

MR-J3

Servo Amplifiers and Motors

Advanced Servo Technology
for ultimate positioning control



Industry leading performance /// Reliable /// High-Speed ///
User-Friendly /// SSCNET III Capable /// Flexible ///

Use tomorrow's technology today



High-speed high-precision control that adapts itself to mechanical characteristics

Maximized to the best advantage for the machinery

Mitsubishi Electric servo systems are globally renowned and respected. Offering a perfect combination of high-end performance and ease of use, they are now found in a huge range of applications throughout all branches of industry – from single and multiple axis systems in mechanical engineering and other metal-working sectors to complex, fully-synchronised solutions in the semiconductor and motor industries.

Manufactured at the highest standards

Mitsubishi automation products enjoy a global reputation for outstanding quality and reliability. The process starts at the design stage, where quality is designed into even the smallest components. Our systematic pursuit of “best practice” means that Mitsubishi products readily comply with product directives and global standards.

Meeting global norms and standards

Mitsubishi Electric's servo amplifiers and motors meet all the standards and specifications laid down in the EU Low Voltage Directive 73/23/EEC and the Machinery Directive 98/37/EC. Needless to say, all systems carry the CE mark and are certified as conforming to UL, cUL and GOST.

Contents

What makes a good servo system	4 – 5	
Servo system overview	6	
Servo amplifiers	7	
The convincing reasons	8 – 9	
The best motors	10	
Plug and play positioning solutions	11	
Software	13	
Applications	14	

What makes a good servo system



Cost effectiveness

Industry leading performance gives faster production cycles and reduced material wastage



Plug and play

The availability of pre-made cables of different length means that connecting a servo motor to an amplifier or any other combination is quick and error free.



Simple networking

High-speed servo and motion applications need special high-speed networking. Mitsubishi's Servo System Controller Network (SSCNET III) provides these system capabilities.

High speed Motion

Advanced and evolving tuning functions

The built-in display panel indicates servo amplifier status and alarm numbers.

Automatic servo motor recognition

Absolute high-resolution encoder as standard equipment

em

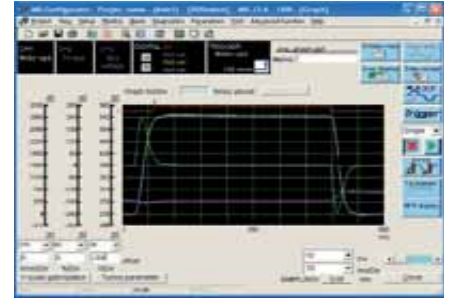
Speed, high performance
Bus system SSCNET III

Position and speed data, etc.
can be set via CC-Link com-
munication.



USB interface for convenient
and fast setup with a PC

CC-Link compatible built-in
positioning function



Simple setup and tuning

The new setup software MR Configurator allows for easy set up and tuning the servo system with a personal computer.



Functionality

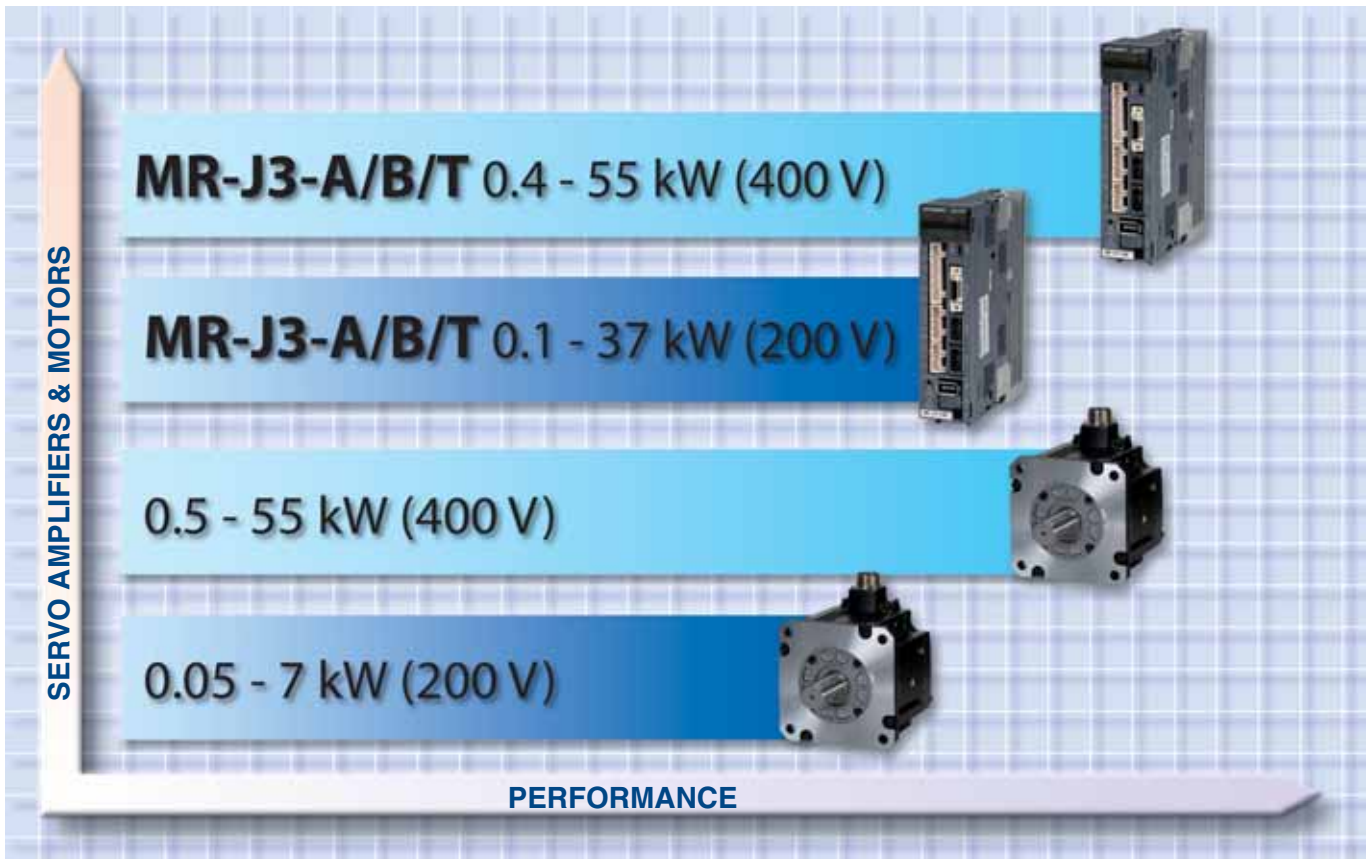
The MR-J3 series, has incorporated advanced control capabilities that are able to maximize the best advantage from the machinery.



