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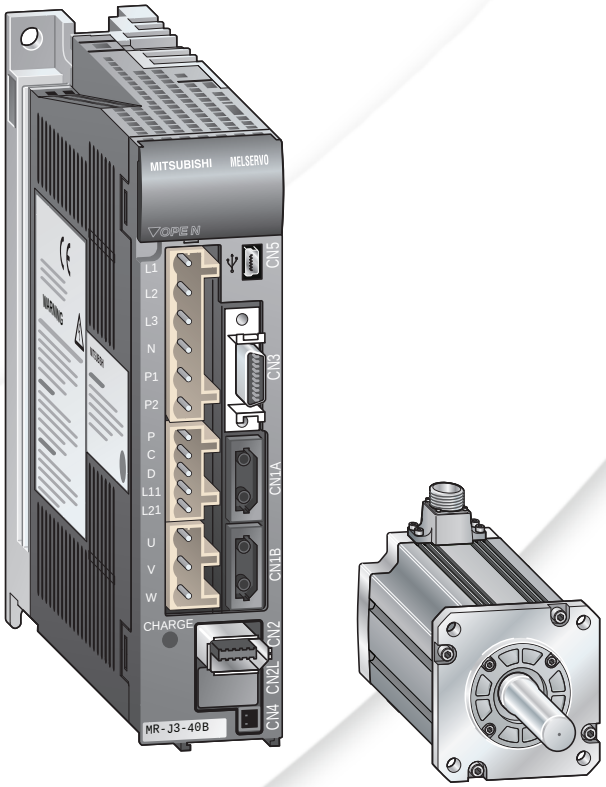
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MITSUBISHI ELECTRIC
FACTORY AUTOMATION

MELSERVO

Servo Amplifiers & Motors

Technical Catalogue



SSCNET
SERVO SYSTEM CONTROLLER NETWORK

Servo Amplifiers /// Servo Motors ///
Motion Controller /// Positioning Units ///
Networking ///

More information?

This technical catalogue is designed to give an overview of the extensive range of MELSERVO amplifiers and motors. If you cannot find the information you require in this catalogue, there are a number of ways you can get further details on configuration and technical issues, pricing and availability.

For technical issues visit the www.mitsubishi-automation.com website.

Our website provides a simple and fast way of accessing further technical data and up to the minute details on our products and services. Manuals and catalogues are available in several different languages and can be downloaded for free.

For technical, configuration, pricing and availability issues contact our distributors and partners.

Mitsubishi partners and distributors are only too happy to help answer your technical questions or help with configuration building. For a list of Mitsubishi partners please see the back of this catalogue or alternatively take a look at the "contact us" section of our website.

About this technical catalogue

This catalogue is a guide to the range of products available. For detailed configuration rules, system building, installation and configuration the associated product manuals must be read. You must satisfy yourself that any system you design with the products in this catalogue is fit for purpose, meets your requires and conforms to the product configuration rules as defined in the product manuals.

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Servo and Motion Systems

Mitsubishi Electric offers a variety of servo and motion system products providing solutions for applications as simple as a single axis point-to-point positioning system through to a fully synchronised 96 axes system.

With both standard pulse type output modules and SSCNET bus modules specific application needs are easily met (SSCNET = Servo System Controller Network; optical fibre bus) .

The servo motors and amplifiers take Mitsubishi Motion Control to new levels of precision with a wide range of motors (MR-J3 series motors are fitted with 262144 pulse-per-revolution encoders) and wide amplifier range (up to 55 kW).

All Mitsubishi servo and motion system hardware is complimented by a range of software packages allowing easy programming and set-up of the units.

What are the Components of a Servo System?

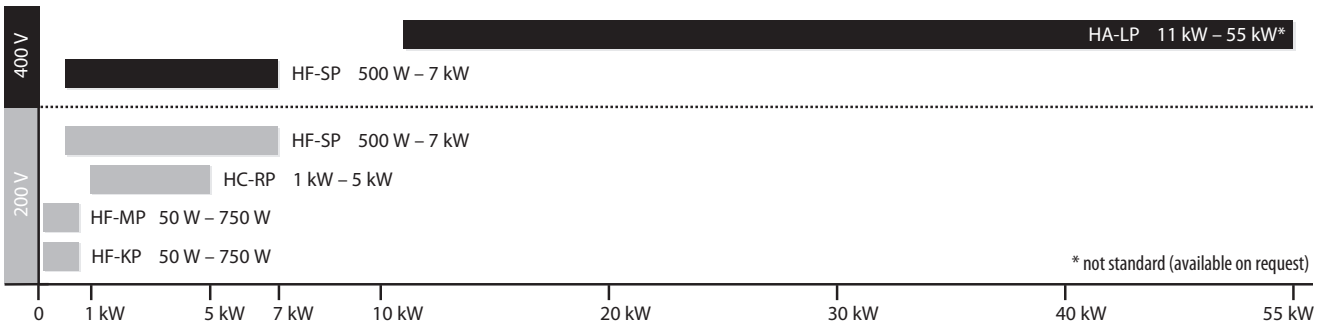
Servo motors

Utilising the most advanced concentrated winding techniques and latest technology, these brushless servo motors are among the most compact on the market.

Mitsubishi servo motors are made to high standards and offer a wide range of power, speed and inertia ratings providing a motor for all applications.

Ranging from 50 W up to 55 kW and with special motors available (flat "pancake" motors) the servo motors complete the line-up of products offered by Mitsubishi Electric.

All Mitsubishi motors are fitted with absolute encoders as standard. Therefore, an absolute system can be created by simply providing power to servo amplifier via a battery. Once this has been done the super capacitor inside the motor and the optional back-up battery allow the servo motor position to be constantly monitored.

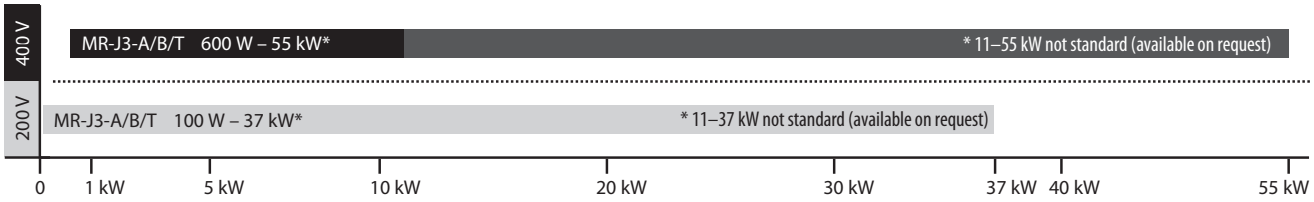


Servo amplifiers

Mitsubishi offer a wide range of servo amplifiers to meet the demands of all types of applications. From standard digital pulse and analogue controlled amplifiers through to dedicated SSCNET III bus type amplifiers, there is a product for all circumstances.

Real Time Adaptive Tuning (RTAT) is a unique Mitsubishi technology, enabling the servo to deliver maximum dynamic performance, even if the load keeps changing, by automatically tuning online (during operation) to the application.

The digital pulse and analogue units of the MR-J3 series range from 100 W units through to 55 kW. The SSCNET III bus type amplifiers (type B) offer the user ease of connectivity, via SSCNET III.



Positioning controllers

For the compact, cost effective, FX range of PLCs, the FX2N-10PG unit provides single-axis control with built-in positioning tables, fast external start and an output pulse rate of up to 1 MHz. The FX3U-20SSC-H is a positioning module for the MR-J3-B series. This module provides a quick and easy, but efficient positioning control system for standard applications.

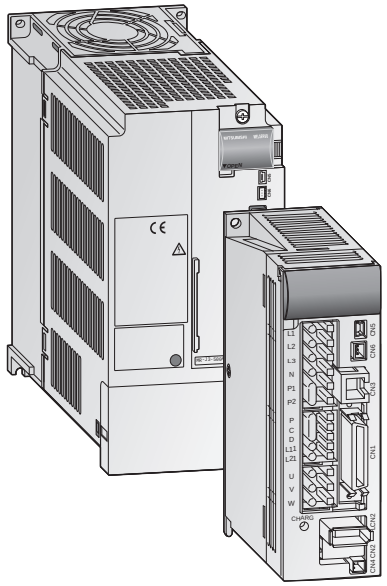
For larger, more complex applications the powerful Qn PLC range offers three QD75 Series modules (one, two and four axes).

Using SSCNET III bus systems (for MR-J3-B fibre optical based SSCNET III is available) significant reduction in wiring saves costs. Thanks to the fibre optical medium of SSCNET III all noise problems are eliminated. All QD75 series controllers can provide functionality such as interpolation and speed-position operation etc..

Motion Controllers

For complex applications requiring the highest level of control and precision, the dynamic servo technology provided by the QH-Motion CPU is combined with the powerful processing power of the Q series PLC CPU, creating a complete new generation of motion controller products. This fully integrated and flexible system has the capability to control up to 96 axes using SSCNET III, which is more than capable for handling any motion application.

MELSERVO MR-J3 Servo Amplifiers



MELSERVO

The MR-J3 servo drive systems from Mitsubishi Electric combine extremely dynamic response with ultra-fast positioning. In addition the servo amplifiers are also very simple to use, and their advanced functionality make it possible to achieve maximum performance very quickly, even for users without special experience in calibrating drive applications. The significantly improved auto-tuning function reduces the need for the time-consuming trial-and-error approach. In combination with the setup software package (MR-Configurator) the MR-J3 series can be used to detect application mechanical critical frequencies. This enables notch filters to be set to avoid resonant frequencies enabling vibration- free operation.

When using amplifiers of competitors the controller response level has to be reduced for the entire operation range.

The MR-J3 servo amplifiers can be used for global applications with superb operation in the toughest environments.

Features

- High-performance CPU
- Integrated Positioning Functions (MR-J3-T only)
- Adaptive vibration supression control function for compensation for resonance up to two resonance frequencies
- Advanced vibration suppression control for compensation of motion overshoot
- Separate wiring of the control power supply
- High responsiveness
- Real-Time Auto-Tuning (RTAT)
- Torque control function (MR-J3-A/B)
- Servo-lock anti-vibration function
- RS-422/USB personal computer interface
- Automatic motor recognition
- Network capability
- Complies with global industrial standards

Differences Between the Three MR-J3 Servo Amplifier Series

MR-J3-A (standard type)

The MR-J3-A series is ideal for servo applications using conventional control systems. The servo amplifiers have two analog inputs numerous digital inputs for activating internal application functions (ie. pulse train positioning). Using the digital pulse train method eliminates the problems inherent in analog control, such as offset shifts caused by temperature fluctuations and drifting when the system is at rest.

The MR-J3-A series can be used in torque, speed or position control mode.

Highlights

- 2 analog inputs
- 1 digital pulse train input
- 7 preset speeds
- Supports three different types of pulse train signals: standard encoder signals (line driver or open collector); pulse and direction; pulse train for right and left rotation

MR-J3-B (SSCNET III bus type)

The MR-J3-B series supports connection to Mitsubishi motion control and positioning control systems. The drive systems are connected to these controllers via SSCNET III, a high-speed motion control enabling high precision synchronization and advanced interpolation. The minimum cycle time of just 0.44 ms increases responsiveness and reduces tact cycle of machine due to fast data exchange. Setting up this plug-and-play network couldn't be easier; you just have to select the axis address and connect the preconfigured bus cable, which also makes wiring errors impossible.

Highlights

- Plug-and-play SSCNET III network
- Motor brake can be controlled directly by the amplifier
- Emulated encoder outputs for connection of conventional slave drive systems
- Amplifier replacement is fast and simple because data management is performed by superior controller.
- Automatic position detection on power-up thanks to absolute position detection system (multi-turn absolute positioning is realised by optional back-up battery).

MR-J3-T (integrated positioning type)

The MR-J3-T series is a compact and cost effective servo solution with integrated positioning control functionality and CC-Link communications capability. By setting position and speed data by using simple point tables in the servo amplifier, positioning operation is possible with a simple start signal from the positioning controller which is input by any standard controller.

It is possible to store up to 256 position steps in the amplifier. The positioning tasks can be started by simply inputting digital signals.

Highlights

- Position and speed data, etc. can be set via CC-Link or RS422 communication
- CC-Link interface can be also used for transmitting positioning data to the amplifier without using the internal point table. Hence centralised data management inside of a machine control can be realised, too.
- Positioning by serial communication (RS-422) for simple applications without fieldbus interfaces
- Parameter unit, MR-PRU03 (optional), makes parameter setting and operation monitoring easier

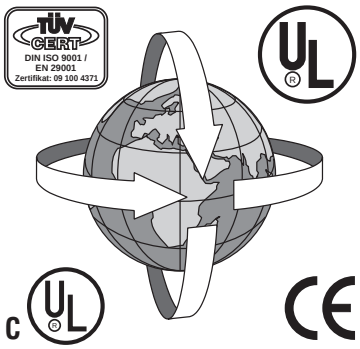
Overview of MR-J3 Features

Compliant and Safe

Complies with global industrial standards

The entire product range can be used in confidence knowing it is in conformity with overseas industrial standards.

An EMC filter (optional) is available for complying with European EMC directives. Effective EMC is only ensured if the suitable filter is selected for the particular system and installed in accordance with the Mitsubishi EMC recommendations. The MELSERVO MR-J3 devices comply with all important standards (CE, UL and cUL).



Enhanced ability to withstand environmental hazards

The HF-SP motor series are equipped with IP67 as standard enhancing their ability to withstand environmental hazards.

The HF-MP and HF-KP series meet IP65 standard protection.

Separate wiring for the control power supply

The control power supply of the servo amplifier is wired separately, ensuring diagnostics and maintenance without connecting all power connecting cables.

Compact and flexible

More compact servo motors

Mitsubishi servo motors keep getting smaller:

- Ultra low-inertia HF-MP series
- Ultra low-inertia HC-RP series (increased capacity)
- Low-inertia HF-KP series
- Medium-inertia HF-SP series

A wide variety of motors

A broad line-up of servo motors is available. Users can choose the motor series that best suits the needs of the application.

Fully Equipped

Absolute detection as standard

The MR-J3 can be easily set to absolute system, which requires no return to home, by merely adding a battery to the servo amplifier and without changing the servo motor.

Dynamic brake function

With an integrated dynamic brake, the servo motor can be stopped quickly in a power failure, emergency case or when an alarm has been triggered.

Integrated regenerative resistor

A brake resistor is already integrated in standard amplifiers, eliminating the need for external optional brake resistors or brake units.

Control signal assignment feature (MR-J3-A)

Control signals necessary for operation can be freely assigned to control terminals within a predetermined range, enabling more flexible operation.

Personal computer interface is standard

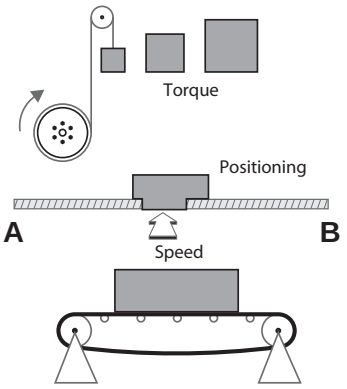
The MR-J3 comes with an integrated RS-422 and USB serial interface as standard equipment, enabling users to connect a personal computer to the MR-J3 to perform setup diagnostics and maintenance by MR-Configurator. This powerful software tool contains numerous support functions for optimisating and analysing the servo system:

- Software oscilloscope
- Machine analyser for detecting mechanical resonance points
- Control signal monitoring
- Encoder and servo system diagnostics
- Versatile test functions
- Gain search wizard for manual tuning and many further useful functionalities

Special Features

Model adaptive control

As the MR-J3 operates in quick response to commands, it offers highly responsive and stable operation, unaffected by machine systems.



Automatic servo motor recognition

Once the encoder cable has been connected, the servo amplifier can determine, as soon as its power is turned ON, which servo motor is connected.

When the servo amplifier detects a mismatch, an alarm is triggered, eliminating the possibility of an error and the need for setting parameters.

Encoder serial communications

The encoder uses serial communications, so there are fewer signal wires to connect.

Real-Time Auto-Tuning (RTAT)

The servo performs automatic gain adjustments even when the load changes.

Control Functions with Enhanced Tuning Technology

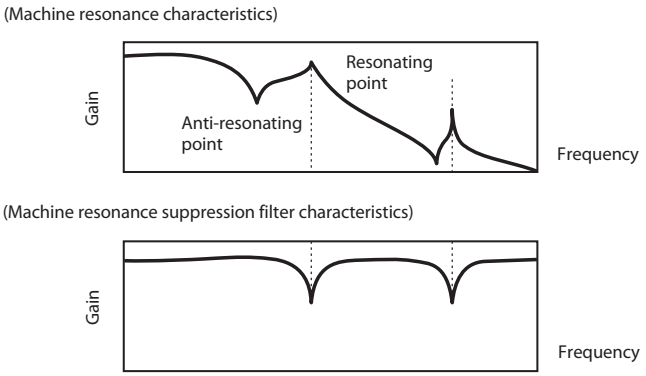
Real-Time Auto-Tuning (RTAT) and Model Adaptive Control

The powerful Auto Tuning function automatically and periodically adjusts all parameters of position, speed and current controller in the background during operation.

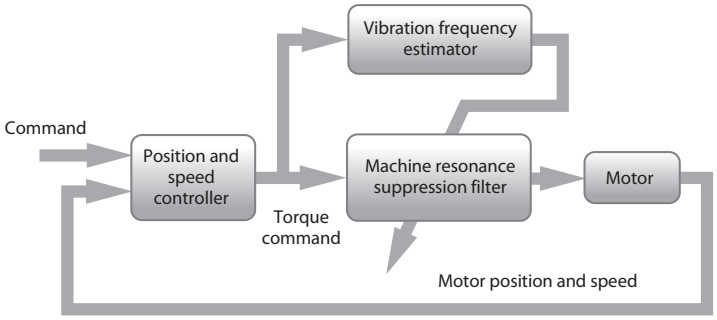
The controller concept is unique due to separate control loops for compensation of control deviations caused by disturbances or changing command values. Therefore manual controller adjustment is not required.

Adaptive Vibration Suppression and Mechanical Resonance Suppression Function

Mechanical constructions often have inherit resonance points in an upper frequency range of several hundred Hertz. Increased control gain settings of servo controller loops can cause to instable operation due to generation of oscillations and vibrations.



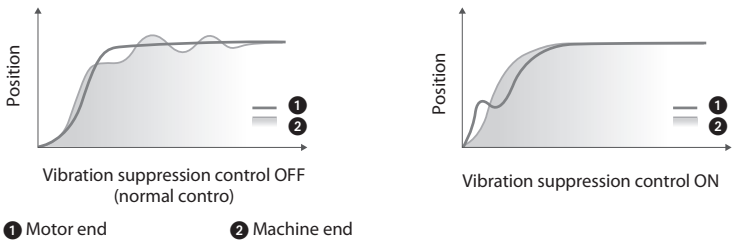
The automatic compensation of mechanical resonances is realised by a socalled Adaptive Filter II. This filter is implemented as a notch filter, detects resonance frequencies and reduces the controller settings (gains) within a certain bandwith of the resonance point.



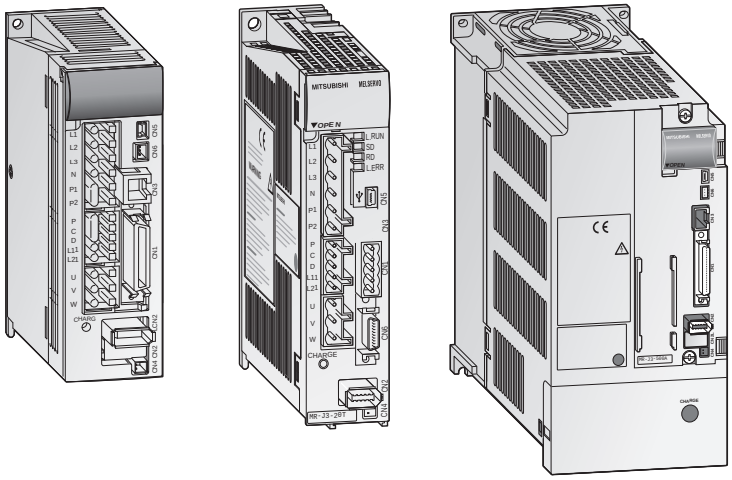
Advanced Vibration Suppression

Advanced Vibration Suppression control is designed to eliminate residual vibrations at the settling time during positioning operation.

The basic control method is to use a mechanical vibration model from command model in order to generate a motion pattern that prevent large overshoot during settling time of positioning operation and so avoid any vibrations.



Servo Amplifiers Model Designation



Servo Amplifiers 200 V

MR-J3 - □ A

Series
MR-J3

Code	Compatible servo motors		
	HF-MP □	HF-KP □	HF-SP □
10	053 / 13	053 / 13	—
20	23	23	—
40	43	43	—
60	—	—	52
70	73	73	—
100	—	—	102
200	—	—	152 / 202
350	—	—	352
500	—	—	502
700	—	—	702

Code	Type
A	Standard general-purpose AC servo
B	SSCNET III compatible
T	CC-Link compatible built-in positioning function

Code	Type
—	200 – 230 V AC power supply

All amplifiers conform to the following standards:
CE, UL, cUL

Servo Amplifiers 400 V

MR-J3 - □ A 4

Series
MR-J3

Code	Compatible servo motors
	HF-SP □
60	524
100	1024
200	1524 / 2024
350	3524
500	5024
700	7024

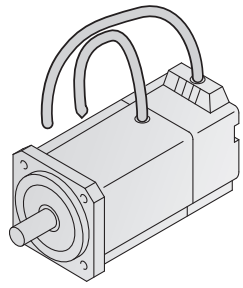
Code	Type
A	Standard general-purpose AC servo
B	SSCNET III compatible
T	CC-Link compatible built-in positioning function

Code	Type
4	380 – 480 V AC power supply

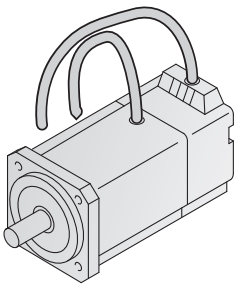
All amplifiers conform to the following standards:
CE, UL, cUL

Servo Motors Model Designation

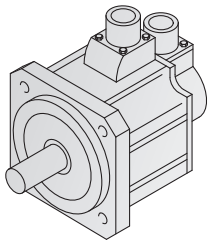
HF-MP series



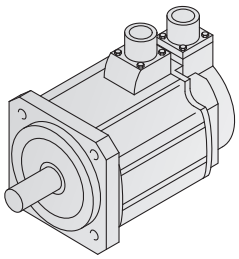
HF-KP series



HF-SP series



HC-RP series



Servo Motors 200 V

HF-KP □□□

Symbol	Motor series
HF-MP	Ultra-low inertia, small capacity
HF-KP	Low inertia, small capacity
HC-RP	Ultra-low inertia, medium capacity
HF-SP	Medium inertia, medium capacity

Code	Rated output [W]	Code	Rated output [W]	Code	Rated output [W]
05	50	5	500	20	2000
1	100	7	750	35	3500
2	200	10	1000	50	5000
4	400	15	1500	70	7000

Code	Rated speed [rpm]
1	1000
2*	2000
3	3000

Code	Electromagnetic brake
—	None
B	●

All motors conform to the following standards: CE, UL, cUL

* available on request

Example: HF-MP 05 3 B = Ultra-low inertia type with small capacity; 0.05 kW; 3000 rpm; 200 V; with electromagnetic brake

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Servo Motors 400 V

HF-SP □□4□

Symbol	Motor series
HF-SP	Medium inertia, medium capacity
HA-LP*	Medium-inertia, high capacity

* available on request

Code	Rated output [W]	Code	Rated output [W]
5	500	35	3500
10	1000	50	5000
15	1500	70	7000
20	2000		

Code	Rated speed [rpm]
2	2000

Code	
4	400 V type

Code	Electromagnetic brake
—	None
B	●

All motors conform to the following standards: CE, UL, cUL

Example: HF-SP 70 2 4B = Medium inertia type with medium capacity; 7 kW; 2000 rpm; 400 V; with electromagnetic brake

General note: **The above tables show the motor model name break-down. Not all combinations are possible. Please refer to the motor specifications table on page 12ff**

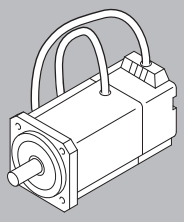
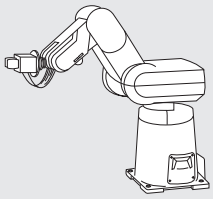
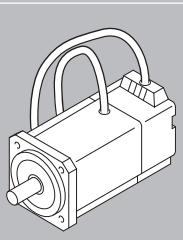
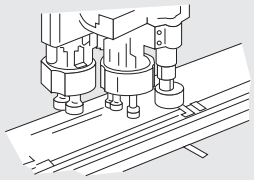
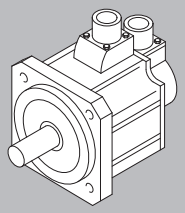
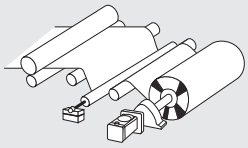
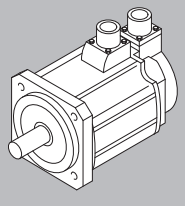
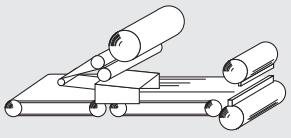
Servo Motor Features and Typical Applications

Absolute high-resolution encoder as standard equipment

Inclusion of an absolute position detection system eliminates the need for a homing sequence, approximate DOG and other sensors, helping to reduce time and enhance reliability. With these motors high performance and safety at low speed is ensured.

