°C)</td></tr>
<tr><td>Digital input</td><td>Within 0.01% of the set output frequency</td></tr>
<tr><td colspan="2">Voltage/frequency characteristics</td><td>Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.</td></tr>
<tr><td rowspan="2">Starting torque</td><td>Induction motor</td><td>120% 0.5 Hz (Advanced magnetic flux vector control)</td></tr>
<tr><td>IPM motor</td><td>50%</td></tr>
<tr><td colspan="2">Torque boost</td><td>Manual torque boost</td></tr>
<tr><td colspan="2">Acceleration/deceleration time setting</td><td>0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.</td></tr>
<tr><td colspan="2">DC injection brake (induction motor)</td><td>Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable</td></tr>
<tr><td colspan="2">Stall prevention operation level</td><td>Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%). Whether to use the stall prevention or not can be selected. (V/F control, Advanced magnetic flux vector control)</td></tr>
<tr><td rowspan="9">Operation specifications</td><td rowspan="2">Frequency setting signal</td><td>Analog input</td><td>Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available.
Terminal 1: -10 to +10 V, -5 to 5 V are available.</td></tr>
<tr><td>Digital input</td><td>Input using the setting dial of the operation panel or the parameter unit
Four-digit BCD or 16-bit binary (when used with option FR-A8AX)</td></tr>
<tr><td colspan="2">Start signal</td><td>Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.</td></tr>
<tr><td colspan="2">Input signals (twelve terminals)</td><td>Low-speed operation command, Middle-speed operation command, High-speed operation command, Second function selection, Terminal 4 input selection, Jog operation selection, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset
The input signal can be changed using **Pr.178 to Pr.189 (input terminal function selection)**.</td></tr>
<tr><td colspan="2">Pulse train input</td><td>100 kpps</td></tr>
<tr><td colspan="2">Operational functions</td><td>Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding[*1], frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, retry function, carrier frequency selection, fast response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, speed smoothing control, traverse, auto tuning, applied motor selection, RS-485 communication, PID control, PID pre-charge function, cooling fan operation selection, stop selection (deceleration stop/coasting), power-failure deceleration stop function, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, test run, 24 V power supply input for control circuit, safety stop function, self power management, BACnet communication, PID gain tuning, cleaning, load characteristics storage, emergency drive[*1]</td></tr>
<tr><td rowspan="2">Output signal</td><td>Open collector output (five terminals)
Relay output (two terminals)</td><td>Inverter running, Up to frequency, Instantaneous power failure/undervoltage[*1], Overload warning, Output frequency detection, Fault
The output signal can be changed using **Pr.190 to Pr.196 (output terminal function selection)**.
Fault codes of the inverter can be output (4 bits) from the open collector.</td></tr>
<tr><td>Pulse train output (FM type)</td><td>50 kpps</td></tr>
<tr><td rowspan="6">Indication</td><td rowspan="4">For meter</td><td>Pulse train output (FM type)</td><td>Max. 2.4 kHz: one terminal (output frequency)
The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.</td></tr>
<tr><td>Current output (CA type)</td><td>Max. 20 mADC: one terminal (output current)
The monitored item can be changed using **Pr.54 FM/CA terminal function selection**.</td></tr>
<tr><td>Voltage output</td><td>Max. 10 VDC: one terminal (output voltage)
The monitored item can be changed using **Pr.158 AM terminal function selection**.</td></tr>
<tr><td rowspan="2">Operation panel (FR-DU08)</td><td>Operating status</td><td>Output frequency, output current, output voltage, frequency setting value
The monitored item can be changed using **Pr.52 Operation panel main monitor selection**.</td></tr>
<tr><td>Fault record</td><td>Fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/current/frequency/cumulative energization time/year/month/date/time) are saved.</td></tr>
<tr><td rowspan="2">Protective/ warning function</td><td rowspan="2">Protective function</td><td>Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip (electronic thermal relay function), Motor overload trip (electronic thermal relay function), Heatsink overheat, Instantaneous power failure[*1], Undervoltage[*1], Input phase loss[*1*2], Stall prevention stop, Loss of synchronism detection[*2], Upper limit fault detection, Lower limit fault detection, Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation[*2], PTC thermistor operation[*2], Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess[*2], CPU fault, Operation panel power supply short circuit/RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection[*2], Inrush current limit circuit fault[*1], Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence[*2], 4 mA input fault[*2], Pre-charge fault[*2], PID signal fault[*2], Internal circuit fault, User definition error in the PLC function</td></tr>
</table>

<table>
<tr><td>Warning function</td><td>Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Electronic thermal relay function pre-alarm, PU stop, Parameter copy, Safety stop, Maintenance timer 1 to 3[*2], USB host error, Operation panel lock[*2], Password locked[*2], Parameter write error, Copy operation error, 24 V external power supply operation, Load fault warning, Emergency drive in operation[*1]</td></tr>
<tr><td rowspan="6">Environment</td><td>Surrounding air temperature</td><td>-10°C to +50°C (non-freezing) (LD rating)
-10°C to +40°C (non-freezing) (SLD rating)</td></tr>
<tr><td>Surrounding air humidity</td><td>With circuit board coating (conforming to IEC60721-3-3 3C2/3S2): 95% RH or less (non-condensing)
Without circuit board coating: 90% RH or less (non-condensing)</td></tr>
<tr><td>Storage temperature[*3]</td><td>-20°C to +65°C</td></tr>
<tr><td>Atmosphere</td><td>Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)</td></tr>
<tr><td>Altitude/vibration</td><td>Maximum 1000 m above sea level[*4], 5.9 m/s² or less[*5] at 10 to 55 Hz (directions of X, Y, Z axes)</td></tr>
</table>

*1: Available only for the standard model.
*2: This protective function is not available in the initial status.
*3: Temperature applicable for a short time, e.g. in transit.
*4: For the installation at an altitude above 1,000 m (up to 2,500 m), derate the rated current 3% per 500 m.
*5: 2.9 m/s² or less for the FR-F840-04320(185K) or higher.

Drive Product

●PLC function specifications

Item		F800 PLC function specifications
Control method		Repeated operation (by stored program)
I/O control mode		Refresh
Programming language		Relay symbolic language (ladder) Function block
No. of instructi-ons	Sequence instructions	25
	Basic instructions	84
	Application instructions	37
Processing speed		Sequence instructions 1.9 μs to 12 μs/step[*1]
Number of I/O device points		128 (input: 64 points, output: 64 points) 19 points built-in (input: 12 points, output: 7 points)[*2] FR-A8AX (input: 16 points) FR-A8AY (output: 7 points) FR-A8AR (output: 3 points)
Number of analog I/O points		3 input points built-in (Terminals 1, 2, and 4) 2 output points built-in (Terminals FM/CA and AM), FR-A8AY: 2 output points (AM0 and AM1)
Pulse train I/O	Input	Terminal JOG maximum input pulse: 100k pulses/s[*3]
	Output	Terminal FM maximum output pulse: 50k pulses/s[*3]
Watchdog timer		10 to 2000 ms
Program capacity		6K steps (24k bytes) (0 to 6144 steps can be set) Contained in one program
Device	Internal relay (M)	128 (M0 to M127)
	Latch relay (L)	Not used (Can be set with parameters but will not latch)[*4]
	Timer (T) — Number of points	16 (T0 to T15)
	Timer (T) — Specifications	100 ms timer: 0.1 to 3276.7 s can be set 10 ms timer: 0.01 to 327.67 s can be set 100 ms retentive timer: 0.1 to 3276.7 s can be set
	Counter (C) — Number of points	16 (C0 to C15)
	Counter (C) — Specifications	Normal counter: Setting range 1 to 32767 Interrupt program counter: Not used
	Data register (D)	256 (D0 to D255)
	Special relay (SM)	2048 (SM0 to SM2047) with limited functions
	Special register (SD)	2048 (SD0 to SD2047) with limited functions

*1: The scan time is approximately 40 ms for 1K steps as inverter control is also performed in actual operations.
*2: The signals same as the ones assigned to the inverter I/O terminals are used.
  One point is always required for a sequence start (RUN/STOP).
*3: **Pr.291 Pulse train I/O selection** must be set.
*4: There is no device latch function for power failures.
  Use the **Pr.1150 to Pr.1199 PLC function user parameters 1 to 50** (D206 to D255) to store device values in the EEPROM.

[**NOTE**]
・There is no buffer memory.

■Standard model

Outline Dimension Drawings

● FR-F820-00046(0.75K), FR-F820-00077(1.5K)

2-φ6 hole

(7.5)
245
260
7.5
(1.5)
6
7.5
95
110
5
D1
D

Inverter Model	D	D1
FR-F820-00046(0.75K)	110	20
FR-F820-00077(1.5K)	125	35
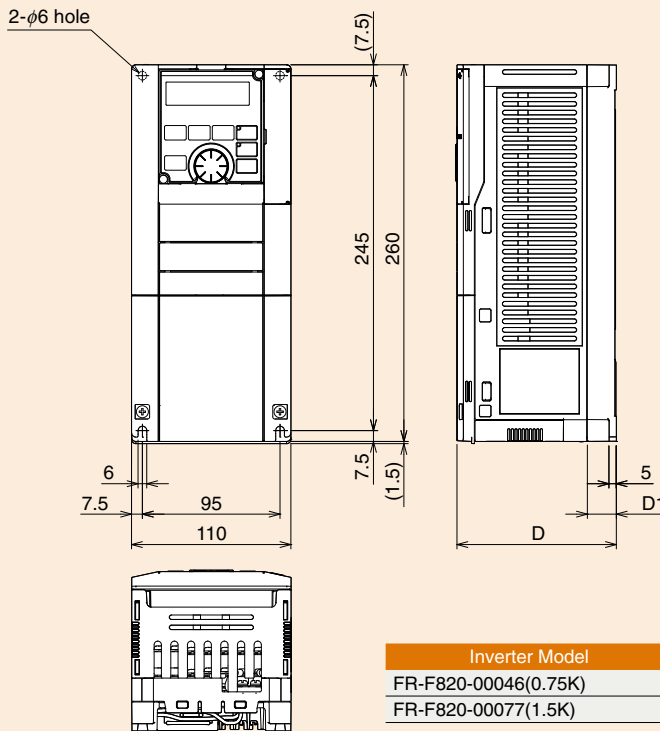
(Unit: mm)

● FR-F820-00105(2.2K), 00167(3.7K), 00250(5.5K)
● FR-F840-00023(0.75K), 00038(1.5K), 00052(2.2K), 00083(3.7K), 00126(5.5K)

2-φ6 hole

7.5
245
260
(7.5)
(1.5)
6
12.5
125
150
FAN
*1
5
140
45.5

*1: FR-F840-00023(0.75K) to 00052(2.2K) are not provided with a cooling fan.

(Unit: mm)

AC Servo
P.268

Inverter
P.436

505

Drive Product
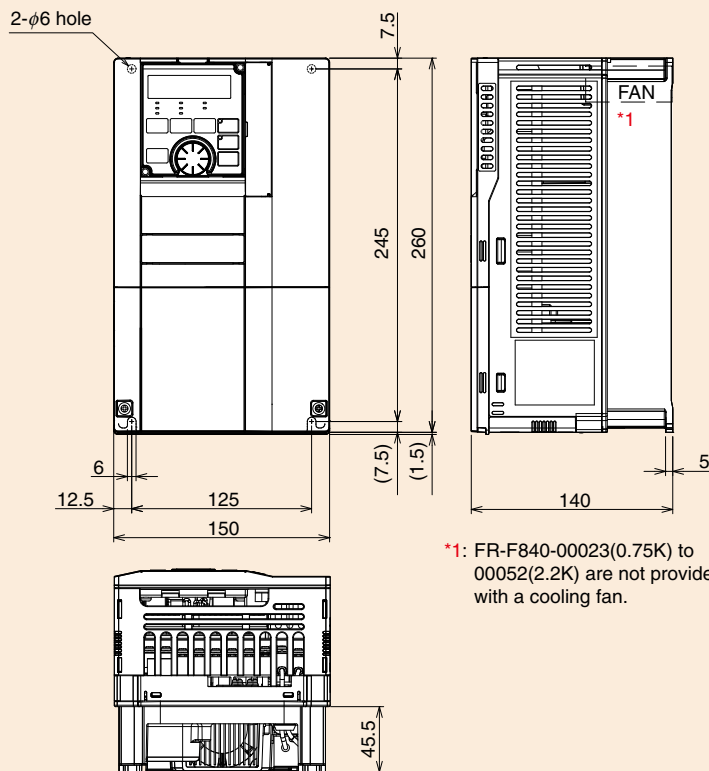
Outline Dimension Drawings

● FR-F820-00340(7.5K), 00490(11K), 00630(15K)
● FR-F840-00170(7.5K), 00250(11K), 00310(15K), 00380(18.5K)

2-φ6 hole
(7.5)
H1
H
7.5
H2
12.5
6
195
220
2.3
D
FAN
D1
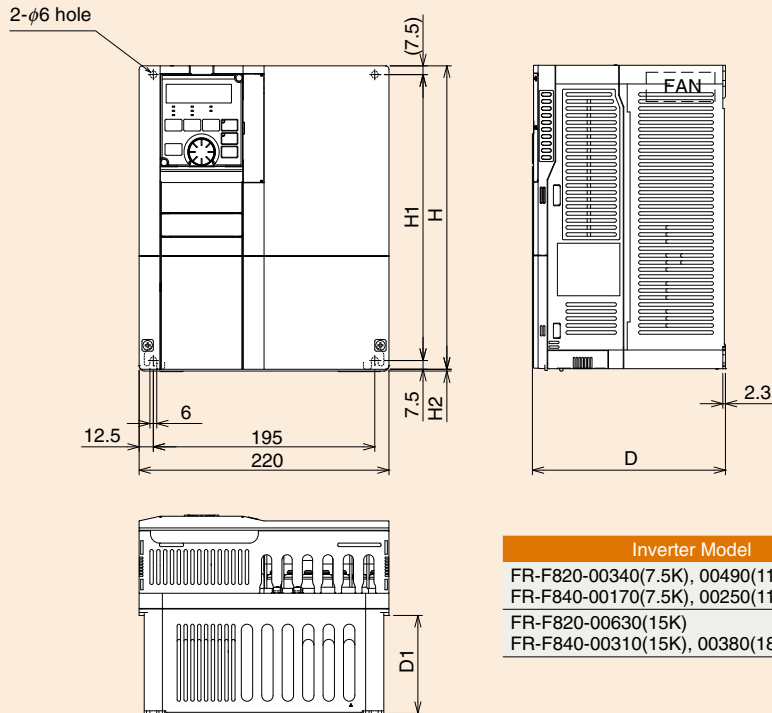
Inverter Model	H	H1	H2	D	D1
FR-F820-00340(7.5K), 00490(11K) FR-F840-00170(7.5K), 00250(11K)	260	245	1.5	170	84
FR-F820-00630(15K) FR-F840-00310(15K), 00380(18.5K)	300	285	3	190	101.5

(Unit: mm)

● FR-F820-00770(18.5K), 00930(22K), 01250(30K)
● FR-F840-00470(22K), 00620(30K)

2-φ10 hole
(10)
380
400
10
(1.5)
10
10
230
250
2.3
190
FAN
93.3
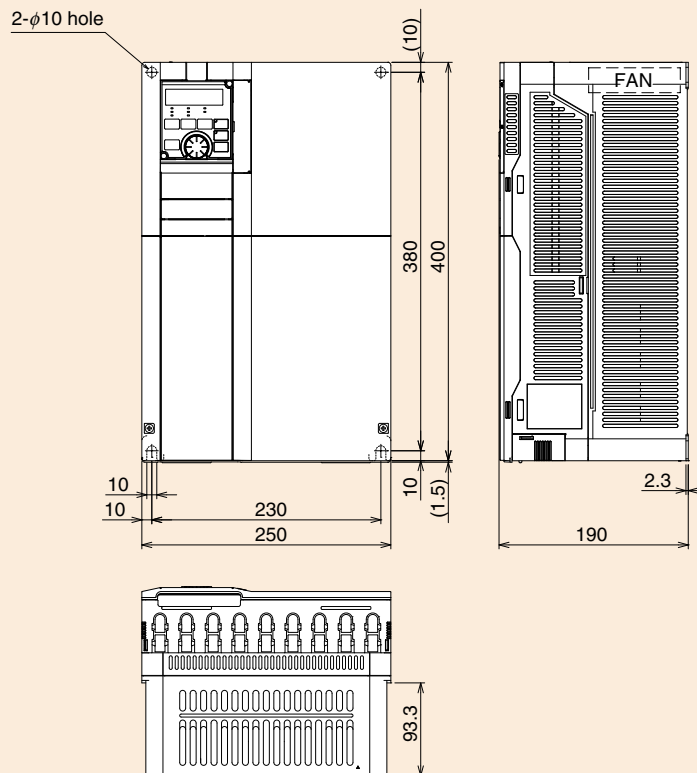
(Unit: mm)

Outline Dimension Drawings

● FR-F820-01540(37K)
● FR-F840-00770(37K)
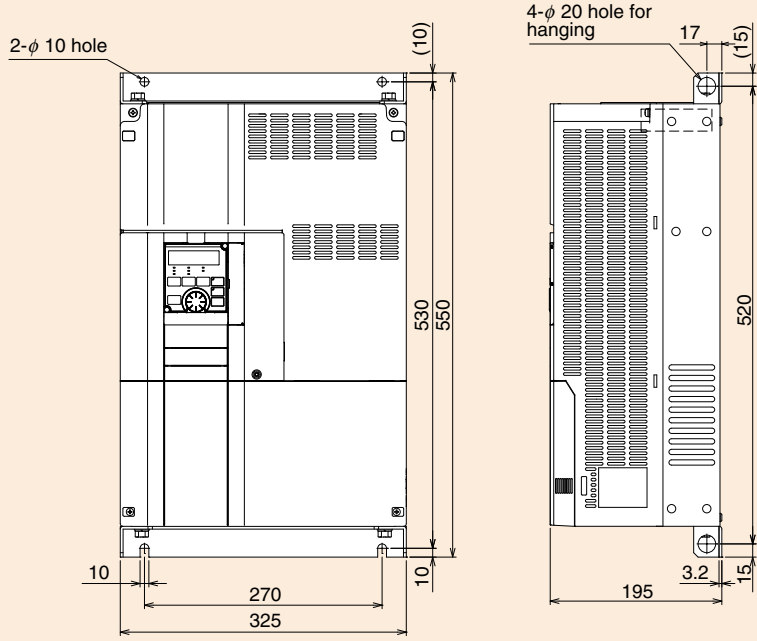
(Unit: mm)

● FR-F820-01870(45K), 02330(55K), 03160(75K), 03800(90K), 04750(110K)
● FR-F840-00930(45K), 01160(55K), 01800(75K), 02160(90K), 02600(110K), 03250(132K), 03610(160K)
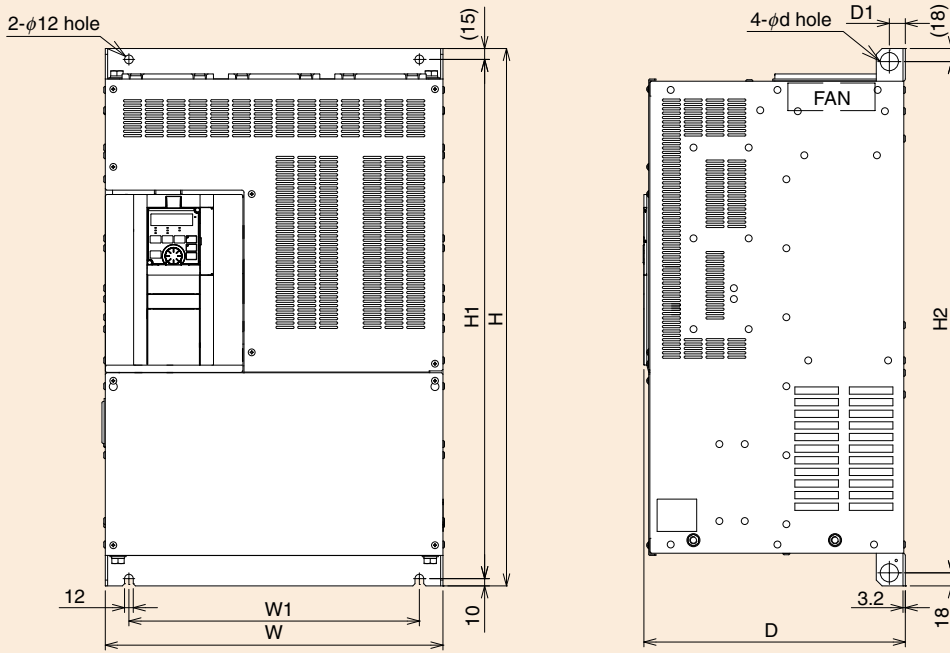
Inverter Model	W	W1	H	H1	H2	d	D	D1
FR-F820-01870(45K), 02330(55K) FR-F840-00930(45K), 01160(55K), 01800(75K)*²	435	380	550	525	514	25	250	24
FR-F820-03160(75K)*²	465	410	700	675	664	25	250	22
FR-F820-03800(90K)*², 04750(110K)*²	465	400	740	715	704	24	360	22
FR-F840-02160(90K)*², 02600(110K)*²	465	400	620	595	584	24	300	22
FR-F840-03250(132K)*², 03610(160K)*²	465	400	740	715	704	25	360	22

*2: Always connect a DC reactor (FR-HEL), which is available as an option.

(Unit: mm)

Drive Product

Outline Dimension Drawings

● FR-F840-04320(185K), 04810(220K)

3-φ12 hole

(15)

985
1010

12

200 200

498

10

4-φ16 hole

22
(13)

FAN

984

380

3.2

13
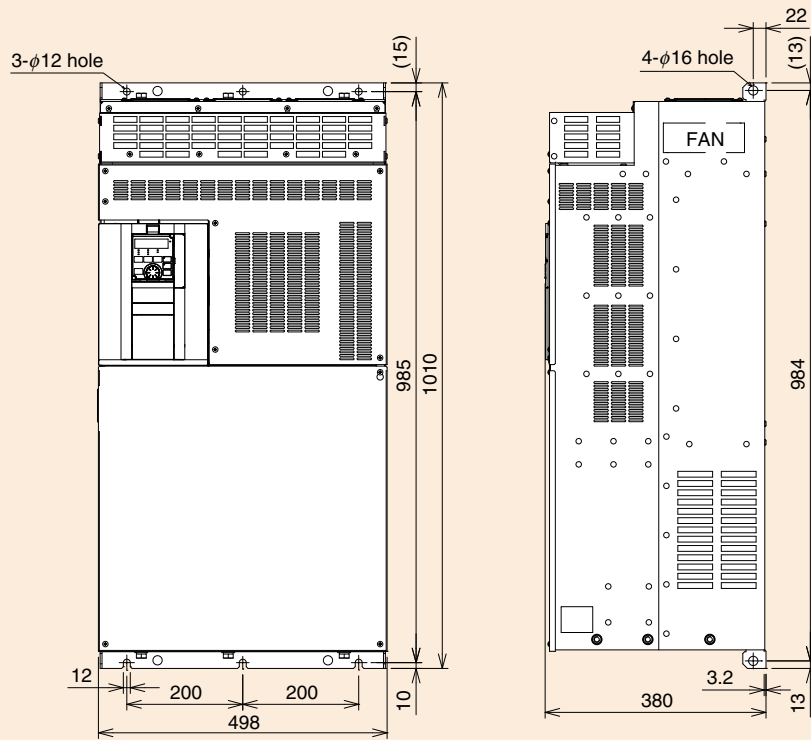
Always connect a DC reactor (FR-HEL), which is available as an option.

(Unit: mm)

● FR-F840-05470(250K), 06100(280K), 06830(315K)
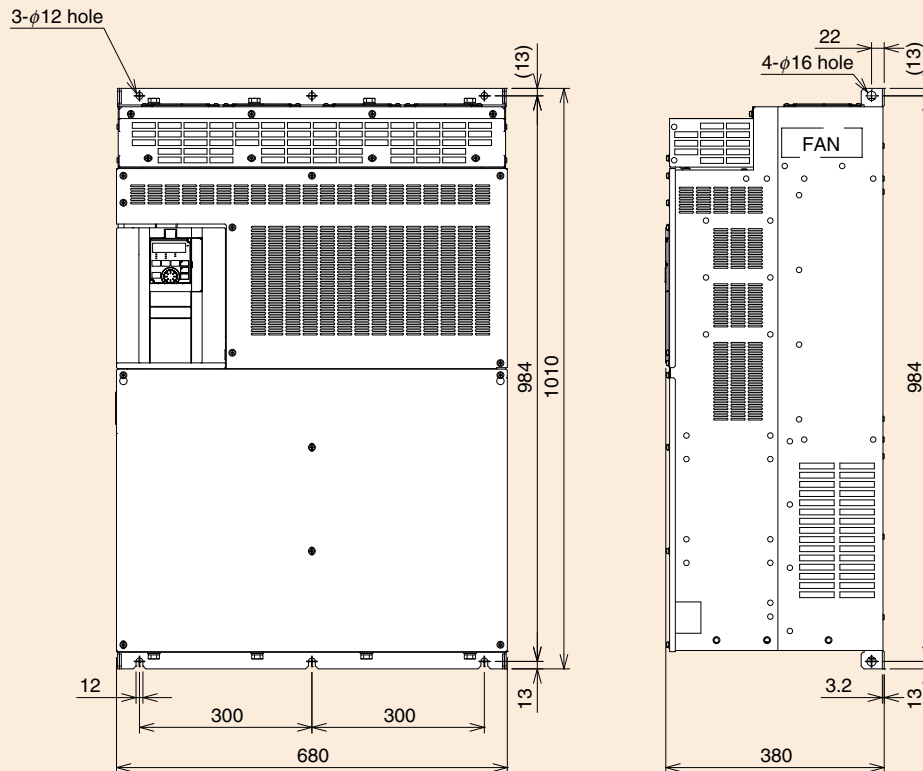
3-φ12 hole

(13)

984
1010

12

300 300

680

13

4-φ16 hole

22
(13)

FAN

984

380

3.2

13

Always connect a DC reactor (FR-HEL), which is available as an option.

(Unit: mm)

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Inverter FREQROL-F800 Series

■Separated converter type

Outline Dimension Drawings

• Inverter
● FR-F842-07700(355K), 08660(400K)
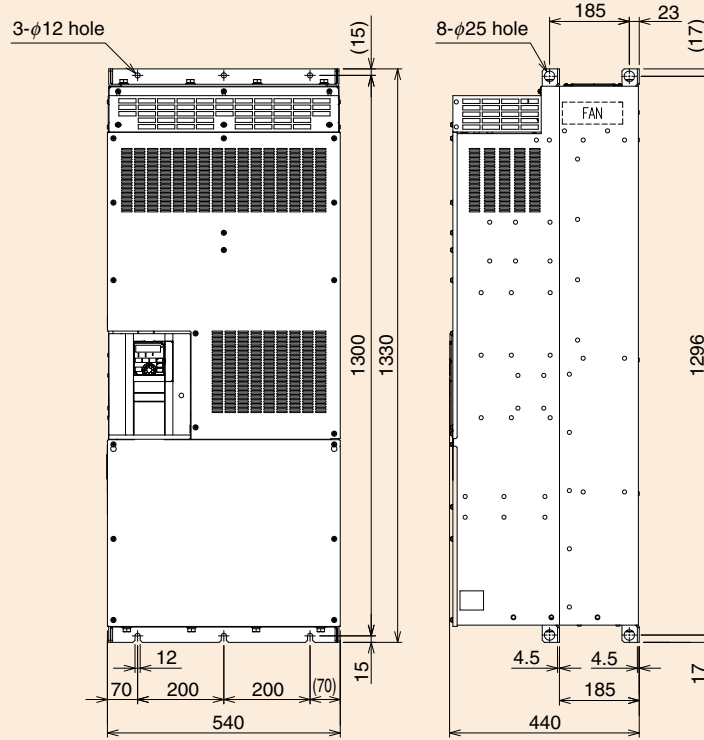
(Unit: mm)

● FR-F842-09620(450K), 10940(500K), 12120(560K)
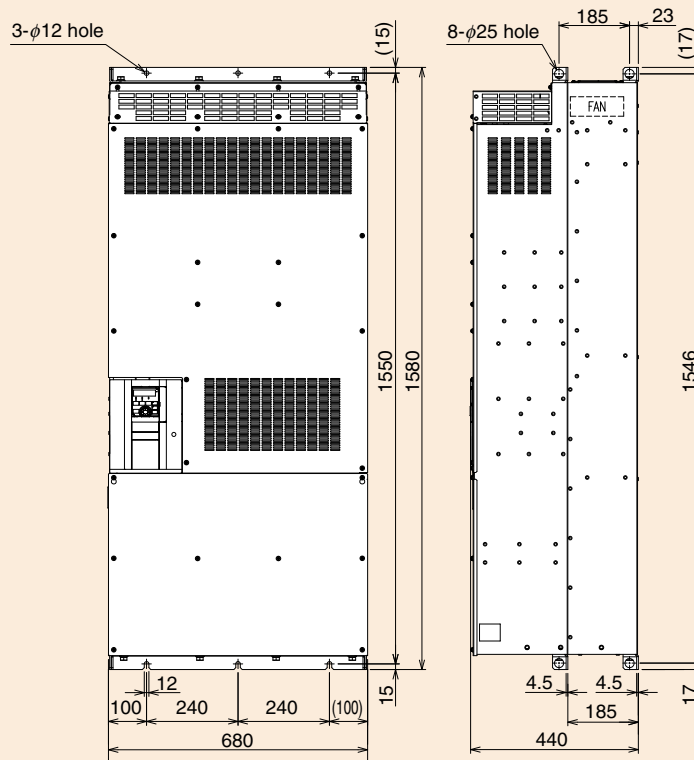
(Unit: mm)

Outline Dimension Drawings

• Converter unit

● FR-CC2-H355K

3-φ12 hole

(15)

8-φ25 hole

185   23

(17)

*1

*1

1300

1330

1296

12

100   200   200   (100)

15

600

4.5   4.5

185

17

440
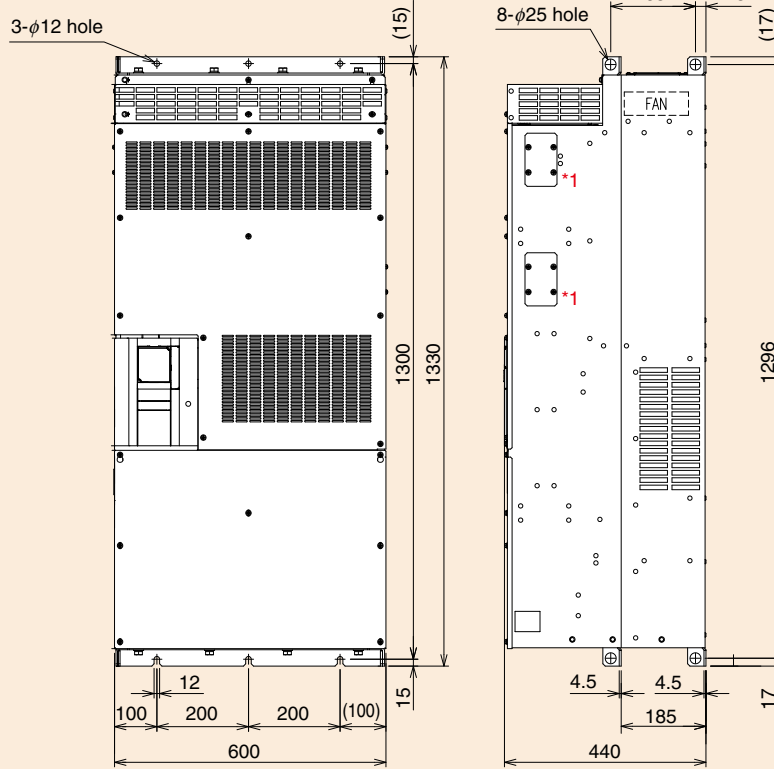
Equipped with a DC reactor.

