**Servo Amplifiers
and Servo Motors**

**MELSERVO
MR-J2-SUPER**

Technical Catalogue

SSCNET
SERVO SYSTEM CONTROLLER NETWORK

2005

Servo Intelligence: MR-J2S Series

New Products

Mitsubishi introduces the new general-purpose 400 V AC servo amplifiers MR-J2S-A4, MR-J2S-B4 and the corresponding HC-SFS and HA-LFS series 400 V AC servo motors.

The new servo amplifiers are available in versions with output ratings from 600 W to 7 kW.

In addition a complete line-up of 400 V products up to 55 kW is available on request.

Further Publications within the Factory Automation Range

Technical Catalogues

Inverter Technical Catalogues

Product catalogues for the frequency inverters FR-A 540 (L-G), FR-E 500, FR-F 700 and FR-S 500E, control panels, and accessories

Motion Controller Technical Catalogue

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

PLC Technical Catalogues

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

Networks Technical Catalogue

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

HMI Technical Catalogue

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 documents for the whole product range offered by MITSUBISHI ELECTRIC as well as the current version of this catalogue. All manuals and catalogues can be downloaded for your convenience. Manuals and catalogues are available in multiple language. Please check for availability.

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 associated accessories. Only the manuals supplied with the units are relevant for installation, commissioning and handling of the units and 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 your nearest office listed on the last page of this document.

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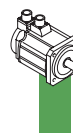# MELSERVO MR-J2S SERIES – SERVO AMPLIFIERS AND SERVO MOTORS

BASICS

Servo and Motion Systems

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

With both standard pulse type output modules and SSCNET bus modules specific application needs are easily met.

The Super series of servo motors and amplifiers take Mitsubishi motion control to new levels of precision with a wide range of motors (all fitted with a standard 131,072 ppr encoder) and wide amplifier range (up to 55 kW continous power).

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

What are the components of a Servo System?
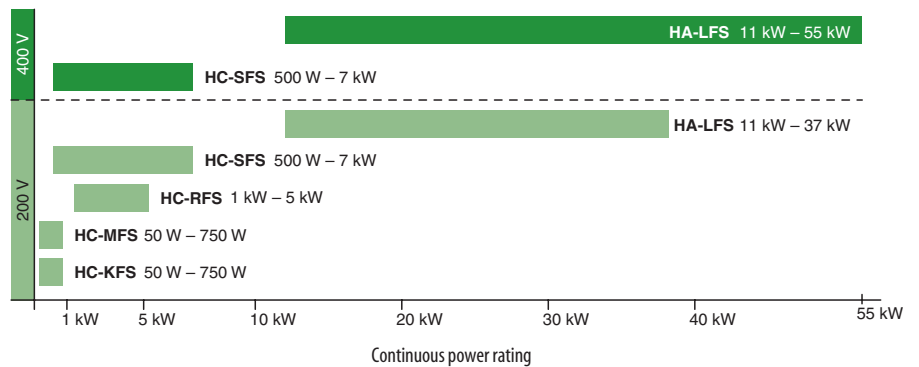
Servo Motors

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

Mitsubishi servo motors are made to high standards and offer a wide range of power, speed and inertia characteristics providing a motor for all applications. Ranging from 50 W through to 55 kW and with specialist type motors available (e.g. flat "pancake" motors) the new Super series servo motors complete the line-up of products offered by Mitsubishi Electric.

Also, all motors in the Mitsubishi Super series are fitted with 131072 ppr encoders as standard. Therefore an absolute system

can be created by simply providing power to servo amplifier via a battery. Once this has been done the super capacitor inside the motor and back-up battery allow the

servo motor position to be constantly monitored, even when disconnected from the system.

HA-LFS 11 kW – 55 kW
HC-SFS 500 W – 7 kW
HA-LFS 11 kW – 37 kW
HC-SFS 500 W – 7 kW
HC-RFS 1 kW – 5 kW
HC-MFS 50 W – 750 W
HC-KFS 50 W – 750 W
400 V / 200 V

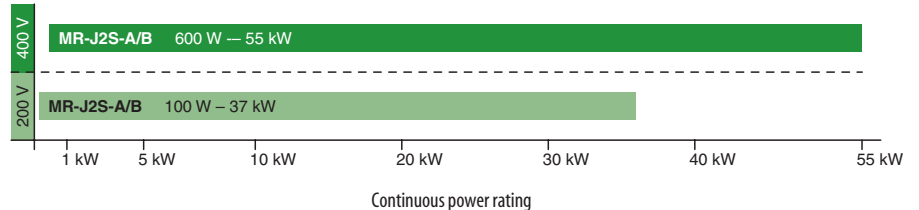1 kW 5 kW 10 kW 20 kW 30 kW 40 kW 55 kW
Continuous power rating

Servo Amplifiers

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

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

All Super series digital pulse and analog units (MR-J2S-A and MR-J2S-B series) range from 100 W through to 55 kW. The SSCNET bus type amplifiers (MR-J2S-B) offer the user ease of connectivity, via SSCNET.

MR-J2S-A/B 600 W — 55 kW
MR-J2S-A/B 100 W – 37 kW
400 V / 200 V

1 kW 5 kW 10 kW 20 kW 30 kW 40 kW 55 kW
Continuous power rating

Positioning Controllers

A range of advanced positioning modules capitalises on the use of Mitsubishi PLC systems.

For the compact, cost effective, FX range of PLCs, the FX2N-10PG unit provides single-axis control with built-in positioning tables, fast external start and an output pulse rate of up to 1 MHz. This provides a quick and easy, but efficient positioning control system for simpler applications.

For larger, more complex applications the new and more powerful System Q range offers three different QD75 modules (one, two and four axes). These are: open-collector output type (QD75P series), differential output type (QD75D series) and SSCNET bus type (QD75M series). Using SSCNET can provide improved and easier positioning systems, with reduced wiring and better noise immunity. All QD75 series controllers can provide functionality such as interpolation and speed-position operation etc.

Motion Controllers

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

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MELSERVO Servo Amplifiers and Servo Motors

The MELSERVO generation

The MR-J2S servo drive systems from Mitsubishi Electric combine extremely dynamic response with ultra-fast positioning. In addition the servo amplifiers are also very simple to operate, and their advanced functionality make it possible to achieve maximum performance very quickly, even for users without special experience in calibrating drive applications. The significantly improved auto-tuning function reduces the need for the time-consuming trial-and-error approach. In combination with the setup software package (MR-Configurator) the MR-J2S series can be used to detect application mechanical critical frequencies. This enables notch filters to be set to avoid resonant frequencies anabling vibration free performance.

The design of the MR-J2S-CL with integrated positioning control reflects the same uncompromising commitment to user-friendliness. This series features a number of additional internal functions, including a simple and yet powerful programming language.
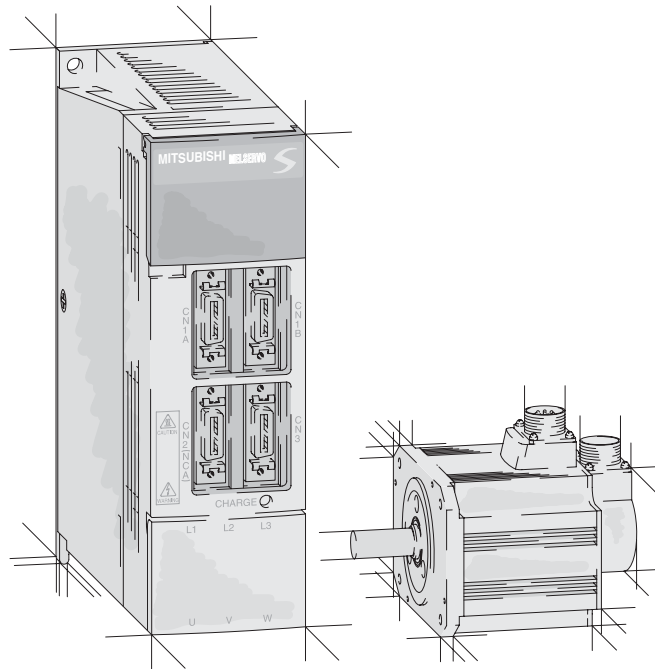
Enhanced Safety and Protection Against Environmental Hazards

Satisfies 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-J2S units meet low-voltage directives (LVD), UL and cUL.

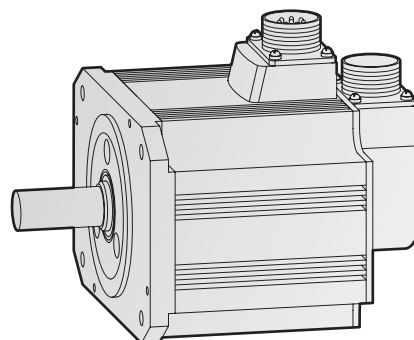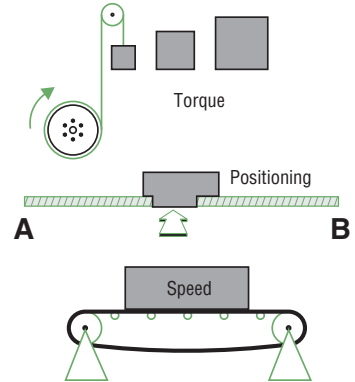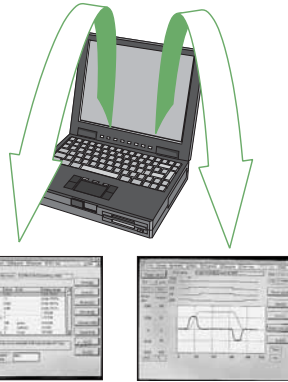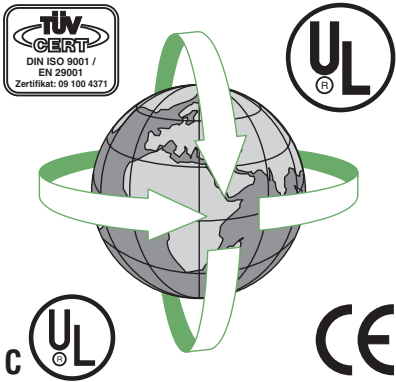### IP65 as standard
(HC-SFS, HC-RFS series)

The HC-SFS and HC-RFS series of servo motors come with IP65 as standard enhancing their ability to withstand environmental hazards.

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

Overview of all General MR-J2S 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.

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:
● Ultra-compact HC-MFS and HC-KFS series
● Very low-inertia HC-RFS series
● 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 needs of the application.

Fully Equipped

Absolute detection 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

The MR-J2S comes with an RS-232C/RS-485 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 quickly in a power failure or when an alarm has been triggered.

Integrated regenerative resistor

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

Control signal assignment feature (MR-J2S-A and MR-J2S-CL series)

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

Special Features

Model adaptive control

As 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.

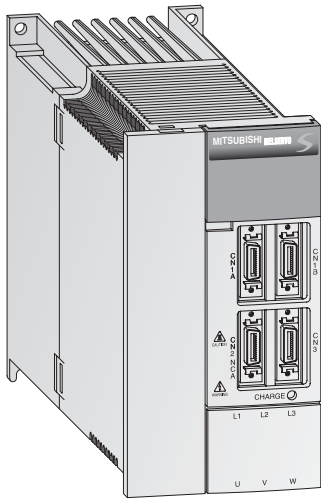### Encoder serial communications

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

Real-Time Auto-Tuning (RTAT)

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

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MELSERVO MR-J2S Servo Amplifiers

Features

The MR-J2S servo amplifiers can be used for global applications with superb operation in the toughest environments.

● Adaptive vibration supression control function
● Separate wiring of the control power supply
● High responsiveness
● Real-Time Auto-Tuning (RTAT)
● Torque control function (MR-J2S-A)
● Servo-lock anti-vibration function
● RS-232C/RS-422 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-J2S series are the best units for use in high-speed positioning applications.

Integrated Positioning Functions

In addition to all the other features of the MR-J2S series the new single axis MR-J2S-CL servo amplifiers also have an integrated programmable positioning function.

SSCNET

SSCNET (Servo System Controller Network) is Mitsubishis dedicated motion control network. All MR-J2S-B amplifiers can be used on this network.

Overview of the Three MR-J2S Servo Amplifier Series

MR-J2S-A (standard type)

The MR-J2S-A series is ideal for servo applications using conventional control systems. The servo amplifiers have two analog reference inputs and digital inputs for pulse train control signals. Using the digital pulse train method eliminates the problems inherent in analog control, such as offset shifts caused by temperature fluctuations and drifting when the system is at rest.

The MR-J2S-A series can be used in torque, speed or position control modes.

Highlights

● 2 analog reference inputs
● 1 digital pulse train input
● 7 preset speeds
● Supports three different types of pulse train signals: Encoder signals; pulse and direction; pulse train for right and left rotation

MR-J2S-B (SSCNET bus type)

The MR-J2S-B series supports connection to Mitsubishi motion control and positioning control systems. The drive systems are connected to these controllers via SSCNET, a high-speed motion control network with a cycle period of just 0.8 ms. Setting up this plug-and-play network couldn't be easier; you just have to select the axis address and connect the preconfigured bus cable, which also makes wiring errors impossible.

Highlights

● Plug-and-play SSCNET network
● Brake can be controlled directly by the amplifier
● Emulated encoder outputs for connection of conventional slave drive systems
● Amplifier replacement is fast and simple because parameters and settings are administered by the connected controller
● Automatic position identification on power-up thanks to absolute position encoding as standard (provided battery-up is fitted)

MR-J2S-CL (programmable type)

The MR-J2S-CL series is a compact and cost effective servo solution with integrated positioning control functionality. Its efficient programming language makes it easy to program functions like incremental and absolute positioning, loops and program triggering by input signal or on the basis of position values. You can store up to 16 programs with a maximum of 120 steps in the unit. Programs can activated with the digital inputs or through the serial port.

Highlights

● 16 programs with a total of up to 120 steps
● Analog input for override signal
● Analog input for torque limiting
● Emulated encoder outputs for connection of conventional slave drive systems
● Handwheel connection
● Interrupt halt facility

Control Functions with Enhanced Tuning Technology

Real-Time Auto-Tuning (RTAT) 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 servo motors.

The sensitivity of the Real-Time Auto-Tuning can be changed in accordance with machine rigidity, enabling the MR-J2-Super series to be used on a wide range of applications.

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 system performance is restricted by machine resonance. This adaptive vibration suppression control function breaks this barrier to give further stability and higher response.

Machine resonance suppression filter

Two points can be set to match the machine resonating points. These filters can be combined with the adaptive vibration suppression control function. 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)
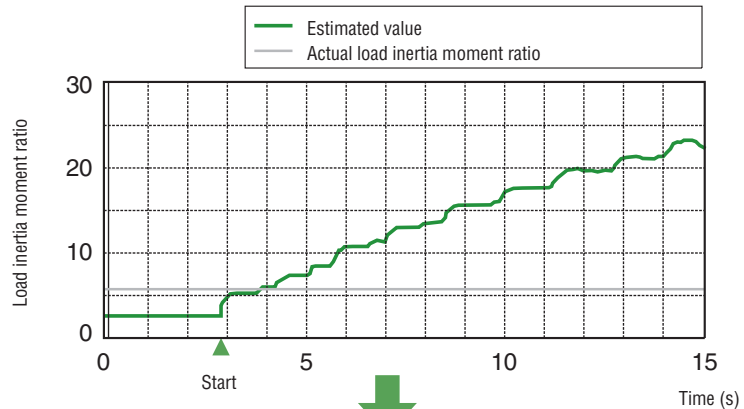
HC-MFS13 advanced Real-Time Auto-Tuning (unbalanced load, high friction)

Machine resonance suppression filter is set automatically as the sensor searches for the resonating point.
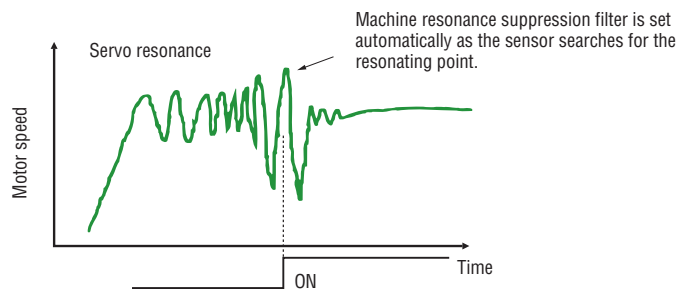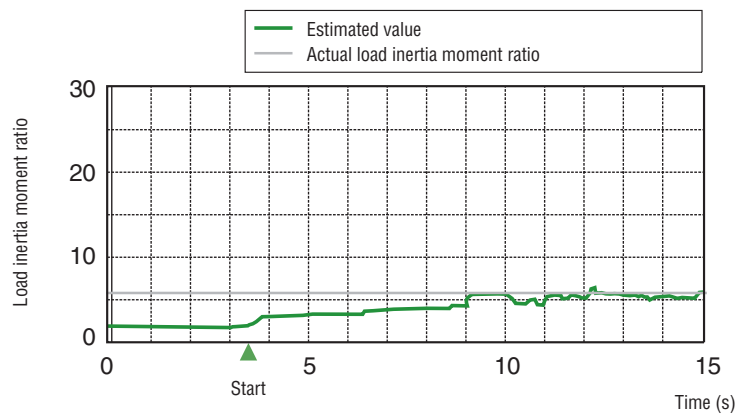
Start of adaptive vibration suppression control function

(Machine resonance characteristics)
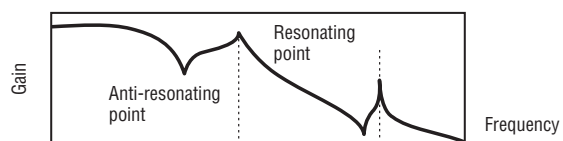
(Machine resonance suppression filter characteristics)

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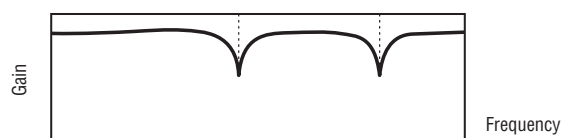
User-friendly Operation

Personal computer interface

The MR-J2S series comes with RS-232C/ RS-422 serial communications as a standard feature, enabling users to connect a personal computer to the MR-J2S range.

Using a personal computer makes it possible to run the optional setup software which enables the user to set up 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 servo motor. When the servo amplifier detects a mismatch, an alarm is triggered, eliminating the possibility of an error and the need for setting parameters.

Programming with the MR-J2S-CL

Positioning is performed by execution of a program with all the necessary data, such as target position, motor speed and acceleration and deceleration times. The unit can store up to 16 positioning programs with a total of up to 120 steps.

Graphical display window

Machine simulator window

Program editor

Serial communication

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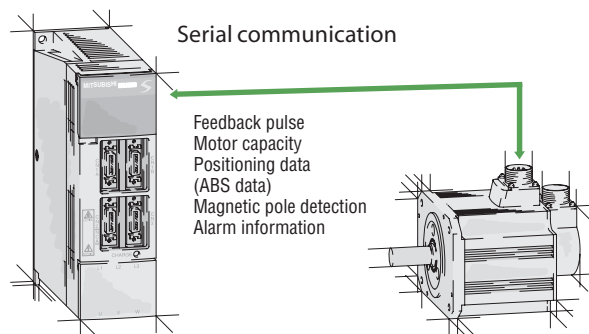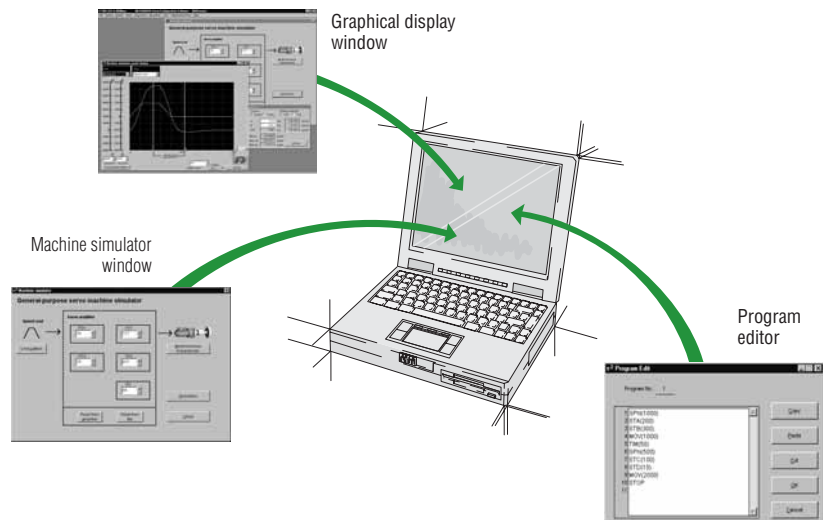
Setup Software for Optimum Adjustment Together with Mechanical System (MR-Configurator)

The comfortable setup software for Windows based personal computers allows perfect tuning of the MR-J2S amplifiers and the connected servo motors. This software makes it easy to read and write parameters, monitor, diagnose and test the servo system via a personal computer.

Machine analysis function

The resonance frequency of the mechanical system can be analyzed by simply connecting the servo motor and running the machine analyzer. 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, servo motor capacity and gains, without running the actual machine.

Gain search function

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

This ability is useful when high-level adjustment is required.
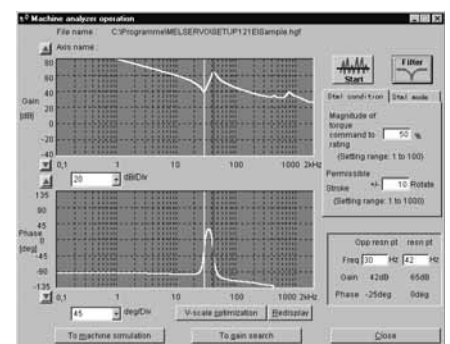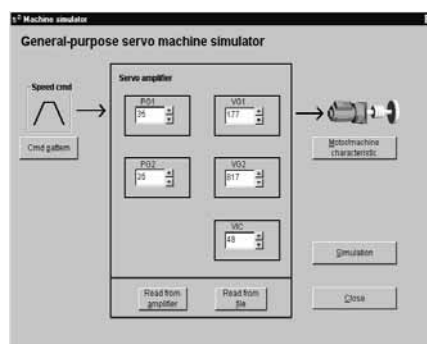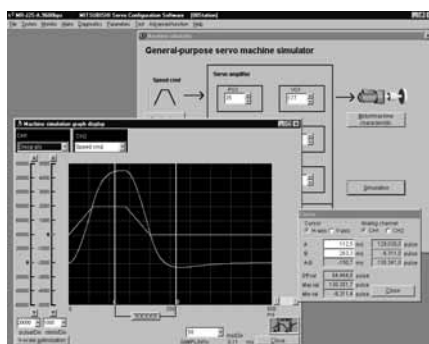
Servo Amplifiers Model Designation

MR-J2S-10A, MR-J2S-20A,
MR-J2S-10B, MR-J2S-20B
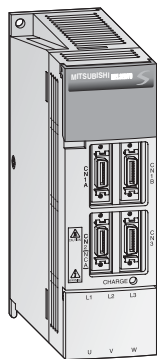
MR-J2S-40A to 100A,
MR-J2S-40B to 100B
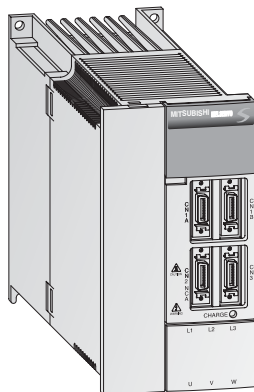
MR-J2S-200A to 700A,
MR-J2S-200B to 700B

Servo Amplifiers 200 V

MR-J2S - ☐ A

Series
MR-J2S

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

Code	Type
A	Standard general-purpose AC servo
B	SSCNET
CL	Programmable servo with integrated positioning

Code	Type
—	200 – 230 V AC power supply

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

Servo Amplifiers 400 V

MR-J2S - ☐ A 4

Series
MR-J2S

Code	Compatible servo motors
	HC-SFS
60	524
100	1024
200	1524 / 2024
350	3524
500	5024
700	7024

Code	Type
A	Standard general-purpose AC servo
B	SSCNET

Code	Type
4	380 – 480 V AC power supply

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

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Servo Motors Model Designation
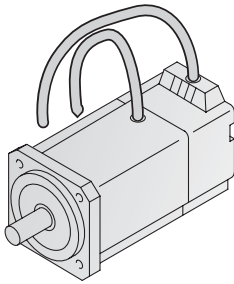
HC-MFS series   HC-KFS series   HC-SFS series   HC-RFS series
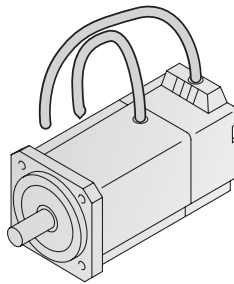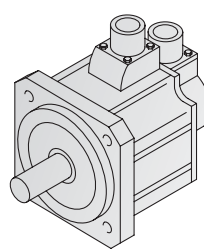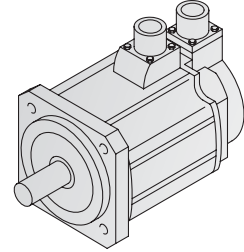
Servo Motors 200 V

HC-KFS ☐ ☐ ☐

Symbol	Motor series
HC-MFS	Ultra-low inertia, small capacity
HC-KFS	Low inertia, small capacity
HC-SFS	Medium inertia, medium capacity
HC-RFS	Ultra-low inertia, medium capacity

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

Code	Rated speed [rpm]
2	2000
3	3000

Code	Electromagnetic brake
—	None
B	●

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

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

Servo Motors 400 V

HC-SFS ☐ ☐ 4 ☐

Symbol	Motor series
HC-SFS	Medium inertia, medium capacity

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

Code	Rated speed [rpm]
2	2000

Code	
4	400 V type

Code	Electromagnetic brake
—	None
B	●

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

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

General note: The above tables show the motor model name break-down. Not all combinations are possible.
Please refer to the motor specifications table on page 13

Servo Motor Features and Typical Applications

BASICS

Absolute high-resolution encoder as standard equipment

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

With Mitsubishi's original absolute mode, an absolute system can be configured using conventional I/O even with pulse-train 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, making it suitable for machinery with higher load inertia moment ratios as well as machinery with lower rigidity.

