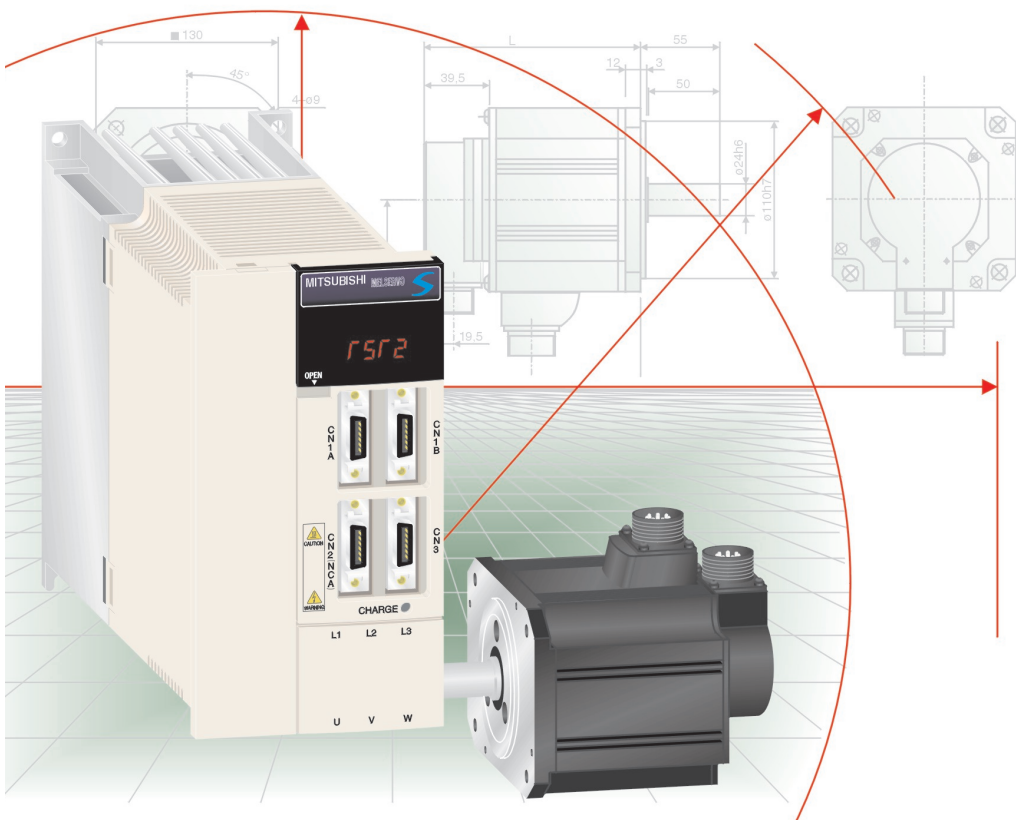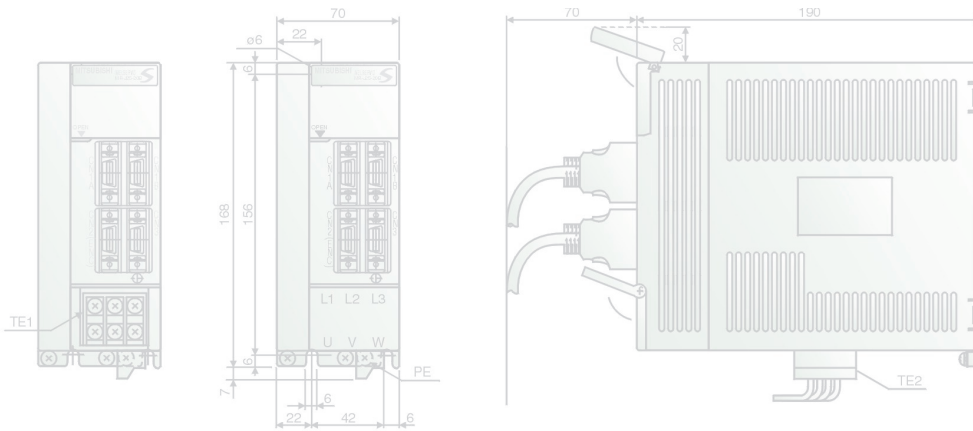# MITSUBISHI ELECTRIC

Servo Amplifiers & Motors

MELSERVO MR-J2-SUPER

Technical Catalogue

2002

The Servo Intelligence: MR-J2-Super

Servo technology that does more

The Mitsubishi Electric servo product line meets the demands for miniaturization and constantly decreasing cycle times for servo drives at the same time.

It provides the highest synchronization, extreme accuracy, and shortest positioning times. Its name is our program: MR-J2-Super.

Further Publications within the Factory Automation Range

Technical Catalogues

Technical Catalogues Inverters

Product catalogues for the frequency inverters FR-A 540 (L-G), FR-E 500, FR-F 500 and FR-S 500 EC, control panels, and accessories

Technical Catalogue Motion Controller

Product catalogues for motion controllers of the MELSEC A and the MELSEC System Q series, motion control software and accessories

Technical Catalogues PLC

Product catalogues for programmable logic controllers and accessories for the MELSEC series

Technical Catalogue Networks

Product catalogue for Master and Slave modules as well as accessories for the use of programmable logic controllers in open networks and MELSEC networks

Technical Catalogue HMI

Product catalogue for operator terminals, process visualisation and programming software as well as accessories

Additional Services

You will find current information on updates, alterations, new items, and technical support on MITSUBISHI ELECTRIC's web pages (www.mitsubishi-automation.com).

The products section of the MITSUBISHI home site includes various documentations of the whole product range by MITSUBISHI ELECTRIC as well as the current version of this catalogue on hand. All manuals and catalogues can be downloaded. The content is updated daily and to date is provided in German and English.

About this product catalogue

Due to the constantly growing product range, technical alteration, and new or changed characteristical features, this catalogue is updated frequently.

Texts, figures and diagrams shown in this product catalogue are intended exclusively for explanation and assistance in planning and ordering the servo motors and amplifiers of the MELSERVO series and the associated accessories. Only the manuals supplied with the units are relevant for installation, commissioning and handling of the units and the accessories. The information given in these documentations must be read before installation and commissioning of the units or software.

Should questions arise with regard to the planning of modules described in this product catalogue, do not hesitate to contact the german branch of the MITSUBISHI ELECTRIC EUROPE B.V. in Ratingen or one of its distributors (see cover page).

SERVO AMPLIFIERS MELSERVO MR-J2S AND SERVO MOTORS

BASICS

Overview of all Features
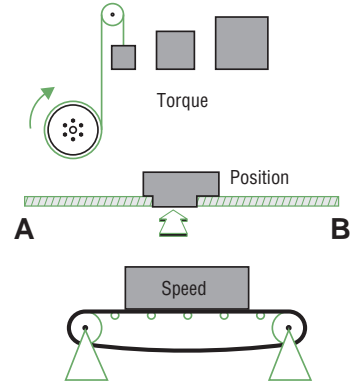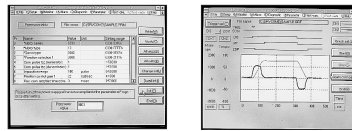
Compliant and safe

Satisfies global industrial standards

The MR-J2S can be used with the confidence of knowing it satisfies global industrial standards, including EN and UL.

Enhanced ability to withstand environmental hazards

HC-SFS and HC-RFS series are rated IP65 as standard equipment.

Separate wiring for the control power supply

The control power supply of the servo amplifier is wired separately, facilitating to turn OFF the main circuit only, when an alarm is triggered.

Compact and flexible

More compact servo motors

Mitsubishi´s servo motors keep getting smaller:
The ultra-compact HC-MFS, HC-KFS series, the low-inertia HC-RFS series, and the medium-inertia HC-SFS series.

A wide variety of motors including models with brakes

A broad line-up of servo motors including models with brakes is available. Users can choose the motor series that best suits the machine being used.

Fully equipped

Absolute encoder as standard

The MR-J2S can be easily switched to absolute encoding, which requires no return to home, by merely adding a battery to the servo amplifier and without changing the servo motor.

Personal computer interface is standard equipment

The MR-J2S comes with an RS232C/RS422 serial communications connector as standard equipment, enabling users to connect a personal computer to the MR-J2S to perform setup and to enter parameters.

Dynamic brake function

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

Integrated regenerative resistor

Regenerative resistor is integrated, eliminating the need for an external regeneration unit during normal operation.

Easy operation

Model adaptive control

Because the MR-J2S operates in quick response to commands, it offers highly responsive and stable operation, unaffected by machine systems.

Servo-lock anti-microvibration function

Microvibrations in the servo-lock state are suppressed, providing the construction of stable 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.

Encoder serial communications

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

Real-time auto-tuning

The servo makes automatic gain adjustments even when the load´s inertia changes.

Switch between torque control mode and other control modes

Switching between torque, speed, and position control modes is supported for the first time.

Control signal assignment feature (A type)

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

Command pulse train types (A type)

The MR-J2S handles three command types: Encoder signals, pulse and direction, and CW/ CCW pulse train.

SSCNET motion bus type (B type)

SSCNET series systems bring you the best in easy to use motion control solutions.

MITSUBISHI ELECTRIC

MELSERVO J2-Super Series

The next generation of MELSERVO:

Embodying an ever more exacting pursuit of higher performance and ease of use. The culmination of Mitsubishi servo technology is realized in the new J2-Super general-purpose AC servo. In addition to being a global product that satisfies EN, UL, and other global industrial standards, the J2-Super's wide range of applications elevates the AC servo playing field to a new plane. The J2-Super is suited for use in intelligent advanced dynamic applications and comes with an absolute encoder as standard. It is fully equipped with the latest advanced features, including Mitsubishi's unique adaptive vibration supression control, real-time auto-tuning, and automatic motor recognition.

With its enhanced features and ease of use, the J2-Super was well worth waiting for - pointing the way towards a new vision of the future.
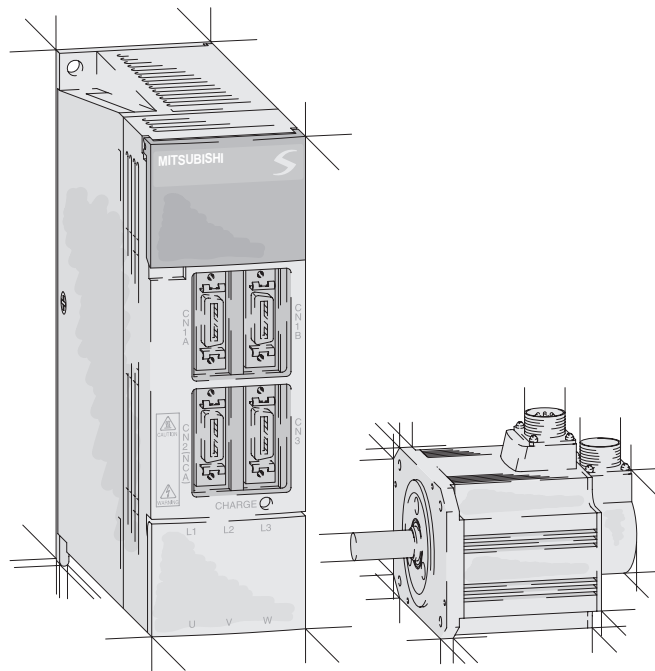
Enhanced Safety and Ability to withstand Environmental Hazards

Satisfies overseas industrial standards

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

An EMC filter (optional) is available for meeting EN-standard 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-J2-Super units meet low-voltage directives (LVD), UL and cUL.
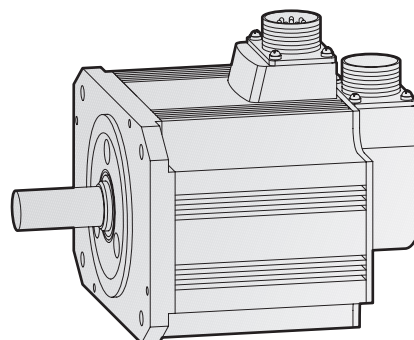
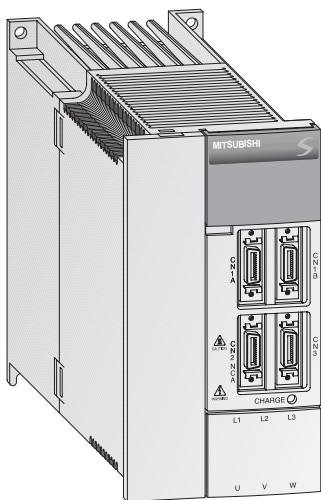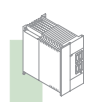### IP65 is standard equipment (HC-SFS, HC-RFS series)

The HC-SFS and HC-RFS series of servo motors come with IP65 as standard equipment, enhancing their ability to withstand any environment.

The HC-KFS and HC-MFS series of servo-motors meet IP55 standard.

Servo Amplifiers MELSERVO J2-Super

Features

MELSERVO amplifiers can be used for global applications for superb operation in the toughest environments.

● Adaptive vibration supression control function
● Separate wiring of the control power supply
● High responsiveness
● Real-time auto-tuning
● Torque control function
● Servo-lock anti-vibration function
● Personal computer interface
● Automatic motor recognition
● Satisfies global industrial standards

High-performance CPU

The application of a high-performance CPU has enhanced response significantly. The speed loop frequency was raised to 550 Hz or more (more than 2 times faster than previous models). Thus the MR-J2-Super series are the best units for use in high-speed positioning applications.

Functionality of the Servo Motors
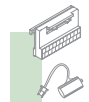
Absolute high-resolution encoder as standard equipment

Inclusion of an absolute high-resolution encoder (131072 p/rev) as standard equipment 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 output control.

Design achievement

Through a molding process that uses newly developed high thermal conductivity resins, the HC-MFS and HC-KFS series of servo motors achieves enhanced motor cooling performance and an ultra-compact design.

This makes it well suited to ultra-low-inertia, high-frequency applications.

Minaturized, low-inertia motor

The new HC-KFS series miniaturized motor is the same size as the HC-MFS series, yet the motor inertia moment is 3 to 5 times larger compared to the HC-MFS series, marking it suitable for machinery with higher load inertia moment ratios as well as machinery with higher rigidity.
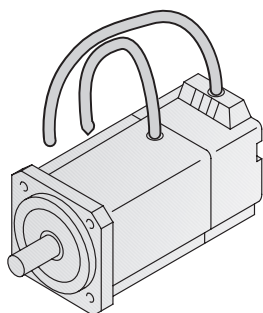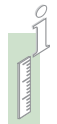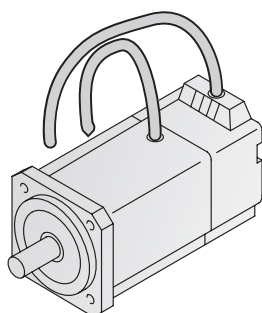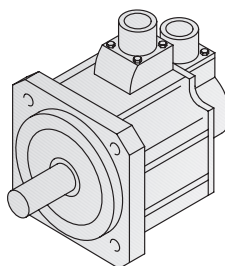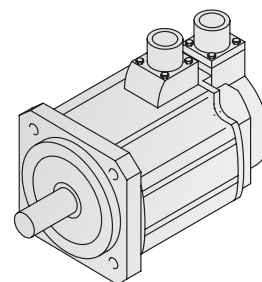
| Series HC-MFS | Series HC-KFS | Series HC-SFS | Series HC-RFS |

Control Functions with Enhanced Tuning Technology

Real-time auto-tuning and high responsiveness

With the advanced real-time auto-tuning, the unit is automatically adjusted to the optimal setting without any need for the gain adjustment unique to servomotors.

The sensitivity of the real-time auto-tuning can be changed in accordance with machine rigidity, enabling the MR-J2-Super to accommodate an even wider range of machinery (response setting selection).

Model adaptive control provides the realisation of a highly responsive and stable system.

Even when acceleration/deceleration torque is short or friction on the vertical axis is large, the load inertia moment is adjusted to the optimum value automatically.

## Separate wiring for the control power supply

Wiring of the control power supply is separated from that for the main circuit power supply. When an alarm is triggered, the main circuit power supply can be turned off and the control power supply left on, making it possible to confirm the alarm message and operate the unit with confidence.

Adaptive vibration suppression control function

All servo systems performance are restricted by machine resonance. This adaptive vibration suppression control function breaks this barrier to give further stability at higher response.

Machine resonance suppression filter

Two points can be set to match the machine resonating point. This filter can be combined with the adaptive vibration suppression control function as well, however, only the point can be set for the machine resonance suppression filter at that time.

HC-MF13 previous auto-tuning (unbalanced load, high friction)
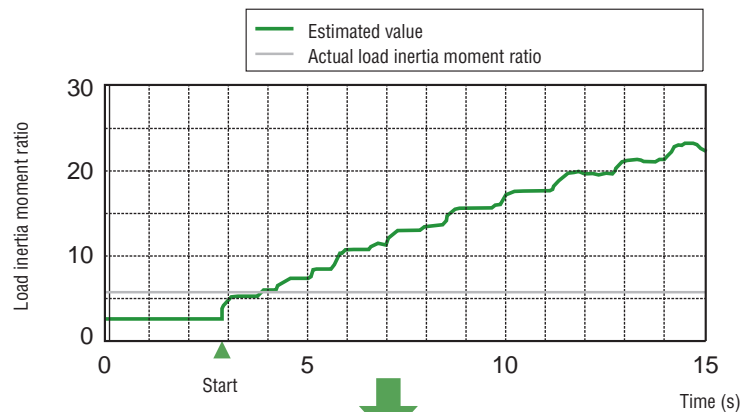
HC-MFS13 advanced real-time auto-tuning (unbalanced load, high friction)

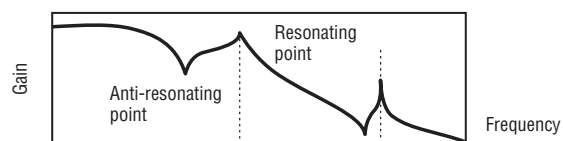Machine resonance suppression filter is set automatically as the sensor searches for the resonating point.