(Unit: mm)

● FR-CC2-H400K, H450K, H500K, H560K, H630K

3-φ12 hole

(15)

8-φ25 hole

185   23

(17)

FAN

*1

*1

1550

1580

1546

12

100   200   200   (100)

15

600

4.5   4.5

185

17

440
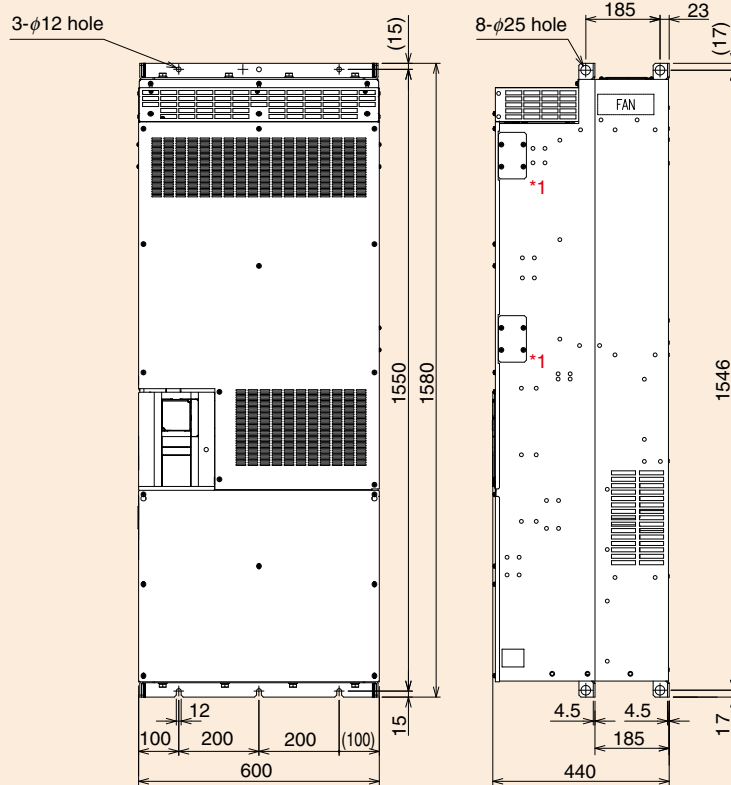
Equipped with a DC reactor.

(Unit: mm)

*1: Do not remove the cover on the side of the converter unit.

Inverter FREQROL-F800 Series

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Operation panel (FR-DU08, FR-LU08)

Outline Dimension Drawings
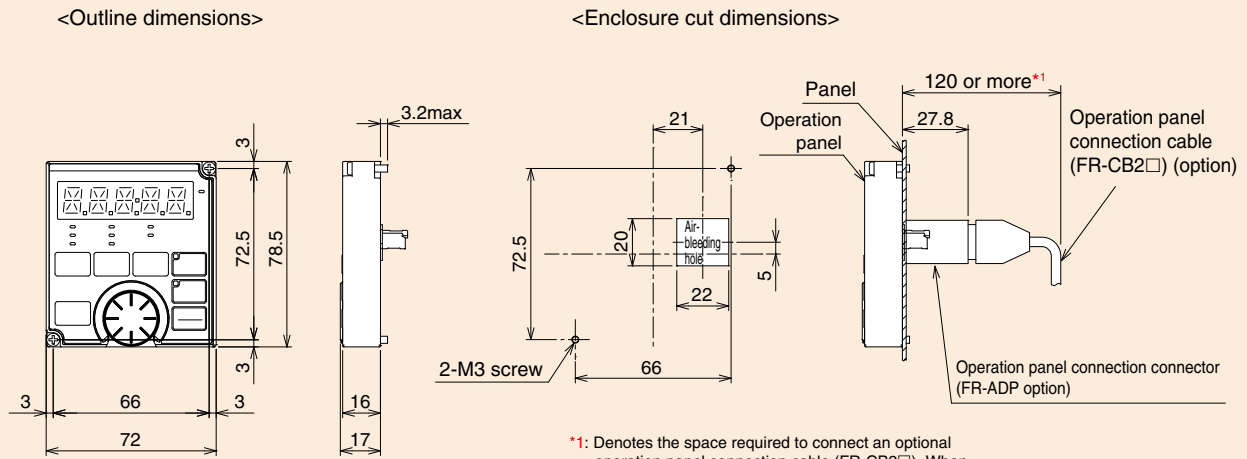
<Outline dimensions>

<Enclosure cut dimensions>

3.2max

3

72.5

78.5

3

3   66   3

72

16

17

21

72.5

20

Air-bleeding hole

22

66

5

2-M3 screw

120 or more*1

27.8

Panel

Operation panel

Operation panel connection cable (FR-CB2□) (option)

Operation panel connection connector (FR-ADP option)

*1: Denotes the space required to connect an optional operation panel connection cable (FR-CB2□). When using another cable, leave the space required for the cable specification.

(Unit: mm)

● **Protruding the heatsink through the panel**

When encasing the inverter or the converter unit in an enclosure, the heat generated in the enclosure can be greatly reduced by protruding the heatsink of the inverter or the converter unit. When installing the inverter in a compact enclosure, etc., this installation method is recommended. For the FR-F840-04320(185K) or higher, a heatsink can be protruded outside the enclosure without using an attachment.

◆ **When using a panel through attachment (FR-A8CN)**

For the FR-F820-00105(2.2K) to FR-F820-04750(110K) and FR-F840-00023(0.75K) to FR-F840-03610(160K), a heatsink can be protruded outside the enclosure using a panel through attachment (FR-A8CN). Refer to the instruction manual of the panel through attachment (FR-A8CN) for details.

・Drawing after attachment installation (when used with the FR-A8CN)
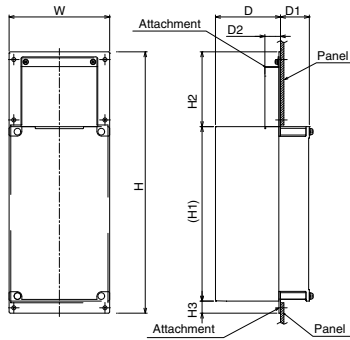
Type	W	H	H1	H2	H3	D	D1	D2
FR-A8CN01	150	389.5	260	111.5	18	97	43	24.3
FR-A8CN02	245	408.5	260	116.5	32	86	84	21.3
FR-A8CN03	245	448.5	300	116.5	32	89	101	21.3
FR-A8CN04	280	554	400	113.5	32	96.7	93.3	40.6
FR-A8CN05	357	654	480	130	44	130.8	64.2	105
FR-A8CN06	478.2	650	465	145	40	96	154	55
FR-A8CN07	510.2	805	610	150	45	130	120	105
FR-A8CN08	510.2	845	650	150	45	176.5	183.5	40
FR-A8CN09	510.2	725	530	150	45	152.3	147.7	65

(Unit: mm)

■ Enclosure cut dimensions (when used with the FR-A8CN)
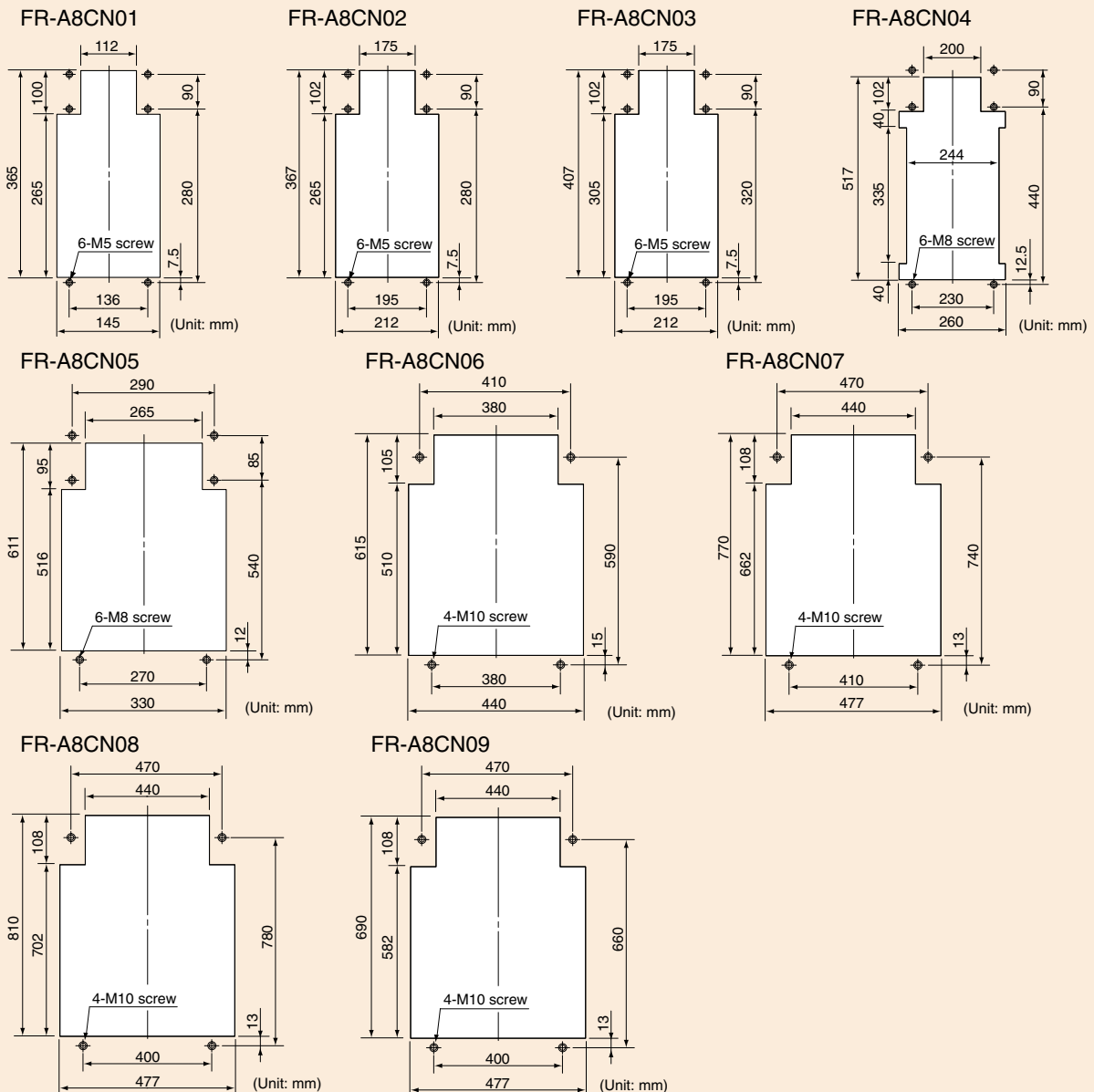
For a compatibility table between the attachment and the inverter.

Inverter FREQROL-F800 Series

■Heatsink protrusion through the panel for the FR-F840-04320(185K) or higher

• Enclosure cutting
  Cut an enclosure according to the capacity of the inverter or the converter unit.

FR-F840-04320(185K)	FR-F840-05470(250K)	FR-F842-07700(355K)	FR-F842-09620(450K)
FR-F840-04810(220K)	FR-F840-06100(280K)	FR-F842-08660(400K)	FR-F842-10940(500K)
	FR-F840-06830(315K)		FR-F842-12120(560K)
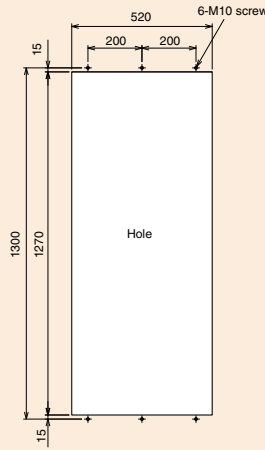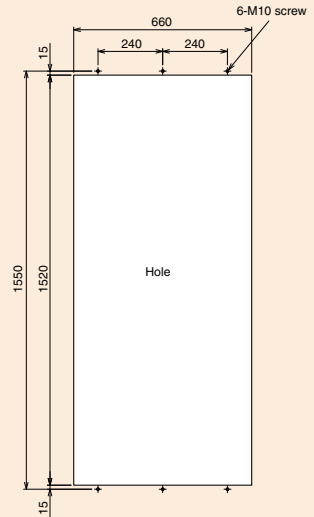
FR-CC2-H355K

FR-CC2-H400K
FR-CC2-H450K
FR-CC2-H500K
FR-CC2-H560K
FR-CC2-H630K

(Unit: mm)

AC Servo
P.268

Inverter
P.436

513

Drive Product
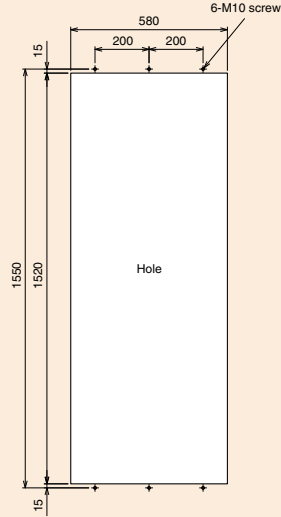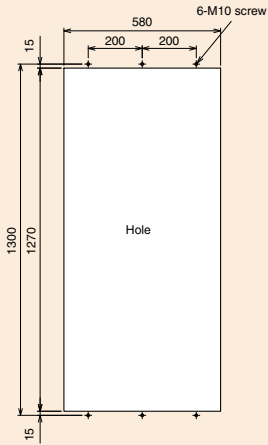
・Shift and removal of a rear side installation frame
For the FR-F840-04320(185K) to FR-F840-06830(315K)

One installation frame is attached to each of the upper and lower parts of the inverter. Change the position of the rear side installation frame on the upper and lower sides of the inverter to the front side as shown below. When changing the installation frames, make sure that the installation orientation is correct.
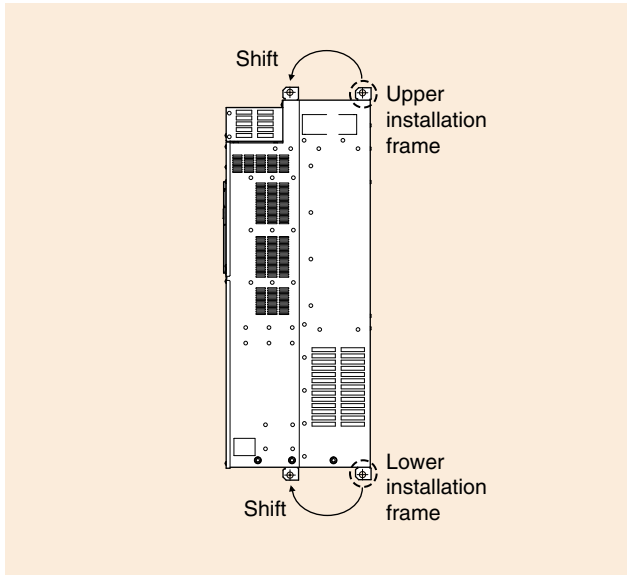
For the FR-F842-07700(355K) to FR-F842-12120(560K), FR-CC2-H355K to FR-CC2-H630K

Two installation frames are attached to each of the upper and lower parts of the inverter or the converter unit. Remove the rear side installation frame on the upper and lower sides of the inverter or the converter unit as shown below.
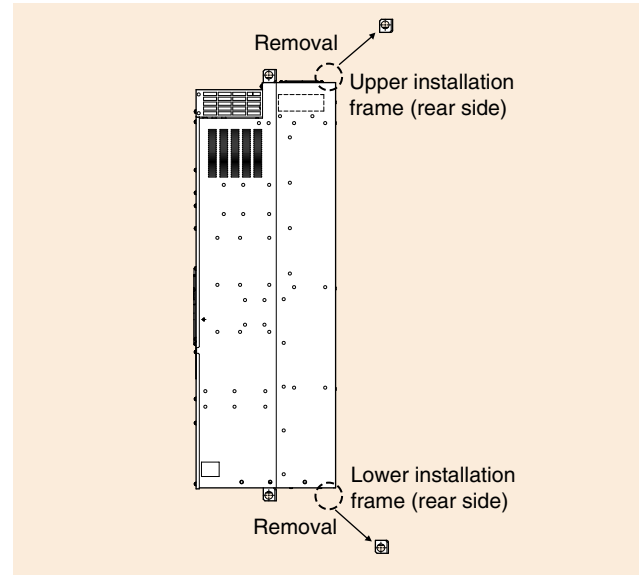
・Installation of the inverter or the converter unit
Push the inverter heatsink portion outside the enclosure and fix the enclosure and the inverter or the converter unit with upper and lower installation frame.
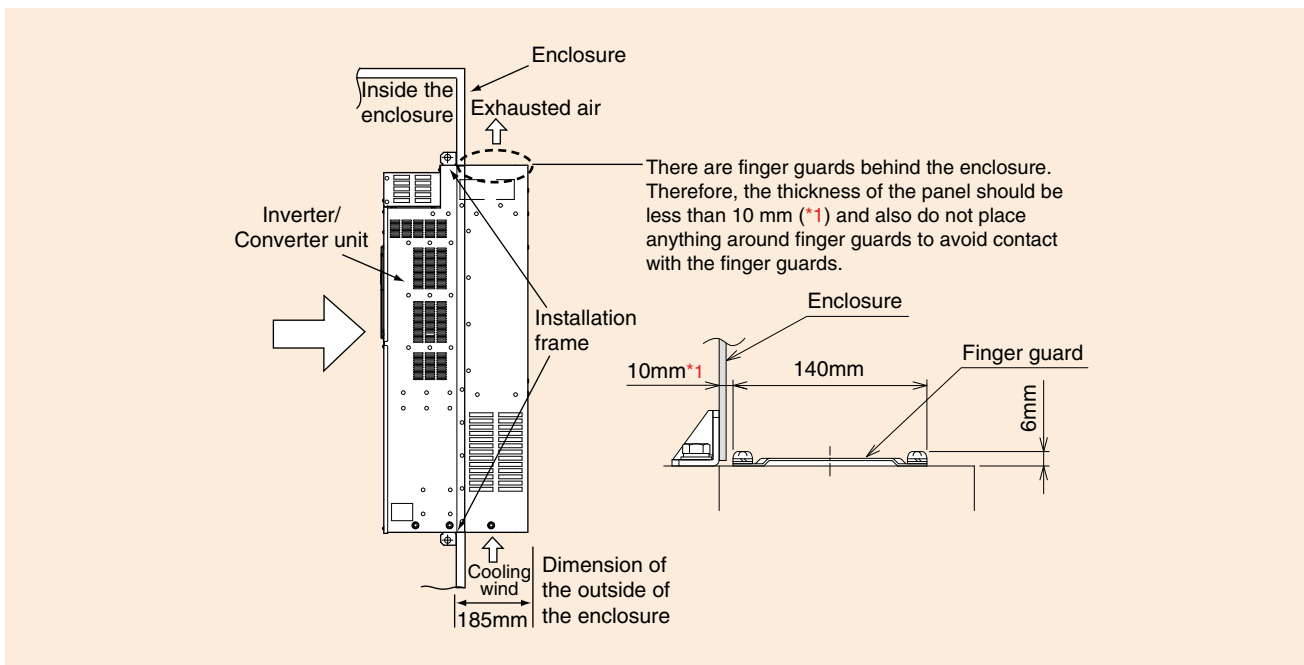
[**NOTE**]
・Having a cooling fan, the cooling section which comes out of the enclosure cannot be used in the environment of water drops, oil, mist, dust, etc.
・Be careful not to drop screws, dust etc. into the inverter or the converter unit and the cooling fan section.
・The FR-A7CN panel through attachment cannot be installed on the FR-F800 series.

■Standard models

●FM type

FR-F820-00770(18.5K) to 01250(30K),
FR-F840-00470(22K) to 01800(75K)

DC reactor (FR-HEL)*1

Brake unit (Option)

Earth (Ground) Jumper *8

P1 P/+ P3 PR*7 N/-

Inrush current limit circuit

Sink logic
◎Main circuit terminal
○Control circuit terminal

DC reactor (FR-HEL)*1

Brake unit (Option)

Earth (Ground) Jumper

Jumper*7

P1 P/+ PX*7 PR*7 N/-

Three-phase AC power supply

MCCB MC

R/L1
S/L2
T/L3

R1/L11
S1/L21

Jumper *2

Earth (Ground)

Inrush current limit circuit

ON OFF EMC filter ON/OFF connecter

U V W

Motor M

Earth (Ground)

Main circuit

Control circuit

Control input signals
(No voltage input allowed)*3

Forward rotation start — STF
Reverse rotation start — STR
Start self-holding selection — STP(STOP)

Multi-speed selection
High speed — RH
Middle speed — RM
Low speed — RL

Jog operation — JOG *4
Second function selection — RT
Output stop — MRS
Reset — RES
Terminal 4 input selection (Current input selection) — AU

*13 — CS

Contact input common — SD

24VDC power supply (Common for external power supply transistor) — PC

SOURCE SINK

24V

Relay output*9

C1
B1
A1 Relay output 1 (Fault output)

C2
B2
A2 Relay output 2

Open collector output*10

RUN Running
SU Up to frequency
IPF Instantaneous power failure
OL Overload
FU Frequency detection
SE Open collector output common Sink/source common

24V external power supply input — +24
Common terminal — SD

*5 Voltage/current input switch

Frequency setting signals (Analog)
10E(+10V)
10(+5V)

Frequency setting potentiometer 1/2W1kΩ*6

2 DC0 to 5V DC0 to 10V DC0 to 20mA Initial value selectable *5

5 (Analog common)

Auxiliary input (+) (-)
1 DC0 to ±10V Initial value DC0 to ±5V selectable *5

Terminal 4 input (Current input) (+) (-)
4 DC4 to 20mA Initial value DC0 to 5V DC0 to 10V selectable *5

Connector for plug-in option connection
connector 1 connector 2
connector 3

PU connector

USB A connector

USB mini B connector

F/C (FM) *11
SD

Calibration resistor *12

Indicator (Frequency meter, etc.) Moving-coil type 1mA full-scale

AM
5 Analog signal output (0 to ±10VDC)

RS-485 terminals
TXD+
TXD- Data transmission
RXD+
RXD- Data reception
GND (SG)
GND

Terminating resistor

VCC 5V (Permissible load current 100mA)

Safety stop signal
Shorting wire
PC 24V
Safety stop input (Channel 1) — S1
Safety stop input (Channel 2) — S2
Safety stop input common — SIC
SD

Output shutoff circuit

So Safety monitor output
SOC Safety monitor output common

*1: For the FR-F820-03160(75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor (FR-HEL), which is available as an option.
   (To select a DC reactor and select one according to the applicable motor capacity.)
   When a DC reactor is connected to the FR-F820-02330(55K) or lower or the FR-F840-01160(55K) or lower, if a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
*3: The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**.
*4: Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage, set the voltage/current input switch OFF.
   To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. **(Pr.561)**
*6: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
*7: Do not use terminals PR and PX. The jumper may or may not be attached depending on the inverter. (Refer to the Instruction Manual (Startup).)
*8: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*9: The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**.
*10: The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**.
*11: The terminal F/C (FM) can be used to output pulse trains as open collector output by setting **Pr.291**.
*12: Not required when calibrating the scale with the operation panel.
*13: No function is assigned in the initial status. Assign the function using **Pr.186 CS terminal function selection**.

Drive Product

● CA type

FR-F820-00770(18.5K) to 01250(30K), FR-F840-00470(22K) to 01800(75K)

*1: For the FR-F820-03160(75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor (FR-HEL), which is available as an option.
(To select a DC reactor and select one according to the applicable motor capacity.)
When a DC reactor is connected to the FR-F820-02330(55K) or lower or the FR-F840-01160(55K) or lower, if a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.
*2: When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
*3: The function of these terminals can be changed with the input terminal assignment (Pr.178 to Pr.189).
*4: Terminal JOG is also used as the pulse train input terminal. Use Pr.291 to choose JOG or pulse.
*5: Terminal input specifications can be changed by analog input specification switchover (Pr.73, Pr.267). To input a voltage, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr.561)
*6: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
*7: Do not use terminals PR and PX. The jumper may or may not be attached depending on the inverter. (Refer to the Instruction Manual (Startup).)
*8: Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*9: The function of these terminals can be changed with the output terminal assignment (Pr.195, Pr.196).
*10: The function of these terminals can be changed with the output terminal assignment (Pr.190 to Pr.194).
*11: No function is assigned in the initial status. Assign the function using Pr.186 CS terminal function selection.

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Separated converter type

●Inverter (FM type)

Sink logic
◎ Main circuit terminal
○ Control circuit terminal

Brake unit (Option)

Converter unit

R/L1
S/L2
T/L3

P/+
N/-

Jumper *1

Earth (Ground)

RDI
OH
RES
SD
PC
+24

C1
B1
A1
RDB
RDA
RSO
IPF
FAN
SE

Inverter

P/+
N/-
R1/L11
S1/L21

Earth (Ground)

U
V
W

Motor
M

Earth (Ground)

Main circuit

Control circuit

Control input signals
(No voltage input allowed) *2
Forward rotation start
Reverse rotation start
Start self-holding selection

Multi-speed selection
High speed
Middle speed
Low speed

Jog operation
Second function selection
Output stop

Reset
Terminal 4 input selection

*5
Contact input common

STF
STR
STP(STOP)
RH
RM
RL
JOG *3
RT
MRS   X10 *4
RES
AU
CS
SD

SOURCE SINK
24V

24VDC power supply
(Common for external power supply transistor)

PC

Relay output *8

C1
B1
A1

Relay output 1
(Fault output)

C2
B2
A2

Relay output 2

RUN Running
SU   Up to frequency
IPF *10
OL   Overload
FU   Frequency detection
SE

Open collector output *9

(Open collector output common)
(Sink/source common)

24V external power supply input
Common terminal

+24
SD

*6 Voltage/current input switch

Frequency setting signals (Analog)

Frequency setting potentiometer 1/2W1kΩ *7

Auxiliary input (+) (-)

Terminal 4 input (Current input) (+) (-)

10E(+10V)
10(+5V)

2
5 (Analog common)

1

4

0 to 5VDC Initial value
0 to 10VDC selectable *6
0 to 20mADC

0 to ±10VDC Initial value
(0 to ±5VDC selectable) *6

4 to 20mADC Initial value
(0 to 5VDC selectable) *6
0 to 10VDC

ON OFF   2 4

PU connector

USB A connector

USB mini B connector

F/C (FM) *11
SD

Indicator (Frequency meter, etc.)
Calibration resistor *12
(Moving-coil type) (1mA full-scale)

AM (+)   Analog signal output
5   (-)   (0 to ±10VDC)

Connector for plug-in option connection

connector 1 connector 2
connector 3

RS-485 terminals

TXD+
TXD- Data transmission
RXD+
RXD- Data reception
GND (SG) GND

Terminating resistor

VCC 5V (Permissible load current 100mA)

Safety stop signal

Shorting wire

24V

Safety stop input (Channel 1)
Safety stop input (Channel 2)
Safety stop input common

PC
S1
S2
SIC
SD

Output shutoff circuit

So   Safety monitor output
SOC Safety monitor output common

*1: The terminals R1/L11 and S1/L21 are connected to the terminals P/+ and N/- with a jumper respectively. When using separate power supply for the control circuit, remove the jumpers from R1/L11 and S1/L21.
*2: The function of these terminals can be changed with the input terminal assignment (**Pr.178 to Pr.189**).
*3: Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.
*4: The X10 signal (NC contact input specification) is assigned to the terminal MRS in the initial setting. Set **Pr.599** = "0" to change the input specification of the X10 signal to NO contact.
*5: No function is assigned in the initial setting. Use **Pr.186** for function assignment.
*6: Terminal input specifications can be changed by analog input specification switchover (**Pr.73**, **Pr.267**). To input a voltage, set the voltage/current input switch OFF.
    To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (**Pr.561**)
*7: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
*8: The function of these terminals can be changed with the output terminal assignment (**Pr.195**, **Pr.196**).
*9: The function of these terminals can be changed with the output terminal assignment (**Pr.190 to Pr.194**).
*10: No function is assigned in the initial setting. Use **Pr.192** for function assignment.
*11: The terminal F/C (FM) can be used to output pulse trains as open collector output by setting **Pr.291**.
*12: Not required when calibrating the scale with the operation panel.

Drive Product

■ Converter unit (FR-CC2)

● When the sink logic is selected

Sink logic
◎ Main circuit terminal
○ Control circuit terminal

Connection is not available

P1

Three-phase AC power supply

MCCB MC

R/L1
S/L2
T/L3

DC reactor

Inrush current limit circuit

P/+
N/-

Inverter

P/+
N/-

R1/L11
S1/L21

Jumper *1

ON
OFF

EMC filter ON/OFF connecter *8

Earth (Ground)

Main circuit

Control circuit

Control input signals (No voltage input allowed) *2

Reset — RES
External thermal relay input — OH
Contact input — RDI

SOURCE SINK

24V

Contact input common — SD
24VDC power supply (Common for external power supply transistor) — PC

24V external power supply input — +24
Common terminal — SD

PU connector

USB mini B connector *5

Open collector output *4

RDA — Inverter operation enable (NO contact) — MRS (X10)
RDB — Inverter operation enable (NC contact)
RSO — Inverter reset — RES
IPF — Instantaneous power failure
FAN — Cooling fan fault
SE — SD

Open collector output common
Sink/source common

Relay output *3

C1
B1 — Relay output (Fault output)
A1

RS-485 terminals

TXD+
TXD- — Data transmission
RXD+
RXD- — Data reception
GND (SG) — GND

Terminating resistor

VCC — 5V (Permissible load current 100mA)

Connector for manufacturer setting *6 — connector 1

88R
88S *7

*1: When using separate power supply for the control circuit, remove the jumpers from R1/L11 and S1/L21.
*2: The function of these terminals can be changed with the input terminal assignment (Pr.178, Pr.187, Pr.189).
*3: The function of these terminals can be changed with the output terminal assignment (Pr.195).
*4: The function of these terminals can be changed with the output terminal assignment (Pr.190 to Pr.194).
*5: The connector is for manufacturer setting. Do not use.
*6: Plug-in options cannot be used.
*7: For manufacturer setting. Do not use.
*8: For the FR-CC2-H400K to H630K, two EMC filter ON/OFF connectors are provided.