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

Servo Motor Specifications and Matching Amplifiers

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

Details of the braked version motors is given on page 19. The detailed specifications of all servo motors are listed on pages 14 to 18.

200 V Servo Motors

Motor series	Rated speed [r/min]	Rated output capacity [kW]	Servo motor model	Servo motor type With electromagnetic brake (B) and 131072 ppr encoder	Protective structure	10A 10B	20A 20B	40A 40B	60A 60B	70A 70B	100A 100B	200A 200B	350A 350B	500A 500B	700A 700B
HC-KFS **K**	3000	0.05	HC-KFS053			●									
		0.1	HC-KFS13			●									
		0.2	HC-KFS23	●	IP55			●							
		0.4	HC-KFS43						●						
		0.75	HC-KFS73							●					
HC-MFS **M**	3000	0.05	HC-MFS053			●									
		0.1	HC-MFS13			●									
		0.2	HC-MFS23	●	IP55			●							
		0.4	HC-MFS43						●						
		0.75	HC-MFS73							●					
HC-SFS **S**	2000	0.5	HC-SFS52						●					
		1.0	HC-SFS102								●				
		1.5	HC-SFS152									●			
		2.0	HC-SFS202	●	IP65								●			
		3.5	HC-SFS352										●		
		5.0	HC-SFS502											●	
		7.0	HC-SFS702												●
HC-RFS **R**	3000	1.0	HC-RFS103									●			
		1.5	HC-RFS153									●			
		2.0	HC-RFS203	●	IP65									●		
		3.5	HC-RFS353											●	
		5.0	HC-RFS503											●	

400 V Servo Motors

Motor series	Rated speed [r/min]	Rated output capacity [kW]	Servo motor model	Servo motor type With electromagnetic brake (B) and 131072 ppr encoder	Protective structure	60A4 60B4	100A4 100B4	200A4 200B4	350A4 350B4	500A4 500B4	700A4 700B4
HC-SFS **S**	2000	0.5	HC-SFS524			●					
		1.0	HC-SFS1024				●				
		1.5	HC-SFS1524					●			
		2.0	HC-SFS2024	●	IP65			●			
		3.5	HC-SFS3524						●		
		5.0	HC-SFS5024							●	
		7.0	HC-SFS7024								●

■ HC-KFS (B) Series Servo Motor Specifications (200 V Type)

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 [$\times 10^{-4}$ kg m^2]		0.053	0.084	0.42	0.67	1.51
Recommended load/ motor inertia ratio		Less than 15 times the servo motors inertia moment				
Speed/ position detector		Resolution per encoder/servo motor rotation: 131072 p/rev. (17-bit)				
Structure		Totally enclosed, non-ventilated (protection rating: 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: 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 specifications 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 bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

[7] For servo motors with electromagnetic brake please refer to page 19.

HC-KFS Series Servo Motor Torque Characteristics

HC-KFS053 (B)

HC-KFS13 (B)

HC-KFS23 (B)

HC-KFS43 (B)

HC-KFS73 (B)

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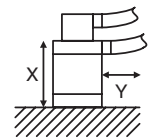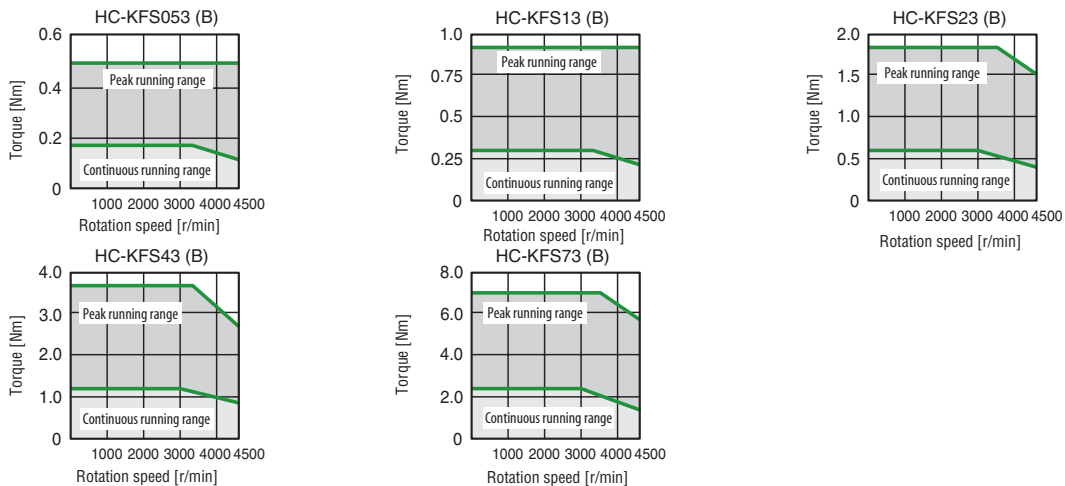
■ HC-MFS (B) Series Servo Motor Specifications (200 V Type)

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 m²]		0.019	0.03	0.088	0.143	0.6
Recommended load/ motor inertia ratio		Less than 30 times the servo motors inertia moment				
Speed/ position detector		Resolution per encoder/servo motor rotation: 131072 p/rev (17-bit)				
Structure		Totally enclosed, non-ventilated (protection rating: 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/ vibration [6]	1000 m or less above sea level; X: 49 m/s², Y: 49m/s²				
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 specifications 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 bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

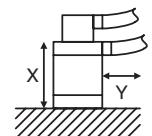[7] For servo motors with electromagnetic brake please refer to page 19.

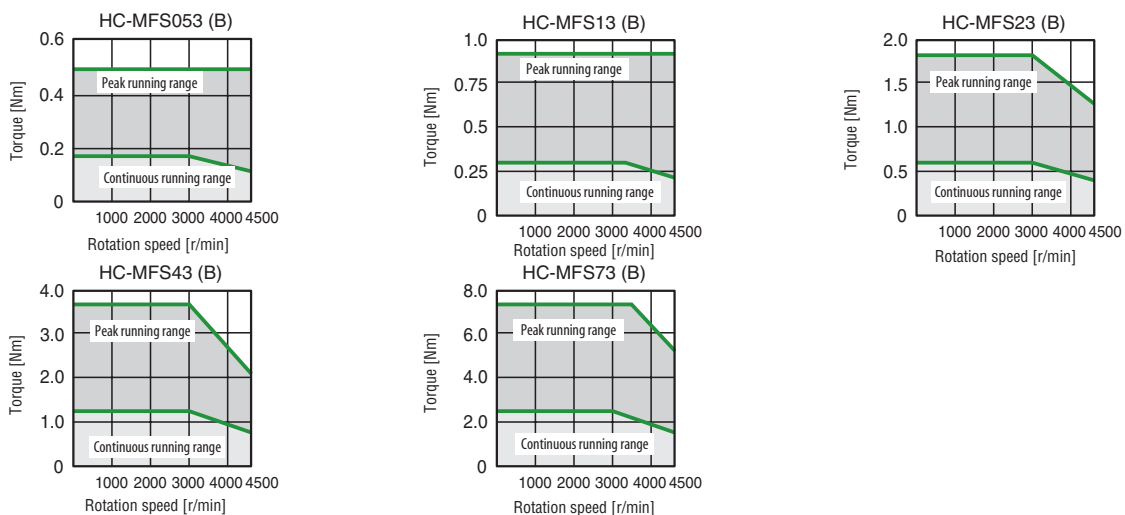## HC-MFS Series Servo Motor Torque Characteristics

HC-MFS053 (B)

HC-MFS13 (B)

HC-MFS23 (B)

HC-MFS43 (B)

HC-MFS73 (B)

■ HC-SFS Series Servo Motor Specifications (200 V Type)

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 [$\times 10^{-4}$ kg m^2]		6.6	13.7	20	42.5	82	101	160
Recommended load/ motor inertia ratio		Less than 15 times the servo motors inertia moment						
Speed/ position detector		Resolution per encoder/servo motor rotation: 131072 p/rev (17-bit)						
Structure		Totally enclosed, non-ventilated (protection degree: IP65)						
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 [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 bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

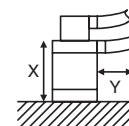[4] For servo motors with electromagnetic brake please refer to page 19.

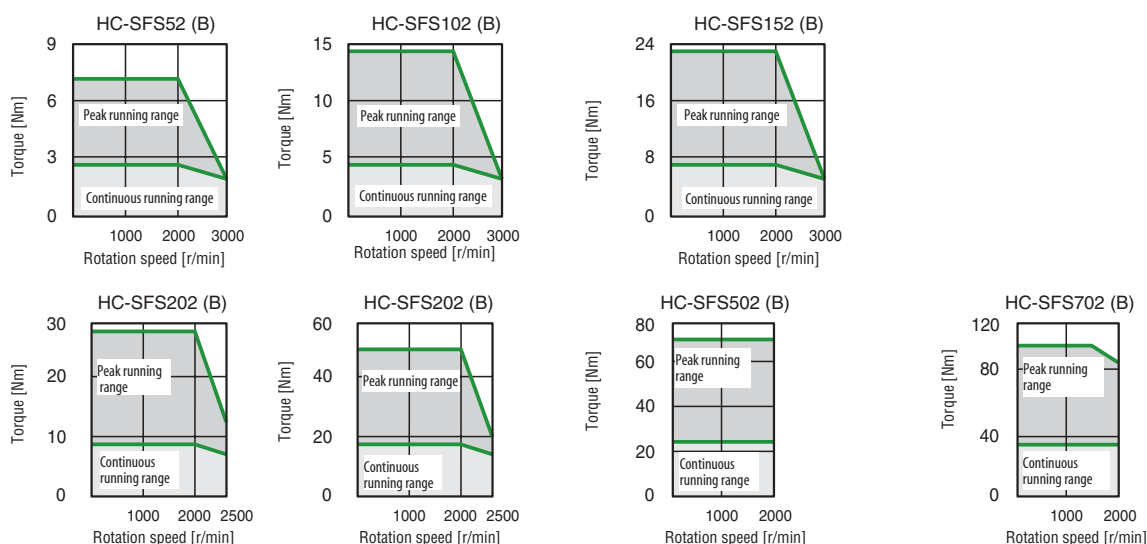## HC-SFS Series Servo Motor Torque Characteristics

■ HC-SFS Series Servo Motor Specifications (400 V Type)

Servo motor model		HC-SFS524(B) [4]	HC-SFS1024(B) [4]	HC-SFS1524(B) [4]	HC-SFS2024(B) [4]	HC-SFS3524(B) [4]	HC-SFS5024(B) [4]	HC-SFS7024(B) [4]
Servo amplifier model		MR-J2S-60A4/B4	MR-J2S-100A4/B4	MR-J2S-200A4/B4	MR-J2S-200A4/B4	MR-J2S-350A4/B4	MR-J2S-500A4/B4	MR-J2S-700A4/B4
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]		1.5	2.8	4.4	5.4	8.6	14	17
Maximum current [A]		4.5	8.4	13.2	16.2	25.8	42	51
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 m²]		6.6	13.7	20	42.5	82	101	160
Recommended load/ motor inertia ratio		Less than 15 times the servo motors inertia moment						
Speed/ position detector		Resolution per encoder/servo motor rotation: 131072 p/rev (17-bit)						
Structure		Totally enclosed, non-ventilated (protection degree: IP65)						
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 [3]	1000 m or less above sea level; X: 24.5 m/s², Y: 24.5 m/s²			1000 m or less above sea level; X: 24.5 m/s², Y: 49 m/s²		1000 m or less above sea level; X: 24.5 m/s², Y: 29.4 m/s²	
Weight [kg]	Standard motor	5	7	9	12	19	23	32
Order information	Art. no.	151551	151554	151555	151556	150873	150875	151557

[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 bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

[4] For servo motors with electromagnetic brake please refer to page 19.
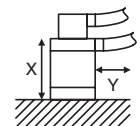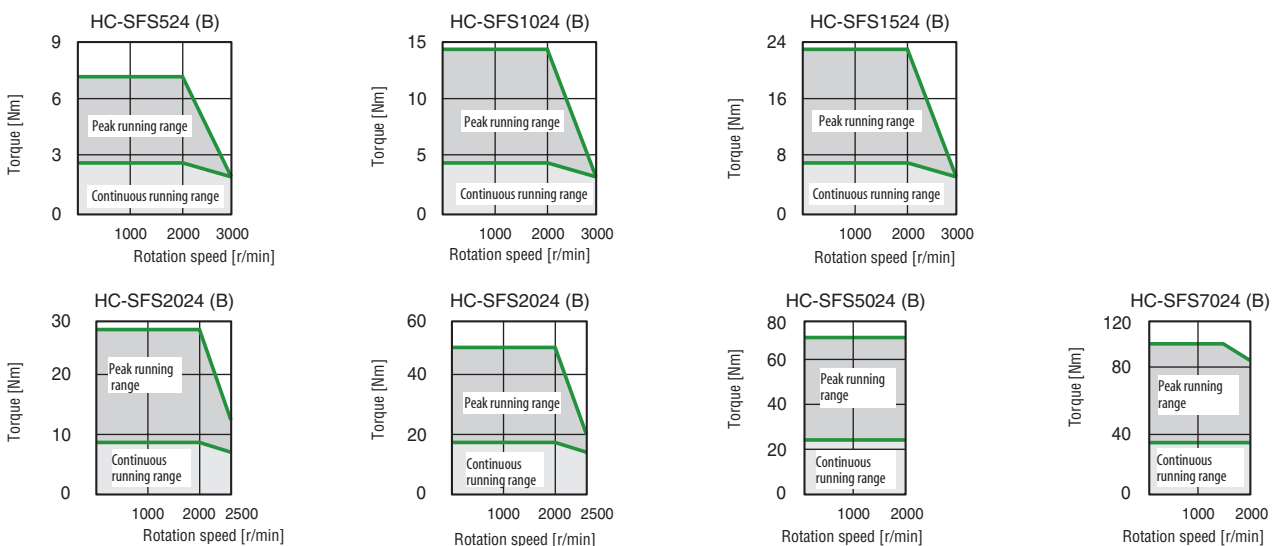
HC-SFS Series Servo Motor Torque Characteristics

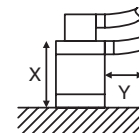## ■ HC-RFS Series Servo Motor Specifications (200 V Type Low Inertia)

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 than 5 times the servo motors inertia moment				
Speed/ position detector		Resolution per encoder/servo motor rotation: 131072 p/rev (17-bit)				
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 bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.

[4] For servo motors with electromagnetic brake please refer to page 19.

HC-RFS Series Servo Motor Torque Characteristics

Torque characteristic charts for HC-RFS103 (B), HC-RFS153 (B), HC-RFS203 (B), HC-RFS353 (B), and HC-RFS503 (B), showing Torque [Nm] vs Rotation speed [r/min] with Peak running range and Continuous running range.
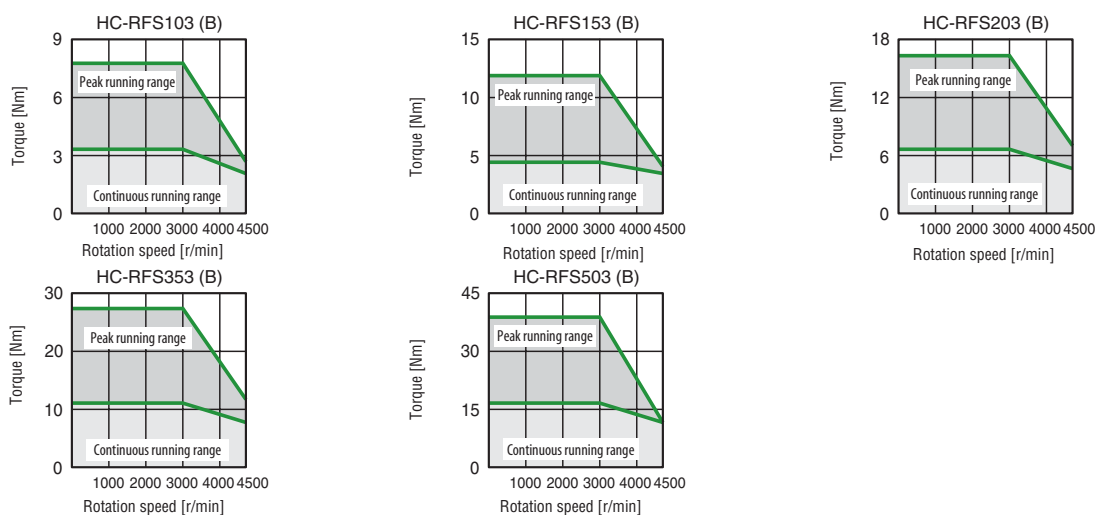
■ Braked Motor Specifications

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

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

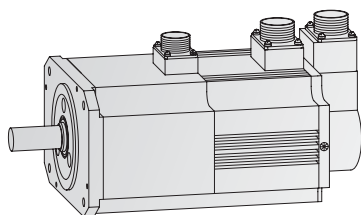| Motor model (200 V)	HC-MFS					HC-KFS					HC-SFS							HC-RFS				
	053B	13B	23B	43B	73B	053B	13B	23B	43B	73B	52B	102B	152B	202B	352B	502B	702B	103B	153B	203B	353B	503B
Type	Spring-loaded safety brake					Spring-loaded safety brake					Spring-loaded safety brake							Spring-loaded safety brake				
Rated voltage	24 V DC					24 V DC					24 V DC							24 V DC				
Static friction torque [Nm]	0.32	0.32	1.3	1.3	2.4	0.32	0.32	1.3	1.3	2.4	8.3	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.

| Motor model (400 V)	HC-SFS						
	524B	1024B	1524B	2024B	3524B	5024B	7024B
Type	Spring-loaded safety brake						
Rated voltage	24 V DC						
Static friction torque [Nm]	8.3	8.3	8.3	43.1	43.1	43.1	43.1
Rated current at 20 °C [A]	0.8	0.8	0.8	1.4	1.4	1.4	1.4
Coil resistance at 20 °C [Ω]	29	29	29	16.8	16.8	16.8	16.8
Power consumption at 20 °C [W]	19	19	19	34	34	34	34
Moment of inertia J [10⁻⁴ kg m²][2]	8.6	15.7	22	52.5	92	111	170
Permissible braking volume — per revolution [Nm]	400	400	400	4500	4500	4500	4500
Permissible braking volume — per hour [Nm]	4000	4000	4000	45000	45000	45000	45000
Brake life [h] [3]	20000						
Brake volume per brake action [Nm]	200	200	200	1000	1000	1000	1000
Weight [kg] [1]	7	9	11	18	25	29	38
Order information — Art. no.	151558	151559	151560	151562	150879	150880	151563

[1] Total mass of motor with electromagnetic brake

[2] Total moment of inertia of motor with electromagnetic brake

[3] Brake gap cannot be adjusted.

■ MR-J2S Servo Amplifier Specifications (200 V Type)

The MR-J2S-A are general purpose servo amplifiers with analog inputs and pulse train interface as a standard. The range covers 100 W units (MR-J2S-10A) through to 7 kW (MR-J2S-700A). Up to 55 kW is available on request.

The MR-J2S-B (SSCNET bus type) servo amplifiers are designed for use with the Mitsubishi motion controllers of the MELSEC System Q and MELSEC A series. The motion controllers and servo amplifiers can be linked via the high speed SSCNET network. Connecting the amplifiers to SSCNET guarantees reliable operation and eliminates the need for complex wiring. The range also covers 100 W units (MR-J2S-10B) through to 7 kW (MR-J2S-700B).
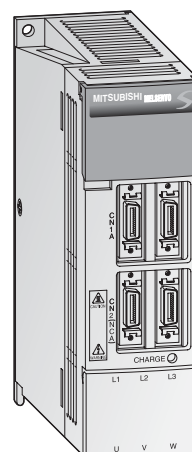
Common specifications MR-J2S-A/B		10A 10B	20A 20B	40A 40B	60A 60B	70A 70B	100A 100B	200A 200B	350A 350B	500A 500B	700A 700B
Power supply	Voltage / frequency [1]	3-phase 200 – 230 V AC, 50 / 60 Hz; 1-phase 230 V AC, 50 / 60 Hz					3-phase 200 – 230 V AC, 50 / 60 Hz				
	Permissible voltage fluctuation	3-phase 200 – 230 V AC: 170 – 253 V AC, 1-phase 230 V AC: 207 – 253 V AC					3-phase 170 – 253 V AC				
	Permissible frequency fluctuation	± 5 %									
Control system		Sinusoidal PWM control / current control system									
Dynamic brake		Built-in									
Speed frequency response		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 °C (no freezing), storage: -20 – 65 °C (no freezing)									
	Ambient humidity	Operation: 90 % RH max. (no condensation), storage: 90 % RH max. (no condensation)									
	Atmosphere	Inside control panel; no corrossive gas, no flammable gas, no oil mist, no dust									
	Elevation	1000 m or less above sea level									
	Oscillation	5.9 m/s² (0.6 G) max.									
Weight [kg]		0.7	0.7	1.1	1.1	1.7	1.7	2.0	2.0	4.9	7.2
Order information											
A type	Art. no.	134807	134808	134806	134828	134829	134831	134827	134832	135969	135854
B type	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.

Control specifications MR-J2S-A		10A	20A	40A	60A	70A	100A	200A	350A	500A	700A
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)									

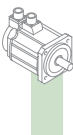| Control specifications MR-J2S-B (SSCNET)	10B	20B	40B	60B	70B	100B	200B	350B	500B	700B
Position and speed control	Possible using SSCNET control									
Maximum command input at the position control	Approximately 10 Mpps									

■ MR-J2S Servo Amplifier Specifications (400 V Type)

Mitsubishi's 400 V range of servo amplifiers provides the same industry leading functionality as the 200 V range. The 400 V servo amplifiers are available over a wide range from 600 W rating to the very powerful 22 kW rating. Suitable for all types of automation solutions, the 400 V servo amplifiers also provide sink/source logic selectability.