Compact & flexible

Mitsubishi's servo systems are both compact and flexible. The reduced component size means more flexibility for installation and reduced enclosure sizes.

The right solution every time



A diverse product range helps you make the right product choice.



"Plug & play" technology

A solution for every application

Mitsubishi Electric always has the right servo system for straightforward and complex applications alike. With so many motor types, different amplifier output performances and features, the right servo solution is available for every conceivable positioning requirement.

The new MR J3 series is Mitsubishi Electric's latest generation of servo amplifiers and motors for industrial automation applications, that are small, precise and easy to integrate, sporting a host of new features.

The powerful amplifier and motors are significantly smaller than previous generations, reducing the need for costly cubicle space and allowing the motors to fit easily and neatly into small recesses of the machine. From simple single-axis drives for point-to-point positioning, to complex systems with 96 fully synchronised axes, the new MR-J3 series can reduce more than just your stress levels.

The ever-evolving new generation servo



Handling systems require exceptional precision and dynamic response.

The MR-J3 is currently available with outputs from 50 W to 55 kW. Units with higher outputs are being added to the range at regular intervals.

Integrated positioning

This CC-Link enabled version of Mitsubishi Electric's latest generation of servo amplifiers makes it easier than ever to build truly integrated automation systems. The powerful amplifier and motors are significantly smaller than previous generations, reducing the need for costly cubicle space and allowing the motors to fit easily and neatly into small recesses of the machine.



Plug and play minimises wiring errors and speeds up installation

Powerful amplifiers

The new MR-J3 generation of servo drives delivers state-of-the-art technology and simple operation in a very compact package. New functions like the advanced vibration suppression system and the further improved real-time autotuning ensure maximum precision, very short positioning times and simple installation.

Mitsubishi offers a wide spectrum of servo amplifiers to meet the demands of all types of applications. The MR-J3-A models are suitable for drive systems with conventional control and are designed for regulating speed, torque and position control tasks. The MR-J3-B models are specified for complex, multi-axis movement sequences and for use in networked automation systems. The MR-J3-T series is a compact and cost effective servo solution with integrated positioning control functionality and CC-Link communications capability.

The units configure themselves by Plug & Play for Mitsubishi Electric's motion control and positioning control systems, to which they are connected via the high-speed optical SSCNET III network, which has a cycle period of just 0.44 milliseconds.

MR-J3 Servos at a glance

Power range

MR-J3-A/B: 0.1–37 kW
MR-J3-A4/B4: 0.4–55 kW
MR-J3-T/T4: 0.1–55 kW

Input

MR-J3-A/B/T: 200–230 V AC (50/60 Hz)
MR-J3-A4/B4/T4: 380–480 V AC (50/60 Hz)