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Standard models, and separated converter type

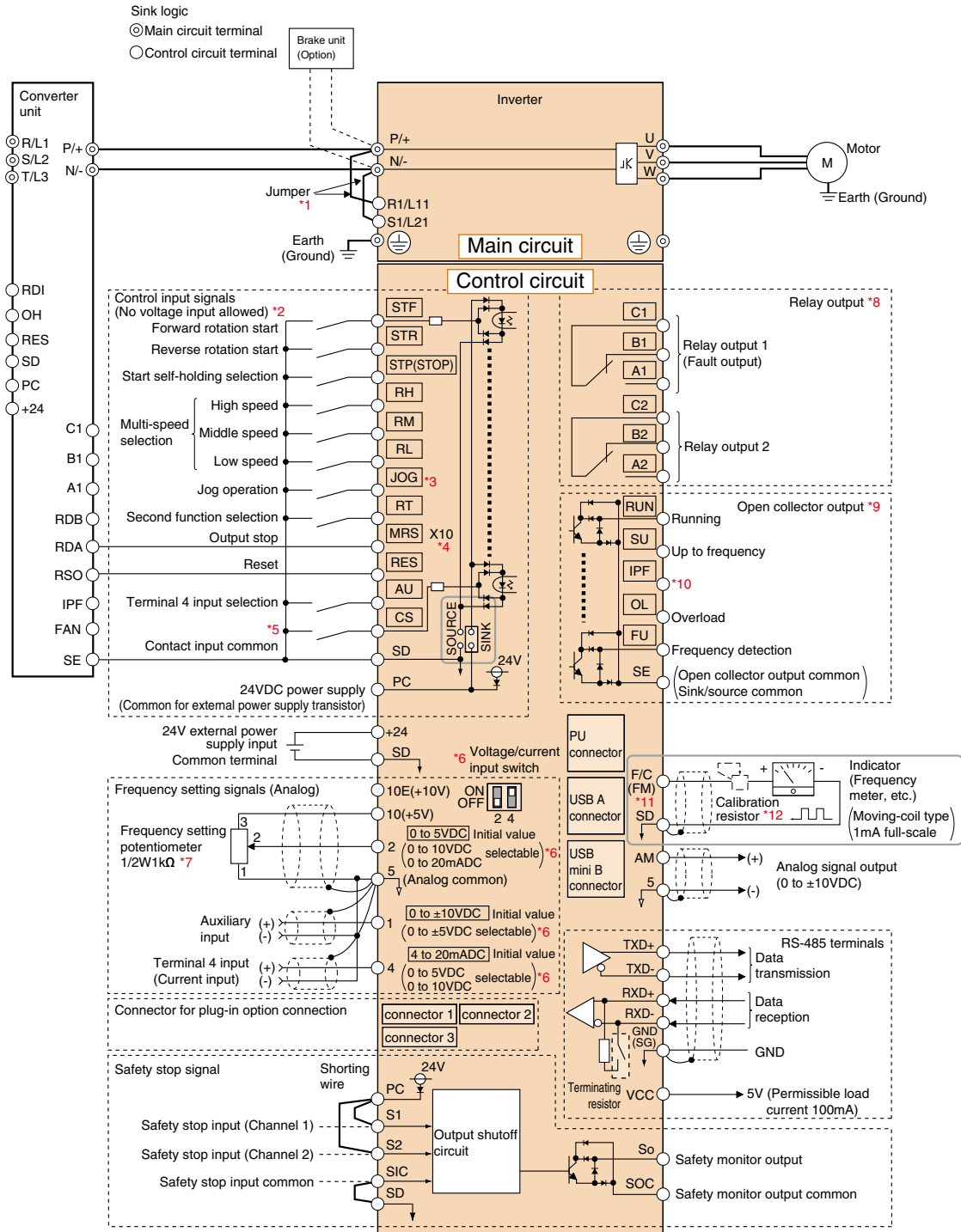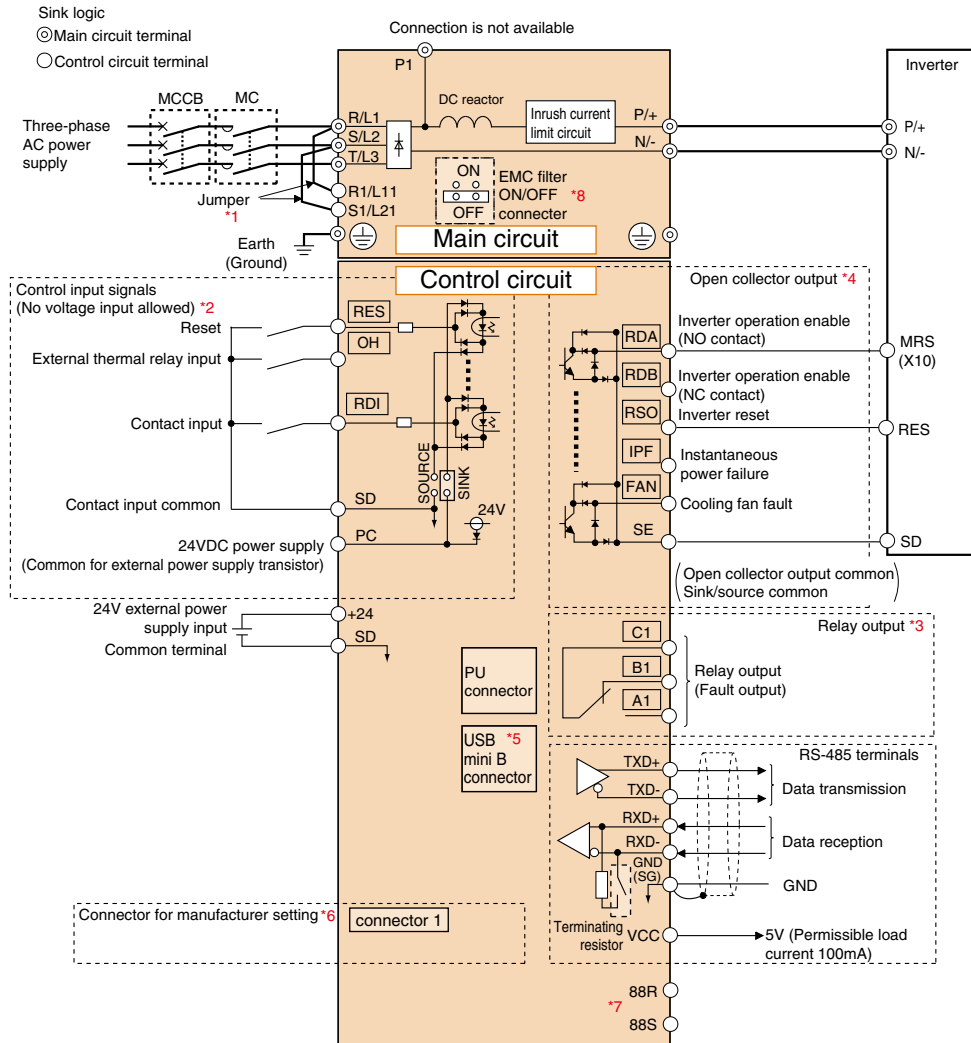| Type		Terminal Symbol	Terminal Name	Description	
Main circuit		R/L1, S/L2, T/L3*1	AC power input	Connect to the commercial power supply.	
		U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or PM motor.	
		R1/L11, S1/L21	Power supply for control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain alarm display and alarm output, apply external power to this terminal.	
		P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV), power regeneration converter (MT-RC), high power factor converter (FR-HC2), or DC power supply (under DC feeding mode). Do not connect the DC power supply between terminals P3 and N/-. Use terminals P/+ and N/- for DC feeding. Connect the separated converter type to the terminals P/+ and N/- of the converter unit.	
		P3, N/-*1*2			
		P/+, P1*1	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. For the FR-F820-03160 (75K) or higher, the FR-F840-01800(75K) or higher, always connect a DC reactor, which is available as an option.	
		PR, PX*1		Do not use terminals PX and PR. The terminal PX is equipped in the FR-F820-00490(11K) or lower and the FR-F840-00250(11K) or lower. The terminal PR is equipped in the FR-F820-01250(30K) or lower and the FR-F840-01800(75K) or lower.	
		⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal	Contact input	STF	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	When the STF and STR signals are turned ON simultaneously, the stop command is given.
		STR	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.	
		STP (STOP)	Start self-holding selection	Turn ON the STOP signal to self-hold the start signal.	
		RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
		JOG	Jog mode selection	Turn ON the JOG signal to select Jog operation (initial setting) and turn ON the start signal (STF or STR) to start Jog operation.	
			Pulse train input	JOG terminal can be used as pulse train input terminal. To use as pulse train input terminal, the **Pr.291** setting needs to be changed. (maximum input pulse: 100k pulses/s)	
		RT	Second function selection	Turn ON the RT signal to select second function selection When the second function such as "Second torque boost" and "Second V/F (base frequency)" are set, turning ON the RT signal selects these functions.	
		MRS	Output stop	Turn ON the MRS signal (2 ms or more) to stop the inverter output. Use to shut OFF the inverter output when stopping the motor by electromagnetic brake.	
		MRS (X10)*7	Output stop (Inverter operation enable)	Connect to the terminal RDA of the converter unit (FR-CC2). When the RDA signal is turned OFF, the inverter output is shut off. The X10 signal (NC contact) is assigned to the terminal MRS in the initial setting. Use **Pr.599** to change the specification to NO contact.	
		RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn ON the RES signal for more than 0.1 s, then turn it OFF. Recover about 1 s after reset is cancelled.	
		AU	Terminal 4 input selection	Terminal 4 is made valid only when the AU signal is turned ON. Turning the AU signal ON makes terminal 2 invalid	
		CS	No function	Use **Pr.186 CS terminal function selection** for function assignment.	
		SD	Contact input common (sink)*3	Common terminal for the contact input terminal (sink logic) and terminal FM.	
			External transistor common (source)*4	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
			24 VDC power supply common	Common output terminal for the 24 VDC 0.1 A power supply (terminal PC). Isolated from terminals 5 and SE.	
		PC	External transistor common (sink)*3	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable currents.	
			Contact input common (source)*4	Common terminal for contact input terminal (source logic).	
			24 VDC power supply	Can be used as a 24 VDC 0.1 A power supply.	
	Frequency setting	10E	Frequency setting power supply	When connecting a frequency setting potentiometer at an initial status, connect it to terminal 10.	10 VDC, permissible load current 10mA
		10		Change the input specifications of terminal 2 when connecting it to terminal 10E.	5 VDC, permissible load current 10mA
		2	Frequency setting (voltage)	Inputting 0 to 5 VDC (or 0 to 10 V, 4 to 20 mA) provides the maximum output frequency at 5 V (10 V, 20 mA) and makes input and output proportional. Use **Pr.73** to switch from among input 0 to 5 VDC (initial setting), 0 to 10 VDC, and 4 to 20 mA. Set the voltage/current input switch in the ON position to select current input (0 to 20 mA).	Voltage input: Input resistance 10 kΩ ± 1 kΩ Maximum permissible voltage 20 VDC Current input: Input resistance 245 Ω ± 5 Ω Maximum permissible current 30 mA
		4	Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). Use **Pr.267** to switch from among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the OFF position to select voltage input (0 to 5 V/0 to 10 V). Use **Pr.858** to switch terminal functions.	
		1	Frequency setting auxiliary	Inputting 0 to ±5 VDC or 0 to ±10 VDC adds this signal to terminal 2 or 4 frequency setting signal. Use **Pr.73** to switch between input 0 to ±5 VDC and 0 to ±10 VDC (initial setting) input.	Input resistance 10 kΩ ±1 kΩ Maximum permissible voltage ±20 VDC
		5	Frequency setting common	Common terminal for frequency setting signal (terminal 2, 1 or 4) and analog output terminal AM, CA. Do not earth (ground).	
	Thermistor	10 2	PTC thermistor input	For receiving PTC thermistor outputs. When PTC thermistor is valid (**Pr.561** ≠ "9999"), the terminal 2 is not available for frequency setting.	Applicable PTC thermistor specification Overheat detection resistance:500 Ω to 30 kΩ (Set by **Pr.561**)
	External power supply input	+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.	Input voltage 23 to 25.5 VDC Input current 1.4 A or less

☐ indicates that terminal functions can be selected from **Pr.178 to Pr.196 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

Drive Product

Type		Terminal Symbol	Terminal Name	Description	
Control circuit/output signal	Relay	A1, B1, C1	Relay output 1 (alarm output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Alarm: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C)	Contact capacity 230 VAC 0.3 A (power factor =0.4) 30 VDC 0.3 A
		A2, B2, C2	Relay output 2	1 changeover contact output	
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched high during stop or DC injection brake operation.	Permissible load 24 VDC (maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).
		SU	Up to frequency	Switched low when the output frequency reaches within the range of ±10% (initial value) of the set frequency. Switched high during acceleration/deceleration and at a stop.	
		OL	Overload alarm	Switched low when stall prevention is activated by the stall prevention function. Switched high when stall prevention is cancelled.	
		IPF	Instantaneous power failure	Switched low when an instantaneous power failure and under voltage protections are activated.	
		IPF*7	Open collector output	No function is assigned in the initial setting. The function can be assigned setting **Pr.192**.	
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.	
		SE	Open collector output common	Common terminal for terminals RUN, SU, OL, IPF, FU	
	Pulse	FM*5	For meter	Select one e.g. output frequency from monitor items. (The signal is not output during an inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item.	Output item: output frequency (initial setting), permissible load current 2 mA, For full scale1440 pulses/s
			NPN open collector output		Signals can be output from the open collector terminals by setting **Pr.291**. (maximum output pulse: 50kpulses/s)
	Analog	AM	Analog voltage output	The output signal is proportional to the magnitude of the corresponding monitoring item.Use **Pr.55**, **Pr.56**, and **Pr.866** to set full scales for the monitored output frequency, output current, and torque.	Output item: output frequency (initial setting), output signal 0 to ±10 VDC, permissible load current 1 mA (load impedance 10 kΩ or more), resolution 8 bit
		CA*6	Analog current output		Output item: output frequency (initial setting), Load impedance 200 Ω to 450 Ω Output signal 0 to 20 mADC
Communication		–	PU connector	With the PU connector, communication can be made through RS-485. (1:1 connection only) • Conforming standard: EIA-485(RS-485) • Communication speed: 4800 to 115200 bps • Transmission format: Multi-drop link • Wiring length: 500 m	
	RS-485 terminals	TXD+, TXD-	Inverter transmission terminal	With the RS-485 terminals, communication can be made through RS-485.	
		RXD+, RXD-	Inverter reception terminal	• Conforming standard: EIA-485(RS-485) • Communication speed: 300 to 115200 bps • Transmission format: Multi-drop link • Overall extension: 500 m	
		GND (SG)	Earth (Ground)		
		–	USB A connector	A connector (receptacle). A USB memory device enables parameter copies and the trace function.	Interface: Conforms to USB1.1 (USB2.0 full-speed compatible). Transmission speed: 12 Mbps
			USB B connector	Mini B connector (receptacle). Connected to a personal computer via USB to enable setting, monitoring, test operations of the inverter by FR Configurator2.	
Safety stop signal		S1	Safety stop input (Channel 1)	The terminals S1 and S2 are used for the safety stop input signal for the safety relay module. The terminals S1 and S2 are used at the same time (dual channel). Inverter output is shutoff by shortening/opening between terminals S1 and SIC, or between S2 and SIC. In the initial status, terminals S1 and S2 are shorted with the terminal PC by shorting wires. The terminal SIC is shorted with the terminal SD. Remove the shorting wires and connect the safety relay module when using the safety stop function.	Input resistance 4.7 kΩ Input current 4 to 6 mADC (with 24 VDC input)
		S2	Safety stop input (Channel 2)		
		SIC	Safety stop input terminal common	Common terminal for terminals S1 and S2.	–
		SO	Safety monitor output (open collector output)	Indicates the safety stop input signal status. Switched to LOW when the status is other than the internal safety circuit failure. Switched to HIGH during the internal safety circuit failure status. (LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).) Refer to the Safety stop function instruction manual (BCN-A23228-001) when the signal is switched to HIGH while both terminals S1 and S2 are open.	Permissible load 24 VDC (27 VDC at maximum), 0.1 A (A voltage drop is 3.4 V at maximum while the signal is ON.) (A voltage drop is 3.4 V at maximum while the signal is ON.)
		SOC	Safety stop input terminal common	Common terminal for terminal SO.	–

In the alarm column spanning: Alarm code (4 bits) output

*1: Terminals R/L1, S/L2, T/L3, PR, P3, P1, and PX are not provided in the separated converter type.
*2: The terminal P3 is equipped in the FR-F820-00770(18.5K) to 01250(30K) and the FR-F840-00470(22K) to 01800(75K).
*3: Sink logic is initially set for the FM-type inverter.
*4: Source logic is initially set for the CA-type inverter.
*5: Terminal FM is provided in the FM-type inverter.
*6: Terminal CA is provided in the CA-type inverter.
*7: Function and name of the separated converter type.

■Converter unit (FR-CC2)

Type			Terminal Symbol	Terminal Name	Description
Main circuit			R/L1, S/L2, T/L3	AC power input	Connect these terminals to the commercial power supply.
			R1/L11, S1/L21	Power supply for the control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain the fault display and fault output, remove the jumpers across terminals R/L1 and R1/L11 and across S/L2 and S1/L21 and supply external power to these terminals.
			P/+, N/-	Inverter connection	Connect to terminals P/+ and N/- of the inverter.
			⏚	Earth (ground)	For earthing (grounding) the converter unit chassis. This must be earthed (grounded).
Control circuit/input signal	Contact input		RES	Reset	Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 s or longer, then turn it OFF. In the initial setting, reset is always enabled. By setting **Pr.75**, reset can be set enabled only at fault occurrence of the converter unit. The inverter recovers about 1 s after the reset is released.
			OH	External thermal relay input	The external thermal relay input (OH) signal is used when using an external thermal relay or a thermal protector built into the motor to protect the motor from overheating. When the thermal relay is activated, the inverter trips by the external thermal relay operation (E.OHT).
			RDI	Contact input	The function can be assigned by setting **Pr.178**.
			SD	Contact input common (sink) (Initial setting)	Common terminal for contact input terminal (sink logic).
				External transistor common (source)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.
				24 VDC power supply common	Common terminal for the 24 VDC power supply (terminal PC, terminal +24) Isolated from terminal SE.
			PC	External transistor common (sink) (Initial setting)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.
				Contact input common (source)	Common terminal for contact input terminal (source logic).
				24 VDC power supply common	Can be used as a 24 VDC 0.1 A power supply.
	External power supply input		+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF. / Input voltage 23 to 25.5 VDC / Input current 1.4 A or less
Control circuit/output signal	Relay		A1, B1, C1	Relay output 1 (fault output)	1 changeover contact output that indicates that the protective function of the converter unit has been activated and the outputs are stopped. Fault: discontinuity across B and C (continuity across A and C), Normal: continuity across B and C (discontinuity across A and C) / Contact capacity 230 VAC 0.3 A (power factor = 0.4) 30 VDC 0.3 A
			88R, 88S	For manufacturer setting. Do not use.	
	Open collector		RDA	Inverter operation enable (NO contact)	Switched to LOW when the converter unit operation is ready. Assign the signal to the terminal MRS (X10) of the inverter. The inverter can be started when the RDA status is LOW. / Permissible load 24 VDC (maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).
			RDB	Inverter operation enable (NC contact)	Switched to LOW when a converter unit fault occurs or the converter is reset. The inverter can be started when the RDB status is HIGH.
			RSO	Inverter reset	Switched to LOW when the converter is reset (RES-ON). Assign the signal to the terminal RES of the inverter. The inverter is reset when it is connected with the RSO status LOW.
			IPF	Instantaneous power failure	Switched to LOW when an instantaneous power failure is detected.
			FAN	Cooling fan fault	Switched to LOW when a cooling fan fault occurs.
			SE	Open collector output common	Common terminal for terminals RDA, RDB, RSO, IPF, FAN
Communication			—	PU connector	With the PU connector, communication can be made through RS-485. (For connection on a 1:1 basis only) • Conforming standard: EIA-485 (RS-485) • Transmission format: Multidrop link • Communication speed: 4800 to 115200 bps • Wiring length: 500 m
		RS-485 terminals	TXD+	Converter unit transmission terminal	The RS-485 terminals enable the communication by RS-485. • Conforming standard: EIA-485 (RS-485) • Transmission format: Multidrop link • Communication speed: 300 to 115200 bps • Overall length: 500 m
			TXD-		
			RXD+	Converter unit reception terminal	
			RXD-		
			GND (SG)	Earthing (grounding)	

☐ indicates that terminal functions can be selected from **Pr.178, Pr.187, Pr.189 to Pr.195 (I/O terminal function selection)**.
Terminal names and terminal functions are those of the factory set.

Drive Product

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FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

MEMO

Inverter FREQROL-E700 Series
Compact body with easy use and High-class drive performance

Top Level of Driving Performance in Compact Body

High Torque 200%/0.5Hz is Realized by Advanced Magnetic Flux Vector Control (3.7K or less)

By the advancement of General-purpose magnetic flux vector control to Advanced magnetic flux vector control, top level of driving performance becomes possible.
Since V/F control and General-purpose magnetic flux vector control operations are available, operation after replacement of the conventional model (FR-E500 series) is ensured.
For the 5.5K to 15K, 150%/0.5Hz torque is realized.

■Speed/torque characteristics example

FR-E720-3.7K (Advanced magnetic flux vector control)
SF-JR 4P 3.7kW

Load torque (%)

Speed (r/min)
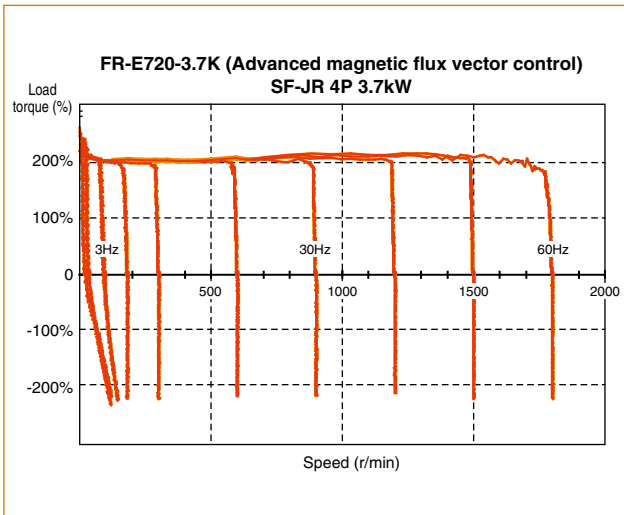
Short Time Overload Capacity is Increased (200% 3s)

Short time overload capacity is increased to 200% 3s (200% 0.5s for the conventional model). Overcurrent trip is less likely to occur.
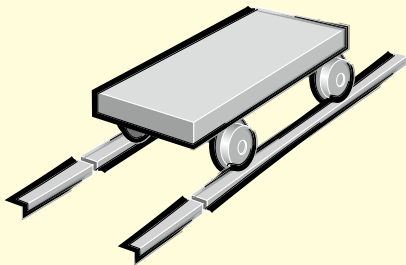
When a bogie runs over a bump, the impact can be beared by this function.

Improved Regeneration Capability

A brake transistor is built-in to the 0.4K to 15K.
Connecting an optional brake resistor increases regeneration capability.

Advanced auto tuning

Many kinds of three phase induction motors can be optimally controlled with Mitsubishi's original "non-rotation" auto tuning function. High precision tuning is enabled even when a test operation of a machine cannot be performed at parameter adjustment.
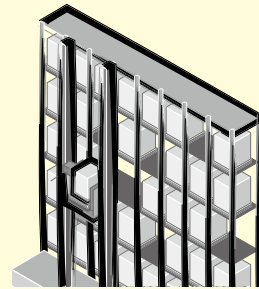
Advanced magnetic flux vector control is ideal for a lift in an automated-storage system which requires high torque at low speed.

Torque Limit/Current Limit Function

Improved torque limit/current limit function provides a machine protection, load limit, and stop-on-contact operation.
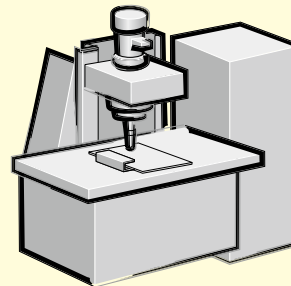
Using the torque limit function, machine breakage from overload can be avoided.
For example, edge chipping of a tool can be avoided.

Enhanced Operability

Usability was thoroughly pursued.

With a Provided USB Connector, Setting is Easily Done from a Personal Computer Using FR Configurator

An USB connector (mini-B connector) is provided as standard. The inverter can be easily connected without a USB-RS-485 converter.
Wizard (interactive) function of FR Configurator (inverter setup software) provides setting support.
In addition, a high-speed graph function with USB enables high speed sampling display.

Setting wizard function (example: acceleration/deceleration time setting)

Acceleration/deceleration
pattern setting

Acceleration/deceleration
time setting

Parameter list display

High speed graph function

Mini-B
connector

Inverter

FR Configurator

USB cable
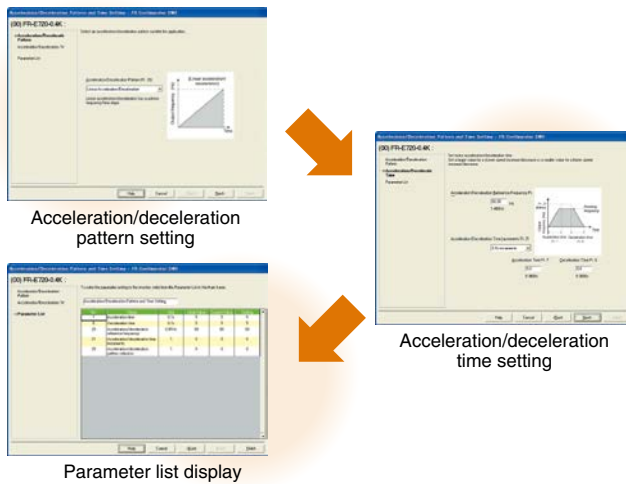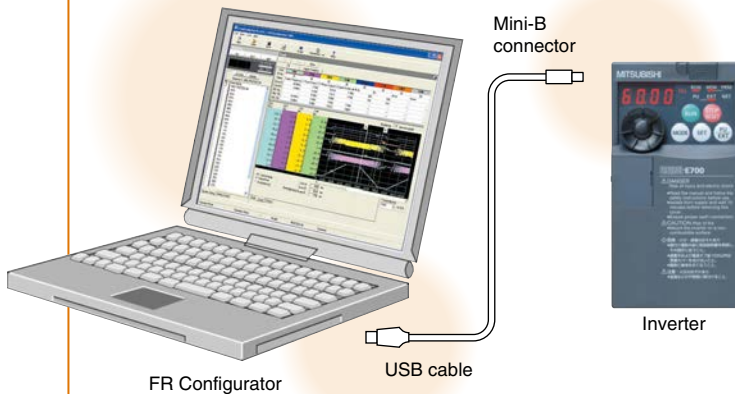
Expanded advanced
operability with USB
and FR Configurator

Enclosure Surface Operation Panel FR-PA07 (Option)

Optional enclosure surface operation panel (FR-PA07) can be connected.

In addition, an operation panel for conventional model (FR-E500 series) can be connected.

The operation panel of the inverter cannot be removed.
A parameter unit connection cable (FR-CB20☐) is separately required.

Parameter Unit FR-PU07/FR-PU07BB(-L) (Option)

The FR-PU07/FR-PU07BB(-L), an optional parameter unit, can be connected as well.

A parameter unit connection cable (FR-CB20☐) is separately required.
(Parameter unit connection cable FR-CB203 (3m) is enclosed with FR-PU07BB(-L).)

● Setting such as direct input method with a
  numeric keypad, operation status indication,
  and help function are useful.
  The display language can be selected from 8
  languages.

● Parameter settings of maximum of three inverters can be stored.

● A battery pack type (FR-PU07BB(-L)) allows parameter setting
  and parameter copy without powering on the inverter.

To use a parameter unit with battery pack (FR-PU07BB) outside of Japan, order a "FR-PU07BB-L"
(parameter unit type indicated on the package has L at the end).

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FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Enhanced Expandability

Mitsubishi inverters offer the expandability that answers to every need

A Variety of Plug-in Options are Mountable

Plug-in options supporting digital input, analog output extension, and a variety of communications provide extended functions which is almost equivalent to the FR-A700 series. (One type of plug-in option can be mounted.)
[For the FR-E700 series, use the "FR-A7 □□ E kit" which is a set of optional board and dedicated front cover.]

Plug-in option
Plug-in option dedicated front cover
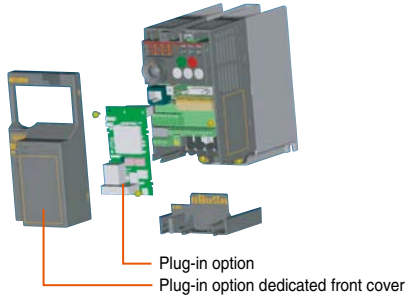
These plug-in options are supported by the standard control circuit terminal model.

Compatible Plug-in Options

- FR-A7AX E kit ...16-bit digital input
- FR-A7AY E kit ...Digital output
  Extension analog output
- FFR-A7AR E kit ...Relay output
- FR-A7NC E kit ...CC-Link
- FR-A7ND E kit ...DeviceNet
- FR-A7NP E kit ...PROFIBUS-DP
- FR-A7NL E kit ...LonWorks

Safety Stop Function (FR-E700-SC)

- Spring clamp terminals are adopted as control circuit terminals.
  Spring clamp terminals are highly reliable and can be easily wired.
- The FR-E700-SC series is compliant to the EU Machinery Directive without the addition of previously required external devices.
  Operation of an external emergency stop device results in a highly reliable immediate shutoff of the D700's output to the motor.
  This safety stop function conforms to the following standards.

EN ISO 13849-1 Category 3 / PLd
EN62061 / IEC61508 SIL2

Provided by the user (present)

Emergency stop

For conventional model...
Two MCs were necessary
- High cost
- Maintenance of two MCs was necessary
- Installation space was necessary

Safety function is equipped
- Magnetic contactor (MC)
- Emergency stop wiring

Only one MC is recommended instead of two.
Although MC is not required for the safety stop function.
- Cost reduction
- Maintenance of one MC
- Installation space is reduced

FR-D700

Emergency stop

*: Approved safety relay unit
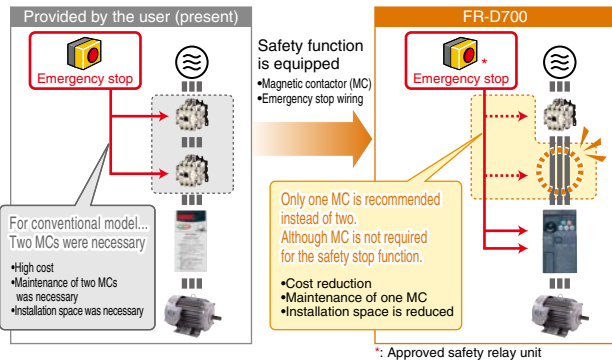
Control Terminals are Selectable According to Applications

Terminal cards other than standard terminal such as analog, plus train (available soon), two port RS-485 terminal are available as options.
A crimp ring terminal type is also available (to be released).
A terminal card is removable and can be easily replaced from a standard terminal card.

Terminal card

Various Kinds of Networks are Supported

- EIA-485 (RS-485), ModbusRTU (equipped as standard), CC-Link, PROFIBUS-DP, DeviceNet®, LonWorks® (option)

LonWorks® is a registered trademark of Echelon Corporation, DeviceNet® is of ODVA, and PROFIBUS is of PROFIBUS User Organization.
Other company and product names herein are the trademarks of their respective owners.

Compact and Space Saving

Compact design expands flexibility of enclosure design.

Compact Body with High Performance Function

Installation size is the same as the conventional model (FR-E500 series) in consideration of intercompatibility. (7.5K or less)

128mm

FR-E720-0.2K (SC)   FR-E520-0.2K

Side by Side Installation Saves Space

Space can be saved by side by side no clearance installation*.

*: Use the inverter at the surrounding air temperature of 40°C or less.

Peripheral device

Mitsubishi magnetic contactors

- Offer a selection of small frames
- Offer a line-up of safety contactors
- Support with low-level load (auxiliary contact)
- Support many international regulations as a standard model

Ensured Maintenance

700 series are the pioneer of long life and high reliability.

Long-life Design

● The design life of the cooling fan has been extended to 10 years[1]. The life of the fan can be further extended utilizing the it's ON/OFF control.
● The design life of the capacitors has been extended to 10 years by adopting a capacitor that endures 5000 hours at 105°C surrounding air temperature[1], [2].

[1]: Surrounding air temperature : annual average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value.
[2]: Output current : 80% of the inverter rated current

● Life indication of life components

Components	Guideline of the FR-E700 Life	Guideline of JEMA[3]
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

[3]: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacturer's Association)

Leading Life Check Function

● Degrees of deterioration of main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be monitored.
● Trouble can be avoided with the self-diagnostic alarm[4] that is output when the life span is near.

[4]: Any one of main circuit capacitor, control circuit capacitor, inrush current limit circuit or cooling fan reaches the output level, an alarm is output.
Capacity of the main circuit capacitor can be measured by setting parameter at a stop and turning the power from off to on. Measuring the capacity enables an alarm to be output.

Easy Replacement of Cooling Fan

● A cooling fan is provided on top of the inverter for all capacities requiring a cooling fan*. A cooling fan can be easily replaced without disconnecting main circuit wires.

*: Cooling fans are equipped with FR-E720-1.5K or more, FR-E740-1.5K or more, and FR-E720S-0.75K or more.

Combed Shaped Wiring Cover

Since a wiring cover can be installed after wiring, wiring work is easily done.

Removable Control Terminal Block

Wiring of the control circuit when replacing the same series inverter can be done by changing the terminal block.

Environment-Friendly

Human and environment-friendly inverter

Compliance with the EU Restriction of Hazardous Substances (RoHS)

● The inverter is human and environment-friendly by being compliance with the RoHS Directive.

Filter Options

● The inverter with filterpack FR-BFP2 (a package of power factor improving DC reactor, common mode choke and capacitive filter) conforms to the Japanese harmonic suppression guideline.
● Noise filter option which is compatible with EMC Directive (EN61800-3 2nd Environment Category C3) is available.

Full of Useful Functions

Enhanced functions for all sorts of applications

● Automatic restart after instantaneous power failure function with frequency search
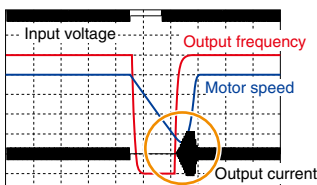
FR-E500 series

FR-E700 series

Detection of coasting speed (frequency search function) prevents the motor speed from decreasing at a restart, starting the motor smoothly with less output current.

● Power-failure deceleration stop function/operation continuation at instantaneous power failure function
The motor can be decelerated to a stop when a power failure or undervoltage occurs to prevent the motor from coasting. This function is useful to stop a motor at power failure as a fail safe of machine tool, etc.
With the new operation continuation function at instantaneous power failure, the motor continues running without coasting even if an instantaneous power failure occurs during operation.

*: The inverter may trip and the motor may coast depending on the load condition.

● Brake sequence mode ··· is useful for mechanical brake control of a lift.
● Regeneration avoidance function ························· prevents regenerative overvoltage in a pressing machine.
● Optimum excitation control ································· can save more energy with the maximum motor efficiency control.
● Main circuit power supply DC input ····················· can be connected to DC power supply.
● Enhanced I/O terminal function ·························· supports switchover of analog input (voltage / current).
● Password function ··· is effective for parameter setting protection.
and so on

Energy saving design for fan/pump use

● Applicable load selection (Pr.14)
Selecting the best output characteristics (V/F characteristics) according to use and load characteristics is possible.
● Optimum excitation control (Pr.60)
Save more energy with control that maximizes motor efficiency.