For amplifiers larger than 22 kW please contact your nearest Mitsubishi office.
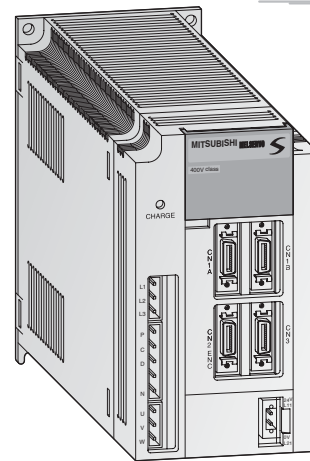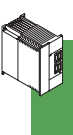
Common specifications MR-J2S-A4/B4		60A4 60B4	100A4 100B4	200A4 200B4	350A4 350B4	500A4 500B4	700A4 700B4	11KA4 11KB4	15KA4 15KB4	22KA4 22KB4
Power supply	Voltage /frequency [1]	3-phase 380 – 480 V AC, 50 / 60 Hz [2]								
	Permissible voltage fluctuation	3-phase 323 – 528 V AC, 50/60 Hz								
	Permissible frequency fluctuation	± 5 % max.								
Control system		Sinusoidal PWM control / current control system								
Dynamic brake		Built-in						External option		
Speed frequency response		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)								
Environment	Ambient temperature	Operation: 0 – 55 °C (no freezing), storage: -20 – 65 °C (no freezing)								
	Ambient humidity	Operation: 90 % RH max. (no condensation), storage: 90 % RH max. (no condensation)								
	Atmosphere	Inside control panel; no corrosive gas, no flammable gas, no oil mist, no dust								
	Elevation	1000 m or less above sea level								
	Oscillation	5.9 m/s² (0.6 G) max.								
Weight [kg]		2.1	2.2	2.2	5.0	5.0	7.2	15.0	16.0	20.0
Order information										
A type	Art. no.	151546	151547	151548	150830	150832	151550	150854	150855	150856
B type	Art. no.	154329	154328	154327	154326	154325	154324	150862	150863	150865

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

[2] For torque characteristics when combined with a servo motor, refer to servos motor characteristics on pages 14-18.

Note that these tables detail servo amplifiers from 11 to 22 kW. These are mentioned for reference only. These servo amplifiers and associated servo motors are detailed in the 400 V supplementary manual.

Control specifications MR-J2S-A4		60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4
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)								

Control specifications MR-J2S-B4 (SSCNET)	60B4	100B4	200B4	350B4	500B4	700B4	11KB4	15KB4	22KB4
Position and speed control	Possible using SSCNET control								
Maximum command input at the position control	Approximately 10 Mpps								

■ MR-J2S-CL Servo Amplifier Specifications (200 V Type)

The MR-J2S-CL servo amplifiers are a further development of MR-J2S-A. In addition to the features of the MELSERVO Super Series these amplifiers also have an integrated positioning controller for one axis and additional programming functions.

The MR-J2S-CL servo amplifier is the ideal solution for complete and inexpensive positioning solutions. Up to 16 positioning programs can be stored in the amplifier. Programs are selected and started via the digital inputs, or in a networked system with support for up to 32 axes.

The table below provides an overview of all the MR-J2S-CL line of servo amplifiers and their special features compared to the MR-J2S-A.
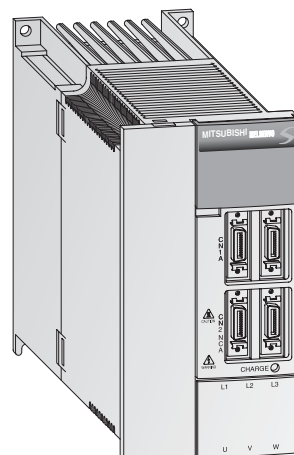
| Servo amplifier model MR-J2S-CL		10CL	20CL	40CL	60CL	70CL	100CL	200CL	350CL	500CL	700CL
Power supply	Voltage/frequency [1]	3-phase 200 – 230 V AC, 50 / 60 Hz; 1-phase 230 V AC, 50 / 60 Hz					3-phase 200 – 230 V AC, 50 / 60 Hz				
	Perm. voltage fluctuation	3-phase 200 – 230 V AC: 170 – 253 V AC, 1-phase 230 V AC: 207 – 253 V AC					3-phase 170 – 253 V AC				
	Perm. frequency fluctuation	± 5 %									
System		Sine-wave PWM control, current control system									
Dynamic brake		Built-in									
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal relay), servo motor overheat protection, encoder error protection, regenerative brake error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection									
Programming/ command system	Programming	Programming language (Programming with Servo-configuration software). Programming capacity: 120 steps									
	Positioning command input	Setting by programming language. Movement setting range at 1 point: ±1 [μm] to ±999.999 [mm]									
	Speed command input	Servo motor speed, acceleration/deceleration time constant and S-pattern acceleration/deceleration time constant by programming language. S-pattern acceleration/deceleration time constant can set by parameter No.14 or by programming.									
	System	Signed absolute value command (signed incremental value command system can be specified), signed incremental value command system									
	Program operation mode	Setting by programming language									
Manual operation mode	JOG	JOG operation is performed in accordance with the parameter-set speed command by contact input or through RS-422/RS-232C communication.									
	Manual pulse generator	Manual feed is made by manual pulse generator. Command pulse multiplication: x1, x10 or x100 selected using parameter									
Manual home position return mode	DOG type	Home position return is made starting with Z-phase pulse after passage of proximity dog. Home position address may be set. Home position shift distance may be set. Home position return direction may be selected. Automatic at-dog home position return, Automatic stroke return function.									
	Count type	Home position return is made by counting encoder pulses after contact with proximity dog. Home position address may be set. Home position shift value may be set. Home position return direction may be set. Automatic at-dog home position return, Automatic stroke return function.									
	Data setting type	Home position return is made without dog. Home position may be set at any position by manual operation, etc. Home position address may be set.									
	Stopper type	Home position return is made by pressing machine part against stroke end. Home position address may be set. Home position return direction may be set.									
	Home position ignorance	Position where servo-on (SON) is switched on is defined as home position. Home position address may be set.									
	Dog type rear end reference	Home position return is made with respect to the rear end of a proximity dog. Home position address may be set. Home position shift value may be set. Home position return direction may be set. Automatic at-dog home position return, Automatic stroke return function									
	Count type front end reference	Home position return is made with respect to the front end of a proximity dog. Home position address may be set. Home position shift value may be set. Home position return direction may be set. Automatic at-dog home position return, Automatic stroke return function									
	Dog cradle type	Home position return is made with respect to the front end of a proximity dog by the first Z-phase pulse. Home position address may be set. Home position shift value may be set. Home position return direction may be set. Automatic at-dog home position return, Automatic stroke return function									
Positioning control functions		Absolute position detection, backlash function, overtravel prevention using external limit switch, software stroke limit, override using external analog signal									
Cooling/protection		Self-cooled, open (IP00)					Force-cooling, open (IP00)				
Environment		Same as MR-J2S-A/B									
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.		146271	146270	146269	146268	146267	146272	146273	146274	147103	147114

[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.

Operating Elements 200 V Types

User-friendly Operation

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

The illustrations below show examples of three different servo amplifier models. The layout of the controls may be slightly different on other models.

MR-J2S-A/-CL   MR-J2S-B
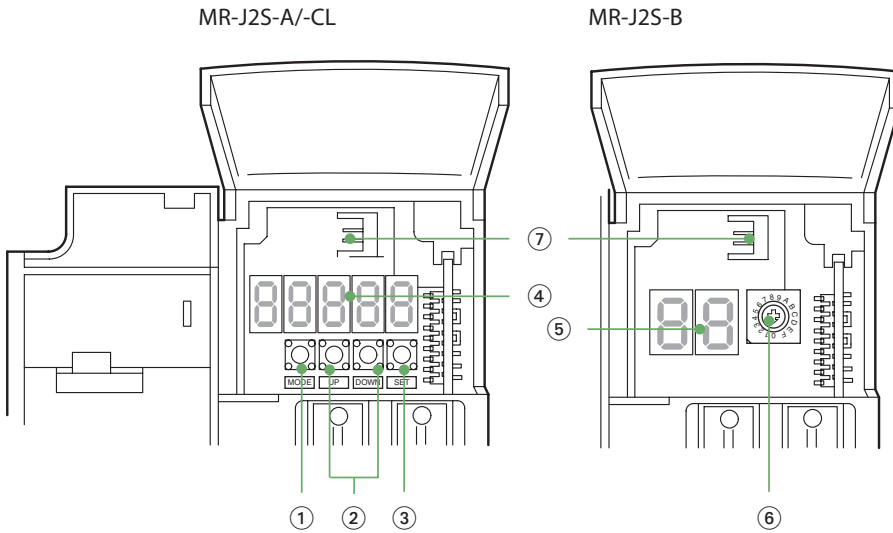
① Mode button:

Used to switch between different functions

② Up/down buttons:

Used to change display content and re-enter parameter data

③ Set button:

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 Display:

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

⑥ Axis select switch (CS1):

Switch for setting the servo amplifier's axis number assignment.

⑦ Battery holder/battery connector:

Using to connect the battery for absolute position data backup.
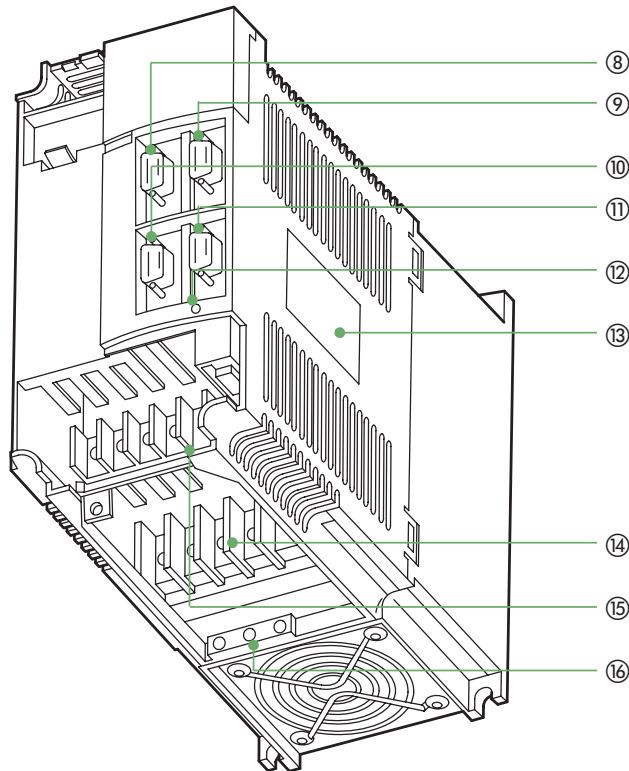
⑧ I/O signal connector (CN1A):

Used to connect digital I/O signals (A/CL type); used to connect SSCNET controller or previous axis (B type)

⑨ I/O signal connector (CN1B):

Used to connect digital I/O signals (A/CL type); used to connect next SSCNET axis or termination connector MR-A-TM (B type).

⑩ Encoder connector (CN2):

Used to connect the servo motor/ encoder

⑪ Communication connector (CN3):

Used to connect a personal computer or as analog monitor output

⑫ Charge lamp:

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

⑬ Name plate

⑭ Main circuit terminal block (TE1):

Used to connect the input power supply and servo motor

⑮ Control circuit terminal block (TE2):

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

⑯ Protective earth terminal (PE):

Ground terminal

BASICS

Operating Elements 400 V Types

User-friendly Operation

The display and setting sections are easy to operate. Also with the advanced features it encorporates, the MR-J2S-A4/-B4 is easy to start up.
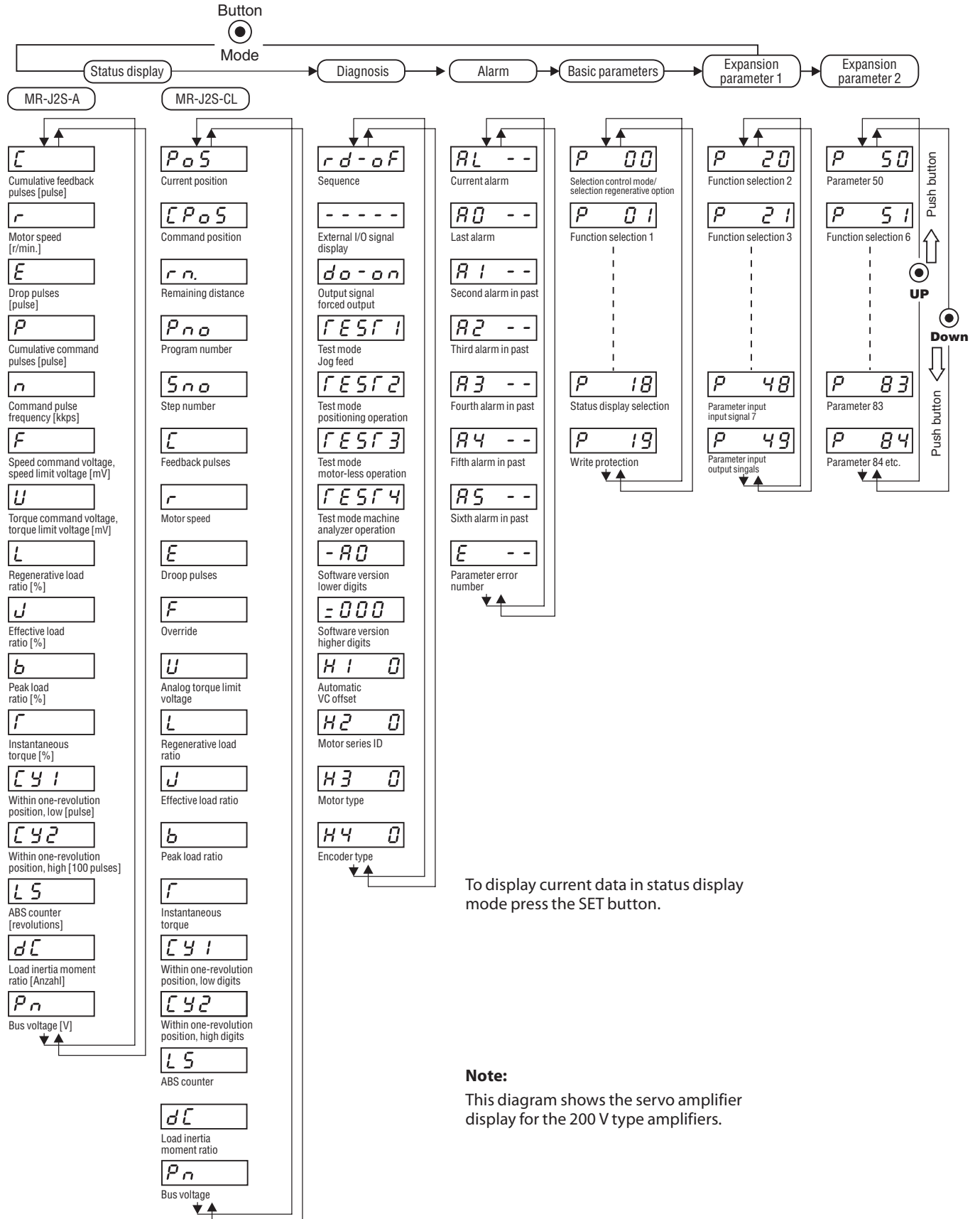
MR-J2S-A4

MR-J2S-B4
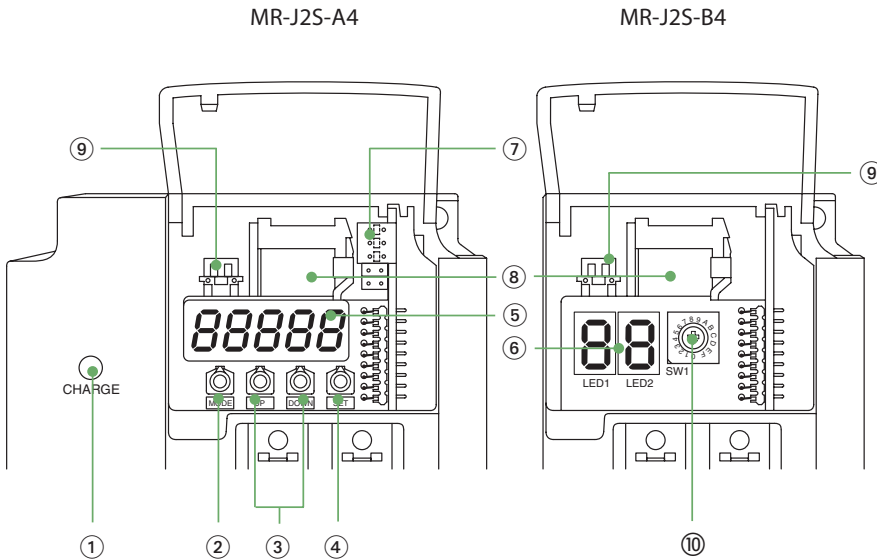
① Charge lamp:

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

② Mode button:

Used to switch between different functions

③ Up/down buttons:

Used to change display content and re-enter parameter data

④ Set button:

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

⑤ Display:

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

⑥ Display:

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

⑦ Jumper pin (JP11):

Used for switching between sink and source (I/O logic only).

⑧ Battery holder:

Contains the battery for absolute position data backup.

⑨ Battery connector (CON1):

Used to connect the battery for absolute position data backup.

⑩ Axis select switch (CS1):

Switch for setting the servo amplifier's axis number assignment.
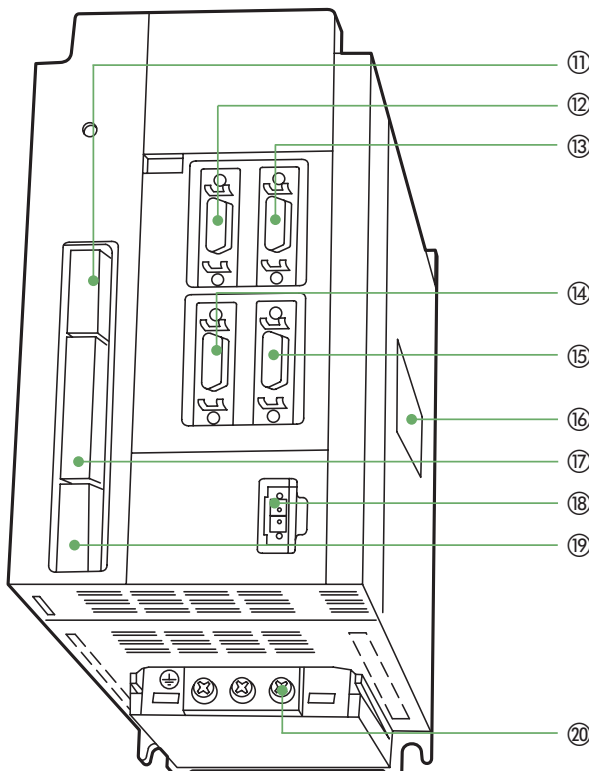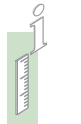
⑪ Main circuit connector (CNP1):

Used to connect the power supply

⑫ I/O signal connector (CN1A):

Used to connect digital I/O signals (A type); used to connect SSCNET controller or previous axis (B type)

⑬ I/O signal connector (CN1B):

Used to connect digital I/O signals (A type); used to connect next SSCNET axis or termination connector MR-A-TM (B type).

⑭ Encoder connector (CN2):

Used to connect the servo motor/ encoder

⑮ Communication connector (CN3):

Used to connect a personal computer or as analog monitor output

⑯ Name plate

⑰ Regeneration connector (CNP2):

Used to connect the regenerative brake option

⑱ Control circuit power supply connector (CN4):

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

⑲ Motor power supply connector (CN4):

Used to connect the servo motor.

⑳ Protective earth terminal (PE):

Ground terminal

Operation / Menu Guide to the Display MR-J2S (A and CL Types)

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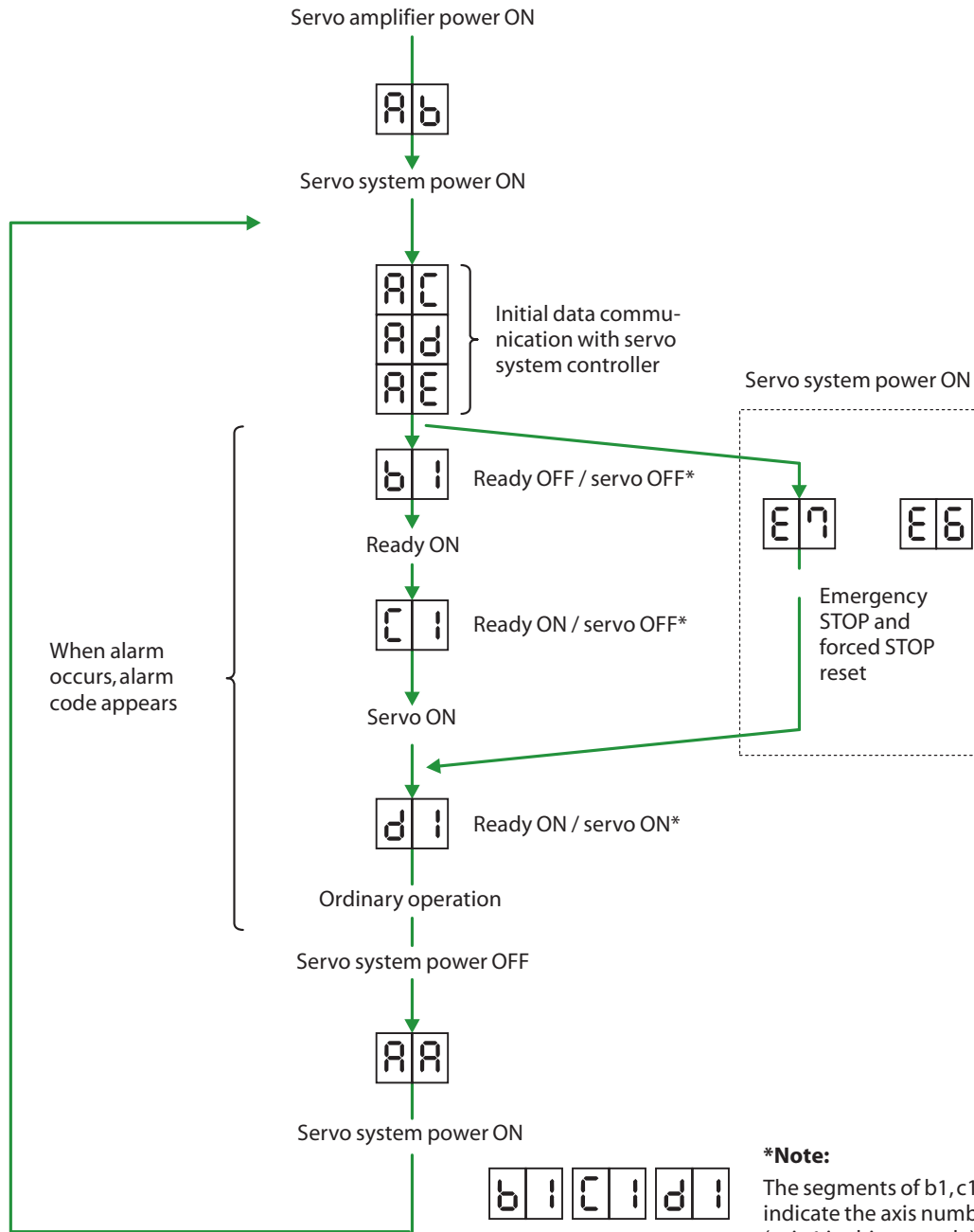
BASICS

Button

●

Mode

Status display → Diagnosis → Alarm → Basic parameters → Expansion parameter 1 → Expansion parameter 2

MR-J2S-A

`C`
Cumulative feedback pulses [pulse]

`r`
Motor speed [r/min.]