With Mitsubishi's original absolute mode, an absolute system can be configured using conventional I/O even with pulse-train control.

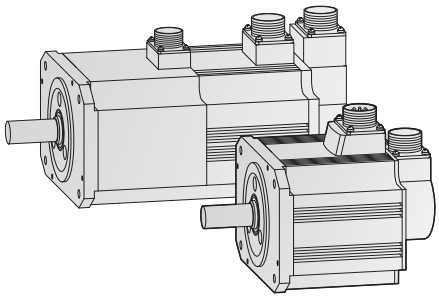
Overview

Model designation	Features	Application example	
K 	**Low inertia** Larger motor inertia moment makes this unit well suited for machines with fluctuating load inertia moment or machines with low rigidity such as conveyors.	● Conveyors ● Food preparation machinery ● Printers ● Small loaders and unloaders ● Small robots and component assembly devices ● Small X-Y tables ● Small press feeders	 Small robots
M 	**Ultra low inertia** Small motor inertia moment makes this unit well suited for high-dynamic positioning operations with extra small cycle times.	● Inserters, mounters, bonders ● Printed board hole openers ● In-circuit testers ● Label printers ● Knitting and embroidery machinery ● Ultra-small robots and robot tips	 Inserters, mounters, bonders
S 	**Medium inertia** Stable control is performed from low to high speeds, enabling this unit to handle a wide range of applications (e.g. direct connection to ball screw components).	● Conveyor machinery ● Specialised machinery ● Robots ● Loaders and unloaders ● Winders and tension devices ● Turrets ● X-Y tables ● Test devices	 Winders and tension devices
R 	**Low inertia** A compact sized low-inertia moment model with medium capacity. Well suited for high-frequency operation.	● Roll feeders ● Loaders and unloaders ● High-frequency conveyor machinery	 Wrapping machinery

Servo Motor Specifications and Matching Amplifiers

The possible combinations of servo amplifiers and servo motors are listed in the table below.

Details of the braked version motors is given on page 17. The detailed specifications of all servo motors are listed on the following pages.



200 V Servo Motors

Motor series	Rated speed [r/min]	Rated output capacity [kW]	Servo motor model	Servo motor type: Voltage	Servo motor type: Protective structure	Amplifier pairing MR-J3: 10A/B 10T	20A/B 20T	40A/B 40T	60A/B 60T	70A/B 70T	100A/B 100T	200A/B 200T	350A/B 350T	500A/B 500T	700A/B 700T	Reference page
HF-KP K	3000	0.05	HF-KP053	200 V AC	IP65	●										13
		0.1	HF-KP13			●										
		0.2	HF-KP23				●									
		0.4	HF-KP43					●								
		0.75	HF-KP73							●						
HF-MP M	3000	0.05	HF-MP053	200 V AC	IP65	●										12
		0.1	HF-MP13			●										
		0.2	HF-MP23				●									
		0.4	HF-MP43					●								
		0.75	HF-MP73							●						
HF-SP S	2000	0.5	HF-SP52	200 V AC	IP67				●							14
		1.0	HF-SP102								●					
		1.5	HF-SP152									●				
		2.0	HF-SP202									●				
		3.5	HF-SP352										●			
		5.0	HF-SP502											●		
		7.0	HF-SP702												●	
HC-RP R	3000	1.0	HC-RP103	200 V AC	IP65							●				16
		1.5	HC-RP153									●				
		2.0	HC-RP203										●			
		3.5	HC-RP353											●		
		5.0	HC-RP503												●	

Note: Further motor types are available on request.

400 V Servo Motors

Motor series 400 V	Rated speed [r/min]	Rated output capacity [kW]	Servo motor model	Servo motor type: Voltage	Servo motor type: Protective structure	Amplifier pairing MR-J3: —	—	—	60A4/B4 60T	—	100A4/B4 100T/T4	200A4/B4 200T/T4	350A4/B4 350T/T4	500A4/B4 500T/T4	700A4/B4 700T/T4	Reference page
HF-SP S	2000	0.5	HF-SP524	400 V AC	IP67				●							15
		1.0	HF-SP1024								●					
		1.5	HF-SP1524									●				
		2.0	HF-SP2024									●				
		3.5	HF-SP3524										●			
		5.0	HF-SP5024											●		
		7.0	HF-SP7024												●	

Note: Further motor types are available on request.

■ HF-MP (B) Series Servo Motor Specifications (200 V Type)

Servo motor model		HF-MP053 (B) ⑥	HF-MP13 (B) ⑥	HF-MP23(B) ⑥	HF-MP43 (B) ⑥	HF-MP73(B) ⑥
Servo amplifier model		MR-J3-10A/B/T	MR-J3-10A/B/T	MR-J3-20A/B/T	MR-J3-40A/B/T	MR-J3-70A/B/T
Power facility capacity [kVA] ①		0.3	0.3	0.5	0.9	1.3
Continuous characteristics	rated output [W]	50	100	200	400	750
	rated torque [Nm]	0.16	0.32	0.64	1.3	2.4
Maximum torque [Nm]		0.48	0.95	1.9	3.8	7.2
Rated rotation speed [rpm]		3000	3000	3000	3000	3000
Maximum rotation speed [rpm]		6000	6000	6000	6000	6000
Permissible instantaneous rotation speed		6900	6900	6900	6900	6900
Power rate at continuous speed [kW/s]		13.3	31.7	46.1	111.6	95.5
Rated current [A]		1.1	0.9	1.6	2.7	5.6
Maximum current [A]		3.2	2.8	5.0	8.6	16.7
Moment of inertia J [$\times 10^{-4}$ kg m^2] ②	standard	0.019	0.032	0.088	0.15	0.60
	with electromagnetic brake	0.025	0.039	0.12	0.18	0.70
Regeneration braking frequency [1/min]		② (a)	② (b)	1570	920	420
Recommended load/ motor inertia ratio		Less than 30 times the servo motors inertia moment ③				
Speed/ position detector		18-bit encoder (resolution per encoder/servo motor rotation: 262144 p/rev.				
Structure		Totally enclosed, non-ventilated (protection rating: IP65) ④				
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)				
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)				
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust				
	elevation/ vibration ⑤	1000 m or less above sea level; X: 49 m/s^2, Y: 49 m/s^2				
Weight [kg]	standard motor ⑥	0.35	0.56	0.94	1.5	2.9
Order information	(without brake) Art. no.	161515	161516	161517	161518	161519

① The power facility capacity varies depending on the power supply's impedance.

② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.

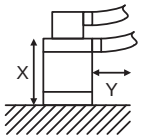
(a)/(b) When a motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range. When a motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load inertia moment is (a) 26-fold (b) 15-fold or less and the effective torque is within the rated torque range.

③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table

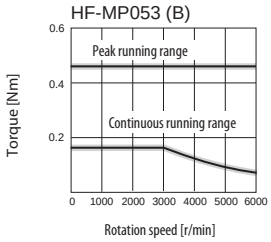
④ The shaft-through portion is excluded.

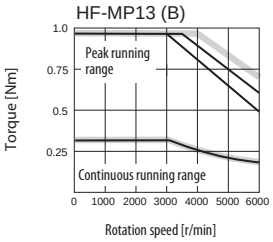
⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

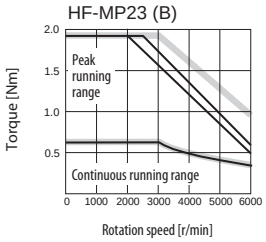
⑥ For servo motors with electromagnetic brake please refer to page 17.

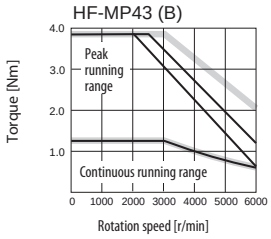


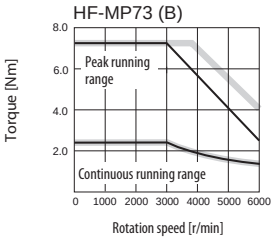
HF-MP Series Servo Motor Torque Characteristics











Notes:
1. : For 3-phase 200VAC or 1-phase 230VAC.
2. : For 1-phase 200VAC.

■ HF-KP (B) Series Servo Motor Specifications (200 V Type)

Servo motor model		HF-KP053 (B) ⑥	HF-KP13 (B) ⑥	HF-KP23(B) ⑥	HF-KP43 (B) ⑥	HF-KP73(B) ⑥
Servo amplifier model		MR-J3-10A/B/T	MR-J3-10A/B/T	MR-J3-20A/B/T	MR-J3-40A/B/T	MR-J3-70A/B/T
Power facility capacity [kVA] ①		0.3	0.3	0.5	0.9	1.3
Continuous characteristics	rated output [W]	50	100	200	400	750
	rated torque [Nm]	0.16	0.32	0.64	1.3	2.4
Maximum torque [Nm]		0.48	0.95	1.9	3.8	7.2
Rated rotation speed [rpm]		3000	3000	3000	3000	3000
Maximum rotation speed [rpm]		6000	6000	6000	6000	6000
Permissible instantaneous rotation speed		6900	6900	6900	6900	6900
Power rate at continuous speed [kW/s]		4.87	11.5	16.9	38.6	39.9
Rated current [A]		0.9	0.8	1.4	2.7	5.2
Maximum current [A]		2.7	2.4	4.2	8.1	15.6
Moment of inertia J [$\times 10^{-4}$ kg m^2] ②	standard	0.052	0.088	0.24	0.42	1.43
	with electromagnetic brake	0.054	0.090	0.31	0.50	1.63
Regeneration braking frequency [1/min]		② (a)	② (b)	448	249	140
Recommended load/ motor inertia ratio		Less than 30 times the servo motors inertia moment ③				
Speed/ position detector		18-bit encoder (resolution per encoder/servo motor rotation: 262144 p/rev.				
Structure		Totally enclosed, non-ventilated (protection rating: IP65) ④				
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)				
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)				
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust				
	elevation/vibration ⑤	1000 m or less above sea level; X: 49 m/s^2 , Y: 49 m/s^2				
Weight [kg]	standard motor ⑥	0.35	0.56	0.94	1.5	2.9
Order information	(without brake) Art. no.	161507	160211	161508	161509	161510

① The power facility capacity varies depending on the power supply's impedance.

② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.

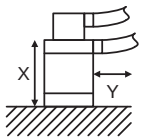
(a)/(b) When a motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range. When a motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load inertia moment is (a) 26-fold (b) 15-fold or less and the effective torque is within the rated torque range.

③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table

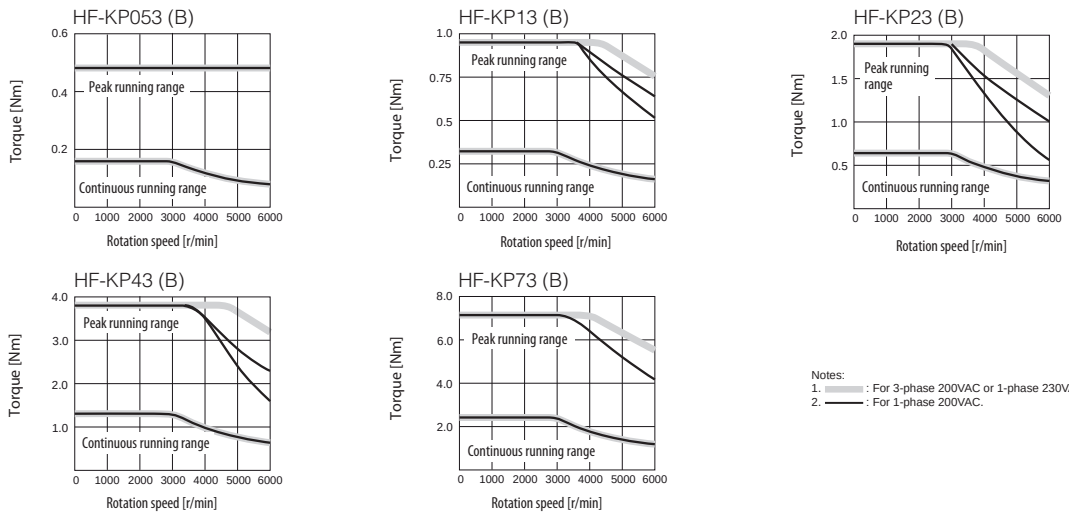
④ The shaft-through portion is excluded.

⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

⑥ For servo motors with electromagnetic brake please refer to page 17.



HF-KP Series Servo Motor Torque Characteristics



■ HF-SP Series Servo Motor Specifications (200 V Type)

Servo motor model		HF-SP52 (B) ⑥	HF-SP102 (B) ⑥	HF-SP152 (B) ⑥	HF-SP202 (B) ⑥	HF-SP352 (B) ⑥	HF-SP502 (B) ⑥	HF-MP702 (B) ⑥
Servo amplifier model		MR-J3-60A/B/T	MR-J3-100A/B/T	MR-J3-200A/B/T	MR-J3-200A/B/T	MR-J3-350A/B/T	MR-J3-500A/B/T	MR-J3-700A/B/T
Power facility capacity [kVA] ①		1.0	1.7	2.5	3.5	5.5	7.5	10
Continuous characteristics	rated output [W]	0.5	1.0	1.5	2.0	3.5	5.0	7.0
	rated torque [Nm]	2.39	4.77	7.16	9.55	16.7	23.9	33.4
Maximum torque [Nm]		7.16	14.3	21.5	28.6	50.1	71.6	100
Rated rotation speed [rpm]		2000	2000	2000	2000	2000	2000	2000
Maximum rotation speed [rpm]		3000	3000	3000	3000	3000	3000	3000
Permissible instantaneous rotation speed		3450	3450	3450	3450	3450	3450	3450
Power rate at continuous speed [kW/s]		9.34	19.2	28.8	23.8	37.2	58.8	72.5
Rated current [A]		2.9	5.3	8.0	10	16	24	33
Maximum current [A]		8.7	15.9	24	30	48	72	99
Moment of inertia J [$\times 10^{-4}$ kg m^2] ②	standard	6.1	11.9	17.8	38.3	75.0	97.0	154
	with electromagnetic brake	8.3	14.0	20.0	47.9	84.7	107	164
Regeneration braking frequency [1/min]		60	62	152	71	33	37	31
Recommended load/ motor inertia ratio		Less than 15 times the servo motors inertia moment ③						
Speed/ position detector		18-bit encoder (resolution per encoder/servo motor rotation: 262144 p/rev.						
Structure		Totally enclosed, non-ventilated (protection rating: IP67) ④						
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)						
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)						
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust						
	elevation/vibration ⑤	1000 m or less above sea level; X: 24.5 m/s^2, Y: 24.5 m/s^2			1000 m or less above sea level; X: 24.5 m/s^2, Y: 49 m/s^2		1000 m or less above sea level; X: 24.5 m/s^2, Y: 29.4 m/s^2	
Weight [kg]	standard motor ⑥	4.8	6.5	8.3	12	19	22	32
Order information	(without brake) Art. no.	161525	161526	161527	161528	161529	161530	161531

① The power facility capacity varies depending on the power supply's impedance.

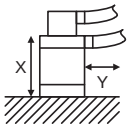
② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.

③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table

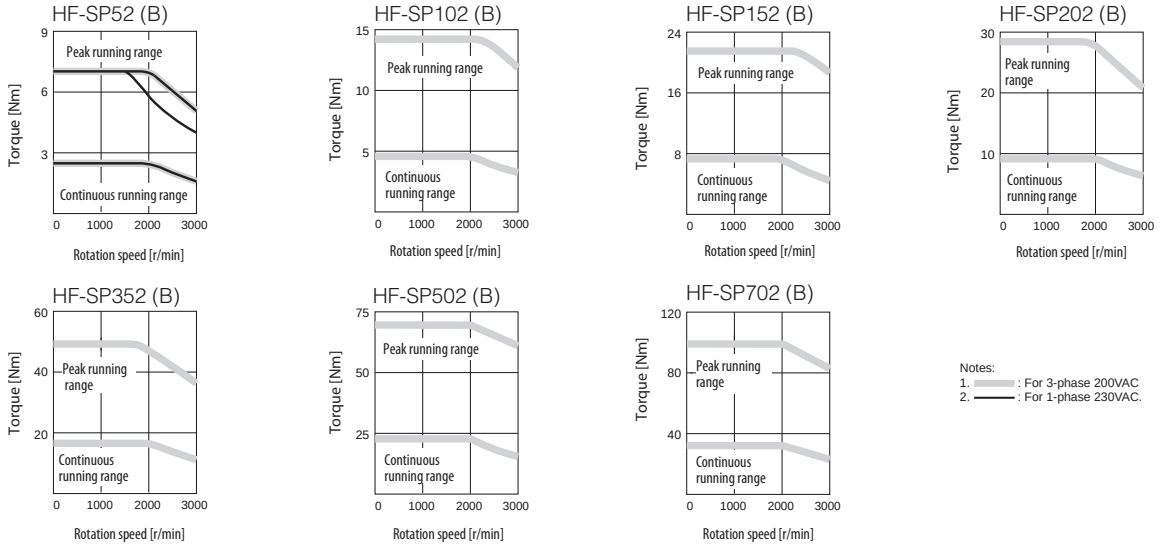
④ The shaft-through portion is excluded.

⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

⑥ For servo motors with electromagnetic brake please refer to page 17.



HF-SP Series Servo Motor Torque Characteristics



■ HF-SP Series Servo Motor Specifications (400 V Type)

Servo motor model		HF-SP524 (B) ⑥	HF-SP1024 (B) ⑥	HF-SP1524 (B) ⑥	HF-SP2024 (B) ⑥	HF-SP3524 (B) ⑥	HF-SP5024 (B) ⑥	HF-MP7024 (B) ⑥
Servo amplifier model		MR-J3-60A4/B4	MR-J3-100A4/B4	MR-J3-200A4/B4	MR-J3-200A4/B4	MR-J3-350A4/B4	MR-J3-500A4/B4	MR-J3-700A4/B4
Power facility capacity [kVA] ①		1.0	1.7	2.5	3.5	5.5	7.5	10
Continuous characteristics	rated output [W]	0.5	1.0	1.5	2.0	3.5	5.0	7.0
	rated torque [Nm]	2.39	4.77	7.16	9.55	16.7	23.9	33.4
Maximum torque [Nm]		7.16	14.3	21.5	28.6	50.1	71.6	100
Rated rotation speed [rpm]		2000	2000	2000	2000	2000	2000	2000
Maximum rotation speed [rpm]		3000	3000	3000	3000	3000	3000	3000
Permissible instantaneous rotation speed		3450	3450	3450	3450	3450	3450	3450
Power rate at continuous speed [kW/s]		9.34	19.2	28.8	23.8	37.2	58.8	72.5
Rated current [A]		1.5	2.9	4.1	5	8.4	12	16
Maximum current [A]		4.5	8.7	12	15	25	36	48
Moment of inertia J [$\times 10^{-4}$ kg m^2] ②	standard	6.1	11.9	17.8	38.3	75.0	97.0	154
	with electromagnetic brake	8.3	14.0	20.0	47.9	84.7	107	164
Regeneration braking frequency [1/min]		90	46	154	72	37	34	28
Recommended load/ motor inertia ratio		Less than 15 times the servo motors inertia moment ③						
Speed/ position detector		18-bit encoder (resolution per encoder/servo motor rotation: 262144 p/rev.						
Structure		Totally enclosed, non-ventilated (protection rating: IP67) ④						
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)						
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)						
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust						
	elevation/vibration ⑤	1000 m or less above sea level; X: 24.5 m/s^2, Y: 24.5 m/s^2			1000 m or less above sea level; X: 24.5 m/s^2, Y: 49 m/s^2		1000 m or less above sea level; X: 24.5 m/s^2, Y: 29.4 m/s^2	
Weight [kg]	standard motor ⑥	4.8	6.7	8.5	13	19	22	32
Order information	(without brake) Art. no.	192042	192043	192054	192055	192056	192057	192058

① The power facility capacity varies depending on the power supply's impedance.

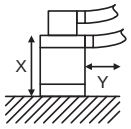
② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.

③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table

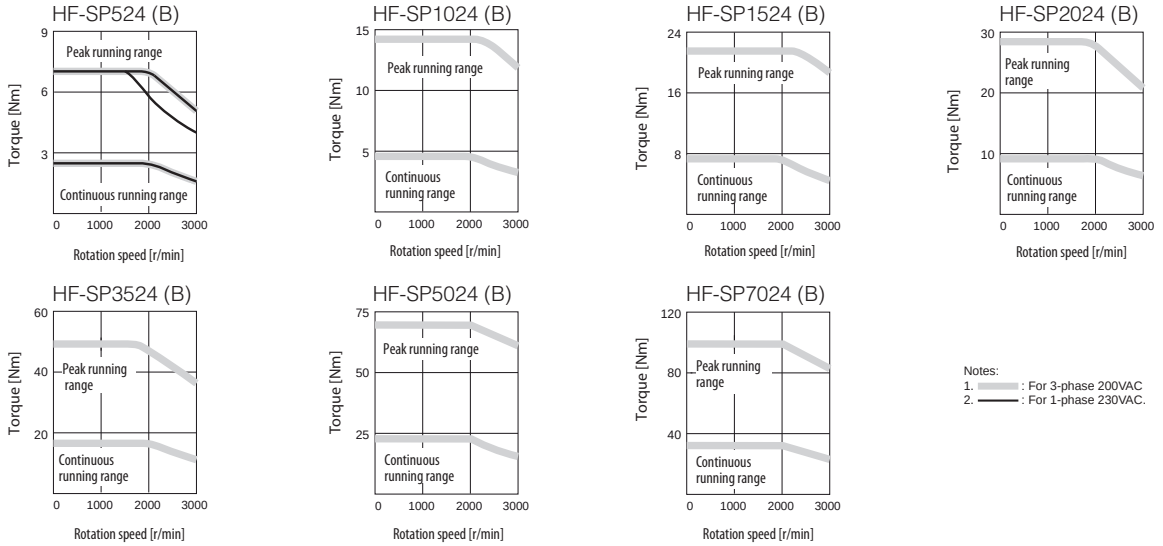
④ The shaft-through portion is excluded.

⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

⑥ For servo motors with electromagnetic brake please refer to page 17.



HF-SP Series Servo Motor Torque Characteristics



■ HC-RP Series Servo Motor Specifications (200 V Type Low Inertia)

Servo motor model		HC-RP103 (B) ⑥	HC-RP153 (B) ⑥	HC-RP203 (B) ⑥	HC-RP353 (B) ⑥	HC-RP503 (B) ⑥
Servo amplifier model		MR-J3-200A/B/T	MR-J3-200A/B/T	MR-J3-350A/B/T	MR-J3-500A/B/T	MR-J3-500A/B/T
Power facility capacity [kVA] ①		1.7	2.5	3.5	5.5	7.5
Continuous characteristics	rated output [kW]	1	1.5	2	3.5	5.0
	rated torque [Nm]	3.18	4.78	6.37	11.1	15.9
Maximum torque [Nm]		7.95	11.9	15.9	27.9	39.7
Rated rotation speed [rpm]		3000	3000	3000	3000	3000
Maximum rotation speed [rpm]		4500	4500	4500	4500	4500
Permissible instantaneous rotation speed		5175	5175	5175	5175	5175
Power rate at continuous speed [kW/s]		67.4	120	176	150	211
Rated current [A]		6.1	8.8	14	23	28
Maximum current [A]		18	23	37	58	70
Regeneration braking frequency [1/min]		1090	860	710	174	125
Moment of inertia J [$\times 10^{-4}$ kg m^2] ②		1.5	1.9	2.3	8.3	12
Recommended load/ motor inertia ratio		Less than 5 times the servo motors inertia moment ③				
Speed/ position detector		Resolution per encoder/servo motor rotation: 262144 p/rev (18-bit)				
Structure		Totally enclosed, non-ventilated (protection degree: IP65) ④				
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)				
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)				
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust				
	elevation/ vibration ⑤	1000 m or less above sea level; X: 24.5 m/s^2, Y: 24.5 m/s^2				
Weight [kg]	standard motor ⑥	3.9	5.0	6.2	12	17
Order information	(without brake) Art. no.	168667	168668	168669	168670	168671

① The power facility capacity varies depending on the power supply's impedance.

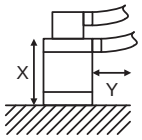
② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.

③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table

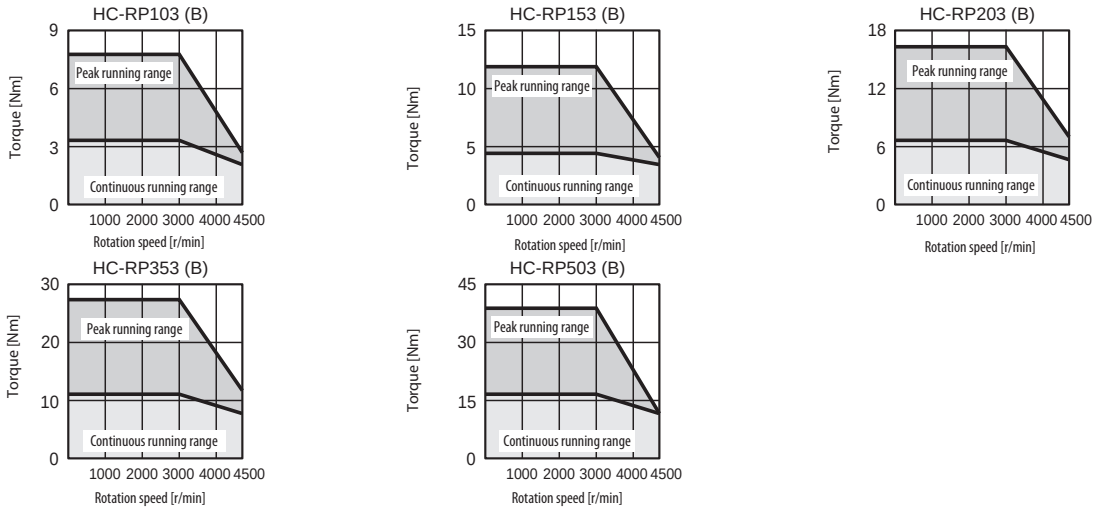
④ The shaft-through portion is excluded.

⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

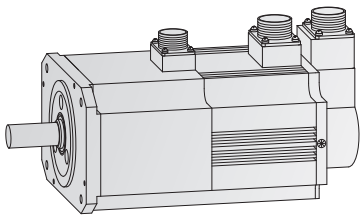
⑥ For servo motors with electromagnetic brake please refer to page 17.



HC-RP Series Servo Motor Torque Characteristics



■ Braked Motor Specifications



For applications requiring the motor shaft to be held in position (e.g. vertical lift applications), all offered motors are available with an electromagnetic brake.

The wide variety of servo motors allows the user to choose a motor suits best according to the task.

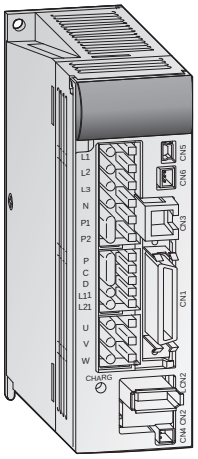
Motor model (200 V)	HF-MP					HF-KP					HF-SP							HC-RP				
	053B	13B	23B	43B	73B	053B	13B	23B	43B	73B	52B	102B	152B	202B	352B	502B	702B	103B	153B	203B	353B	503B
Type	Spring-loaded safety brake					Spring-loaded safety brake					Spring-loaded safety brake							Spring-loaded safety brake				
Rated voltage	24 V DC					24 V DC					24 V DC							24 V DC				
Static friction torque [Nm]	0.32	0.32	1.3	1.3	2.4	0.32	0.32	1.3	1.3	2.4	8.5	8.5	8.5	44	44	44	44	7	7	7	23	23
Rated current at 20 °C [A]	0.26	0.26	0.33	0.33	0.42	0.26	0.26	0.33	0.33	0.42	0.8	0.8	0.8	1.4	1.4	1.4	1.4	0.8	0.8	0.8	0.96	0.96
Coil resistance at 20 °C [Ω]	91	91	73	73	57	91	91	73	73	57	29	29	29	16.8	16.8	16.8	16.8	30	30	30	25	25
Power consumption at 20 °C [W]	6.3	6.3	7.9	7.9	10	6.3	6.3	7.9	7.9	10	20	20	20	34	34	34	34	19	19	19	23	23
Moment of inertia J [10^{-4} kg m^2] ②	0.022	0.032	0.136	0.191	0.725	0.056	0.087	0.47	0.72	1.635	8.6	15.7	22	52.5	92	111	170	1.85	2.25	2.65	11.8	15.5
Permissible braking volume per revolution [Nm]	5.6	5.6	22	22	64	5.6	5.6	22	22	64	400	400	400	4500	4500	4500	4500	400	400	400	400	400
Permissible braking volume per hour [Nm]	56	56	220	220	640	56	56	220	220	640	4000	4000	4000	45000	45000	45000	45000	4000	4000	4000	4000	4000
Brake life [h] ③	20000					20000					20000							20000				
Brake volume per brake action [Nm]	4	4	15	15	32	4	4	15	15	32	200	200	200	1000	1000	1000	1000	200	200	200	200	200
Weight [kg] ①	0.75	0.89	1.6	2.1	4.0	0.75	0.86	1.6	2.1	4.0	7	9	11	18	25	29	38	6	7	8.3	15	21
Order information Art. no.	161520	161521	161522	161523	161524	160213	161511	161512	161513	161514	161532	161533	161534	161535	161536	161537	161538	168644	168645	168664	168665	168666

① Total mass of motor with electromagnetic brake ② Total moment of inertia of motor with electromagnetic brake ③ Brake gap cannot be adjusted.

Motor model (400 V)	HF-SP						
	524B	1024B	1524B	2024B	3524B	5024B	7024B
Type	Spring-loaded safety brake						
Rated voltage	24 V DC						
Static friction torque [Nm]	8.5	8.5	8.5	44	44	44	44
Rated current at 20 °C [A]	0.8	0.8	0.8	1.4	1.4	1.4	1.4
Coil resistance at 20 °C [Ω]	29	29	29	16.8	16.8	16.8	16.8
Power consumption at 20 °C [W]	20	20	20	34	34	34	34
Moment of inertia J [10^{-4} kg m^2] ②	8.6	15.7	22	52.5	92	111	170
Permissible braking volume per revolution [Nm]	400	400	400	4500	4500	4500	4500
Permissible braking volume per hour [Nm]	4000	4000	4000	45000	45000	45000	45000
Brake life [h] ③	20000						
Brake volume per brake action [Nm]	200	200	200	1000	1000	1000	1000
Weight [kg] ①	7	9	11	18	25	29	38
Order information Art. no.	200975	200976	200977	200978	200979	200980	200981

① Total mass of motor with electromagnetic brake
② Total moment of inertia of motor with electromagnetic brake
③ Brake gap cannot be adjusted.

■ MR-J3 Servo Amplifier Specifications (200 V Type)



The **MR-J3-A** are general purpose servo amplifiers with analog inputs and pulse train interface as a standard. The range covers 100 W units (MR-J3-10A) up to 7 kW (MR-J3-700A).

The **MR-J3-B** (SSCNET III bus type) servo amplifiers are designed for use with the Mitsubishi motion controllers of the MELSEC System Q series. The motion controllers and servo amplifiers can be linked via the high speed SSCNET III network.

Connecting the amplifiers to SSCNET III guarantees reliable operation and eliminates the need for complex wiring.

The range also covers 100 W units (MR-J3-10B) up to 7 kW (MR-J3-700B). MR-J3-A/B servo amplifers of increased capacity (up to 55 kW) are availible on request only.

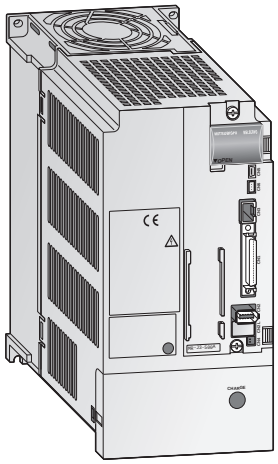
Common specifications MR-J3-A/B		10A 10B	20A 20B	40A 40B	60A 60B	70A 70B	100A 100B	200A 200B	350A 350B	500A 500B	700A 700B
Power supply	voltage / frequency ①	3-phase 200 – 230 V AC, 50 / 60 Hz; 1-phase 230 V AC, 50 / 60 Hz					3-phase 200 – 230 V AC, 50 / 60 Hz				
	permissible voltage fluctuation	3-phase 200 – 230 V AC: 170 – 253 V AC, 1-phase 230 V AC: 207 – 253 V AC					3-phase 170 – 253 V AC				
	permissible frequency fluctuation	± 5 %									
Control system		Sinusoidal PWM control / current control system									
Dynamic brake		Built-in									
Speed frequency response		900Hz									
Protective functions		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage / sudden power outage protection, overspeed protection, excess error protection.									
Structure		Self-cooling, open (IP00)			Fan-cooling, open (IP00)						
Environment	ambient temperature	Operation: 0 – 55 °C (no freezing), storage: -20 – 65 °C (no freezing)									
	ambient humidity	Operation: 90 % RH max. (no condensation), storage: 90 % RH max. (no condensation)									
	atmosphere	Inside control panel; no corrosive gas, no flammable gas, no oil mist, no dust									
	elevation	1000 m or less above sea level									
	oscillation	5.9 m/s² (0.6 G) max.									
Weight [kg]		0.8	0.8	1.0	1.0	1.4	1.4	2.3	2.3	4.6	6.2
Dimensions (W x H x D)		40x168x135	40x168x135	40x168x170	40x168x170	60x168x185	60x168x185	90x168x195	90x168x195	130x250x200	172x300x200
Order information											
A type	Art. no.	160210	161485	161486	161487	161488	161489	161490	161491	161492	161493
B type	Art. no.	161497	161498	161499	161500	161501	161502	161503	161504	161505	161506

① Rated output capacity and rated rotation speed of the servo motor used in combination with the servo amplifier are as indicated when using the power voltage and frequency listed. Output and speed cannot be guaranteed when the power supply voltage is less than specified.

Control specifications MR-J3-A		10A	20A	40A	60A	70A	100A	200A	350A	500A	700A
Position control mode	maximum input pulse frequency	1000 kpps (when using differential receiver), 200 kpps (when using open collector)									
	positioning feedback pulse	Resolution per encoder / servo motor rotation (262144 pulses/revolution)									
	command pulse multiple	Electronic gear A/B multiple; A: 1 – 1048576, B: 1 – 1048576, 1/10 < A/B < 2000									
	positioning complete width setting	0 – ±10000 Impulse (command pulse unit)									
	excess error	±3 rotations (position control)									
	torque limit input	Set by parameters or external analog input (0 – + 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 – ± 10 V DC / rated speed									
	speed fluctuation rate	±0.01 % max. (load fluctuation 0 – 100 %); 0 % (power fluctuation ±10 %) ±0.2 % max. (ambient temperature 25 °C ±10 °C), when using external analog speed command									
	torque limit	Set by parameters or external analog input (0 – +10 V DC / maximum torque)									
Torque control specifications	torque command input	0 – ±8 V DC / maximum torque (input impedance 10 to 12 kΩ)									
	speed limit	Set by parameters or external analog input (0 – ± 10 V DC, rated speed)									

Control specifications MR-J3-B (SSCNET III)	10B	20B	40B	60B	70B	100B	200B	350B	500B	700B
Position and speed control	SSCNET III control									
Comunication speed	50 Mbps									

■ MR-J3 Servo Amplifier Specifications (400 V Type)



Mitsubishi's 400 V range of servo amplifiers provides the same industry leading functionality as the 200 V range.

The 400 V servo amplifiers are available over a wide range from 600 W rating to the very powerful 55 kW rating. Suitable for all types of automation solutions, the 400 V servo amplifiers also provide sink/source logic selectability.

For amplifiers larger than 7 kW please contact your nearest Mitsubishi represantative. MR-J3-A/B servo amplifers of increased capacity (up to 55 kW) are availible on request only.

Common specifications MR-J3-A4/B4		60A4 60B4	100A4 100B4	200A4 200B4	350A4 350B4	500A4 500B4	700A4 700B4	11KA4 11KB4	15KA4 15KB4	22KA4 22KB4
Power supply	voltage /frequency ①	3-phase 380 – 480 V AC, 50 / 60 Hz ②								
	permissible voltage fluctuation	3-phase 323 – 528 V AC, 50/60 Hz								
	permissible frequency fluctuation	± 5 % max.								
Control system		Sinusoidal PWM control / current control system								
Dynamic brake		Built-in						External option		
Speed frequency response		900 Hz								
Protective functions		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage / sudden power outage protection, overspeed protection, excess error protection.								
Structure		Self-cooling, open (IP00)		Fan cooling						
Environment	ambient temperature	Operation: 0 – 55 °C (no freezing), storage: -20 – 65 °C (no freezing)								
	ambient humidity	Operation: 90 % RH max. (no condensation), storage: 90 % RH max. (no condensation)								
	atmosphere	Inside control panel; no corrossive gas, no flammable gas, no oil mist, no dust								
	elevation	1000 m or less above sea level								
	oscillation	5.9 m/s² (0.6 G) max.								
Weight [kg]		1.7	1.7	2.1	4.6	4.6	6.2	18	18	19
Dimensions (W x H x D)		90x168x195	90x168x195	90x168x195	130x250x200	130x250x200	180x350x200	260x400x260	260x400x260	260x400x260
Order information										
A type	Art. no.	205081	205082	205083	205084	205085	205086	on request	on request	on request
B type	Art. no.	192036	192037	192038	192039	192040	192041	on request	on request	on request

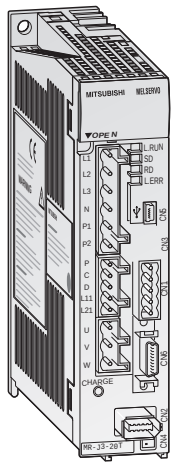
① Rated output capacity and rated rotation speed of the servo motor used in combination with the servo amplifier are as indicated when using the power voltage and frequency listed. Output and speed cannot be guaranteed when the power supply voltage is less than specified.

② For torque characteristics when combined with a servo motor manual.

Control specifications MR-J3-A4		60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4
Position control mode	maximum input pulse frequency	1 Mpps (when using differential receiver), 200 kpps (when using open collector)								
	positioning feedback pulse	Resolution per encoder / servo motor rotation (262144 pulses/revolution)								
	command pulse multiple	Electronic gear A/B multiple; A: 1 – 1048576 or 131072, B: 1 – 1048576, 1/10 < A/B < 2000								
	positioning complete width setting	0 – ±10000 Impulse (command pulse unit)								
	excess error	±3 rotations (position control)								
	torque limit input	Set by parameters or external analog input (0 – + 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 – ± 10 V DC / rated speed								
	speed fluctuation rate	±0.01 % max. (load fluctuation 0 – 100 %); 0 % (power fluctuation ±10 %) ±0.2 % max. (ambient temperature 25 °C ±10 °C), when using external analog speed command								
	torque limit	Set by parameters or external analog input (0 – +10 V DC / maximum torque)								
Torque control specifications	torque command input	0 – ±8 V DC / maximum torque (input impedance 10 to 12 kΩ)								
	speed limit	Set by parameters or external analog input (0 – +10 V DC, rated speed)								

Control specifications MR-J3-B4 (SSCNET III)	60B4	100B4	200B4	350B4	500B4	700B4	11KB4	15KB4	22KB4
Position and speed control	SSCNET III control								
Comunication speed	50 Mbps								

■ MR-J3-T Servo Amplifier Specifications



The MR-J3-T servo amplifiers are a further development of MR-J3-A. In addition to the features of the MELSERVO series these amplifiers have an integrated positioning controller for one axis.

Point to point positioning operation can be performed just by setting position data (target positions), servo motor speeds, and acceleration/deceleration time constant, etc. in the point tables as if setting them in parameters. An additional highlight of the servo amplifier MR-J3-T is the "**turret function**". Main focus of this function is positioning on different stations, which are equally placed on a circle.
Typical applications are:

- Tool changer
- Rotary table systems

CC-Link interface can be also used for transmitting positioning data to the amplifier without using the internal point table. Hence centralised data management inside of a machine control can be realised, too.

For simple servo application without any fieldbus components internal point table entries can be activated by serial RS-422 communication.

The table below provides an overview of all the MR-J3-T of servo amplifiers and their special features compared to the MR-J3-A.

MR-J3-T (200 V type)		10T	20T	40T	60T	70T	100T	200T	350T	500T	700T
Main circuit power supply	voltage/frequency ①	3-phase 200 – 230 V AC, 50 / 60 Hz; 1-phase 230 V AC, 50 / 60 Hz					3-phase 200 – 230 V AC, 50 / 60 Hz				
	perm. voltage fluctuation	3-phase 200 – 230 V AC: 170 – 253 V AC, 1-phase 230 V AC: 207 – 253 V AC					3-phase 170 – 253 V AC				
	perm. frequency fluctuation	± 5 %									
Control circuit power supply	voltage/frequency	1-phase 200 – 230 V AC, 50 / 60 Hz					1-phase 200 – 230 V AC, 50 / 60 Hz				
	perm. voltage fluctuation	1-phase 170 – 253 V AC, 50 / 60 Hz									
	perm. frequency fluctuation	± 5 %									
Regenerative brake resistor/ tolerable regenerative power [W] ②		—	10	10	10	20	20	100	100	130	170
Weight [kg]		0.8	0.8	1.0	1.0	1.4	1.4	2.3	2.3	4.6	6.2
Order information	Art. no.	190647	190648	190649	190650	190651	190652	190653	190654	190655	190656

MR-J3-T (400 V type)		60T4	100T4	200T4	350T4	500T4	700T4
Main circuit power supply	voltage/frequency ①	3-phase 380 – 480 V AC, 50 / 60 Hz					
	perm. voltage fluctuation	3-phase 323 – 528 V AC					
	perm. frequency fluctuation	± 5 %					
Control circuit power supply	voltage/frequency	1-phase 380 – 480 V AC, 50 / 60 Hz					
	perm. voltage fluctuation	1-phase 323 – 528 V AC, 50 / 60 Hz					
	perm. frequency fluctuation	± 5 %					
Regenerative brake resistor/ tolerable regenerative power [W] ②		15	15	100	100	130 ⑥	170 ⑥
Weight [kg]		1.7	1.7	2.1	4.6	4.6	6.2
Order information	Art. no.	212524	212525	212526	212527	212528	212529

MR-J3-T General specifications		
Interface power supply		24 V DC ± 10 % (required current capacity: 150 mA) ③
Control system		Sine-wave PWM control, current control system
Dynamic brake		Built-in ④
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal relay), servo motor overheat protection, encoder error protection, regenerative brake error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection
Cooling/protection		MR-J3-10T–60T; MR-J3-60T4–MR-J3-100T4: Self-cooling, open (IP00); MR-J3-70T–700T, MR-J3-200T4–700T4: Fan cooling, open (IP00)
Environment	ambient temperature ⑤	Operation: 0 – 55 °C (no freezing), storage: -20 – 65 °C (no freezing)
	ambient humidity	Operation: 90 % RH max. (no condensation), storage: 90 % RH max. (no condensation)
	atmosphere	Inside control panel; no corrossive gas, no flammable gas, no oil mist, no dust
	elevation	1000 m or less above sea level
	vibration	5.9 m/s² (0.6 G) max.

① Rated output capacity and rated rotation speed of the servo motor used in combination with the servo amplifier are as indicated when using the power voltage and frequency listed. Torque and speed cannot be guaranteed when the power supply voltage is less than specified.

② Optimal brake resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.

③ 150 mA is the value when all of the input/output points are used. The current capacity can be stepped down according to the number of input/output points in use.
Refer to the MR-J3 servo instruction manual for details.

④ Special specification models without a dynamic brake are available on request.

⑤ The MR-J3-350T or smaller servo amplifier can be installed closely. In this case, keep the ambient temperature within 0 to 40 °C or use the servo amplifier with 75 % or less of the effective load rate.

⑥ The amplifier built-in resistor is compatible with the maximum torque deceleration when the motor is used within the rated speedand the recommended load/motor inertia moment ratio.