Start of adaptive vibration suppression control function
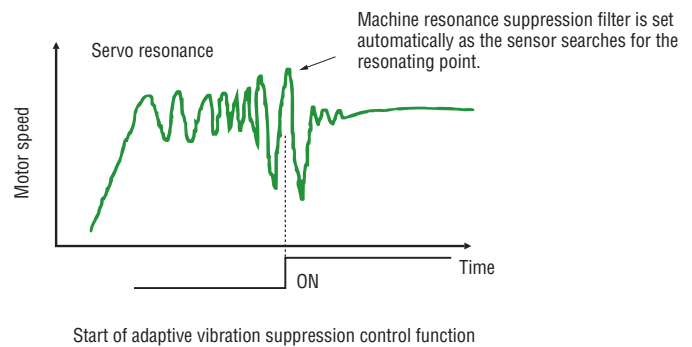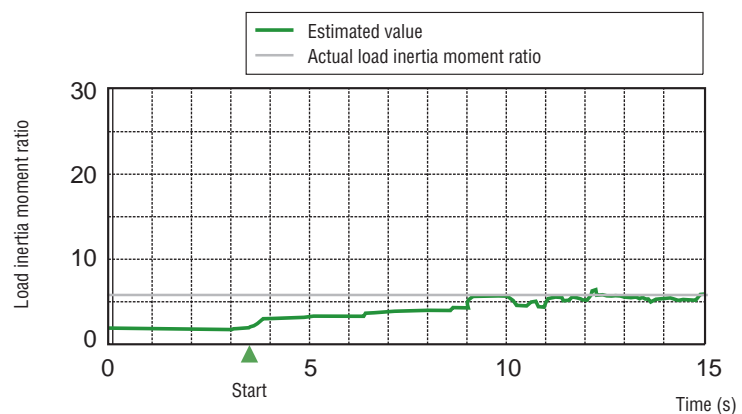
(Machine resonance characteristics)

(Machine resonance suppression filter characteristics)
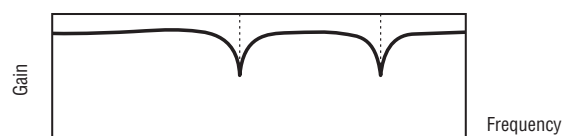
User-friendly Operation

Personal computer interface

The MR-J2S comes with RS232C/RS422 serial communications as a standard feature, enabling users to connect a personal computer to the MR-J2S.

Using a personal computer makes it possible to run the optional setup software which enables the user to setup the servo in an easy and comfortable way.

Automatic motor recognition feature

Incorporating motor identification information into the encoder means that the servo amplifier can automatically recognise the drive motor. When the servo amplifier detects a mismatch, an alarm is triggered, eliminating the possibility of an error and the need for setting parameters.
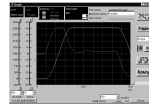
Graph display window
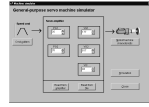
Machine simulator window
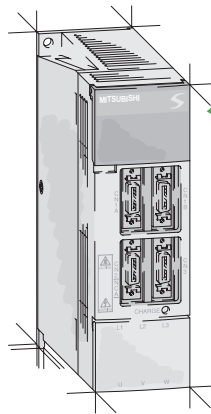
Serial communication

Feedback pulse
Motor capacity
Positioning data (ABS data)
Magnetic pole detection
Alarm information
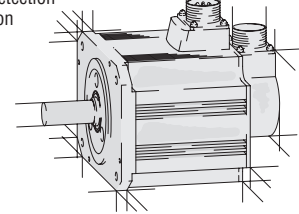
Setup Software for Optimum Adjustment Together with Mechanical System

The comfortable setup software for WINDOWS based personal computers allows a perfect tuning of the MR-J2S and the connected servomotors. This software makes it easy to do monitor, diagnosis, reading and writing of parameters, and test operations from the setup via a personal computer.

Machine analysis function

The resonant frequency of the mechanical system can be analyzed by a simple connection of the servomotor. The analysis is completed within 30 seconds.

Machine simulation function

The results of the machine analyzer are read into a simulation model, and the response of the mechanical system can be predicted.

You can look on the simulated waveforms of speed, torque and droop pulse etc. while changing the command pattern, servomotor capacity and gains.

Gain search function

The software changes gains automatically and searches out the value that ensures the shortest possible settling time with a minimum overshoot and vibration.

Ability is best shown, when high-level adjustment is required.

Connections with Peripheral Equipment

Peripheral equipment is connected to the MR-J2-Super as shown below.

Connectors, options, and other necessary equipment are available to allow users to easily to setup the MR-J2S and begin using it right away.

④ Power supply

⑤ No-fuse circuit breaker (NFB)

⑥ Magnetic contactor (MC)

EMC filter (optional)

⑦ Upper controller (connector CN1A)

① MR-J2S servo amplifier MR-J2S-□A
Display panel
Setting section
Battery compartment

⑧ Junction terminal block (optional)

⑨ Control signal (optional/for operation panel; connector CN1B)

⑩ RS232C/RS422 communications (optional; connector CN3)

②

③ Control circuit terminal block

Encoder cable

Servo motor power lead

② Servo motor and encoder (connector CN2)

① MR-J2 servo amplifier MR-J2S-□A

● **Display panel**
Displays monitoring data, parameters, and alarms.

● **Setting section**
Parameter settings are performed with push buttons, and monitoring data is displayed.

● **Charge lamp**
Goes on when the main circuit power supply is on. Do not plug/ unplug power lines when this light is on.

● **Battery compartment**
A battery (A6BAT) can be optionally installed in the holder if used as an absolute system (not required if used as an incremental system).

② Servo motor and encoder (connector CN2)

③ Control circuit terminal block

Used to connect the control circuit power supply and the regenerative brake option.

④ Power supply

3~, 200–230 V AC
1~, 230 V AC for Servo Drives ≤ 750 W

⑤ No-fuse circuit breaker (NFB)

Used to protect the power supply line.

⑥ Magnetic contactor (MC)

Used to turn OFF the power of the servo amplifier when an alarm has been triggered.

⑦ Upper controller (connector CN1A)

The J2 can be connected to any pulse train output controller (e.g. FX2N-10GM/-20GM, FX2N-1PG, A(1S)D75□, QD75P□).

⑧ Junction terminal block (optional)

All signals can be connected at this junction terminal block.

⑨ Control signal (optional/ for operation panel; connector CN1B)

Connects to the I/O port of the PLC or to the operation panel of the machine.
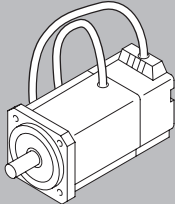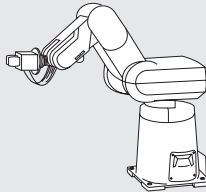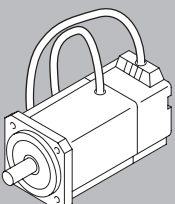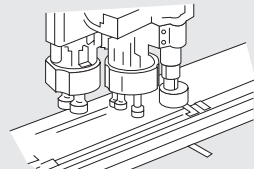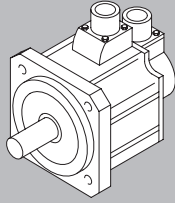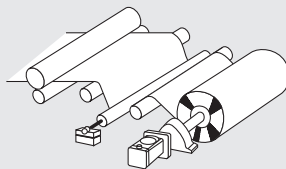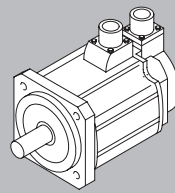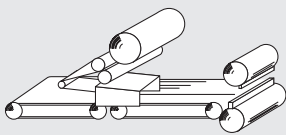
⑩ RS232C/RS422 communications (optional; connector CN3)

Connects the unit to a personal computer, enabling the user to perform monitoring, batch parameter entry and saving, graph display, test operation and advanced setup features.
Dedicated cables and setup software are also available.

Applications and Motor Models

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.	● LCD and 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-frequency operation directly connected to ball screw components.	● 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

MITSUBISHI ELECTRIC

Servo Motor Features and Amplifier Models

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

For further details to the servo amplifiers please refer to page 22. The detailed specifications of all servo motors are listed on pages 13 to 16.
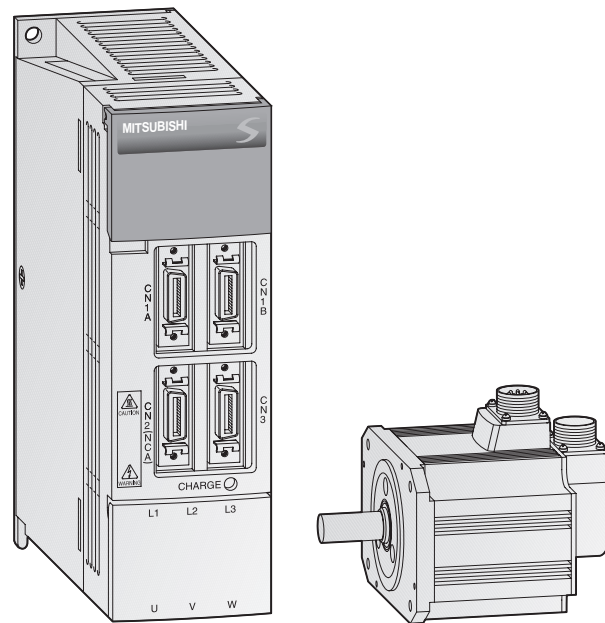
Motor series	Rated speed [r/min]	Rated output capacity [kW]	Servo motor model	With electromagnetic brake (B) and absolute encoder	Protective structure	Amplifier pairing MR-J2S									
						10A	20A	40A	60A	70A	100A	200A	350A	500A	700A
HC-KFS K	3000	0.05	HC-KFS053	●	IP55	●									
		0.1	HC-KFS13			●									
		0.2	HC-KFS23				●								
		0.4	HC-KFS43					●							
		0.75	HC-KFS73							●					
HC-MFS M	3000	0.05	HC-MFS053	●	IP55	●									
		0.1	HC-MFS13			●									
		0.2	HC-MFS23				●								
		0.4	HC-MFS43					●							
		0.75	HC-MFS73							●					
HC-SFS S	2000	0.5	HC-SFS52	●	IP65				●						
		1.0	HC-SFS102								●				
		1.5	HC-SFS152									●			
		2.0	HC-SFS202									●			
		3.5	HC-SFS352										●		
		5.0	HC-SFS502											●	
		7.0	HC-SFS702												●
HC-RFS R	3000	1.0	HC-RFS103	●	IP65							●			
		1.5	HC-RFS153									●			
		2.0	HC-RFS203										●		
		3.5	HC-RFS353											●	
		5.0	HC-RFS503											●	

Model Designation of Servo Motors
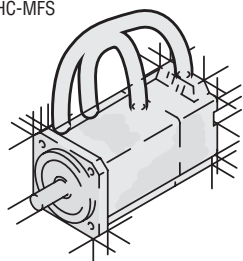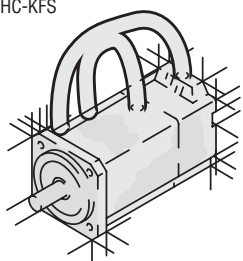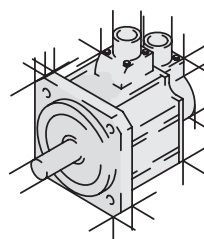
Series HC-MFS   Series HC-KFS   Series HC-SFS   Series HC-RFS
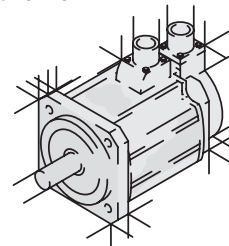
HC-KFS ☐☐☐

Series
HC-MFS
HC-KFS
HC-SFS
HC-RFS

Code	Rated output [W]	Code	Rated output [W]	Code	Rated output [W]
05	50	5	500	20	2000
1	100	7	750	30	3000
2	200	10	1000	50	5000
4	400	15	1500	70	7000

Code	Rated speed [rpm]
2	2000
3	3000

Code	Electromagnetic brake
—	—
B	●

Model Designation of Servo Amplifiers
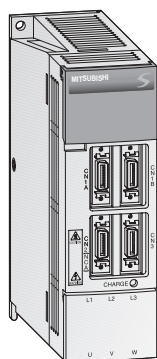
MR-J2S-10A und 20A   MR-J2S-40A–100A   MR-J2S-200A–700A

MR-J2S - ☐ A

Series
MR-J2S

Code	Compatible servo motors				Code	Type
	HC-MFS☐	HC-KFS☐	HC-SFS☐	HC-RFS☐		
10	053 / 13	053 / 13	—	—	A	Standard general-purpose AC servo
20	23	23	—	—	B	SSCNET
40	43	43	—	—		
60	—	—	52	—		
70	73	73	—	—		
100	—	—	102	—		
200	—	—	152 / 202	103 / 153		
350	—	—	352	203		
500	—	—	502	353 / 503		
700	—	—	702	—		

■ HC-KFS (B) Series Servo Motor Specifications

Servo motor model ①		HC-KFS053 (B) ⑦	HC-KFS13 (B) ⑦	HC-KFS23(B) ⑦	HC-KFS43 (B) ⑦	HC-KFS73(B) ⑦
Servo amplifier model		MR-J2S-10A/B	MR-J2S-10A/B	MR-J2S-20A/B	MR-J2S-40A/B	MR-J2S-70A/B
Power facility capacity [kVA] ②		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]		4500	4500	4500	4500	4500
Permissible instantaneous rotation speed		5175	5175	5175	5175	5175
Rated current [A]		0.83	0.71	1.1	2.3	5.8
Maximum current [A]		2.5	2.2	3.4	6.9	18.6
Regeneration braking frequency [1/min] ③	Without additonal resistor	●④	●④	●④	220	190
	MR-RFH75 (150 W)	●④	●④	●④	2200	940
Moment of inertia J [×10^{-4} kg m^2]		0.053	0.084	0.42	0.67	1.51
Recommended load/ motor inertia ratio		Less than 15 times the servomotor´s inertia moment				
Speed/ position detector		Resolution per encoder/servomotor rotation: 131072 p/rev. (17 bits)				
Structure		Totally enclosed, non-ventilated (protection degree: IP55) ⑤				
Environment	Ambient temperature	Operation: 0 – 40 ℃ (no freezing). Storage: -15 – 70 ℃ (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/ vibration⑥	1000 m or less above sea level; X: 49 m/s^2 , Y: 49 m/s^2				
Weight [kg]	Standard motor	0.4	0.53	0.99	1.45	3.0
Order information	Art. no.	134872	134845	126013	134873	135968

① If used in location such as actual site of machinery where oil or water may contact the product, special specifeications apply, contact Mitsubishi Electric.

② The power facility capacity varies depending on the power supply's impedance.

③ The regenerative brake 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 rpm varies with the freqency or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating and do not exceed the permissible value.

④ There are no limits on regeneration frequency as long as the effective torque is within the rated torque range. However, the load/motor of inertia ratio must be 15 times or less.

⑤ The shaft-through portion and connector for cable terminal are excluded.

⑥ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracker 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.

⑦ For servo motors with electromagnetic brake please refer to page 17.

HC-KFS Series Servo Motor Torque Characteristics
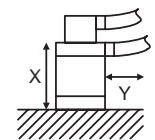
HC-KFS053 (B)

HC-KFS13 (B)

HC-KFS23 (B)

HC-KFS43 (B)

HC-KFS73 (B)
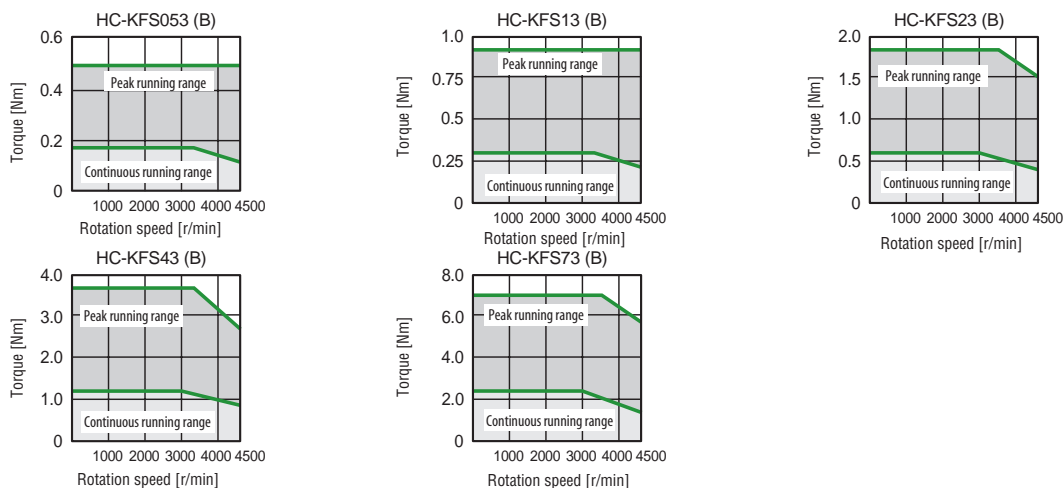
■ HC-MFS (B) Series Servo Motor Specifications

Servo motor model [1]		HC-MFS053 (B) [7]	HC-MFS13 (B) [7]	HC-MFS23 (B) [7]	HC-MFS43 (B) [7]	HC-MFS73 (B) [7]
Servo amplifier model		MR-J2S-10A/B	MR-J2S-10A/B	MR-J2S-20A/B	MR-J2S-40A/B	MR-J2S-70A/B
Power facility capacity [kVA] [2]		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]		4500	4500	4500	4500	4500
Permissible instantaneous rotation speed [rpm]		5175	5175	5175	5175	5175
Rated current [A]		0.85	0.85	1.5	2.8	5.1
Maximum current [A]		2.6	2.6	5.0	9.0	18
Regeneration braking frequency [1/min] [3]	Without additonal resistor	● [4]	● [4]	● [4]	1010	400
	With MR-RFH75 (150 W)	● [4]	● [4]	● [4]	● [4]	2400
Moment of inertia J [×10^{-4} kg m^2]		0.019	0.03	0.088	0.143	0.6
Recommended load/ motor inertia ratio		Less than 30 times th servomotor´s inertia moment				
Speed/ position detector		Resolution per encoder/servomotor rotation: 131072 p/rev (17 bits)				
Structure		Totally enclosed, non-ventilated (protection degree: IP55) [5]				
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 [6]	1000 m or less above sea level; X: 49 m/s^2 , Y: 49m/s^2				
Weight [kg]	Standard motor	0.4	0.53	0.99	1.45	3.0
Order information	Art. no.	134809	134852	134883	134810	134877

[1] If used in location such as actual site of machinery where oil or water may contact the product, special specifeications apply, contact Mitsubishi Electric.

[2] The power facility capacity varies depending on the power supply's impedance.

[3] The regenerative brake 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 rpm varies with the freqency or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating and do not exceed the permissible value.

[4] There are no limits on regeneration frequency as long as the effective torque is within the rated torque range. However, the load/motor of inertia ratio must be 30 times or less.