Drive Product

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FREQROL-A800 Series
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FREQROL-F700PJ Series
FREQROL-D700 Series

Drive Product

Lineup

FR-E720⬜⬜-0.1K⬜-⬜

Symbol	Voltage
1	100V class
2	200V class
4	400V class

Symbol	Number of Power Phases
None	Three-phase input
S	Single-phase input
W	Single-phase input (double voltage output)

Symbol	Inverter Capacity
0.1K to 15K	Represents the inverter capacity "kW".

Symbol	Control circuit terminal specification
None	Standard control circuit terminal model (screw type)
SC	Safety stop function model
NF	FL remote communication compatible model
NC	CC-Link communication compatible model

Symbol	Protective Structure
None	Enclosed-type structure IP20
C	Totally enclosed structure IP40

Inverter Model	Inverter capacity	0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K
Three-phase 200V FR-E720-⬜⬜	Enclosed-type structure (IP20)	●	●	●	●	●	●	●	●	●	●	●
	Totally enclosed structure (IP40)	○	○	○	○	○	○	○	○	○	○	○
Three-phase 400V FR-E740-⬜⬜	Enclosed-type structure (IP20)	—	—	●	●	●	●	●	●	●	●	●
	Totally enclosed structure (IP40)	—	—	○	○	○	○	○	○	○	○	○
Single-phase 200V FR-E720S-⬜⬜*	Enclosed-type structure (IP20)	●	●	●	●	●	●	—	—	—	—	—
Single-phase 100V FR-E710W-⬜⬜*	Enclosed-type structure (IP20)	●	●	●	●	—	—	—	—	—	—	—

*:Output of the single-phase 200V and single-phase 100V input specifications is three-phase 200V.

●:Available models ○:Models to be released — :Not available

Inverter type	Inverter Capacity	0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K
3-phase 200V class FR-E720-⬜⬜NF/NC		●	●	●	●	●	●	●	●	●	●	●
3-phase 400V class FR-E740-⬜⬜NF/NC		—	—	●	●	●	●	●	●	●	●	●

●:Available models — :Not available

c(UL)us LISTED   C E

Complies with
UL, cUL, EC Directives (CE marking)
as a standard model

Single-phase 100V power input specification models are not in compliance with the EMC Directive.

Our inverters comply with RoHS Directive and are eco friendly to people and the environment.

Drive Product

■Installation Example

AC power supply
Use within the permissible power supply specifications of the inverter.
To ensure safety, use a moulded case circuit breaker, earth leakage circuit breaker or magnetic contactor to switch power ON/OFF.

Moulded case circuit breaker (MCCB) or earth leakage current breaker (ELB), fuse
The breaker must be selected carefully since an in-rush current flows in the inverter at power on.

Magnetic contactor (MC)
Install the magnetic contactor to ensure safety. Do not use this magnetic contactor to start and stop the inverter. Doing so will cause the inverter life to be shorten.

Reactor (FR-HAL, FR-HEL option)
Install reactors to suppress harmonics and to improve the power factor.
A reactor (option) is required when installing the inverter near a large power supply system (500kVA or more).
The inverter may be damaged if you do not use reactors. Select the reactor according to the model. Remove the jumpers across terminals P/+ - P1 to connect the DC reactor.

Parameter unit (FR-PU07/FR-PU07BB(-L))

Enclosure surface operation panel (FR-PA07)
Connect a connection cable (FR-CB2) to the PU connector to use the FR-PA07, FR-PU07/FR-PU07BB(-L).

USB connector
A personal computer and an inverter can be connected with a USB (Ver1.1) cable.

MITSUBISHI
FREQROL-E700

Approved safety relay module
Required for compliance with safety standard.

S1
S2
PC

Brake resistor (FR-ABR, MRS, MYS)
Braking capability can be improved. (0.4K or more)
Always install a thermal relay when using a brake resistor whose capacity is 11K or more.

P/+
PR

AC reactor (FR-HAL)

DC reactor (FR-HEL)*

EMC filter (ferrite core)* (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. When more wires are passed through, a more effective result can be obtained. A wire should be wound four turns or more.

P/+ P1

R/L1 S/L2 T/L3

P/+ N/-

Earth (Ground)

U V W

EMC filter (capacitor)* (FR-BIF)
Reduces the radio noise.

EMC filter (ferrite core) (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. A wire should be wound four turns at a maximum.

Motor

Earth (Ground)

*Filterpack (FR-BFP2), which contains DC reactor and noise filter in one package, is also available.

Brake unit (FR-BU2)

P/+ PR
P/+
PR

High power factor converter (FR-HC)
Power supply harmonics can be greatly suppressed. Install this as required.*2

Power regeneration common converter (FR-CV)
Great braking capability is obtained. Install this as required.*2

Register unit (FR-BR) Discharging resistor (GZG, GRZG)
The regenerative braking capability of the inverter can be exhibited fully. Install this as required.

Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the output side of the inverter. When installing a moulded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the moulded case circuit breaker.

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

: Install these options as required.

*2 Can be used only with standard control circuit terminal specification models and safety-stop function models.

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Standard specifications

●Rating

Three-phase 200V power supply

Model FR-E720-□K*9(-C)*10			0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1			0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2		0.3	0.6	1.2	2.0	3.2	4.4	7.0	9.5	13.1	18.7	23.9
	Rated current (A)*7		0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11 (10)	17.5 (16.5)	24 (23)	33 (31)	47 (44)	60 (57)
	Overload current rating*3		150% 60s, 200% 3s (inverse-time characteristics)										
	Voltage*4		Three-phase 200 to 240V										
	Regenerative braking torque*5		150%		100%		50%		20%				
Power supply	Rated input AC (DC) voltage/ frequency		Three-phase 200 to 240V 50Hz/60Hz (283 to 339VDC*8)										
	Permissible AC (DC) voltage fluctuation		170 to 264V 50Hz/60Hz (240 to 373VDC*8)										
	Permissible frequency fluctuation		±5%										
	Power supply capacity (kVA)*6		0.4	0.8	1.5	2.5	4.5	5.5	9	12	17	20	28
Protective structure (JEM1030)			Enclosed type (IP20). IP40 for totally enclosed structure series.										
Cooling system			Self-cooling				Forced air cooling						
Approximate mass (kg)			0.5	0.5	0.7	1.0	1.4	1.4	1.7	4.3	4.3	6.5	6.5

Three-phase 400V power supply

Model FR-E740-□K*9(-C)*10			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)*1			0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2		1.2	2.0	3.0	4.6	7.2	9.1	13.0	17.5	23.0
	Rated current (A)*7		1.6 (1.4)	2.6 (2.2)	4.0 (3.8)	6.0 (5.4)	9.5 (8.7)	12	17	23	30
	Overload current rating*3		150% 60s, 200% 3s (inverse-time characteristics)								
	Voltage*4		Three-phase 380 to 480V								
	Regenerative braking torque*5		100%		50%		20%				
Power supply	Rated input voltage/frequency		Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation		325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation		±5%								
	Power supply capacity (kVA)*6		1.5	2.5	4.5	5.5	9.5	12	17	20	28
Protective structure (JEM1030)			Enclosed type (IP20). IP40 for totally enclosed structure series.								
Cooling system			Self-cooling		Forced air cooling						
Approximate mass (kg)			1.4	1.4	1.9	1.9	1.9	3.2	3.2	6.0	6.0

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V for three-phase 200V class and 440V for three-phase 400V class.
*3 The % of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used. (Option brake resisitor cannot be used for 0.1K and 0.2K.)
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 Setting 2kHz or more in **Pr. 72 PWM frequency selection** to perform low acoustic noise operation in the surrounding air temperature exceeding 40°C (totallyenclosed structure is 30°C), the rated output current is the value in parenthesis.
*8 • Connect DC power supply to terminal P/+ and N/-. Connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-.
   • Since the voltage between P/+ and N/- may increase due to the regeneration energy from the motor and exceeds 415V temporarily, select the DC power supply which can withstand the voltage/energy during regeneration. If using the power supply which can not withstand voltage/energy during regeneration, insert diodes in series for reverse current prevention.
   • Although the FR-E700 series has the built-in inrush current limit circuit, select the DC power supply considering the inrush current at powering ON as the inrush current four times of the rated inverter flows at powering ON.
   • Since the power supply capacity depends on the output impedance of the power, select the power supply capacity which has enough allowance according to the AC power supply system capacity.
*9 The safety stop function model is indicated with SC.
*10 FL remote communication compatible models are indicated with "NF".
*11 CC-Link communication compatible models are indicated with "NC".

Drive Product

Single-phase 200V power supply

Model FR-E720S-□K(SC)*10			0.1	0.2	0.4	0.75	1.5	2.2
Applicable motor capacity (kW)*1			0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2		0.3	0.6	1.2	2.0	3.2	4.4
	Rated current (A)*7		0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11.0 (10.0)
	Overload current rating*3		150% 60s, 200% 3s (inverse-time characteristics)					
	Rated output voltage*4		Three-phase 200 to 240V					
	Regenerative braking torque*5		150%		100%		50%	20%
Power supply	Rated input AC voltage/frequency		Single-phase 200 to 240V 50Hz/60Hz					
	Permissible AC voltage fluctuation		170 to 264V 50Hz/60Hz					
	Permissible frequency fluctuation		Within ±5%					
	Power supply capacity (kVA)*6		0.5	0.9	1.5	2.5	4.0	5.2
Protective structure (JEM1030)			Enclosed type (IP20)					
Cooling system			Self-cooling			Forced air cooling		
Approximate mass (kg)			0.6	0.6	0.9	1.4	1.5	2.0

Single-phase 100V power supply

Model FR-E710W-□K			0.1	0.2	0.4	0.75
Applicable motor capacity (kW)*1			0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)*2		0.3	0.6	1.2	2.0
	Rated current (A)*7		0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)
	Overload current rating*3		150% 60s, 200% 3s (inverse-time characteristics)			
	Rated output voltage*4		Three-phase 200 to 230V*8, *9			
	Regenerative braking torque*5		150%		100%	
Power supply	Rated input AC voltage/frequency		Single-phase 100 to 115V 50Hz/60Hz			
	Permissible AC voltage fluctuation		90 to 132V 50Hz/60Hz			
	Permissible frequency fluctuation		Within ±5%			
	Power supply capacity (kVA)*6		0.5	0.9	1.5	2.5
Protective structure (JEM1030)			Enclosed type (IP20)			
Cooling system			Self-cooling			
Approximate mass (kg)			0.6	0.7	0.9	1.5

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load. If the automatic restart after instantaneous power failure function **(Pr. 57)** or power failure stop function **(Pr. 261)** is set and power supply voltage is low while load becomes bigger, the bus voltage decreases to power failure detection level and load of 100% or more may not be available.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque. When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used. (Option brake resisitor cannot be used for 0.1K and 0.2K.)
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 Setting 2kHz or more in **Pr. 72 PWM frequency selection** to perform low acoustic noise operation with the surrounding air temperature exceeding 40°C, the rated output current is the value in parenthesis.
*8 For single-phase 100V power input model, the maximum output voltage is twice the amount of the power supply voltage and cannot be exceeded.
*9 In a single-phase 100V power input model, the output voltage may fall down when the load is heavy, and larger output current may flow compared to a threephase input model. Use the motor with less load so that the output current is within the rated motor current range.
*10 The safety stop function model is indicated with SC.

Drive Product

●Common specifications

Control specifications	Control method		Soft-PWM control/high carrier frequency PWM control (V/F control, Advanced magnetic flux vector control, General-purpose magnetic flux vector control, Optimum excitation control are available)
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminal2, 4: 0 to 10V/10bit) 0.12Hz/60Hz (terminal2, 4: 0 to 5V/9bit) 0.06Hz/60Hz (terminal4: 0 to 20mA/10bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±0.5% of the max. output frequency (25°C ±10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 400Hz, Constant-torque/variable torque pattern can be selected
	Starting torque		200% or more (at 0.5Hz)...when Advanced magnetic flux vector control is set (3.7K or less)
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.01 to 360s, 0.1 to 3600s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration modes are available.
	DC injection brake		Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) can be changed.
	Stall prevention operation level		Operation current level can be set (0 to 200% adjustable), whether to use the function or not can be selected
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V, 0 to 5V can be selected Terminal 4: 0 to 10V, 0 to 5V, 4 to 20mA can be selected
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set. 4 digit BCD or 16bit binary data (when the option FR-A7AX E kit is used)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (Standard control circuit terminal model:Seven terminals Safety stop function model: Six terminals)		The following signals can be assigned to **Pr. 178 to Pr.184 (input terminal function selection)**: multi-speed selection, remote setting, stop-on contact selection, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, brake opening completion signal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, brake sequence, second function, multi-speed operation, stop-on contact control, droop control, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485)
	Safety stop function[*2]		Safety shutoff signal can be input from terminals S1 and S2. (compliant with EN ISO 13849-1 Category 3 / PLd EN62061 / IEC61508 SIL2)
	Output signal Open collector output (Two terminals) Relay output (One terminal)		The following signals can be assigned to **Pr.190 to Pr.192 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, brake opening request, fan alarm[*1], heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, safety monitor output[*2], safety monitor output2[*2], during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm
		Operating status	
		For meter Pulse train output (Max. 2.4kHz: one terminal)	The following signals can be assigned to **Pr.54 FM terminal function selection**: output frequency, motor current (steady), output voltage, frequency setting, motor torque, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power Pulse train output (1440 pulses/s/full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, motor current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, motor torque, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, I/O terminal option monitor, output power, cumulative power, motor thermal load factor, and inverter thermal load factor.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault records (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored
		Interactive guidance	Function (help) for operation guide[*3]
Protective/warning function	Protective functions		Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, input phase failure[*5], output side earth ground) fault overcurrent at start[*4], output phase failure, external thermal relay operation[*4], option fault[*4], parameter error, internal board fault, PU disconnection, retry count excess[*4], CPU fault, brake transistor alarm, inrush resistance overheat, communication error, analog input error, USB communication error, brake sequence error 4 to 7[*4], safety circuit fault[*2]
	Warning functions		Fan alarm[*1], overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm[*4], electronic thermal relay function prealarm, maintenance output[*4], undervoltage, operation panel lock, password locked, inverter reset, safety stop[*2]
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing) (-10°C to +40°C for totally-enclosed structure feature)[*6]
	Ambient humidity		90%RH or less (non-condensing)
	Storage temperature[*7]		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)
	Altitude/vibration		Maximum 1000m above sea level, 5.9m/s² or less at 10 to 55Hz (directions of X, Y, Z axes)

*1 As the FR-E720-0.1K(SC) to 0.75K(SC), FR-E740-0.4K(SC) and 0.75K(SC), FR-E720S-0.1K(SC) to 0.4K(SC), FR-E710W-0.1K to 0.75K are not provided with the cooling fan, this alarm does not function.
*2 This function is only available for the safety stop function model.
*3 This operation guide is only available with option parameter unit (FR-PU07).
*4 This protective function does not function in the initial status.
*5 This protective function is available with the three-phase power input model only.
*6 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
*7 Temperatures applicable for a short time, e.g. in transit.

■ Standard Model

Outline Dimension Drawings

● FR-E720-0.1K(SC) to 0.75K(SC)
● FR-E720S-0.1K(SC) to 0.4K(SC)
● FR-E710W-0.1K to 0.4K

φ5 hole

When used with the plug-in option

Capacity plate

Rating plate

Rating plate

118
128
5
5
5
56
68

D1
4
D

D1
4
D2 *
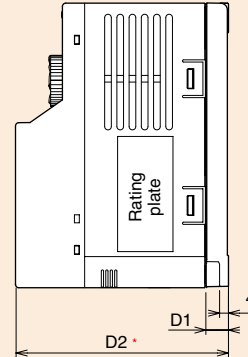
Inverter Model	D	D1	D2*
FR-E720-0.1K, 0.2K FR-E720S-0.1K, 0.2K FR-E710W-0.1K	80.5	10	95.6
FR-E720-0.1KSC, 0.2KSC FR-E720S-0.1KSC, 0.2KSC	86.5		108.1
FR-E710W-0.2K	110.5	10	125.6
FR-E720-0.4K	112.5	42	127.6
FR-E720-0.4KSC	118.5		140.1
FR-E720-0.75K	132.5	62	147.6
FR-E720-0.75KSC	138.5		160.1
FR-E720S-0.4K FR-E710W-0.4K	142.5	42	157.6
FR-E720S-0.4KSC	148.5		170.1

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Outline Dimension Drawings

- FR-E720-1.5K(SC), 2.2K(SC)
- FR-E720S-0.75K(SC), 1.5K(SC)
- FR-E710W-0.75K

When used with the plug-in option

*1 FR-E710W-0.75K are not provided with the cooling fan.
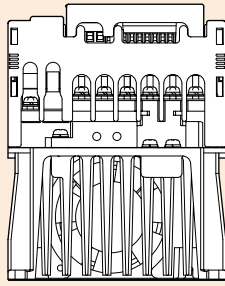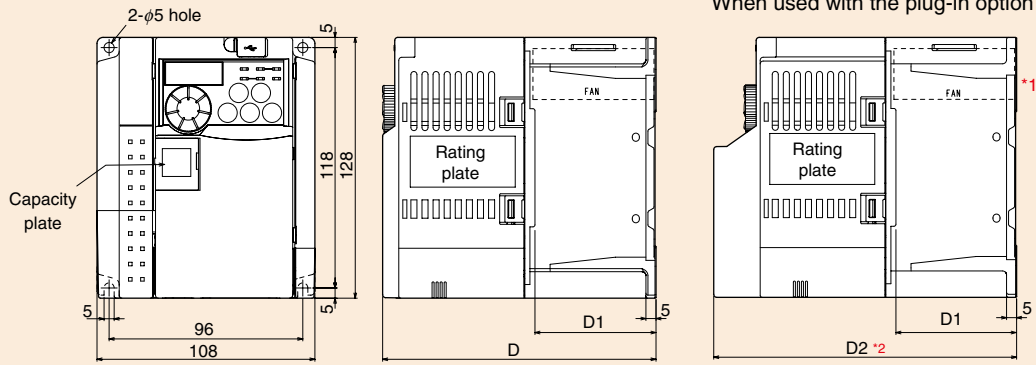
Inverter Model	D	D1	D2*2
FR-E720-1.5K, 2.2K FR-E720S-0.75K	135.5	60	150.6
FR-E720-1.5KSC, 2.2KSC FR-E720S-0.75KSC	141.5		163.1
FR-E720S-1.5K	161		176.1
FR-E720S-1.5KSC	167		188.6
FR-E710W-0.75K	155	54	170.1

*2 When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

FR-E720-3.7K(SC)

When used with the plug-in option
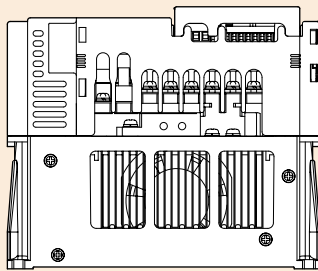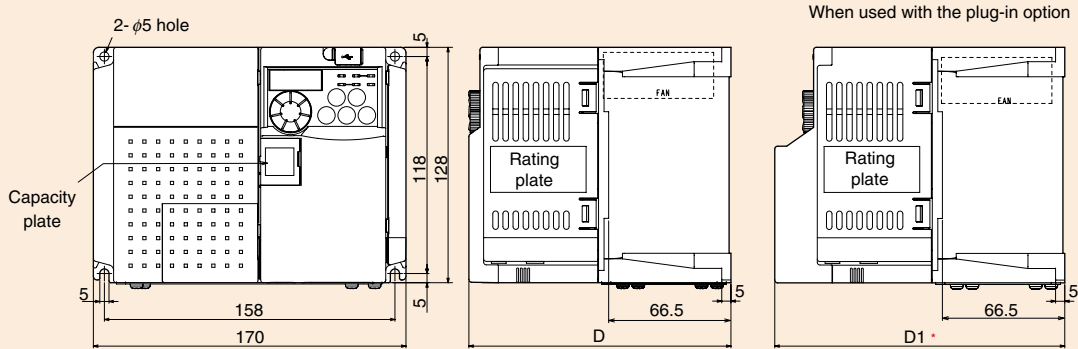
Inverter Model	D	D1*
FR-E720-3.7K	142.5	157.6
FR-E720-3.7KSC	148.5	170.1

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Drive Product

Outline Dimension Drawings

●FR-E720-5.5K(SC) to 15K(SC)

When used with the plug-in option

2-φ6hole

244
260
8
8

6
W1
W

Capacity plate

Rating plate

D
D2
D3

Rating plate

D1 *
D2
D3

W2
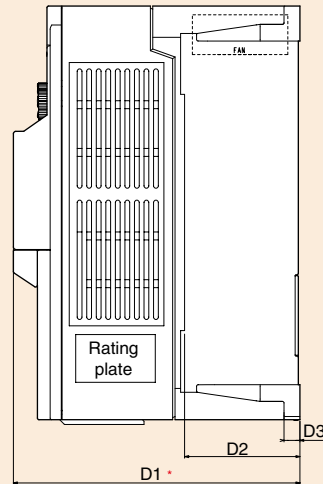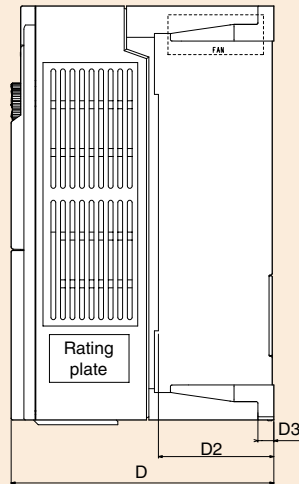
Inverter Model	W	W1	W2	D	D1*	D2	D3
FR-E720-5.5K, 7.5K	180	164	180	165	180.1	71.5	10
FR-E720-5.5KSC, 7.5KSC				171	192.6		
FR-E720-11K, 15K	220	195	211	190	205.1	84.5	10.5
FR-E720-11KSC, 15KSC				196	217.6		

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

●FR-E740-0.4K(SC) to 3.7K(SC)
●FR-E720S-2.2K(SC)

When used with the plug-in option

2-φ5 hole

6
138
150
6

Capacity plate

5
128
140

Rating plate
*1

FAN

D1
D
5

Rating plate
*1

FAN

D1
D2 *2
5
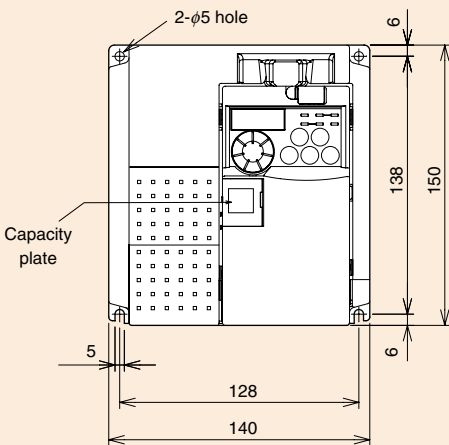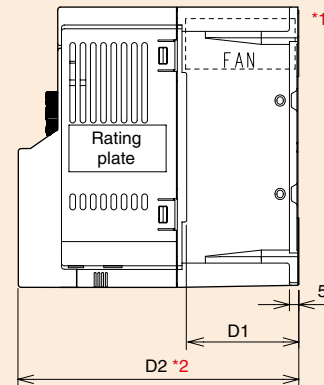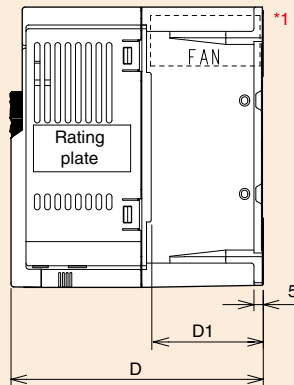
*1 FR-E740-0.4K, 0.75K are not provided with the cooling fan.

Inverter Model	D	D1	D2*2
FR-E740-0.4K, 0.75K	114	39	129.1
FR-E740-0.4KSC, 0.75KSC	120		141.6
FR-E740-1.5K, 2.2K, 3.7K	135	60	150.1
FR-E740-1.5KSC, 2.2KSC, 3.7KSC	141		162.6
FR-E720S-2.2K	155.5		170.6
FR-E720S-2.2KSC	161.5		183.1

*2 When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.

(Unit: mm)

Outline Dimension Drawings

● FR-E740-5.5K(SC), 7.5K(SC)

2-φ5 hole

When used with the plug-in option

FAN

Rating plate

FAN

Rating plate

Capacity plate

5

208

220

6

138

150

6

10

68

D

10

68

D1*

Inverter Model	D	D1*
FR-E740-5.5K, 7.5K	147	162.1
FR-E740-5.5KSC, 7.5KSC	153	174.6

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.
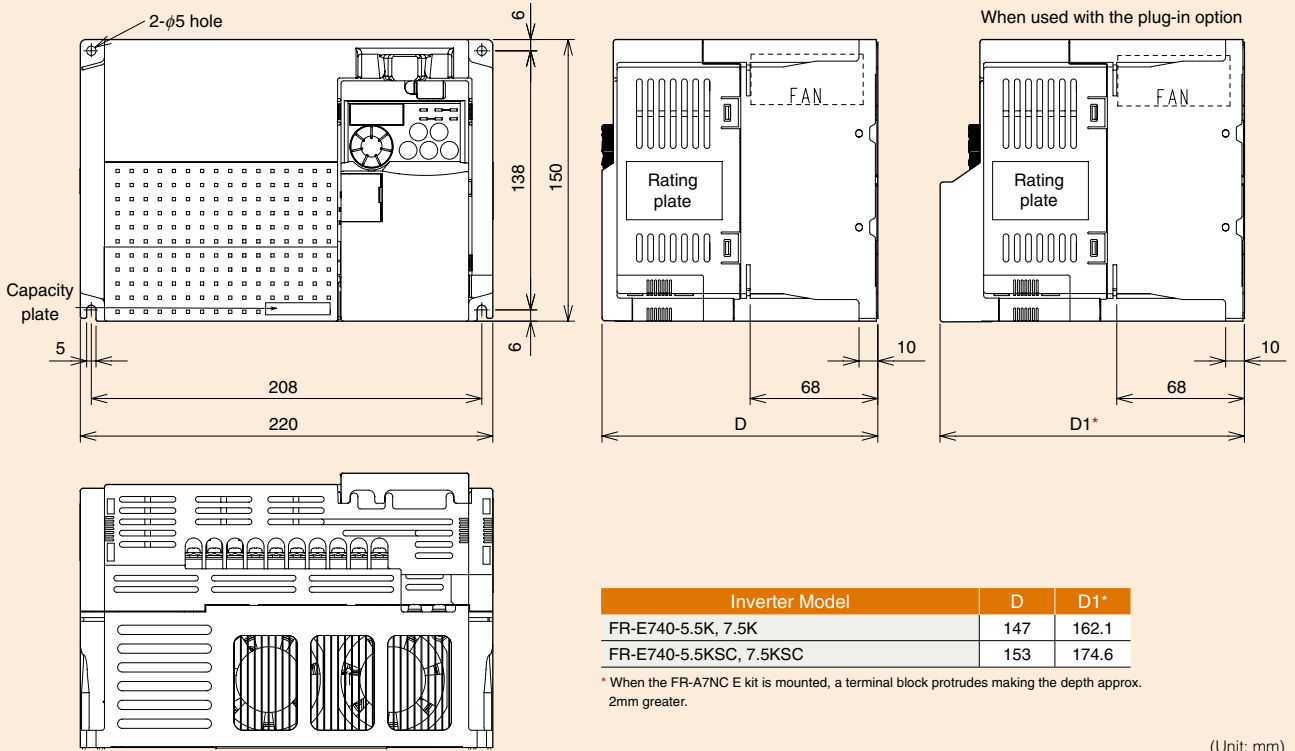
(Unit: mm)

● FR-E740-11K(SC), 15K(SC)

2-φ6 hole

When used with the plug-in option

FAN

Rating plate

FAN

Rating plate

6

195

220

Capacity plate

8

244

260

8

10.5

84.5

D

10.5

84.5

D1 *

211

Inverter Model	D	D1*
FR-E740-11K, 15K	190	205.1
FR-E740-11KSC, 15KSC	196	217.6

* When the FR-A7NC E kit is mounted, a terminal block protrudes making the depth approx. 2mm greater.
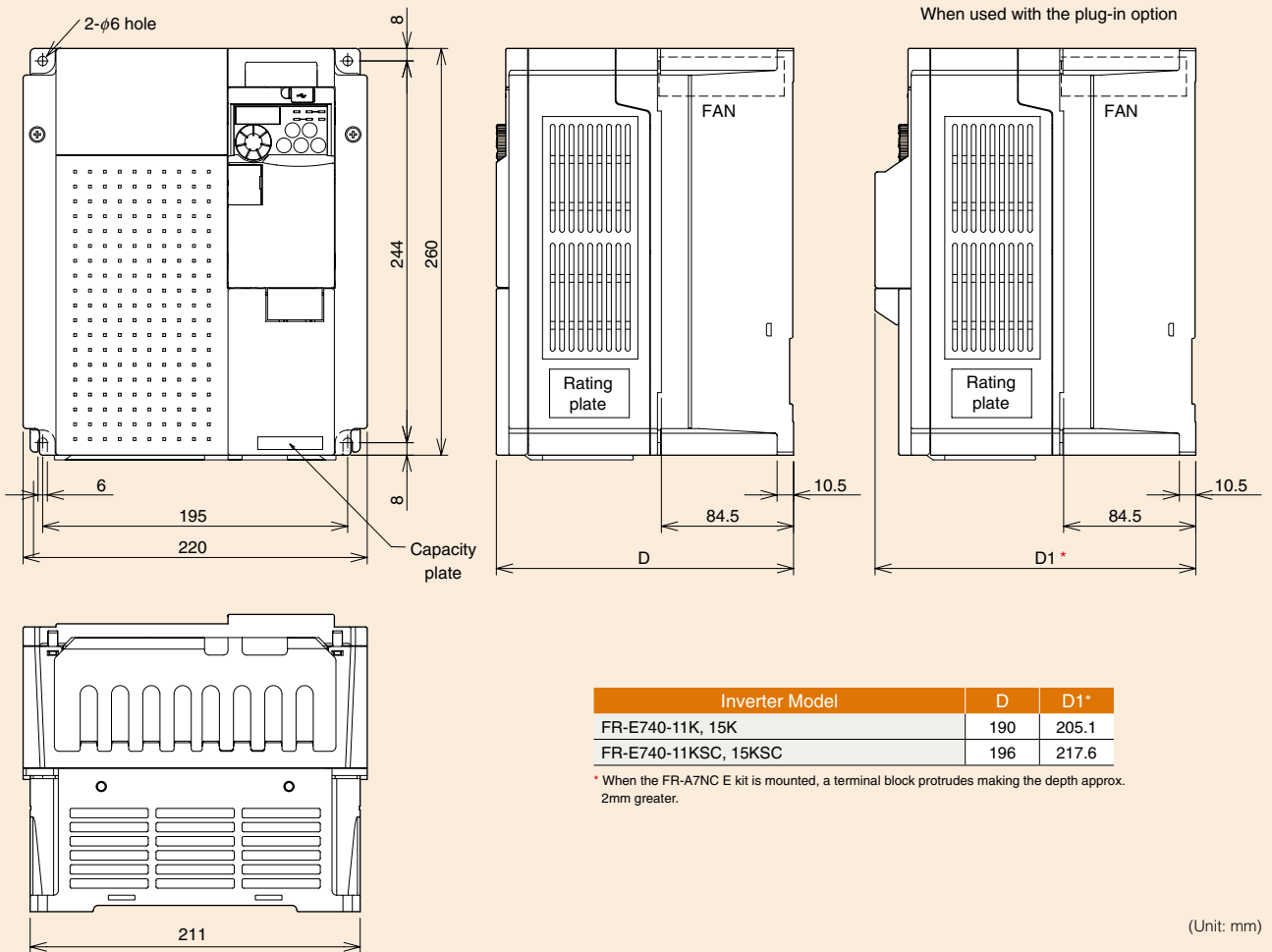
(Unit: mm)

■Terminal Connection Diagram

(1) Standard control circuit terminal model

Sink logic
◎ Main circuit terminal
◯ Control circuit terminal

Single-phase power input
MCCB　MC
Single-phase AC power supply
R/L1
S/L2

Three-phase AC power supply
MCCB　MC
R/L1
S/L2
T/L3
Earth (Ground)

*1 DC reactor (FR-HEL)
When connecting a DC reactor, remove the jumper across P1 and P/+.
Not available for single-phase 100V power input model.