Speed frequency response
900 Hz

Control functions with enhanced tuning technology

Real-Time Auto-tuning and Model Adaptive Control;
Advanced Vibration Suppression

Integrated interfaces

RS-422

Network links

MR-J3-B: SSCNET III
MR-J3-T: CC-Link

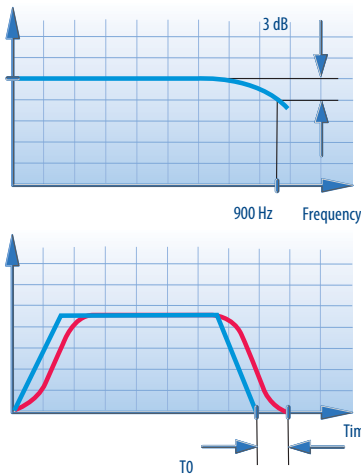
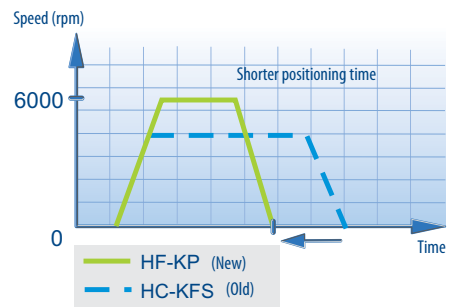
The power to perform



Bottle filling with increased productivity by decreased cycle times thanks to short settling time.

Increased response speed

The MR-J3's 900Hz speed-frequency response rate is over 30% faster than existing models. For users this means faster operation, greater precision, faster retooling in production, less wastage and better product quality.



High speed response of 900 Hz offers shortest settling times resulting in short cycle times.

Intelligent functions for any application

Every detail of the MR-J3 series is designed for performance and reliability, from the intelligent drive electronics to the robust mechanical components. These next-generation servo systems are both compact and flexible, featuring Plug & Play functionality, fibre-optics technology and optical feedback systems.

Reduced component size

The reduced component size is critically important to machine designers who are often called upon to squeeze all of the control solutions they need into the smallest deliverable package. The MR-J3 series boasts an intelligent design that has reduced amplifier sizes by up to 40 % and motor lengths by almost a quarter. This means machine designers don't have to make as many compromises to get the right motor and deliver the right power in the right place. These servos' compact dimensions enable flexible installation and economical design, which helps you to keep your costs down and be more competitive in the global economy.

Firmware that delivers performance

All MR-J3 servo amplifiers use the very latest regulation and control technologies. These systems ensure fast installation and setup and make it possible to configure stable systems with very short response times – no matter what your application.

■ Real-Time Auto-tuning

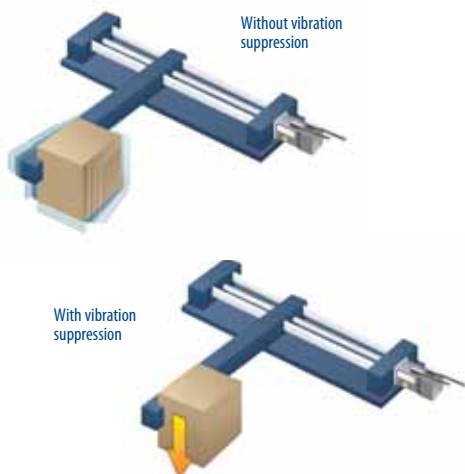
The real-time auto-tuning function sets the servo's control parameters automatically, eliminating the need to calibrate the system for each individual application. But that's not all – auto-tuning also works continuously while the system is in operation, making constant adjustments to cater for applications with fluctuating moments of inertia. This makes it possible to use these servos in a much wider range of applications.

Precise tuning functions

■ Advanced suppression of mechanical vibration

Advanced vibration suppress control is designed to suppress the vibrations in Category 2 above. It is effective in suppressing residual vibrations at the time of settling during positioning operation.

The primary control method of the MR-J3 is Model Adaptive Control. In this method, the motor is driven in such a manner that the tip of the given machinery moves together with the reference model applied.

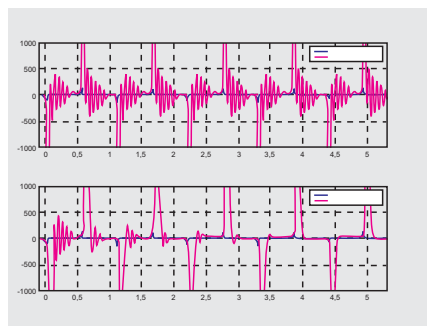


In applications with extreme load vibrations this function significantly improves both performance and system response.

Under Advanced vibration suppress control, it uses a mechanical vibration model from reference model to generate a drive pattern that prevent the tip of machinery from vibrating, thereby suppressing any residual vibration. Advanced vibration suppress control can extract vibration components from actual motor movements. It identifies the vibration characteristics of the machinery in real time, and automatically make adjustment to the mechanical vibration model.

■ Adaptive filtering

The optimum machine resonance suppression filter is automatically set to suppress resonance without even measuring the machine system's (drive shaft) frequency characteristics. The adaptive frequency range has been increased compared to the prior models, so resonance at the drive shaft can also be suppressed.



Adaptive filter (upper figure) to suppress drive shaft vibrations such as in a ball screw

When a given machine has a mechanical resonance at a high frequency, (in the range of several hundred Hz and above.) increase control gain will cause the control system to oscillate in this vibration mode and subsequently lose control. In order to overcome the mechanical resonance, it is common practice to insert a machine resonance suppression filter into the control loop to prevent oscillation. Adaptive filter II is a function that automatically set this machine resonance suppression filter in real time.