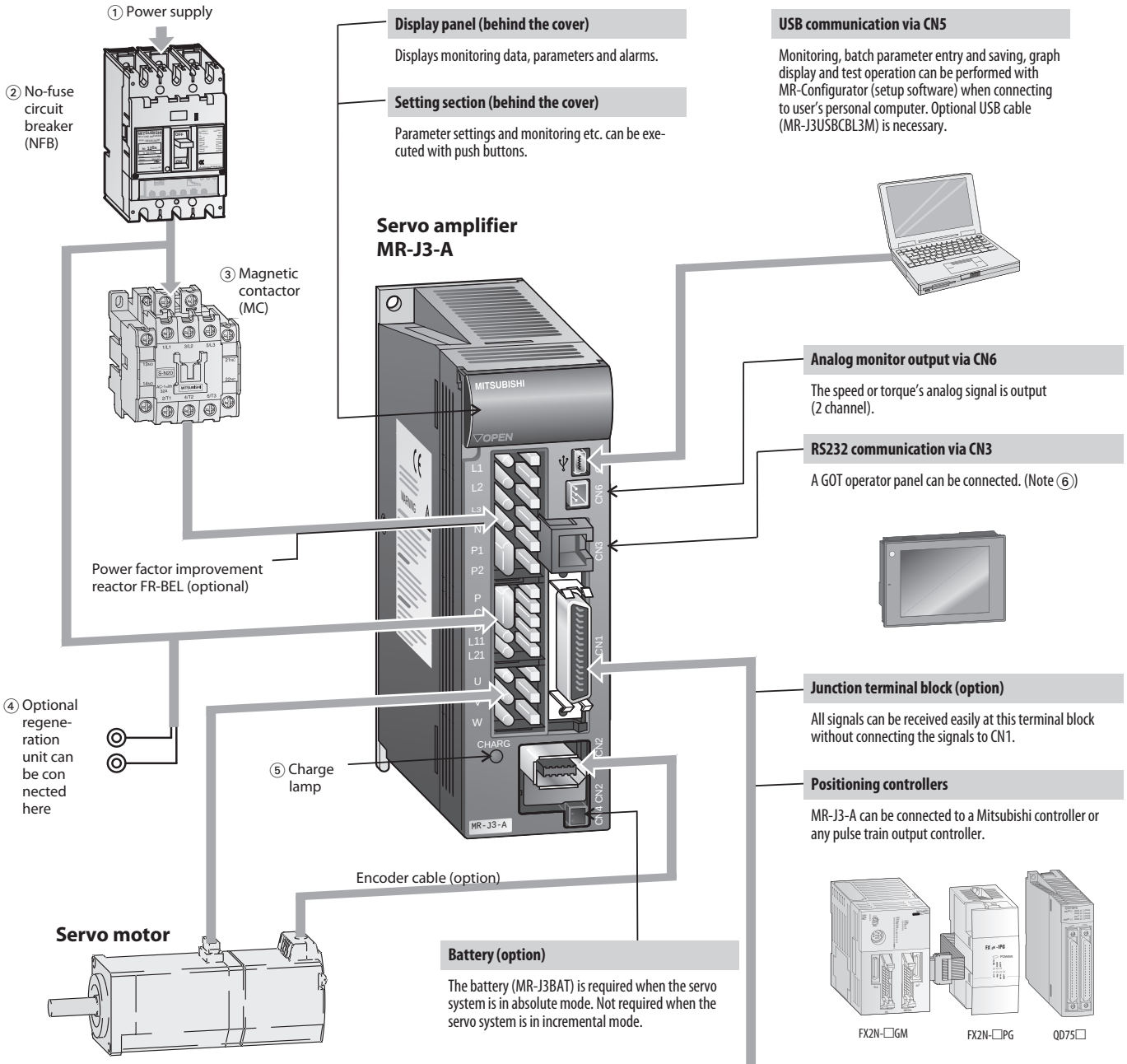
■ Overview of MR-J3-T Commands and Operation Modes

Servo amplifier model MR-J3-T		
Command interface		CC-Link communication (Ver.1.10), DIO command (extension IO unit MR-J3-D01 is required), or RS-422 communication
Command control	Remote register	Possible with CC-Link communication when 2 stations are occupied. Position command input: position command data is set with the remote register; Feed length input setting range at 1 point: ±1 [μm] to ±999.999 [mm]; Speed command input: speed command data (rotating speed) is set with the remote register.
	Point table no. input	Possible with CC-Link communication, DIO command or RS-422 communication. CC-Link communication (when 1 station occupied): 31 points; CC-Link communication (when 2 stations occupied): 255 points; DIO command: 255 points (extension IO unit MR-J3-D01 is required.); RS-422 communication: 255 points; Position command input: selects from the point table; Feed length input setting range at 1 point: ±1 [μm] to ±999.999 [mm]; Speed command input: selects speed and acceleration/deceleration time constant from the point table.
	Station position command input	Possible with CC-Link communication, DIO command or RS-422 communication. CC-Link communication (when 1 station occupied): 31 stations; CC-Link communication (when 2 stations occupied): 255 stations; DIO command: 255 stations (extension IO unit MR-J3-D01 is required.); RS-422 communication: 255 stations
	Speed command input with remote register	Possible with CC-Link communication when 2 stations occupied. Sets speed command data (rotating speed) with the remote register.
	Speed command input with speed no. input	Selects speed and acceleration/deceleration time constant from the point table.
Automatic operation mode	Point table	Point table no. input or point table data input system. Each positioning operation based on position and speed data. Speed changing operation (2 to 255 speeds). Automatic continuous positioning operation (2 to 255 points). Roll feed display is selectable. Clearing droop pulses with the clear (CR) signal is settable.
	Rotating direction specified	Positions to the specified station. Rotating direction is settable.
	Shortest rotating direction	Positions to the specified station. Shorter rotating direction from the current point is selected.
Manual operation mode	JOG operation	Inches upon contact input, CC-Link communication or RS-422 communication based on speed data set by a parameter
	Index JOG operation	Rotates in a direction specified by rotating direction evaluation when the start signal (ST1) turns ON. Positions to a nearest station where deceleration to a stop is possible when the start signal (ST1) turns OFF.
	Manual pulse generator	Manual feed with the manual pulse generator. Command pulse multiplication: 1, 10, 100 is selectable with parameter
Manual home position return mode	DOG type	Home position return is made starting with Z-phase pulse after passage of proximity dog. Home position address may be set. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.
	Count type	Home position return is made by counting encoder pulses after contact with proximity dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.
	Data setting type	Returns to home position without dog. Sets any position as home position using manual operation, etc. Home position address settable.
	Stopper type	Returns to home position upon hitting end of stroke. Direction for return to home position selectable. Home position address settable.
	Home position ignorance	Position where servo-on (SON) is switched on is defined as home position. Home position address may be set.
	Dog type rear end reference	Home position return is made with respect to the rear end of a proximity dog. Home position address may be set. Home position shift value may be set. Home position return direction may be set. Automatic at-dog home position return, Automatic stroke return function
	Count type front end reference	Home position return is made with respect to the front end of a proximity dog. Home position address may be set. Home position shift value may be set. Home position return direction may be set. Automatic at-dog home position return, Automatic stroke return function
	Dog cradle type	Home position return is made with respect to the front end of a proximity dog by the first Z-phase pulse. Home position address may be set. Home position shift value may be set. Home position return direction may be set. Automatic at-dog home position return, Automatic stroke return function
	Dog type adjacent Z-phase reference	Returns to home position upon the Z-phase pulse right before a near-point dog with respect to the front end of a near-point dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.
	Dog type front end reference	Returns to home position to the front end of a point dog with respect to the front end of a near-point dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function.
	Dog less Z-phase reference	Returns to home position to the first Z-phase pulse with respect to the first Z-phase pulse. Direction for return to home position selectable. Home position shift amount and home position address settable
	Dog type torque limit	Returns to home position upon Z-phase pulse count after passing through near-point dog. Direction for return to home position selectable. Home position shift amount and home position address settable. Automatic retreat on dog back to home position and automatic stroke retreat function. Torque limit settable.
	Data set type torque limit	Returns to home position without dog. Sets any position as home position by manual movement. Home position address and torque limit settable.
	Automatic positioning to home position function	High-speed automatic positioning to a defined home position

■ MR-J3-A Servo Amplifier Connections with Peripheral Equipment

Peripheral equipment is connected to the MR-J3-A as shown below. To ensure fast, efficient configuration and reliable operation always use only the connecting cables, expansion options and other accessories supplied or recommended by Mitsubishi.

A complete overview with detailed specifications on all cables and accessories can be found in the next chapter.



① Power supply

3~, 200–230 V AC
1~, 230 V AC for servo drives ≤ 750 W
3~, 400 V AC for servo drives ≥ 600 W (A4)

② No-fuse circuit breaker (NFB)

Used to protect the power supply line.

③ Magnetic contactor (MC)

Used to turn OFF the power of the servo amplifier.

④ Regeneration unit (option)

This unit can be installed in situations involving frequent regeneration and large load inertia moments. For more details refer to the MR-J3-A users manual.

⑤ Charge lamp

Lights up when the main power supply is on. **Power lines should not be plugged or unplugged when this lamp is on**.

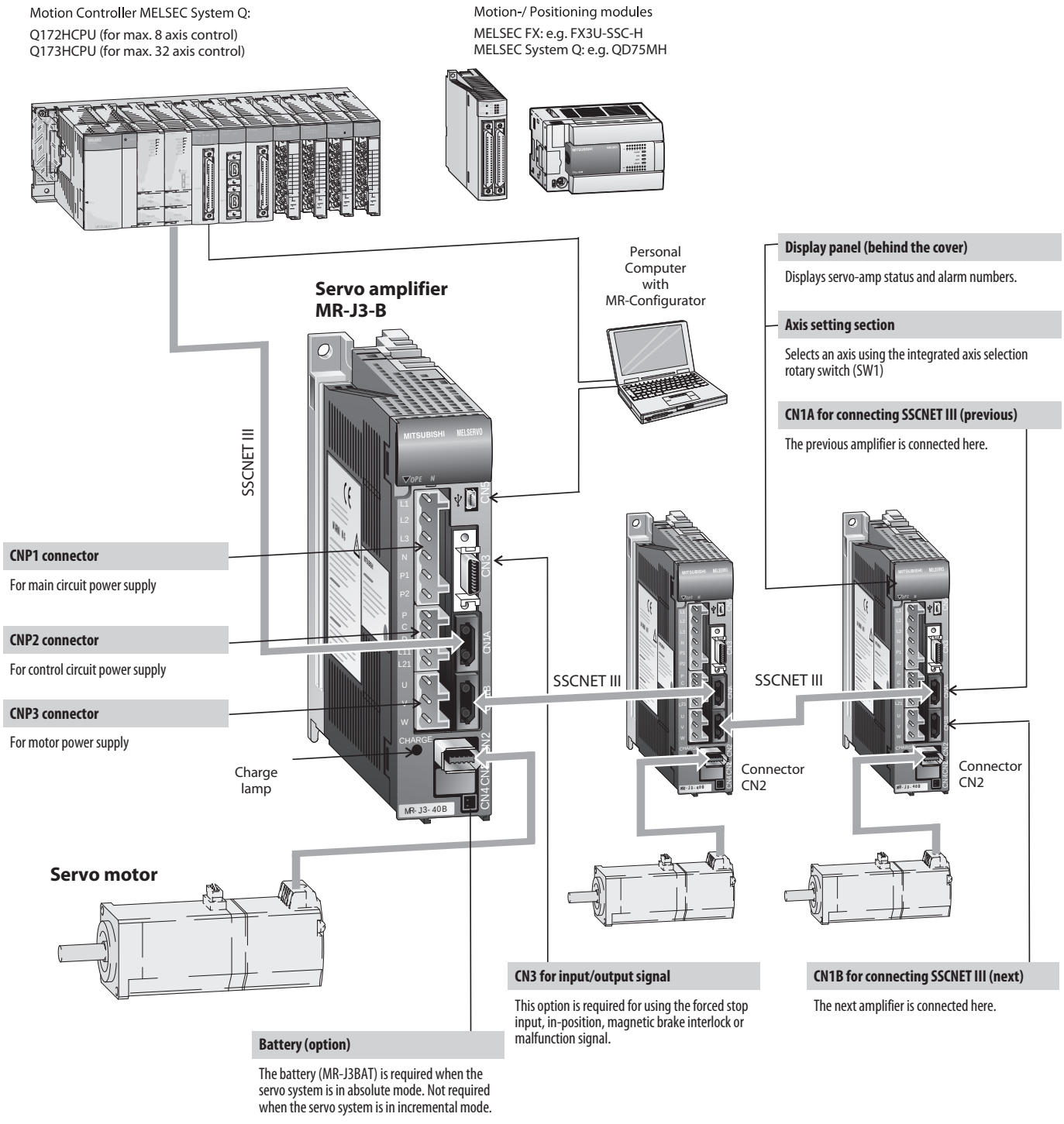
⑥ RS422 Communication

A personal computer can be connected using a RS-422/RS-232C converter and a conversion cable.

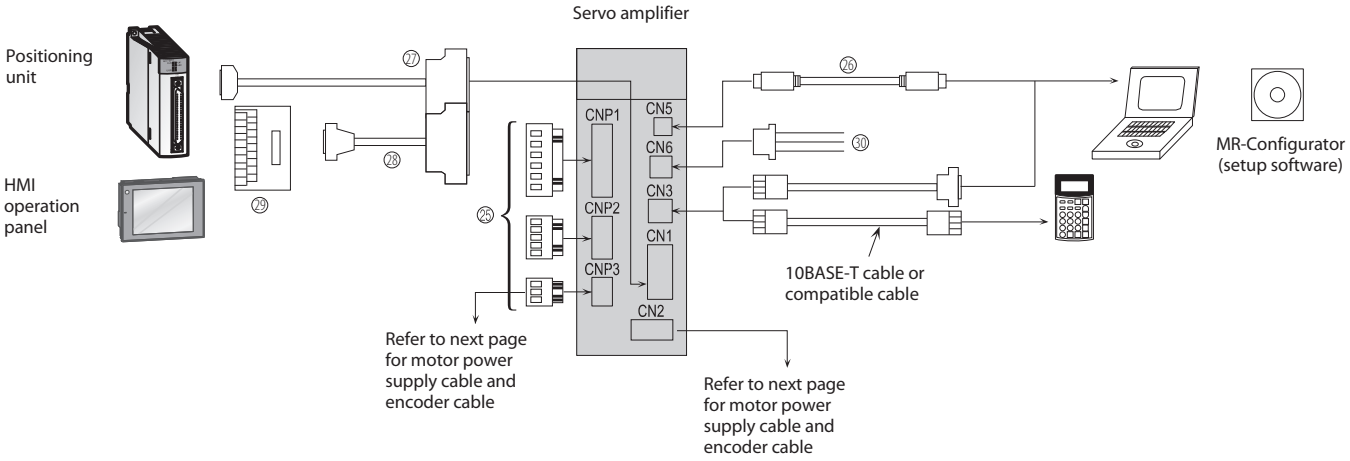
■ MR-J3-B Servo Amplifier Connections with Peripheral Equipment

Peripheral equipment is connected to the MR-J3-B as shown below. Connectors, cables, options, and other necessary equipment are available so that users can set up MR-J3-B easily and begin using it right away. Through its SSCNET III-compatible simple connections (optical fibre bus, 50 Mbps), the MR-J3-B series reduce wiring time and chances of wiring errors.

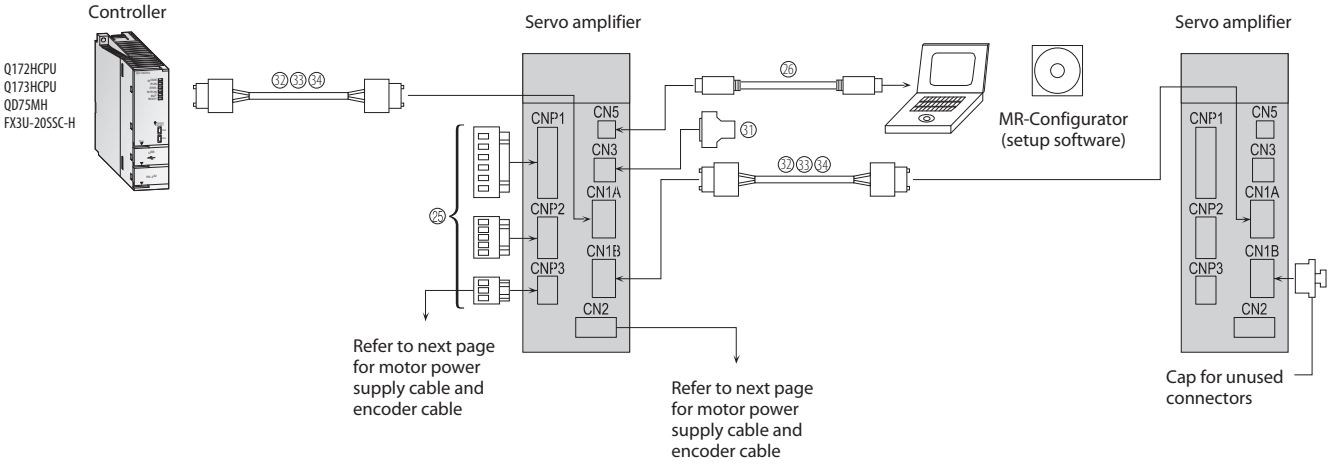
A complete overview with detailed specifications on all cables and accessories can be found in the next chapter.



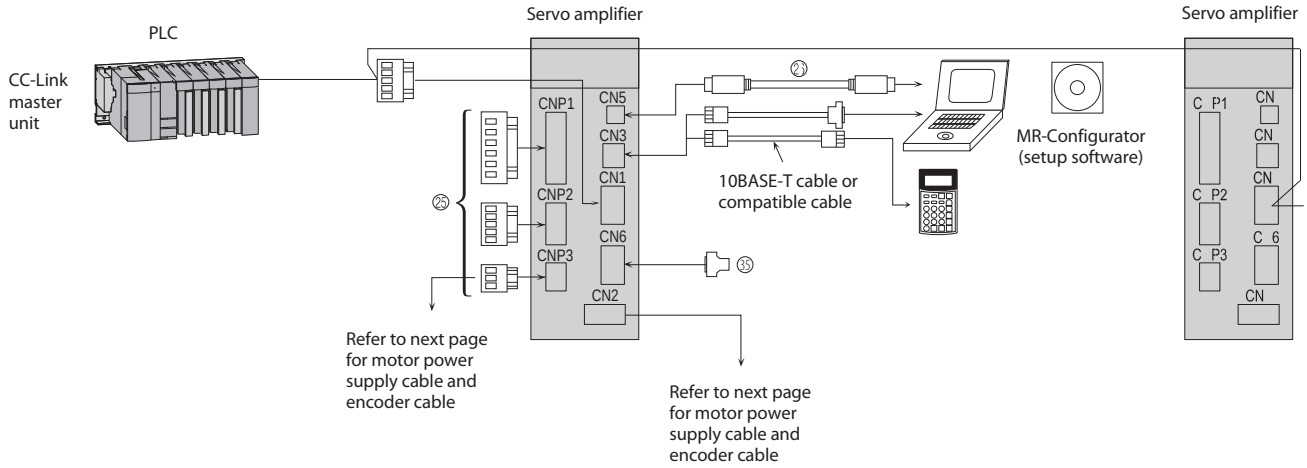
■ Cables and Connectors for MR-J3-A Servo Amplifiers



■ Cables and Connectors for MR-J3-B Servo Amplifiers



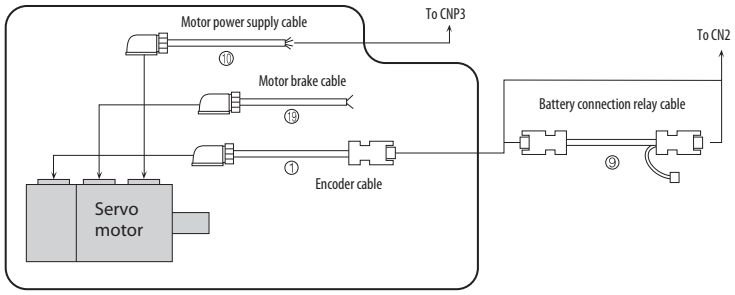
■ Cables and Connectors for MR-J3-T Servo Amplifiers



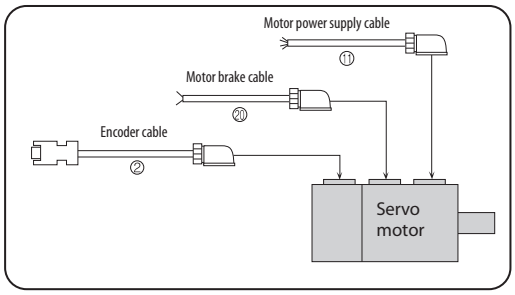
■ Cables and Connectors for Servo Motors

For HF-KP/HF-MP servo motor series: encoder cable lenght ≤ 10 m

Cables leading in the direction of the motor shaft

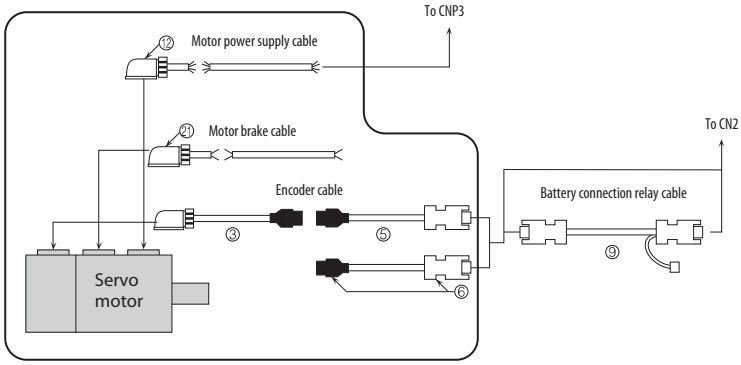


Cables leading in the opposite direction of the motor shaft

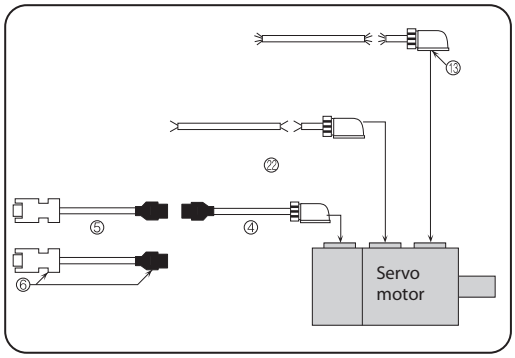


For HF-KP/HF-MP servo motor series: encoder cable lenght > 10 m

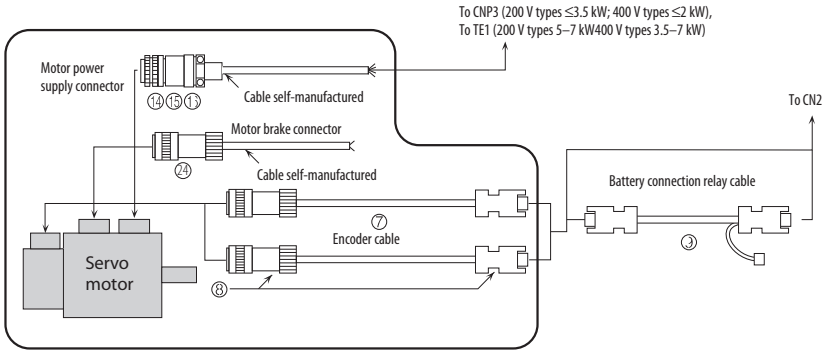
Cables leading in the direction of the motor shaft