*6 Terminal P1 is not available for single-phase 100V power input model.

*7 A brake transistor is not built-in to the 0.1K and 0.2K.

*8 Brake resistor (FR-ABR, MRS, MYS type)
Install a thermal relay to prevent an overheat and burnout of the brake resistor.
(The brake resistor can not be connected to the 0.1K and 0.2K.)

Brake unit (Option)
Earth (Ground)
Jumper
P1　P/+　PR　N/-
*6　　　　*7
*1　*8
R

Main circuit

U
V
W
Motor
IM
Earth (Ground)

Control circuit

Standard control terminal block

Control input signals (No voltage input allowed)

Terminal functions vary with the input terminal assignment (Pr. 178 to Pr. 184)

Forward rotation start
Reverse rotation start
STF
STR

High speed
Middle speed
Low speed
Multi-speed selection
RH
RM
RL

*2 When using terminals PC-SD as a 24VDC power supply, take care not to short across terminals PC-SD.

Output stop
Reset
MRS
RES
SD

SOURCE　SINK

Contact input common

24VDC power supply (Common for external power supply transistor)
PC *2

Relay output
C
B
A
Relay output (Fault output)

Terminal functions vary by Pr. 192 A,B,C terminal function selection

Open collector output
RUN
FU
SE
Running
Frequency detection
Open collector output common
Sink/source common

Terminal functions vary with the output terminal assignment (Pr. 190 and Pr. 191)

Frequency setting signals (Analog)

*3 Terminal input specifications can be changed by analog input specifications switchover (Pr. 73).

*4 It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.

Frequency setting potentiometer 1/2W1kΩ

3
2
1

10(+5V)
2 0 to 5VDC *3
(0 to 10VDC)
5(Analog common)

Terminal 4 input (+) (Current input) (-)
4 4 to 20mADC
0 to 5VDC
0 to 10VDC *5

*5 Terminal input specifications can be changed by analog input specifications switchover (Pr. 267). Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to10V) and "I" (initial value) to select current input (4 to 20mA).
To use terminal 4 (initial setting is current input), set "4" in any of Pr.178 to Pr.184 (input terminal function selection) to assign the function, and turn ON AU signal.

I □ V
Voltage/current input switch *5

Calibration resistor
Indicator (Frequency meter, etc.)
FM
SD
+ -
*9
Moving-coil type 1mA full-scale

*9 It is not necessary when calibrating the indicator from the operation panel.

PU connector

USB connector

Connector for plug-in option connection
Option connector

Earth (Ground)

[NOTE]
・To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
・After wiring, wire offcuts must not be left in the inverter.
　Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
・The output of the single-phase power input model is three-phase 200V.

(2) Safety stop function model

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Sink logic
◎ Main circuit terminal
◯ Control circuit terminal

Single-phase power input

MCCB   MC

Single-phase AC power supply

R/L1
S/L2

*1 DC reactor (FR-HEL)
When connecting a DC reactor, remove the jumper across P1 and P/+.

Brake unit (Option)

*6 Brake transistor are not built-in to the 0.1K and 0.2K.

*7 Brake resistor (FR-ABR, MRS, MYS type) Install a thermal relay to prevent an overheat and burnout of the brake resistor. (The brake resistor can not be connected to the 0.1K and 0.2K.)

Earth (Ground)
Jumper
P1   P/+   PR   N/-
*6

Three-phase AC power supply

MCCB   MC

R/L1
S/L2
T/L3

U
V
W

Motor
IM

Earth (Ground)

Earth (Ground)

Main circuit

Control circuit

Safety stop function model

Control input signals (No voltage input allowed)

Terminal functions vary with the input terminal assignment (Pr. 178 to Pr. 182 and Pr. 184)

Forward rotation start
Reverse rotation start

STF
STR
RH
RM
RL
RES
SD

High speed
Middle speed
Low speed

Multi-speed selection

Reset

*2 When using terminals PC-SD as a 24VDC power supply, take care not to short across terminals PC-SD.

Contact input common
24VDC power supply
(Common for external power supply transistor)
Safety stop input common terminal
Safety stop input (Channel 1)
Safety stop input (Channel 2)

PC *2
S1
S2

SOURCE   SINK

Shorting wire

Relay output
C
B
A

Relay output (Fault output)

Terminal functions vary by Pr. 192 A,B,C terminal function selection

Open collector output
RUN
FU
SE

Running

Frequency detection

Terminal functions vary with the output terminal assignment (Pr. 190 and Pr. 191)

Open collector output common
Sink/source common

Frequency setting signals (Analog)

*3 Terminal input specifications can be changed by analog input specifications switchover (Pr. 73).

*4 It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.

Frequency setting potentiometer 1/2W1kΩ

10(+5V)
2 0 to 5VDC *3
(0 to 10VDC)
5(Analog common)

Terminal 4 input (+)
(Current input) (-)

4 4 to 20mADC
0 to 5VDC
0 to 10VDC *5

*5 Terminal input specifications can be changed by analog input specifications switchover (Pr. 267). Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to10V) and "I" (initial value) to select current input (4 to 20mA).
To use terminal 4 (initial setting is current input), set "4" in any of Pr.178 to Pr.184 (input terminal function selection) to assign the function, and turn ON AU signal.

V ▢ I
Voltage/current input switch *5

Calibration resistor

Indicator (Frequency meter, etc.)
Moving-coil type 1mA full-scale

FM
SD
*8

*8 It is not necessary when calibrating the indicator from the operation panel.

PU connector

USB connector

Connector for plug-in option connection

Option connector

[**NOTE**]

・To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.

・After wiring, wire offcuts must not be left in the inverter.
Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

・The output of the single-phase power input model is three-phase 200V.

Drive Product

(3) FL remote communication compatible model (NF)

Sink logic
◎ Main circuit terminal
○ Control circuit terminal

*1 DC reactor (FR-HEL)
When connecting a DC reactor, remove the jumper across P1 and P/+.

*2 Brake transistor are not built-in to the 0.1K and 0.2K.

*3 Brake resistor (FR-ABR, MRS, MYS type) Install a thermal relay to prevent an overheat and burnout of the brake resistor. (The brake resistor can not be connected to the 0.1K and 0.2K.)

Brake unit (Option)

Earth (Ground)
Jumper
P1 P/+ PR N/-

Three-phase AC power supply
NFB MC
R/L1
S/L2
T/L3
Earth (Ground)

Motor
U
V
W
IM
Earth (Ground)

Main circuit
Control circuit

24V external power supply
24V power supply — +24
Common terminal — SD

Open collector output
Y0 — Open collector output Y0 (Safety monitoring output 2)
SE — Shared open collector output common sync/source

Safety stop input signal   Wire for short circuit use
Safety stop input (system 1) — S1
Safety stop input (system 2) — S2
Safety stop input common terminal — PC

FL remote communication connector

Node address settings
X1 X10

LED (operation status display)
D1 D2
D3 D4
D1:Communication setting status LED (CHG)
D2:Device status LED (DEV)
D3:Incoming/outgoing transmissions LED (TX/RX)
D4:Remote status LED (RMT)

[**NOTE**]
・To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
・After wiring, wire offcuts must not be left in the inverter.
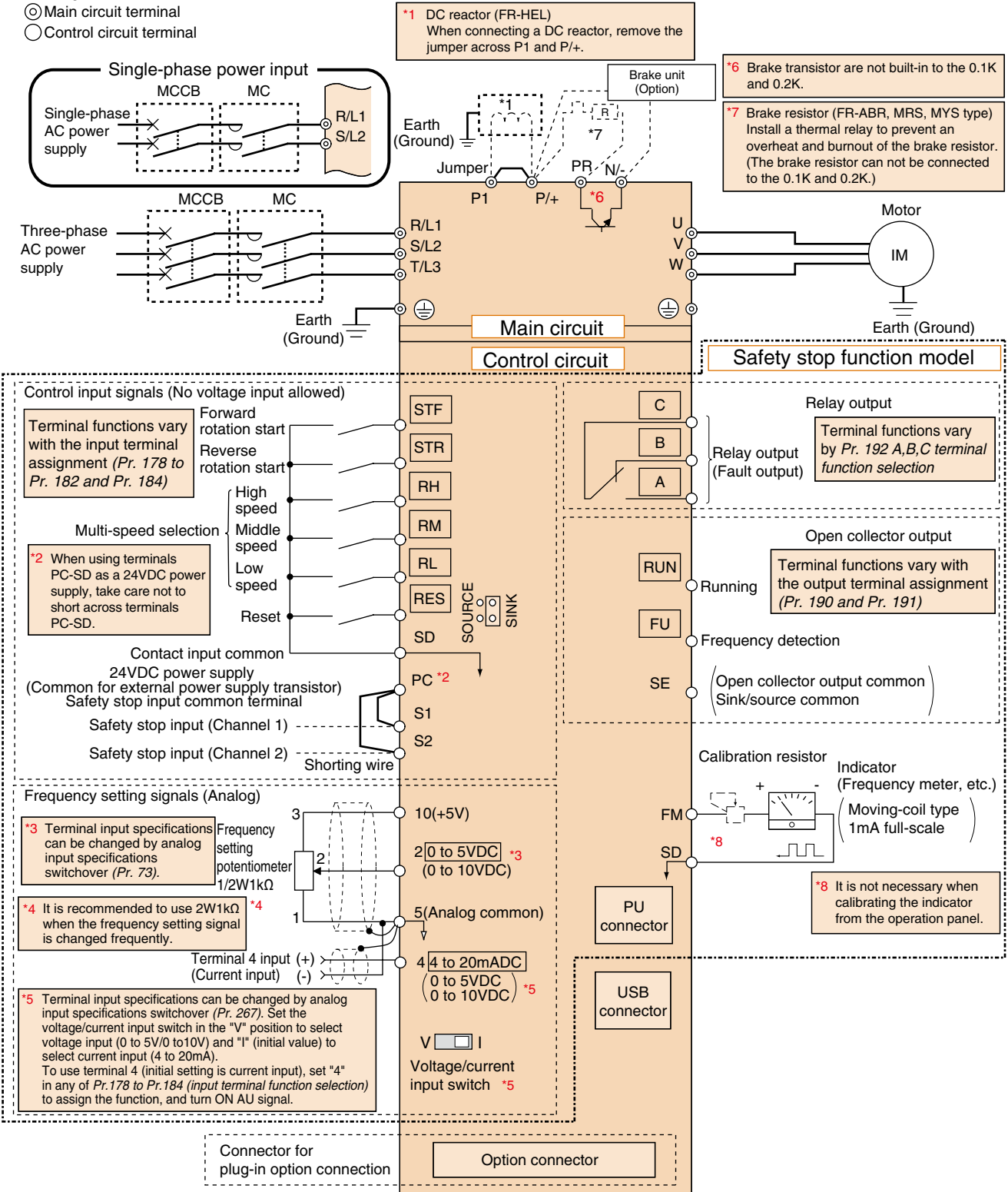 Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

(4) CC-Link communication compatible model (NC)

Sink logic
◎ Main circuit terminal
○ Control circuit terminal

*1 DC reactor (FR-HEL)
When connecting a DC reactor, remove the jumper across P1 and P/+.

*2 A brake transistor is not built-in to the 0.1K and 0.2K.

*3 Brake resistor (FR-ABR, MRS, MYS type) Install a thermal relay to prevent an overheat and burnout of the brake resistor. (The brake resistor can not be connected to the 0.1K and 0.2K.)

Brake unit (Option)

Earth (Ground)
Jumper
P1 P/+ PR N/-

Three-phase AC power supply
NFB MC
R/L1
S/L2
T/L3
Earth (Ground)

Motor
U
V
W
IM
Earth (Ground)

Main circuit
Control circuit

24V external power supply
24V power supply — +24
Common terminal — SD

Open collector output
Terminal function can be changed by using the *Pr.190 RX2 (terminal Y0) function selection.*
Y0 — Open collector output Y0 (in operation)
SE — Shared open collector output common sync/source

Safety stop input signal   Wire for short circuit use
Safety stop input (system 1) — S1
Safety stop input (system 2) — S2
24V
Safety stop input common terminal — PC

CC-Link communication connector (2 ports)

SD L.RUN
RD L.ERR
RUN

Operation status display LED
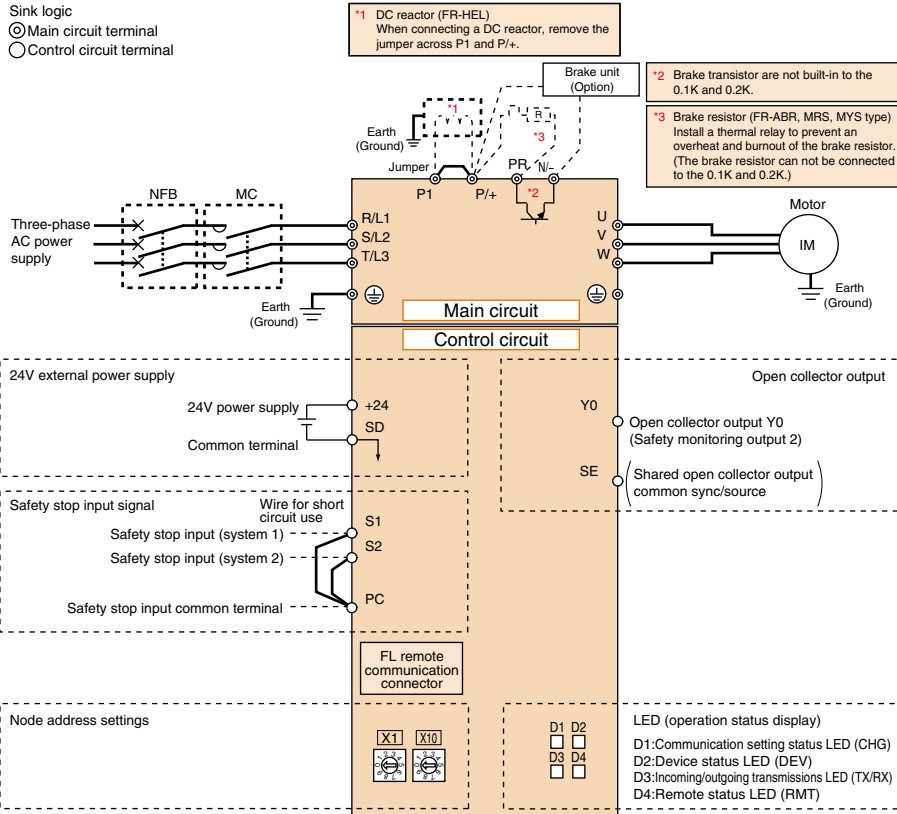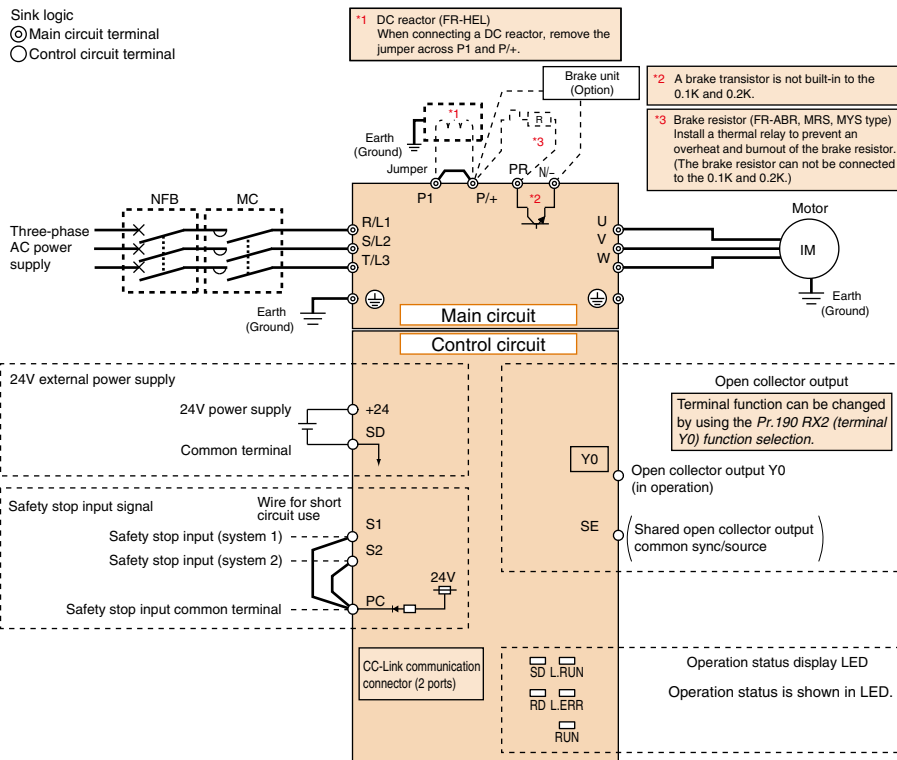Operation status is shown in LED.

[**NOTE**]
・To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
・After wiring, wire offcuts must not be left in the inverter.
 Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

Features/Outline
Lineup/Functions Connectivity Examples
Specifications/Outline Drawing
FREQROL-A800 Series
FREQROL-F800 Series
FREQROL-E700 Series
FREQROL-F700PJ Series
FREQROL-D700 Series

■Terminal Specification Explanation

(1) Standard control circuit terminal specification model and safety-stop model (SC)

Type			Terminal Symbol	Terminal Name	Description	
Main circuit			R/L1, S/L2, T/L3*	AC power input	Connect to the commercial power supply. Keep these terminals open when using the high power factor converter (FR-HC) or power regeneration common converter (FR-CV). *When using single-phase power input, terminals are R/L1 and S/L2.	
			U, V, W	Inverter output	Connect a three-phase squirrel-cage motor.	
			P/+, PR	Brake resistor connection	Connect a brake transistor (MRS type, MYS type, FR-ABR) across terminals P/+-PR. (The brake resistor can not be connected to the 0.1K or 0.2K)	
			P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or high power factor converter (FR-HC).	
				DC power input	Connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-.	
			P/+, P1*	DC reactor connection	Remove the jumper across terminals P/+-P1 and connect a DC reactor. Single-phase 100V power input model is not compatible with DC reactor. *Terminal P1 is not available for single-phase 100V power input model.	
			⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).	
Control circuit/input signal	Contact input		STF	Forward rotation start	Turn on the STF signal to start forward rotation and turn it off to stop.	When the STF and STR signals are turned on simultaneously, the stop command is given.
			STR	Reverse rotation start	Turn on the STR signal to start reverse rotation and turn it off to stop.	
			RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.	
			MRS*	Output stop	Turn on the MRS signal (20ms or more) to stop the inverter output. Use to shut off the inverter output when stopping the motor by electromagnetic brake. *Terminal MRS is only available for the standard control circuit terminal model.	
			RES	Reset	Used to reset alarm output provided when protective circuit is activated. Turn on the RES signal for more than 0.1s, then turn it off. Initial setting is for reset always. By setting **Pr. 75**, reset can be set to enabled only at fault occurrence. Recover about 1s after reset is cancelled.	
			SD	Contact input common (sink) (initial setting)	Common terminal for contact input terminal (sink logic) and terminal FM.	
				External transistor common (source)	When connecting the transistor output (open collector output), such as a programmable controller, when source logic is selected, connect the external power supply common for transistor output to this terminal to prevent a malfunction caused by undesirable currents.	
				24VDC power supply common	Common output terminal for 24VDC 0.1A power supply (PC terminal). Isolated from terminals 5 and SE.	
			PC	External transistor common (sink) (initial setting)	When connecting the transistor output (open collector output), such as a programmable controller, when sink logic is selected, connect the external power supply common for transistor output to this terminal to prevent a malfunction caused by undesirable currents.	
				Contact input common (source)	Common terminal for contact input terminal (source logic).	
				24VDC power supply	Can be used as 24VDC 0.1A power supply.	
				Safety stop input terminal common*	Common terminal for safety stop input terminals S1 and S2. *Terminal S1 and S2 are only available for the safety stop function model.	
	Frequency setting		10	Frequency setting power supply	Used as power supply when connecting potentiometer for frequency setting (speed setting) from outside of the inverter.	5VDC permissible load current 10mA
			2	Frequency setting (voltage)	Inputting 0 to 5VDC (or 0 to 10V) provides the maximum output frequency at 5V (10V) and makes input and output proportional. Use **Pr. 73** to switch between input 0 to 5VDC (initial setting) and 0 to 10VDC input.	Input resistance 10kΩ ± 1kΩ Permissible maximum voltage 20VDC
			4	Frequency setting (current)	Inputting 0 to 20mADC (or 0 to 5V / 0 to 10V) provides the maximum output frequency at 20mA makes input and output proportional. This input signal is valid only when the AU signal is on (terminal 2 input is invalid). To use terminal 4 (initial setting is current input), set "4" to any of **Pr.178 to Pr.184 (input terminal function selection)**, and turn AU signal ON. Use Pr. 267 to switch from among input 4 to 20mA (initial setting), 0 to 5VDC and 0 to 10VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to 10V).	Voltage input: Input resistance 10kΩ ± 1kΩ Permissible maximum voltage 20VDC Current input: Input resistance 233Ω ± 5Ω Maximum permissible current 30mA.
					Standard control circuit terminal model: Current input (initial status) / Voltage input. Safety stop function model: Current input (initial status) / Voltage input.	
			5	Frequency setting common	Common terminal for the frequency setting signals (terminals 2 or 4). Do not earth (ground).	
	Safety stop		S1	Safe stop input (Channel 1)*	S1/S2 are safe stop signals for use with in conjunction with an approved external safety unit. Both S1/S2 must be used in dual channel form. Inverter output is shutoff depending on shorting/opening between S1 and PC, S2 and PC. In the initial status, terminal S1 and S2 are shorted with terminal PC by shortening wire. Remove the shortening wire and connect the safety relay module when using the safety stop function. *Terminal S1 and S2 are only available for the safety stop function model.	Input resistance 4.7kW Voltage when contacts are open 21 to 26VDC When contacts are shortcircuited 4 to 6mADC
			S2	Safe stop input (Channel 2)*		

Type		Terminal Symbol	Terminal Name	Description	
Control circuit/output signal	Relay	A, B, C	Relay output (fault output)	1 changeover contact output indicates that the inverter fault occurs. Fault: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C) Contact capacity 230VAC 0.3A (power factor = 0.4) 30VDC 0.3A	
	Open collector	RUN	Inverter running	Switched low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched high during stop or DC injection brake operation.*	Permissible load 24VDC (Maximum 27VDC) 0.1A (a voltage drop is 3.4V maximum when the signal is on)
		FU	Frequency detection	Switched low when the inverter output frequency is equal to or higher than the preset detected frequency and high when less than the preset detected frequency.*	*Low is when the open collector output transistor is on (conducts). High is when the transistor is off (does not conduct).
		SE	Open collector output common	Common terminal of terminal RUN and FU.	
	Pulse	FM	For meter	Select one e.g. output frequency from monitor items. (Not output during inverter reset.) The output signal is proportional to the magnitude of the corresponding monitoring item.	Permissible load current 1mA 1440 pulses/s at 60Hz
Communication		−	PU connector	With the PU connector, RS-485 communication can be made. · Conforming standard: EIA-485 (RS-485) · Transmission format: Multi-drop link · Communication speed: 4800 to 38400bps · Overall extension: 500m	
		−	USB connector	The FR Configurator can be operated by connecting the inverter to the personal computer through USB. · Interface: conforms to USB1.1 · Transmission Speed: 12Mbps · Connector: USB mini B connector (receptacle mini B type)	

[**Note**]
· Set **Pr. 267** and a voltage/current input switch correctly, then input an analog signal in accordance with the setting. Applying a voltage with voltage/current input switch in "I" position (current input is selected) or a current with switch in "V" position (voltage input is selected) could cause component damage of the inverter or analog circuit of output devices.
· The inverter will be damaged if power is applied to the inverter output terminals (U, V, W). Never perform such wiring.
· ▢ indicates that terminal functions can be selected using **Pr. 178 to Pr. 192 (I/O terminal function selection)**.
· Terminal names and terminal functions are those of the factory set.
· When connecting the DC power supply, be sure to connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-. Opposite polarity will damage the inverter.
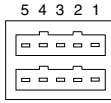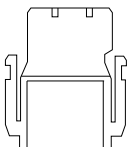
(2) Models compatible with FL remote communication (NF) and CC-Link communication (NC)

Type		Terminal symbol	Terminal name	Descriptions of terminal functions	
Main circuit		R/L1, S/L2, T/L3	Alternating current power input	Connects with commercial power supply.	
		U, V, W	Inverter output	Connects with 3-phase squirrel-cage motor.	
		P/+, PR	Brake resistor connection	Connects with optional brake resistor (MRS and MYS types, FR-ABR) between terminal P/+-PR. (Cannot be connected with 0.1K and 0.2K.)	
		P/+, N/-	Brake unit connection	Connects with a brake unit (FR-BU2).	
		P/+, P1	DC reactor connection	Remove the short-circuit piece between terminals P/+-P1, and connect the DC reactor.	
		⏚	Ground	For inverter chassis; make earth ground connection.	
Control circuit	24V external power supply	+24	24V external power supply	The 24V power input from an external source enables ongoing communication even when the main circuit power is OFF.	Input voltage 23.5 - 26.5VDC Input current 0.7A or lower
		SD	24V external power supply terminals common	Common terminal for positive terminal 24	
	Safety stop	S1	Safety stop input (system 1)	Terminals S1 and S2 are safety stop input signals and are used for the safety relay unit. Terminals S1 and S2 are used simultaneously (dual-channel). Short circuit release between S1 - PC and S2 - PC will shut off the inverter output. In initial state, terminals S1 and S2 are short-circuited with terminal PC with short-circuit wires. When using the safety stop function, remove the short-circuit wires and connect to the safety relay unit.	Input resistance 4.7kΩ Release voltage 21 - 26VDC Short-circuit DC4 - 6mA
		S2	Safety stop input (system 2)		
		PC	Safety stop input terminal common	Common terminals for safety stop input terminals S1 and S2.	
	Open collector output	Y0	**FL remote communication compatible model (NF)**		Allowable load 24VDC (Maximum 27VDC) 0.1A (Maximum voltage drop of 3.4V when ON)
			Open collector output Y0 (Safety monitoring output 2)	Indicates either the L level when safety stop function prevents occurrence of safety circuit fault (E.SAF), or the H level for other status.*	
			CC-Link communication compatible model (NC)		*L level means the open collector output transistor is ON (conduction state). H level means the open collector output transistor is OFF (non-conduction state).
			Open collector output Y0 (inverter in operation)	Indicates either the L level when the inverter output frequency is at or higher than the starting frequency level (initial value 0.5Hz), or the H level during stop or in DC braking stage. Terminal function can be selected by using the *Pr.190 RX2 (terminal Y0) function selection.*	
		SE	Open collector output common	Common terminal for terminal Y0.	
Communication	FL-net	FL remote communication connector	**FL remote communication compatible model (NF)**		
			The FL remote communication connector enables FL remote communication.		
	CC-Link	CONA CONB	**CC-Link communication compatible model (NC)**		
			CC-Link communication connector (2 ports)	Pin layout	

CONA / CONB

Pin number	5	4	3	2	1
Signal name	SLD	NC	DG	DB	DA

CC-Link communication one-touch connector

Model	Manufacturer name
A6CON-L5P	Mitsubishi Electric Corporation
35505-6000-B0M GF	Sumitomo 3M Limited

[**Note**]
・The inverter will be damaged if power is applied to the inverter output terminals (U, V, W). Never perform such wiring.
・When connecting the DC power supply, be sure to connect the plus side of the power supply to terminal P/+ and minus side to terminal N/-. Opposite polarity will damage the inverter.

■Main Differences and Compatibilities with the FR-E500 series

Item	FR-E500	FR-E700
Control method	V/F control General-purpose magnetic flux vector control	V/F control General-purpose magnetic flux vector control Advanced magnetic flux vector control Optimum excitation control
Changed/cleared functions	Torque boost **(Pr. 0)** initial value FR-E520-1.5K to 7.5K: 6% FR-E540-1.5K to 3.7K: 6% FR-E540-5.5K, 7.5K: 4%	FR-E720-1.5K(SC) to 3.7K(SC): 4% FR-E720-5.5K(SC), 7.5K(SC): 3% FR-E740-1.5K(SC) to 3.7K(SC): 4% FR-E740-5.5K(SC), 7.5K(SC): 3%
	DC injection brake operation voltage **(Pr. 12)** initial value 0.4K to 7.5K: 6%	0.4K to 7.5K: 4%
	Frequency at 5V (10V) input **(Pr. 38)** Frequency at 20mA input frequency **(Pr. 39)** Second electronic thermal O/L relay **(Pr. 48)** Shortest acceleration/deceleration mode **(Pr. 60)**	Parameter number change **(Pr. 125 Terminal 2 frequency setting gain frequency)** **(Pr. 126 Terminal 4 frequency setting gain frequency)** **(Pr. 51 Second electronic thermal O/L relay)** **(Pr. 60 Energy saving control selection)** **(Pr. 292 Automatic acceleration/deceleration)**
	Reverse rotation from the inverter operation panel Press REV .	After setting "1" in **Pr. 40 RUN key rotation direction selection**, press RUN .
	FM terminal function selection **(Pr. 54)** setting 0: Output frequency (initial value), 1: Output current, 2: Output voltage	1: Output frequency (initial value), 2: Output current, 3: Output voltage
	Second applied motor **Pr. 71** = 100 to 123	**Pr. 450 Second applied motor**
	Terminal 2 0 to 5V, 0 to 10V selection **(Pr. 73)** setting 0: 0 to 5V (initial value), 1: 0 to 10V	**Pr. 73 Analog input selection** 0: 0 to 10V 1: 0 to 5V (initial value)
	Operation mode selection **(Pr. 79)** Initial value 1: PU operation mode Setting 8: Operation mode switching by external signal	Initial value 0: External operation mode is selected at power ON Setting 8: deleted (X16 signal is used instead)
	Setting General-purpose magnetic flux vector **Pr. 80** ≠ 9999	**Pr. 80** ≠ 9999, **Pr. 81** ≠ 9999, **Pr. 800** = 30
	User group 1 (16), user group 2 (16) **(Pr. 160, Pr. 173 to Pr. 175)**	User group (16) only, setting methods were partially changed **(Pr. 160, Pr. 172, Pr. 173)**
	Input terminal function selection **(Pr. 180 to Pr. 183)** setting 5: STOP signal (start self-holding selection) 6: MRS signal (output stop)	**Pr. 178 to Pr. 184 Input terminal function selection** setting 5: JOG signal (Jog operation selection) 6: None 24: MRS signal (output stop) 25: STOP signal (start self-holding selection)
	Long wiring mode **(Pr. 240 setting 10, 11)**	Setting is unnecessary **(Pr. 240** setting 0, 11 are deleted)
	Cooling fan operation selection **(Pr. 244)** initial setting 0: Cooling fan operates in power-on status.	11: Cooling fan on/off control valid
	Stop selection **(Pr. 250)** setting increments 1s	0.1s
	RS-485 communication control source from the PU connector PU operation mode	Network operation mode (PU operation mode as FR-E500 when **Pr. 551** = 2)
	Earth (ground) fault detection 400V class: Detects always	400V class: Detects only at a start
Inrush current limit circuit	Provided for the 200V class 2.2K or more and 400V class	Provided for the all capacity
Control terminal block	Fixed terminal block (can not be removed) Screw type terminal block (Phillips screw M2.5) Length of recommended bar terminal is 7mm.	Removable terminal block Standard control circuit terminal model: Screw type terminal block (Flathead screw M2 (M3 for terminal A, B, and C) Length of recommended blade terminal is 5mm (6mm for terminal A, B and C). Safety stop function model: Spring clamp terminal block (Fixes a wire with a pressure of inside spring) Length of recommended blade terminal is 10mm
Operation panel	Removable operation panel (PA02)	Integrated operation panel (can not be removed)
Parameter unit	FR-PU04	FR-PU07 FR-PU04 (some functions, such as parameter copy, are unavailable.)
Plug-in option	Dedicated plug-in option (installation is incompatible)	
	for 400V class only FR-E5NC : CC-Link communication FR-E5ND : DeviceNet communication FR-E5NL : LᴏɴWᴏʀᴋs communication	FR-A7NC E kit : CC-Link communication FR-A7ND E kit : DeviceNet communication FR-A7NL E kit : LᴏɴWᴏʀᴋs communication
Installation size	FR-E720-0.1K(SC) to 7.5K(SC), FR-E740-0.4K(SC) to 7.5K(SC), FR-E720S-0.1K(SC) to 0.75K(SC), FR-E710W-0.1K to 0.75K are compatible in mounting dimensions	

Drive Product

Features/Outline

Lineup/Functions Connectivity Examples

Specifications/Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

INVERTER FREQROL-F700PJ Series

GREAT ENERGY SAVING WITH A COMPACT BODY

Easy and Compact | General-purpose Motor and IPM Motor Control | Energy Saving

Suitable for Both The General-Purpose Motor (Three-Phase Induction Motor) and The IPM Motor

The F700PJ Series for Both a General-Purpose Motor (IM) and an IPM Motor (IPM)

- The IM drive setting can be switched to IPM drive setting by only one setting "12" (MM-EFS) in the parameter **IPM**.
  Never drive an IPM motor in the IM drive setting.
- One spare F700PJ inverter is enough for the two types of motors (IM and IPM); the number of required spare inverters is reduced by half.
- A push on the setting dial in the monitor mode brings up the control setting (IM, IPM).