`E`
Drop pulses [pulse]

`P`
Cumulative command pulses [pulse]

`n`
Command pulse frequency [kkps]

`F`
Speed command voltage, speed limit voltage [mV]

`U`
Torque command voltage, torque limit voltage [mV]

`L`
Regenerative load ratio [%]

`J`
Effective load ratio [%]

`b`
Peak load ratio [%]

`r`
Instantaneous torque [%]

`CY1`
Within one-revolution position, low [pulse]

`CY2`
Within one-revolution position, high [100 pulses]

`LS`
ABS counter [revolutions]

`dC`
Load inertia moment ratio [Anzahl]

`Pn`
Bus voltage [V]

MR-J2S-CL

`PoS`
Current position

`CPoS`
Command position

`rn.`
Remaining distance

`Pno`
Program number

`Sno`
Step number

`C`
Feedback pulses

`r`
Motor speed

`E`
Droop pulses

`F`
Override

`U`
Analog torque limit voltage

`L`
Regenerative load ratio

`J`
Effective load ratio

`b`
Peak load ratio

`r`
Instantaneous torque

`CY1`
Within one-revolution position, low digits

`CY2`
Within one-revolution position, high digits

`LS`
ABS counter

`dC`
Load inertia moment ratio

`Pn`
Bus voltage

Diagnosis

`rd-of`
Sequence

`- - - - -`
External I/O signal display

`do-on`
Output signal forced output

`rESr1`
Test mode Jog feed

`rESr2`
Test mode positioning operation

`rESr3`
Test mode motor-less operation

`rESr4`
Test mode machine analyzer operation

`-A0`
Software version lower digits

`=000`
Software version higher digits

`H1     0`
Automatic VC offset

`H2     0`
Motor series ID

`H3     0`
Motor type

`H4     0`
Encoder type

Alarm

`AL  --`
Current alarm

`A0  --`
Last alarm

`A1  --`
Second alarm in past

`A2  --`
Third alarm in past

`A3  --`
Fourth alarm in past

`A4  --`
Fifth alarm in past

`A5  --`
Sixth alarm in past

`E   --`
Parameter error number

Basic parameters

`P   00`
Selection control mode/ selection regenerative option

`P   01`
Function selection 1

`P   18`
Status display selection

`P   19`
Write protection

Expansion parameter 1

`P   20`
Function selection 2

`P   21`
Function selection 3

`P   48`
Parameter input input signal 7

`P   49`
Parameter input output singals

Expansion parameter 2

`P   50`
Parameter 50

`P   51`
Function selection 6

`P   83`
Parameter 83

`P   84`
Parameter 84 etc.

Push button

UP ●

Down ●

Push button

To display current data in status display mode press the SET button.

Note:

This diagram shows the servo amplifier display for the 200 V type amplifiers.

Operation / Menu Guide to the Display MR-J2S (B Type SSCNET)

On the display for the SSCNET type servo amplifiers the status of communication with the servo system controller at power-on, the axis number and the diagnosis of a fault occurence can be checked.

Servo amplifier power ON

Ab

Servo system power ON

AC
Ad
AE
Initial data communication with servo system controller

Servo system power ON

b1   Ready OFF / servo OFF*

Ready ON

C1   Ready ON / servo OFF*

Servo ON

E7   **E6**

Emergency STOP and forced STOP reset

When alarm occurs, alarm code appears

d1   Ready ON / servo ON*

Ordinary operation

Servo system power OFF

AA

Servo system power ON

b1 C1 d1

*Note:

The segments of b1, c1 and d1 indicate the axis number. (axis 1 in this example)

MR-J2S-CL Programming Instructions

The simple and yet powerful programming language of the MR-J2S-CL servo amplifier makes it very easy to configure positioning applications. Using the extended instruction set you can quickly program movement and positioning sequences by entering the target position, motor speed, acceleration and deceleration times and so on. Support for external interrupts, relays, counters and loops provides maximum flexibility for the development of powerful programs.

BASICS

| Command	Name	Setting	Setting range	Unit	Description
SPN	Speed (motor speed)	SPN(□)	0 – max. speed	r/min.	Use to set the command speed given to the motor for positioning. The set value should not be more than the maximum speed of the motor.
STD	S-pattern acceleration/deceleration time constant	STD(□)	0 – 100	ms	S-pattern acceleration/deceleration time constant. Set this command when inserting an S-pattern time constant for the acceleration/deceleration time constant of the program.
STC	Acceleration/deceleration time constant	STC(□)	0 – 20000	ms	Use to set both the acceleration time constant and deceleration time constant. The set value is the time from when the used servo motor is at a stop until it reaches the rated speed, or the time from when the servo motor is running at the rated speed until it stops.
STA	Acceleration time constant	STA(□)	0 – 20000	ms	Use to set the acceleration time. The set value is the time from when the used servo motor is at a stop until it reaches the rated speed. It can not be changed during command output.
STB	Deceleration time constant	STB(□)	0 – 20000	ms	Use to set the deceleration time constant. The set value is the time from when the servo motor is running at the rated speed until it stops. It can not be changed during command output.
MOV	Absolute move command	MOV(□)	-999999 – 999999	$\times 10^{STM}$ µm	The set value is regarded as an absolute value for movement.
MOVA	Absolute continuous move command	MOVA(□)	-999999 – 999999	$\times 10^{STM}$ µm	The set value is regarded as an absolute value for continuous movement. Always use this command with the MOV(□) command.
MOVI	Incremental move command	MOVI(□)	-999999 – 999999	$\times 10^{STM}$ µm	The set value is regarded as an incremental value for movement.
MOVIA	Incremental continuous move command	MOVIA(□)	-999999 – 999999	$\times 10^{STM}$ µm	The set value is regarded as an incremental value for movement. Always use this command with the MOVI(□) command.
SYNC	Waiting external signal to switch on	SYNC(□)	1 – 3	—	Stops the next step until any of Program input 1 (PI□) to Program input 3 (PI3) turns ON after the output of SYNC synchronous output (SOUT).
OUTON	External signal ON output	OUTON(□)	1 – 3	—	Turns ON any of Program output 1 OUT□ to Program output 3 (OUT3). By setting the ON time with parameter No. 74 to No.76, the signal can also be turned OFF in the preset time.
OUTOF	External signal OFF output	OUTOF(□)	1 – 3	—	Turns OFF any of Program output 1 OUT□ to Program output 3 (OUT3) that has been turned ON by the OUTON(□) command.
TRIP	Absolute trip point	TRIP(□)	-999999 – 999999	$\times 10^{STM}$ µm	When the trip point is reached, the next step will be executed.
TRIPI	Incremental trip point	TRIPI(□)	-999999 – 999999	$\times 10^{STM}$ µm	Executes the next step when the moving distance set to the TRIPI(□) command is traveled from when MOVI(□) and MOVIA(□) started during the movement executed by the MOVI(□) and MOVIA(□) commands. The command should be programmed after MOVI(□) and MOVIA(□) command, otherwise program error occurs.
ITP	Interrupt positioning command	ITP(□)	-999999 – 999999	$\times 10^{STM}$ µm	Makes a stop using the interrupt signal when the preset moving distance is reached. Use this command in combination with the SYNC(□) command, and describe it after SYNC(□). An error will occur if this command is described after any other command.
COUNT	External pulse counter	COUNT(□)	-999999 – 999999	Pulse	Executes the next step when the pulse counter value becomes greater than the count value set to the COUNT(□) command.
FOR NEXT	Step repeat command	FOR(□) NEXT	0, 1 – 10000	—	Repeats the steps located between the FOR(□) command and NEXT command by the preset number of times.
LPOS	Position latch	LPOS	—	—	Latches the current position on the leading edge of input device current latch (LPS). The latched current position data can be read by the communication command. There are some error values between the latched data and the actual exact position, due to the sampling time and motor speed.
TIM	Dwell command time	TIM(□)	1 – 2000	x 10 ms	Holds the next step until the preset time elapses.
ZRT	Zeroing	ZRT	—	—	Executes a manual home position return.
TIMES	Program repeat command	TIMES(□)	0, 1 – 10000	Cycles	Place the TIMES(□) command at the beginning of the program and set the number of program execution times.
STOP	Program end		—	—	Program stop signal must be at end of the program (required).

Programming MR-J2S-□CL

Example program 1

Workpiece feed operation sequence with intermediate processing step

This program performs two positioning sequences with the same rpm speeds, acceleration and deceleration times, but with different target positions.

Program	Description		
SPN (1000)	Speed (motor speed)	1000 [r/min]	①
STA (200)	Acceleration time constant	200 [ms]	②
STB (300)	Deceleration time constant	300 [ms]	③
MOV (1000)	Absolute move command	1000 [× 10^{STM} μm]	④
TIM (10)	Dwell time	100 [ms]	⑤
MOV (2000)	Absolute move command	2000 [× 10^{STM} μm]	⑥
STOP	Program end		
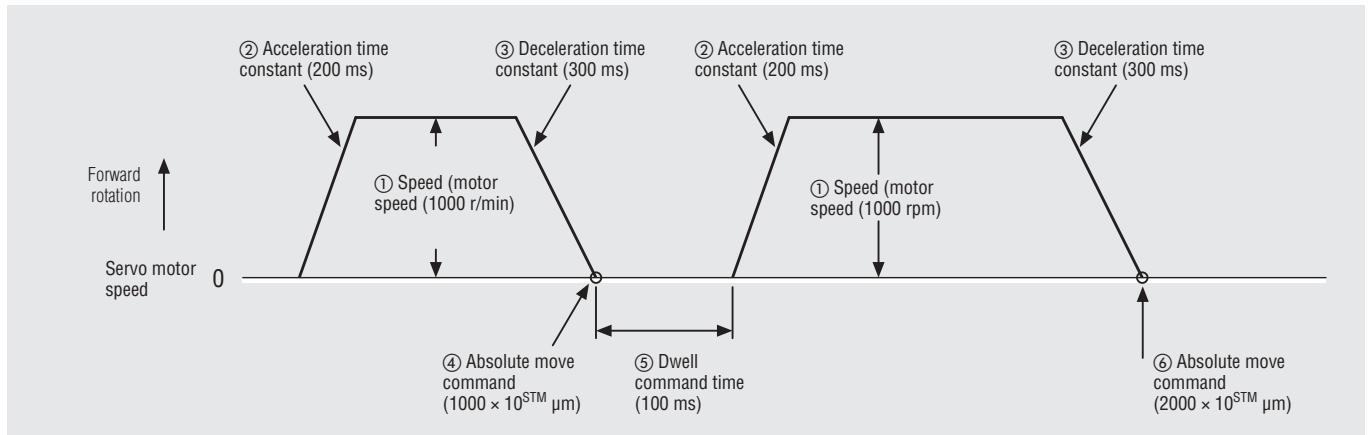
Example program 2

Vibration recorder sequence with test operations during constant speed operation and stop phase

The program executes two movement profiles. In the first profile the vibration behaviour is measured at constant speed, in the second it is measured during the stop phase. The measurement system is switched on and off on the basis of its position in both profiles.

Program	Description		
SPN (1000)	Speed (motor speed)	1000 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (1000)	Absolute move command	500 [× 10^{STM} μm]	
TRIP (250)	Absolute trip point	250 [× 10^{STM} μm]	①
OUTON (2)	Program output 2 (OUT 2) is turned ON		②
TRIP (400)	Absolute trip point	400 [× 10^{STM} μm]	③
OUTOF (2)	Program output 2 (OUT 2) is turned OFF		④
TIM (10)	Dwell command time	100 [ms]	
MOVI (500)	Incremental move command	500 [× 10^{STM} μm]	
TRIPI (300)	Incremental trip point	300 [× 10^{STM} μm]	⑤
OUTON (2)	Program output 2 (OUT 2) is turned ON		⑥
STOP	Program end		⑦

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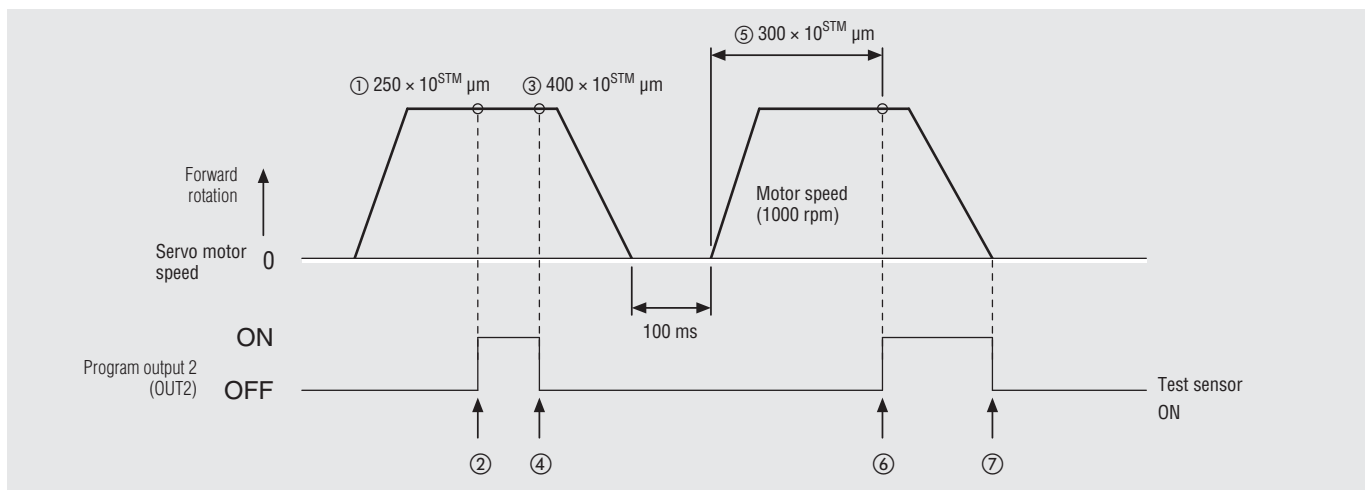
Example program 3

Workpiece transport into a machining cell

The workpiece is first transported to the work cell entrance at high speed, then slowed down to creep speed for the entry sequence. After the workpiece passes through a photoelectric barrier it is transported for a programmed distance and then the feed sequence is stopped.

Program	Description		
SPN (500)	Speed (motor speed)	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (600)	Absolute move command	600 [× 10^{STM} μm]	
SPN (100)	Speed (motor speed)	100 [r/min]	
MOVA (600)	Absolute continuous move command	600 [× 10^{STM} μm]	
SYNC (1)	Step is suspended until program input (PI1) turn ON		①
ITP (200)	Interrupt positioning command	200 [× 10^{STM} μm]	②
STOP	Program end		
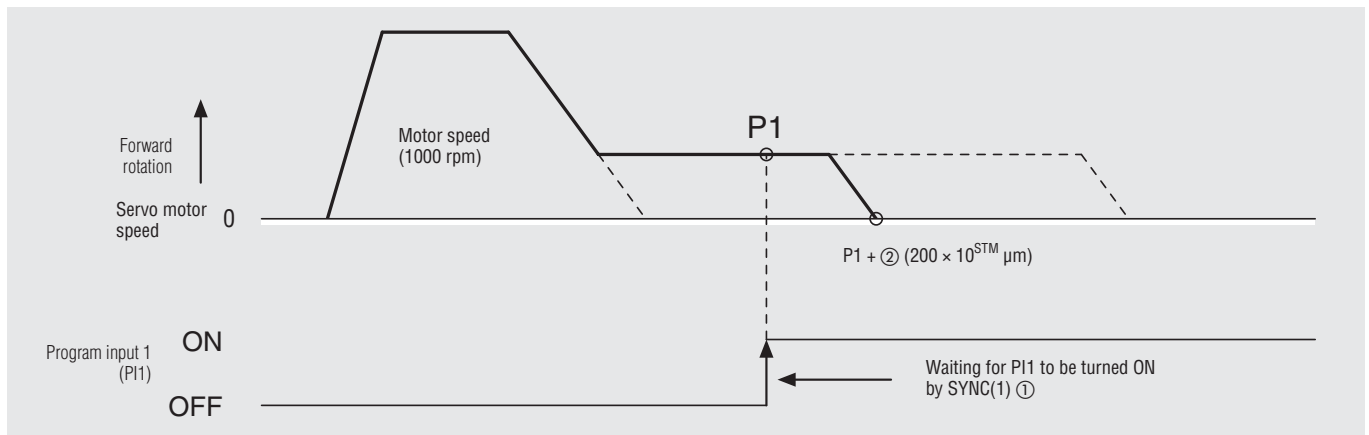
Example program 4

Processing a pallet of workpieces with continually changing positions

A pallet of keyboards with a variety of laser lettering requirements is centred beneath the laser device. The varying target positions of the different keyboards on the pallet are stored in data register D and then processed accordingly.

Program	Description		
SPN (1000)	Speed (motor speed)	1000 [r/min]	①
STA (D1)	Acceleration time constant	D1 = 200 [ms]	②
STB (D2)	Deceleration time constant	D2 = 300 [ms]	③
MOVA (R1)	Absolute move command	R1 = 1000 [× 10^{STM} μm]	④
TIM (10)	Dwell time	10 [ms]	⑤
MOVA (R2)	Absolute move command	R2 = 2000 [× 10^{STM} μm]	⑥
STOP	Program end		

| MR-J2S-A | MR-J2S-B | MR-J2S-A4 | MR-J2S-B4 | MR-J2S-CL |
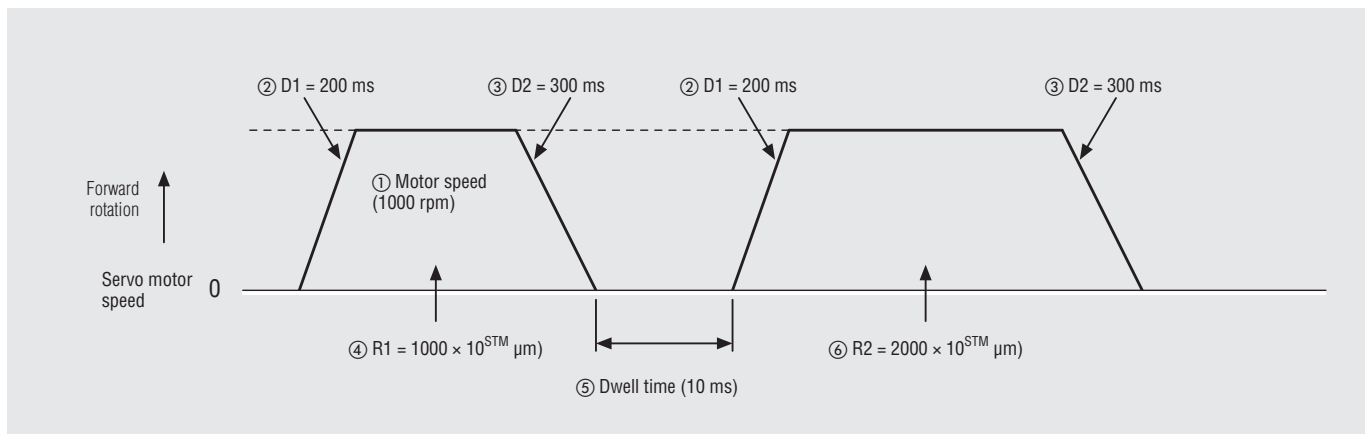
Basic Parameters

A subtotal of 85 different parameters for MR-J2S-A/A4 (40 for MR-J2S-B/B4) and 91 different parameters for MR-J2S-CL 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		Servo amplifier		Description	Default setting	Setting range
Symbol	Name	MR-J2S-A/B	MR-J2S-CL			
STY✳ [1]	Control mode/ regeneration selection	●	●	Selection of the control mode and the regeneration option.	0000	0000 – 0605h
FTY✳ [1]	Feeding function selection		●	Used to set the feed length multiplication factor and manual pulse generator multiplication factor.	0000	
OP1✳	Function selection 1	●	●	Used to select servo-type options.	0002	0000 – 1013h
ATU	Auto-Tuning	●	●	Used to select the auto-tuning function.	0105	0001 – 040Fh
CMX✳ [1][2]	Electronic gear (command pulse magnification numerator)	●	●	Used to set the multiplier for the command pulse input.	1	1 – 65535
CDV✳ [1][2]	Electronic gear (command pulse magnification denominator)	●	●	Used to set the divisor for the command pulse input.	1	1 – 65535
INP	In-position range output	●		Used to set the range for the standing pulse, which sends in-position output.	100 [pulse]	0 – 10000
PED	Movement complete output range		●	Used to set the droop pulse range when the movement complete output range (PED) is output.	100 [μm]	0 – 10000
PG1	Position loop gain 1	●	●	Used to set the model position loop gain.	35 [rad/s]	4 – 2000
PST [1]	Position acceleration / deceleration time constant (smoothing)	●		Used to set the time constant when using a delayed filter for the position command.	3 [ms]	0 – 20000
ZTY✳	Home position return type		●	Used to set the home position return system, home position return direction and proximity dog input polarity.	0010	
ZRF	Home position return speed		●	Used to set the servo motor speed for home position return.	500 [rpm]	0 – permissible speed
CRF	Creep speed		●	Used to set the creep speed after proximity dog detection.	10 [rpm]	0 – permissible speed
ZST	Home position shift distance		●	Used to set the shift distance starting at the Z-phase pulse detection position inside the encoder.	0 [μm]	0–65535
SC1 [1]	Internal speed command 1	●		Used to set the first speed of the internal speed command	100 [rpm]	0 – permissible speed
SC2 [1]	Internal speed command 2	●		Used to set the second speed of the internal speed command	500 [rpm]	0 – permissible speed
SC3 [1]	Internal speed command 3	●		Used to set the third speed of the internal speed command	1000 [rpm]	0 – permissible speed
JOG	Jog speed mode		●	Used to set the jog speed command.	100 [rpm]	0 – permissible speed
STA [1]	Speed acceleration time constant	●		Used to set the acceleration time from stop until the attainment of rated rotation speed for the speed command	0 [ms]	0 – 20000
STB [1]	Speed deceleration time constant	●		Used to set the deceleration time from rotation speed until stop for the speed command	0 [ms]	0 – 20000
STC✳ [1]	S-pattern acceleration/deceleration time constant	●	●	Used to set the time for the circular portion of S acceleration / deceleration	0 [ms]	0 – 1000
TQC [1]	Torque command time constant	●		Used to set the time constant when using a delayed filter for the torque command	0 [ms]	0 – 20000
SNO✳ [1]	Station number setting	●	●	Station number for the serial communication	0	0 – 31
BPS✳ [1]	Communications baud rate selection / alarm history clear	●	●	Used to set the RS-232C baud rate and to clear the alarm history	0000	0000 – 1113h
MOD	Analog monitor output	●	●	Used to make the settings related to analog monitor output	0100	0000 – 0B0Bh
DMD✳ [1]	Status display selection	●	●	Used to make the settings related to status display	0000	0000 – 001Fh
BLK✳	Parameter entry prohibition	●	●	Used to select the parameter reference range and entry range	0000	0000 – 100Eh

[1] These parameters are valid for MR-J2S-A and MR-J2S-CL only.

[2] For MR-J2S-A these Parameters are effective without setting the power on and off (*).

Note:

The parameters of the 200 V type and 400 V type servo amplifier are basically the same, but Parameter "STY" and "MOD" of the 400 V amplifiers have more setting options.

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MR-J2S-A MR-J2S-B MR-J2S-A4 MR-J2S-B4 MR-J2S-CL

# Protective Functions/ Safety Features/ Alarms and Warnings

The MR-J2S servo amplifiers possess 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	The voltage of the power supply has dropped below a certain level or a sudden power outage of more than 15 ms has occured (60 ms for 400 V series).
	AL.12	Memory error 1	An error has been detected in the RAM memory of the printed board.
	AL.13	Clock error	An error has been detected in the printed board.
	AL.15	Memory error 2	An error has been detected in the EEPROM memory of the printed board.
	AL.16	Encoder error 1	A different type of encoder has been detected and communication with the encorder cannot be performed accurately.
	AL.17	Board error 2	An error has been detected in a board component of the servo amplifier.
	AL.19	Memory error 3	An error has been detected in the ROM memory of the printed board.
	AL.1A	Motor combination error	A wrong combination of servo amplifier and motor exists.
	AL.20	Encoder error 2	An error has been detected in the encoder or encoder cable.
	AL.24	Motor output ground fault	A ground fault has occured at the servo motor outputs of the servo amplifier.
	AL.25	Absolute position erase	The absolute position data is errornous or the power has been switched on for the first time in the absolute position detection system.
	AL.30	Regenerative alarm	The permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option has been exceeded or the regenerative transistor is faulty or cooling fan has stopped (not all types feature a fan).
	AL.31	Overspeed	The motor rotation speed has been detected to have exceeded the permissible rotation speed.
	AL.32	Overcurrent	An excess current has been detected.
	AL.33	Overvoltage	An excess converter voltage has been detected.
	AL.35	Command pulse error	An excess frequency command pulse has been input.
	AL.37	Parameter error	Parameters have been detected to be outside the setting range through a parameter check performed when the power has been turned ON.
	AL.45	Main circuit device overheat	A main circuit device has been overheated.
	AL.46	Servo motor overheat	The thermal protector inside the encoder has been activated due to motor overheating.
	AL.50	Overload 1	An overload has been detected in the motor or servo amplifier.
	AL.51	Overload 2	An overload has been detected in the motor or servo amplifier.
	AL.52	Excess error	The difference between the input pulse and return pulse has been detected to have exceeded 80 k pulses when operating in position control mode.
	AL.8A	Serial communication time-out	The RS-232C or RS-422 communication has been stopped for longer than the time set by parameter.
	AL.8E	Serial communications error	An error has occured in the serial communication between the servo amplifier and the communication device.
	88888	System error (watchdog)	A system error has been detected.
Warnings	A.92	Battery disconnection error	The battery wire connected to the encoder becomes disconnected or if the battery voltage has dropped.
	A.96	Origin set error	The origin has not been set.
	A.9F	Battery warning	The battery voltage has dropped.
	A.E0	Excess regeneration warning	The load of the regeneration resistor has reached 85 % of the alarm level.
	A.E1	Overload warning	The unit has reached 85 % of the overload alarm level.
	A.E3	ABS data counter warning	There has been an error in the backup data of the absolute data counter.
	A.E5	ABS time-out warning	There has been a time-out error during the forwarding of absolute data.
	A.E6	Servo emergency stop	An external emergency stop signal has been lifted.
	A.E9	Main circuit OFF warning	The main circuit voltage (P-N) has dropped below 215 V when the servo ON signal (SON) has turned ON (200 V series).
	A.EA	ABS servo ON warning	The servo ON signal has not gone ON within 1 second after the ABS forwarding mode (D13) has turned ON.