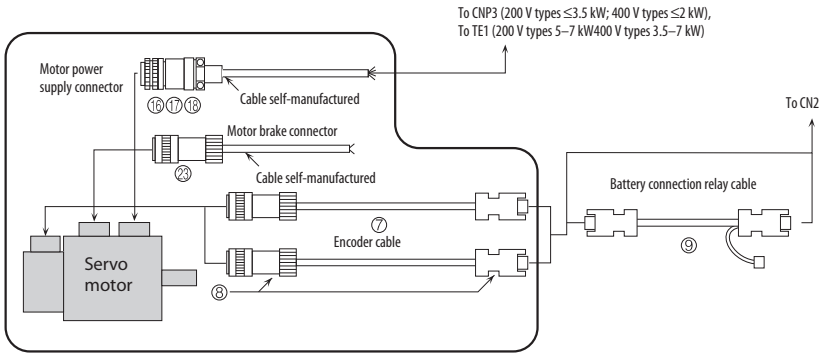
Cables leading in the opposite direction of the motor shaft



For HF-SP servo motor series



For HC-RP servo motor series



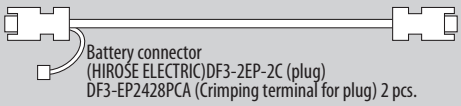
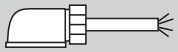
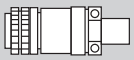
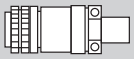
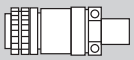
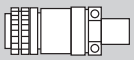
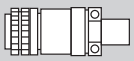
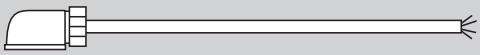
■ Cables and Connectors for Servo amplifier (general)

Item		Description	Model	Protection	Length	Art. no.
Encoder cables and connector sets for CN2	① Encoder cable for HF-KP/HF-MP series Lead out in direction of motor shaft	Encoder connector (Tyco Electronics AMP) 1674320-1 Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex)	MR-J3ENCBL☐M-A1-H ☐=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	160312 161547 161548
			MR-J3ENCBL☐M-A1-L ☐=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	161549 161550 161551
	② Encoder cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft		MR-J3ENCBL☐M-A2-H ☐=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	160230 161552 161553
			MR-J3ENCBL☐M-A2-L ☐=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	161554 161555 161556
	③ Motor-side encoder cable for HF-KP/HF-MP series Lead out in direction of motor shaft	Encoder connector (Tyco Electronics AMP) 1674320-1 Junction connector (Tyco Electronics AMP) 1473226-1 (with ring) (contact) 1-172169-9 (housing) 316454-1 (cable clamp)	MR-J3JCBL03M-A1-L Cable length: 0.3m ❶	IP20	0.3 m	161557
	④ Motor-side encoder cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft		MR-J3JCBL03M-A2-L Cable length: 0.3m ❶	IP20	0.3 m	161558
	⑤ Encoder connector set for HC-SFS, HC-RFS series motors	Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex) Use these in combination of ③ or ④.	MR-EKCBL☐M-H ☐=cable length: 20, 30, 40, 50 m ❶	IP20	20 m 30 m 40 m 50 m	161559 161560 on request on request
			MR-EKCBL☐M-L ☐=cable length: 20, 30 m ❶	IP20	20 m 30 m	161561 161562
	⑥ Junction connector, amplifier connector ❷ for HF-KP/HF-MP series	Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) <Applicable cable example> Wire size: 0.3 mm^2 (AWG22) Completed cable outer diameter: ϕ 8.2 mm Crimping tool (91529-1) is required. Amplifier connector 54599-1019 (connector set, Molex), or 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M) Use these in combination of ③ or ④.	MR-ECNM	IP20	–	161572
	⑦ Encoder cable for HF-SP/HC-RP/ HA-LP series	Encoder connector (DDK) <For 10 m or shorter cable> CM10-SP10S-M (straight plug) CM10-#22SC(C1)-100 (socket contact) Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex) <For exceeding 10 m> CM10-SP10S-M (straight plug) CM10-#22SC(C2)-100 (socket contact)	MR-J3ENSCBL☐M-H ☐=cable length: 2, 5, 10, 20, 30, 40, 50 m ❶	IP67	2 m 5 m 10 m 20 m 30 m 40 m 50 m	160226 161563 161564 161565 161566 on request on request
			MR-J3ENSCBL☐M-L ☐=cable length: 2, 5, 10, 20, 30 m ❶	IP67	2 m 5 m 10 m 20 m 30 m	161567 161568 161569 161570 161571
	⑧ Encoder connector set for HF-SP/HC-RP/ HA-LP series	Encoder connector (DDK) CM10-SP10S-M (straight plug) CM10-#22SC(S1)-100 (socket contact) Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex) <Applicable cable example> Wire size: 0.5 mm^2 (AWG20) or smaller Completed cable outer diameter: ϕ 6.0 to 9.0 mm	MR-J3SCNS	IP67	–	161576

Notes:

❶ -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.

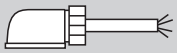
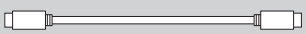
❷ Refer to the MR-J3 users manual for details on manufacturing the cable.

Item		Description	Model	Protection	Length	Art. no.
Encoder cables and connector sets for CN2	⑨ Battery connection relay cable	Amplifier CN2 connector ❷ (3 M or an equivalent product) 36210-0100PL (receptacle) 36310-3200-008 (shell kit) Junction connector (3 M) 36110-3000FD (plug) 36310-F200-008 (shell kit)  Battery connector (HIROSE ELECTRIC)DF3-2EP-2C (plug) DF3-EP2428PCA (Crimping terminal for plug) 2 pcs. Not required when the servo system is used in incremental mode. Refer to the section "Battery and special cables" for details.	MR-J3BTCBL03M Cable length: 0.3 m	–	0.3 m	160327
Select one from ⑩ to ⑱ for the motor power supply	⑩ Power supply cable for HF-KP/HF-MP seriesLead out in direction of motor shaft	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-PWS1CBL□M-A1-H □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	160227 161592 161593
			MR-PWS1CBL□M-A1-L □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	161594 / 161595 / 161596
	⑪ Power supply cable for HF-KP/HF-MP seriesLead out in opposite direction of motor shaft	 Lead-out	MR-PWS1CBL□M-A2-H □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	160228 / 161597 / 161598
			MR-PWS1CBL□M-A2-L □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	161599 / 161600 / 161601
	⑫ Power supply cable for HF-KP/HF-MP seriesLead out in direction of motor shaft	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-PWS2CBL03M-A1-L Cable length: 0.3m ❶	IP55	0.3 m	161602
	⑬ Power supply cable for HF-KP/HF-MP seriesLead out in opposite direction of motor shaft	 Lead-out	MR-PWS2CBL03M-A2-L Cable length: 0.3m ❶	IP55	0.3 m	161603
	⑭ Power supply connector for HF-SP51, 81,HF-SP52, 102, 152,HF-SP524, 1024, 1524	 Motor power supply connector (DDK) CE05-6A18-10SD-D-BSS (plug) (straight) CE3057-10A-1-D (cable clamp) <Applicable cable example> Wire size: 2 mm² (AWG14) to 3.5 mm² (AWG12) Completed cable outer diameter: ϕ 10.5 to 14.1 mm	MR-PWCNS4 (Straight type)	IP67	–	161573
	⑮ Power supply connector for HF-SP121, 201, 301HF-SP202, 352, 502,HF-SP2024, 3524, 5024	 Motor power supply connector (DDK) CE05-6A22-22SD-D-BSS (plug) (straight) CE3057-12A-1-D (cable clamp) <Applicable cable example> Wire size: 5.5 mm² (AWG10) to 8 mm² (AWG8) Completed cable outer diameter: ϕ 12.5 to 16 mm	MR-PWCNS5 (Straight type)	IP67	–	161574
	⑯ Power supply connector for HF-SP421, 702, 7024HA-LP702	 Motor power supply connector (DDK) CE05-6A32-17SD-D-BSS (plug) (straight) CE3057-20A-1-D (cable clamp) <Applicable cable example> Wire size: 14 mm² (AWG6) to 22 mm² (AWG4) Completed cable outer diameter: ϕ 22 to 23.8 mm	MR-PWCNS3 (Straight type)	IP67	–	136358
	⑰ Power supply connector for HC-LP52, 102, 152,HC-RP103, 153, 203,HC-UP72, 152	 Motor power supply connector (DDK) CE05-6A22-23SD-D-BSS (plug) (straight) CE3057-12A-2-D (cable clamp) <Applicable cable example> Wire size: 2 mm² (AWG14) to 3.5 mm² (AWG12) Completed cable outer diameter: ϕ 9.5 to 13 mm	MR-PWCNS1 (Straight type)	IP67	–	64036
	⑱ Power supply connector for HC-LP202, 302,HC-RP353, 503,HC-UP202, 352, 502,HA-LP502	 Motor power supply connector (DDK) CE05-6A24-10SD-D-BSS (plug) (straight) CE3057-16A-2-D (cable clamp) <Applicable cable example> Wire size: 5.5 mm² (AWG10) to 8 mm² (AWG8) Completed cable outer diameter: ϕ 13 to 15.5 mm	MR-PWCNS2 (Straight type)	IP67	–	64035
Select one for the motor electro-magnetic brake	⑲ Brake cable for HF-KP/HF-MP series Lead out in direction of motor shaft	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-BKS1CBL□M-A1-H □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	161604 161605 161606
			MR-BKS1CBL□M-A1-L □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	161607 161608 161609
	⑳ Brake cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft	 Lead-out	MR-BKS1CBL□M-A1-H □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	160311 161610 161611
			MR-BKS1CBL□M-A1-L □=cable length: 2, 5, 10 m ❶	IP65	2 m 5 m 10 m	161612 161613 161614

Notes:

❶ -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
❹ The battery connection relay cable has a built-in diode. Only this cable must be used.

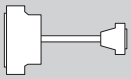
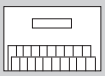
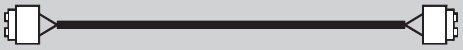
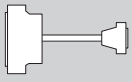
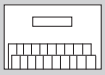
■ Cables and Connectors for servo amplifier (general)

Item		Description	Model	Protection	Length	Art. no.
Select one for the motor electro-magnetic brake	㉑ Brake cable for HF-KP/HF-MP series Lead out in direction of motor shaft	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04SJ1-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)  Lead-out	MR-BKS2CBL03M-A1-L Cable length: 0.3 m ❶	IP55	0.3 m	161615
	㉒ Brake cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft		MR-BKS2CBL03M-A2-L Cable length: 0.3 m ❶	IP55	0.3 m	161616
	㉓ Brake connector for HF-SP series	 Motor brake connector (DDK) (soldered type) CM10-SP2S-L (straight plug), CM10-#22SC (S2)-100 (socket contact) <Applicable cable example> Wire size: 1.25 mm² (AWG16) or smaller Completed cable outer diameter: ϕ 9.0 to 11.6 mm	MR-BKCNS1 (Straight type)	IP67	–	161575
	㉔ Brake connector for 12K1B, 12K14B, 11K1MB, 15K1MB, 11K1M4B, 15K1M4B,HA-LP11K2B, 15K2B, 22K2B, 11K24B, 15K24B, 22K24B	 Motor brake connector D/MS3106A10SL-4S (D190) (plug, DDK) YSO10-5 to 8 (cable connector (straight), Daiwa Dengyo) <Applicable cable example> Wire size: 0.3 mm² (AWG22) to 1.25 mm² (AWG16) Completed cable outer diameter: ϕ 5 to 8.3 mm	MR-BKCN (Straight type)	IP65	–	64034
For CNP1, CNP2, CNP3	㉕ For 1kW or smaller (200VAC)	CNP1 connector: 54928-0670 (connector) (Molex or an equivalent product) CNP2 connector: 54927-0520 (connector) (Molex or an equivalent product) CNP3 connector: 54928-0370 (connector) (Molex or an equivalent product) Insertion tool: 54932-0000 (Molex or an equivalent product) <Applicable cable example> Wire size: 0.14 mm² (AWG26) to 2.5 mm² (AWG14) Completed cable outer diameter: up to ϕ 3.8 mm	(Standard accessory: Insertion type) ❷	–	–	on request
	For 2kW, 3.5kW (200VAC)	CNP1 connector: PC4/6-STF-7.62-CRWH (connector) (PHOENIX or an equivalent product) CNP2 connector: 54927-0520 (connector) (Molex or an equivalent product) CNP3 connector: PC4/3-STF-7.62-CRWH (connector) (PHOENIX or an equivalent product) Insertion tool: 54932-0000 (Molex or an equivalent product) <Applicable cable example> Wire size: 0.2 mm² (AWG24) to 5.5 mm² (AWG10) Completed cable outer diameter: up to ϕ 5mm				on request
	For 2kW or smaller (400VAC)	CNP1 connector: 721-207/026-000 (plug) (WAGO or an equivalent product) CNP2 connector: 721-205/026-000 (plug) (WAGO or an equivalent product) CNP3 connector: 721-203/026-000 (plug) (WAGO or an equivalent product) Insertion tool: 231-131(WAGO or an equivalent product) <Applicable cable example> Wire size: 0.08 mm² (AWG28) to 2 mm² (AWG14) Completed cable outer diameter: up to ϕ 4.1 mm				on request
For CN5	㉖ USB cable	Amplifier connector mini-B connector (5 pins) Personal computer connector A connector 	MR-J3USBCBL3M Cable length: 3 m	–	3m	160229

Notes:

❶ -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
❷ The connector type terminal blocks are available for 200V 3.5kw or smaller and 400V 2kW or smaller servo amplifiers. For 200V 5kw or larger and 400V 3.5kW or larger, screw type connector blocks are used.

■ Cables and Connectors for servo amplifier (type specific)

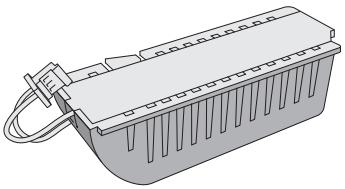
Item		Description	Model	Protection	Length	Art. no.
Servo amplifier series MR-J3 A						
For CN1	㉗ CN6 connector	 Amplifier connector (3 M or an equivalent product) 10150-3000PE (connector) 10350-52F0-008 (shell kit)	MR-J3CN1	–	–	160225
For CN1	㉘ Cable for junction terminal block TB-20	Amplifier connector (3 M or an equivalent product)10150-6000EL (connector) 10350-3210-000 (shell kit) ❸  Junction terminal block connector (3 M) D7950-B500FL (connector)	MR-J2TBL□M □=cable length: 0.5, 1 m	–	0.5 m 1 m	61216 61218
For CN1	㉘ Cable for junction terminal block TB-50		MR-J2M-CN1TBL□M □=cable length: 0.5, 1m	–	0.5 m 1 m	146794 189864
	㉙ Junction terminal block		MR-TB20-S MR-TB20-C MR-TB50-S MR-TB50-C	–	–	149148 149023 in preparation in preparation
For CN6	㉚ Monitor-Kabel		MR-J3CN6CBL1M Kabellänge: 1 m	–	1 m	161578
Servo amplifier series MR-J3-B						
For CN3	㉛ Input/output signal connector	 Amplifier connector (3M or an equivalent product) 10120-3000PE (connector) 10320-52F0-008 (shell kit) ❹	MR-CCN1	–	–	60041
For CN1A For CN1B	㉜ ㉝ SSCNET III cable (standard)	Connector: PF-2D103 (Japan Aviation Electronics Industry) Connector: PF-2D103 (Japan Aviation Electronics Industry) 	MR-J3BUS□M □=cable length: 015, 03, 05, 1, 3	–	0.15 m 0.3 m 0.5 m 1 m 3 m	161579 161580 161581 161582 161583
For CN1A For CN1B	㉝ SSCNET III cable (standard)		MR-J3BUS□M-A □=Kabellänge: 5, 10, 20	–	5 m 10 m 20 m	161584 161585 161586
For CN1A For CN1B	㉞ SSCNET III cable (long flex)		MR-J3BUS□M-B □=cable length: 30, 40, 50	–	30 m 40 M 50 m	161587 161588 161589
Servo amplifier series MR-J3-T						
For CN6	㉟ CN6 connector	 Amplifier connector (3 M or an equivalent product) 10126-3000PE (connector) 10326-52F0-008 (shell kit)	MR-J2CMP2	–	–	149764
For CN20 ❺	㉛ Input/output signal connector	 Amplifier connector (3 M or an equivalent product) 10120-3000PE (connector) 10320-52F0-008 (shell kit) ❹	MR-CCN1	–	–	60041
For CN10 ❺	㉗ Input/output signal connector	 Amplifier connector (3 M or an equivalent product) 10150-3000PE (connector) 10350-52F0-008 (shell kit)	MR-J3CN1	–	–	160225
For CN10 ❺	㉘ Cable for junction terminal block TB-20	Amplifier connector (3 M or an equivalent product)10150-6000EL (connector) 10350-3210-000 (shell kit) ❸  Junction terminal block connector (3 M) D7950-B500FL (connector)	MR-J2TBL□M □=cable length: 0.5, 1 m	–	0.5 m 1 m	61216 61218
For CN10 ❺	㉘ Cable for junction terminal block TB-50		MR-J2M-CN1TBL□M □=cable length: 0.5, 1 m	–	0.5 m 1 m	146794 189864
	㉙ Junction terminal block		MR-TB20-S MR-TB20-C MR-TB50-S MR-TB50-C	–	–	149148 149023 in preparation in preparation

Notes:

❸ The connector and the shell kit are press bonding type. Models for soldered type are 10120-3000PE (connector) and 10350-52F0-008 (shell kit).
❹ The connector and the shell kit are soldered type. Models for press bonding type are 10120-6000EL (connector) and 10320-3210-000 (shell kit).
❺ CN10 and CN20 are only availible with extension I/O unit MR-J3-D01.

Encoder cables, battery connection relay cable, power supply cables, brake cables, USB cable and servo amplifier power supply connector set from ① to ㉖ are same for the servo amplifier series MR-J3-A, MR-J3-B and MR-J3-T.

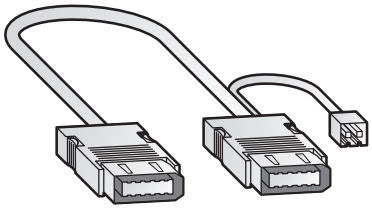
■ Buffer Battery



The servomotor's absolute value can be maintained by mounting the MR-J3BAT battery on the servo amplifier. The battery is not required when the servo system is used in incremental mode.

Battery	Application	Art. no.
MR-J3BAT	Buffering absolute positioning data	160224

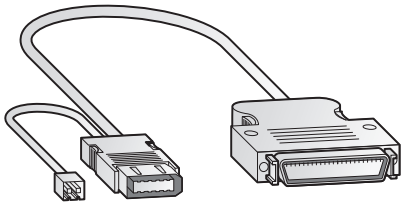
■ Battery Connection Relay Cable



This relay cable is used to hold the absolute value if the servo amplifier has to be removed from a machine for shipping. The servo motor does not have a super capacitor (for holding an absolute value for short time) in the encoder. When this optional cable is used, the absolute value can be held even when the encoder cable is disconnected from the servo amplifier, making it easy to do maintenance on the servo amplifier.

Cable	Application	Art. no.
MR-J3BTCBL03M	Buffering absolute value	160327

■ Diagnostic Cable

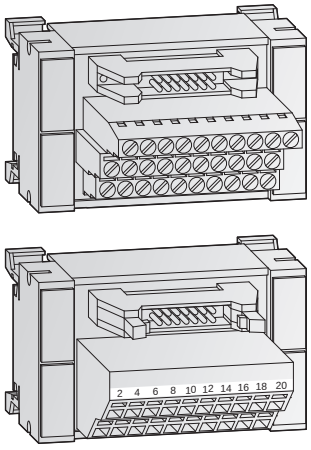


This cable is required when using the amplifier diagnostic function of MR -Configurator (Setup software).

Can be used only in combination with an MR-J3-A servo amplifier.

Cable	Application	Art. no.
MR-J3ACHECK	MR-Configurator diagnostic function	161577

■ Terminal Blocks

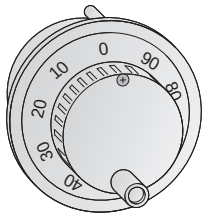


These terminal blocks TB-20/TB-50 are adapter modules that simplify the wiring of the inputs and outputs of the servo amplifiers.

In addition preconfigured system cabling is available for all the terminal blocks

	TB-20-S	TB-20-C	TB-50-S	TB-50-C
Terminal block type	Input/output block		Input/output block	
Channels	8 / 16		50	
Design	20 pin terminal module		50 pin terminal module	
Connection type	Screw terminals	Spring terminals	Screw terminals	Spring terminals
Application	MR-J3-B, MR-J3-D01 or positioning unit FX2N-10PG		Servoamplifier MR-J3-A and MR-J3-T	
Dimensions (W x H x D) mm	75 x 45 x 52	75 x 45 x 52	244 x 46.5 x 52.5	110 x 62 x 45
Order information Art. no.	149148	149023	in preparation	in preparation
Connection cables	Connection cable: MR-J2TBL05M; length 0.5 m; Art.-Nr.: 61216, MR-J2TBL1M; length 1 m; Art.-Nr.: 61218		Connection cable: MR-J2M-CN1TBL05M0; length 0.5 m; Art.-Nr.: 146794 MR-J2M-CN1TBL1M; length 1 m; Art.-Nr.: 189864	

■ Manual Pulse Generator



MR-HDP01

By this serial handwheel an external incremental setting value can be generated.

Specifications	MR-HDP01
Resolution	25 pls/rev (100 pls/rev at magnification of 4)
Output voltage	Input voltage > 1 V
Consumtion current	Max. 60 mA
Weight kg	0.4
Order information Art. no.	128728

■ Parameter Unit



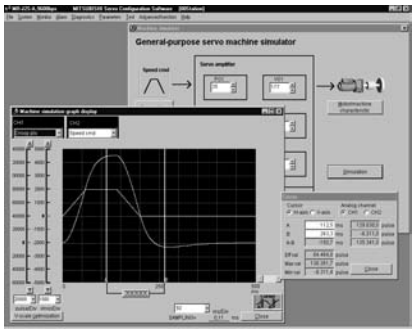
The parameter unit MR-PRU03 with a 16 characters x 4 lines LCD display, is available as an option.

By connecting the parameter unit to the servo amplifier, data setting, test operation, parameter setting, etc. can be performed without using MR-Configurator.

The parameter unit can be used with a MR-J3-□T□ servo amplifier.

Functions	MR-PRU03
Parameter mode	Basic setting parameters, gain/filter parameters, extension setting parameters, input/output setting parameters
Monitor Mode MR-J3-□T□	Current position, command position, command remaining distance, point table No., cumulative feedback pulses,droop pulses, regenerative load ratio, effective load ratio, peak load ratio, instantaneous torque, within one revolution position, ABS counter, servo motor speed, bus voltage, load inertia moment ratio
Diagnosis mode	External input/output display, motor information
Alarm mode	Current alarm, alarm history
Test operation mode	JOG operation, positioning operation, DO forced output, motor-less operation, single-step feed
Point table mode	Position data, servo motor speed, acceleration/deceleration time constant, dwell time, auxiliary function, M code
Order information Art. no.	208805

■ Setup Software (MR-Configurator)

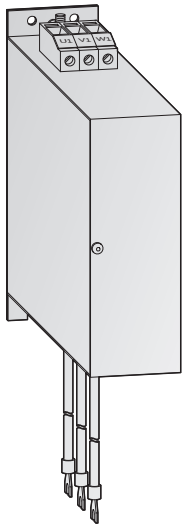


The comfortable setup software for Windows based personal computers allows perfect tuning of the servo amplifiers and the connected servo motors.

The software makes it easy to read and write parameters, monitor, diagnose and test the servo system via a personal computer.