[5] The shaft-through portion and connector for cable terminal are excluded.

[6] The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracker 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.

[7] For servo motors with electromagnetic brake please refer to page 17.
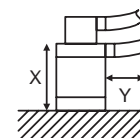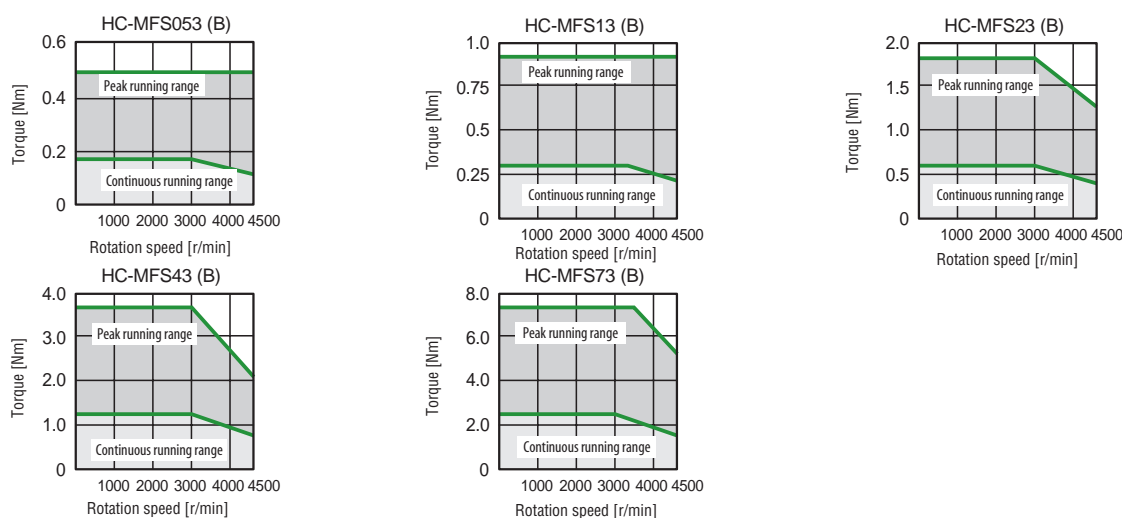
HC-MFS Series Servo Motor Torque Characteristics

HC-MFS053 (B)

HC-MFS13 (B)

HC-MFS23 (B)

HC-MFS43 (B)

HC-MFS73 (B)

MITSUBISHI ELECTRIC

■ HC-SFS Series Servo Motor Specifications

Servo motor model		HC-SFS52 (B) [4]	HC-SFS102 (B) [4]	HC-SFS152 (B) [4]	HC-SFS202 (B) [4]	HC-SFS352 (B) [4]	HC-SFS502 (B) [4]	HC-SFS702 (B) [4]
Servo amplifier model		MR-J2S-60A/B	MR-J2S-100A/B	MR-J2S-200A/B	MR-J2S-200AB	MR-J2S-350A/B	MR-J2S-500A/B	MR-J2S-700A/B
Power facility capacity [kVA] [1]		1.0	1.7	2.5	3.5	5.5	7.5	10
Continuous characteristics	Rated output [kW]	0.5	1.0	1.5	2.0	3.5	5.0	7
	Rated torque [Nm]	2.39	4.78	7.16	9.55	16.7	23.9	33.4
Maximum torque [Nm]		7.16	14.4	21.6	28.5	50.1	71.6	100
Rated rotation speed [rpm]		2000	2000	2000	2000	2000	2000	2000
Maximum rotation speed [rpm]		3000	3000	3000	2500	2500	2000	2000
Permissible instantaneous rotation speed		3450	3450	3450	2850	2850	2300	2300
Rated current [A]		3.2	6	9	11	17	28	35
Maximum current [A]		9.6	18	27	33	51	84	105
Regeneration braking frequency [1/min] [2]	Without additonal resistor	56	54	136	64	31	39	32
	With MR-RFH75 (150 W)	560	270	—	—	—	—	—
	With MR-RFH220 (400 W)	—	810	—	—	—	—	—
	With MR-RFH400 (600 W)	—	—	680	320	150	150	95
Moment of inertia J [×10^{-4} kg m^2]		6.6	13.7	20	42.5	82	101	160
Recommended load/ motor inertia ratio		Less than 15 times the servomotor´s inertia moment						
Speed/ position detector		Resolution per encoder/servomotor rotation: 131072 p/rev (17 bits)						
Structure		Totally enclosed, non-ventilated (protection degree: IP65)						
Environment	Ambient temperature	Operation: 0 – 40 ℃ (no freezing). Storage: -15 – 70 ℃ (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 [3]	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	5	7	9	12	19	23	32
Order information	Art. no.	134811	134864	134865	134866	134867	134868	134869

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

[2] The regenerative brake 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 rpm varies with the freqency or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating and do not exceed the permissible value.

[3] The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracker 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.

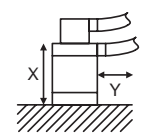[4] For servo motors with electromagnetic brake please refer to page 17.

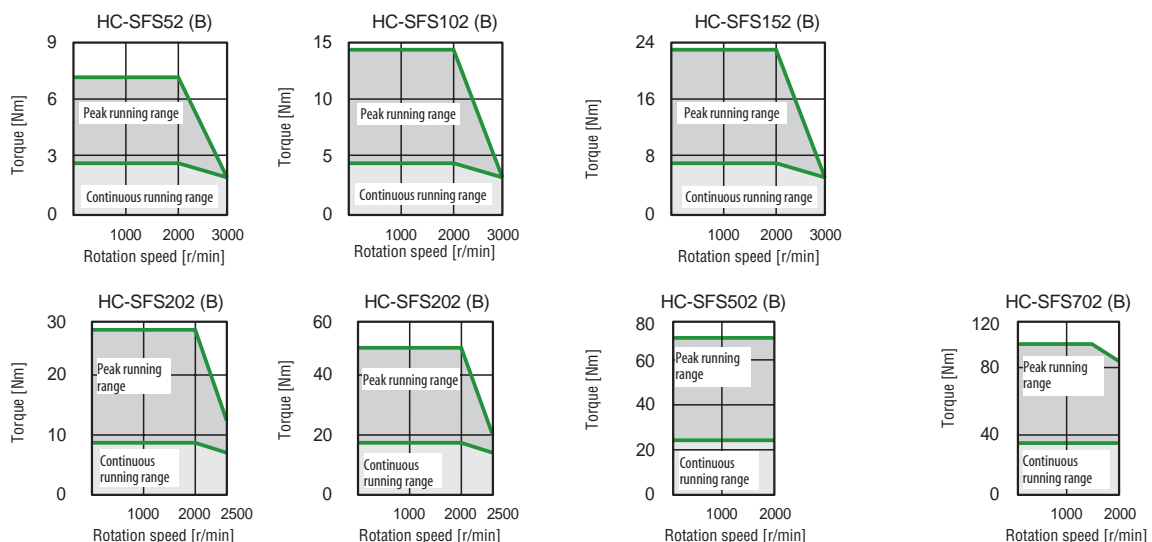## HC-SFS Series Servo Motor Torque Characteristics

HC-SFS52 (B)

HC-SFS102 (B)

HC-SFS152 (B)

HC-SFS202 (B)

HC-SFS202 (B)

HC-SFS502 (B)

HC-SFS702 (B)

■ HC-RFS Series Servo Motor Specifications (Low Inertia)

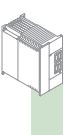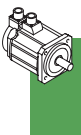| Servo motor model		HC-RFS103 (B) [4]	HC-RFS153 (B) [4]	HC-RFS203 (B) [4]	HC-RFS353 (B) [4]	HC-RFS503 (B) [4]
Servo amplifier model		MR-J2S-200A/B	MR-J2S-200A/B	MR-J2S-350A/B	MR-J2S-500A/B	MR-J2S-500A/B
Power facility capacity [kVA] [1]		1.7	2.5	3.5	5.5	7.5
Continuous characteristics	Rated output [kW]	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
Rated current [A]		6.1	8.8	14	23	28
Maximum current [A]		18.4	23.4	37	58	70
Regeneration braking frequency [1/min] [2]	Without additonal resistor	1090	860	710	174	125
	With MR-RFH400 (600 W)	5450	4300	3550	669	479
Moment of inertia J [×10⁻⁴ kg m²]		1.5	1.9	2.3	8.6	12
Recommended load/ motor inertia ratio		Less than5 times the servomotor´s inertia moment				
Speed/ position detector		Resolution per encoder/servomotor rotation: 131072 p/rev (17 bits)				
Structure		Totally enclosed, non-ventilated (protection degree: IP65)				
Environment	Ambient temperature	Operation: 0 – 40 ℃ (no freezing). Storage: -15 – 70 ℃ (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 [3]	1000 m or less above sea level; X: 24.5 m/s² , Y: 24.5 m/s²				
Weight [kg]	Standard motor	3.9	5.0	6.2	12	17
Order information	Art. no.	134853	134854	134855	134856	134857

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

[2] The regenerative brake 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 rpm varies with the freqency or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating and do not exceed the permissible value.

[3] The vibration direction is shown in the right side dagram. The numeric value indicates the maximum value of the component (commonly the bracker 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.

[4] For servo motors with electromagnetic brake please refer to page 17.

HC-RFS Series Servo Motor Torque Characteristics

HC-RFS103 (B)

HC-RFS153 (B)

HC-RFS203 (B)

HC-RFS353 (B)

HC-RFS503 (B)
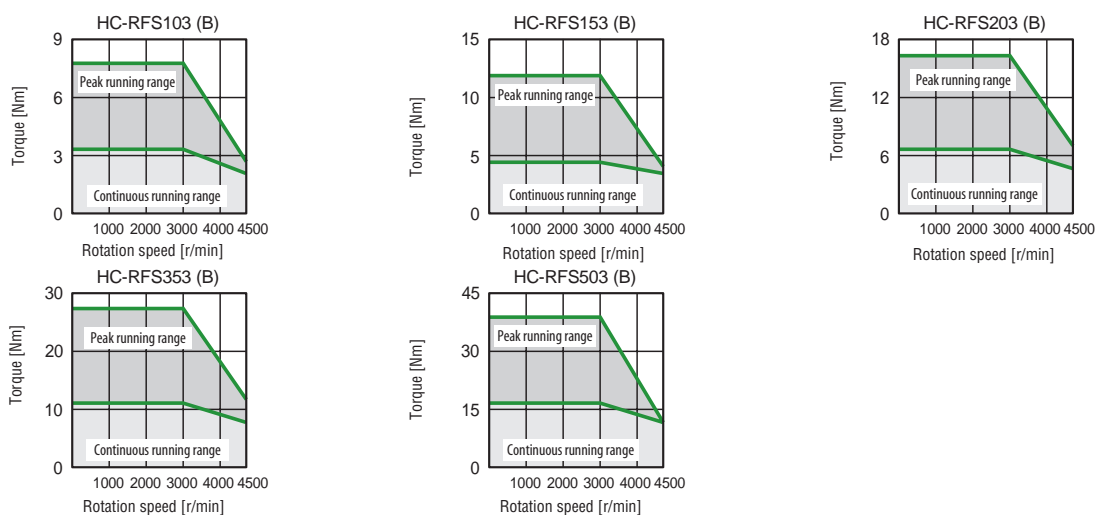
■ Braked Motor Specifications

For applications requiring the motor shaft to be hold in a specific 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 that suits best the according task.

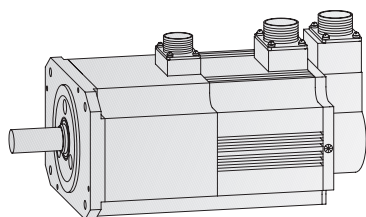| Motor model	HC-MFS					HC-KFS					HC-SFS							HC-RFS				
	053B	13B	23B	43B	73B	053B	13B	23B	43B	73B	52B	102B	152B	202B	352B	502B	702B	103B	153B	203B	353B	503B
Type	Spring-action safety brake					Spring-action safety brake					Spring-action safety brake							Spring-action safety brake				
Rated voltage	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	8.3	8.3	8.3	43.1	43.1	43.1	43.1	6.8	6.8	6.8	16.7	16.76
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	19	19	19	34	34	34	34	19	19	19	23	23
Moment of inertia J [10^{-4} kg m²] [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.	134878	134879	134880	14881	134882	134844	134874	134875	134876	135967	134870	134871	134861	134862	134863	135966	135965	134859	134858	134860	138702	138703

[1] Total mass of motor with electromagnetic brake.

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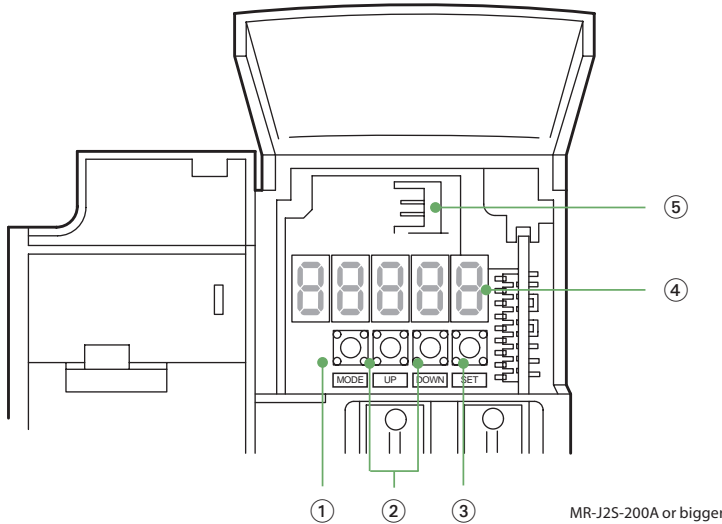
[3] Brake gap cannot be adjusted.

Operating Elements

Easier to operate than ever before

The display and setting sections are easy to operate. And with the advanced features it encorporates, the MR-J2S is easy to start up.

MR-J2S-200A or bigger

① Mode:

Used to switch between display modes

② Up/ Down:

Used to change display content and re-enter parameter data

③ Set:

Used to set parameters for auto-tuning and for switching to the test screen

④ Display:

5-digit, 7-segment display panel. Displays operating status, parameters, etc.

⑤ Battery holder/ connector:

Using to connect the battery for absolute position data backup.

MR-J2S-200A or bigger
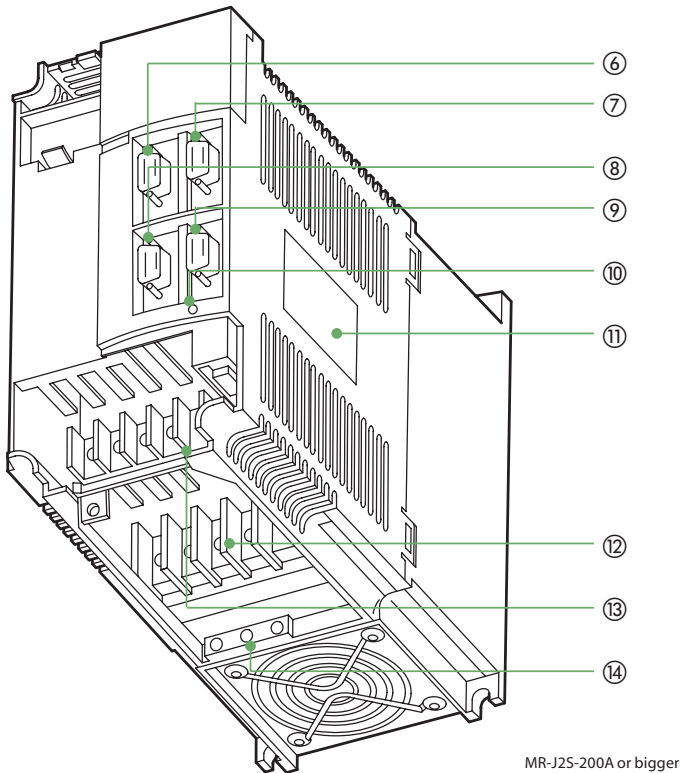
⑥ I/O signal connector (CN1A):

Used to connect digital I/O signals

⑦ I/O signal connector (CN1B):

Used to connect digital I/O signals

⑧ Encoder connector (CN2):

Used to connect the servo motor/ encoder

⑨ Communication connector (CN3):

Used to connect a personal computer or as analog monitor output

⑩ Charge lamp:

Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.

⑪ Name plate

⑫ Main circuit terminal block (TE1):

Used to connect the input power supply and servo motor

⑬ Control circuit terminal block (TE2):

Used to connect the control circuit power supply and regenerative brake option.

⑭ Protective earth terminal (PE):

Ground terminal

Operation / Menu Guide to the Display

Pressing the MODE button causes the display mode to change one step at a time in the sequence illustrated below.

Button

Mode

| Status display | Diagnosis | Alarm | Basic parameters | Expansion parameters 1 | Expansion parameters 2 |

Status display

C
Cumulative feedback pulses [pulse]

r
Motor speed [r/min.]

E
Droop pulses [pulse]

P
Cumulative command pulses [pulse]

n
Command pulse frequency [kkps]

F
Speed command voltage Speed limit voltage [mV]

U
Torque limit voltage Torque command voltage [mV]

L
Regenerative load ratio [%]

J
Effective load ratio [%]

b
Peak load ratio [%]

r
Instantaneous torque [%]

C 41
Within one-revolution position, low [pulse]

C 42
Within one-revolution position, high [100 pulses]

L 5
ABS counter [rev]

d C
Load intertia moment ratio [times]

P n
Bus voltage [V]

Diagnosis

r d - o F
Sequence

- - - - -
External I/O signal display

d o - o n
Output signal forced output

r E S r 1
Test operation Jog feed

r E S r 2
Test operation positioning operation

r E S r 3
Test operation Motor-less operation

r E S r 4
Test operation Machine analyzer operation

- A 0
Sofware version L

. 0 0 0
Sofware version H

H 1   0
Automatic VC offset

H 2   0
Motor series ID

H 3   0
Motor type ID

H 4   0
Encoder ID

Alarm

A L - -
Current alarm

A 0 - -
Last alarm

A 1 - -
Second alarm in past

A 2 - -
Third alarm in past

A 3 - -
Fourth alarm in past

A 4 - -
Fifth alarm in past

A 5 - -
Sixth alarm in past

E - -
Parameter error number

Basic parameters

P   00
Parameter No. 0

P   01
Parameter No. 1

P   18
Parameter No. 18

P   19
Parameter No. 19

Expansion parameters 1

P   20
Parameter No. 20

P   21
Parameter No. 21

P   48
Parameter No. 48

P   49
Parameter No. 49

Expansion parameters 2

P   50
Parameter No. 50

P   51
Parameter No. 51

P   83
Parameter No. 83

P   84
Parameter No. 84

UP button

UP

Down

DOWN button

Note: Press the SET button to display actual data in status display mode.