MR-J2S-A | MR-J2S-B | MR-J2S-A4 | MR-J2S-B4 | MR-J2S-CL
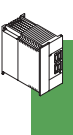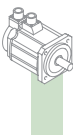
Test Operation Mode

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 amplifier 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.

BASICS

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MR-J2S-A Position Control Mode/ Connection to QD75P/QD75D (position servo, incremental) (SOURCE logic)
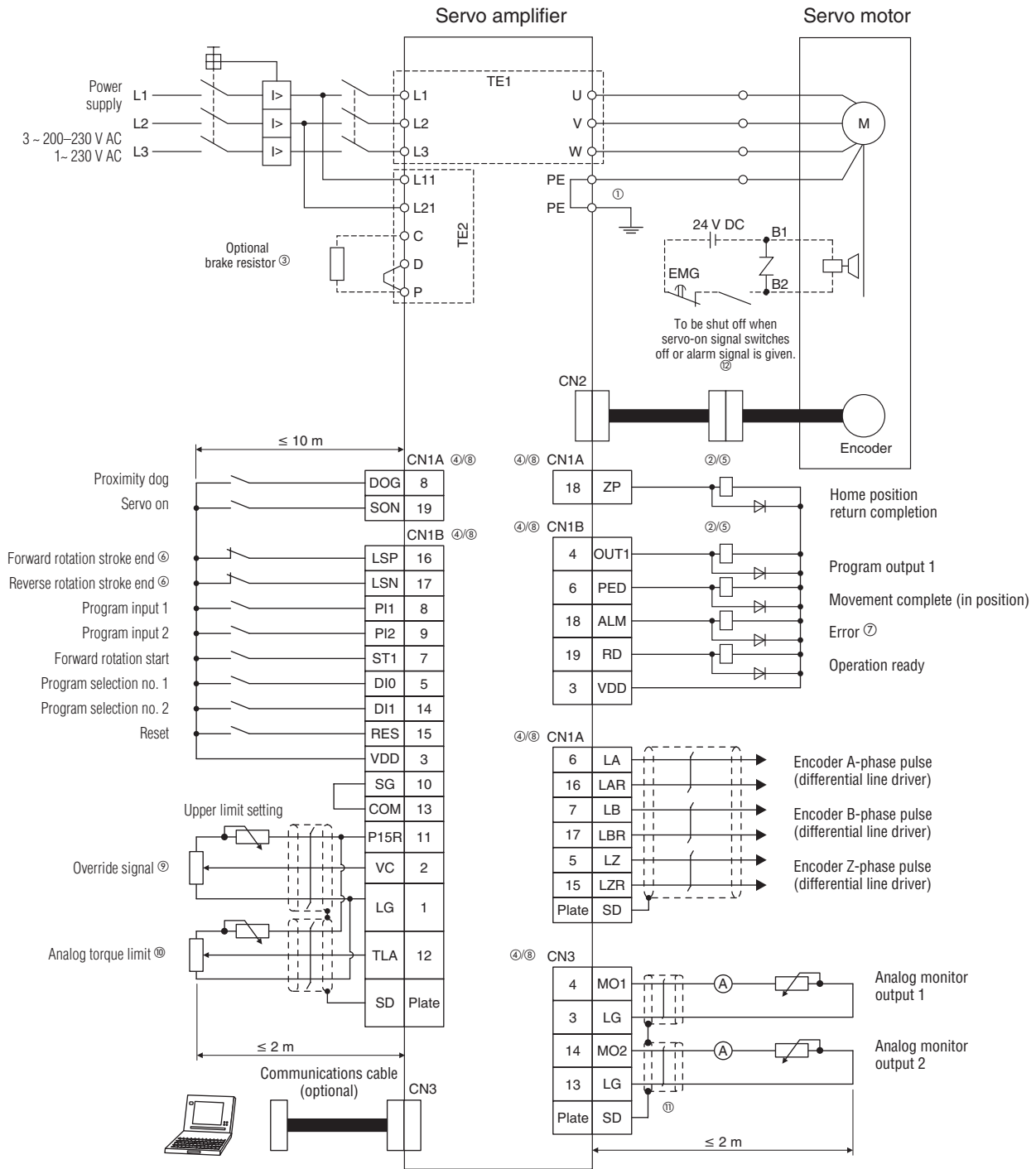

① To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth of the control box.

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 instruction 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 length is 2 m or less in the open collector system.
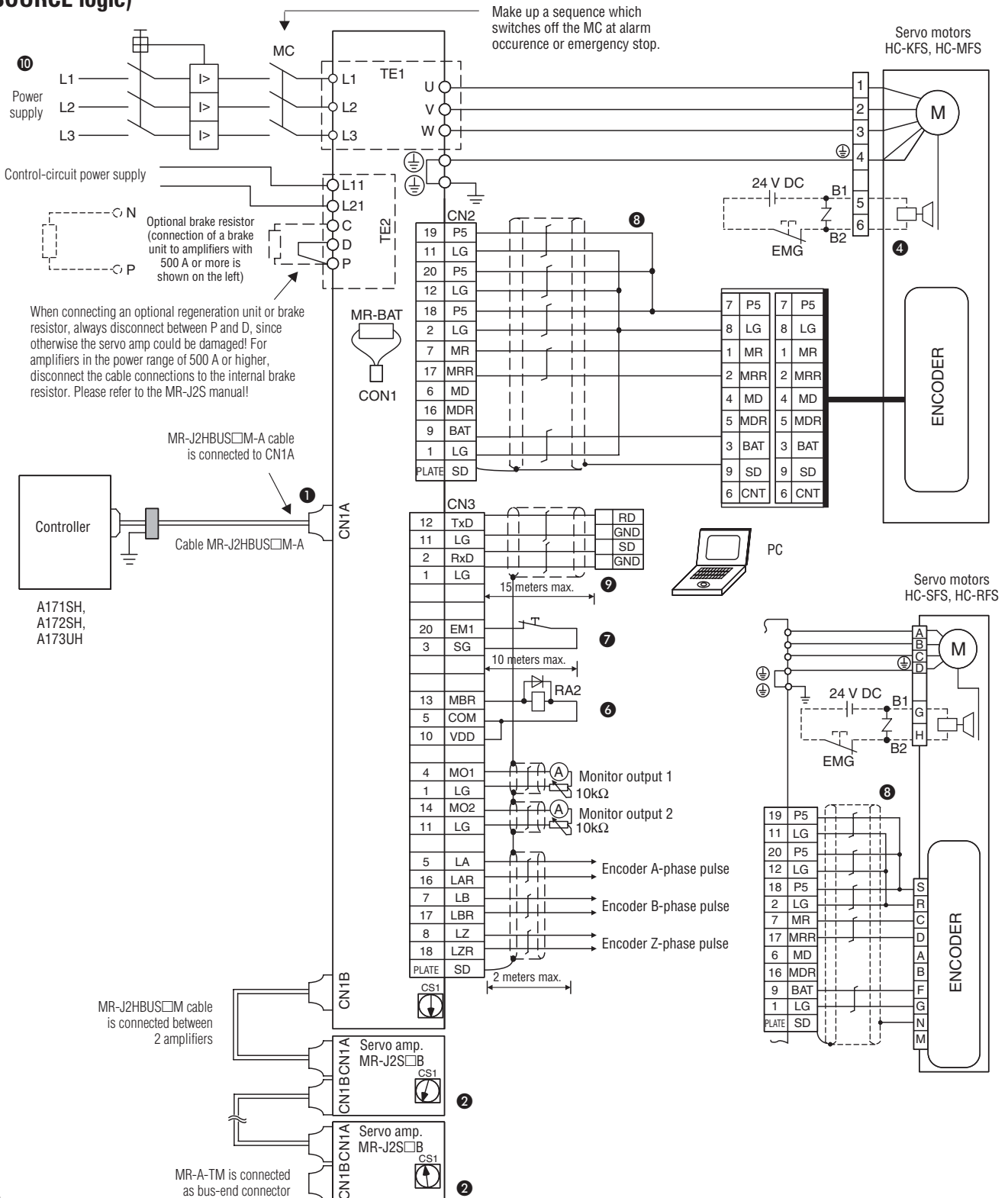
Note: The above diagram shows the connection of a MR-J2S-A type servo amplifier using SOURCE logic. If the 400 V range of servo (MR-J2S-A4) is used, then it is possible to choose between SINK and SOURCE logic connection but some connections wil be different, for example there should be no connection between SG and COM. For full details refer to the 400 V supplementary manual.

MR-J2S-A | MR-J2S-B | MR-J2S-A4 | MR-J2S-B4 | MR-J2S-CL

MR-J2S-A Speed Control Mode
(SOURCE logic)

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

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 instruction 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.

Note: The above diagram shows the connection of a MR-J2S-A type servo amplifier using SOURCE logic. If the 400 V range of servo (MR-J2S-A4) is used, then it is possible to choose between SINK and SOURCE logic connection but some connections wil be different, for example there should be no connection between SG and COM. For full details refer to the 400 V supplementary manual.

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MR-J2S-A Torque Control Mode
(SOURCE logic)

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 electromagnetic brake.

Note: The above diagram shows the connection of a MR-J2S-A type servo amplifier using SOURCE logic. If the 400 V range of servo (MR-J2S-A4) is used, then it is possible to choose between SINK and SOURCE logic connection but some connections wil be different, for example there should be no connection between SG and COM. For full details refer to the 400 V supplementary manual.

MR-J2S-CL Standard Wiring Diagram

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 illustrated terminal connection for a regenerative brake resistor is valid only for the servo amplifier MR-J2S-350CL or smaller.

④ CN1A, CN1B, CN2 and CN3 have the same shape. Wrong connection of the connectors will lead to a fault or may lead to a destruction of the inputs/outputs.

⑤ The sum of currents that flow in the external relays should be 80mA max. If it exceeds 80mA, supply interface power from external.

⑥ When starting operation, always connect the forward/reverse rotation stroke end (LSN/LSP) with SG. (Normally closed contact.

⑦ Trouble (ALM) is connected with COM in normal alarm-free condition.

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

⑨ When using override (VC), make the override selection (OVR) device available.

⑩ When using analog torque limit (TLA), make the external torque limit selection (TL) devices available.

⑪ Always use a shielded multicore cable up to a maximum of 15 m in a low noise environment.

⑫ Only for motors with electomagnetic brake.

MR-J2S-B Standard Wiring Diagram
(SOURCE logic)

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

Servo motors HC-KFS, HC-MFS

❿ Power supply

L1 L2 L3

MC TE1 L1 L2 L3 U V W

1 2 3 4 M

24 V DC B1 B2 5 6 EMG ❹

Control-circuit power supply

L11 L21 C D P TE2

○ N
Optional brake resistor (connection of a brake unit to amplifiers with 500 A or more is shown on the left)
○ P

When connecting an optional regeneration unit or brake resistor, always disconnect between P and D, since otherwise the servo amp could be damaged! For amplifiers in the power range of 500 A or higher, disconnect the cable connections to the internal brake resistor. Please refer to the MR-J2S manual!

MR-BAT
CON1

CN2
19	P5
11	LG
20	P5
12	LG
18	P5
2	LG
7	MR
17	MRR
6	MD
16	MDR
9	BAT
1	LG
PLATE	SD

❽

7	P5	7	P5
8	LG	8	LG
1	MR	1	MR
2	MRR	2	MRR
4	MD	4	MD
5	MDR	5	MDR
3	BAT	3	BAT
9	SD	9	SD
6	CNT	6	CNT

ENCODER

MR-J2HBUS☐M-A cable is connected to CN1A

Controller

A171SH, A172SH, A173UH

❶ CN1A

Cable MR-J2HBUS☐M-A

CN3
12	TxD
11	LG
2	RxD
1	LG

RD
GND
SD
GND

PC

15 meters max. ❾

| 20 | EM1 |
| 3 | SG |

❼ 10 meters max.

13	MBR
5	COM
10	VDD

RA2 ❻

4	MO1
1	LG
14	MO2
11	LG

Monitor output 1 10kΩ
Monitor output 2 10kΩ

5	LA
16	LAR
7	LB
17	LBR
8	LZ
18	LZR
PLATE	SD

Encoder A-phase pulse
Encoder B-phase pulse
Encoder Z-phase pulse

2 meters max.

CN1B

MR-J2HBUS☐M cable is connected between 2 amplifiers

CN1B CN1A Servo amp. MR-J2S☐B CS1 ❷

CN1B CN1A Servo amp. MR-J2S☐B CS1 ❷

MR-A-TM is connected as bus-end connector

Servo motors HC-SFS, HC-RFS

A B C D M

24 V DC B1 B2 G H EMG

❽

19	P5
11	LG
20	P5
12	LG
18	P5
2	LG
7	MR
17	MRR
6	MD
16	MDR
9	BAT
1	LG
PLATE	SD

S R C D A B F G N M

ENCODER

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 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.

Note: The above diagram shows the connection of a MR-J2S-B type servo amplifier using SOURCE logic. If the 400 V range of servo (MR-J2S-B4) is used, then it is possible to choose between SINK and SOURCE logic connection but some connections wil be different, for example there should be no connection between VDD and COM. For full details refer to the 400 V supplementary manual.

Interface Assignment

1a. Digital input interface DI-1 (200 V type source logic)

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

about 5 mA

$U_{CES} \leq 1$ V
$I_{CEO} \leq 100$ µA
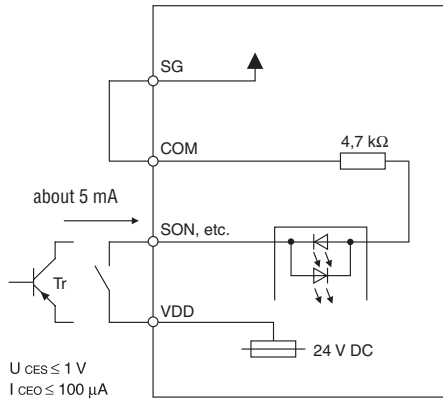
1b. Digital input interface DI-1 (400 V type source logic)

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

24 V DC ≥ 200 mA

about 5 mA

$U_{CES} \leq 1$ V
$I_{CEO} \leq 100$ µA
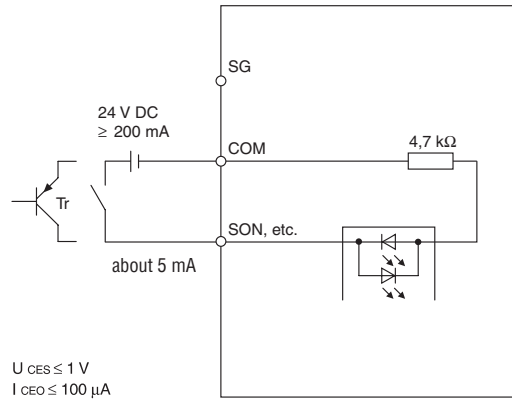
1c. Digital input interface DI-1 (200 V type sink logic)

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

about 5 mA

$U_{CES} \leq 1$ V
$I_{CEO} \leq 100$ µA
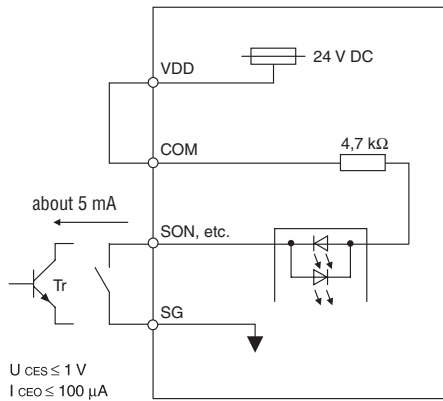
2a. Digital output interface DO-1 (200 V type sink logic)

Can drive a lamp, relay or photocoupler
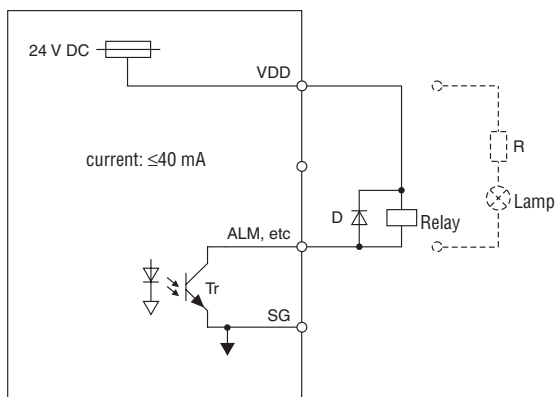
24 V DC

current: ≤40 mA

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

2b. Digital output interface DO-1 (400 V type source logic)

Can drive a lamp, relay or photocoupler
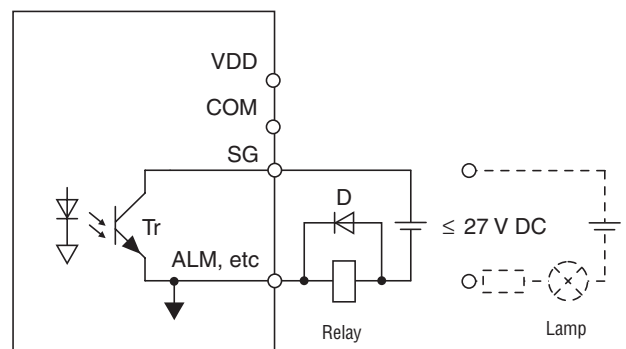
≤ 27 V DC

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)
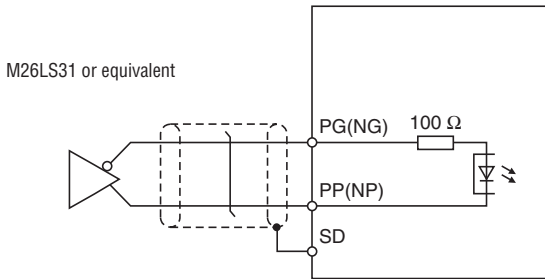
3b. Pulse train input interface DI-2 (200 V type sink logic)

Open collector mode (max. 200 kpps)
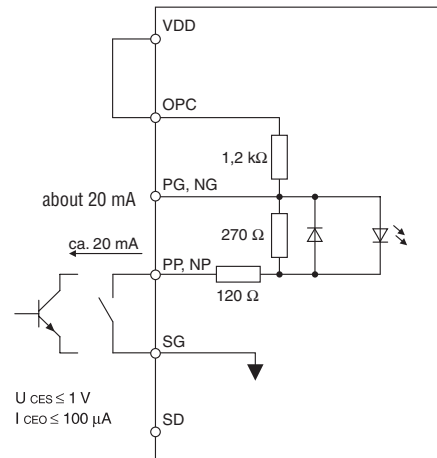
4a. Encoder pulse train output interface DO-2

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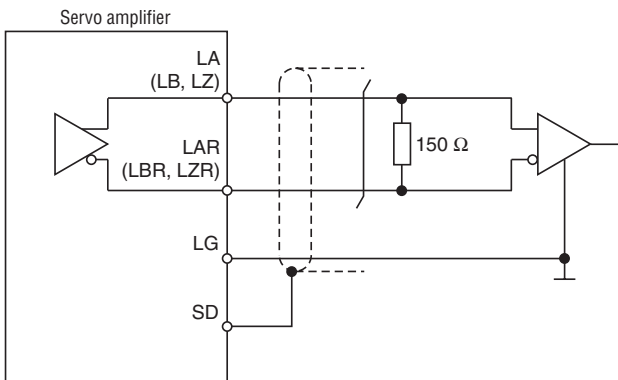
4b. Encoder pulse train output interface DO-2

Open collector mode
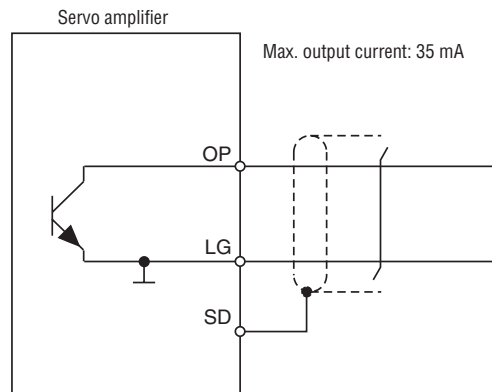
5. Analog input interface
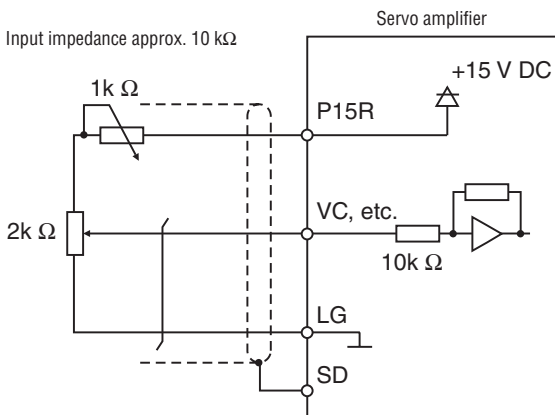
6. Analog output interface
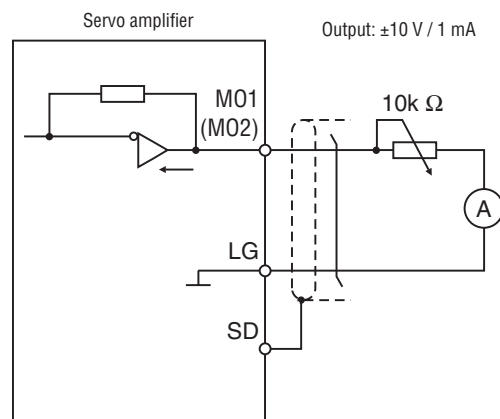
Connecting Peripheral Equipment (MR-J2S-A, MR-J2S-CL Type)

Peripheral equipment is connected to the MR-J2-Super as shown below. To ensure fast, efficient configuration and reliable operation always use only the connecting cables, expansion options and other accessories supplied or recommended by Mitsubishi.

④ Power supply

⑤ No-fuse circuit breaker (NFB)

⑥ Magnetic contactor (MC)

EMC filter (optional)

⑦ Controller/network*

⑧ Terminal block for A and CL (optional)

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

⑧ Terminal block for A and CL (optional)

⑨ Controller/network*

⑩ RS-232C/RS-422 communications (optional; connector CN3)

③ Control circuit terminal block

②

Encoder cable

Servo motor power supply

② Servo motor and encoder (connector CN2)

① Servo amplifier MR-J2S-A/-CL

● **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 (MR-BAT) 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
3~, 400 V AC for servo drives ≥ 600 W (A4)

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 or network (connector CN1A)

The MR-J2S can be connected to any pulse train output controller (e.g. FX2N-10PG, QD75P□ etc.).

This is where the digital outputs from a PLC can be connected to the MR-J2S-CL. On the MR-J2S-B the connection is made via the SSCNET network (see following page).

⑧ Junction terminal block (optional)

All signals can be connected at this junction terminal block.