Functions	MR-Configurator
Monitor	Batch display, input/output I/F display, high speed monitor, graph display
Parameters	Parameter setting, device setting, tuning, display of change list, display of detailed information, converter, parameter copy
Diagnostics	Rotation failure reason display, system information display, tuning data display, absolute data display, axes name setting, amplifier diagnostic
Alarms	Alarm display, alarmhistory, display of data that generated alarm
Test operations	JOG operation, positioning operation, operation witout motor, forced digital output, program operation using simple language
Advanced function	Machine analyser, gain search, machine simulation
Others	Automatic operation, help display, project and data administration
Order information Art. no.	191431

■ Noise Filters



For complying with the EMC directives of the European Community regarding the electromagnetic compatibility, the servo amplifiers have to be equipped with a noise filter across the input circuit. Additionally it has to be installed and wired according to the EMC directives.

The filter units are designed to reduce mains conducted RFI emissions to meet the European standard EN 61800-3.

More details are enclosed in the installation sheet of the MR-J3 filters.

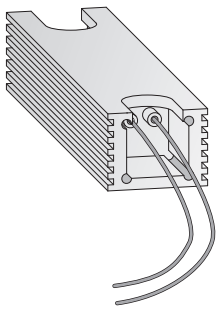
Filter ①	Servo amplifier	Power loss [W]	Rated current [A]	Leakage ② current [mA]	Weight [kg]	Order number
MF-2F230-006.230MFa	MR-J3-10A/B/T – MR-J3-60A/B/T	10	6	< 26	0.45	189332
MF-2F230-006.230MFb	MR-J3-70A/B/T	10	6	< 26	0.45	189331
MF-3F480-010.230MF3	MR-J3-100A/B/T	9	10	< 7	1.0	203853
MF-3F480-010.233MF	MR-J3-60A4/B4, MR-J3-100A4/B4	9	10	< 7	1.0	208775
MF-3F480-015.230MF3	MR-J3-200A/B/T and MR-J3-200A4/B4	12	15	< 4②	1.5	203463
MF-3F480-015.233MF	MR-J3-350A4/B4	16	15	< 20	2.0	208776
MF-3F480-025.230MF3③	MR-J3-350A/B/T, MR-J3-500A4/B4/T and MR-J3-700A4/B4	20	25	< 4	3.0	203854
MF-3F480-050.230MF3	MR-J3-500A/B/T and MR-J3-700A/B/T	40	50	< 4②	4.0	203855

① All filters can provide conformity with the limits for environment 1, restricted distribution up to 50 m or environment 1, unrestricted distibution up to 20 m.

② At normal operation: voltage difference between 2 phases < 3 % / at fault occurrence (value in brackets) : 2 dead phases (worst case)

③ No foot print filter

■ Brake Resistors

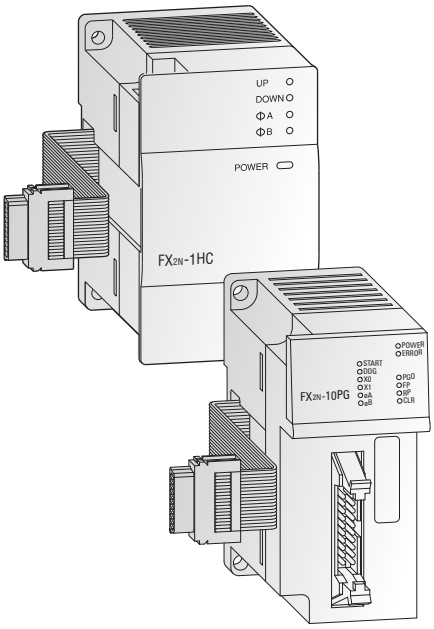


If the regenerative power exceeds the power of the built-in resistor, the following listed optional brake resistors can be used.

Resistor	Servo amplifier	Power capacity [W]	Resistance (Ω)	Weight [kg]	Dimensions (W x H x D)	Order number
MR-RFH75-40	MR-J3-10A/B/T – MR-J3-60A/B/T, MR-J3-70A/B/T and MR-J3-100A/B/T	150	40	0.16	36 x 27 x 90	137279
MR-RFH220-40	MR-J3-70A/B/T and MR-J3-100A/B/T	400	40	0.42	36 x 27 x 200	137278
MR-RFH400-13	MR-J3-200A/B/T, MR-J3-350A/B/T and MR-J3-500A/B/T	600	13	0.73	36 x 27 x 320	137277
MR-RFH400-6.7	MR-J3-700A/B/T	600	6.7	0.73	36 x 27 x 320	137275
MR-PWR-T-400-120	MR-J3-60A4/B4 and MR-J3-100A4/B4	400	120	0.4	36 x 27 x 200	154746
MR-PWR-T-600-47	MR-J3-200A4/B4 and MR-J3-350A4/B4	600	47	0.64	36 x 27 x 320	154751
MR-PWR-T-600-26	MR-J3-500A4/B4 and MR-J3-700A4/B4	600	26	0.64	36 x 27 x 320	154752

■ MELSEC FX Positioning Units

The high-speed counter and single axis positioning modules described below can be used in combination with the FX series PLCs. This provides a cost effective solution for small servo/motion applications.



High-speed counter FX2N-1HC

In addition to the internal high-speed MELSEC FX counters, the high-speed counter module FX2N-1HC provides the user with an external hardware counter. It counts 1- or 2-phase pulses up to a frequency of 50 kHz. The counting range covers either 16 or 32 bit.

The two integrated transistor outputs can be switched independently of one another by means of internal comparison functions. Hence, simple positioning tasks can also be realized economically. In addition, the FX2N-1HC can be used as a ring counter.

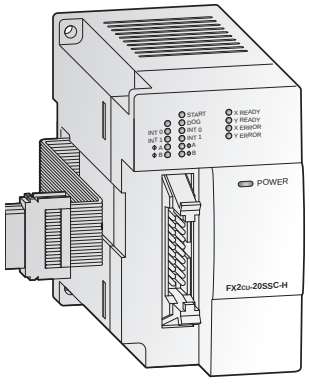
Single-axis positioning module

The positioning modules FX2N-1PG-E and FX2N-10PG are extremely efficient single-axis positioning modules for controlling servo drives (by external controller) with a pulse train. It is very suitable for achieving accurate positioning in combination with the MELSEC FX series.

The configuration and allocation of the position data are carried out directly via the PLC program.

A very wide range of manual and automatic functions are available to the user.

Specifications		FX2N-1PG-E	FX2N-10PG
Accessible axes		1	1
Output frequency	pulse/s	10 – 100 000	1 – 1 000 000
Signal level for digital inputs		24 V DC / 40 mA	5 V DC / 100 mA; 24 V DC / 70 mA
Power supply	5 V DC	55 mA (from base unit)	120 mA (from base unit)
	24 V DC	—	—
Related I/O points		8	8
Dimensions (W x H x D)	mm	43 x 90 x 87	43 x 90 x 87



SSCNET III module FX3U-20SSC-H

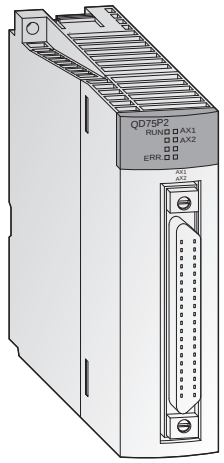
The SSCNET module FX3U-20SSC-H can be used in combination with a FX3U programmable controller to achieve a cost effective solution for high precision, high speed positioning. The plug- and-play fiber optic SSCNET III cabling reduces setup time and increases control distance for positioning operations in a wide range of applications.

Servo parameters and positioning information for the FX3U-20SSC-H are easily set up with an FX3U base unit and a personal computer. For parameter setting, monitoring and testing the easy programming software FX Configurator-FP is available.

For further specifications please refer to the MELSEC FX technical catalogue.

Specifications		FX3U-20SSC-H
Accessible axes		2 (independent or interpolation) via SSCNET III (motion bus)
Output frequency		1 Hz to 50 MHz
Communications speed		50 Mbps
Starting time	ms	1.6 (+1.7 SSCNET cycle time)
Max. to PLC connectable modules		Up to 8 can be connected to the FX3U PLC
Power supply	5 V DC	100 mA
	24 V DC	—
Related I/O points		8
Dimensions (W x H x D)	mm	55 x 90 x 87
Order information	Art. no.	206189

■ MELSEC System Q Positioning Units



The Qn PLC range offers three QD75 series modules (one, two and four axes)

- Differential output type (QD75D series)
- SSCNET III bus type (QD75MH series).

The differential output controllers can be used with MR-J3-A standard type servo amplifiers , whilst the QD75MH series controllers can be used with the MR-J3-B (SSCNET III bus type) Servo amplifiers. Using the SSCNET system can provide much improved, easier to use positioning system, with reduced wiring and better noise immunity.

All QD75 series controllers can provide functionality such as interpolation and speed-position operation etc.

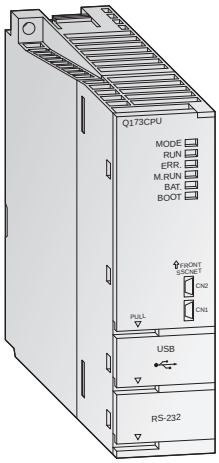
The modules provide positioning with open collector control. The modules generate the travel command via the pulse chain. The speed is proportional to the pulse frequency and the distance travelled is proportional to the pulse length.

The differential output type modules are suitable for bridging long distances between the module and the drive system due to the fact that the differential line driver signals have an improved noise immunity compared to open collector types (QD75P series).

Specifications		QD75D1	QD75D2	QD75D4
Number of control axes		1	2	4
Interpolation		—	2 axis linear and circular interpolation	2, 3, or 4 axis linear and 2 axis circular interpolation
Positioning data itmes		600 per axis		
Output type		Differential driver	Differential driver	Differential driver
Output signal		Pulse chain	Pulse chain	Pulse chain
Positioning	method	PTP control: absolute data and/or incremental; speed/position swiching control: incremental; locus/speed control: incremental; path control: absolute data and/or incremental		
	units	Absolute data: -2 147 483 648 – 2 147 483 647 pulse -21 4748 364.8 – 214 748 364.7 µm -21 474.83648 – 21 474.83647 inch 0 – 359.99999 degree Incremental method: -2 147 483 648 – 2 147 483 647 pulse -214 748 364.8 – 214 748 364,7 µm -21 474.83648 – 21 474.83647 inch -21 474.83648 – 21 474.83647 degree Speed/position switching control : 0 – 2 147 483 647 pulse 0 – 21 4748 364.7 µm 0 – 21 474.83647 inch 0 – 21 474.83647 degree		
	speed	1 – 1 000 000 pulse/s 0.01 – 20 000 000.00 mm/min 0.001 – 200 000.000 degree/min 0.001 – 200 000.000 inch/min		
	acceleration/deceleration processing	Automatic trapezoidal or S-pattern acceleration and deceleration or automatic S-pattern acceleration and deceleration		
	acceleration and deceleration time	1 – 8388608 ms (4 patterns, each can be set)		
	rapid stop decceleration time	1 – 8388608 ms		
I/O points		32	32	32
Dimensions (W x H x D)	mm	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90
Order information	Art. no.	129675	129676	129677
Accessories		40-pin connector and ready to use connection cables and system terminals; Programming software: GX Configurator QP, art. no.: 132219		

Specifications		QD75MH1	QD75MH2	QD75MH4
Number of control axes		1	2	4
Interpolation		—	2 axis linear and circular interpolation	2, 3, or 4 axis linear and 2 axis circular interpolation
Positioning data itmes		600 per axis		
Output type		SSCNET III	SSCNET III	SSCNET III
Output signal		BUS	BUS	BUS
Positioning	method	PTP control: absolute data and/or incremental; speed/position swiching control: incremental; locus/speed control: incremental; path control: absolute data and/or incremental		
	units	Absolute data: -2 147 483 648 – 2 147 483 647 pulse -21 4748 364.8 – 214 748 364.7 µm -21 474.83648 – 21 474.83647 inch 0 – 359.99999 degree Incremental method: -2 147 483 648 – 2 147 483 647 pulse -214 748 364.8 – 214 748 364,7 µm -21 474.83648 – 21 474.83647 inch -21 474.83648 – 21 474.83647 degree Speed/position switching control : 0 – 2 147 483 647 pulse 0 – 21 4748 364.7 µm 0 – 21 474.83647 inch 0 – 21 474.83647 degree		
	speed	1 – 1 000 000 pulse/s 0.01 – 20 000 000.00 mm/min 0.001 – 200 000.000 degree/min 0.001 – 200 000.000 inch/min		
	acceleration/deceleration processing	Automatic trapezoidal or S-pattern acceleration and deceleration or automatic S-pattern acceleration and deceleration		
	acceleration and deceleration time	1 – 8388608 ms (4 patterns, each can be set)		
	rapid stop decceleration time	1 – 8388608 ms		
I/O points		32	32	32
Dimensions (W x H x D)	mm	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90
Order information	Art. no.	165761	165762	165763
Accessories		40-pin connector and ready to use connection cables and system terminals; Programming software: GX Configurator QP, art. no.: 132219		

■ MELSEC System Q Motion CPUs



The Q-Motion controller CPU controls and synchronises the connected servo amplifiers and servo motors. A motion system besides the controller CPU, also includes a PLC CPU. Only after combining a highly dynamic positioning control CPU and a PLC, an innovative motion control system is created.

While the Motion CPU controls complex servo movements the PLC CPU is responsible for the machine control and the communication.

Special features:

- Using multiple CPUs to distribute the load improves the overall performance of the whole system and enables modular system configuration
- Use of up to 3 motion CPUs within one system
- Large scale control system for up to 96 axes per system
- Interpolation of 4 axes simultaneously
- Software cam control
- Virtual and real master axes
- Integration in the high-speed SSCNET III network for communication with high-performance servo amplifiers at 50 Mbps

Specifications		Q172HCPU	Q173HCPU
Type		Motion CPU	Motion CPU
I/O points		8192	8192
No. of control axes		8	32
Interpolation functions		Linear interpolation for up to 4 axes, circular interpolation for 2 axes, helical interpolation for 3 axes	
Positioning	method	PTP (point to point), speed control/speed-position control, fixed pitch feed, constant speed control, position follow-up control, speed switching control, high-speed oscillation control, synchronous control (SV22)	
	acceleration/ deceleration control	Automatic trapezoidal acceleration/deceleration, S-curve acceleration/deceleration	
	compensation	Backlash compensation, electronic gear	
Programming language		Motion SFC, dedicated instructions, software for conveyor assembly (SV13), virtual mechanical support language (SV22)	
Program capacity		14 k steps	
No. of positioning points		3200	
Interfaces		USB, SSCNET III	
Real I/O points (PX/PY)		256 (these I/Os can be allocated directly to the motion CPU)	
Dimensions (W x H x D)	mm	27.4 x 98 x 114.3	27.4 x 98 x 114.3
Order information	Art. no.	162417	162416

■ MELSEC System Q Motion System Modules

Servo external signals interface module Q172LX

The Q172LX input module is used in conjunction with a Q Motion CPU to capture external servo signals.

Up to 8 axes can be evaluated per module. In this way, cam-switching values, limit switching positions, stop positions and operating modes can be easily incorporated into the system.

- 32 address points for 8 axes for each 4 inputs
- Bipolar inputs for positive and negative logic
- Galvanic isolation of the inputs by means of photocoupler
- Shortest response time of < 0.4 ms
- Modular extension possible

Serial absolute synchronous encoder interface module Q172EX and Q172EX-S2

The serial absolute synchronous encoder interface module Q172EX is a Motion system module for receiving and evaluating up to two serial absolute-value encoders. (Incremental encoders cannot be connected.) Via an external encoder (MR-HENC) it is possible to feed a setpoint source to the Motion system, which inturn is programmed as a guide axis.

In addition to the interfaces for the signals of two absolute value encoders, the Q172EX has two digital inputs with ultra-rapid responsetimes.

- Transfer rate of 2.5 Mbit per second
- Resolution of 14 bit
- Voltage-failure security of the absolute values by means of built-in buffer battery
- Shortest response times of < 0.4 ms
- Modular extension possible

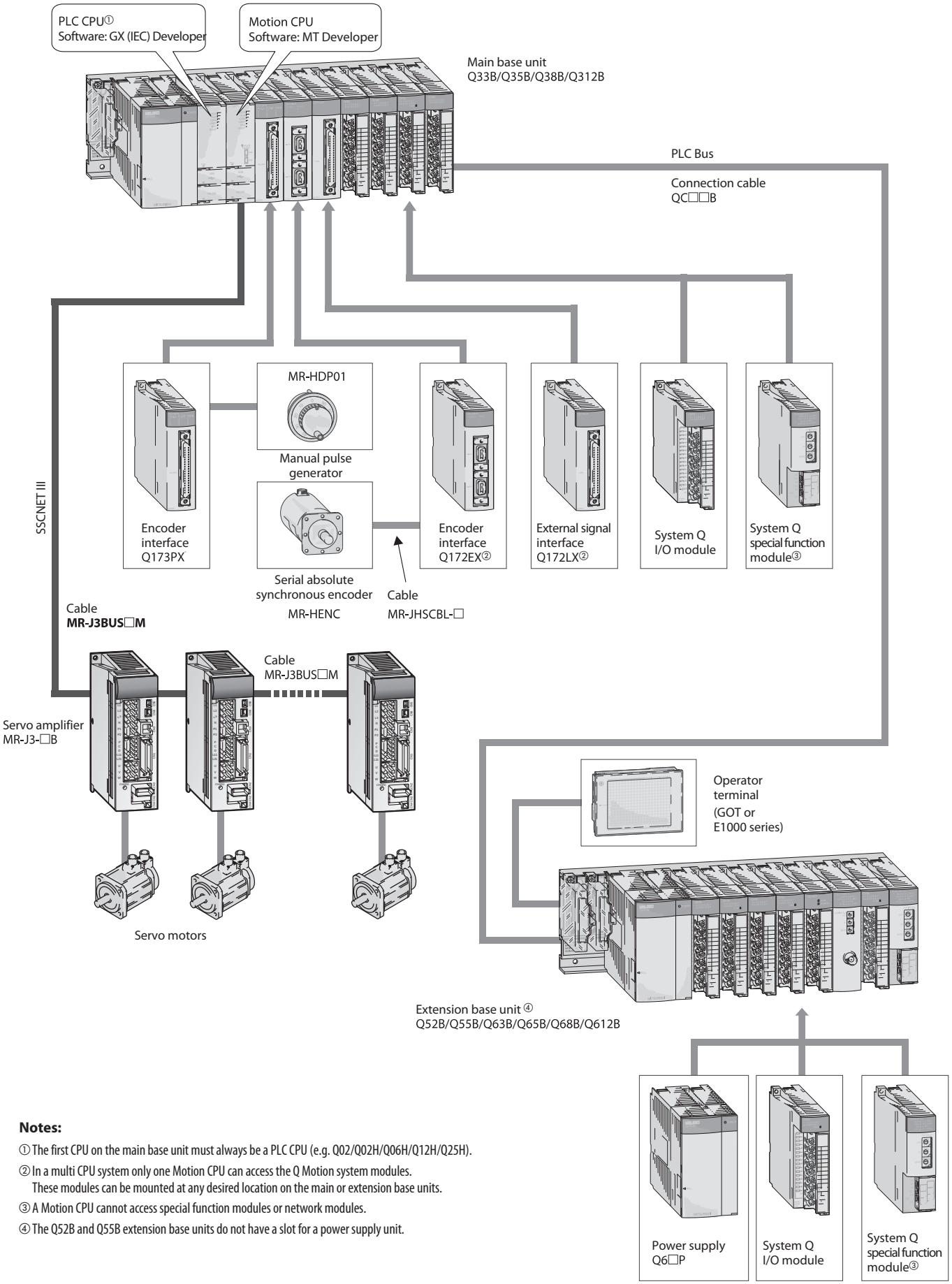
Manual pulse generator interface module Q173PX

The Manual pulse generator interface module Q173PX is used in a Motion system to receive the signals of up to 3 external incremental encoders or manual impulse generators (hand wheels).

In addition to the inputs for the encoders, the Q173PX has three digital inputs with which the encoder signal counting procedure can be started (Encoder start signal).

- Bipolar inputs for positive and negative logic
- Galvanic isolation of the inputs by means of photo coupler
- Shortest response times of < 0.4 ms
- Modular extension possible

■ Configuration of a SSCNET III System



Notes:

① The first CPU on the main base unit must always be a PLC CPU (e.g. Q02/Q02H/Q06H/Q12H/Q25H).

② In a multi CPU system only one Motion CPU can access the Q Motion system modules.
These modules can be mounted at any desired location on the main or extension base units.

③ A Motion CPU cannot access special function modules or network modules.

④ The Q52B and Q55B extension base units do not have a slot for a power supply unit.

■ X-Y Table System Configurations

An X-Y table is a typical two axes servo application, commonly used in industry for pick and place systems such as PCB component insertion machines through to welding machines.

The following information provides two examples of possible X-Y table system configurations, using Mitsubishi automation equipment.

The first is a linear FX2N-10PG based system and the second is a more complex interpolating QD75M (SSCNET) based system.

System 1: FX2N-10PG based system

Products	Function
FX2N-16MR-ES/UL	PLC
FX2N-10PG	Pulse train output module
FX2N-10PG	Pulse train output module
MR-J2S-10A	Servo Amplifier
HF-KP13	Motor
MR-J2S-60A	Servo Amplifier
HF-SP52	Motor

The FX2N-10PG is a single axis position control module, therefore two modules are used to control the X and Y axes. The FX2N-10PG uses a differential pulse train output to control the position of the Servo Motors. As a differential pulse train output is given, then the MR-J3-A Series of Servo amplifiers must be used (these allow control from either a pulse train or analogue source).

One of the disadvantages of using the FX2N-10PG system is that interpolation between the two axes is not possible. This is due to the fact that as the position modules are independent of each other they cannot make combined moves.

Another disadvantage is that the controller (FX PLC) does not know the true position of each of the Servo motors. This may cause problems if a power-down situation occurs or an axis is physically moved.

One major advantage that the FX2N-10PG systems have is that they can be easily integrated into existing FX PLC systems.

- Simple to use
- Widely used
- Cost effective
- Simple functionality

System 2: QD75MH based system

Products	Function
Q00J	Q PLC
QD75-MH2	Positioning Controller
MR-J2S-10B	Servo Amplifier
HF-KP13	Motor
MR-J2S-40B	Servo Amplifier
HF-SP52	Motor
MR-BAT	Servo Amplifier Battery

The QD75MH based system uses the powerful modular Qn PLC Series, providing greater functionality and expandability options. The QD75MH system is connected using SSCNET III (Servo System Controller Network), which is Mitsubishi's dedicated motion control network. SSCNET III simplifies the set-up of the system and reduces the wiring required. SSCNET III systems are created by simply plugging an amplifier into the main controller (QD75MH) and then "daisy-chaining" each additional axis that is added. SSCNET III connectivity requires MR-J3-B type amplifiers to be used.

Furthermore, as the Servo amplifiers are connected by a bus system, all Servo data, such as current position, torque etc. can all be monitored back at the main controller (Q00J PLC) as the data is automatically updated on the QD75MH module.

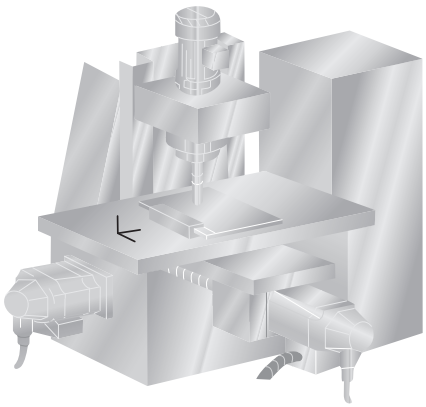
Also, all of the internal Servo parameters can be set from the PLC, again due to the bus system used.