BASICS

BASICS

Test Operation Mode

The operation of the servo amplifier and servo motor can be checked before wiring the signal wires.

● **Test operation mode 1:**
Operation without commands
The motor can be operated even without speed/position commands, start signals, or other external signals. This enables users to test the servo alone, prior to the fabrication of a control panel, and to confirm the operation of the machine.

● **Test operation mode 2:**
Operation without a motor
The servo amplifiers can be checked without connecting them to a motor. This is convenient when you want to confirm a command or peripheral sequence before operating the actual machine. You can monitor the simulated rotation speed and command status of the motor on the display screen of the amplifier as you would during normal operation.

Output signal forced output
Forcing output signals ON or OFF, such as alarm and ready signals, makes it easy to perform external wiring and sequence checks.

Basic Parameters

Subtotal 76 different parameters can be set. The basic parameters are listed below. For parameters marked with an asterisk *, turn the power OFF after setting and turn the power back ON to complete the setting.

| Parameter	Meaning	Symbol	Description	Default setting	Setting range
0 *	Control mode/ regeneration selection	STY	Used to select the control mode and regeneration option	0000	0000 – 0605h
1 *	Function selection 1	OP1	Used to select servo-type options	0002	0000 – 1013h
2	Auto-tuning	ATU	Used to select the auto-tuning function	0105	0001 – 040Fh
3	Electronic gear (command pulse magnification numerator)	CMX	Used to set the multiplier for the command pulse input	1	1 – 65535
4	Electronic gear (command pulse magnification denominator)	CDV	Used to set the divisor for the command pulse input	1	1 – 65535
5	In-position range	INP	Used to set the range for the standing pulse, which sends in-position output	100 [pulse]	0 – 10000
6	Position control gain 1	PG1	Used to set the model position loop gain	35 [rad/s]	4 – 2000
7	Position acceleration / deceleration time constant (smoothing)	PST	Used to set the time constant when using a delayed filter for the position command	3 [ms]	0 – 20000
8	Internal speed command 1	SC1	Used to set the first speed of the internal speed command	100 [rpm]	0 – permissible speed
9	Internal speed command 2	SC2	Used to set the second speed of the internal speed command	500 [rpm]	0 – permissible speed
10	Internal speed command 3	SC3	Used to set the third speed of the internal speed command	1000 [rpm]	0 – permissible speed
11	Speed acceleration time constant	STA	Used to set the acceleration time from stop until the attainment of rated rotation speed for the speed command	0 [ms]	0 – 20000
12	Speed deceleration time constant	STB	Used to set the deceleration time from rotation speed until stop for the speed command	0 [ms]	0 – 20000
13	S-pattern acceleration/deceleration time constant	STC	Used to set the time for the circular portion of S acceleration / deceleration	0 [ms]	0 – 1000
14	Torque command time constant	TQC	Used to set the time constant when using a delayed filter for the torque command	0 [ms]	0 – 20000
15*	Station number setting	SN0	Used to specifiy the station number for serial communication	0	0 – 31
16 *	Communications baud rate selection / alarm history clear	BPS	Used to set the RS232C baud rate and to clear the alarm history	0000	0000 – 1113h
17	Analog monitor output	MOD	Used to make the settings related to analog monitor output	0100	0000 – 0B0Bh
18 *	Status display selection	DMD	Used to make the settings related to status display	0000	0000 – 001Fh
19 *	Parameter entry prohibition	BLK	Used to select the parameter reference range and entry range	0000	0000 – 100Eh

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Protective Functions/ Safety Features/ Alarms and Warnings

The J2 servo amplifier possesses the safety features described below. In order to protect the unit when a safety circuit is activated, the output is suspended by cutting OFF the power to the transistor base. When this happens, the dynamic brake is activated and stops the motor. An alarm number is displayed on the servo amplifier or personal computer. After eliminating the cause, close the reset terminal (RES) or turn OFF the control power and reset.

	LED display	Meaning	Description
Alarms	AL.10	Undervoltage	Is activated, if the voltage of the power supply falls below a certain level or if a sudden power outage of more than 15 ms occurs.
	AL.12	Memory error 1	Is activated, if an error is detected in the RAM memory of the printed board.
	AL.13	Clock error	Is activated, if an error is detected in the printed board.
	AL.15	Memory error 2	Is activated, if an error is detected in the EEPROM memory of the printed board.
	AL.16	Encoder error 1	Is activated, if a different type of encoder is detected and communication with the encorder cannot be performed accurately.
	AL.17	Board error 2	Is activated, if an error is detected in a board component of the servo amplifier.
	AL.19	Memory error 3	Is activated, if an error is detected in the ROM memory of the printed board.
	AL.1A	Motor combination error	Is activated, if a wrong combination of servo amplifier and motor exists,
	AL.20	Encoder error 2	Is activated, if an error is detected in the encoder or encoder cable.
	AL.24	Motor output ground fault	Is activated, if a ground fault occured at the servo motor outputs of the servo amplifier.
	AL.25	Absolute position erase	Is activated, if the absolute position data is errornous or if the power was switched on for the first time in the absolute position detection system.
	AL.30	Regenerative alarm	Is activated, if the permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded or if the regenerative transistor is faulty or cooling fan has stopped (MR-J2S-200A, MR-J2S-300A).
	AL.31	Overspeed	Is activated, if the motor rotation speed is detected to have exceeded the permissible rotation speed.
	AL.32	Overcurrent	Is activated, if an excess current is detected.
	AL.33	Overvoltage	Is activated, if an excess converter voltage is detected.
	AL.35	Command pulse error	Is activated, if an excess frequency command pulse is input.
	AL.37	Parameter error	Is activated, if parameters are detected to be outside the setting range through a parameter check performed when the power is turned ON.
	AL.45	Main circuit device overheat	Is activated, if a main circuit device is overheated.
	AL.46	Servo motor overheat	Is activated by the thermal protector inside the encoder due to motor overheating.
	AL.50	Overload 1	Is activated, if an overload is detected in the motor or servo amplifier.
	AL.51	Overload 2	Is activated, if an overload is detected in the motor or servo amplifier.
	AL.52	Excess error	Is activated, if the difference between the input pulse and return pulse is detected to have exceeded 80 k pulses when operating in position control mode.
	AL.8A	Serial communication time-out	Is activated, if the RS232C or RS422 communication is stopped for longer than the time set by parameter.
	AL.8E	Serial communications error	Is activated, if an error occurs in the serial communication between the servo amplifier and the communication device.
	88888	System error (watchdog)	Is activated, if a system error is detected.
Warnings	A.92	Battery disconnection error	Is activated, if the battery wire connected to the encoder becomes disconnected or if the battery voltage falls.
	A.96	Origin set error	Is activated, if the origin is not set.
	A.9F	Battery warning	Is activated, if the battery voltage falls.
	A.E0	Excess regeneration warning	Is activated, if the load of the regeneration resistor reaches 85 % of the alarm level.
	A.E1	Overload warning	Is activated, if the unit reaches 85 % of the overload alarm level.
	A.E3	ABS data counter warning	Is activated, if there is an error in the backup data of the absolute data counter.
	A.E5	ABS time-out warning	Is activated, if there is a time-out error during the forwarding of absolute data.
	A.E6	Servo emergency stop	Is activated, if an external emergency stop signal has been lifted.
	A.E9	Main circuit OFF warning	Is activated, if the main circuit voltage (P-N) is below 215 V when the servo ON signal (SON) is turned ON.
	A.EA	ABS servo ON warning	Is activated, if the servo ON signal does not go ON within 1 second after the ABS forwarding mode (D13) is turned ON.
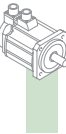
■ Specifications of Servo Amplifiers MR-J2S-□A

MR-J2S-□A are general purpose servo amplifieres with analog input and pulse train interface as a standard.

The following table provides a complete overview on all MR-J2S-□A servo amplifieres.
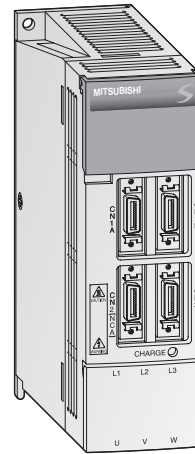
Servo amplifier model MR-J2-S-□A		10A	20A	40A	60A	70A	100A	200A	350A	500A	700A
Power supply	Voltage / frequency [1]	3-phase 200 – 230 V AC, 50 / 60 Hz; 1-phase 230 V AC, 50 / 60 Hz [2]					3-phase 200 – 230 V AC, 50 / 60 Hz [2]				
	Permissible voltage fluctuation	3-phase 200 – 230 V AC: 170 – 253 V 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		550 Hz or more									
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.									
Position control mode	Maximum input pulse frequency	500 kpps (when using differential receiver), 200 kpps (when using open collector)									
	Positioning feedback pulse	Resolution per encoder / servo motor rotation (131072 pulses/revolution)									
	Command pulse multiple	Electronic gear A/B multiple; A: 1 – 65535 or 131072, B: 1 – 65535, 1/50 < A/B < 500									
	Positioning complete width setting	0 – ±10 V DC (command pulse unit)									
	Excess error	±10 rotations									
	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)									
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/s^2 (0.6 G) max.									
Weight [kg]		0.7	0.7	1.1	1.1	1.7	1.7	2.0	2.0	4.9	7.2
Order information Art. no.		134807	134808	134806	134828	134829	134831	134827	134832	135969	135854

[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.
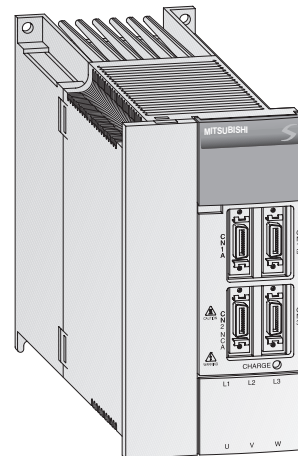
[2] When combined with a servomotor, torque characteristics are those in the case of 3-phase 200–230 V AC or 1-phase 230 V AC.

■ Specifications of Servo Amplifiers MR-J2S-□B

MR-J2S-□B are designed for SSCNET connection in combination with Mitsubishi MELSEC A series or MELSEC System Q series motion controllers.

The motion controllers and servo amplifiers can be linked via the high-speed network SSCNET. Through SSCNET connection, the MR-J2S-B series system delivers high reliability and less wiring. SSCNET series systems brings you the best in modern motion control application.

The following table provides a complete overview on all MR-J2S-□B servo amplifieres.

Servo amplifier model MR-J2S-□B		10B	20B	40B	60B	70B	100B	200B	350B	500B	700B
Power supply	Voltage / frequency [1]	3-phase 200 – 230 V AC, 50 / 60 Hz; 1-phase 230 V AC, 50 / 60 Hz [2]					3-phase 200 – 230 V AC, 50 / 60 Hz [2]				
	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		550 Hz or more									
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 ℃ (no freezing), storage: -20 – 65 ℃ (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/s^2 (0.6 G) max.									
Weight [kg]		0.7	0.7	1.1	1.1	1.7	1.7	2.0	2.0	4.9	7.2

Order information	Art. no.	134833	134834	134835	134836	134837	134838	134839	134840	135971	135970

[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] When combined with a servomotor, torque characteristics are those in the case of 3-phase 200–230 V AC or 1-phase 230 V AC

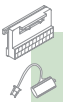## Position Control Mode/ Connection to QD75P/QD75D (position servo, incremental)

Make up a sequence which switches off the MC at alarm occurence or emergency stop.

MR-J2S-□A

Servo motor

Power supply

Optional brake resistor [4]

≤10 m [11]

To be shut off when servo-on signal switches off or alarm signal is given [10]

Encoder cable (option)

Encoder

Communication cable (option)

PC

≤15 m

Monitor output
Max ± 1mA meter reading in both directions

≤2 m

External emergency stop [3]/[7]
Servo on
Reset
Proportion control
Torque limit
[7] Forward rotation stroke end
Reverse rotation stroke end

≤10 m

Trouble [9]
Zero speed
Limiting torque

Analog torque limit ±10 V/max. current

≤2 m

Encoder Z-phase pulse (differential line driver)
Encoder A-phase pulse (differential line driver)
Encoder B-phase pulse (differential line driver)
Control common
Encoder Z-phase pulse (open collector)

[1] To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth of the control box.

[2] Do not reverse the diode's direction. Connecting it backwards could cause the amp to malfunction so that signals are not output and emergency stop and other safety circuits are inoperable.

[3] The emergency stop switch must be installed.

[4] When using a regenerative brake resistor in combination with an amplifier in the power range of 350 A or less, always remove the lead from across the terminals D and P. When using an external brake unit or a regenerative brake resistor in combination with amplifiers in the power range of 500 A or higher, disconnect the cable connections to the internal brake resistor. For further details please refer to the MR-J2S manual.

[5] CN1A, CN1B, CN2 and CN3 have the same shape. Wrong connection of the connectors will lead to a fault.

[6] Make sure that the sum of current flowing to external relays does not exceed 80 mA. If it exceeds 80 mA, supply interface power from an external source.

[7] When starting operation, always switch on the external emergency stop signal (EMG) and forward/reverse rotation stroke end signal (LSN/LSP) (normally closed contacts).

[8] The pins with the same signal name are connected in the servo amplifier.

[9] The trouble (ALM) signal is on when there is no alarm, i.e. in the normal state. When the signal is switched off (at occurence of an alarm), the output of the controller should be stopped by the sequence program.

[10] Only for motors with electomagnetic brake.

[11] This length applies to the command pulse train input in the differential line driver system. The lenght is 2 m or less in the open collector system.

Position Control Mode/ Connection to A1SD75P (position servo, absolute)
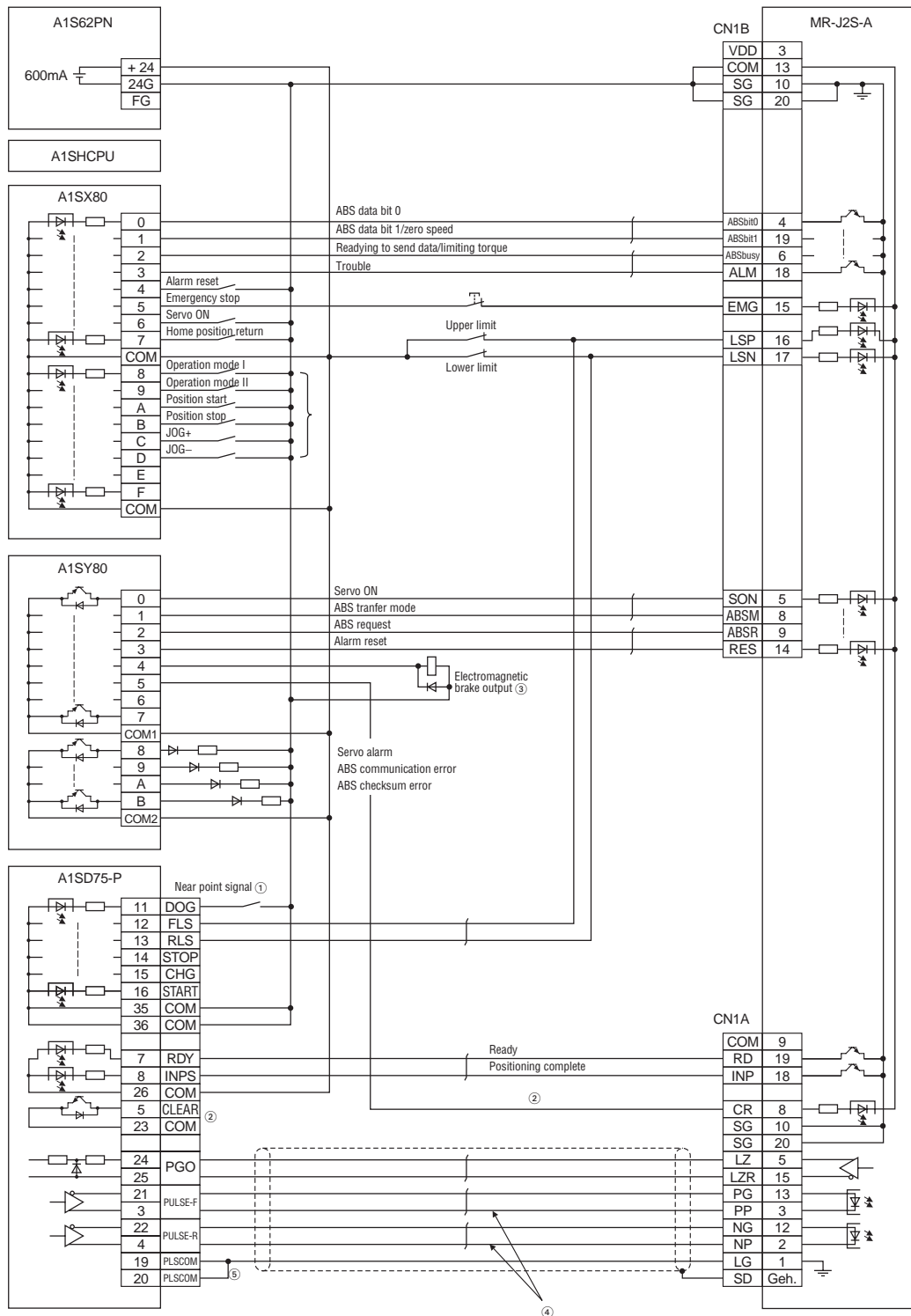
① For dog type home position return. Do not connect when home position return is of the data set type.

② Starting up when the servomotor is above the zero signal causes the A1SD75 (AD75) deviation clear signal to be output. Therefore, do not wire the MR-J2-Super clear signal to the A1SD75 (AD75) side, but to the sequencer output unit.

③ The electromagnetic brake output should be controlled via a relay connected to the programmable controller output.

④ Use the differential line driver system for pulse input. Do not use the the open collector system.

⑤ To reinforce noise suppression, connect LG and pulse output COM.

Speed Control Mode

① To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth of the control box.

② Do not reverse the diode's direction. Connecting it backwards could cause the amp to malfunction so that signals are not output and emergency stop and other safety circuits are inoperable.

③ The emergency stop switch must be installed.