⑨ Upper controller or network (connector CN1B)

Connects to the I/O of the PLC/controller or to the operation panel of the machine.

⑩ RS-232C/RS-422 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.

MITSUBISHI ELECTRIC

Connecting Peripheral Equipment (MR-J2S-B SSCNET Type)

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.

BASICS

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
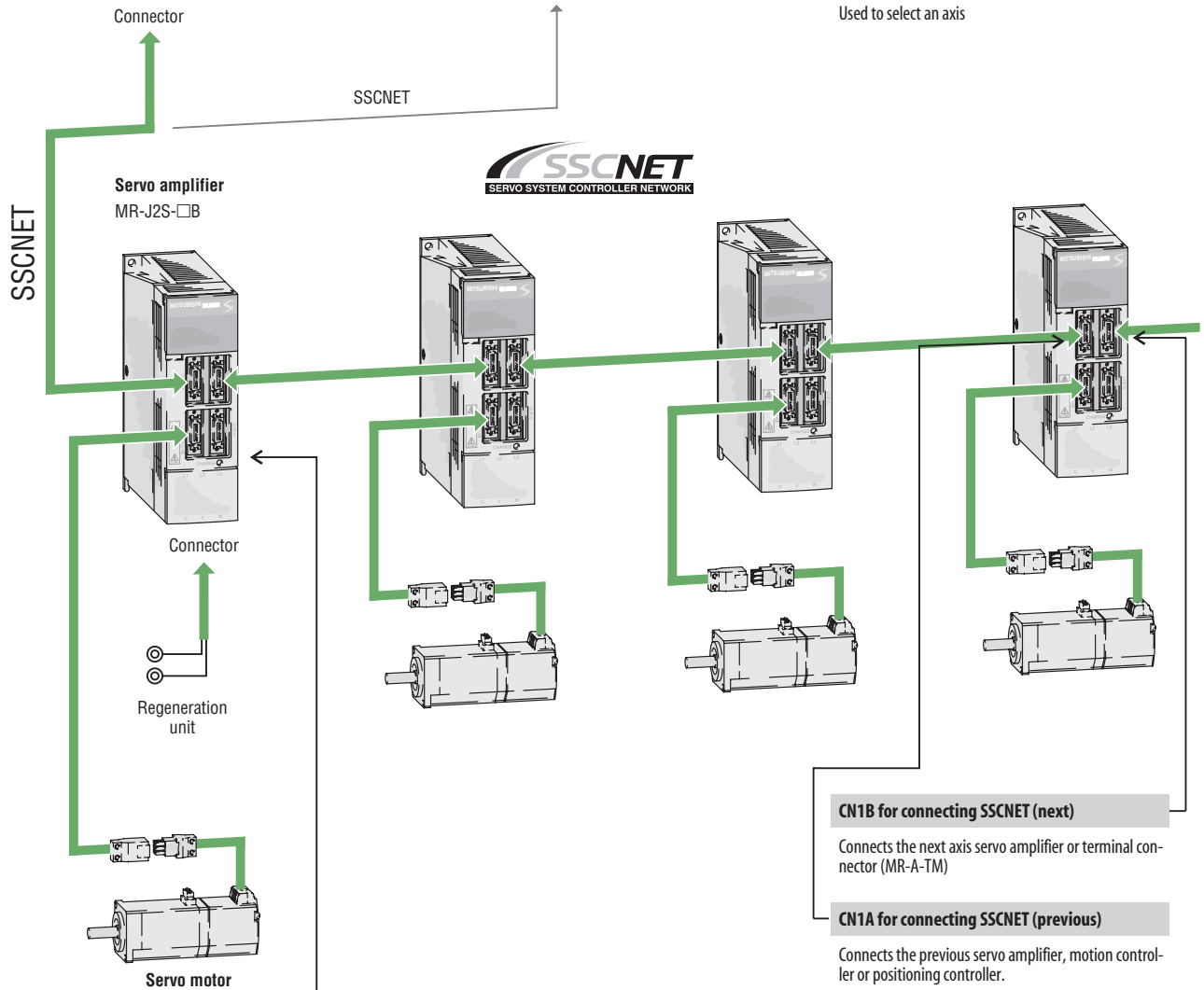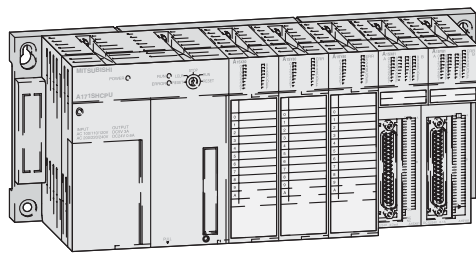
Battery compartment (optional)

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

Connector

SSCNET

SSCNET

SSCNET
SERVO SYSTEM CONTROLLER NETWORK

Servo amplifier
MR-J2S-☐B

SSCNET

Connector

Regeneration unit

Servo motor

CN1B for connecting SSCNET (next)

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

CN1A for connecting SSCNET (previous)

Connects the previous servo amplifier, motion controller or positioning controller.
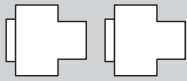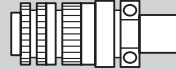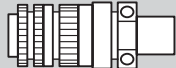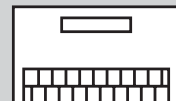
CN3 for RS-232C communication

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. Also features RS-422 protocol.

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.

| MR-J2S-A | MR-J2S-B | MR-J2S-A4 | MR-J2S-B4 | MR-J2S-CL |

■ Cables and Connectors (MR-J2S-A/A4 and MR-J2S-CL Servo Amplifiers)

HC-SFS, HC-RFS servo motor

BASICS

Item		Description		Model	Protection	Length	Art. no.
For CN2	①	Encoder cable for HC-KFS, HC-MFS series motors	Amplifier 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	Amplifier 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		Amplifier side connector — Cable clamp — Junction connector — Encoder	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	Amplifier side connector — Junction connector ❷	MR-J2CNM	IP20	—	61212
	④	Encoder connector set for HC-SFS, HC-RFS series motors	Amplifier side connector — Junction connector	MR-J2CNS	IP20	—	61213
	⑩		Amplifier side connector — Junction connector	MR-ENCNS	IP65 IP67	—	87237

◇ **MITSUBISHI ELECTRIC**

MR-J2S-A MR-J2S-B MR-J2S-A4 MR-J2S-B4 MR-J2S-CL

Item		Description	Model	Protection	Length	Art. no.
For CN1	⑤ CN1 connector	Amplifier side connector	MR-J2CN1 ❹ (set contents are 2 pcs.)	—	—	55912
	⑦ Junction terminal block cable	Amplifier side connector — Junction terminal block 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	Amplifier side connector — PC side connector	MR-CPCATCBL3M	—	3 m	55910
For motors and external peripherals	⑪ Power supply connector set for HC-KFS, HC-MFS series motor		MR-PWCNK1	IP20	—	131663
	⑫ Power supply connector set for HC-KFS, HC-MFS, series motor with electrom. brake		MR-PWCNK2	IP20	—	131664
	⑬ Power-supply connector set for HC-SFS52, 102, 152, 524, 1024, 1524 HC-RFS103, 153, 203		MR-PWCNS1	IP65 IP67	—	64036
	⑭ Power supply connector set for HC-SFS 202, 352, 502, 2024, 3524, 5024 HC-RFS353, 503		MR-PWCNS2	IP65 IP67	—	64035
	⑮ Power supply connector set for HC-SFS702, 7024		MR-PWCNS3	IP65 IP67	—	136358
	⑯ Brake connector set for HC-SFS 202B, 352B, 502B, 702B, 2024B, 3534B, 5024B, 7024B		MR-BKCN	IP65 IP67	—	64034
	⑧ Terminal blocks		TB-20S, TB-20C	—	—	149148, 149023

Notes:

❶ H and L indicate bending life. H products are highly flexible.

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 RS-422 communication cable is supplied by the customer.

❺ The encoder cable is not oil-resistant.
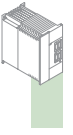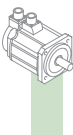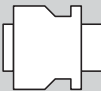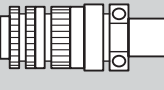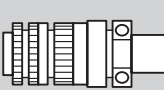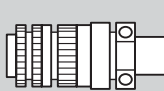
■ Cables and Connectors (MR-J2S-B/B4 Servo Amplifier)

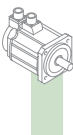| Item		Description			Model	Protection	Length	Art. no.
For CN2	①	Encoder cable for HC-KFS, HC-MFS series motors	Amplifier side connector — Junction connector — Encoder		MR-JCCBL□M-L (standard) Cable lenght in □: 2, 5, 10, 20, 30 m ❶	IP20	2 m / 5 m / 10 m / 20 m / 30 m	61372 / 55550 / 61332 / 61373 / 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	Amplifier 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		Amplifier side connector — Cable clamp — Junction connector — Encoder		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	Amplifier side connector	Junction connector ❷	MR-J2CNM	IP20	—	61212
	④	Encoder connector set for HC-SFS, HC-RFS series motors	Amplifier side connector	Junction connector	MR-J2CNS	IP20	—	61213
	⑩		Amplifier side connector	Junction connector	MR-ENCNS	IP65 IP67	—	87237

⬥ MITSUBISHI ELECTRIC

MR-J2S-A | MR-J2S-B | MR-J2S-A4 | MR-J2S-B4 | MR-J2S-CL

Item		Description		Model	Protection	Length	Art. no.
For CN1	⑤	Controller to amplifier bus cable	Controller side connector — Amplifier 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 CN1B	⑦	Amplifier to amplifier bus cable	Amplifier side connector — PC 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
For motors	⑪	Power supply connector set for HC-KFS, HC-MFS series motor		MR-PWCNK1	IP20	—	131663
	⑫	Power supply connector set for HC-KFS, HC-MFS, series motor with electrom. brake		MR-PWCNK2	IP20	—	131664
	⑬	Power-supply connector set for HC-SFS52, 102, 152, 524, 1024, 1524 HC-RFS103, 153, 203		MR-PWCNS1	IP65 IP67	—	64036
	⑭	Power supply connector set for HC-SFS202, 352, 502 HC-RFS353, 503		MR-PWCNS2	IP65 IP67	—	64035
	⑮	Power supply connector set for HC-SFS702, 7024		MR-PWCNS3	IP65 IP67	—	136358
	⑯	Brake connector set for HC-SFS202B, 352B, 702B, 2024B, 3524B, 7024B		MR-BKCN	IP65 IP67	—	64034

Notes:

❶ H and L indicate bending life. H products are highly flexible.

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.
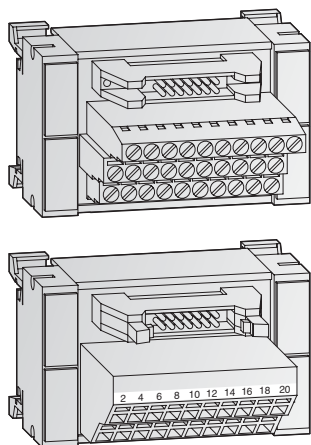
BASICS
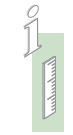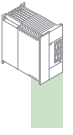
■ Battery (MR-BAT)
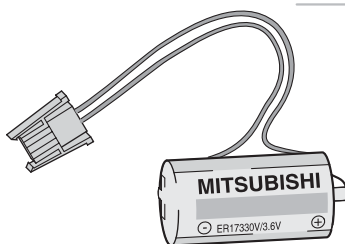
The servomotor's absolute value can be maintained by installing the MR-BAT battery in the servo amplifier. There is no need to install the battery when using the servo motor in incremental mode.

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

■ Terminal Blocks

These terminal blocks are adapter modules that simplify the wiring of the inputs and outputs of the servo amplifiers. The terminal block is available either with screw terminals or with cage clamp terminals.

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

	TB-20-S	TB-20-C
Block type	Input/output block	Input/output block
Channels	8 / 16	8 / 16
Design	20 pin terminal module	
Connection type	Screw terminals	Spring terminals
Application	MR-J2S series or FX2N-10PG module terminal block	
Dimensions (W x H x D) mm	75 x 45 x 52	75 x 45 x 52
Order information Art. no.	149148	149023
Accessories	Connection cable	

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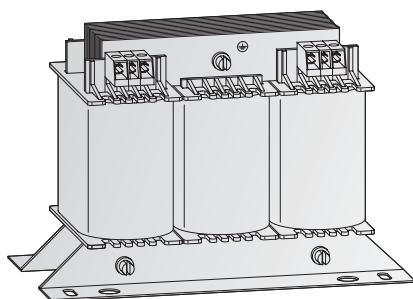
This auto transformer is used to adapt the servo amplifier to a 3-phase 400 V power supply. Furthermore, this auto transformer reduces the harmonics generated by the system and it protects the servo electronics.

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

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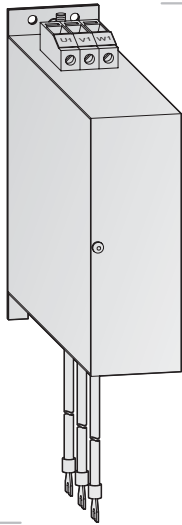
For complying with the EMC directives of the European Community regarding the electromagnetic compatibility, the servo amplifiers have to be equipped with a noise filter across the input circuit. Additionally it has to be installed and wired according to the EMC directives.

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

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

Filter	Servo amplifier	Power loss [W]	Rated current [A]	Leakage current [mA]	Weight [kg]	Order number
MF-2F230-007.230 [1]	MR-J2S-10A/B/CL to MR-J2S-70A/B/CL	11	7	<9	1.0	140055
MF-3F480-010.230 [1]	MR-J2S-100A/B/CL and MR-J2S-60A4/B4 to MR-J2S-200A4/B4	16	10	< 3.5 (<165) [2]	3.0	156428
MF-3F480-025.230 [1]	MR-J2S-200A/B/CL and MR-J2S-350A/B/CL, MR-J2S-350A4/B4 to MR-J2S-700A4/B4	33	25	< 3.5 (<165) [2]	4.0	156429
MF-3F230-050.230 [1]	MR-J2S-500A/B/CL and MR-J2S-700A/B/CL	31	50	<0.65 (<72) [2]	3.0	140058

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

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

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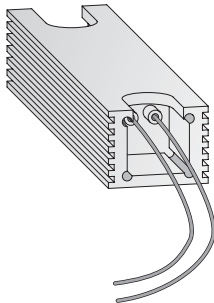
If the regenerative power exceeds the power of the built-in resistor, the following listed optional brake resistors can be used.

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/CL – MR-J2S-70A/B/CL	150	40	0.16	36 x 27 x 90	137279
MR-RFH220-40	MR-J2S-100 A/B/CL	400	40	0.42	36 x 27 x 200	137278
MR-RFH400-13	MR-J2S-200A/B/CL, MR-J2S-350A/B/CL and MR-J2S-500A/B/CL	600	13	0.73	36 x 27 x 320	137277
MR-RFH400-6.7	MR-J2S-700A/B/CL	600	6.7	0.73	36 x 27 x 320	137275
MR-PWR-T-150-270	MR-J2S-60A4/B4	150	270	0.18	36 x 27 x 90	154428
MR-PWR-T-400-120	MR-J2S-100A4/B4	400	120	0.4	36 x 27 x 200	154746
MR-PWR-T-600-80	MR-J2S-200A4/B4	600	80	0.64	36 x 27 x 320	154750
MR-PWR-T-600-47	MR-J2S-350A4/B4 – MR-J2S-500A4/B4	600	47	0.64	36 x 27 x 320	154751
MR-PWR-T-600-26	MR-J2S-700A4/B4	600	26	0.64	36 x 27 x 320	154752
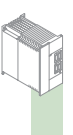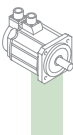
■ MELSEC System Q Positioning Units
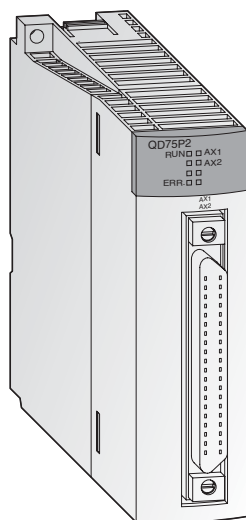
The System Q range offers three QD75 series modules for one, two or four axes:

● Open-collector output type: QD75P series
● Differential output type: QD75D series
● SSCNET bus type: QD75M series

The open-collector and differential output controllers can be used with standard type servo amplifiers (MR-J2S-A/-A4), whist the QD75M series controllers should be used with the MR-J2S-B/-B4 (SSCNET bus type) servo amplifiers. Using the SSCNET system can provide much improved, easier to use positioning system, with reduced wiring and better noise immunity. All QD75M series modules can provide functionality such as interpolation and speed-position operation.

The open-collector output type modules QD75P1, QD75P2 and QD75P4 provide positioning with open loop control. The travel command is generated via a pulse train. The speed is proportional to the pulse frequency and the distance travelled is proportional to the pulse length.

The differential output type modules QD75D1, QD75D2 and QD75D4 are suitable for bridging long distances between module and drive system due to the fact that the output allows longer cable lengths.

Specifications		QD75D1	QD75M1	QD75P1	QD75D2	QD75M2	QD75P2	QD75D4	QD75M4	QD75P4
Number of control axes		1	1	1	2	2	2	4	4	4
Interpolation		—	—	—	2 axis linear and circular interpolation			2, 3, or 4 axis linear and 2 axis circular interpolation		
Points per axis		600 pieces of data with PLC program, 100 pieces of data with GX Configurator QP								
Output type		Differential driver	SSCNET	Open collector	Differential driver	SSCNET	Open collector	Differential driver	SSCNET	Open collector
Output signal		Pulse chain	BUS	Pulse chain	Pulse chain	BUS	Pulse chain	Pulse chain	BUS	Pulse chain
Output frequency	kHz	1 – 1000	1 – 1000	1 – 200	1 – 1000	1 – 1000	1 – 200	1 – 1000	1 – 1000	1 – 200
Positioning	method	PTP control: absolute data and/or incremental; speed/position swiching control: incremental; locus/speed control: incremental; path control: absolute data and/or incremental								

	units	Absolute data: -2 147 483 648 – 2 147 483 647 pulse
		           -21 4748 364.8 – 214 748 364.7 μm
		           -21 474.83648 – 21 474.83647 inch
		                   0 – 359.99999 degree
		
		Incremental method: -2 147 483 648 – 2 147 483 647 pulse
		           -214 748 364.8 – 214 748 364,7 μm
		           -21 474.83648 – 21 474.83647 inch
		           -21 474.83648 – 21 474.83647 degree
		
		Speed/position switching control: 0 – 2 147 483 647 pulse
		           0 – 21 4748 364.7 μm
		           0 – 21 474.83647 inch
		           0 – 21 474.83647 degree								

	speed	1 – 1 000 000 pulse/s 0.01 – 20 000 000.00 mm/min 0.001 – 200 000.000 degree/min 0.001 – 200 000.000 inch/min								
	acceleration/deceleration processing	Automatic trapezoidal or S-pattern acceleration and deceleration or automatic S-pattern acceleration and deceleration								
	acceleration and deceleration time	1 – 8388608 ms (4 patterns, each can be set)								
	rapid stop decceleration time	1 – 8388608 ms								
Max. length for servo motor cable	m	10	30	2	10	30	2	10	30	2
I/O points		32	32	32	32	32	32	32	32	32
Internal power consumption (5 V DC)	mA	520	520	400	560	560	460	820	820	580
Weight	kg	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16
Dimensions (W x H x D)	mm	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90
Order information	Art. no.	129675	142153	132581	129676	142154	132582	129677	142155	132583
Accessories		40-pin connector and ready to use connection cables and system terminals; Programming software: GX Configurator QP, art. no.: 132219								

■ MELSEC System Q Motion CPUs
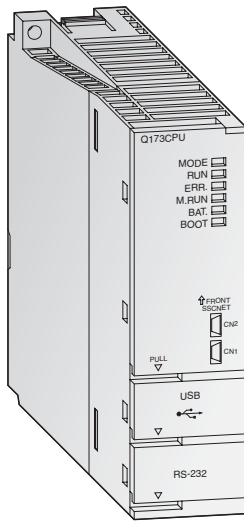
The System Q motion controller CPU controls and synchronizes the connected servo amplifiers and servo motors. A motion system besides the controller CPU as well includes a PLC CPU. Only after combining a highly dynamic positioning control and a PLC an innovative and autarkical motion control system is created.

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

Special features:

- Using multiple CPUs to distribute the load improves the overall performance of the whole system
- Use of up to 3 motion CPUs within one system
- Large scale control system for up to 96 axes per system
- Interpolation of 4 axes simultaneously
- Software CAM control
- Virtual and real master axes
- High-speed SSCNET communication

Specifications		Q172CPUN	Q173CPUN
Type		Motion CPU	Motion CPU
Input/output points		8192	8192
Number of control axes		8	32
Interpolation functions		Linear interpolation for up to 4 axes, circular interpolation for 2 axes, helical interpolation for 3 axes	
Positioning	control modes	PTP (Point to Point), speed control/speed positioning control, fixed pitch feed, constant speed control, position follow-up control, speed switching control, high-speed oscillation control, synchronous control (SV22)	
	acceleration/deceleration	Automatic trapezoidal acceleration/deceleration; S-curve acceleration/deceleration	
	compensation	Backlash compensation; electronic gear	
Programming language		Motion SFC, software conveyor assembly (SV13), virtual mechanical support language (SV22)	
Program capacity		14 k steps	
Number of positioning points		3200	
Interface		USB, RS-232C, SSCNET	
Real I/O points (PX/PY)		256 (these I/Os can be directly assigned to the Motion CPU.)	
Dimensions (W x H x D) mm		27.4 x 98 x 114.3	27.4 x 98 x 114.3
Order information Art. no.		142695	142696

■ MELSEC System Q Motion System Modules

Servo external signal interface module Q172LX

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

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

Special features:

- 32 address points for 8 axes for each 4 inputs
- Bipolar inputs for positive and negative logic

Serial absolute synchronous encoder interface module Q172EX

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

Special features:

- Transfer rate of 2.5 MBit per second
- Resolution of 14 Bit
- Voltage-failure security of the absolute values by means of built-in buffer battery

Manual pulse generator interface module Q173PX

The Manual pulse generator interface module Q173PX is used in a Motion system to receive the signals of up to 3 external incremental encoders or manual impulse generators (hand wheels).
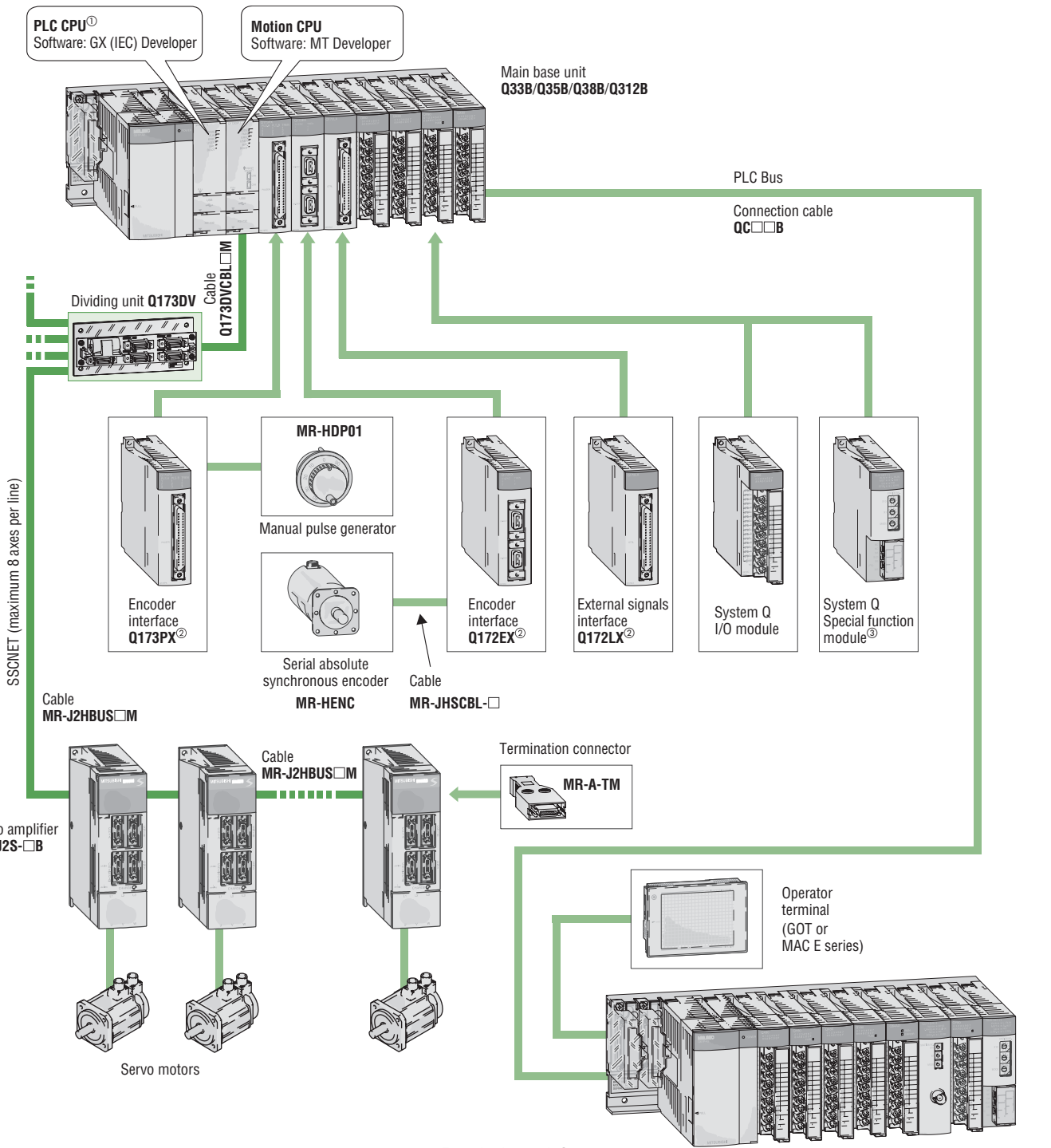
In addition to the inputs for the encoders, the Q173PX has three digital inputs with which the encoder signal counting procedure can be started (Encoder start signal).