SSCNET III – The benchmark standard



In addition to conventional pulse train positioning, the MR-J3 series also supports the SSCNET III high-speed motion control network. The SSCNET III is a high-speed synchronous network using an optical fiber cable. The MR-J3-B servo amplifier is connected to a control device with SSCNET III interface (e.g Q172HCPU, QD75MH motion controller or FX3U-20SSC-H interface module). As for the communications specifications of SSCNET III, it can control up to 32 axes per master interface with the transmission rate of 50 Mbps and command communications period of 0.4 ms.

Since long-distance wiring has become possible, it is possible to locate the controller's control panel and drive units far apart and spread widely in a large-scale facility or a large-scale production line. This, in turn, will shorten the cable between amplifier and motor in machines where there is a relatively large amount of wiring.

As for the servo adjustments, a servo setting and support tool, MT Developer can be used over SSCNET III, just simply connect a personal computer to the motion controller makes it possible to perform controller settings and servo parameters of all the connected axes to SSCNET III.

Servo motors to add movement



Speed, accuracy and control, whenever you need it.

Advanced features

■ Increased motor speed

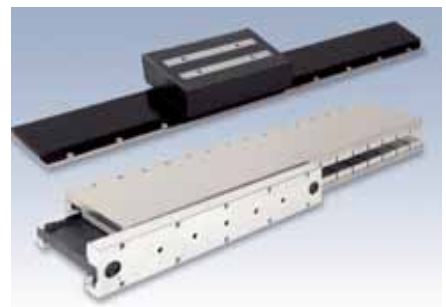
MR-J3 motors lead the market, combining speeds of up to 6,000rpm with high torques. This makes it easier for designers to select the motors they need to meet tough performance criteria.

■ Increased encoder resolution

All MR-J3 encoders are 18 bit, delivering an industry-leading 262,144 pulses per revolution. This high resolution makes it possible to detect and suppress mechanical vibrations. The non-volatile absolute encoder system has a backup battery, eliminating the need for time-wasting zero-point calibration routines.

■ Improved motor IP ratings

All MR-J3 motors are IP65 rated as standard (all 400 V motors are IP67). This means that MR-J3 systems can be used in heavy-duty industrial environments.



Linear motors are available optionally.



HF-KP motors – IP65 standard protection

Motor solutions for all

Featuring the most advanced concentrated winding techniques and the latest technology, Mitsubishi servo motors are among the most compact in the market.

Motors are available in a range of options from 50 W to 55 kW in different designs, including specialised motors such as hollow shaft and pancake designs that suit most application needs.

All Mitsubishi servo motors provide integrated ABS encoders. Additional return-to-origin routines, limit switches, or other sensors are not required.

Moreover, Mitsubishi's low, ultra low and medium inertia designs allow users to select the best motor characteristics for their application.

Plug & play positioning solutions

Using the right positioning solution can help increase the accuracy of the work process, reduce waste and rework as well as provide a higher quality of production.

The MR-J3 series together with SSCNET III support a very broad spectrum of applications with between 2 and 96 axes. Components with a variety of different PLC and positioning systems for a modular and fully-scalable configuration can be combined. This gives the user full control over the system and complete cost transparency, combined with the dependable controller performance of the MELSEC FX series or the MELSEC System Q series with motion controllers.

The range starts from simple pulse train positioning controllers over dedicated motion cards to most complex applications with System Q motion CPUs.



Fast, high-precision positioning

Positioning modules

■ MELSEC FX positioning modules

High-speed counter and single axis positioning modules are available, which can be used in combination with the FX series PLCs. This provides a cost effective solution for small servo/motion applications.

■ SSCNET III connection

The SSCNET module FX3U-20SSC-H can be used in combination with a FX3U PLC to achieve a cost effective solution for high precision, high speed positioning.

■ System Q positioning modules

For a wide range of applications the System Q offers their QD75MH positioning module series – from stand-alone configurations for single-axis tasks to the coordinated movement of up to 4 axes per module.

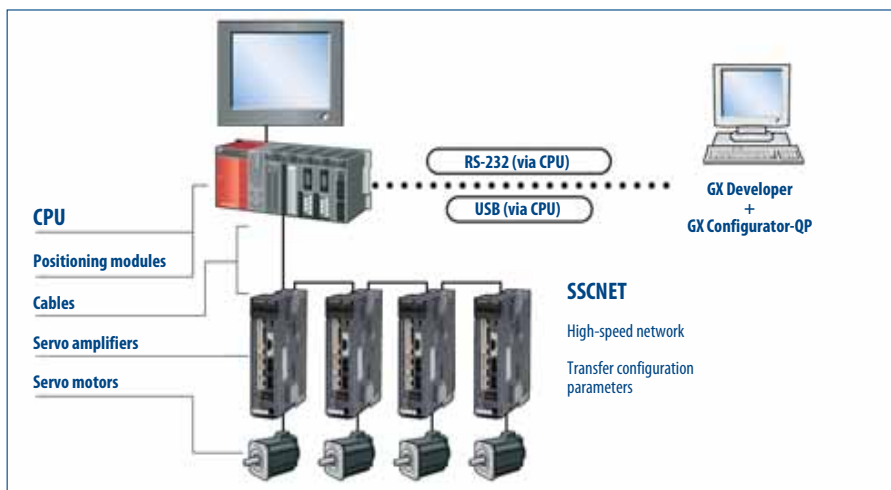
When MR-J3-B servo amplifiers are used the QD75MH can be connected via the SSCNET III motion control network.