④ When using a regenerative brake resistor in combination with an amplifier in the power range of 350 A or less, always remove the lead from across the terminals D and P. When using an external brake unit or a regenerative brake resistor in combination with amplifiers in the power range of 500 A or higher, disconnect the cable connections to the internal brake resistor. For further details please refer to the MR-J2S manual.

⑤ CN1A, CN1B, CN2 and CN3 have the same shape. Wrong connection of the connectors will lead to a fault.

⑥ Make sure that the sum of current flowing to external relays does not exceed 80 mA. If it exceeds 80 mA, supply interface power from an external source.

⑦ When starting operation, always switch on the external emergency stop signal (EMG) and forward/reverse rotation stroke end signal (LSN/LSP) (normally closed contacts).

⑧ The pins with the same signal name are connected in the servo amplifier.

⑨ The trouble (ALM) signal is on when there is no alarm, i.e. in the normal state. When the signal is switched off (at occurence of an alarm), the output of the controller should be stopped by the sequence program.

⑩ Only for motors with electomagnetic brake.

⑪ TLA can be used by setting any of parameters No. 43 to 48 to make TL available.

Torque Control Mode

Make up a sequence which switches off the MC at alarm occurence or emergency stop.

MR-J2S-□A

Servo motor

To be shut off when servo-on signal switches off or alarm signal is given. ⑩

① To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth of the control box.

② Do not reverse the diode's direction. Connecting it backwards could cause the amp to malfunction so that signals are not output and emergency stop and other safety circuits are inoperable.

③ The emergency stop switch must be installed.

④ When using a regenerative brake resistor in combination with an amplifier in the power range of 350 A or less, always remove the lead from across the terminals D and P. When using an external brake unit or a regenerative brake resistor in combination with amplifiers in the power range of 500 A or higher, disconnect the cable connections to the internal brake resistor. For further details please refer to the MR-J2S manual.

⑤ CN1A, CN1B, CN2 and CN3 have the same shape. Wrong connection of the connectors will lead to a fault.

⑥ Make sure that the sum of current flowing to external relays does not exceed 80 mA. If it exceeds 80 mA, supply interface power from an external source.

⑦ When starting operation, always switch on the external emergency stop signal (EMG).

⑧ The pins with the same signal name are connected in the servo amplifier.

⑨ The trouble (ALM) signal is on when there is no alarm, i.e. in the normal state. When the signal is switched off (at occurence of an alarm), the output of the controller should be stopped by the sequence program.

⑩ Only for motors with electomagnetic brake.

BASICS

1a. Digital input interface DI-1 (source logic)

Supply signal with a miniature relay or an open collector transistor (Tr).

SG

COM

4,7 kΩ

about 5 mA

SON, etc.

Tr

VDD

24 V DC

$U_{CES} \leq 1$ V
$I_{CEO} \leq 100$ µA
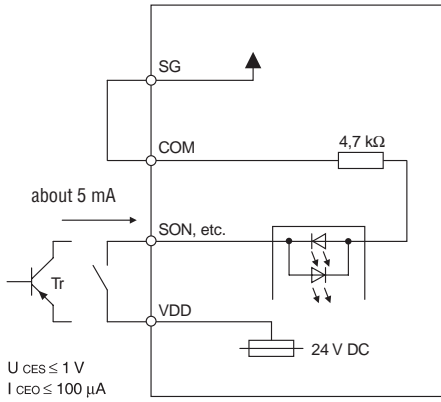
1b. Digital input interface DI-1 (sink logic)

Supply signal with a miniature relay or an open collector transistor (Tr).

VDD

24 V DC

COM

4,7 kΩ

about 5 mA

SON, etc.

Tr

SG

$U_{CES} \leq 1$ V
$I_{CEO} \leq 100$ µA
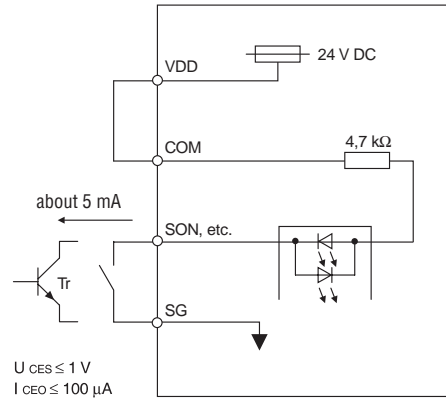
2. Digital output interface DO-1

Can drive a lamp, relay or photocoupler

24 V DC

VDD

current: ≤40 mA

R

Lamp

ALM, etc

D

Relay

Tr

SG
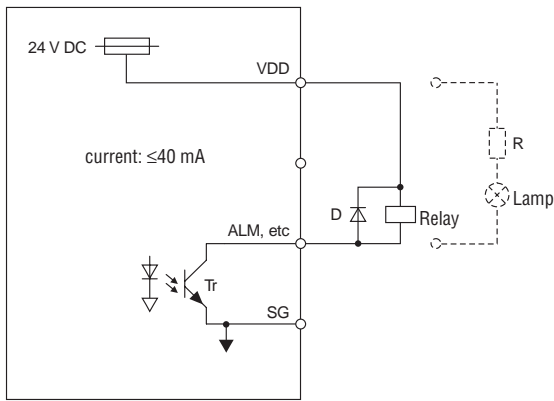
Note: For an induction load install a surge suppressor (D); for a
lamp load install an incoming current suppression resistor (R).

3a. Pulse train input interface DI-2

Differential mode (max. 500 kpps)

AM26LS31 or equivalent

PG(NG)

100 Ω

PP(NP)

SD
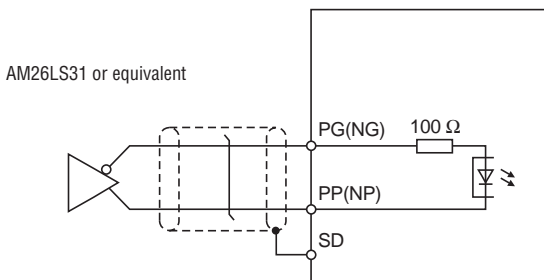
3b. Pulse train input interface DI-2 (sink logic)

Open collector mode (max. 200 kpps)

VDD

OPC

1,2 kΩ

PG, NG

270 Ω

ça. 20 mA

PP, NP

120 Ω

SG

$U_{CES} \leq 1$ V
$I_{CEO} \leq 100$ µA

SD

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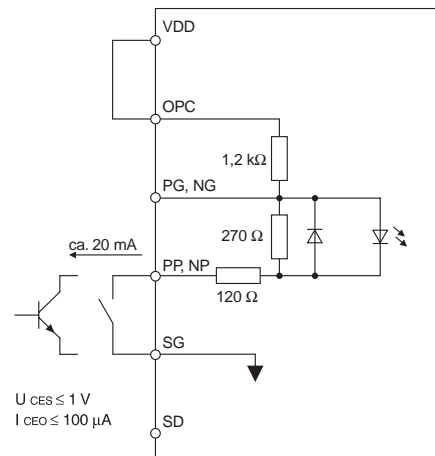
4a. Encoder pulse train output interface DO-2

Differential mode
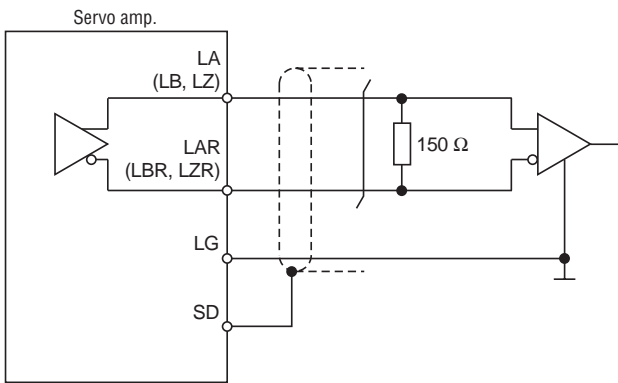
4b. Encoder pulse train output interface DO-2

Open collector mode
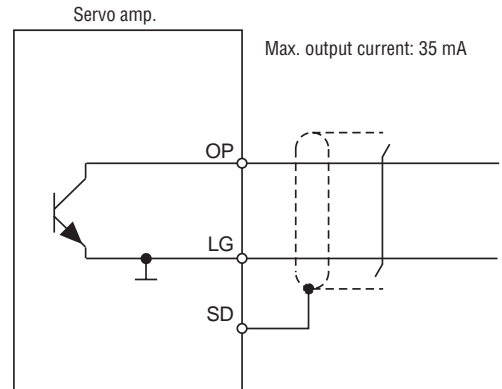
5. Analog input interface
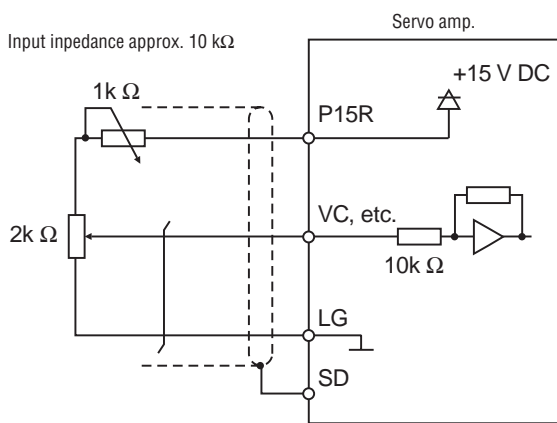
6. Analog output interface
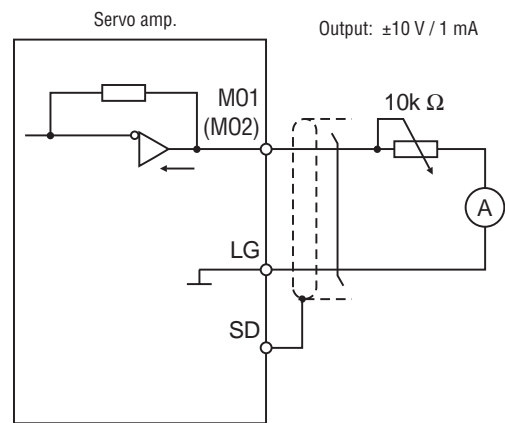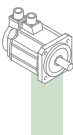
Terminal Assignment

Terminal block

Signal	Symbol	Terminal	Description
AC power supply	L1, L2, L3	TE1	Connect to a 3-phase 200 – 230 V 50/60 Hz or 1-phase 230 V 50/60 Hz (≤ 750 W) commercial power supply.
	L11, L21	TE2	Connect to a 1-phase 200 – 230 V 50/60 Hz commercial power supply. Supply power from the same source as that for L1, L2, and L3. Turn ON before or simultaneously with L1, L2, and L3. Turn OFF simultaneously with or after L1, L2, and L3.
Motor output	U, V, W	TE1	Connect to the U,V, and W terminals of the motor power supply. The motor will not rotate properly, if an error is made in the phase sequence.
Regenerative brake resistor, brake unit	P, C, D	TE2	When using an optional regenerative brake resistor in combination with an amplifier in the power range of 350 A or less, always remove the lead from across the terminals D and P. When using an external brake unit or a regenerative brake resistor in combination with amplifiers in the power range of 500 A or higher, disconnect the cable connections to the internal brake resistor (refer to the MR-J2S manual). For all ampli-
	N	TE2	fiers connect the optional regeneration resistor between P and C. When using the optional regeneration unit with amplifiers in the power range of 500 A or higher, connect the unit between P and N.
Ground	PE	Chassis	Ground with the motor at one point. Connected to the chassis.

Connector CN1A and CN1B signal assignment

The signal assignment of the connector changes depending on the control mode as indicated below.

Conector	Pin No.	I/O ❶	I/O Signals in Control Modes ❷					
			P	P/S	S	S/T	T	T/P
CN1A	1	—	LG	LG	LG	LG	LG	LG
	2	I	NP	NP / –	—	—	—	– / NP
	3	I	PP	PP / –	—	—	—	– / PP
	4	—	P15R	P15R / P15R	P15R	P15R	P15R	P15R
	5	0	LZ	LZ	LZ	LZ	LZ	LZ
	6	0	LA	LA	LA	LA	LA	LA
	7	0	LB	LB	LB	LB	LB	LB
	8 ❽	I	CR	CR / SP1	SP1 ❸	SP1 / SP1	SP1 ❸	SP1 / CR
	9	—	COM	COM	COM	COM	COM	COM
	10	—	SG	SG	SG	SG	SG	SG
	11	—	OPC	OPC / –	—	—	—	– / OPC
	12	I	NG	NG / –	—	—	—	– / NG
	13	I	PG	PG / –	—	—	—	– / PG
	14	0	OP	OP	OP	OP	OP	OP
	15	0	LZR	LZR	LZR	LZR	LZR	LZR
	16	0	LAR	LAR	LAR	LAR	LAR	LAR
	17	0	LBR	LBR	LBR	LBR	LBR	LBR
	18 ❼❾	0	INP	INP / SA	SA	SA / –	—	– / INP
	19 ❼❾	0	RD	RD	RD	RD	RD	RD
	20	—	SG	SG	SG	SG	SG	SG
CN1B	1	—	LG	LG	LG	LG	LG	LG
	2	I	—	– / VC	VC	VC / VLA	VLA	VLA / –
	3	—	VDD	VDD	VDD	VDD	VDD	VDD
	4 ❿	0	D01	D01	D01	D01	D01	D01
	5 ❽	I	SON	SON	SON	SON	SON	SON
	6 ❼	0	TLC	TLC	TLC	TLC / VLC	VLC	VLC / TLC
	7 ❽	I	—	LOP	SP2	LOP	SP2	LOP
	8 ❽	I	PC	PC / ST1	ST1 ❹	ST1 / RS2	RS2 ❹	RS2 / PC
	9 ❽	I	TL	TL / ST2	ST 2 ❺	ST2 / RS1	RS1 ❺	RS1 / TL
	10	—	SG	SG	SG	SG	SG	SG
	11	—	P15R	P15R	P15R	P15R	P15R	P15R
	12	I	TLA	TLA / TLA ❻	❻	TLA / TC ❻	TC	TC / TLA
	13	—	COM	COM	COM	COM	COM	COM
	14 ❽	I	RES	RES	RES	RES	RES	RES
	15	I	EMG	EMG	EMG	EMG	EMG	EMG
	16	I	LSP	LSP	LSP	LSP / –	—	– / LSP
	17	I	LSN	LSN	LSN	LSN / –	—	– / LSN
	18 ❼	0	ALM	ALM	ALM	ALM	ALM	ALM
	19 ❼❾⓫	0	ZSP	ZSP	ZSP	ZSP	ZSP	ZSP
	20	—	SG	SG	SG	SG	SG	SG

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Notes (table page 30)

❶ I = Input signal, 0 = output signal, – = others (e.g. power)

❷ P = position control mode, S = speed control mode, T = torque control mode, P/S = positioning/speed control change mode, S/T = speed/torque control change mode, T/P = torque/position control chnage mode

❸ Set parameter no. 45 to use CR.

❹ Set parameter no. 47 to use PC.

❺ Set parameter no. 48 to use TL.

❻ By setting parameters no. 43 to 48 to make TL available, TLA can be used.

❼ Set parameter no. 49 to use WNG and BWNG.

❽ Set parameter no. 43 to 48 to change signals.

❾ Set parameter no. 49 to select alarm codes

❿ The signal of CN1A-18 is always output.

⓫ Set parameter no. 1 to select MBR.
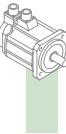
Symbols and Signal Names

Symbol	Signal name	Symbol	Signal name	Symbol	Signal name
SON	Servo ON	RS1	Forward rotation selection	LZ	Encoder Z-phase pulse
LSP	Forward rotation stroke end	RS2	Reverse rotation selection	LZR	
LSN	Reverse rotation stroke end	PP	Forward/reverse rotation pulse train	LA	Encoder A-phase pulse
CR	Clear	NP		LAR	
SP1	Speed selection 1	PG		LB	Encoder B-phase pulse
SP2	Speed selection 2	NG		LBR	
PC	Proportion control	TLC	Limiting torque	VDD	I/F internal power supply
ST1	Forward rotation start	VLC	Limiting speed	COM	Digital I/F power supply input
ST2	Reverse rotation start	RD	Ready	OPC	Open collector power input
TL	Torque limit selection	ZSP	Zero speed	SG	Digital I/F common
RES	Reset	INP	In position	P15R	15 V DC power supply
EMG	Forced stop	SA	Speed reached	LG	Control common
LOP	Control change	ALM	Trouble	SD	Shield
VC	Analog speed command	WNG	Warning		
VLA	Analog speed limit	BWNG	Battery warning		
TLA	Analog torque limit	OP	Encoder Z-phase pulse (open collector)		
TC	Analog torque command	MBR	Electromagnetic brake interlock		

Standard Wiring Diagram for Serial Bus Version (MR-J2S-☐B)

Notes:

❶ Total length of the MR-J2HBUS M-A and MR-J2HBUS M cables = max. 30m. Use of a cable clamp or data line filters (3-4 in a row) near the connector pull to enhance noise resistence is recommended.

❷ Motor-side wiring after the second axis has been omitted.

❸ Up to 8 axes (n = 0-7) can be connected. MR-H-B series servo can be connected to the same bus (however, it requires a different cable).

❹ When using a motor with an electromagnetic brake. There is no need for concern regarding the polarity when connecting the power-supply.

❺ Connect the shield wire securely to the plate inside the connector (grand plate).

❻ Do not reverse the diode's direction. Connecting it backwards could cause the amp to malfunction so that signals are not output, and emergency stop and other safety circuits are inoperable.

❼ Forced emergency stop for each servo-amplifier of each axis. Please use when deemed necessary. When not used, please short-circuit EM1-SG. Please execute overall system emergency stop on controller's side.

❽ For further details, please refer to "MR-J2S- B Servo Amplifier Instruction Manual".

❾ Always use a shielded multicore cable up to a max. of 15 m in a low noise environment. However, if the RS232C communication is set up with a baud rate of more than 38400 bps keep length to 3m.

❿ A 1-phase 230VAC power-supply can be used with servo-amps rated at MR-J2S-70A or less. Please connect the power-supply using only terminals L1 and L2. Do not connect anything to L3.

Connections with peripheral equipment

The figure below shows the linking of a motion controller system. The motion controllers of the series MELSEC A and MELSEC System Q as well as the servo amplifiers are linked via the high-speed network SSCNET.

The SSCNET network delivers high reliability and less wiring. SSCNET series systems brings you the best in easy-to-use motion control applications.

Further information on the motion control systems by Mitsubishi Electric is included in the Technical Catalogues to motion controllers of the series MELSEC A and MELSEC System Q.