IPM motor control indicator

Before | Now... | Future

Inverter | Drive unit | FR-F700PJ | IM and IPM driven by one inverter

Spare inverters for both | One spare inverter

Inverter | Drive unit

IM | IPM
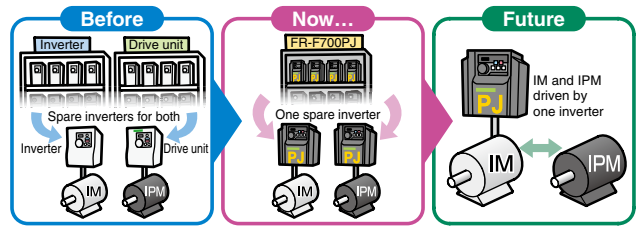
Simple and Reliable Transition from IM to IPM

- There is no need to replace the whole system at once; replace the inverters first, then replace the motors.
  When the budget is limited, equipment investment can be made over several stages.

Equipment Investment in Stages

1st Stage
First, replace inverters.

Renewal completed!

2nd Stage
Next, replace motors.
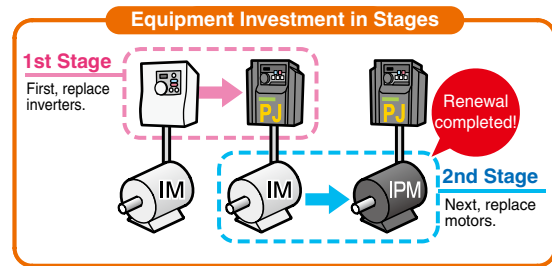
What is an IPM Motor?

An IPM motor is a synchronous motor with strong permanent magnets embedded in its rotor.

Why is an IPM motor more efficient?

- No current flows to the rotor (secondary side), and no secondary copper loss is generated.
- Magnetic flux is generated with permanent magnets, and less motor current is required.
- Embedded magnets provide reluctance torque*, which can be used for driving.

*: Reluctance torque occurs due to magnetic imbalance in the rotor.

[Comparison of motor losses]
* Example of 22kW motors

General-purpose motor
- Iron loss
- Primary copper loss (stator side)
- Secondary copper loss (rotor side)
- Other
100%
SF-JR

Premium high-efficiency IPM motor
- Iron loss
- Primary copper loss
- Other
40%
MM-EFS

Stator coil
Stator core
Rotor core
Permanent magnet
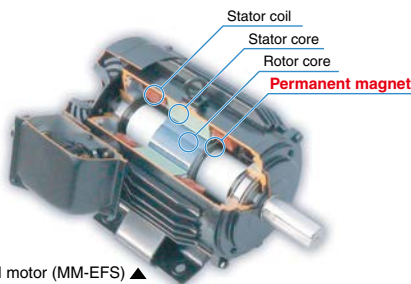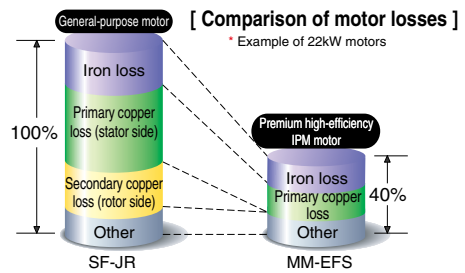
IPM motor (MM-EFS) ▲

Motor structure (section view)

IPM motor (synchronous motor)	General-purpose motor (induction motor)
Stator coil (three-phase coil)	Stator coil (three-phase coil)
Stator core	Stator core
Shaft	Shaft
Rotor core	Rotor core
Permanent magnets	Rotor conductor (copper or aluminum)
*Example of 6-pole motor	

Drive Product
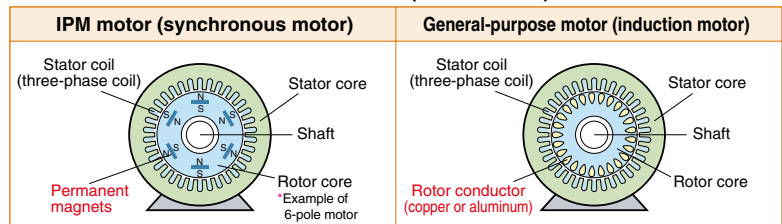
Inverter Control for Energy Saving

Energy Saving with Speed Control

● The consumed power of a variable-torque load, such as fans, pumps, and blowers, is proportional to the cube of its rotation speed.
This means that controlling the rotation speed to adjust the air volume can lead to energy saving.

[Example of blower operation characteristic]

*1: Consumed power (%)
- Damper control
- High-performance energy-saving motor driven with inverter
- General-purpose motor driven with inverter
- Premium high-efficiency IPM motor driven with inverter

Air volume (%)
[Comparison of Mitsubishi products]

*1: Rated motor output is 100%.

Energy Saving with Optimum Excitation Control (General-Purpose Motors)

● The optimum excitation control achieves the highest motor efficiency. Further energy saving can be achieved for applications such as fans and pumps with variable load torque.

(Example: Pump)

Motor efficiency (%)
- Optimum excitation control
- More energy saving
- V/F control

Motor load torque (%)
[Comparison of Mitsubishi products]
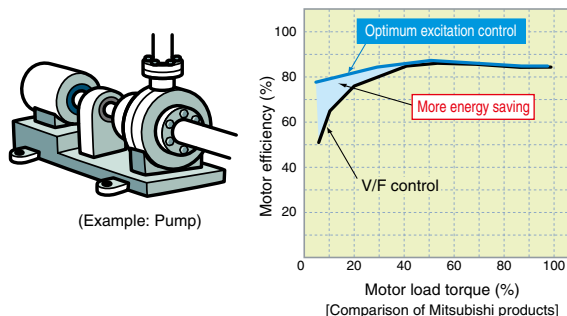
To Save More Energy – the IPM Motor Control (MM-EFS Series) is Now Available

High efficiency achieved with IPM motors

● The IPM motors that have permanent magnets embedded in their rotors are even more efficient than the high-performance energy-saving motors.

[Comparison of efficiency]

Total efficiency (%)
- Premium high-efficiency IPM motor driven with inverter
- High-performance energy-saving motor driven with inverter
- General-purpose motor driven with inverter

Motor capacity (kW)
0.75 1.5 2.2 3.7 5.5 7.5 11 15
[Comparison of Mitsubishi products]
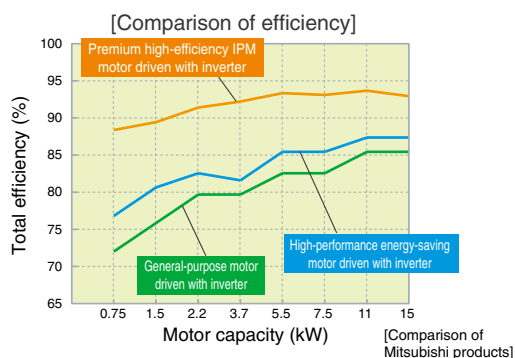
Smooth replacement from a general-purpose motor (with the same installation size)

● The frame number of the MM-EFS is the same (same size) as the Mitsubishi general-purpose motors (4-pole SF-JR/SF-HR series). Replacement is easy as the installation sizes are compatible.

Same size

SF-JR 3.7kW   MM-EFS371M4
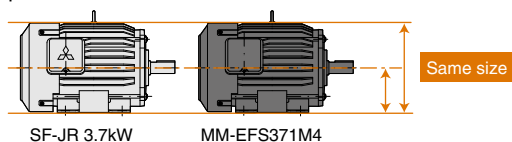
IE4-equivalent efficiency level

● The premium high-efficiency IPM motor "MM-EFS series" provides efficiency that is equivalent to IE4 (super premium efficiency), the highest efficiency class[*2].

*2: As of October 2012

IEC 60034-30 Efficiency class	Efficiency of Mitsubishi motors	
	General-purpose motor	IPM motor
IE4 (super premium efficiency)[*3]	——	Premium high-efficiency IPM (MM-EFS)
IE3 (premium efficiency)	Super line premium series (SF-PR)	——
IE2 (high efficiency)	Super line eco series (SF-HR)	——
IE1 (standard efficiency)	Super line series (SF-JR)	——
Below the class		——

High / Efficiency / Low

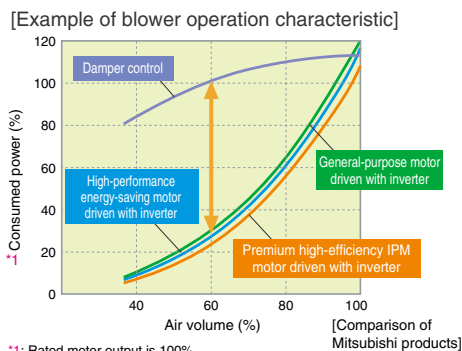*3: The details of IE4 can be found in IEC 60034-31.

Check the Energy Saving Effect at a Glance

● Energy saving monitor is available. The energy saving effect can be checked using an operation panel, output terminal (terminal FM), or network.

Example of the monitor display for power saving

[List of monitored items for energy saving]

Power saving monitor (kW)	Power saving rate average value (%)
Power saving rate (%)	Power cost saving average value (yen)
Power saving amount (kWh)	Annual power saving amount (kWh)
Power cost saving (yen)	Annual power saving amount (kWh)
Power saving average value (kW)	

● The output power amount measured by the inverter can be output in pulses. The cumulative power amount can be easily checked.[*4]

*4: This function cannot be used as a meter to certify billings.

PJ

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series
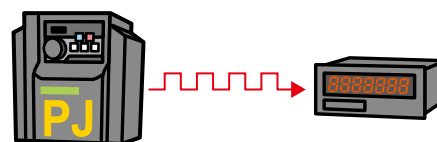
Wire and Space Saving

A Lineup of Filterpack Models Available

●The power factor improving DC reactor, common mode choke (line noise filter), and capacitive filter (radio noise filter) are all essential for air conditioning applications, and all of these are included in a Filterpack.
The Filterpack inverter models (FR-F7□0PJ-□F) are also available.
The option wiring, which was necessary in the past, is no longer required.
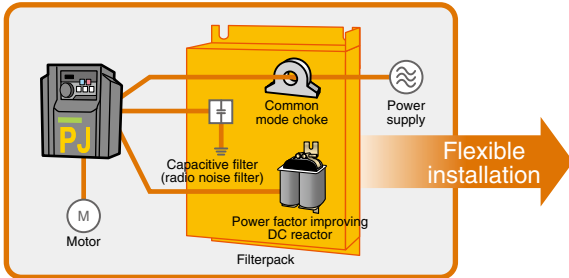
●A Filterpack allows flexible installation and various layouts in the enclosure. Smaller space is required for installation.
●Less wiring and smaller space also enable compliance with the Harmonic Suppression Guidelines, **the Architectural Standard Specifications (Electrical Installation)**, and **the Architectural StandardSpecifications (Machinery Installation) (2013 revisions)** in Japan.

Back of the panel	Installation area reduced by[1]
Filterpack Motor M ≈ Power supply	**Approx. 72%** With FR-F740PJ-3.7KF

Side of the panel	Installation area reduced by[1]
Filterpack Power supply ≈ M Motor	**Approx. 84%** With FR-F740PJ-3.7KF 200 mm or less depth at all capacities

[1]: The area required for the separate installation of power factor improving DC reactor, common mode choke (line noise filter), and capacitive filter (radio noise filter) with clearance around them.

Space Saving by Side-by-Side Installation

●Side-by-side installation is possible[2] and requires less space.
A DIN rail installation attachment (FR-UDA□□) option can be installed.

[2]: Keep the surrounding air temperature of the inverter at 40°C maximum.
Side-by-side installation is not available for Filterpacks.

Easy Operation and Maintenance

Quick Setting Using the Setting Dial

●The adaptable scroll speed setting dial allows for quick jumps or precise increments based on turning speed.
●The non-slip treatment was applied to the setting dial for easier turning.

Automatic Parameter Setting for Specific Applications

●Simple parameter setting (Pr.79 Operation mode selection)
●Communication setting for Mitsubishi HMI (GOT)
●Rated frequency change (60Hz→50Hz)

Spring Clamp Terminals (Control Circuit Terminals)

●Spring clamp terminals[1] are adopted as control circuit terminals. Spring clamp terminals are highly reliable and can be easily wired.

[1]: The control circuit terminals are screw terminals.

Easy wiring only by inserting wires

Tensile strength conforming to the DIN standard
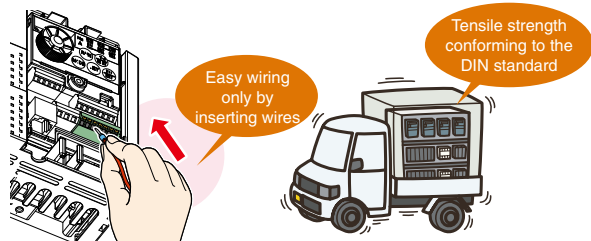
Longer Life Parts

●The service life of the cooling fans is now 10 years[2]. The service life can be further extended by ON/OFF control of the cooling fan.
●Capacitors with a design life of 10 years[2][3] are adapted. (Surrounding air temperature of 105°C for 5000 hours). With these capacitors, the service life of the inverter is further extended.

[2]: Surrounding air temperature: Annual average of 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt). The design life is a calculated value and is not a guaranteed product life.
[3]: Output current: 80% of the inverter rating.

The Leading-Edge Life Diagnosis Function

●The degree of deterioration of the main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be diagnosed on the monitor.
●Using the self-diagnosis function, the part life warning[4] can be output. With these warnings, the self-diagnosis function prevents troubles from occurring.
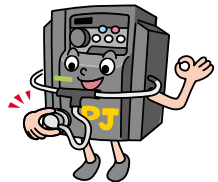
[4]: A warning is output when any of the main circuit capacitor, control circuit capacitor, inrush current limit circuit, and cooling fan reaches its specified output level.

Enhanced Communication Function

●The Mitsubishi inverter protocol and Modbus-RTU are selectable.
●The speed of RS-485 communication has been improved. (Communication at 38.4kbps is available.)

Introducing the Mitsubishi magnetic contactor

●Offers a selection of small frames
●Offers a line-up of safety contactors
●Supports small loads (auxiliary contact)
●Supports many international regulations as standard

Optimum for Fan and Pump Applications

Enhanced PID Control

● To save energy in low-speed operation:
  PID output shutoff (sleep) function
● To shorten the start-up time of PID control:
  PID automatic switchover function
● For air conditioning applications: Forward/reverse rotation switching by external signals
● To use various types of detectors: PID set point and measured value outputs in voltage (0 to 5V / 0 to 10V) and current (4 to 20mA)
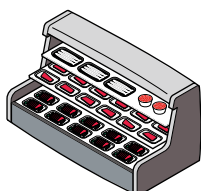
(Example: Water-cooling pump for a showcase)

Regeneration Avoidance Function

● The operation frequency is automatically increased to prevent the regenerative overvoltage fault from occurring. This function is useful when a load is forcibly rotated by another fan in the duct.

Automatic Restart After Instantaneous Power Failure / Flying Start Function

● After an instantaneous power failure, the operation is re-startable from the coasting motor speed.
  Even if the rotation direction has been forcibly reversed, the operation can be smoothly restarted in the original direction.
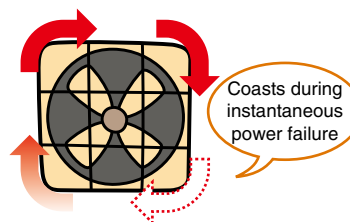
Coasts during instantaneous power failure
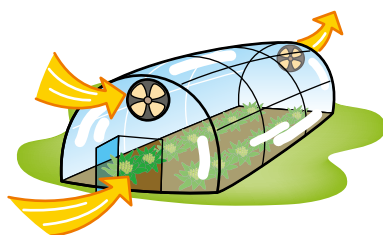
Example

The fan is rotated by the external force.

We need smooth start-up of the motor.

Use the flying start function.
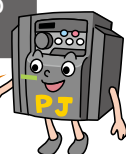
The motor can be started smoothly even after the motor was rotated by the external force (coasting).
This function can be set enabled by changing **Pr.57** setting.

Power supply	Power supply
Motor speed — Sudden change of rotation	Motor speed — Smooth starting
Output frequency	Output frequency
Without the function	With the function
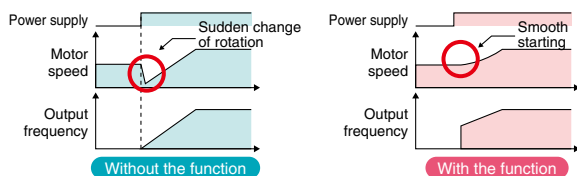
Parameters to adjust the acceleration time at a restart **(Pr.611)**, to detect the fan rotation direction **(Pr.299)**, etc. are also available.

We need continuous operations without being interrupted by the overvoltage protective function (E.OV).

Use the regeneration avoidance function.

When the external force accelerates rotation of the running motor (regeneration), the motor may trip due to the overvoltage.
The regeneration avoidance function is available to increase the frequency and avoid the regenerative condition.
This function can be set enabled by changing **Pr.822** setting.

Motor speed	Motor speed
Bus voltage — OV trip	Bus voltage — The trip does not occur and the operation continues.
Output frequency	Output frequency
Without the function	With the function
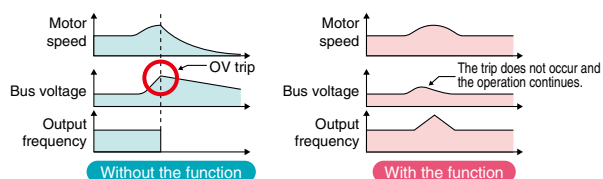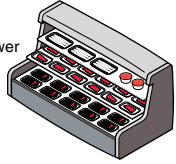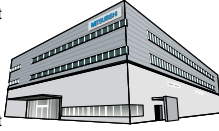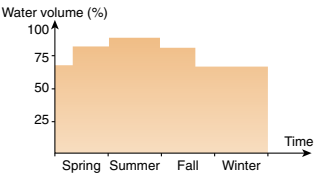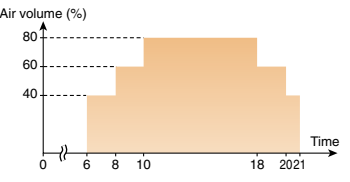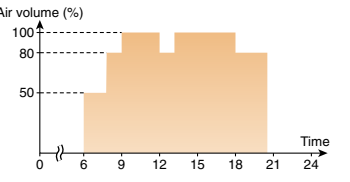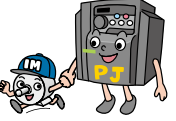
Parameters to start the regeneration avoidance operation **(Pr.883)** and to adjust the response level **(Pr.886)** are also available.

Application Example

Great energy saving effect obtained in medium airow

(When the electricity cost is 14 yen/kWh, and the CO_2 emission is [1,000 kWh 0.555 ton - CO_2 emission])

Water-cooling pump for a showcase

Commercial power supply (valve) + General-purpose motor (SF-JR)
▼
Inverter + General-purpose motor (SF-JR)

[Units to drive]
- Water-cooling pump
  3.7 kW × 1 unit
- Fans for the cooling tower
  1.5 kW × 1 unit
- Freezer
  11 kW × 3 unit
  5.5 kW × 2 unit
  3.7 kW × 1 unit
  3.0 kW × 1 unit

Condition

Operation patterns

Water volume (%)
100 / 75 / 50 / 25
Spring Summer Fall Winter — Time

8760 hours/year

- **With commercial power supply**
  Approx. 0.15 million kWh
  Approx. 2.17 million yen
- **With inverter**
  Approx. 0.14 million kWh
  Approx. 1.9 million yen

(Annual) energy saving effect produced by replacing to IPM motors driven with inverters

- **Annual energy saving effect** (differences in the amount and cost)
  Approx. 0.019 million kWh
  Approx. 0.27 million yen
- **Annual CO_2 emission reduction**
  Approx. 0.019 million kWh
  10.7 tons

Air conditioning in a Mitsubishi plant

Inverter + General-purpose motor (SF-JR)
▼
Inverter + IPM motor (MM-EFS)

[Units to drive]
- Ventilator
  0.75 kW × 3 unit
  1.5 kW × 1 unit
  2.2 kW × 3 unit
- Air conditioner
  15 kW × 1 unit
  18.5 kW × 1 unit
  30 kW × 2 unit

Air volume (%)
80 / 60 / 40
0 6 8 10 18 2021 — Time

5475 hours/year

- **With general-purpose motor**
  Approx. 0.25 million kWh
  Approx. 3.44 million yen
- **With IPM motor**
  Approx. 0.22 million kWh
  Approx. 3.02 million yen

- **Annual energy saving effect**
  Approx. 0.03 million kWh
  Approx. 0.42 million yen
- **Annual CO_2 emission reduction**
  Approx. 0.03 million kWh
  16.7 tons

Air conditioning in a building

Inverter + General-purpose motor (SF-JR)
▼
Inverter + IPM motor (MM-EFS)

[Units to drive]
- Fans for air conditioning
  5.5 kW × 10 unit
  7.5 kW × 10 unit
  3.7 kW × 100 unit

Air volume (%)
100 / 80 / 50
0 6 9 12 15 18 21 24 — Time

4745 hours/year

- **With general-purpose motor**
  Approx. 2.39 million kWh
  Approx. 33.42 million yen
- **With IPM motor**
  Approx. 2.1 million kWh
  Approx. 29.43 million yen

- **Annual energy saving effect**
  Approx. 0.28 million kWh
  Approx. 3.99 million yen
- **Annual CO_2 emission reduction**
  Approx. 0.28 million kWh
  158 tons

Your best assistant — Mitsubishi inverter software

●IPM energy savings simulation file

The IPM energy savings simulation file calculates the energy saving effect and CO_2 reduction rate achieved by replacing commercial power supply (damper/valve control) operation with IPM motor operation by inverter. This file requires inputs of motor capacity, quantity, air volume, operating time, etc.
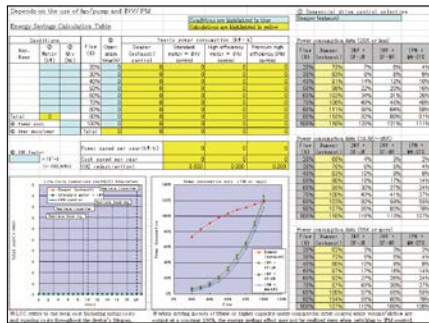
IPM energy savings simulation file

●FR Configurator (FR-SW3-SETUP-WE) (Option)

Support tool for the inverter operations from start-up to maintenance.
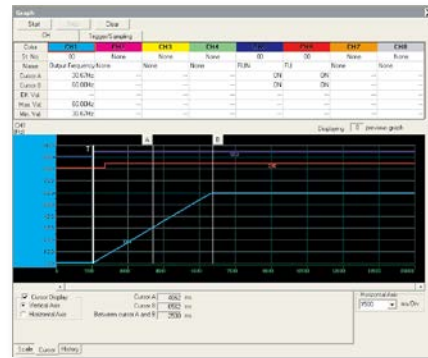
Lineup

●Inverter

F R - F 7 4 0 P J - 3 . 7 K ☐

Symbol	Inverter capacity
0.4K to 15K	Represents the capacity (kW).

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Filterpack
None	No
F	Yes*

*: The inverter with Filterpack consists of an inverter and a Filterpack. The inverter carries the rating plate, "FR-F7☐0PJ-☐KF," and the Filterpack carries the rating plate "FR-BFP2-☐K".

Power supply specification	Inverter model	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Three-phase 200 V	FR-F720PJ-☐K FR-F720PJ-☐KF	●	●	●	●	●	●	●	●	●
Three-phase 400 V	FR-F740PJ-☐K FR-F740PJ-☐KF	●	●	●	●	●	●	●	●	●

■Precautions
• Never drive an IPM motor in the IM drive setting.
• Use the same IPM motor capacity as the inverter capacity.
• For IPM motor, use an MM-EFS or MM-EF series motor. Please contact us regarding a combination with other manufacturer's IPM motor.

●:To be released

c⚲UL US LISTED CE

Compatible with UL, cUL, EC Directives (CE marking)
• IPM motors and Filterpacks are not compatible with the above regulations and directives.

Being RoHS compliant, the FR-F700PJ series inverters are friendly to people and to the environment.

●Premium high-efficiency IPM motor

M M - E F S 7 1 M 4 ☐ ☐

Symbol	Output	Symbol	Output
7	0.75kW	55	5.5kW
15	1.5kW	75	7.5kW
22	2.2kW	11K	11kW
37	3.7kW	15K	15kW

Symbol	Voltage class
None	200V
4	400V

Symbol	Rated speed*1
1M	1500r/min

Symbol	Specification*2
Q	Class B

Symbol	Specification*2
P1	Outdoor-type

*1: Also applicable to an application with the rated speed of 1800r/min.
*2: The outdoor-type and class B are semi-standard models. Please contact your sales representative for a special specification such as the long-axis type, flange shape, and salt-proof type.

Rated output (kW)		0.75	1.5	2.2	3.7	5.5	7.5	11	15
Motor model		7	15	22	37	55	75	11K	15K
200 V class	MM-EFS☐1M	●	●	●	●	●	●	●	●
400 V class	MM-EFS☐1M4	●	●	●	●	●	●	●	●

●:To be released

■Precautions
• MM-EFS series IPM motors cannot be driven with commercial power supply
• The total wiring length for an IPM motor should be 100 m or less.
• Only one IPM motor can be connected to an inverter.

Inverter FREQROL-F700PJ Series

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Installation Example

AC power supply
Use within the permissible power supply specifications of the inverter. To ensure safety, use a moulded case circuit breaker, earth leakage circuit breaker or magnetic contactor to switch power ON/OFF.

Molded case circuit breaker (MCCB), earth leakage circuit breaker (ELB), or fuse
The breaker must be selected carefully since an inrush current flows in the inverter at power on.

Magnetic contactor (MC)
Install the magnetic contactor to ensure safety. Do not use this magnetic contactor to start and stop the inverter. Doing so will cause the inverter life to be shortened.

Enclosure surface operation panel (FR-PA07)

Parameter unit (FR-PU07)

RS-232C - RS-485 converter is required when connecting to PC with RS-232C interface.

RS-485⇔RS-232C Converter

Inverter (FR-F700PJ) Filterpack (FR-BFP2)
The FR-F7□0PJ-□F Filterpack model has "F" at the end of its model name. An inverter and a Filterpack are enclosed with this series.

Brake resistor (FR-ABR, MRS type, MYS type)

P/+
PR

AC reactor (FR-HAL)

DC reactor (FR-HEL)*

IM connection   **IPM connection**

U V W   U V W

Noise filter (ferrite core) (FR-BSF01, FR-BLF)

Inverter FR-F700PJ

Earth (Ground)

P/+ P1

Noise filter (ferrite core)* (FR-BSF01, FR-BLF)

R/L1 S/L2 T/L3

Noise filter (capacitor)* (FR-BIF)

General-purpose motor

Earth (Ground)

Contactor Example) No-fuse switch (DSN type)
Install a contactor in an application where the IPM motor is driven by the load even at power-OFF of the inverter. Do not open or close the contactor while the inverter is running (outputting).

Dedicated IPM motor (MM-EFS, MM-EF)

P/+ N-

* Not necessary if Filterpack (FR-BFP2) is used.

Brake unit (FR-BU2)

P/+ PR
P/+
PR

High power factor converter (FR-HC2)

Power regeneration common converter (FR-CV)

Resistor unit (FR-BR) Discharging resistor (GZG, GRZG)

Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or noise filter (capacitor) on the output side of the inverter. When installing a molded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the molded case circuit breaker.

Earth (Ground)

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

    : Install these options as required.

[NOTE]
• The life of the inverter is influenced by surrounding air temperature. Use the product within the permissible surrounding air temperature. This must be noted especially when the inverter is installed in an enclosure.
  (Refer to chapter 1 of the Instruction Manual (Applied))
• Wrong wiring might lead to damage of the inverter. The control signal lines must be kept fully away from the main circuit to protect them from noise.
• Do not install a power factor correction capacitor, surge suppressor or noise filter (capacitor) on the inverter output side. This will cause the inverter to trip or the capacitor and surge suppressor to be damaged.
  If any of the above devices are connected, immediately remove them.
• Electromagnetic wave interference
  The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter.
  In this case, install the FR-BIF optional EMC filter (capacitor) (for use in the input side only) or FR-BSF01 or FR-BLF noise filter (ferrite core) to minimize interference.
  (Refer to chapter 3 of the Instruction Manual (Applied))
• Refer to the Instruction Manual of each option and peripheral devices for details of peripheral devices.
• An IPM motor cannot be driven by the commercial power supply.
• An IPM motor is a motor with permanent magnets embedded inside. High voltage is generated at the motor terminals while the motor is running.
  Before closing the contactor at the output side, make sure that the inverter power is ON and the motor is stopped.

■Standard Specifications

●Rating

Three-phase 200V power supply

Inverter										
Model FR-F720PJ-□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable general-purpose motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	1.0	1.6	2.7	3.8	6.3	9.1	12.1	17.1	22.1
	Rated current (A)	2.5	4.2	7.0	10.0	16.5	23.8	31.8	45	58
	Overload current rating*3	120% 60s, 150% 0.5s (inverse-time characteristics)								
	Rated voltage*4	Three-phase 200 to 240V								
Power supply	Rated input AC voltage/frequency	Three-phase 200 to 240V 50Hz/60Hz								
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz								
	Permissible frequency fluctuation	±5%								
	Power supply capacity (kVA)*5 — Without Filterpack	1.2	2.1	4.0	5.0	8.8	12.0	17.0	20.0	27.0
	Power supply capacity (kVA)*5 — With Filterpack	0.8	1.2	2.6	3.4	5.5	8.4	11.0	16.0	19.0
Protective structure (JEM 1030)		Enclosed type (IP20)*6								
Cooling system		Self-cooling		Forced air cooling						
Approximate mass (kg)		0.8	1.0	1.4	1.4	1.8	3.6	3.6	6.5	6.5

Filterpack									
Model FR-BFP2-□K	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Approximate mass (kg)	1.3	1.4	2.0	2.2	2.8	3.8	4.5	6.7	7.0
Power factor improving reactor	Install the DC reactor in the DC side. 93% to 95% of power supply power factor under 100% load (94.4% *7)								
EMC filter — Common mode choke	Install a ferrite core on the input side								
EMC filter — Capacitive filter	About 4mA of capacitor leakage current*8								
Protective structure (JEM 1030)	Open type (IP00)								

Three-phase 400V power supply

Inverter										
Model FR-F740PJ-□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable general-purpose motor capacity (kW)*1		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)*2	0.9	1.7	2.8	3.8	6.2	9.1	12.4	17.5	22.5
	Rated current (A)	1.2	2.2	3.7	5.0	8.1	12.0	16.3	23.0	29.5
	Overload current rating*3	120%60s, 150% 0.5s (inverse-time characteristics)								
	Rated voltage*4	Three-phase 380 to 480V								
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation	325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation	±5%								
	Power supply capacity (kVA)*5 — Without Filterpack	1.1	2.2	4.2	4.8	8.6	12.0	17.0	20.0	28.0
	Power supply capacity (kVA)*5 — With Filterpack	0.7	1.3	2.7	3.3	5.4	8.5	11.0	16.0	19.0
Protective structure (JEM 1030)		Enclosed type (IP20)*6								
Cooling system		Self-cooling		Forced air cooling						
Approximate mass (kg)		1.3	1.3	1.4	1.5	1.5	3.3	3.3	6.0	6.0

Filterpack									
Model FR-BFP2-H□K	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Approximate mass (kg)	1.6	1.7	1.9	2.3	2.6	4.5	5.0	7.0	8.2
Power factor improving reactor	Install the DC reactor in the DC side. 93% to 95% of power supply power factor under 100% load (94.4%*7)								
EMC filter — Common mode choke	Install a ferrite core on the input side								
EMC filter — Capacitive filter	About 8mA of capacitor leakage current*8								
Protective structure (JEM 1030)	Open type (IP00)								

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor. To use a dedicated IPM motor.