Motion Control and PLC in perfect harmony

Motion control systems have huge potential for optimising production processes and improving product quality. To control these systems, System Q offers solutions ranging from individual motion/positioning cards to advanced motion CPUs capable of synchronised operation across many axes.

System Q's unique design allows users to select and use different combinations of CPUs from the same platform. For example, motion CPUs can be employed independently or in tandem with PLC, PC or process CPUs.

Thanks to the dedicated motion control network SSCNETIII, each motion CPU can connect up to 32 servo axes. In addition, three motion CPUs can be used in a single System Q solution to bring advanced motion control to 96 axes.



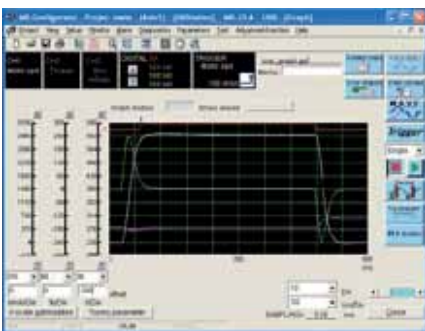
SSCNET configuration

Servo setting and support software

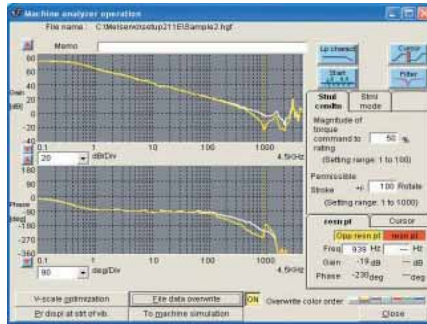
MR Configurator – a complete engineering environment



The MR Configurator software package makes configuration and diagnostics quick and easy and includes powerful graphical machine analysis and simulation functions. Machine analysis enables determination of the frequency response of the connected drive train without any additional instruments. If necessary, you can then make design changes or install filters to achieve better machine performance. The system can be connected to a personal computer with a standard USB (Universal Serial Bus) port.



Selecting a variety of waveforms is possible in a Graph window.



Monitoring and checking with the diagnostics features

A wide range of automatic configuration assistants make it easy to set up your new servo systems correctly, even for less experienced users. The strong benefits are:

■ Easy set up

MR Configurator allows for easy set up and tuning the servo system with a standard personal computer.

■ Multiple monitor functions

Graphic display functions are provided to display the servo motor status with the input signal triggers, such as the command pulse, droop pulse and speed.

■ Test operations with a personal computer

Test operation of the servo motors can be performed with a personal computer using multiple test mode menus.

■ Advanced functions

Further advanced tuning is possible with the improved advanced functions.

Powerful new functions

■ Selecting a variety of waveforms is now possible

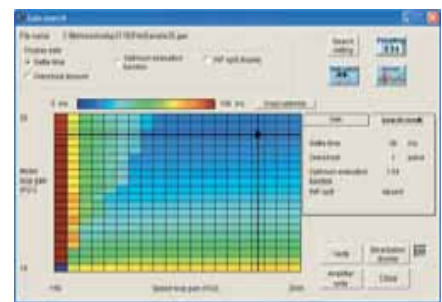
Powerful graph functions with 3 analog channels and 4 digital channels support tuning. User-friendly functions and a diverse waveform selection powerfully support user's work.

The speed-torque characteristic diagram of the motor in operation can be displayed. Since the current operation status can be displayed on the screen, the status of a servo system can be checked in real-time.

■ Improved accuracy

When the Start button is pressed, the servo motor is automatically oscillated, and the machine system's frequency characteristics are displayed.

The frequency characteristics that could previously only be analyzed in a range between 0.1 and 1kHz can now be analyzed in a range between 0.1 and 4.5kHz. This can also be used as a tool to comprehend the machine system's characteristics. In addition, data can be overwritten.