Motion Controller
MELSEC A: A171SH, A172SH or A173UH,
MELSEC System Q: Q172CPUN, Q173CPUN

Positioning modules
MELSEC A: e.g. A1SD75M,
MELSEC System Q: e.g. QD75M

Connector

SSCNET

SSCNET

Servo amplifier
MR-J2S-☐B

Connector

Regeneration
unit

Motor
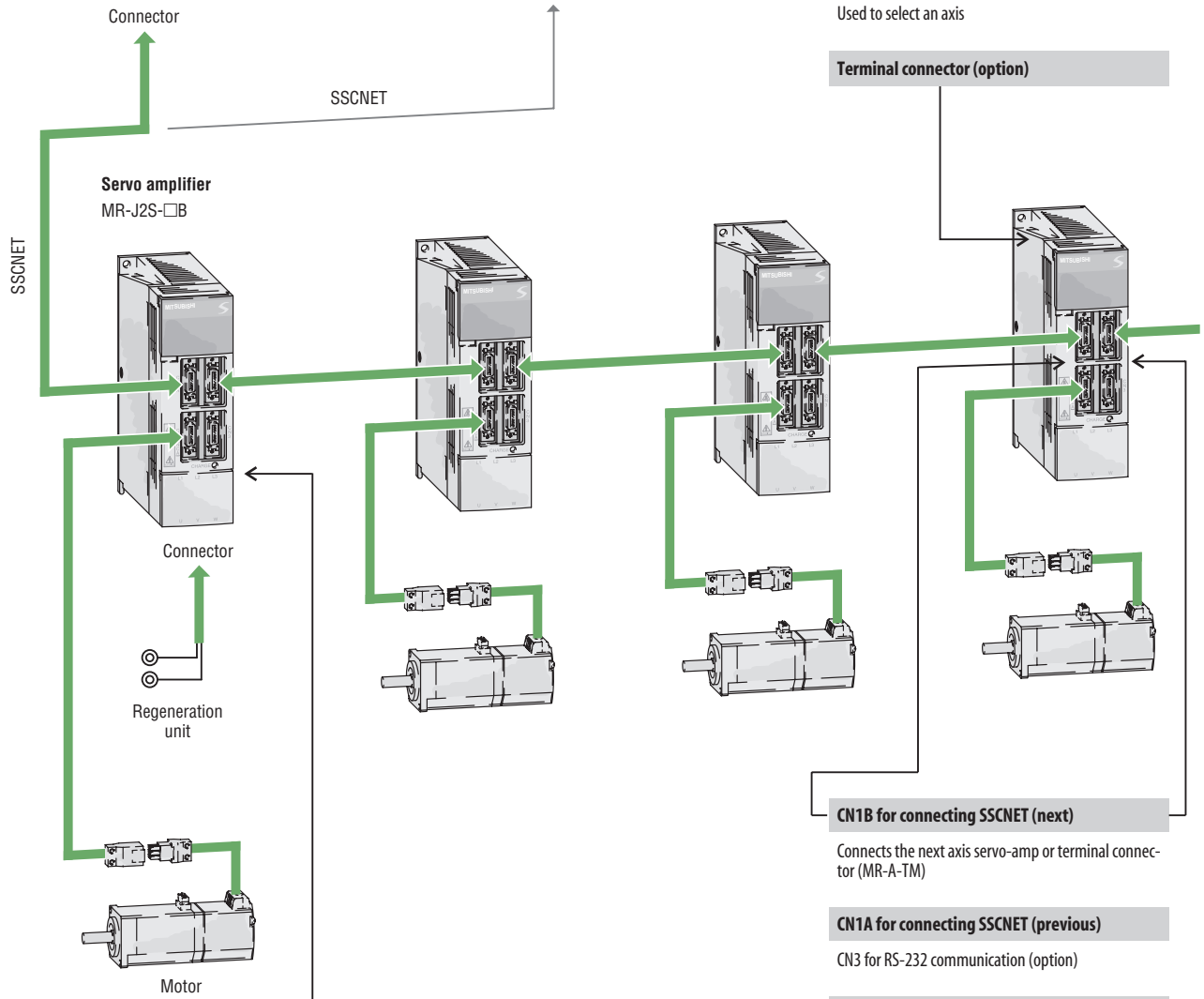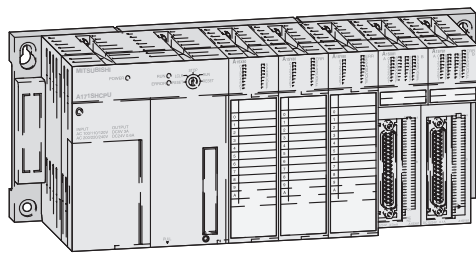
Battery compartment (option)

A battery (MR-BAT) is installed in the holder when using as an absolute system.

Display panel

Displays servo-amp status and alarm numbers

Axis setting section

Used to select an axis

Terminal connector (option)

CN1B for connecting SSCNET (next)

Connects the next axis servo-amp or terminal connector (MR-A-TM)

CN1A for connecting SSCNET (previous)

CN3 for RS-232 communication (option)

CN3 for RS-232C communication (option)

Connects the unit to the user's personal computer, enabling the user to monitor conditions, display graphs, and perform test operation. Setup software and dedicated cable are available too.

Regeneration unit (option)

Install this unit in situations involving frequent regeneration and large load inertia. Disconnect P and D when using this optional unit.

Charge lamp

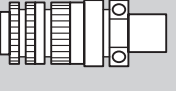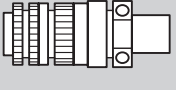Illuminates when the main circuit power supply is on. Do not plug or unplug the power lines when this lamp is on.
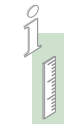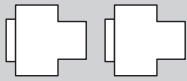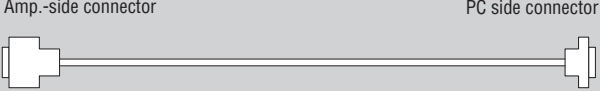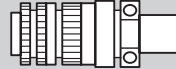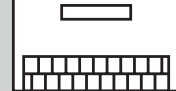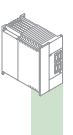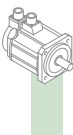
■ Cables and Connectors (MR-J2S-□A series)

HC-SFS, HC-RFS
servo motor

Positioning unit

Operation panel

Servo motor:
MC-KFS
HC-MFS

Cable attached to motor (0.3 m)

Item		Description		Model	Protection	Length	Art. no.
For CN2	①	Encoder cable for HC-KFS, HC-MFS series motors	Amp.-side connector / Junction connector / Encoder	MR-JCCBL□M-L (standard) Cable lenght in □: 2, 5, 10, 20, 30 m ❶	IP20	2 m 5 m 10 m 20 m 30 m	61372 55550 61332 61373 61374
				MR-JCCBL□M-H (high-flexible) Cable lenght in □: 2, 5, 10, 20, 30 m ❶	IP20	2 m 5 m 10 m 20 m 30 m	61375 55551 61376 61377 61378
	②	Encoder cable for HC-SFS, HC-RFS series motors	Amp.-side connector / Junction connector / Encoder	MR-JHSCBL□M-L (standard) Cable lenght in □: 2, 5, 10, 20, 30 m ❶, ❸	IP20	2 m 5 m 10 m 20 m 30 m	61380 61191 61194 61195 61197
				MR-JHSCBL□M-H (high-flexible) Cable lenght in □: 2, 5, 10, 20, 30 m ❶, ❸	IP20	2 m 5 m 10 m 20 m 30 m	61198 61199 61201 61215 61211
	⑨		Amp.-side connector / Back shell / Cable clamp / Plug	MR-ENCBL□M-H Cable lenght in □: 2, 5, 10, 20, 30 m ❶, ❺	IP65 IP67	2 m 5 m 10 m 20 m 30 m	104338 104340 104352 104353 104354
	③	Encoder connector set for HC-KFS, HC-MFS series motors	Amp.-side connector / Junction connector ❷	MR-J2CNM	IP20	—	61212
	④	Encoder connector set for HC-SFS, HC-RFS series motors	Amp.-side connector / Junction connector	MR-J2CNS	IP20	—	61213
	⑩		Amp.-side connector / Junction connector	MR-ENCNS	IP65 IP67	—	87237

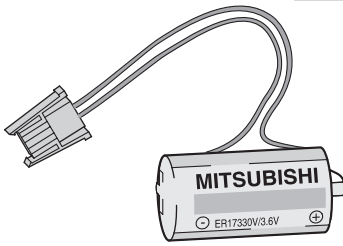| Item		Description		Model	Protection	Length	Art. no.
For CN1	⑤	CN1 connector	Amp.-side connector	MR-J2CN1 ❹ (set contents are 2 pcs.)	—	—	55912
	⑦	Junction terminal block cable	Junction terminal block side connector / Amp.-side connector	MR-J2TBL☐M Cable lenght in ☐: 0.5, 1 m	—	0,5 m / 1 m	61216 / 61218
For CN3	⑥	Personal computer communications cable	Amp.-side connector / PC side connector	MR-CPCATCBL3M	—	3 m	55910
	⑪	Power supply connector set for HC-KFS, HC-MFS series motor	Plug and male terminal	MR-PWCNK1	IP20	—	131663
	⑫	Power supply connector set for HC-KFS, HC-MFS, series motor with electrom. brake	Plug and male terminal	MR-PWCNK2	IP20	—	131664
	⑬	Power-supply connector set for HC-SFS52, 53, 81, 102, 103, 152, 153, HC-RFS103, 153, 203		MR-PWCNS1	IP65 IP67	—	64036
	⑭	Power supply connector set for HC-SFS121, 201, 202, 203, 301, 352, 502, HC-RFS353, 503		MR-PWCNS2	IP65 IP67	—	64035
	⑮	Power supply connector set for HC-SFS702		MR-PWCNS3	IP65 IP67	—	136358
	⑯	Brake connector set for HC-SFS121B, 201B, 301B, 202B, 352B, 502B, 702B,		MR-BKCN	IP65 IP67	—	64034
	⑧	Junction terminal block		MR-TB20	—	—	61390

Notes:

❶ H and L indicate bending life. H products have a long bending life.

❷ AMP 1-172161-1 (white) can be used for the connector housing. For connector pins, 170363-1 (bulk) can be used.

❸ MR-JHSCBL-☐M-H and L are not IP65 compliant

❹ Use the MR-J2CN1 connector when the RS422 communication cable is supplied by the customer.

❺ The encoder cable is not oil-resistant.
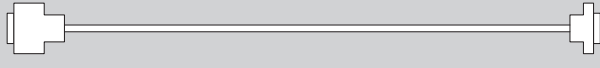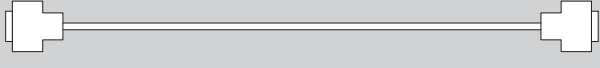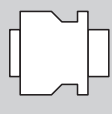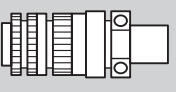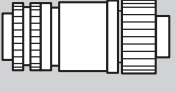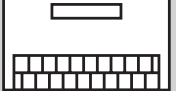
■ Cables and Connectors (MR-J2S-☐B series)

Motion controller/
positioning module

Terminal
connector

Servo
motor

Cable attached
to motor (0.3 m)

HC-SFS, HC-RFS
servo motor

Item		Description		Model	Protection	Length	Art. no.
For CN2	①	Encoder cable for HC-KFS, HC-MFS series motors	Amp.-side connector Junction connector Encoder	MR-JCCBL☐M-L (standard) Cable lenght in ☐: 2, 5, 10, 20, 30 m ❶	IP20	2 m 5 m 10 m 20 m 30 m	61372 55550 61332 61373 61374
				MR-JCCBL☐M-H (high-flexible) Cable lenght in ☐: 2, 5, 10, 20, 30 m ❶	IP20	2 m 5 m 10 m 20 m 30 m	61375 55551 61376 61377 61378
	②	Encoder cable for HC-SFS, HC-RFS series motors	Amp.-side connector Junction connector Encoder	MR-JHSCBL☐M-L (standard) Cable lenght in ☐: 2, 5, 10, 20, 30 m ❶, ❸	IP20	2 m 5 m 10 m 20 m 30 m	61380 61191 61194 61195 61197
				MR-JHSCBL☐M-H (high-flexible) Cable lenght in ☐: 2, 5, 10, 20, 30 m ❶, ❸	IP20	2 m 5 m 10 m 20 m 30 m	61198 61199 61201 61215 61211
	⑨		Amp.-side connector Back shell Plug Cable clamp	MR-ENCBL☐M-H Cable lenght in ☐: 2, 5, 10, 20, 30 m ❶, ❺	IP65 IP67	2 m 5 m 10 m 20 m 30 m	104338 104340 104352 104353 104354
	③	Encoder connector set for HC-KFS, HC-MFS series motors	Amp.-side connector Junction connector ❷	MR-J2CNM	IP20	—	61212
	④	Encoder connector set for HC-SFS, HC-RFS series motors	Amp.-side connector Junction connector	MR-J2CNS	IP20	—	61213
	⑩		Amp.-side connector Junction connector	MR-ENCNS	IP65 IP67	—	87237

Item		Description		Model	Protection	Length	Art. no.
For CN1	⑤	Controller to amplifier bus cable	Controller side connector / Amp.-side connector	Cable depends on the controller/ positioning module used (please refer to the tech. catalogue)	—	0.5 m / 1 m / 5 m	70009 / 86733 / 70006
For CN3	⑥	Personal computer communications cable	Amp.-side connector / PC side connector	MR-CPCATCBL3M	—	3 m	55910
For CN1B	⑦	Amplifier to amplifier bus cable	Amp.-side connector / Amp.-side connector	MR-J2HBUS□M Cable lenght in □: 0.5, 1, 5 m	—	0.5 m / 1 m / 5 m	70014 / 70012 / 70011
	⑧	Bus-end connector		MR-A-TM	—	—	70004
	⑪	Power supply connector set for HC-KFS, HC-MFS series motor	Plug and male terminal	MR-PWCNK1	IP20	—	131663
	⑫	Power supply connector set for HC-KFS, HC-MFS, series motor with electrom. brake	Plug and male terminal	MR-PWCNK2	IP20	—	131664
	⑬	Power-supply connector set for HC-SFS52, 53, 81, 102, 103, 152, 153, HC-RFS103, 153, 203		MR-PWCNS1	IP65 IP67	—	64036
	⑭	Power supply connector set for HC-SFS121, 201, 202, 203, 301, 352, 502, HC-RFS353, 503		MR-PWCNS2	IP65 IP67	—	64035
	⑮	Power supply connector set for HC-SFS702		MR-PWCNS3	IP65 IP67	—	136358
	⑯	Brake connector set for HC-SFS121B, 201B, 301B, 202B, 352B, 502B, 702B,		MR-BKCN	IP65 IP67	—	64034
	⑧	Junction terminal block		MR-TB20	—	—	61390

Notes:

❶ H and L indicate bending life. H products have a long bending life.

❷ AMP 1-172161-1 (white) can be used for the connector housing. For connector pins, 170363-1 (bulk) can be used.

❸ MR-JHSCBL-□M-H and L are not IP65 compliant

❹ The encoder cable is not oil-resistant.

■ Battery (MR-BAT)

The servomotor's absolute value can be maintained by installing the MR-BAT battery in the servo amp. There is no need to install the battery when using the servomotor in incremental mode.

Battery	Application	Art. no.
MR-BAT	Buffering amp data	103862

■ Junction Terminal Block (MR-TB20)
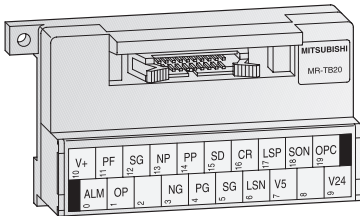
All signals can be wired to this junction terminal block without a connection to CN1. Always use the junction terminal block with the junction terminal block cable (MR-J2TBL□M). A connection example and the pin designation of the connectors are shown below.

Ground the junction terminal block cable on the junction terminal block side with a standard cable clamp fitting.

The junction terminal block has three terminal labels which indicate signal arrangement.

Please take care of the following wiring between the terminal and the servo itself. Misswiring might cause misoperation or damage the product.

Junction terminal block	Art. no.
MR-TB20	61390

Cable	Length	Art. no.
MR-J2TBL05M	0.5 m	61216
MR-J2TBL1M	1 m	61218

Servo amp.

Cable clamp fitting

CN1A or CN1B — MR-J2TBL05M — MR-TB20
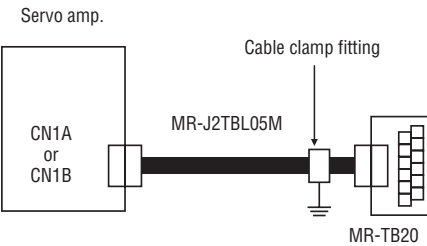
Junction terminal block side connector   Servo amplifier side

CN1A	CN1B	#	PIN		PIN
LG	LG	10	B1		1
NP	VC	0	A1		2
PP	VDD	11	B2		3
P15R	DO1	1	A2		4
LZ	SON	12	B3		5
LA	TLC	2	A3		6
LB		13	B4		7
CR	PC	3	A4		8
COM	TL	14	B5		9
SG	SG	4	A5		10
OPC	P15R	15	B6		11
NG	TLA	5	A6		12
PG	COM	16	B7		13
OP	RES	6	A7		14
LZR	EMG	17	B8		15
LAR	LSP	7	A8		16
LBR	LSN	18	B9		17
INP	ALM	8	A9		18
RD	ZSP	19	B10		19
SD	SD	9	A10		20
					Plate

The labels are designed for position control mode. Since the signals change parameter setting and control mode, use the accessory signal seals to change the signal symbols.

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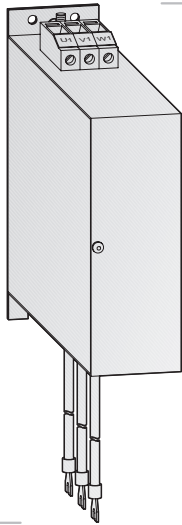
■ Noise Filters

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 55022 A/B. More details are enclosed in the EMC short reference sheet of the MR-J2S filters.