*2 The rated output capacity assumes the following output voltages: 220V for the three-phase 200V and 440V for the three-phase 400V class.

*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

*4 The maximum output voltage does not exceed the power supply voltage.The maximum output voltage can be changed within the setting range.
   However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.

*5 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

*6 Open type (IP00) for Filterpack.

*7 The values in parentheses are calculated with 1 fundamental frequency power factor according to the Year 2013 Standard specification for public constructions (electric installation works), published by the Ministry of Land, Infrastructure, Transport and Tourism in Japan.

*8 The indicated leakage current is equivalent to one-phase of the three-phase three wire 人 connection cable.

Drive Product

● Common Specification

Control specifications	Control method		High carrier frequency PWM control (V/F control)/Optimum excitation control/General-purpose magnetic flux vector control/IPM motor control
	Output frequency range		0.2 to 400Hz
	Frequency setting resolution	Analog input	0.06Hz/60Hz (terminals 2 and 4: 0 to 10V/10-bit) 0.12Hz/60Hz (terminals 2 and 4: 0 to 5V/9-bit) 0.06Hz/60Hz (terminal 4: 0 to 20mA/10-bit)
		Digital input	0.01Hz
	Frequency accuracy	Analog input	Within ±1% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Speed control range		V/F control 1:10, General-purpose magnetic flux vector control (during power driving) 1:60, IPM motor control 1:10
	Voltage/frequency characteristics		Base frequency can be set from 0 to 400Hz. Constant-torque/variable-torque pattern can be selected.
	Starting torque	General-purpose motor control	General-purpose motor control (General-purpose magnetic flux vector control or slip compensation): 120% (at 1Hz)
		IPM motor control	IPM motor control: 50%
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0.1 to 3600s (acceleration and deceleration can be set individually), linear and S-pattern acceleration/deceleration modes are available.
	Regenerative braking torque	General-purpose motor control	General-purpose motor control: 15%*1
		IPM motor control	IPM motor control: 5% (10% for 1.5kW or less)*1
	DC injection brake		General-purpose motor control: Operation frequency (0 to 120Hz), operation time (0 to 10s), operation voltage (0 to 30%) can be changed.
	Stall prevention operation level		Operation current level can be set (0 to 150% variable). Whether to use the function or not can be set.
Operation specifications	Frequency setting signal	Analog input	Two terminals Terminal 2: 0 to 10V and 0 to 5V are available Terminal 4: 0 to 10V, 0 to 5V, and 4 to 20mA are available
		Digital input	The signal is entered from the operation panel or parameter unit. Frequency setting increment can be set.
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signal (five terminals)		The following signals can be assigned to **Pr. 178 to Pr.182 (input terminal function selection)**: multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PID forward/reverse action switchover, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, PU operation external interlock, PID integral value reset.
	Operational functions		Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485), Optimum excitation control, power failure stop, speed smoothing control, MODBUS RTU
	Output signal Open collector output (one terminal) Relay output (one terminal)	Operating status	The following signals can be assigned to **Pr.190 and Pr.192 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm.*2, heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID deviation limit, IPM motor control*3, PID output interruption, pulse train output of output power, during retry, life alarm, average current value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.
		For meter Pulse train output (MAX 2.4kHz: one terminal)	The following signals can be assigned to **Pr. 54 FM terminal function selection**: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, energy saving effect, cumulative energy saving, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor. Pulse train output (1440 pulses/s/full scale)
Indication	Operation panel Parameter unit (FR-PU07)	Operating status	The following operating status can be displayed: output frequency, output current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, and PTC thermistor resistance.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault definitions (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.
		Interactive guidance	Function (help) for operation guide*4
	Protective/warning function	Protective function	Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, undervoltage *3, input phase loss *5, output side earth (ground) fault overcurrent at start *5, output short circuit, output phase loss, external thermal relay operation *5, PTC thermistor operation *5, parameter error, PU disconnection, retry count excess *5, CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, overspeed occurrence *3 ,PID signal fault *5, stall prevention operation, output current detection value exceeded *5, loss of synchronism detection *3
		Warning function	Fan alarm*2, overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm*5, electronic thermal relay function prealarm, maintenance output*5, undervoltage, operation panel lock, password locked, inverter reset
Environment	Surrounding air temperature		-10°C to +50°C (non-freezing)*6
	Ambient humidity		90% RH or less (non-condensing)
	Storage temperature*7		-20°C to +65°C
	Atmosphere		Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration		Maximum 1000m above sea level, 5.9m/s² or less*8 at 10 to 55Hz (directions of X, Y, Z axes)

*1 The regenerative braking torque indicates the average short-time torque (which varies by the motor loss) that is generated when a motor decelerates in the shortest time by itself from the rated speed. It is not the
 continuous regenerative torque. When a motor decelerates from a speed higher than the rated speed, the average deceleration torque decreases. When the regenerative power is large, use an option brake unit.
*2 As the 0.75K or lower are not provided with the cooling fan, this alarm does not function.
*3 This function is available only when an IPM motor is connected.
*4 This operation guide is only available with option parameter unit (FR-PU07).
*5 This protective function is not available in the initial status.
*6 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
 Side-by-side installation is not available for Filterpacks.
*7 Temperatures applicable for a short time, e.g. in transit.
*8 When installing Filterpack of 11K or 15K on the rear side of an inverter, do not install to a moving object or place where vibrates (exceeding 1.96m/s²).

Drive Product

■Standard Model (Without a Filterpack)

●FR-F720PJ-0.4K, 0.75K

φ5 hole
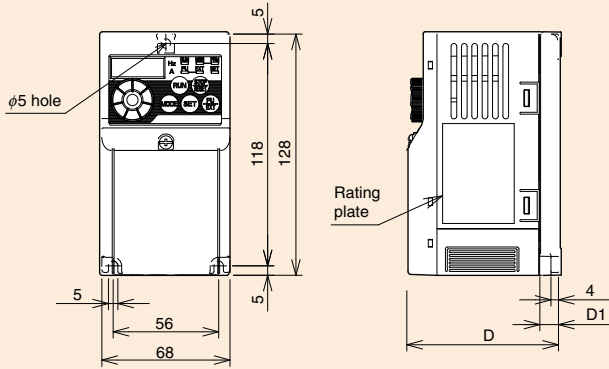
Inverter Model	D	D1
FR-F720PJ-0.4K	112.5	42
FR-F720PJ-0.75K	132.5	62

(Unit: mm)

●FR-F720PJ-1.5K to 3.7K
●FR-F740PJ-0.4K to 3.7K

2-φ5 hole

FAN

Rating plate
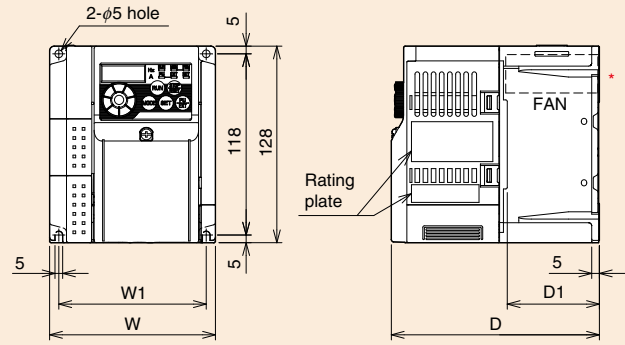
* FR-F740PJ-0.4K and 0.75K are not provided with the cooling fan.

Inverter Model	W	W1	D	D1
FR-F720PJ-1.5K, 2.2K FR-F740PJ-1.5K	108	96	135.5	60
FR-F740PJ-0.4K, 0.75K			129.5	54
FR-F740PJ-2.2K			155.5	60
FR-F740PJ-3.7K			165.5	
FR-F720PJ-3.7K	170	158	142.5	66.5

(Unit: mm)

●FR-F720PJ-5.5K, 7.5K
●FR-F740PJ-5.5K, 7.5K

2-φ5 hole

FAN

Rating plate

208 / 220 / 138 / 150 / 10 / 68 / 155
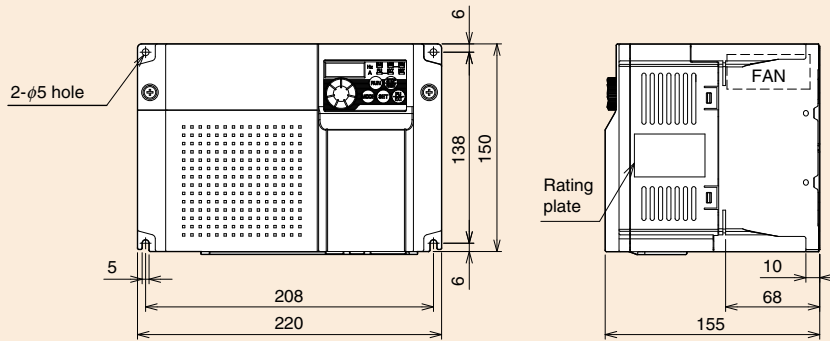
(Unit: mm)

●FR-F720PJ-11K, 15K
●FR-F740PJ-11K, 15K

2-φ6 hole

FAN

Rating plate

195 / 220 / 244 / 260 / 84.5 / 10.5 / 190

(Unit: mm)

Features/Outline
Lineup/Functions Connectivity Examples
Specifications/Outline Drawing
FREQROL-A800 Series
FREQROL-F800 Series
FREQROL-E700 Series
FREQROL-F700PJ Series
FREQROL-D700 Series
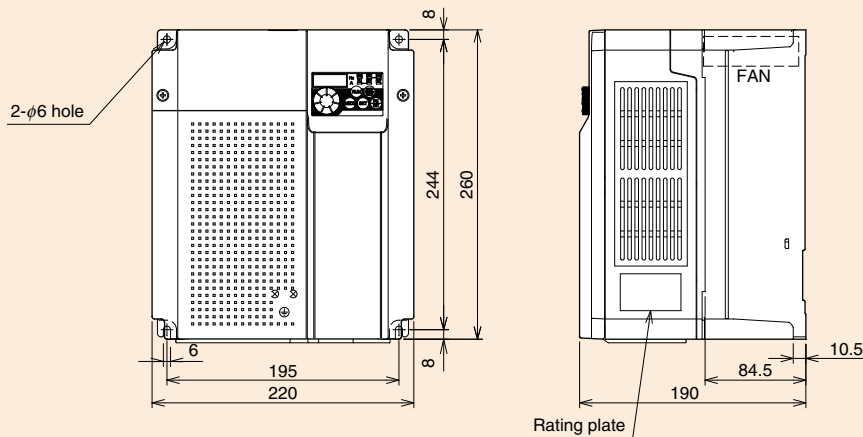
■Standard Model (With a Filterpack) A Filterpack can be installed on the side or rear panel of the inverter. This is a sample outline dimension drawing. The shape differs by the model.

Outline Dimension Drawings

●Filterpack installed on the rear panel
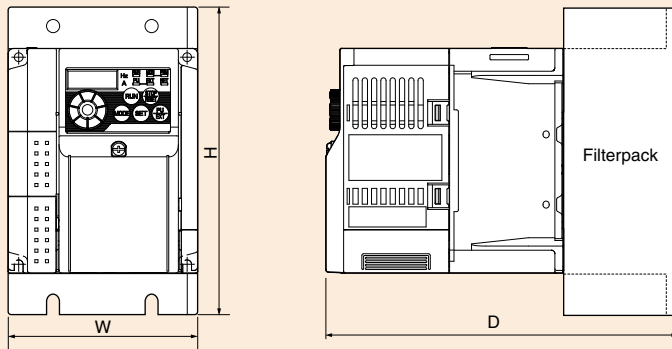
Inverter Model	W	H	D
FR-F720PJ-0.4KF	68	218	172.5
FR-F720PJ-0.75KF	68	218	192.5
FR-F720PJ-1.5KF, 2.2KF	108	188	215.5
FR-F720PJ-3.7KF	170	188	207.5
FR-F720PJ-5.5KF, 7.5KF	220	210	230
FR-F720PJ-11KF, 15KF	220	320	275
FR-F740PJ-0.4KF, 0.75KF	108	188	184.5
FR-F740PJ-1.5KF	108	188	215.5
FR-F740PJ-2.2KF	108	188	235.5
FR-F740PJ-3.7KF	108	188	245.5
FR-F740PJ-5.5KF, 7.5KF	220	210	230
FR-F740PJ-11KF, 15KF	220	320	275

(Unit: mm)

●Filterpack installed on the side panel
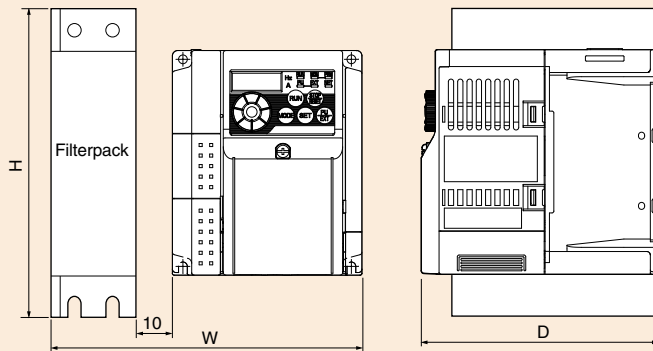
Inverter Model	W*	H	D
FR-F720PJ-0.4KF	138	218	112.5
FR-F720PJ-0.75KF	138	218	132.5
FR-F720PJ-1.5KF, 2.2KF	198	188	135.5
FR-F720PJ-3.7KF	245	188	170
FR-F720PJ-5.5KF, 7.5KF	305	210	195
FR-F720PJ-11KF, 15KF	315	320	195
FR-F740PJ-0.4KF, 0.75KF	173	188	129.5
FR-F740PJ-1.5KF	198	188	135.5
FR-F740PJ-2.2KF	198	188	155.5
FR-F740PJ-3.7KF	198	188	165.5
FR-F740PJ-5.5KF, 7.5KF	305	210	195
FR-F740PJ-11KF, 15KF	315	320	195

* The clearance between the inverter and the filter is 10mm.

(Unit: mm)

Drive Product

■Terminal Connection Diagram

Sink logic
◎Main circuit terminal
〇Control circuit terminal

With Filterpack

*1 Remove the jumper across the terminals P1 and P/+ to install Filterpack.

Filterpack FR-BFP2   Inverter

P → P/+
P1 *1 P1
Jumper
R0 R R/L1
S0 S S/L2
T0 T T/L3
GND ⏚

MCCB MC

Three-phase AC power supply

Earth (ground)

*2 DC reactor (FR-HEL) When connecting a DC reactor, remove the jumper across P1 and P/+.

Brake unit (Option)

*7 Brake resistor (FR-ABR, MRS type, MYS type) Install a thermal relay to prevent an overheat and burnout of the brake resistor. Always install a thermal relay when using a brake resistor whose capacity is 11K or higher.

Earth (Ground)
Jumper P1 P/+ PR N/-

MCCB MC

Three-phase AC power supply

R/L1
S/L2
T/L3

Inrush current limit circuit

U
V
W

Motor
M

Earth (Ground)

Earth (Ground)

Main circuit

Control circuit

Control input signals (No voltage input allowed)

The function of these terminals can be changed to the reset signal, etc. with the input terminal assignment **(Pr. 178 to Pr. 182)**.

*3 When using terminals PC-SD as a 24VDC power supply, take care not to short across terminals PC and SD.

Forward rotation start
Reverse rotation start
Multi-speed
High speed
Middle speed
Terminal 4 input selection

Contact input common
24VDC power supply
(Common for external power supply transistor)

STF
STR
RH
RM
AU
SD
PC *3

SOURCE SINK
24V

Relay output

C
B
A

Relay output (Fault output)

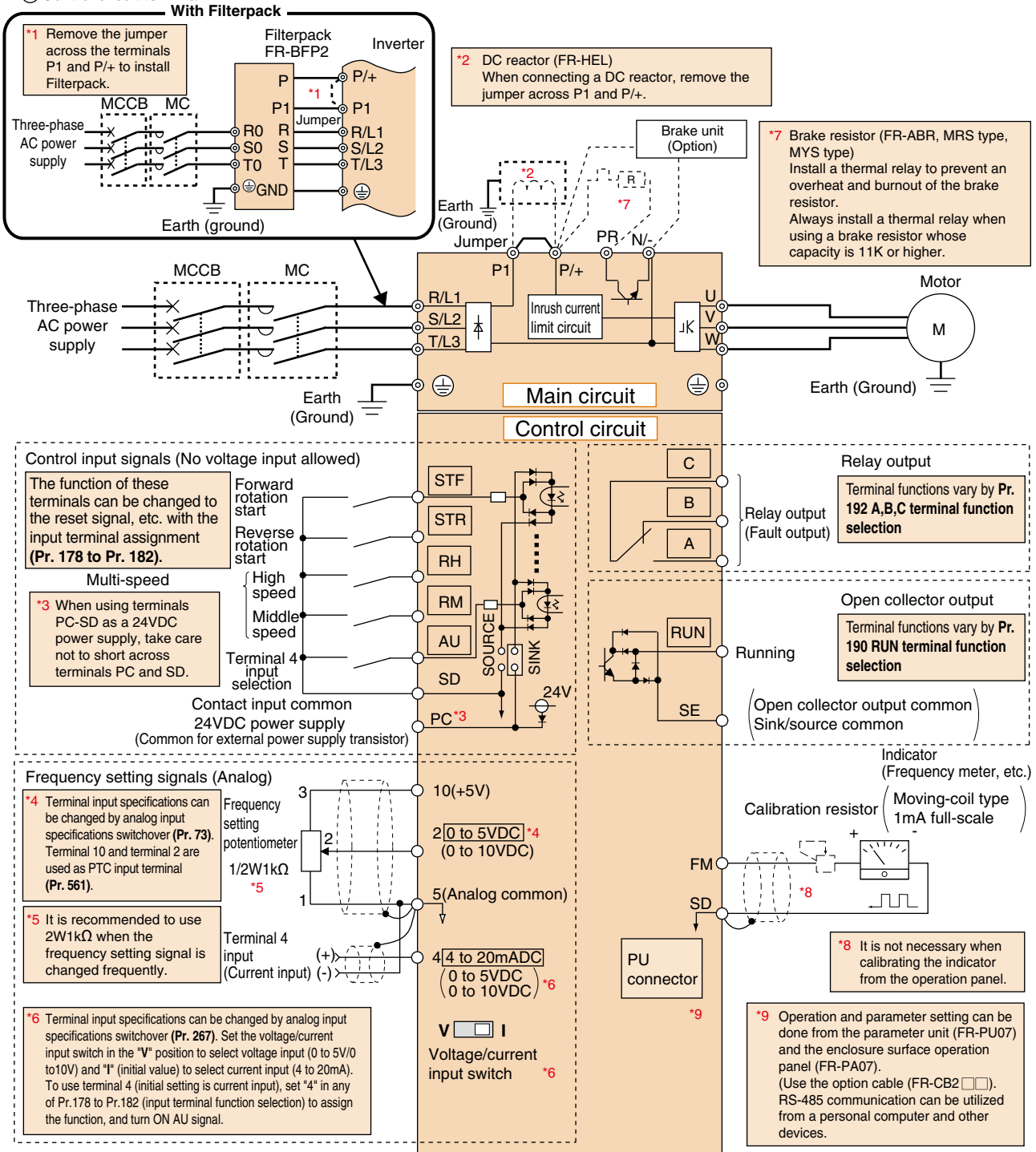Terminal functions vary by **Pr. 192 A,B,C terminal function selection**

Open collector output

RUN

Running

SE

Terminal functions vary by **Pr. 190 RUN terminal function selection**

Open collector output common
Sink/source common

Frequency setting signals (Analog)

*4 Terminal input specifications can be changed by analog input specifications switchover **(Pr. 73)**. Terminal 10 and terminal 2 are used as PTC input terminal **(Pr. 561)**.

*5 It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.

*6 Terminal input specifications can be changed by analog input specifications switchover **(Pr. 267)**. Set the voltage/current input switch in the "**V**" position to select voltage input (0 to 5V/0 to10V) and "**I**" (initial value) to select current input (4 to 20mA). To use terminal 4 (initial setting is current input), set "4" in any of Pr.178 to Pr.182 (input terminal function selection) to assign the function, and turn ON AU signal.

Frequency setting potentiometer
1/2W1kΩ *5

Terminal 4 input (Current input)
(+)
(-)

10(+5V)
2 0 to 5VDC *4 (0 to 10VDC)
5(Analog common)
4 4 to 20mADC (0 to 5VDC / 0 to 10VDC) *6

V ▢ I
Voltage/current input switch *6

PU connector *9

Indicator (Frequency meter, etc.)

Calibration resistor Moving-coil type 1mA full-scale
+ -

FM
SD *8

*8 It is not necessary when calibrating the indicator from the operation panel.

*9 Operation and parameter setting can be done from the parameter unit (FR-PU07) and the enclosure surface operation panel (FR-PA07). (Use the option cable (FR-CB2☐☐). RS-485 communication can be utilized from a personal computer and other devices.

[NOTE]
• To prevent a malfunction caused by noise, separate the signal cables more than 10cm from the power cables. Also separate the main circuit wire of the input side and the output side.
• After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
• The terminals S1, S2, SC, and SO are for manufacturer setting. Do not remove the shortening wires across the terminals S1 and SC and the terminals S2 and SC.

■Terminal Specification Explanation

Type			Terminal Symbol	Terminal Name	Terminal Specification	
Main circuit	Inverter		R/L1, S/L2, T/L3	AC power input	Connect to the commercial power supply. Do not connect anything to these terminals when using the high power factor converter (FR-HC2) or power regeneration common converter (FR-CV). To use Filterpack, connect the R, S, and T cables of Filterpack.	
			U, V, W	Inverter output	Connect a three-phase squirrel-cage motor or a dedicated IPM motor.	
			P/+, PR	Brake resistor connection	Connect a brake resistor (FR-ABR, MRS type, MYS type) across terminals P/+ and PR.	
			P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2), power regeneration common converter (FR-CV) or high power factor converter (FR-HC2).	
			P/+, P1	DC reactor (Filterpack) connection	Remove the jumper across terminals P/+ and P1 and connect a DC reactor. To use Filterpack, remove the jumper across the terminals P/+ and P1, then connect the P and P1 cables of Filterpack.	
			⏚	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded). To use Filterpack, connect the GND cable of Filterpack.	
	Filterpack		R0, S0, T0	Commercial power supply input	Connect to the commercial power supply.	
			⏚	Earth (Ground)	For earthing (grounding) the Filterpack. Must be earthed (grounded).	
			R, S, T	Inverter power supply	Connect to R/L1, S/L2, and T/L3 of the inverter.	
			P, P1	DC reactor terminal	Remove the jumper across terminals P/+ and P1, and connect to the terminals P/+ and P1 of the inverter.	
			GND	Inverter earth (ground) connection	Connect to the earth (ground) terminal of the inverter.	
Control circuit/Input signal	Contact input		STF	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	When the STF and STR signals are turned ON simultaneously, the stop command is given.
			STR	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.	
			RH, RM	Multi-speed selection	Multi-speed can be selected according to the combination of RH and RM signals.	
			AU	Terminal 4 input selection	The terminal 4 function is available only when the AU signal is ON. (the operation with the frequency setting signal of 4 to 20mA DC is available) Turning ON the AU signal disables the terminal 2 (voltage input) function.	
			SD	Contact input common (sink) (initial setting)	Common terminal for contact input terminal (sink logic) and terminal FM.	
				External transistor common (source)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
				24VDC power supply common	Common output terminal for 24VDC 0.1A power supply (PC terminal). Isolated from terminals 5 and SE.	
			PC	External transistor common (sink) (initial setting)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable current.	
				Contact input common (source)	Common terminal for contact input terminal (source logic).	
				24VDC power supply	Can be used as 24VDC 0.1A power supply.	
		Frequency setting	10	Frequency setting power supply	Used as power supply when connecting potentiometer for frequency setting (speed setting) from outside of the inverter.	5VDC permissible load current 10mA
			2	Frequency setting (voltage)	Inputting 0 to 5VDC (or 0 to 10V) provides the maximum output frequency at 5V (10V) and makes input and output proportional. Use Pr. 73 to switch between input 0 to 5VDC input (initial setting) and 0 to 10VDC.	Input resistance10kΩ ± 1kΩ Permissible maximum voltage 20VDC
			4	Frequency setting (current)	Inputting 4 to 20mADC (or 0 to 5V, 0 to 10V) provides the maximum output frequency at 20mA and makes input and output proportional. The input signal to terminal 4 is valid only when the AU signal is ON (terminal 2 input is invalid). Use **Pr. 267** to switch from among input 4 to 20mA (initial setting), 0 to 5VDC and 0 to 10VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5V/0 to 10V).	Current input: Input resistance 249Ω ± 5Ω Maximum permissible current 30mA Voltage input: Input resistance10kΩ ± 1kΩ Permissible maximum voltage 20VDC
			5	Frequency setting common	Frequency setting signal (terminal 2 or 4) common terminal. Do not earth (ground).	
		Thermistor	10 2	PTC thermistor input	For connecting PTC thermistor output. When PTC thermistor protection is valid (**Pr. 561** ≠ "9999"), terminal 2 is not available for frequency setting.	Adaptive PTC thermistor specification Heat detection resistance: 500Ω to 30kΩ (Set by **Pr. 561**)

Type			Terminal Symbol	Terminal Name	Terminal Specification	
Control circuit terminal/Output signal	Relay		A, B, C	Relay output (fault output)	1 changeover contact output indicates that the inverter protective function has activated and the output stopped. Fault: discontinuity across B-C (continuity across A-C), Normal: continuity across B-C (discontinuity across A-C) Contact capacity:230VAC 0.3A (power factor =0.4) 30VDC 0.3A	
	Open collector		RUN	Inverter running	Switched Low when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5Hz). Switched High during stop or DC injection brake operation. (Low is when the open collector output transistor is ON (conducts). High is when the transistor is OFF (does not conduct).)	Permissible load 24VDC (maximum 27VDC) 0.1A (a voltage drop is 3.4V maximum when the signal is ON)
			SE	Open collector output common	Common terminal of terminal RUN.	
	Pulse		FM	For meter	Selected one e.g. output frequency from monitored items. (Not output during inverter reset.) The output signal is proportional to the magnitude of the corresponding monitored item.	Permissible load current 1mA 1440 pulses/s at full scale
Communication			–	PU connector	With the PU connector, communication can be established through RS-485. •Conforming standard: EIA-485 (RS-485) •Transmission format: Multidrop link •Communication speed: 4800 to 38400bps •Overall length: 500m	

[NOTE]
• To change the input specification for terminal 4, set **Pr. 267** and the voltage/current input switch correctly, then input the analog signal relevant to the setting. Applying a voltage with voltage/current input
  switch in "I" position (current input is selected) or a current with switch in "V" position (voltage input is selected) could cause component damage of the inverter or analog circuit of output devices.
• Connecting the power supply to the inverter output terminals (U, V, W) will damage the inverter. Do not perform such wiring.
• ☐ indicates that terminal functions can be selected using **Pr. 178 to Pr. 182, Pr. 190 and Pr. 192 (I/O terminal function selection)**.
• The terminal names and functions shown here are the initial settings.
• The terminals S1, S2, SC, and SO are for manufacturer setting. Do not connect anything to these.
  Doing so may cause an inverter failure. Do not remove the shortening wires across the terminals S1 and SC and the terminals S2 and SC. Removing either shortening wire disables the inverter operation.

Drive Product

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Lineup/Functions Connectivity Examples

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FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

INVERTER FREQROL-D700 Series
Simple and compact; the Mitsubishi standard

## Mitsubishi Inverter Sets a New Standard ——— with More Reliability!!

Spring Clamp Terminal (Control Circuit Terminal)

With spring clamp terminals*, the wiring becomes easier and more secure.
*: Main circuit terminal is screw terminal.

● **Easy wiring**
Wiring is completed only by inserting wires treated with blade terminal (max. diameter 1.5mm) Capable of wiring without a blade terminal.
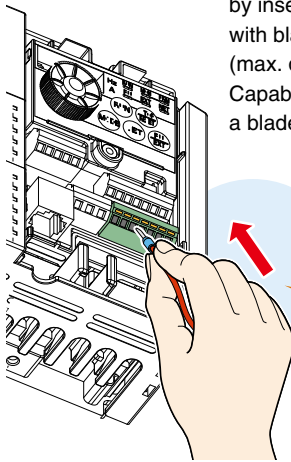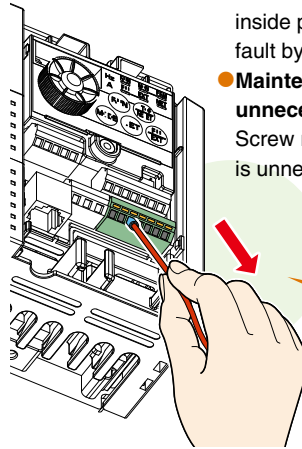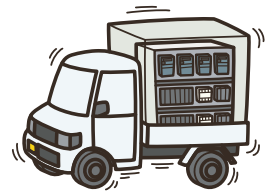
● **High reliability**
Spring structure in terminal contact section inside prevents contact fault by vibration.

● **Maintenance is unnecessary**
Screw retightening is unnecessary.

(i.e. inverter transportation)

Simply insert the wire

Tensile strength conforms to DIN standard

Safety Stop Function

The FR-D700 series is compliant to the EU Machinery Directive without the addition of previously required external devices. Operation of an external Emergency Stop device results in a highly reliable immediate shutoff of the D700's output to the motor. This safety stop function conforms to the following standards.

EN ISO 13849-1 Category 3 / PLd
EN62061 / IEC61508 SIL2

Provided by the user (present)

Emergency stop

Safety function is equipped
• Magnetic contactor (MC)
• Emergency stop wiring

FR-D700

Emergency stop *

For conventional model... Two MCs were necessary
• High cost
• Maintenance of two MCs was necessary
• Installation space was necessary

Only one MC is recommended instead of two. Although MC is not required for the safety stop function.
• Cost reduction
• Maintenance of one MC
• Installation space is reduced

*: Approved safety relay unit

Password Function

Registering 4-digit password can limit parameter read/write.
● It is effective for parameter setting protection.

Equipped with High-Class Performance (as of April 2008)

150%/1Hz High Starting Torque by General-Purpose Magnetic Flux Vector Control

General-purpose magnetic flux vector control and auto tuning function are available.
It ensures operation that requires high starting torque, such as transfer machine including conveyer, hoist, lift, etc., washing machine, and agitators.
● High torque of 150%/1Hz and 200%/3Hz (3.7K or less) is realized (when the slip compensation function is valid).
● Auto tuning
Many kinds of motors can be optimally controlled with Mitsubishi original "non-rotation" auto tuning function. (R1 constants tuning)

(example: conveyer)

(example: industrial washing machine)

Simple & Easy Operation

Quick Setup with the Setting Dial

Setting dial is the feature of Mitsubishi inverters.
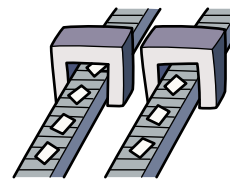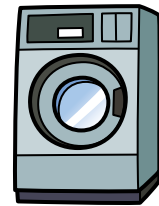● Displayed numbers can be jumped by turning the setting dial quickly, and numbers can be changed one by one by turning it slowly, enabling speedy parameter setting.
● The nonslip setting dial is easier to turn.

Easy Setting from a Personal Computer Using the FR Configurator (Option)

Connecting a personal computer and the inverter via RS-485 communication enables setting with wizard (interactive) function of the FR Configurator (inverter setup software).
In addition, a parameter setting can be converted from the FR-S500 series to the FR-D700 series by "Convert" function.
"Graph" function displays monitor data in waveform.

Enclosure Surface Operation Panel FR-PA07 (Option)

Optional enclosure surface operation panel (FR-PA07) can be connected. In addition, an operation panel for the FR-E500 series can be connected.
The operation panel of the inverter can not be removed. A parameter unit connection cable (FR-CB20☐) is separately necessary.

Parameter Unit FR-PU07 (Option)

An optional parameter unit (FR-PU07) can be connected as well.
A parameter unit connection cable (FR-CB20☐) is separately necessary.
● Setting such as direct input method with a numeric keypad, operation status indication, and help function are usable. Eight languages can be displayed.
● Parameter setting values of maximum of three inverters can be stored.

Drive Product

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

Compact and Space Saving

Easily Replaceable Compact Body

Installation size is the same as that of the FR-S500 series which is the smallest model of the Mitsubishi inverter.

128mm

FR-D740-0.4K   FR-S540E-0.4K

Side by Side Installation Saves Space

Space can be saved by side by side no clearance installation*.
*: Use the inverter at the surrounding air temperature of 40°C or less.