Special features:

- Bipolar inputs for positive and negative logic
- Galvanic isolation of the inputs by means of photocoupler

■ System Configuration

PLC CPU[1]
Software: GX (IEC) Developer

Motion CPU
Software: MT Developer

Main base unit
Q33B/Q35B/Q38B/Q312B

PLC Bus

Connection cable
QC□□B

Cable **Q173DVCBL□M**

Dividing unit **Q173DV**

SSCNET (maximum 8 axes per line)

MR-HDP01

Manual pulse generator

Encoder interface **Q173PX**[2]

Serial absolute synchronous encoder **MR-HENC**

Cable **MR-JHSCBL-□**

Encoder interface **Q172EX**[2]

External signals interface **Q172LX**[2]

System Q I/O module

System Q Special function module[3]

Cable **MR-J2HBUS□M**

Cable **MR-J2HBUS□M**

Termination connector

MR-A-TM

Servo amplifier **MR-J2S-□B**

Servo motors

Operator terminal (GOT or MAC E series)

Extension base unit ④
Q52B/Q55B/Q63B/Q65B/Q68B/Q612B

SSCNET
SERVO SYSTEM CONTROLLER NETWORK

Power supply **Q6□P**

System Q I/O module

System Q special function module[3]

Notes:

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

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

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

④ The Q52B and Q55B extension base units do not have a slot for a power supply unit.
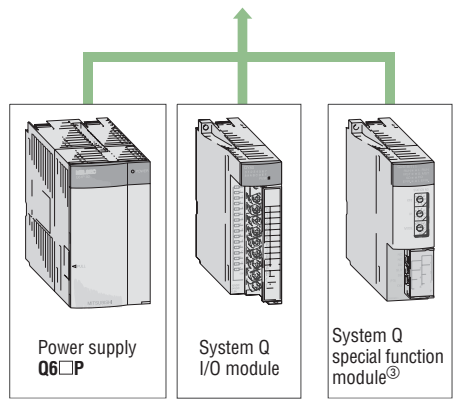
■ MELSEC FX Positioning Units

The high-speed counter and single axis positioning modules described below can be used in combination with the FX series PLCs. This provides a cost effective solution for small to medium size servo/motion applications.
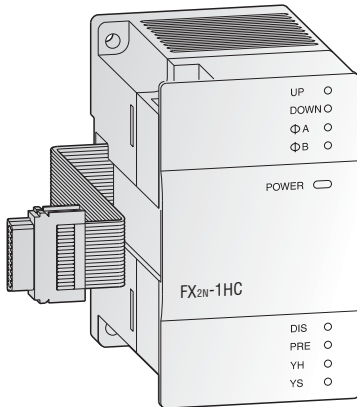
High-speed counter FX2N-1HC

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

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

For further specifications please refer to the MELSEC FX technical catalogue.
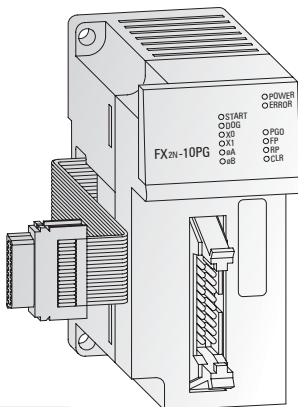
Single-axis positioning module

The positioning modules FX2N-1PG-E and FX2N-10PG are extremely efficient single-axis positioning modules for controlling either step drives or servo drives (by external regulator) with a pulse train. It is very suitable for achieving accurate positioning in combination with the MELSEC FX series. The configuration and allocation of the position data are carried out directly via the PLC program.
A very wide range of manual and automatic functions are available to the user.

Further special features are:
● Possibility of absolute or incremental positioning
● 7 different operation functions, such as jog mode, zeroing, variable speeds, etc.
● Separate programming units and operator panels are not required.
● The speed increase or decrease can be set either automatically or manually.
For further specifications please refer to the MELSEC FX technical catalogue.

X-Y Table System Configurations

An X-Y table is a typical two axes servo application, commonly used in industry for pick and place systems such as PCB components insertion machines through to welding machines. A linear based X-Y table application can be realized for example very simple with two FX2N-10PG modules.

The FX2N-10PG uses a differential pulse train output to control the position of the servo motors. As a differential pulse train output is given, then the MR-J2S-A series of servo amplifiers must be used (these allow control from either a pulse train or analog source).

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

Alternatively the X-Y application can be realized with a QD75M based system. The QD75M system is connected using the powerful SSCNET. This connectivity requires MR-J2S-B type amplifiers to be used.
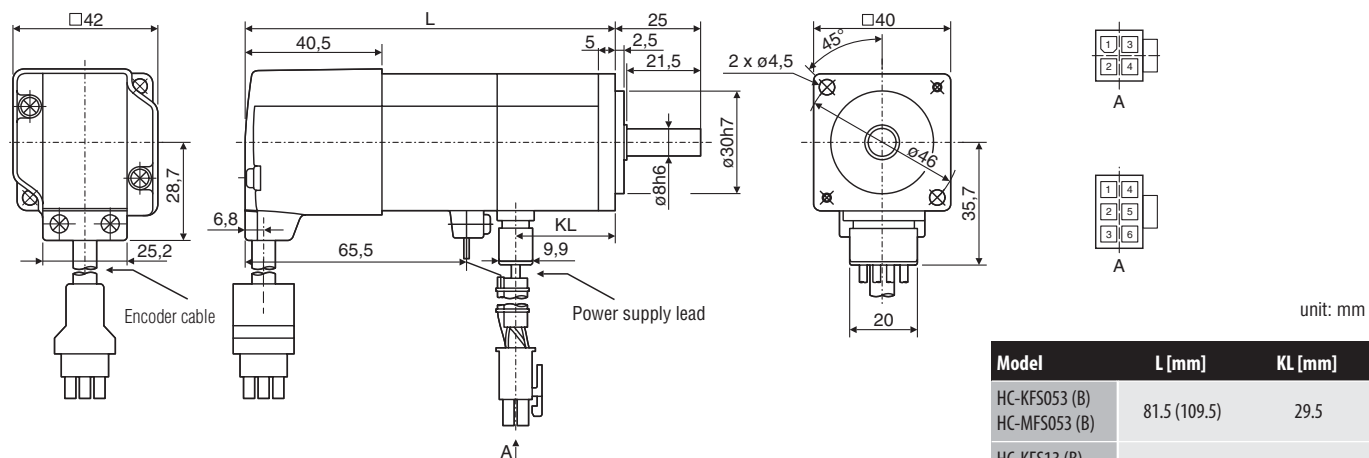
Furthermore, as the servo amplifiers are connected by a bus system, all servo data, such as current position, torque etc. can all be monitored back at the main controller (System Q PLC) as the data is automatically updated on the QD75M module. Also, all of the internal servo parameters can be set from the PLC, again due to the bus system used. The bus system also means that position data is sent serially, therefore reducing any possible interference due to noise.
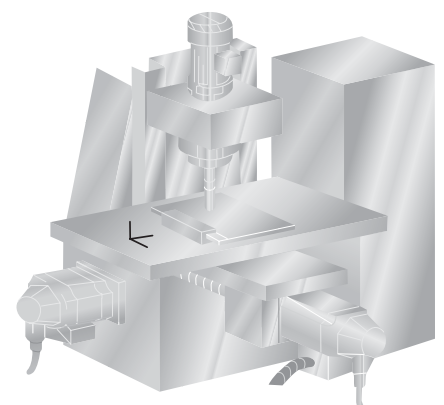
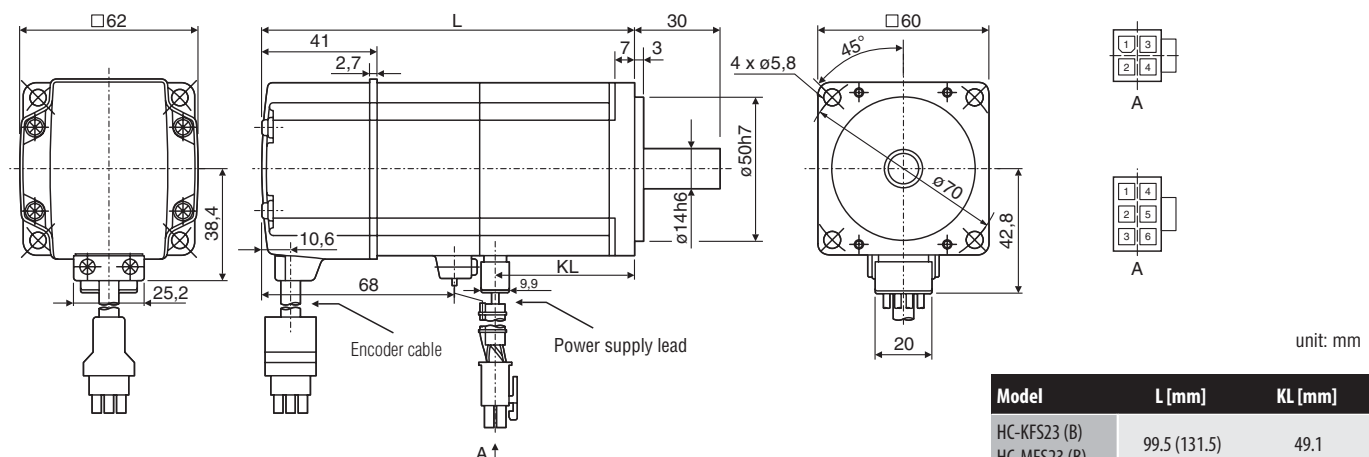## ■ Servo Motors HC-KFS and HC-MFS Series

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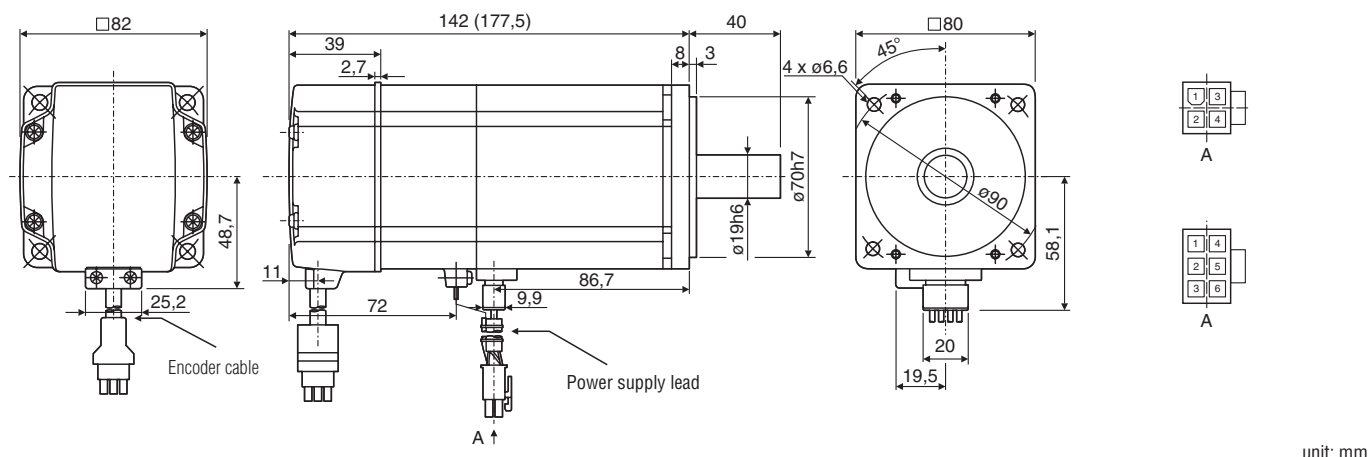### HC-MFS053 (B), HC-MFS13 (B)

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

⬙ MITSUBISHI ELECTRIC

■ Servo Motors HC-SFS Series

HC-SFS52 (B), HC-SFS102 (B), HC-SFS152 (B),
HC-SFS524 (B), HC-SFS1024 (B), HC-SFS1524 (B)

Encoder connector

Power supply connector
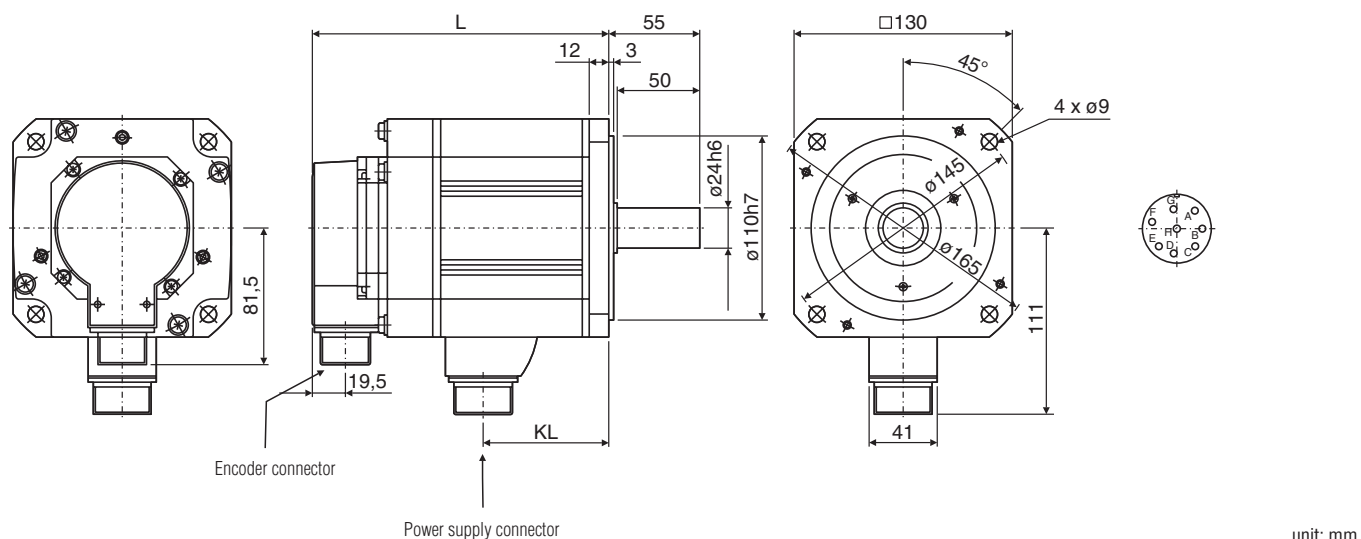
unit: mm

Model	L [mm]	KL [mm]
HC-SFS52 (B) HC-SFS524 (B)	120 (153)	51.5
HC-SFS102 (B) HC-SFS1024 (B)	145 (178)	76.5
HC-SFS152 (B) HC-SFS1524 (B)	170 (203)	101.5

HC-SFS202 (B), HC-SFS352 (B), HC-SFS502 (B), HC-SFS702 (B),
HC-SFS2024 (B), HC-SFS3524 (B), HC-SFS5024 (B), HC-SFS7024 (B)

Encoder connector

Power supply connector
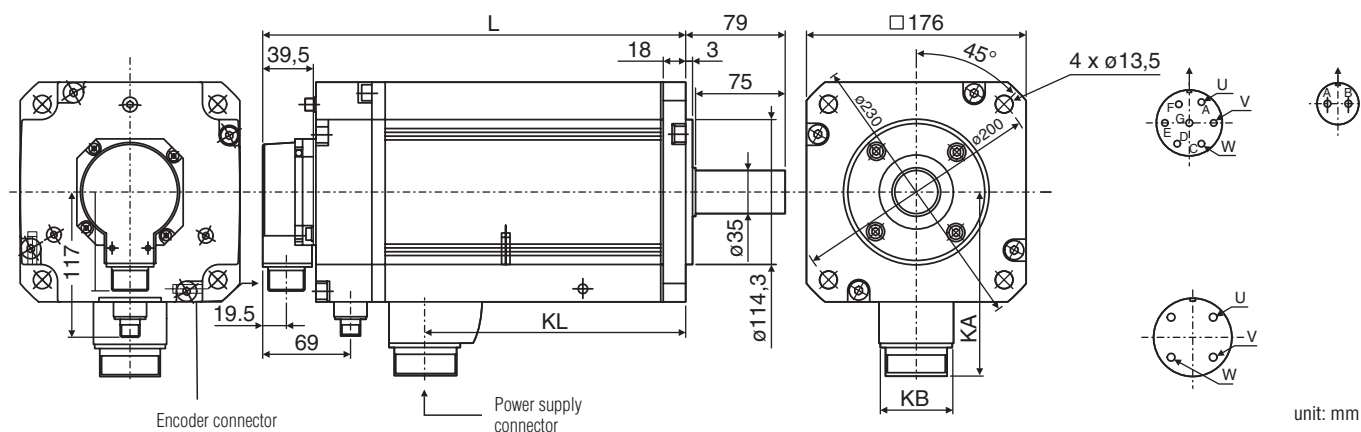
unit: mm

Model	L [mm]	KL [mm]	KA [mm]	KB [mm]
HC-SFS202 (B), HC-SFS2024 (B)	145 (193)	68.5	142	46
HC-SFS352 (B), HC-SFS3524 (B)	187 (235)	110.5	142	46
HC-SFS502(B), HC-SFS5024 (B)	208 (256)	131.5	142	46
HC-SFS702 (B), HC-SFS7024 (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
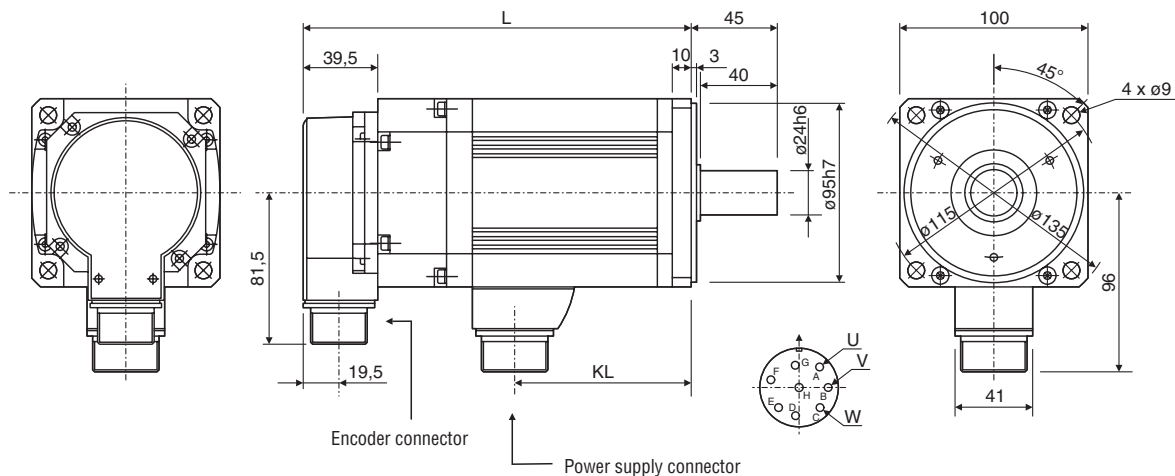
unit: mm

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
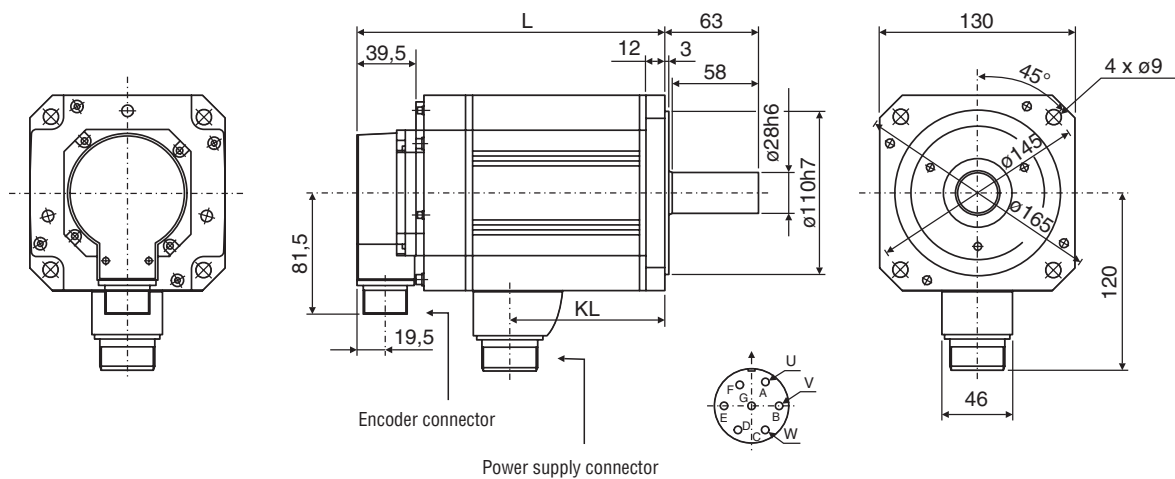
unit: mm

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

Dimensions for motors with brakes in brackets ( ).

MITSUBISHI ELECTRIC

■ Servo Amplifiers

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

unit: mm

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

unit: mm

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

70

ø6

22

6

168

156

70

190

20

6

TE1

OPEN

CN1A
CN1B
CN2ENC
CN3

L1 L2 L3

U V W

PE

7

22

6

42

6

TE2

unit: mm

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

90

78

6

6

168

156

70

195

20

TE2

TE1

PE

3–M4

OPEN

CN1A
CN1B
CN2ENC
CN3

unit: mm

MITSUBISHI ELECTRIC

MR-J2S-500A/B/CL

TE1

TE1

N.P.