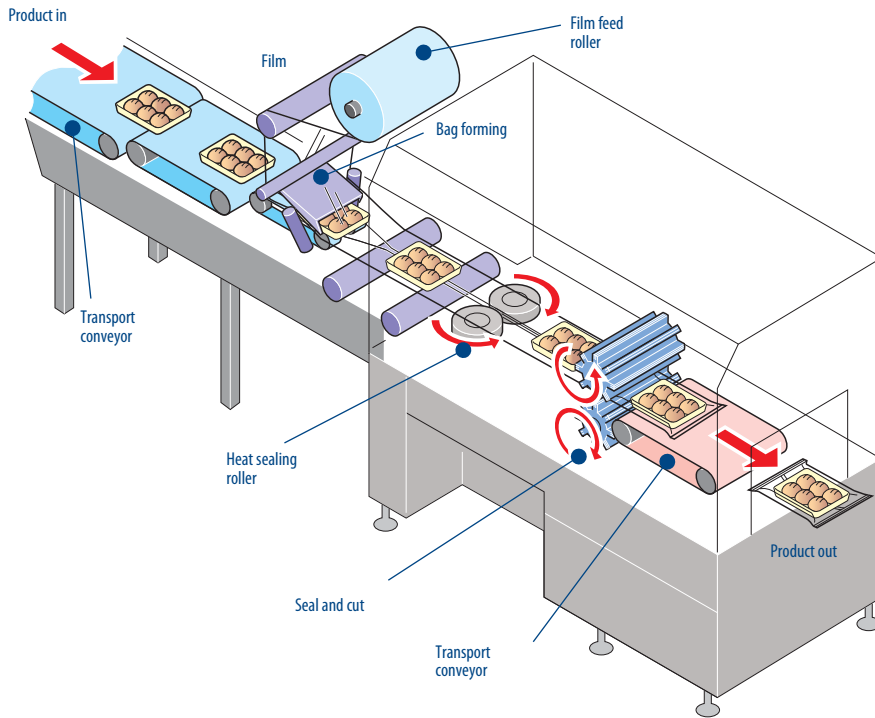
Gain search window

■ Improved usability

While automatically fluctuating the gain, the setup software MR Configurator searches for values with the shortest settling time and lowest overshooting or vibration.

Basic setting parameters can be easily set in a selection format. Settings in the list format are also possible.

Horizontal and vertical pillow



System Q is ideal for such applications as programming can be kept simple with the Q CPU logic controller, high accuracy maintained with the Q motion controller easily integrated with an efficient user interface such as the GOT1000. Hence these products are combined into a truly total solution.

Phase compensation is the key

The high accuracy demands of this type of machine are not a problem for the Q motion controller and MR-J3 series of servo drives together with SSCNET III servo network. As mentioned with bottle filling, a cam profile can be very easily designed and implemented by using software based tools. In addition to this, the Q motion controller incorporates a phase compensation algorithm which ensures that the encoder phase angle and cam phase angle are precisely in synchronization. In general this means that the packaging cutters can be precisely synchronised with the feed of the conveyor, hence providing an accurate cut at high speed.