Filter	Servo amplfier	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Order number
MF-2F230-007.230 [1]	MR-J2S-10A/B to MR-J2S-70A/B	11	7	<9	1.0	140055
MF-3F230-010.230 [1]	MR-J2S-100 A/B	16	10	< 0.60 (<32) [2]	2.1	140056
MF-3F230-025.230 [1]	MR-J2S-200A/B and MR-J2S-350A/B	33	25	< 0.62 (<36) [2]	2.5	140057
MF-3F230-050.230 [1]	MR-J2S-500A/B and MR-J2S-700A/B	31	50	< 0.65 (<72) [2]	3.0	140058

[1] All filters conform to EN55011A at a cable length of 50 m and EN55022B at 20 m.

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

■ Transformers
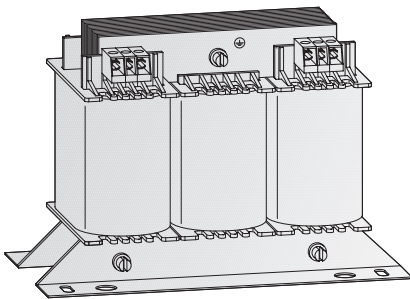
This auto transformer is used to adapt the servo amplifier to a 3~ 400 V power supply. Further, this auto transformer reduces the harmonics generated by the system and it protects the servo electronics.

The input voltage is 400 V, the output voltage is 230 V.

Transformer	Power capacity [kVA] ([kW])	ED [%]	Input current [A]	Output current [A]	Power dissipation [W]	Weight [kg]	Order number
MT 1,3-60	1.3 (0.4) 1.7	60 30	2.02 2.69	3.26 4.27	103 167	7.0	137281
MT 1,7-60	1.7 (0.7) 2.5	60 30	2.61 3.89	4.27 6.28	110 199	10.7	137302
MT 2,5-60	2.5 (1.0) 3.5	60 30	3.80 5.42	6.28 8.78	155 282	16.5	137303
MT 3,5-60	3.5 (2.0) 5.5	60 30	5.30 8.41	8.78 13.80	170 330	22.0	137304
MT 5,5-60	5.5 (3.5)	60	8.26	13.80	243	22.0	137305
MT 7,5-60	7.5 (5.0)	60	11.25	18.82	190	28.0	137306
MT 11-60	11 (7.0)	60	16.40	27.61	280	41.0	137307

■ Brake Resistors
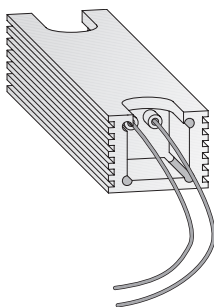
If the regenerative power exceeds the power of the built-in resistor,

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-J2S-10A/B to MR-J2S-70A/B	150	40	0.16	36 x 27 x 90	137279
MR-RFH220-40	MR-J2S-100 A/B	400	40	0.42	36 x 27 x 200	137278
MR-RFH400-13	MR-J2S-200A/B, MR-J2S-350A/B and MR-J2S-500A/B	600	13	0.73	36 x 27 x 320	137277
MR-RFH400-6,7	MR-J2S-700A/B	600	6.7	0.73	36 x 27 x 320	137275

■ MELSEC A/Q Positioning Units

Positioning units A(1S)D75P(M)/QD75P(D)

The following MELSEC positioning controllers are available for the MR-J2S-A (or B) series servo-amplifiers. Choose the unit that best fits your operating objectives and system size.

All units are compatible with the MELSEC A and System Q series PLC's. A high precision, highly functional positioning unit that uses a 32-bit RISC chip. For further details please refer to the appropriate technical catalogues (see page 2).

Through SSCNET connection, the servo system delivers highest reliability and less wiring.

Special Features

● Control of up to four axes with linear interpolation and two axes with circular interpolation.
● Storage of up to 600 positional data (flash ROM).
● Units of travel can be defined in pulses, mm, inches or degrees.
● Configuration and presetting of positional data is carried out by means of the PLC program or with the aid of a special positioning software.

AD75P□,
AD75M□ (SSCNET)

A1SD75P□,
A(1S)D75M□ (SSCNET)
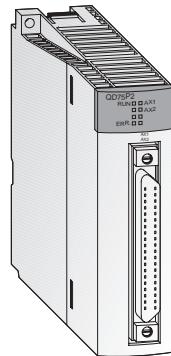
QD75P□,
QD75D□,
QD75M□ (SSCNET)

	AD75P1 A1SD75P1	AD75P2 A1SD75P2	AD75P3 A1SD75P3	QD75P1	QD75P2	QD75P4
Number of control axes	1	2	3	1	2	4
Interpolation functions	—	2-axes linear interpolation; 2-axes circular interpolation	2-, 3-axes linear interpolation; 2-axes circular interpolation	—	2-axes linear interpolation; 2-axes circular interpolation	2-, 3-, or 4-axes linear interpolation; 2-axes circular interpolation
Control mode	PTP control, locus control, speed control, speed position control			PTP control, path control, speed control, position switching control, position speed switching control		
Command mode	Incremental, absolute			Incremental, absolute		
Max. number of output pulses	±2147483648			±2147483648		
Max. pulse frequency	Differential output: 400 kpps, open collector: 200 kpps					
Positioning pattern	600 pattern/shaft (100 patterns from GX IEC Developer software)			600 pattern/shaft (100 patterns from GX Developer software)		
Input/output duty points	32			32		
Acceleration/deceleration pattern	Automatic trapezoidal, S-pattern acceleration/deceleration			Automatic trapezoidal, S-pattern acceleration/deceleration		
Order information Art. no.	54927 65028	54928 65029	54929 65030	132581	132582	132583

■ MELSEC FX Positioning Units
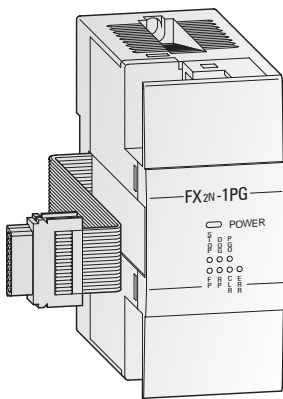
Single-Axis
Positioning Module
FX2N-1PG-E,
FX2N-10PG*
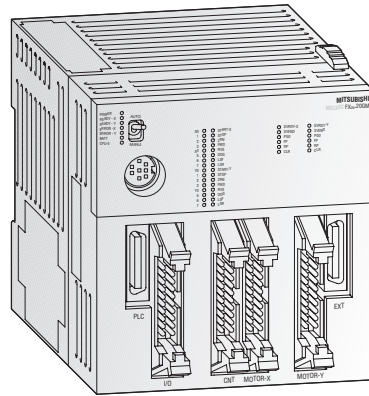
1-axis or 2-axes
positioning modules
FX2N-10GM/-20GM

Positioning module

The FX series allows the user to select a model suitable to the positioning application, from simple reciprocating motion with one speed to complicated simultaneous control of two axes.

For further details please refer to the appropriate technical catalogues (see page 2).

Special Features FX2N-1PG-E/-10PG

● Works with all FX1N/FX2N series controllers
● Possibility of absolute or relative positioning
● 7 different operation functions, such as jog mode, zeroing, variable speeds, etc.
● The speed increase or decrease can be set either automatically or manually.

Special Features FX2N-10GM/20GM

● Can be used as a stand-alone device or in combination with an FX2N PLC
● Up to 8 FX2N-10GM and/or FX2N-20GM can be connected to an FX2N PLC
● Pulse generator connection possible
● Linear and circular interpolation are available
● Integrated inputs and outputs
● Additional inputs/outputs can be added

BASICS

Positioning made simple

The positioning instructions of the FX1S and FX1N series can control stepping motors and servo motors. Since they require no special blocks, units or dedicated positioning peripherals, system configurations can be built up at minimal costs.

Special features

● integrated positioning instructions
● 2-axis control (independent)
● up to 100 kHz output frequency

Max. pulse output: 100 kHz

Rotation direction output

OFF (reverse)

ON (forward)

FX1S/FX1N PLC
(with transistor outputs)
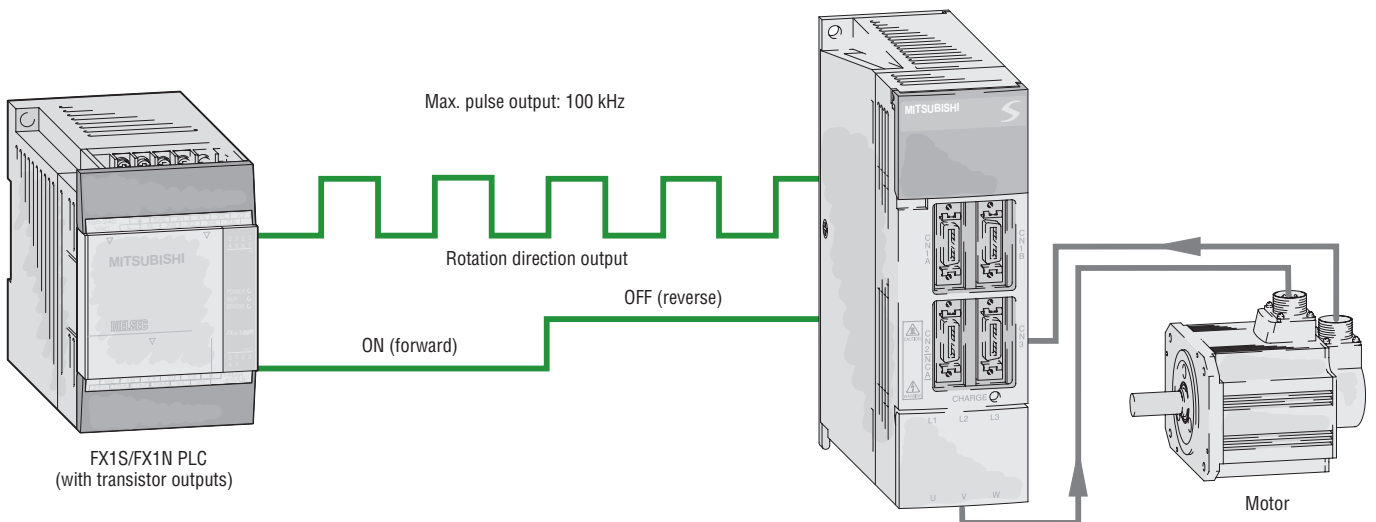
Motor

■ Servo Motors HC-KFS and HC-MFS Series

HC-KFS053 (B), HC-KFS13 (B), HC-MFS053 (B), HC-MFS13 (B)

Encoder cable

Power supply lead
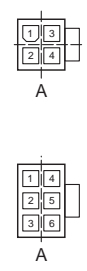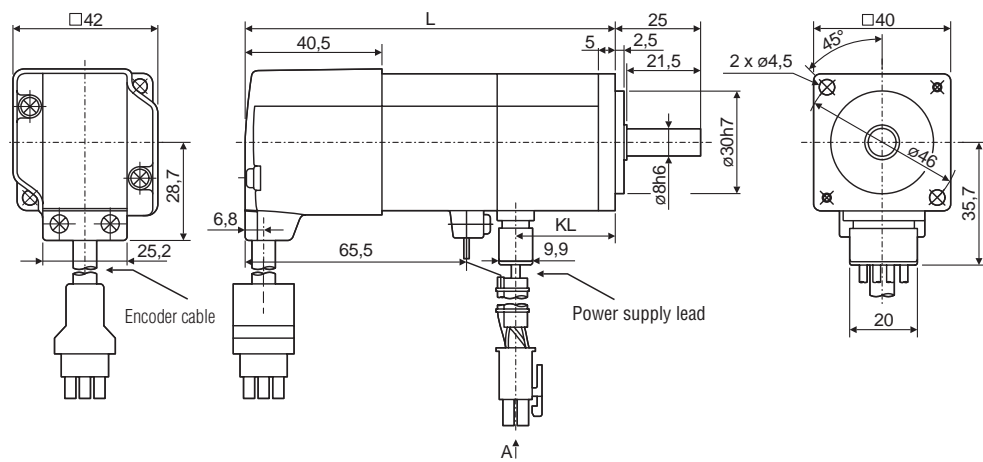
unit: mm

Model	L [mm]	KL [mm]
HC-KFS053 (B) HC-MFS053 (B)	81.5 (109.5)	29.5
HC-KFS13 (B) HC-MFS13 (B)	96.5 (124.5)	44.5

Dimensions for motors with brakes in brackets ( ).

HC-KFS23 (B), HC-KFS43 (B), HC-MFS23 (B), HC-MFS43 (B)

Encoder cable

Power supply lead
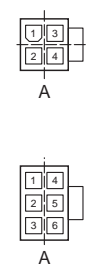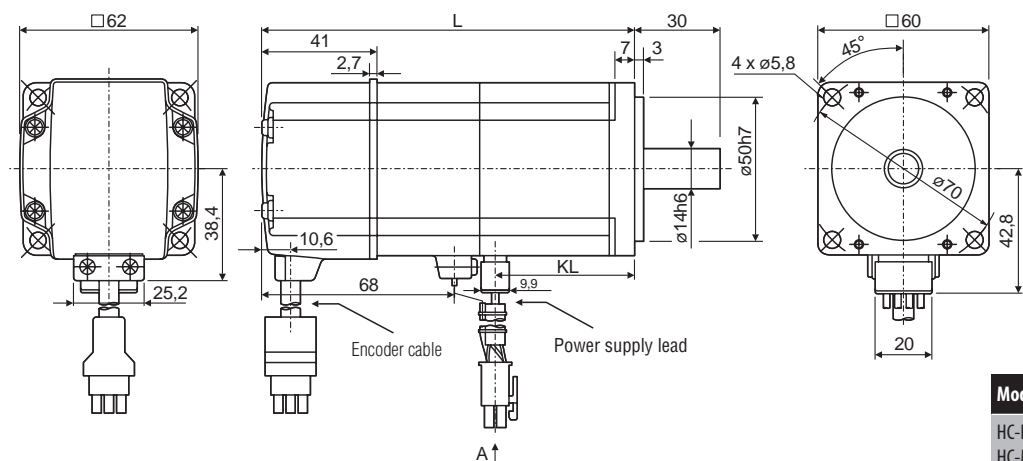
unit: mm

Model	L [mm]	KL [mm]
HC-KFS23 (B) HC-MFS23 (B)	99.5 (131.5)	49.1
HC-KFS43 (B) HC-MFS43 (B)	124.5 (156.5)	72.1

Dimensions for motors with brakes in brackets ( ).

HC-KFS73 (B), HC-MFS73 (B)

Encoder cable

Power supply lead

unit: mm

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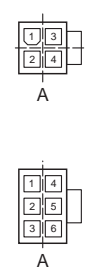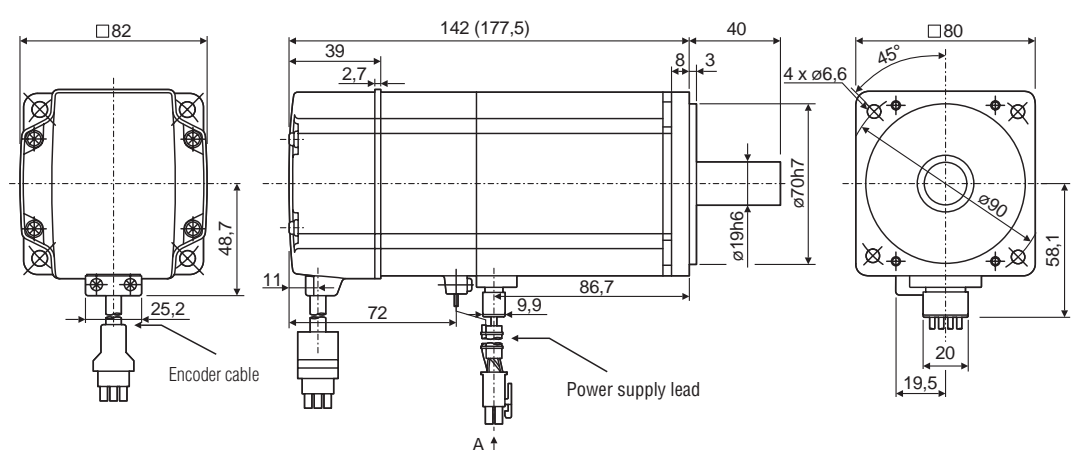
■ Servo Motors HC-SFS Series

HC-SFS52 (B) – HC-SFS152 (B)

Encoder connector

Power supply connector
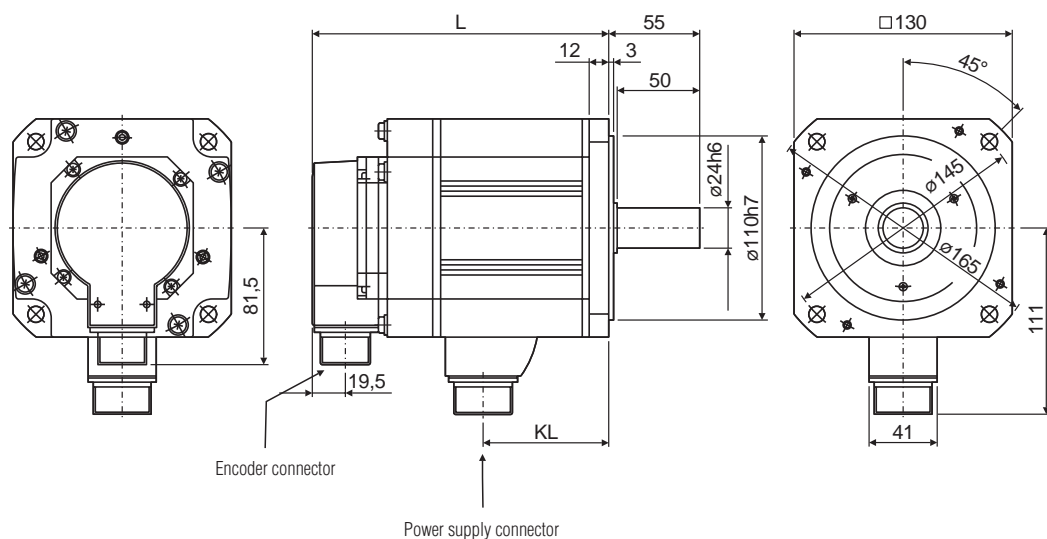
unit: mm

Model	L [mm]	KL [mm]
HC-SFS52 (B)	120 (153)	51.5
HC-SFS102 (B)	145 (178)	76.5
HC-SFS152 (B)	170 (203)	101.5

Dimensions for motors with brakes in brackets ( ).