The bus system also means that position data is sent serially, therefore reducing any possible interference due to noise.

Finally, as both axes are controlled from one high function module (QD75MH), interpolation between the two axes is possible.

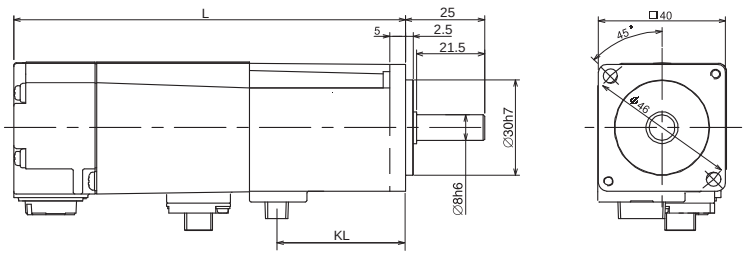
- SSCNET III capability
- Easy of set-up
- High functionality
- Expandability
- Module Options
- Reduced Wiring

X-Y table control



■ Servo motors

HF-MP053 (B), HF-MP13 (B), HF-KP053 (B), HF-KP13 (B)

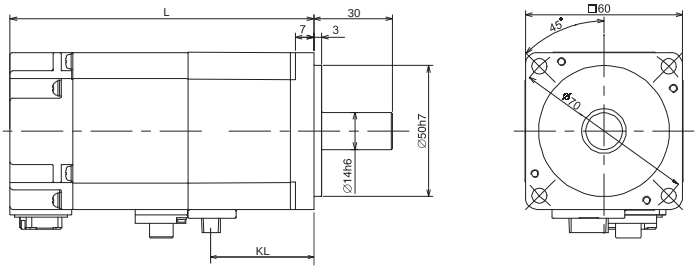


Type	L [mm]	KL [mm]
HF-MP053 (B)	66.4 (107.5)	24.5
HF-MP13 (B)	82.4 (123.5)	40.5
HF-KP053 (B)	66.4 (107.5)	24.5
HF-KP13 (B)	82.4 (123.5)	40.5

Dimensions for motors with brake in brackets ( ).

Unit: mm

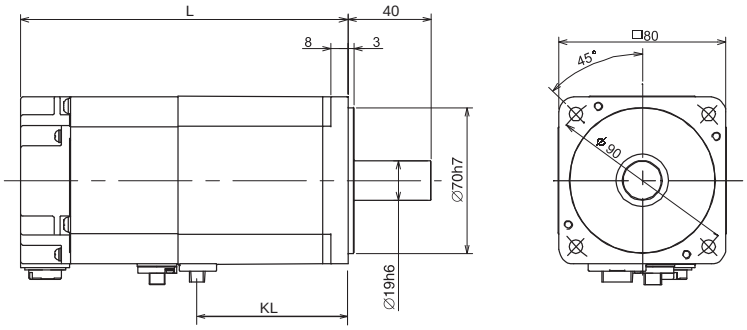
HF-MP23 (B), HF-MP43 (B), HF-KP23 (B), HF-KP43 (B)



Type	L [mm]	KL [mm]
HF-MP23 (B)	82.4 (116.1)	39.3
HF-MP43 (B)	98.5 (138.0)	61.2
HF-KP23 (B)	82.4 (116.1)	39.3
HF-KP43 (B)	98.5 (138.0)	61.2

Dimensions for motors with brake in brackets ( ).

Unit: mm

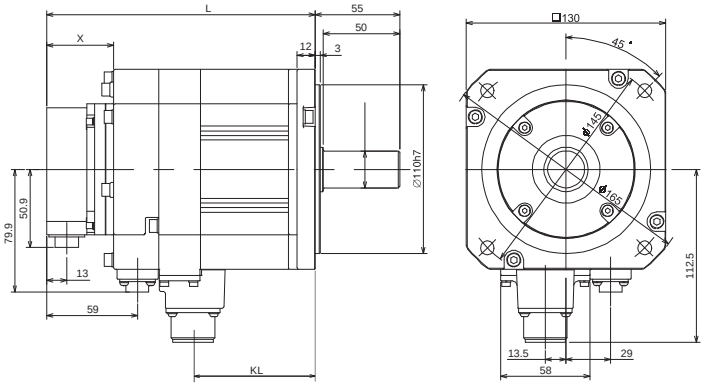


Type	L [mm]	KL [mm]
HF-MP73 (B)	113.8 (157.0)	72.3
HF-KP73 (B)	113.8 (157.0)	72.3

Dimensions for motors with brake in brackets ( ).

Unit: mm

HF-SP52 (B), HF-SP102 (B), HF-SP152 (B)

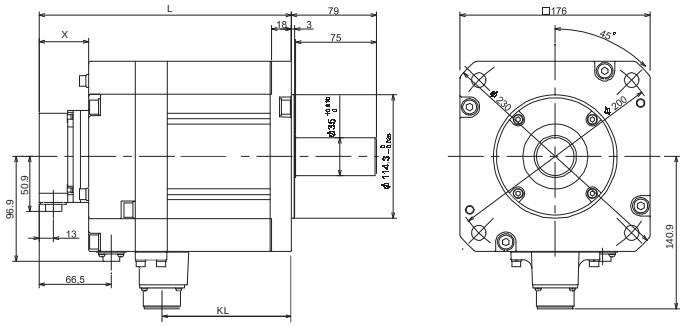


Type	L [mm]	KL [mm]	X [mm]
HF-SP52 (B)	118.5 (153.0)	57.8	38.2 (43.5)
HF-SP102 (B)	140.5 (175.0)	79.8	38.2 (43.5)
HF-SP152 (B)	162.5 (197.0)	101.8	38.2 (43.5)

Dimensions for motors with brake in brackets ( ).

Unit: mm

HF-SP202 (B), HF-SP352 (B), HF-SP502 (B), HF-SP702 (B)

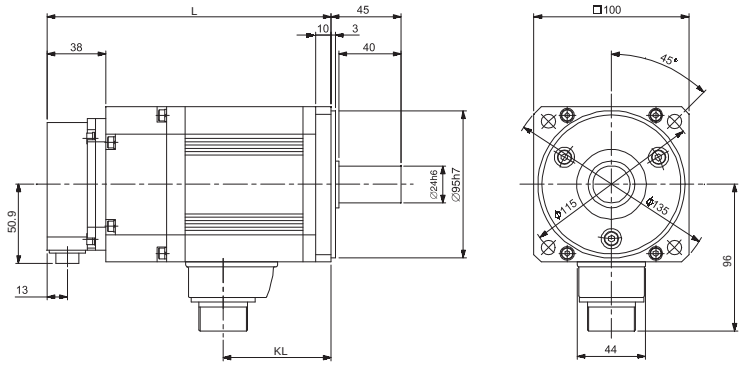


Type	L [mm]	KL [mm]	X [mm]
HF-SP202 (B)	143.5 (193.0)	79.8	38.5 (45.5)
HF-SP352 (B)	183.5 (233.0)	119.8	38.5 (45.5)
HF-SP502 (B)	203.5 (253.0)	139.8	38.5 (45.5)
HF-SP702 (B)	263.5 (313.0)	191.8	38.5 (45.5)

Dimensions for motors with brake in brackets ( ).

Unit: mm

HC-RP103 (B), HC-RP153 (B), HC-RP203 (B)

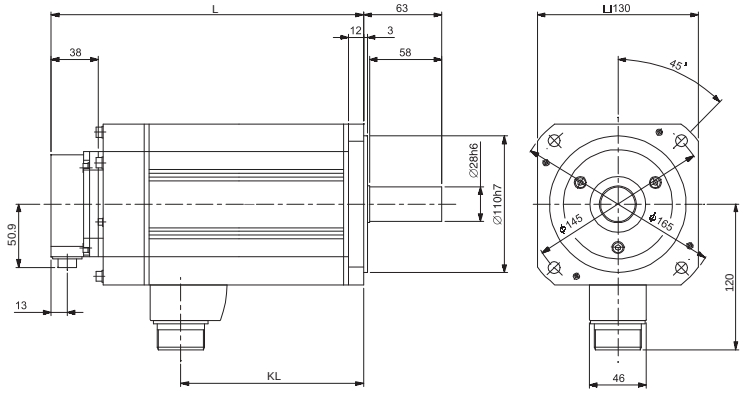


Type	L [mm]	KL [mm]
HC-RP103 (B)	145.5 (183.5)	69.5
HC-RP153 (B)	170.5 (208.5)	94.5
HC-RP203 (B)	195.5 (233.5)	119.5

Dimensions for motors with brake in brackets ( ).

Unit: mm

HC-RP353 (B), HC-RP503 (B)

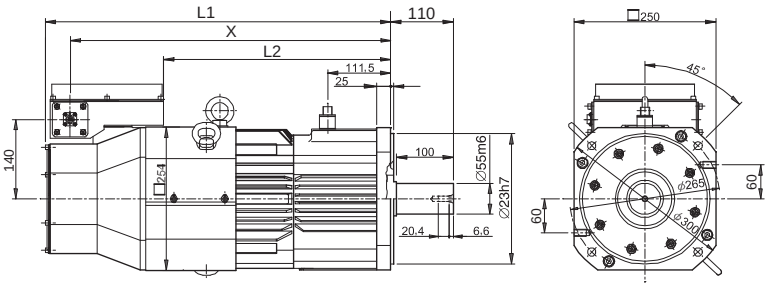


Type	L [mm]	KL [mm]
HC-RP353 (B)	215.5 (252.5)	148
HC-RP503 (B)	272.5 (309.5)	205

Dimensions for motors with brake in brackets ( ).

Unit: mm

HA-LP11K2[4] (B), HA-LP15K2[4] (B), HA-LP22K2[4] (B)



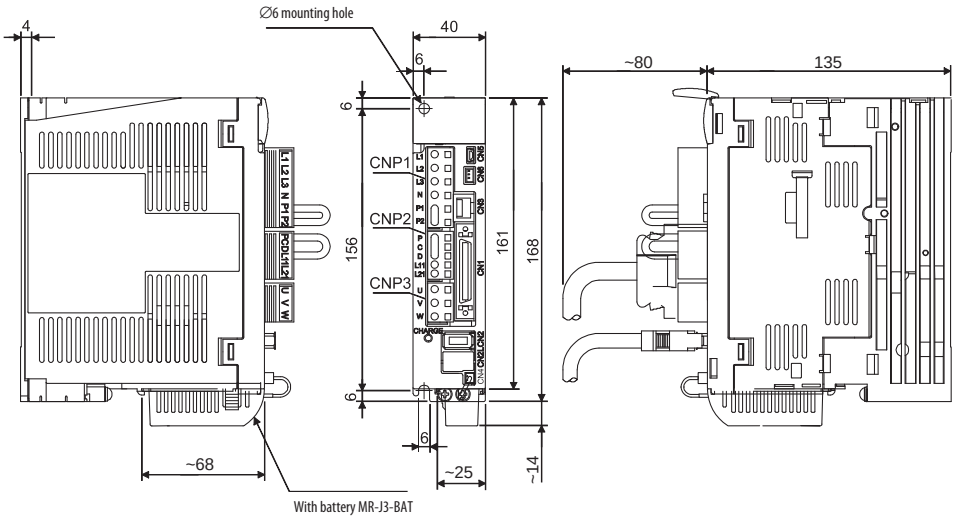
Type	L1 [mm]	L2 [mm]	X
HA-LP11K2[4] (B)	480 (550)	262 (334)	426 (498)
HA-LP15K2[4] (B)	495 (610)	289 (400)	454 (565)
HA-LP22K2[4] (B)	555 (670)	346 (457)	511 (622)

Dimensions for motors with brake in brackets ( ).