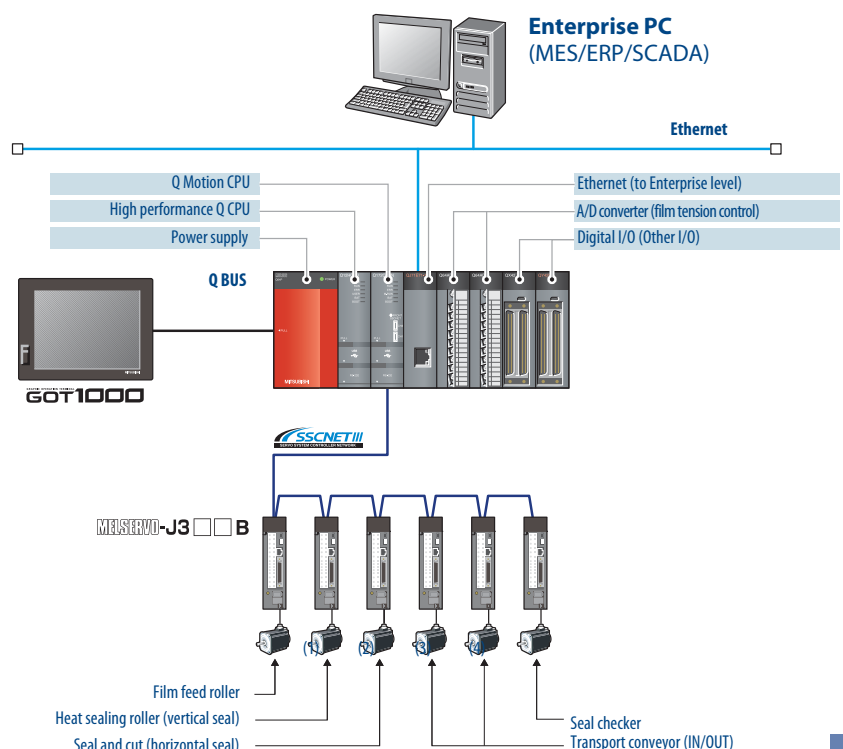
Sealing packaging solutions

From tubes to pillows

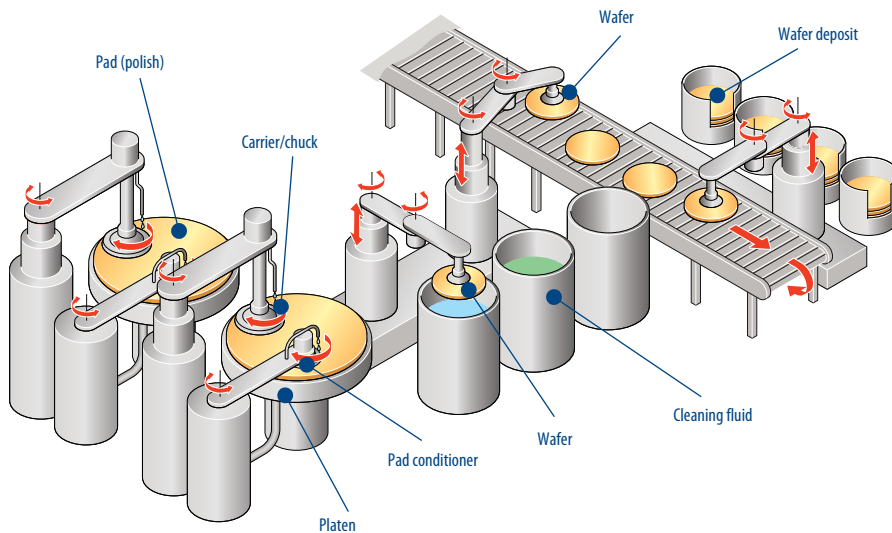
Probably the most common type of packaging machines are the pillow type machines used to package a whole host of products. These machine types are known as "pillow" because of the distinct shape of the packaging film being formed around the product to be packaged. There is often a variance of 2 or 3 specific sealing points which are then cut to individually package the product ready for shipping. The products are fed into the machine in a number of different ways using conveyors, hoppers, rotating arms etc.

The inline feed of the product is synchronised with the film packaging which is fed from the feed roller into a forming station which forms the packaging around the product. The package is then sealed and cut away from the film train, resulting in a completely packaged product ready for boxing or other packaging processes.

Various processes need to be synchronised with this application as it requires a high level of flexibility to cater for a diverse range of shapes and sizes.



Semiconductor fabrication



The exceptionally dynamic performance of the servo motors enables faster handling, increasing the throughput of the entire system.

As processing progresses the wafers get thinner and their diameters simultaneously increase, making them increasingly fragile. The movements executed by the wafer handling drives must thus be fast but very smooth, without any sudden shocks or vibrations. The positioning precision of the axes that move the polishing pads must be very high to prevent unnecessary stresses on the wafers. In addition to this the polishing pads above must be perfectly synchronised with the wafer platens below to meet the exacting specifications of the polishing process. The servo components from Mitsubishi Electric pass all these tests with flying colours.

Systems of this kind are installed in clean rooms, which means that the size of the system is a key factor in the total cost of operation (TCO). The Mitsubishi components are so compact that the switchgear cabinet can be integrated in the machine bed, saving valuable space. Quick and easy wiring and an optimum price-performance ratio are added benefits.

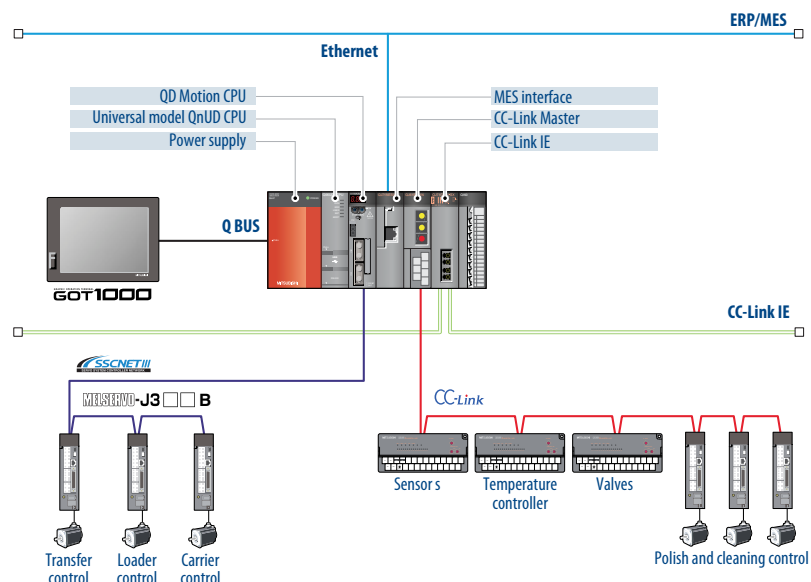
World wide market challenges with productronic