HC-SFS202 (B)– HC-SFS702 (B)

Encoder connector

Power supply connector
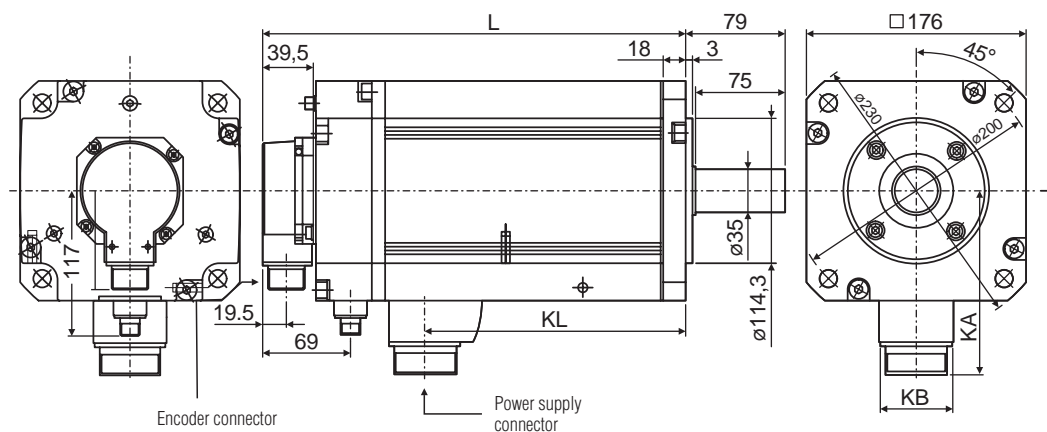
unit: mm

Model	L [mm]	KL [mm]	KA [mm]	KB [mm]
HC-SFS202 (B)	145 (193)	68.5	142	46
HC-SFS352 (B)	187 (235)	110.5	142	46
HC-SFS502(B)	208 (256)	131.5	142	46
HC-SFS702 (B)	292 (340)	210.5	150	58

Dimensions for motors with brakes in brackets ( ).

■ Servo Motors HC-RFS-Series

HC-RFS103 (B), HC-RFS153 (B), HC-RFS203 (B)

Encoder connector

Power supply connector
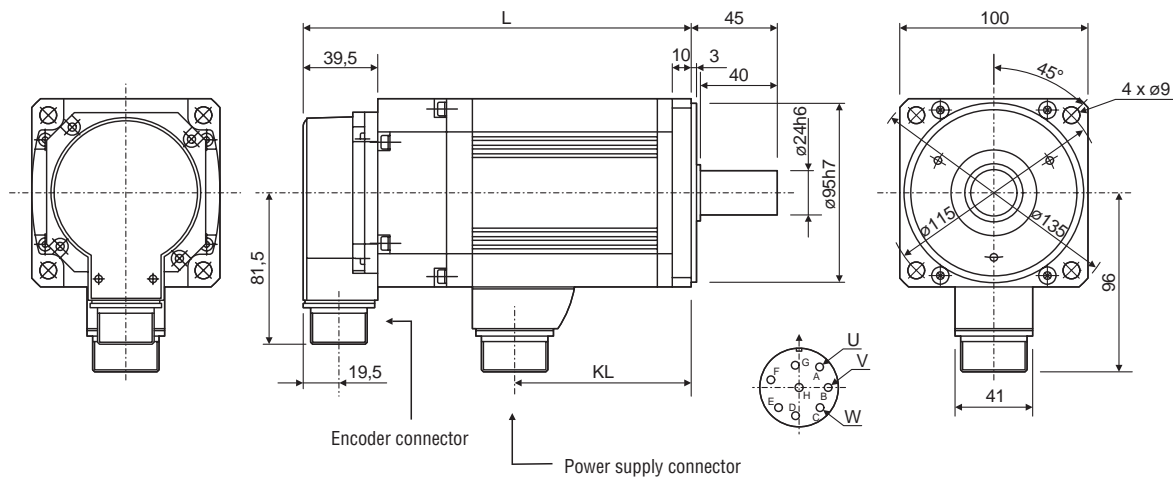
unit: mm

Model	L [mm]	KL [mm]
HC-RFS103 (B)	147 (185)	71
HC-RFS153 (B)	172 (210)	96
HC-RFS203 (B)	197 (235)	121

Dimensions for motors with brakes in brackets ( ).

HC-RFS353 (B), HC-RFS503 (B)

Encoder connector

Power supply connector
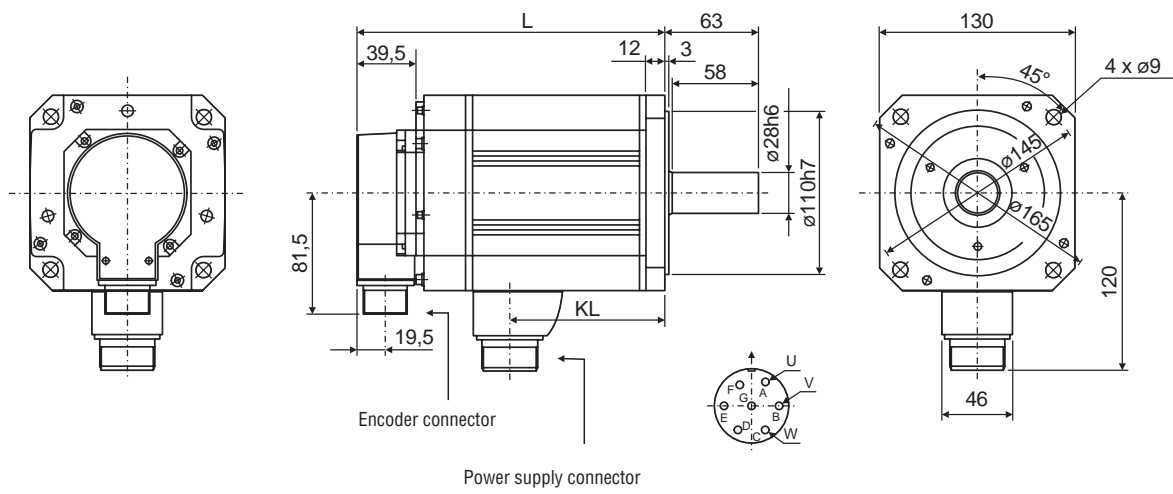
unit: mm

Model	L [mm]	KL [mm]
HC-RFS353 (B)	217 (254)	148
HC-RFS503 (B)	274 (311)	205

Dimensions for motors with brakes in brackets ( ).

■ Servo Amplifiers

MR-J2S-10A/B, MR-J2S-20A/B

unit: mm

MR-J2S-40A/B, MR-J2S-60A/B

unit: mm

MR-J2S-70A/B, MR-J2S-100A/B

unit: mm

MR-J2S-200A/B, MR-J2S-350A/B

unit: mm

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MR-J2S-500A/B
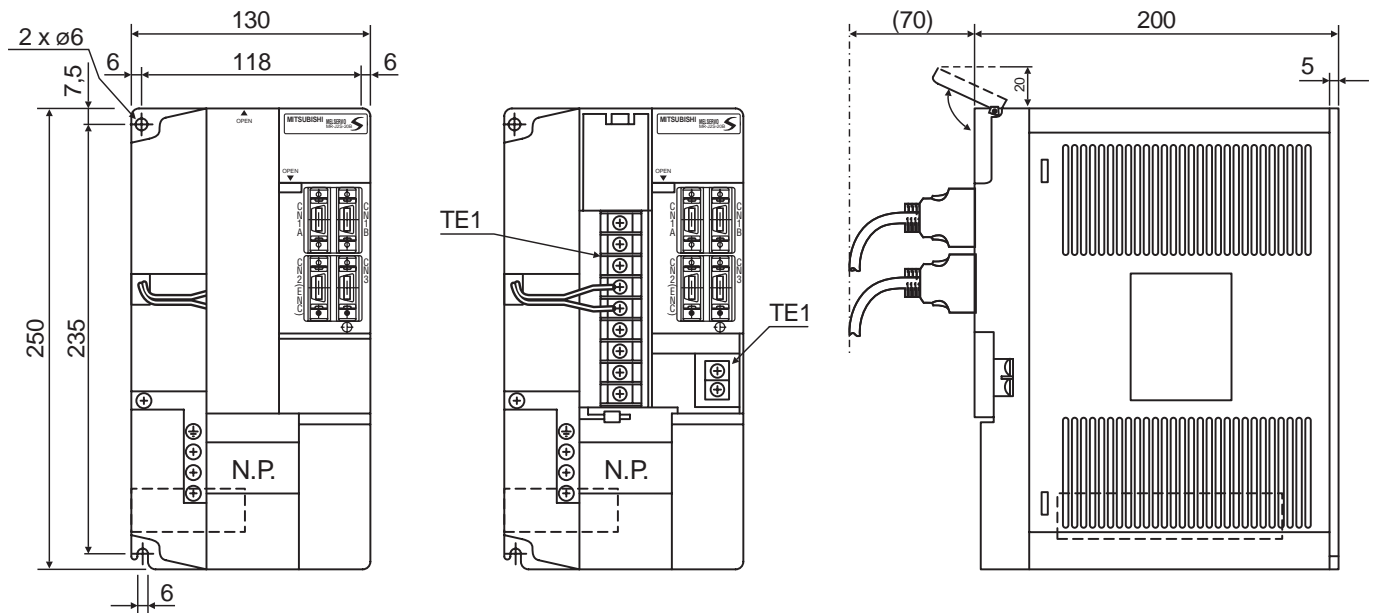
unit: mm

MR-J2S-700A/B
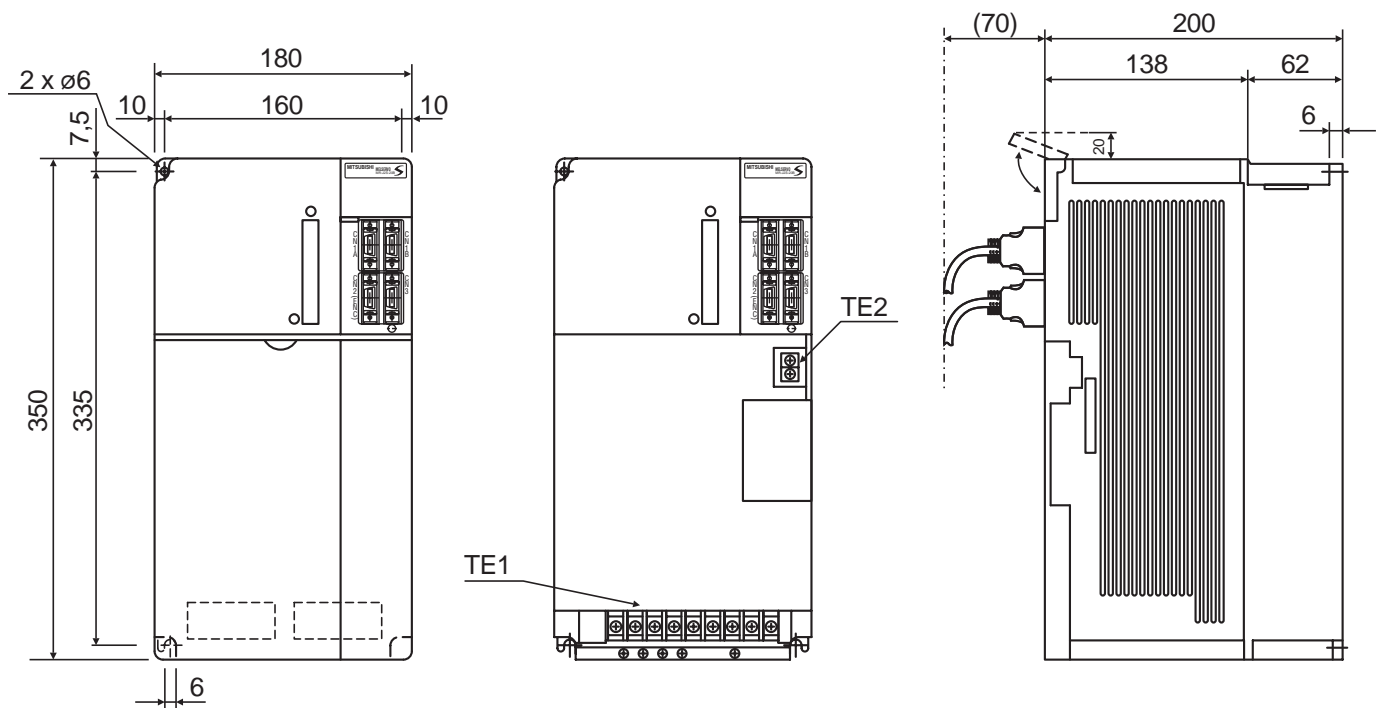
unit: mm

■ Noise Filters

MF-2F230-007.230
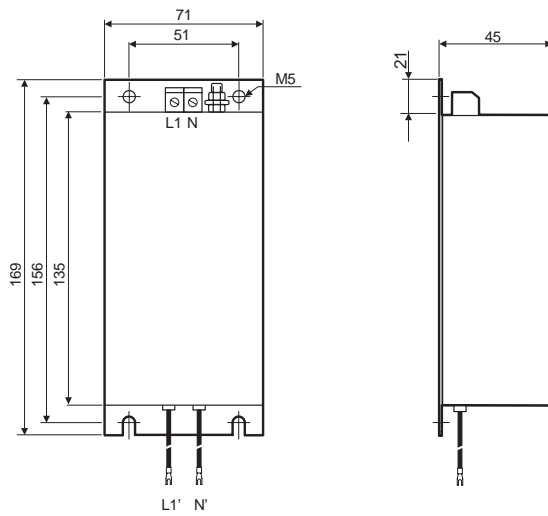
Unit: mm

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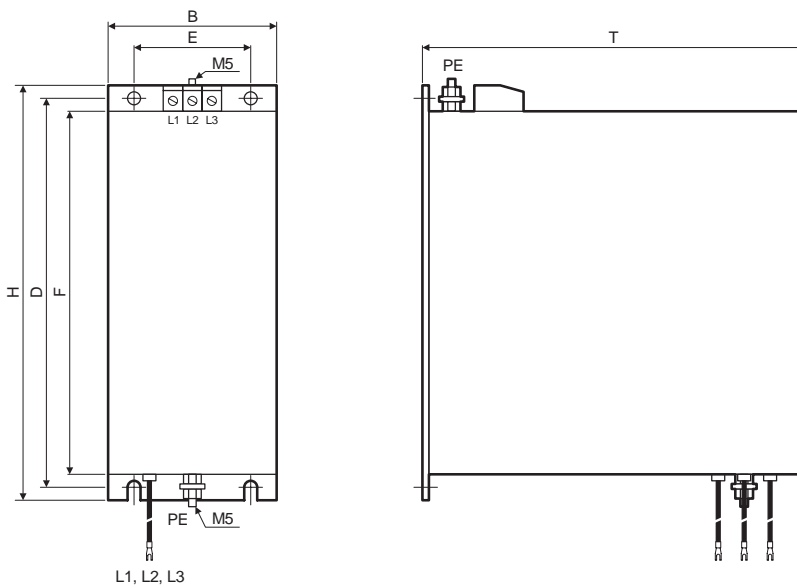
Type	H	B	T	D	E	F
MF-3F230-010.230	168	45	135	156	36	140
MF-3F230-025.230	168	75	195	156	60	140
MF-3F230-050.230	250	75	200	235	45	222

Unit: mm

■ Brake Resistors

RFH75 – RFH-400
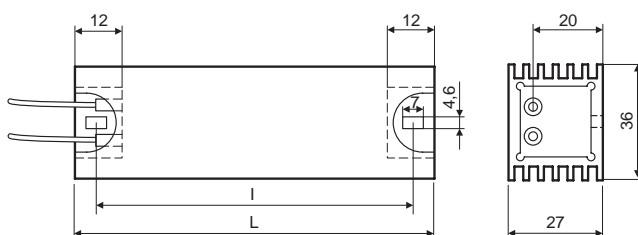
Type	L	I
MR-RFH75-40	90	79
MR-RFH220-40	200	189
MR-RFH400-13	320	309
MR-RFH400-6.7	320	309

Unit: mm

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■ Transformers

UI : UA = 400 V : 230 V
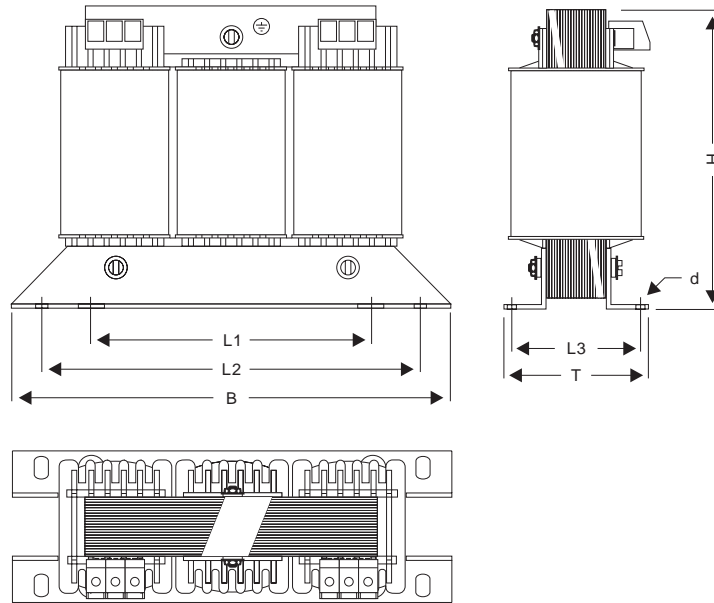
Type	Power [kVA] ([kW])	∅ Terminal [mm²]	B [mm]	T [mm]	H [mm]	L1 [mm]	L2 [mm]	L3 [mm]	d [mm²]	Weight [kg]
MT 1.2-60	1.3 (0.4) 1.7	2.5 2.5	219	105	163	136	201	71	7 x 12	7.0
MT 1.7-60	1.7 (0.7) 1.5	2.5 2.5	219	125	163	136	201	91	7 x 12	10.7
MT 2.5-60	2.5 (1.0) 3.5	2.5 2.5	267	115	202	176	249	80	7 x 12	16.5
MT 3.5-60	3.5 (2.0) 5.5	4 4	267	139	202	176	249	104	7 x 12	22.0
MT 5.5-60	5.5 (3.5)	4	267	139	202	175	249	104	7 x 12	22.0
MT 7.5-60	7.5 (5.0)	4	316	160	245	200	292	112	10 x 16	28
MT 11-60	11 (7.0)	4	352	165	300	224	328	117	10 x 16	41

■ Junction Terminal Block MR-TB20

Please note the informations on page 38.

unit: mm

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Order declaration

Pos.	Number	Item (type)	Article number	Description	Remarks

Notes when ordering:

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