Unit: mm

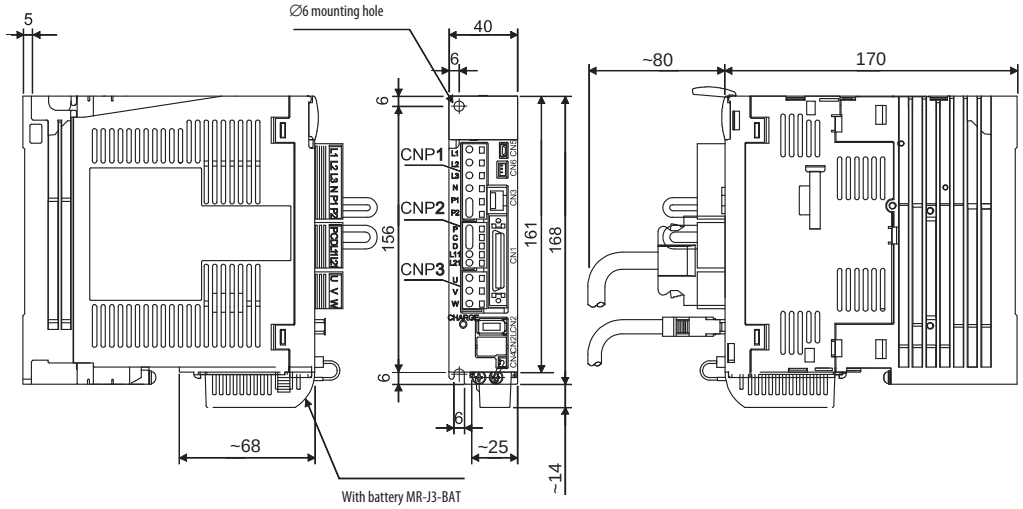
■ Servo amplifiers MR-J3-A/B

MR-J3-10A/B and MR-J3-20A/B



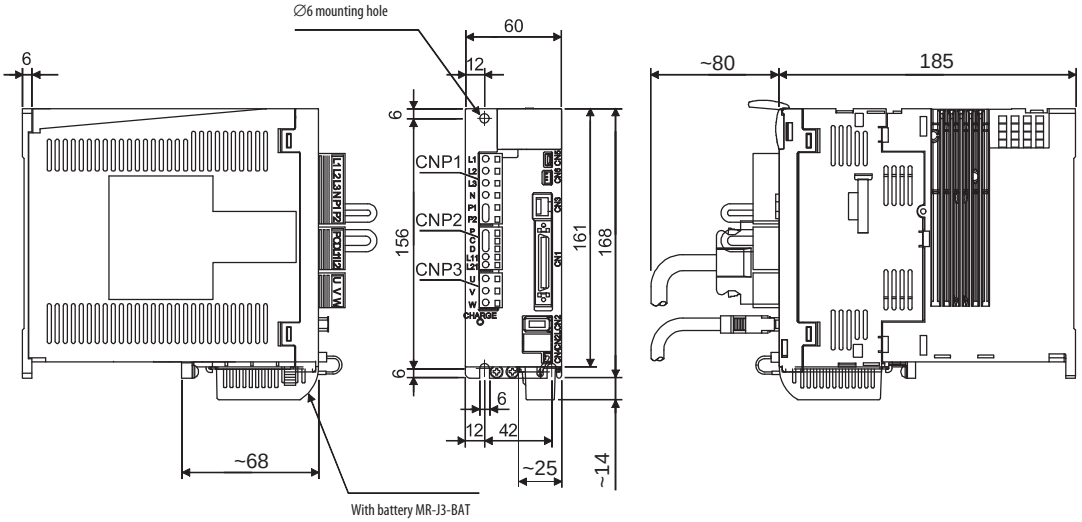
Unit: mm

MR-J3-40A/B and MR-J3-60A/B



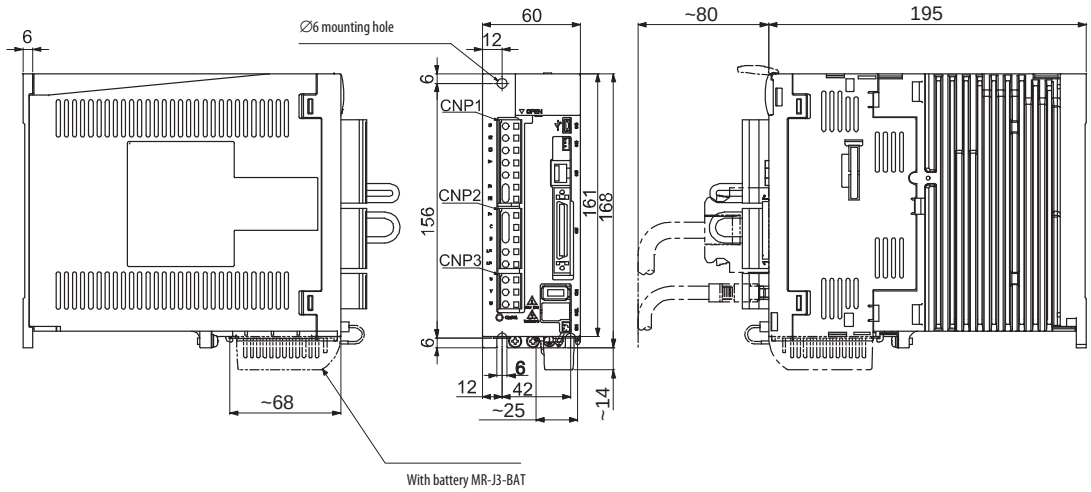
Unit: mm

MR-J3-A-70A/B and MR-J3-100A/B



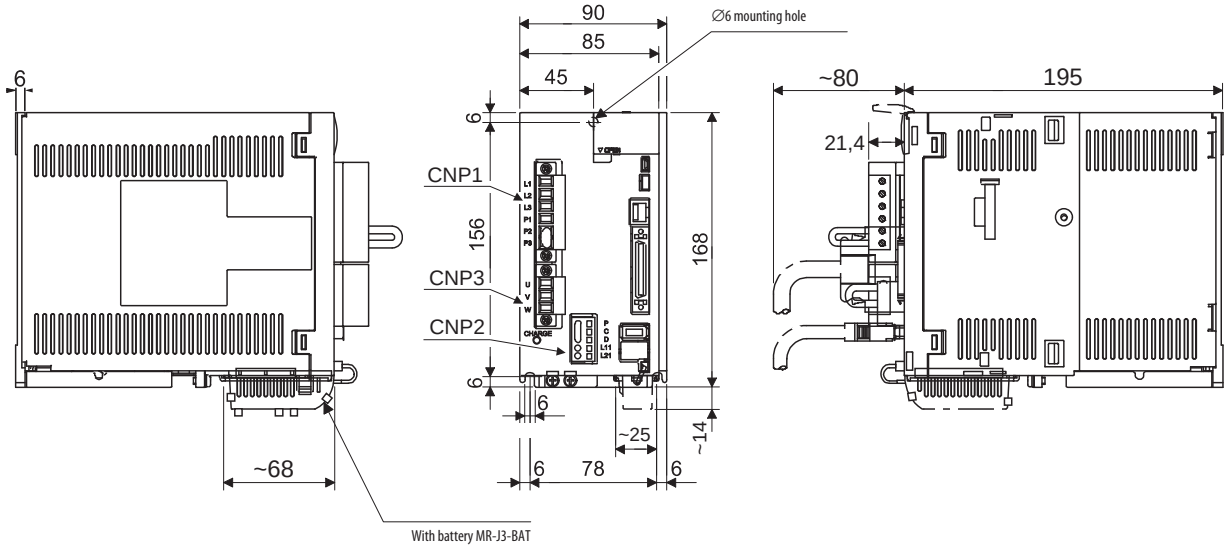
Unit: mm

MR-J3-60A4/B4 and MR-J3-100A4/B4



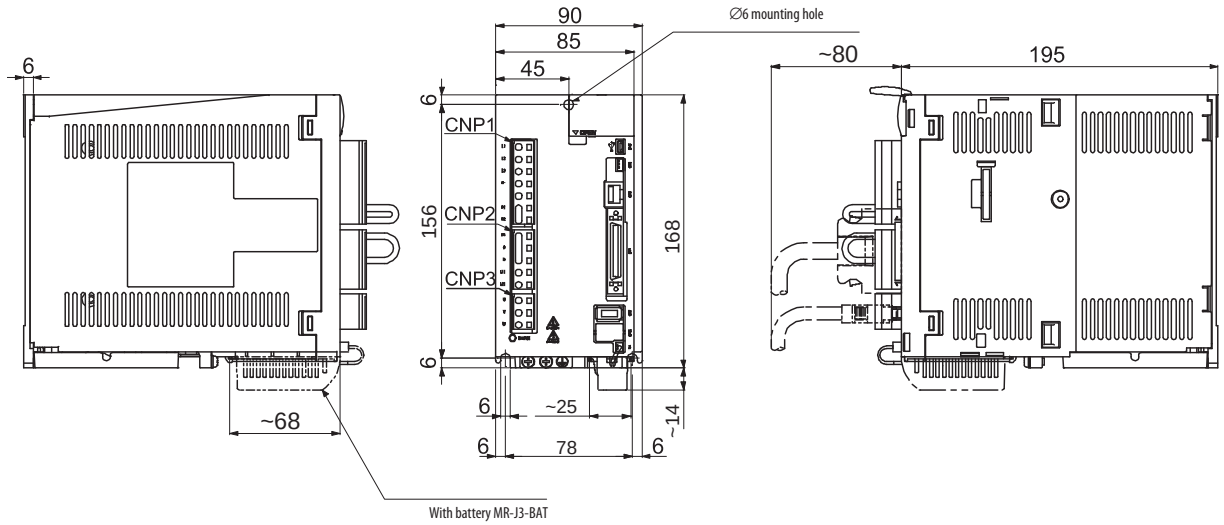
Unit: mm

MR-J3-200A/B and MR-J3-350A/B



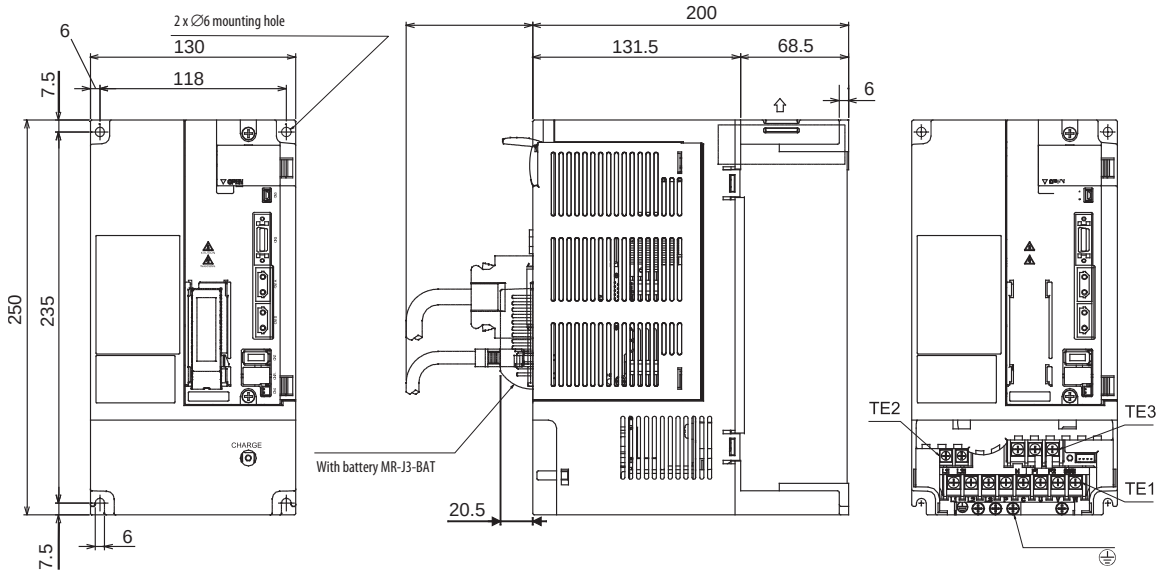
Unit: mm

MR-J3-200A4/B4



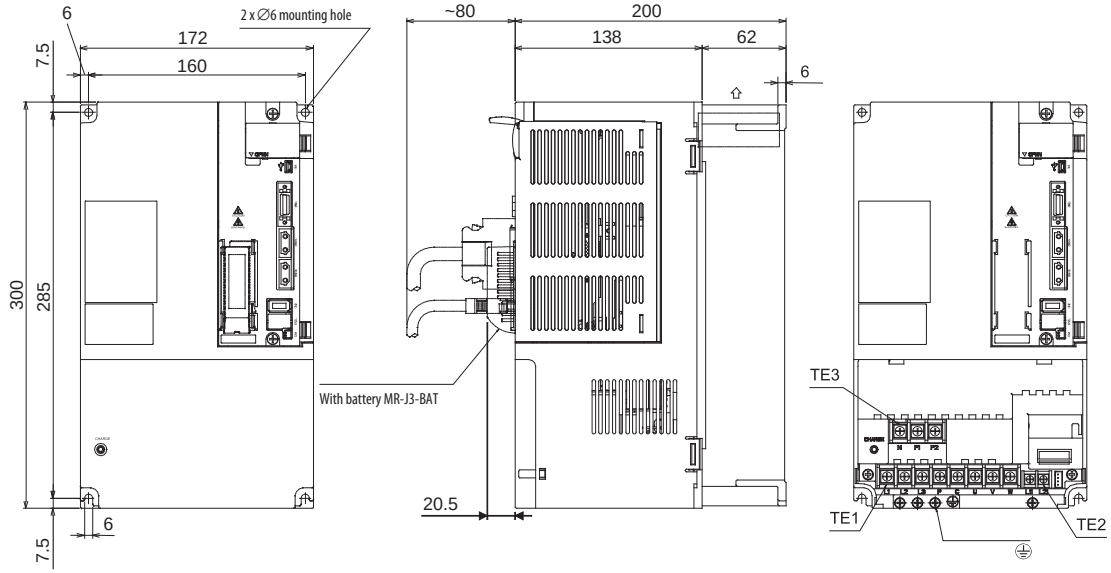
Unit: mm

MR-J3-500A/B, MR-J3-350A4/B4 and MR-J3-500A4/B4



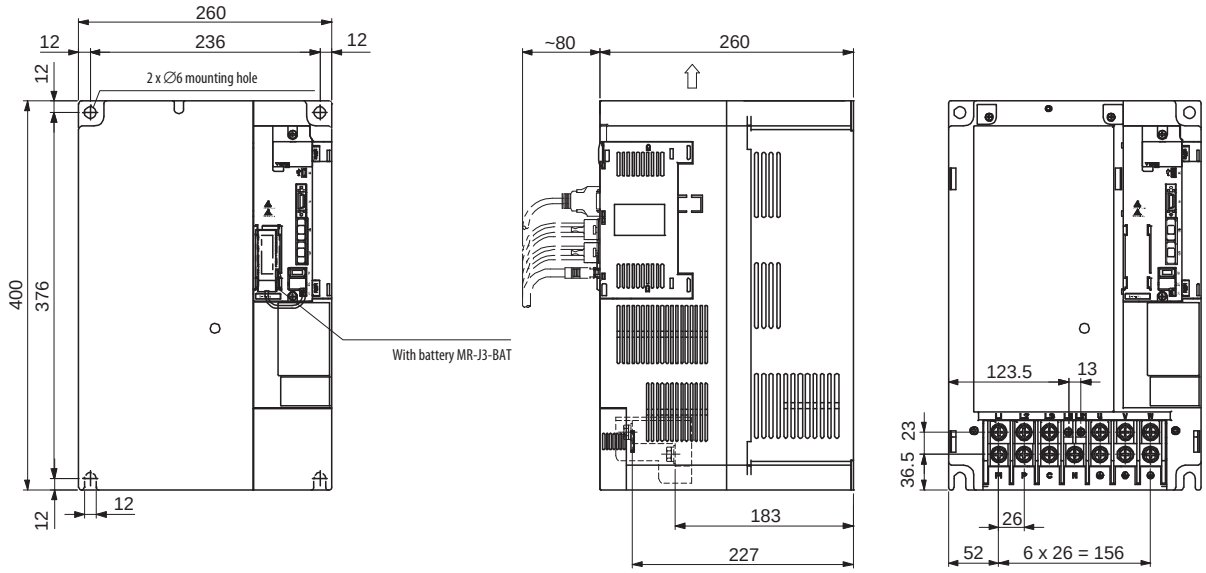
Unit: mm

MR-J3-700A/B and MR-J3-700A4/B4



Unit: mm

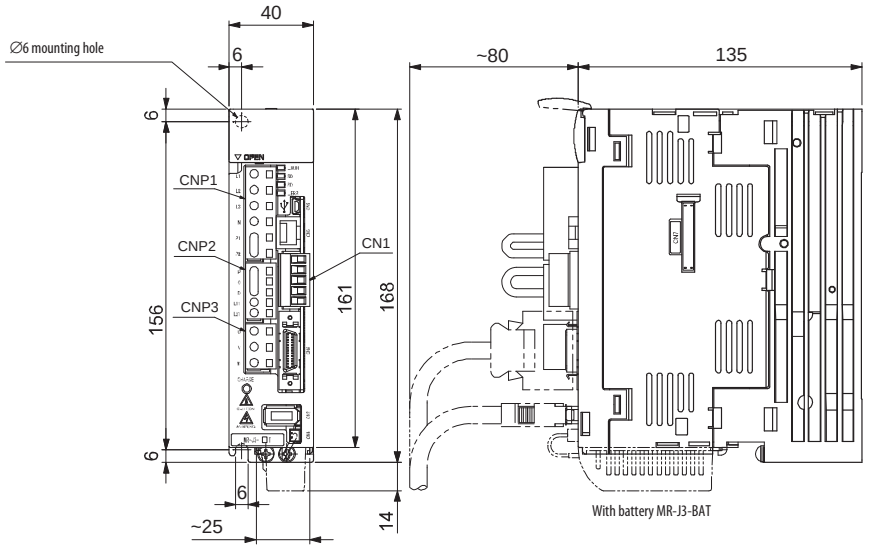
MR-J3-11KB to MR-J3-22KB and MR-J3-11KB4 to MR-J3-22KB4



Unit: mm

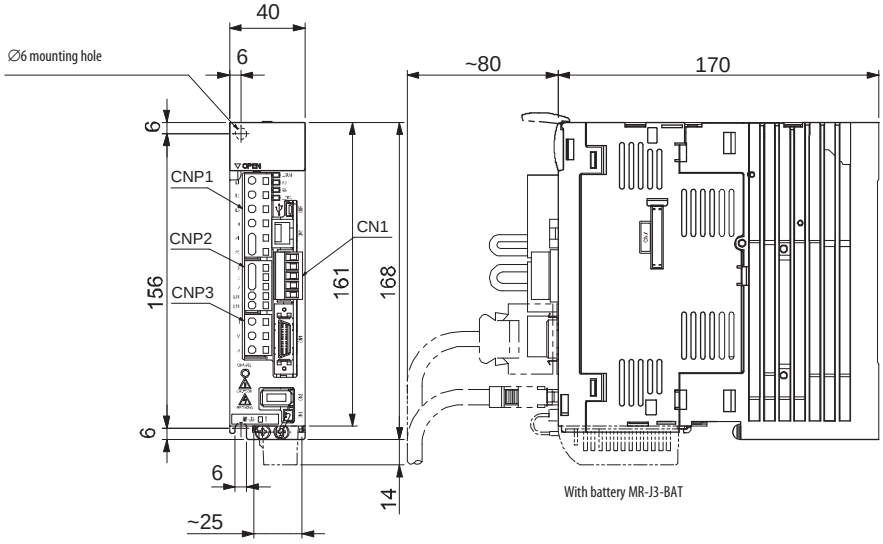
■ Servo amplifiers MR-J3-T

MR-J3-10T and MR-J3-20T



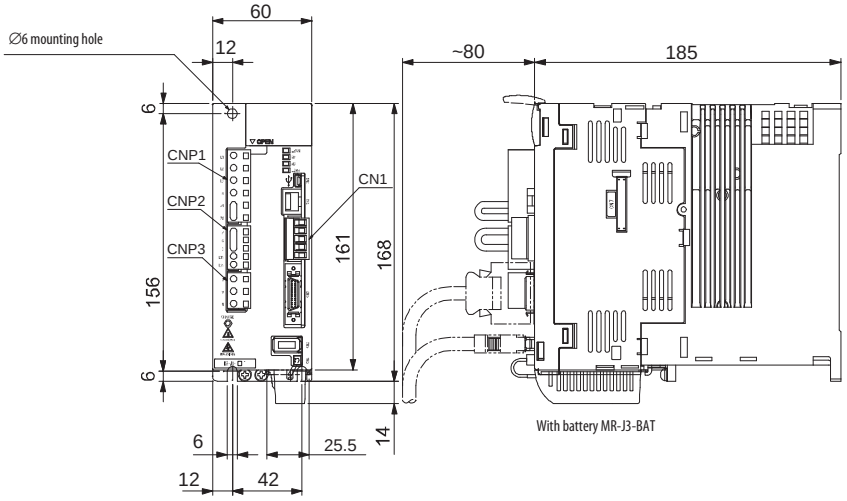
Unit: mm

MR-J3-40T and MR-J3-60T



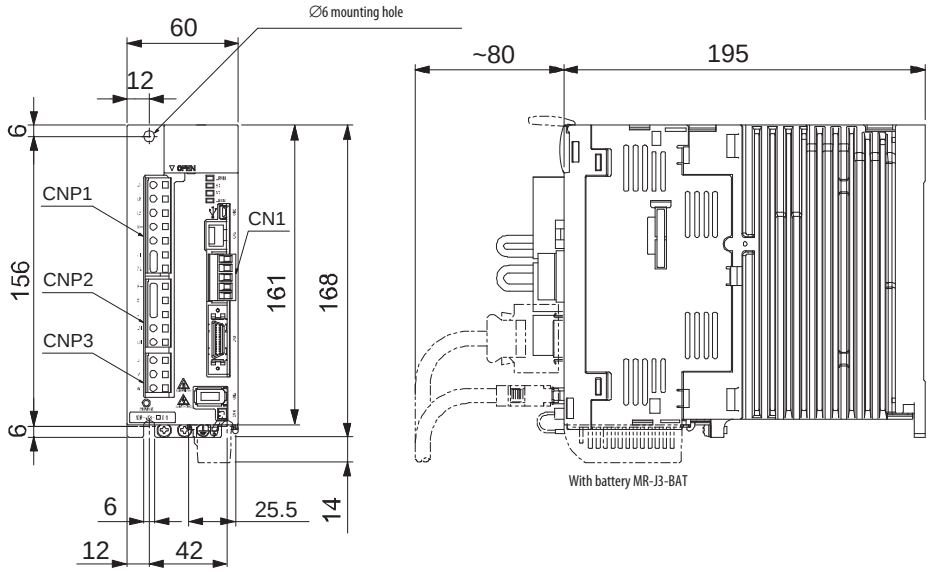
Unit: mm

MR-J3-70T and MR-J3-100T



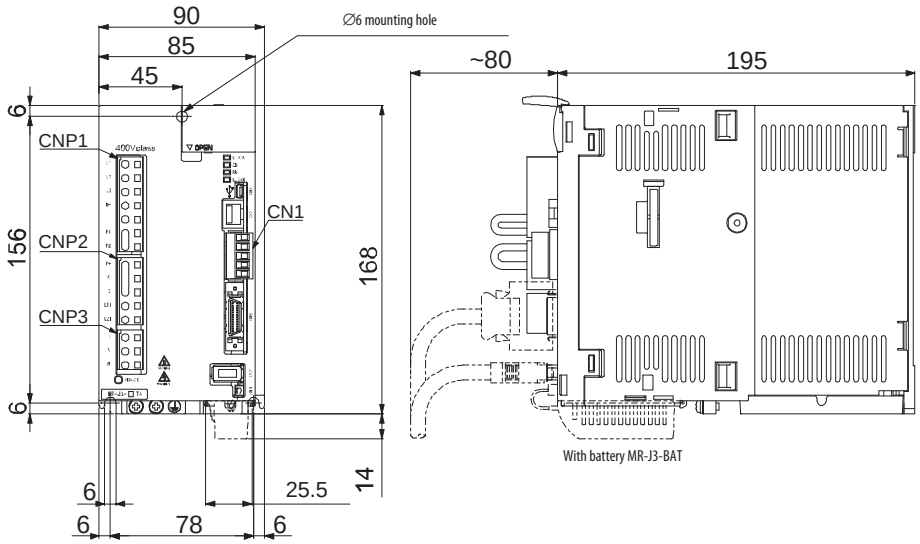
Unit: mm

MR-J3-60T4 and MR-J3-100T4



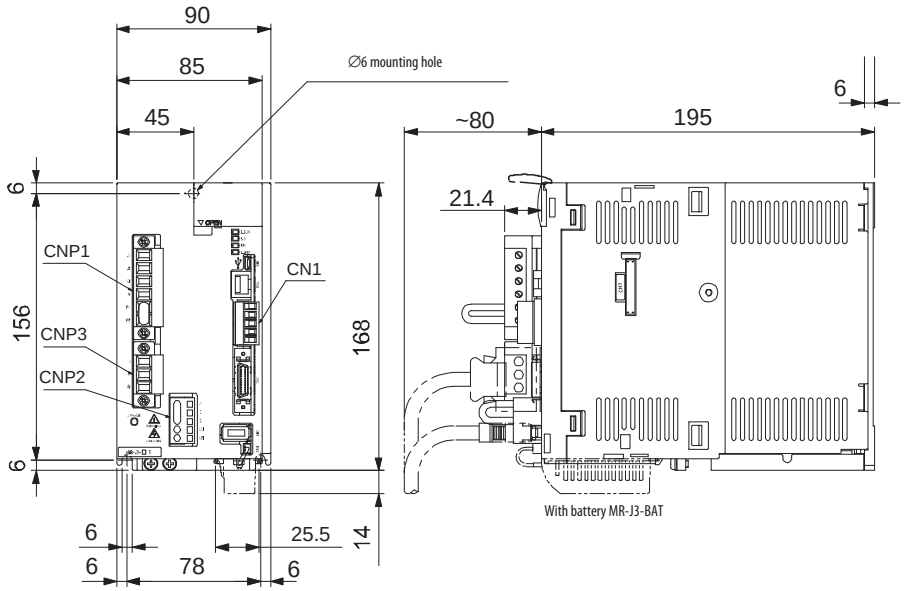
Unit: mm

MR-J3-200T(4)



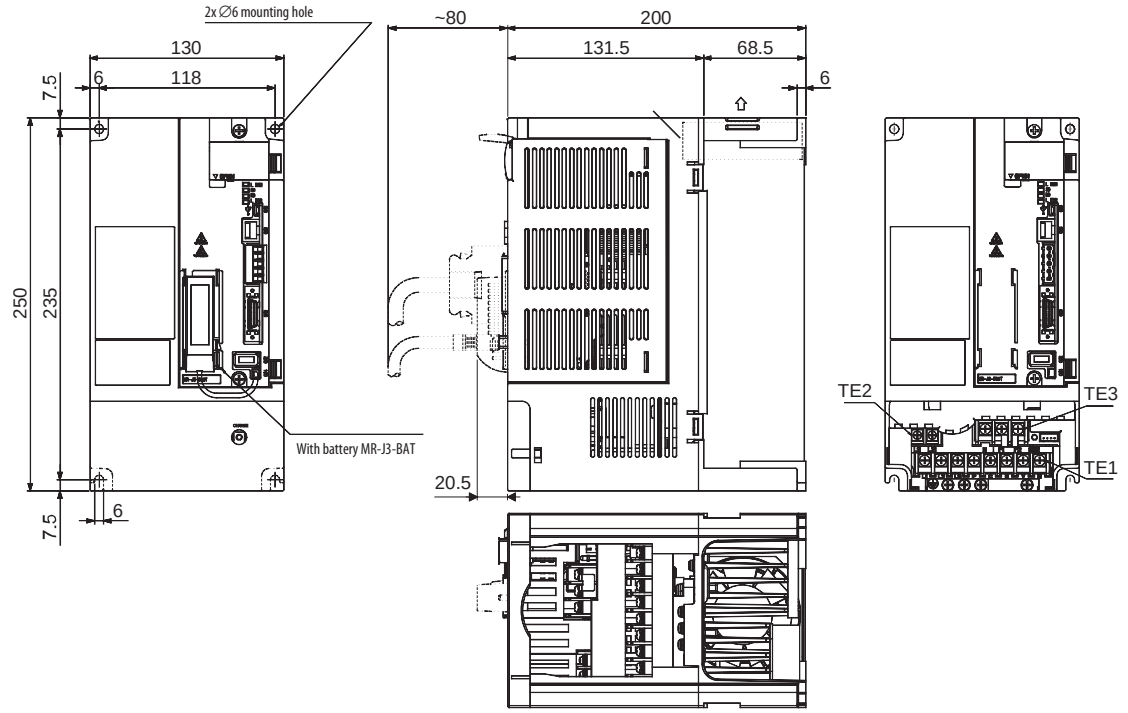
Unit: mm

MR-J3-350T



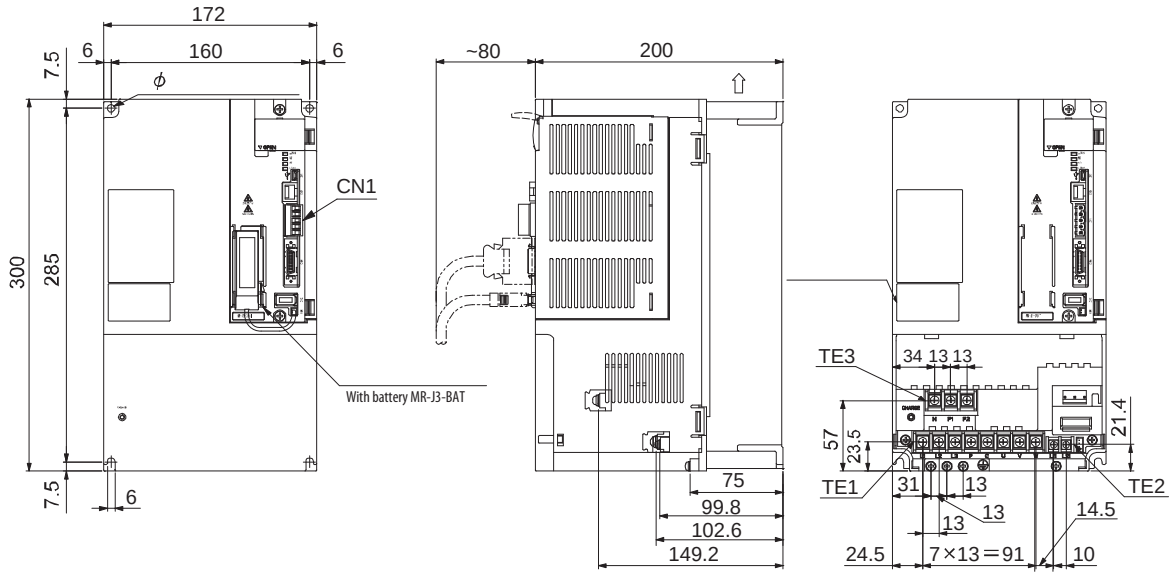
Unit: mm

MR-J3-350T4 and MR-J3-500T(4)



Unit: mm

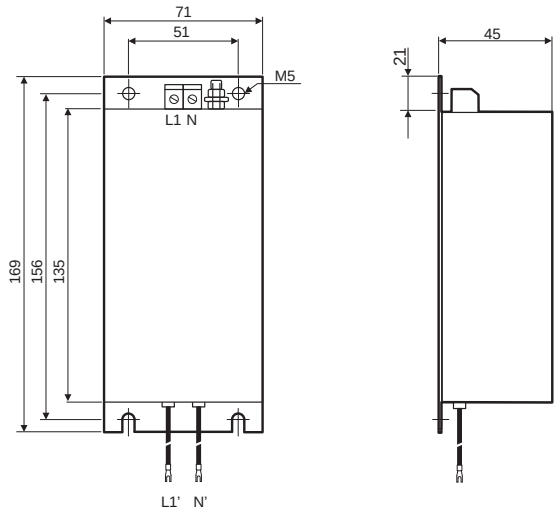
MR-J3-700T(4)



Unit: mm

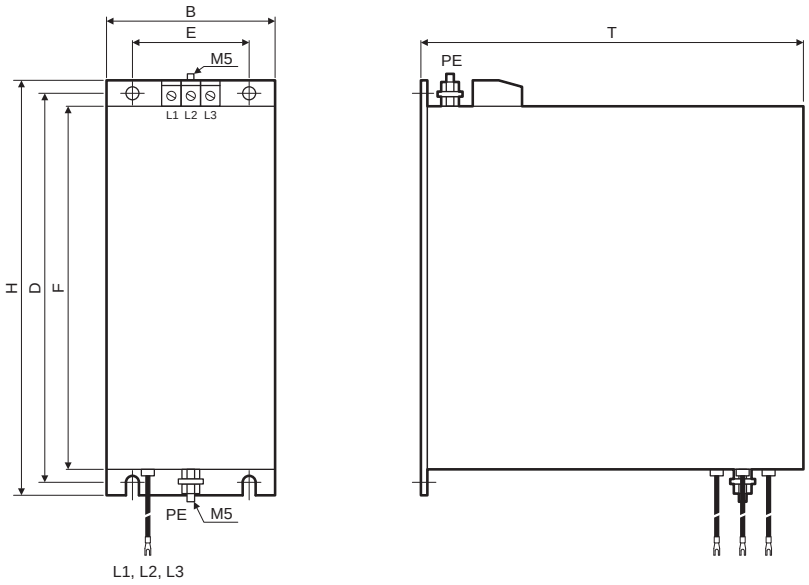
■ Noise Filters

MF-2F230-006.230MF



Unit: mm

MF-3F480-□□□MF

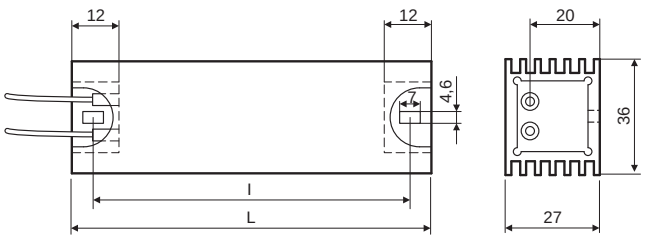


Type	H	B	T	D	E	F
MF-3F480-010.230	168	45	135	156	36	140
MF-3F480-025.230	168	75	195	156	60	140
MF-3F230-050.230	250	75	200	235	45	222

Unit: mm

■ Brake Resistors

MR-RFH, MR-PWR-R



Type	L	I
MR-RFH75-40	90	79
MR-RFH220-40	200	189
MR-RFH400-13	320	309
MR-RFH400-6.7	320	309
MR-PWR-R-T150-270	90	79
MR-PWR-R-T400-120	200	189
MR-PWR-R-T600-80	320	309
MR-PWR-R-T600-47	320	309
MR-PWR-R-T600-26	320	309

Unit: mm

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