Long-Life and Easy Maitenance

Long-Life Design

● The design life of the cooling fan has been extended to 10 years[1]. The life of the fan can be further extended utilizing the it's ON/OFF control.
● The design life of the capacitors has been extended to 10 years by the adoption of a capacitor endures 5000 hours at 105°C surrounding air temperature[1], [2].

[1]: Surrounding air temperature : annual average 40°C (free from corrosive gas, flammable gas, oil mist, dust and dirt) Since the design life is a calculated value, it is not a guaranteed value.
[2]: Output current : 80% of the inverter rated current

● Life indication of critical components

Components	Guideline of the FR-D700 Life	Guideline of JEMA[3]
Cooling fan	10 years	2 to 3 years
Main circuit smoothing capacitor	10 years	5 years
Printed board smoothing capacitor	10 years	5 years

[3]: Excerpts from "Periodic check of the transistorized inverter" of JEMA (Japan Electrical Manufacture's Association)

Leading Life Check Function

● Degrees of deterioration of main circuit capacitor, control circuit capacitor, and inrush current limit circuit can be monitored.
● Trouble can be avoided with the self-diagnostic alarm[4] that is output when the life span is near.

[4]: If any one of main circuit capacitor, control circuit capacitor, inrush current restriction circuit or cooling fan reaches the output level, an alarm is output. Capacity of the main circuit capacitor can be measured by setting parameter at a stop and turning the power from off to on. Measuring the capacity enables alarm to be output.
The cooling fan outputs alarm by using fan speed detection.

Easy Replacement of Cooling Fan

A cooling fan is provided on top of the inverter of all capacities requiring a cooling fan (1.5K or more).
A cooling fan can be easily replaced without disconnecting main circuit wires.

Combed Shaped Wiring Cover

Since a cover can be fitted after wiring, wiring work is easily done.

Environment Consciousness in Global Standards

RoHS Directive Compliant

Human and environment-friendly inverter in compliant with 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.

Filterpack FR-BFP2 (Option)

Power factor improving DC reactor, zero phase reactor, and capacitative filter (radio noise filter), are frequently-used units for an air conditioning application. The filterpack combines those three units are available as an option.
Not only it uses less space and wiring, the filterpack is in compliance with the harmonic suppression guidelines, and conforms to the public building construction standard specifications (electrical equipment construction edition) as well as the public building construction standard specifications (machinery and equipment construction edition) (2010 edition) edited by the Ministry of Land, Infrastructure, Transport and Tourism.

EMC Directive Compliant Noise Filter

Compliance to the EMC Directive of European Norm is easier.
● Noise filter option which is compatible with EMC Directive (EN61800-3 2nd Environment Category C3) is available.

Complies with UL, cUL, EC Directives (CE Marking) as a Standard Model

c(UL)us LISTED   CE

Single-phase 100V power input specification models are not in compliance with the EMC Directive.

Enhanced Functions

Built for Various Applications

Equipped with many useful functions for various applications

Fan and pump

Energy saving

● **Applicable load selection** *(Pr.14)*
 Select the best output features (V/F features) according to use and load characteristics.
● **Optimum excitation control** *(Pr.60)*
 This control maximizes motor efficiency, saving more energy especially during use of reduced load torque such as fan and pump applications.

● **Regeneration avoidance function**
 This function automatically increases the frequency level during regeneration, for example, a dragging fan, to restrain tripping.
● **Deceleration and stop function upon power failure/continuous operation function upon instantaneous power failure**
● **PID control**
● **Auto-restart upon instantaneous power failure/drag retraction**
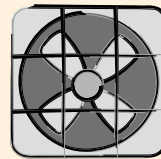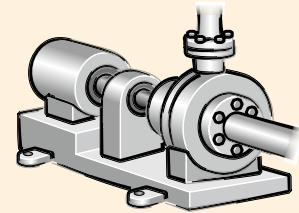
(i.e. A/C fan)   (i.e. pump)

Conveyor and food machineries

● **General-purpose magnetic flux vector control**
● **S-shaped acceleration and deceleration**
● **Multi-speed function (up to 15 speed)**
● **Brake resistor connection**
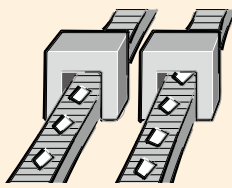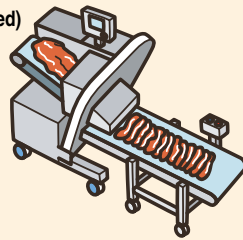
(i.e. conveyor)   (i.e. meat slicer)

Environmental and consumer-related machineries

● **General-purpose magnetic flux vector control**
● **Brake resistor connection**
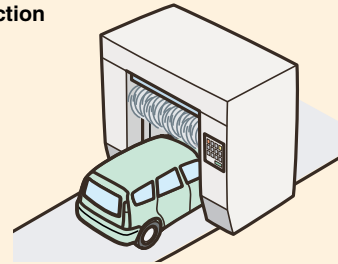
(i.e. Industrial washing machine)   (i.e. Car wash machine)

Machine tools

● **General-purpose magnetic flux vector control**
● **Deceleration and stop function upon power failure**
 In the event of a power failure or an undervoltage, the motor decelerates and stops to prevent a free-run state. This function is useful to prevent risks associated with machine tools, such as when stopping a motor upon power failure.
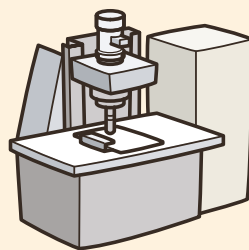
(i.e. Spindle)

Amusement machine
Packaging machinery
Textile machinery
Printing machinery
etc.

Enhanced Communication Function

● Mitsubishi inverter protocol and Modbus-RTU Faster communication speed with RS-485 models (enables 38.4kbps communication)
 Added the "Multi-Command Mode" to the Mitsubishi inverter protocol (reduces inverter data process time by 1/3 - 1/4)
 Compatible with Modbus-RTU

Brake Resistor Connection Possible

Built-in brake transistor for 0.4K and above.
Regenerative capacity can be increased by connecting the optional brake resistor.
The above function can also be used to reduce deceleration time of fans and other machineries with a large inertia as well as lifts.

Introducing the Mitsubishi magnetic contactor
● Offers a selection of small frames
● Offers a line-up of safety contactors
● Supports small loads (auxiliary contact)
● Supports many international regulations as standard

Lineup

The lineup of three phase 200V/400V class goes to 15K.

● For a use in harsh environment, special unit with board coating is also available. Please contact our sales representative.

● For the FR-D700 series, North American (NA), EU (EC), and Chinese (CHT) specifications also are supported.

*: This catalog explains based on the Japanese specifications.
Consult our sales office for specifications of each country.

F R - D 7 4 0 - 0 . 4 K

Symbol	Voltage
1	100V class
2	200V class
4	400V class

Symbol	Number of Power Phases
None	Three-phase input
S	Single-phase input
W	Single-phase input (double voltage output)

Symbol	Inverter Capacity
0.1K to 15K	Indicate capacity "kW".

Power Supply	Inverter Model	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Three phase 200V	FR-D720-□K	●	●	●	●	●	●	●	●	●	●	●
Three phase 400V	FR-D740-□K	–	–	●	●	●	●	●	●	●	●	●
Single phase 200V*	FR-D720S-□K	●	●	●	●	●	●	–	–	–	–	–
Single phase 100V*	FR-D710W-□K	●	●	●	●	–	–	–	–	–	–	–

*: Output of the single-phase 200V and single-phase 100V input models is three-phase 200V.

●:Available models   –:Not available

Features/ Outline

Lineup/Functions Connectivity Examples

Specifications/ Outline Drawing

FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Installation Example

AC power supply
Use within the permissible power supply specifications of the inverter.
To ensure safety, use a moulded case circuit breaker, earth leakage circuit breaker or magnetic contactor to switch power ON/OFF.

Moulded case circuit breaker (MCCB) or earth leakage current breaker (ELB), fuse
The breaker must be selected carefully since an in-rush current flows in the inverter at power on.

Magnetic contactor (MC)
Install the magnetic contactor to ensure safety. Do not use this magnetic contactor to start and stop the inverter. Doing so will cause the inverter life to be shorten.

Reactor (FR-HAL, FR-HEL option)
Install reactors to suppress harmonics and to improve the power factor.
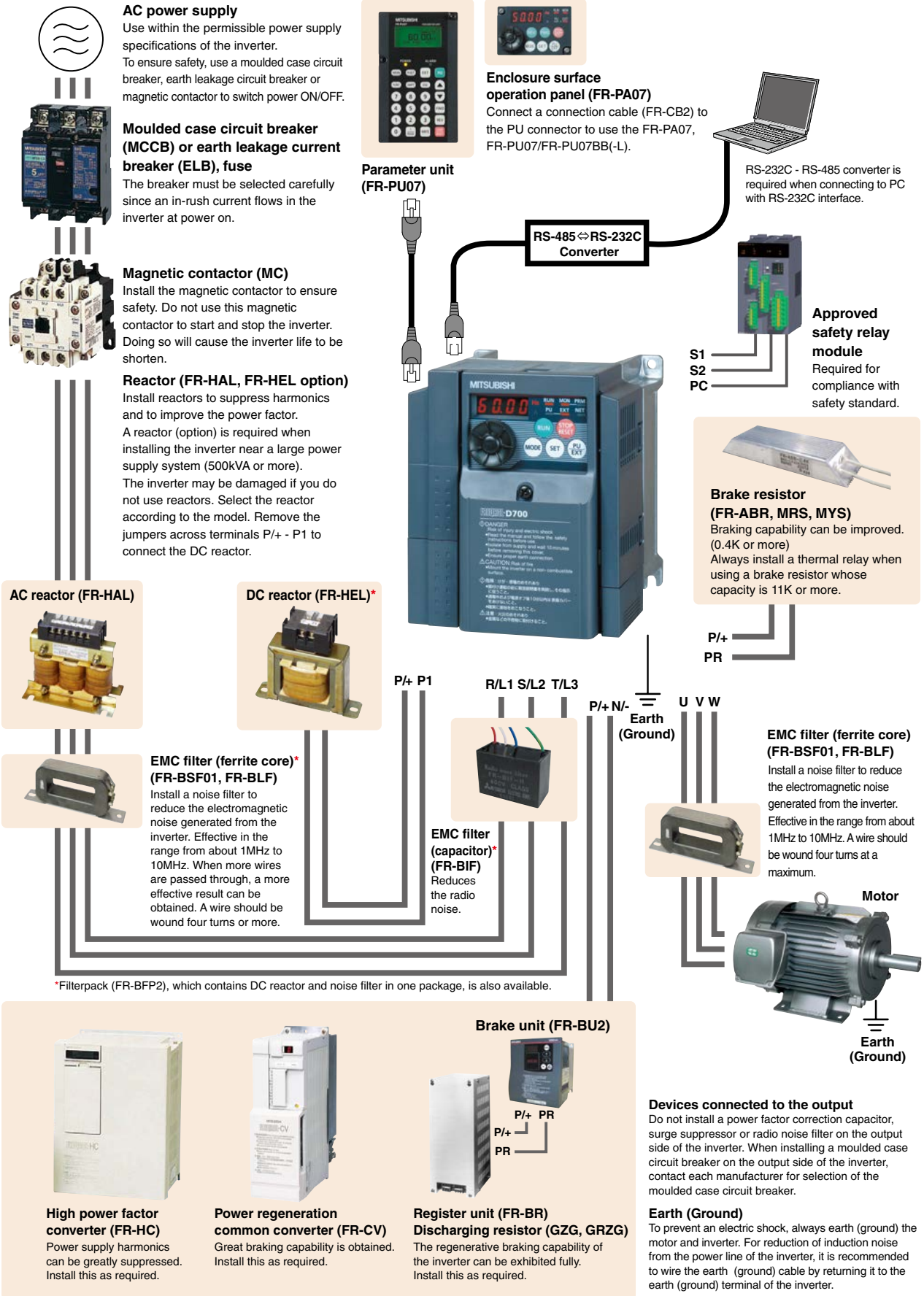A reactor (option) is required when installing the inverter near a large power supply system (500kVA or more).
The inverter may be damaged if you do not use reactors. Select the reactor according to the model. Remove the jumpers across terminals P/+ - P1 to connect the DC reactor.

AC reactor (FR-HAL)

DC reactor (FR-HEL)*

Parameter unit (FR-PU07)

Enclosure surface operation panel (FR-PA07)
Connect a connection cable (FR-CB2) to the PU connector to use the FR-PA07, FR-PU07/FR-PU07BB(-L).

RS-232C - RS-485 converter is required when connecting to PC with RS-232C interface.

RS-485⇔RS-232C Converter

Approved safety relay module
S1
S2
PC
Required for compliance with safety standard.

Brake resistor (FR-ABR, MRS, MYS)
Braking capability can be improved. (0.4K or more)
Always install a thermal relay when using a brake resistor whose capacity is 11K or more.

P/+
PR

EMC filter (ferrite core)* (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. When more wires are passed through, a more effective result can be obtained. A wire should be wound four turns or more.

P/+ P1

R/L1 S/L2 T/L3

P/+ N/-

Earth (Ground)

U V W

EMC filter (capacitor)* (FR-BIF)
Reduces the radio noise.

EMC filter (ferrite core) (FR-BSF01, FR-BLF)
Install a noise filter to reduce the electromagnetic noise generated from the inverter. Effective in the range from about 1MHz to 10MHz. A wire should be wound four turns at a maximum.

Motor

Earth (Ground)

*Filterpack (FR-BFP2), which contains DC reactor and noise filter in one package, is also available.

Brake unit (FR-BU2)

P/+ PR
P/+
PR

High power factor converter (FR-HC)
Power supply harmonics can be greatly suppressed. Install this as required.

Power regeneration common converter (FR-CV)
Great braking capability is obtained. Install this as required.

Register unit (FR-BR) Discharging resistor (GZG, GRZG)
The regenerative braking capability of the inverter can be exhibited fully. Install this as required.

Devices connected to the output
Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the output side of the inverter. When installing a moulded case circuit breaker on the output side of the inverter, contact each manufacturer for selection of the moulded case circuit breaker.

Earth (Ground)
To prevent an electric shock, always earth (ground) the motor and inverter. For reduction of induction noise from the power line of the inverter, it is recommended to wire the earth (ground) cable by returning it to the earth (ground) terminal of the inverter.

*2 Can be used only with standard control circuit terminal specification products and safety stop compatible models.

 : Install these options as required.

Features/ Outline

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FREQROL-A800 Series

FREQROL-F800 Series

FREQROL-E700 Series

FREQROL-F700PJ Series

FREQROL-D700 Series

■Standard Specifications

●Rating

Three-phase 200V power supply

Model FR-D720-□K		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)[*1]		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)[*2]	0.3	0.6	1.0	1.7	2.8	4.0	6.6	9.5	12.7	17.9	23.1
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0	16.5	23.8	31.8	45	58
	Overload current rating[*3]	150% 60s, 200% 0.5s (inverse-time characteristics)										
	Voltage[*4]	Three-phase 200 to 240V										
	Regenerative braking torque[*5]	150%		100%		50%	20%					
Power supply	Rated input AC voltage/frequency	Three-phase 200 to 240V 50Hz/60Hz										
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz										
	Permissible frequency fluctuation	±5%										
	Power supply capacity (kVA)[*6]	0.4	0.7	1.2	2.1	4.0	5.5	9.0	12.0	17.0	20.0	27.0
Protective structure (JEM1030)		Enclosed type (IP20).										
Cooling system		Self-cooling				Forced air cooling						
Approximate mass (kg)		0.5	0.5	0.8	1.0	1.4	1.4	1.8	3.6	3.6	6.5	6.5

Three-phase 400V power supply

Model FR-D740-□K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Applicable motor capacity (kW)[*1]		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output	Rated capacity (kVA)[*2]	0.9	1.7	2.7	3.8	6.1	9.1	12.2	17.5	22.5
	Rated current (A)	1.2	2.2	3.6	5.0	8.0	12.0	16.0	23.0	29.5
	Overload current rating[*3]	150% 60s, 200% 0.5s (inverse-time characteristics)								
	Voltage[*4]	Three-phase 380 to 480V								
	Regenerative braking torque[*5]	50%		100%	20%					
Power supply	Rated input AC voltage/frequency	Three-phase 380 to 480V 50Hz/60Hz								
	Permissible AC voltage fluctuation	325 to 528V 50Hz/60Hz								
	Permissible frequency fluctuation	±5%								
	Power supply capacity (kVA)[*6]	1.5	2.5	4.5	5.5	9.5	12.0	17.0	20.0	28.0
Protective structure (JEM1030)		Enclosed type (IP20).								
Cooling system		Self-cooling		Forced air cooling						
Approximate mass (kg)		1.3	1.3	1.4	1.5	1.5	3.3	3.3	6.0	6.0

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V for three-phase 200V class and 440V for three-phase 400V class.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range.
   However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque.
   When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used.
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).

Single-phase 200V power supply

Model FR-D720S-□K		0.1	0.2	0.4	0.75	1.5	2.2
Applicable motor capacity (kW)[*1]		0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)[*2]	0.3	0.6	1.0	1.7	2.8	4.0
	Rated current (A)	0.8	1.4	2.5	4.2	7.0	10.0
	Overload current rating[*3]	150% 60s, 200% 0.5s (inverse-time characteristics)					
	Voltage[*4]	Three-phase 200 to 240V					
	Regenerative braking torque[*5]	150%		100%		50%	20%
Power supply	Rated input AC voltage/frequency	Single-phase 200 to 240V 50Hz/60Hz					
	Permissible AC voltage fluctuation	170 to 264V 50Hz/60Hz					
	Permissible frequency fluctuation	±5%					
	Power supply capacity (kVA)[*6]	0.5	0.9	1.5	2.3	4.0	5.2
Protective structure (JEM1030)		Enclosed type (IP20).					
Cooling system		Self-cooling				Forced air cooling	
Approximate mass (kg)		0.5	0.5	0.9	1.1	1.5	2.0

Single-phase 100V power supply

Model FR-D710W-□K		0.1	0.2	0.4	0.75
Applicable motor capacity (kW)[*1]		0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)[*2]	0.3	0.6	1.0	1.7
	Rated current (A)	0.8	1.4	2.5	4.2
	Overload current rating[*3]	150% 60s, 200% 0.5s (inverse-time characteristics)			
	Voltage	Three-phase 200 to 230V[*7, *8]			
	Regenerative braking torque[*5]	150%		100%	
Power supply	Rated input AC voltage/frequency	Single-phase 100 to 115V 50Hz/60Hz			
	Permissible AC voltage fluctuation	90 to 132V 50Hz/60Hz			
	Permissible frequency fluctuation	±5%			
	Power supply capacity (kVA)[*6]	0.5	0.9	1.5	2.5
Protective structure (JEM1030)		Enclosed type (IP20).			
Cooling system		Self-cooling			
Approximate mass (kg)		0.6	0.7	0.9	1.4

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 230V.
*3 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load. If the automatic restart after instantaneous power failure function (**Pr. 57**) or power failure stop function (**Pr. 261**) is set and power supply voltage is low while load becomes bigger, the bus voltage decreases to power failure detection level and load of 100% or more may not be available.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range.
   However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
*5 The braking torque indicated is a short-duration average torque (which varies with motor loss) when the motor alone is decelerated from 60Hz in the shortest time and is not a continuous regenerative torque.
   When the motor is decelerated from the frequency higher than the base frequency, the average deceleration torque will reduce. Since the inverter does not contain a brake resistor, use the optional brake resistor when regenerative energy is large. A brake unit (FR-BU2) may also be used.
*6 The power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and cables).
*7 For single-phase 100V power input model, the maximum output voltage is twice the power supply voltage and cannot be exceeded.
*8 In a single-phase 100V power input model, the output voltage may fall down when the load is heavy, and larger output current may flow compared to a three-phase input model.
   Use the motor with less load so that the output current is within the rated motor current range.

Drive Product

## ●Common Specifications

<table>
<tr><td rowspan="11">Control specifications</td><td colspan="2">Control method</td><td colspan="2">Soft-PWM control/high carrier frequency PWM control (V/F control, General-purpose magnetic flux vector control, and Optimum excitation control are available)</td></tr>
<tr><td colspan="2">Output frequency range</td><td colspan="2">0.2 to 400Hz</td></tr>
<tr><td rowspan="2">Frequency setting resolution</td><td>Analog input</td><td colspan="2">0.06Hz/60Hz (terminal2, 4: 0 to 10V/10bit)
0.12Hz/60Hz (terminal2, 4: 0 to 5V/9bit)
0.06Hz/60Hz (terminal4: 0 to 20mA/10bit)</td></tr>
<tr><td>Digital input</td><td colspan="2">0.01Hz</td></tr>
<tr><td rowspan="2">Frequency accuracy</td><td>Analog input</td><td colspan="2">Within ±1% of the max. output frequency (25°C ±10°C)</td></tr>
<tr><td>Digital input</td><td colspan="2">Within 0.01% of the set output frequency</td></tr>
<tr><td colspan="2">Voltage/frequency characteristics</td><td colspan="2">Base frequency can be set from 0 to 400Hz. Constant-torque/variable torque pattern can be selected</td></tr>
<tr><td colspan="2">Starting torque</td><td colspan="2">150% or more (at 1Hz)...when General-purpose magnetic flux vector control and slip compensation is set</td></tr>
<tr><td colspan="2">Torque boost</td><td colspan="2">Manual torque boost</td></tr>
<tr><td colspan="2">Acceleration/deceleration time setting</td><td colspan="2">0.1 to 3600s (acceleration and deceleration can be set individually),
Linear and S-pattern acceleration/deceleration modes are available.</td></tr>
<tr><td colspan="2">DC injection brake</td><td colspan="2">Operation frequency (0 to 120Hz), operation time (0 to 10s), and operation voltage (0 to 30%) can be changed</td></tr>
<tr><td colspan="2">Stall prevention operation level</td><td colspan="2">Operation current level (0 to 200%), and whether to use the function or not can be selected</td></tr>
<tr><td rowspan="8">Operation specifications</td><td rowspan="2">Frequency setting signal</td><td>Analog input</td><td colspan="2">Two terminals
Terminal 2: 0 to 10V and 0 to 5V are available
Terminal 4: 0 to 10V, 0 to 5V, and 4 to 20mA are available</td></tr>
<tr><td>Digital input</td><td colspan="2">The signal is entered from the operation panel or parameter unit.
Frequency setting increment can be set.</td></tr>
<tr><td colspan="2">Start signal</td><td colspan="2">Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.</td></tr>
<tr><td colspan="2">Input signal (five terminals)</td><td colspan="2">The following signals can be assigned to **Pr.178 to Pr.182 (input terminal function selection)**: multi-speed selection, remote setting, second function selection, terminal 4 input selection, JOG operation selection, PID control valid terminal, external thermal input, PU-External operation switchover, V/F switchover, output stop, start self-holding selection, forward rotation, reverse rotation command, inverter reset, PU-NET operation switchover, External-NET operation switchover, command source switchover, inverter operation enable signal, and PU operation external interlock.</td></tr>
<tr><td colspan="2">Operational functions</td><td colspan="2">Maximum/minimum frequency setting, frequency jump operation, external thermal relay input selection, automatic restart after instantaneous power failure operation, forward/reverse rotation prevention, remote setting, second function, multi-speed operation, regeneration avoidance, slip compensation, operation mode selection, offline auto tuning function, PID control, computer link operation (RS-485), Optimum excitation control, power failure stop, speed smoothing control, Modbus-RTU</td></tr>
<tr><td rowspan="3">Output signal
Open collector output (two terminals)
Relay output (one terminal)</td><td></td><td colspan="2">The following signals can be assigned to **Pr.190, Pr.192 and Pr.197 (output terminal function selection)**: inverter operation, up-to-frequency, overload alarm, output frequency detection, regenerative brake prealarm, electronic thermal relay function prealarm, inverter operation ready, output current detection, zero current detection, PID lower limit, PID upper limit, PID forward/reverse rotation output, fan alarm[*1], heatsink overheat pre-alarm, deceleration at an instantaneous power failure, PID control activated, PID output interruption, safety monitor output, safety monitor output 2, during retry, life alarm, current average value monitor, remote output, alarm output, fault output, fault output 3, and maintenance timer alarm.</td></tr>
<tr><td>Operating status</td><td colspan="2"></td></tr>
<tr><td>For meter
Pulse train output
(MAX 2.4kHz: one terminal)</td><td colspan="2">The following signals can be assigned to **Pr.54 FM terminal function selection**: output frequency, output current (steady), output voltage, frequency setting, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, reference voltage output, motor load factor, PID set point, PID measured value, output power, PID deviation, motor thermal load factor, and inverter thermal load factor.
Pulse train output (1440 pulses/s/full scale)</td></tr>
<tr><td rowspan="3">Indication</td><td rowspan="3">Operation panel
Parameter unit
(FR-PU07)</td><td>Operating status</td><td colspan="2">The following operating status can be displayed: output frequency, output current (steady), output voltage, frequency setting, cumulative energization time, actual operation time, converter output voltage, regenerative brake duty, electronic thermal relay function load factor, output current peak value, converter output voltage peak value, motor load factor, PID set point, PID measured value, PID deviation, inverter I/O terminal monitor, output power, cumulative power, motor thermal load factor, inverter thermal load factor, and PTC thermistor resistance.</td></tr>
<tr><td>Fault record</td><td colspan="2">Fault definition is displayed when a fault occurs. Past 8 fault records (output voltage/current/frequency/cumulative energization time right before the fault occurs) are stored.</td></tr>
<tr><td>Interactive guidance</td><td colspan="2">Function (help) for operation guide[*2]</td></tr>
<tr><td rowspan="2">Protective/warning function</td><td></td><td>Protective function</td><td colspan="2">Overcurrent during acceleration, overcurrent during constant speed, overcurrent during deceleration, overvoltage during acceleration, overvoltage during constant speed, overvoltage during deceleration, inverter protection thermal operation, motor protection thermal operation, heatsink overheat, input phase loss[*3*4], output side earth (ground) fault overcurrent at start[*3], output phase loss, external thermal relay operation[*3], PTC thermistor operation[*3], parameter error, PU disconnection, retry count excess[*3], CPU fault, brake transistor alarm, inrush resistance overheat, analog input error, stall prevention operation, output current detection value exceeded[*3], safety circuit fault</td></tr>
<tr><td></td><td>Warning function</td><td colspan="2">Fan alarm[*1], overcurrent stall prevention, overvoltage stall prevention, PU stop, parameter write error, regenerative brake prealarm[*3], electronic thermal relay function prealarm, maintenance output[*3], undervoltage, operation panel lock, password locked, inverter reset, safety stop</td></tr>
<tr><td rowspan="5">Environment</td><td colspan="2">Surrounding air temperature</td><td colspan="2">-10°C to +50°C maximum (non-freezing)[*5]</td></tr>
<tr><td colspan="2">Ambient humidity</td><td colspan="2">90%RH or less (non-condensing)</td></tr>
<tr><td colspan="2">Storage temperature[*6]</td><td colspan="2">-20°C to +65°C</td></tr>
<tr><td colspan="2">Atmosphere</td><td colspan="2">Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.)</td></tr>
<tr><td colspan="2">Altitude/vibration</td><td colspan="2">Maximum 1000m above sea level, 5.9m/s² or less at 10 to 55Hz (directions of X, Y, Z axes)</td></tr>
</table>

*1 As the 0.75K or less are not provided with the cooling fan, this alarm does not function.
*2 This operation guide is only available with option parameter unit (FR-PU07).
*3 This protective function does not function in the initial status.
*4 This protective function is available with the three-phase power input specification model only.
*5 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0cm clearance).
*6 Temperatures applicable for a short time, e.g. in transit.

Drive Product

Outline Dimension Drawings

- FR-D720-0.1K to 0.75K
- FR-D720S-0.1K to 0.75K
- FR-D710W-0.1K to 0.4K

1-φ5 hole

Rating plate
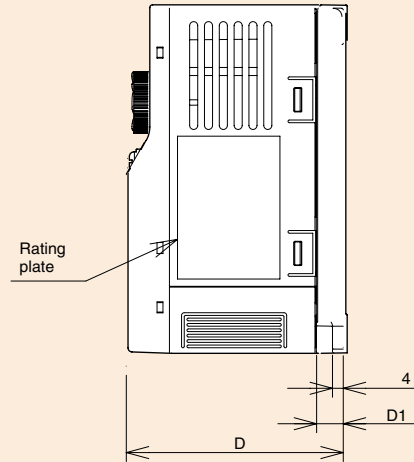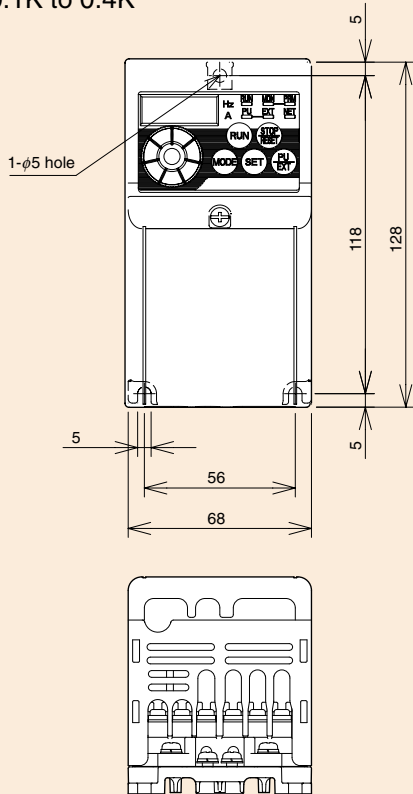
Inverter Model	D	D1
FR-D720-0.1K, 0.2K FR-D720S-0.1K, 0.2K FR-D710W-0.1K	80.5	10
FR-D710W-0.2K	110.5	10
FR-D720-0.4K	112.5	42
FR-D720-0.75K	132.5	62
FR-D720S-0.4K FR-D710W-0.4K	142.5	42
FR-D720S-0.75K	162.5	62

(Unit: mm)

- FR-D720-1.5K to 3.7K
- FR-D740-0.4K to 3.7K
- FR-D720S-1.5K
- FR-D710W-0.75K

2-φ5 hole

Rating plate

FAN *
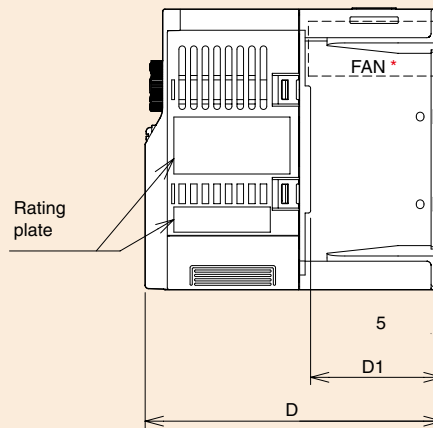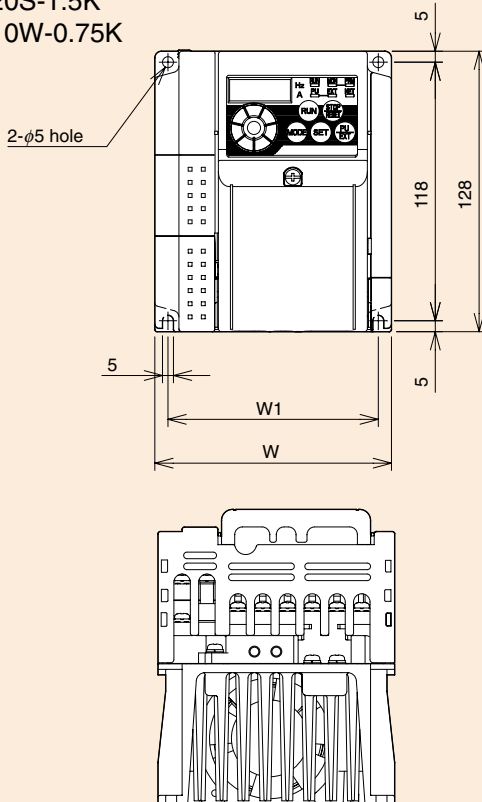
* FR-D740-0.4K, 0.75K, FR-D710W-0.75K are not provided with the cooling fan.

Inverter Model	W	W1	D	D1
FR-D720-1.5K, 2.2K FR-D740-1.5K	108	96	135.5	60
FR-D740-0.4K, 0.75K			129.5	54
FR-D740-2.2K FR-D720S-1.5K			155.5	60
FR-D740-3.7K			165.5	
FR-D710W-0.75K			149.5	54
FR-D720-3.7K	170	158	142.5	66.5

(Unit: mm)