N.P.
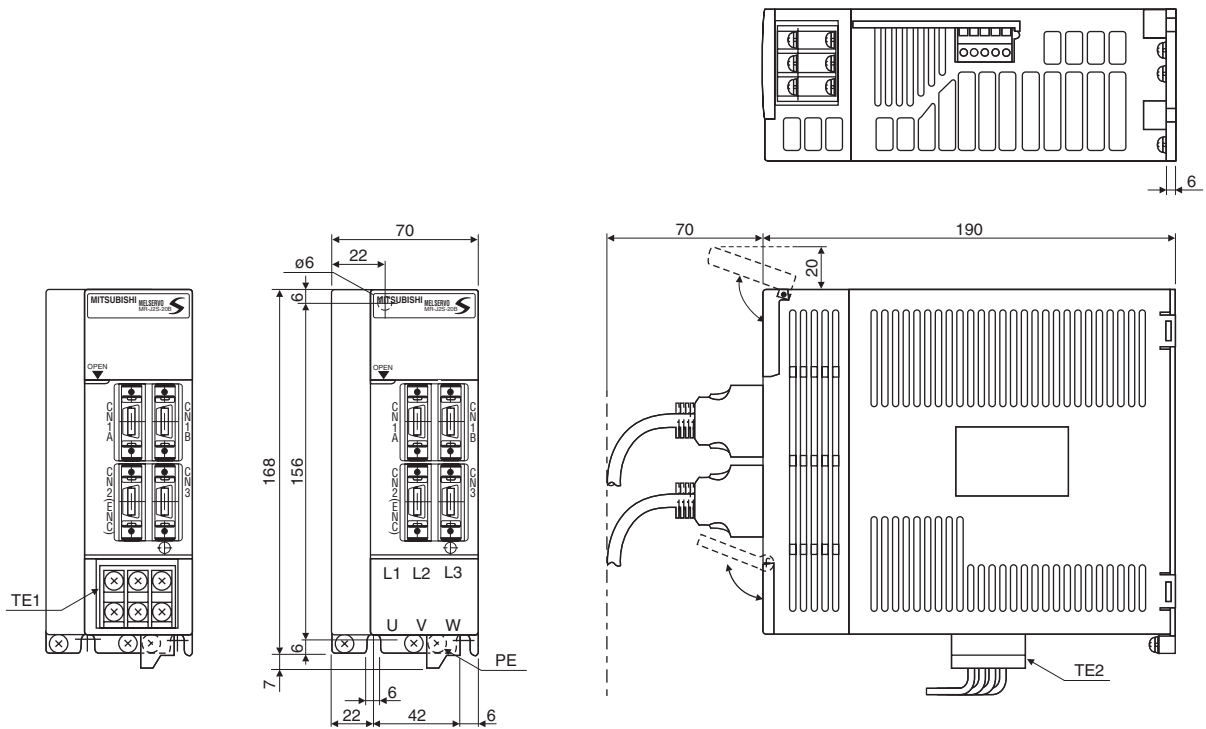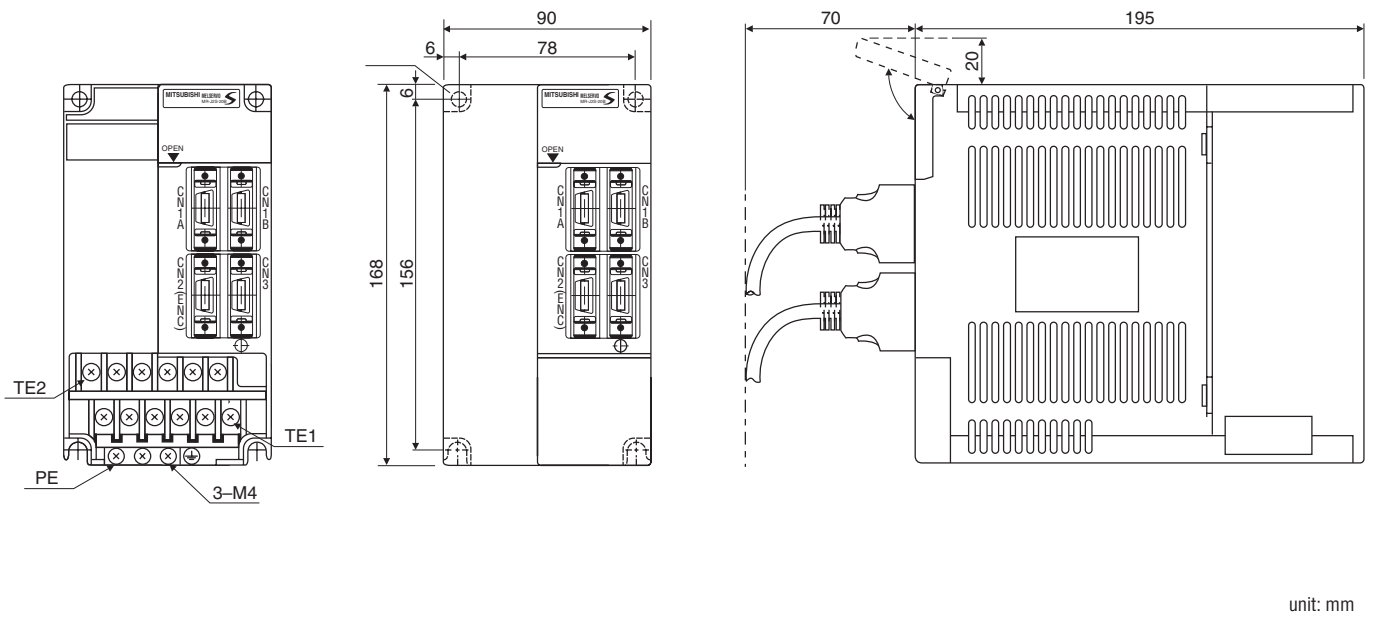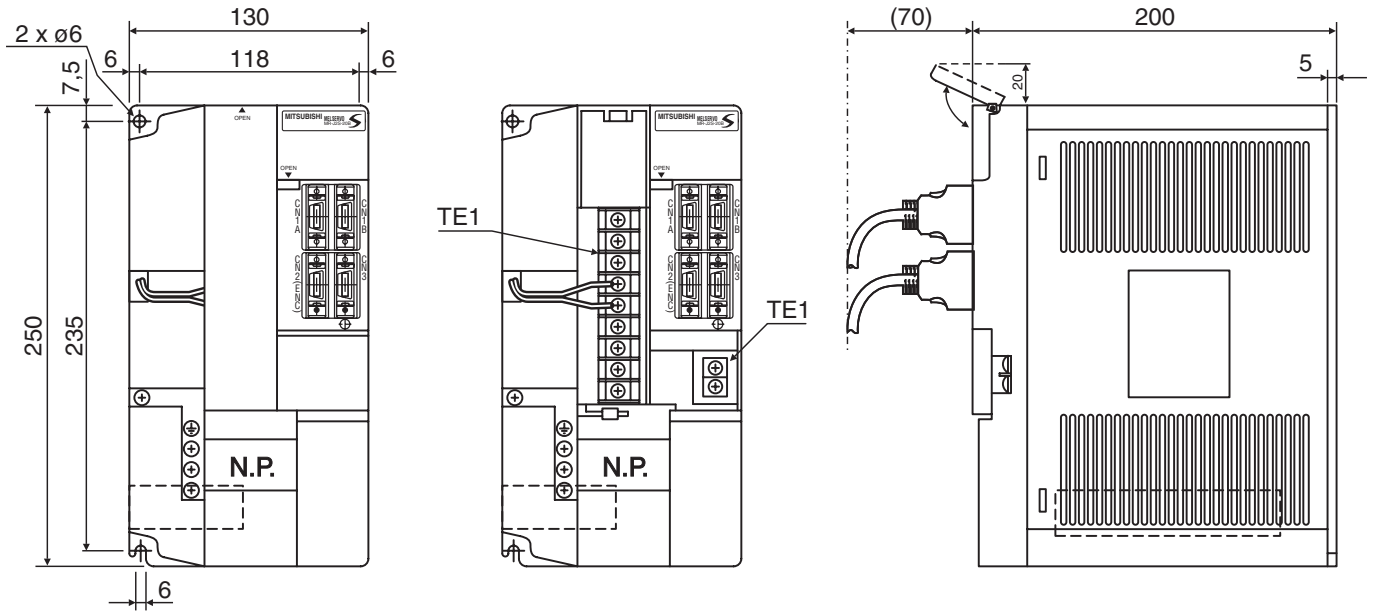
unit: mm

MR-J2S-700A/B/CL

TE2

TE1
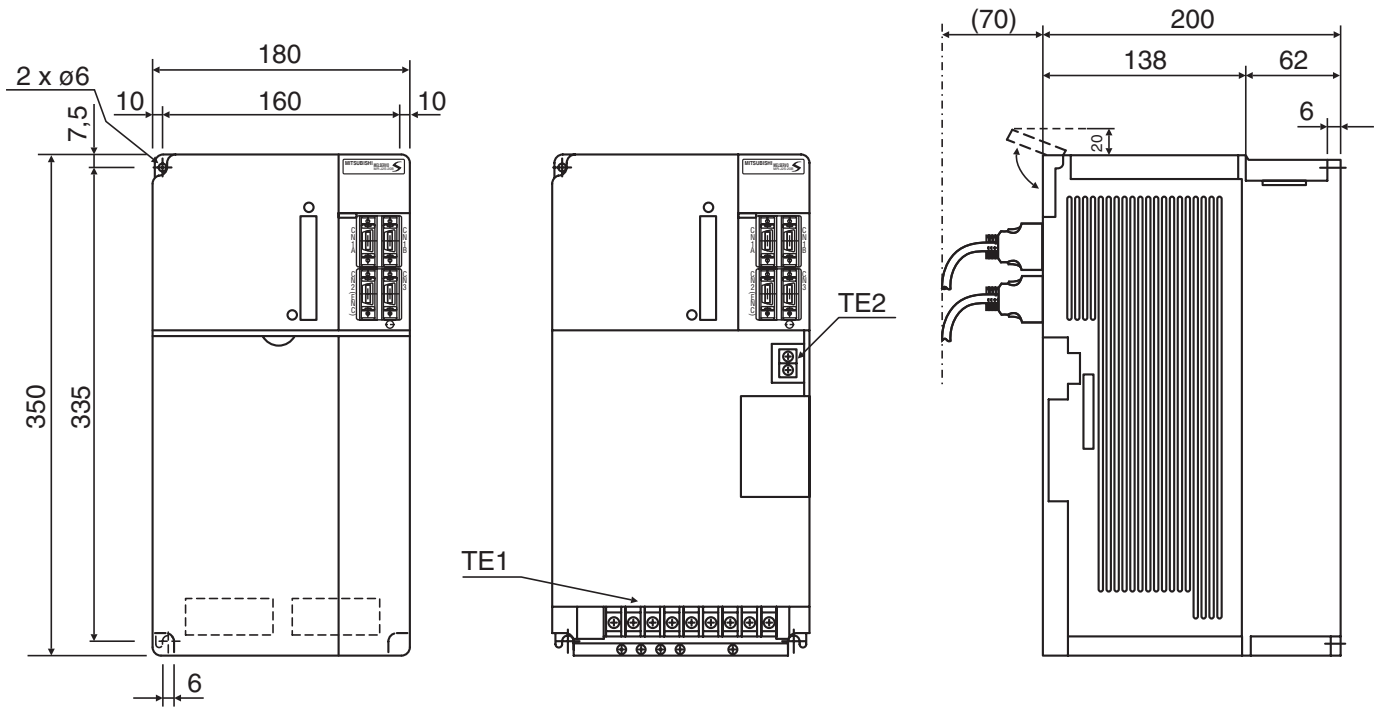
unit: mm

MR-J2S-60A4/B4, MR-J2S-100A4/B4, MR-J2S-200A4/B4
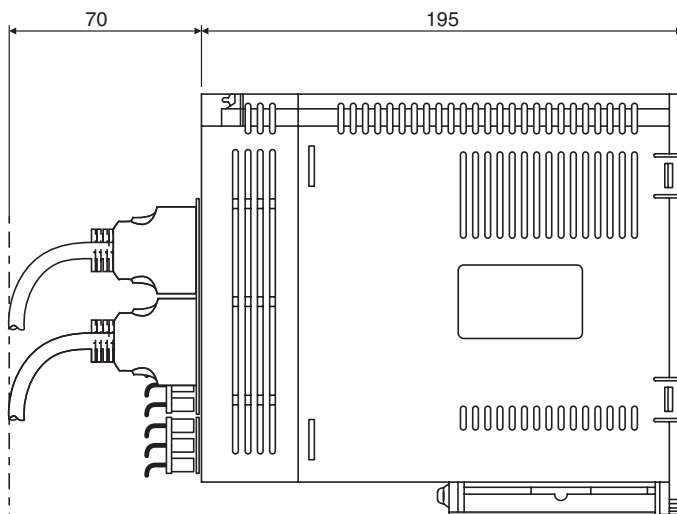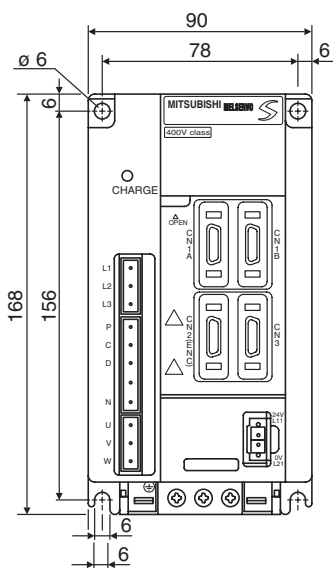
CNP1
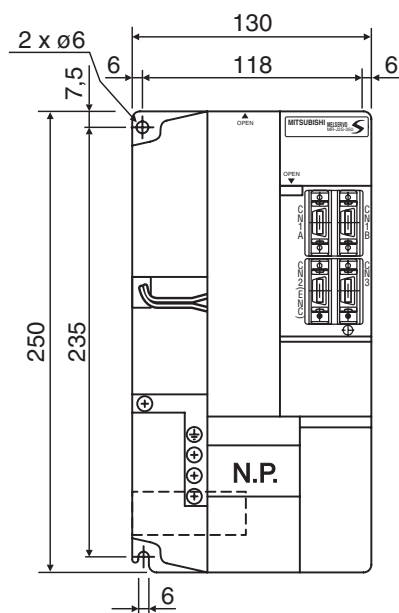| L1 |
| L2 |
| L3 |

CNP2
| P |
| C |
| D |
| N |

CNP3
| U |
| V |
| W |

CNP4
| 24V - L11 |
| 0V - L21 |

Note:

The connector CNP1, CNP2, CNP3 and CNP4 are supplied with the amplifier.
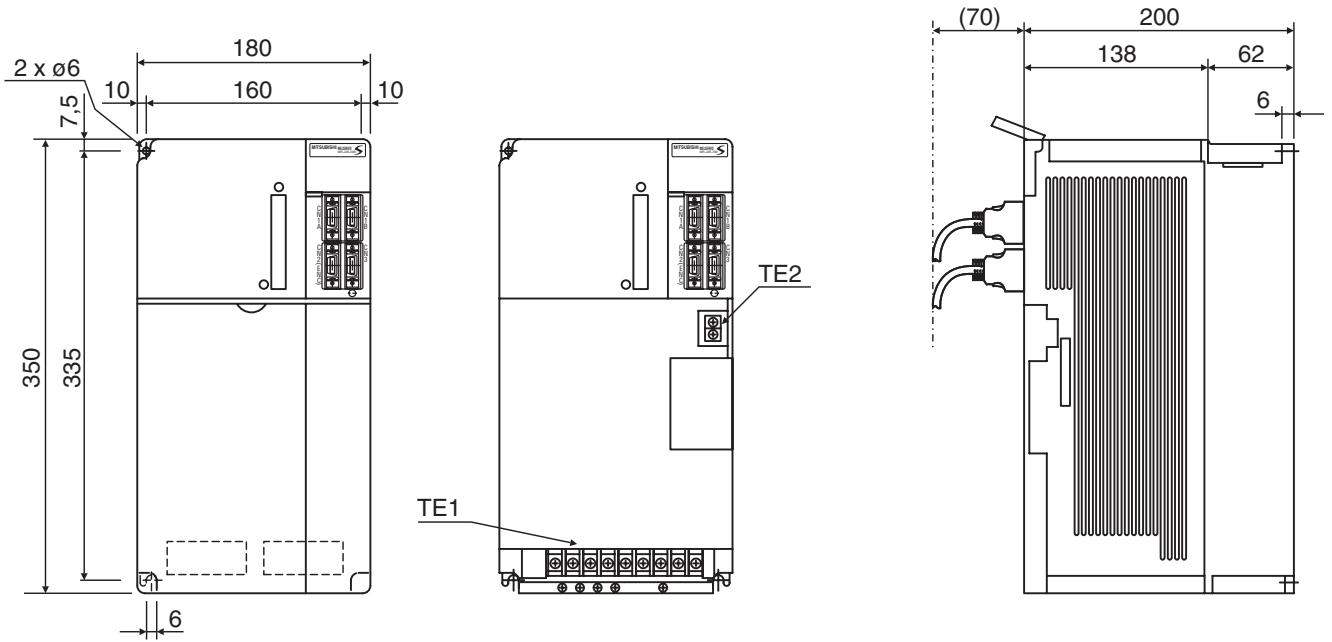
unit: mm
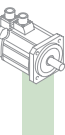
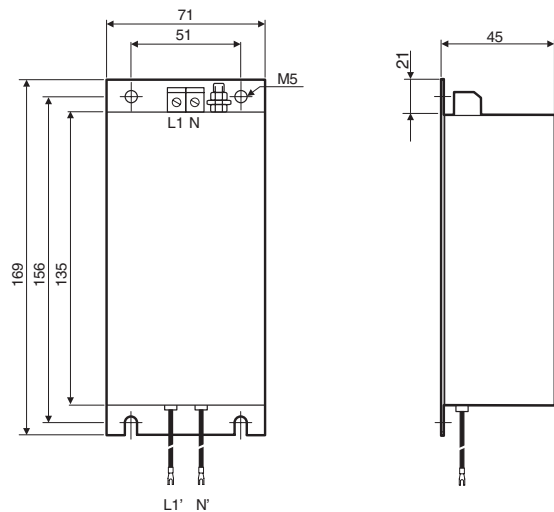## MR-J2S-350A4/B4, MR-J2S-500A4/B4
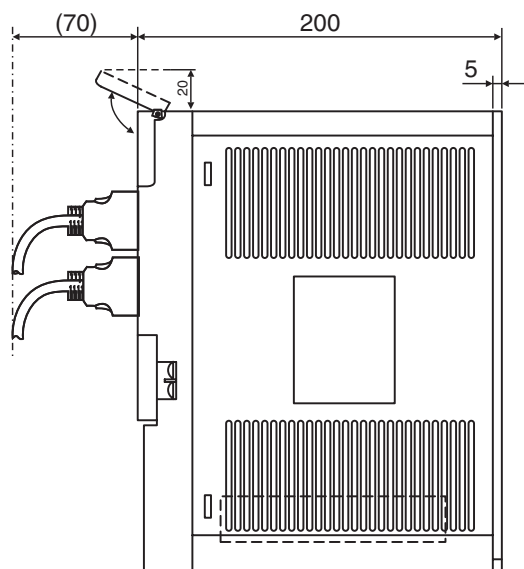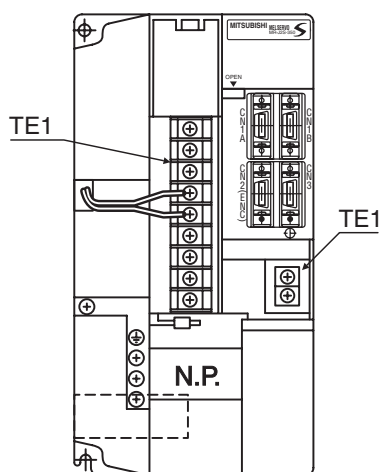
unit: mm

MR-J2S-700A4/B4

TE2

TE1

(70)   200
138   62

6

unit: mm

■ Noise Filters

MF-2F230-007.230

Unit: mm

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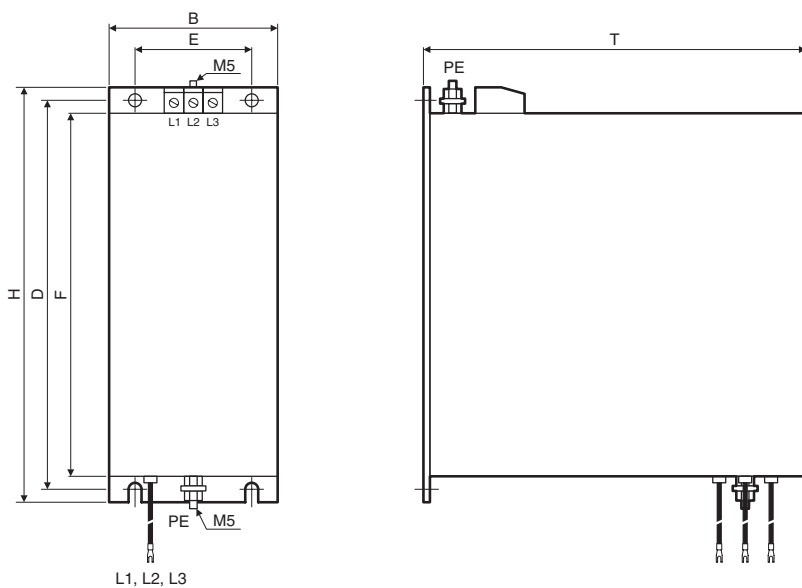
Type	H	B	T	D	E	F
MF-3F480-010.230	168	45	135	156	36	140
MF-3F480-025.230	168	75	195	156	60	140
MF-3F230-050.230	250	75	200	235	45	222

Unit: mm

■ Brake Resistors

RFH75 – RFH-400
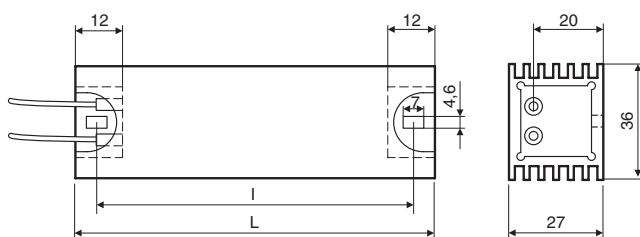
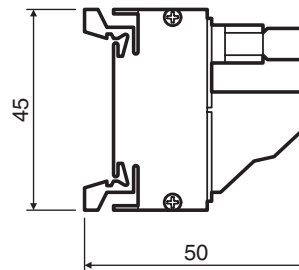| Type	L	I
MR-RFH75-40	90	79
MR-RFH220-40	200	189
MR-RFH400-13	320	309
MR-RFH400-6.7	320	309
MR-PWR-R-T150-270	90	79
MR-PWR-R-T400-120	200	189
MR-PWR-R-T600-80	320	309
MR-PWR-R-T600-47	320	309
MR-PWR-R-T600-26	320	309

Unit: mm

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■ Transformers

UI : UA = 400 V : 230 V
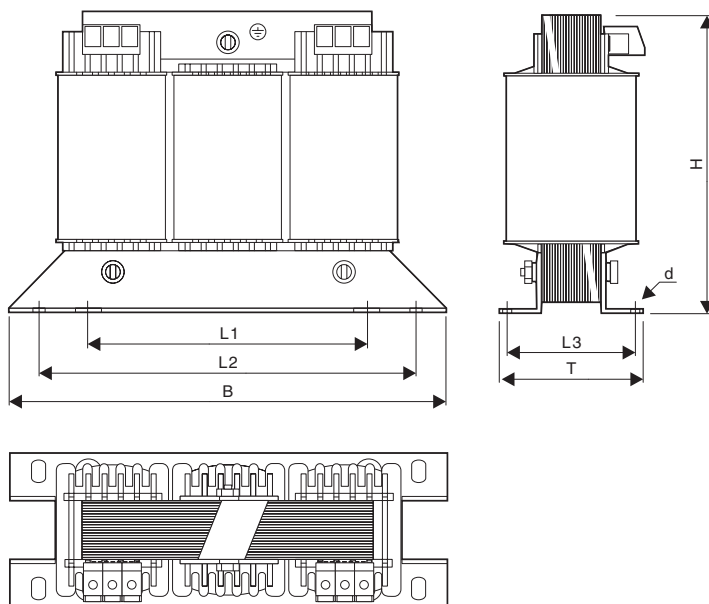
Type	Power [kVA] ([kW])	∅ Terminal [mm²]	B [mm]	T [mm]	H [mm]	L1 [mm]	L2 [mm]	L3 [mm]	d [mm²]	Weight [kg]
MT 1.2-60	1.3 (0.4) 1.7	2.5 2.5	219	105	163	136	201	71	7 x 12	7.0
MT 1.7-60	1.7 (0.7) 1.5	2.5 2.5	219	125	163	136	201	91	7 x 12	10.7
MT 2.5-60	2.5 (1.0) 3.5	2.5 2.5	267	115	202	176	249	80	7 x 12	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

■ Terminal Blocks

TB-20-C

TB-20-S

unit: mm

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Pos.	Number	Item (type)	Article number	Description	Remarks

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