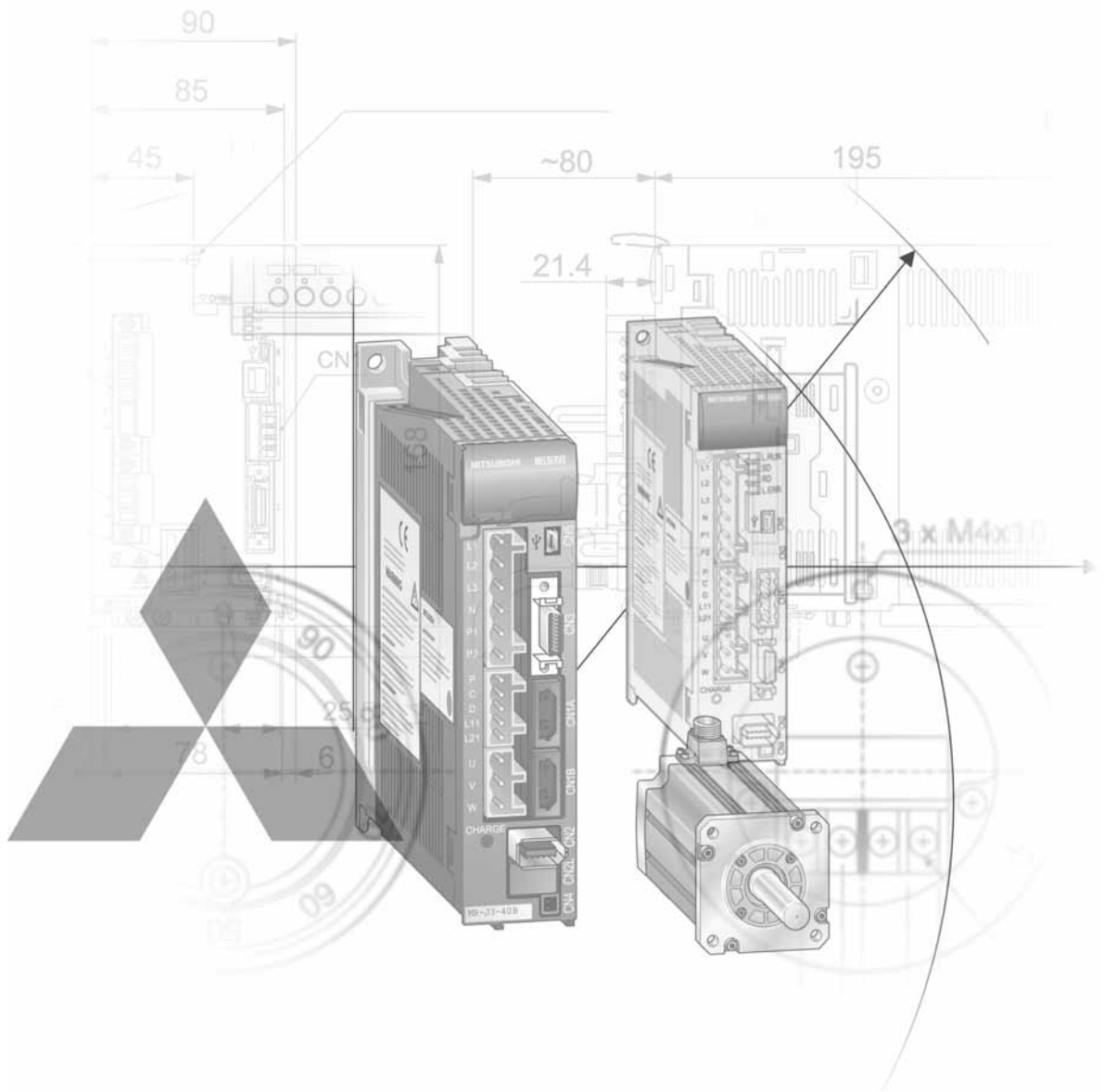
Today electronic is an important part of our daily life. It helps to make our life more convenient, safe and ensure the energy supply for tomorrow. Faster smaller and cheaper components will lead the trend of penetrating our world even more than today. In order to do so, an enormous pressure for extremely fast development of technology and integration is not only the challenge for the electronic developer but also for the designer of the production facilities. Needless to say that such facilities can be build only with the necessary know how and automation components which are outstanding in performance and quality.

Mitsubishi Electric is the market leader in the area where electronic production is established. As one of the target markets Mitsubishi offers as well the know how as the products for reliable, stable and high efficiency productronic systems.

Chemical mechanical polishing (CMP)

In the sample application shown above Mitsubishi servo motors rotate the polishing pads and wafer platens, and they are also used in the handling devices and the axes that move the polishing pads.





Technical Information Section

More information?

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

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

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

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

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

About this technical catalogue

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

Specifications are subject to change without notice. All trademarks acknowledged.

1 System Description

- ◆ Servo and motion systems 4
- ◆ Introduction to the MELSERVO series and description of the MR-J3 servo amplifiers 5
- ◆ Overview of general MR-J3 Features 6
- ◆ Control functions and enhanced tuning technology 7
- ◆ Servo motor and servo amplifier model designations 8

2 Servo Motors

- ◆ Description of the servo motors 10
- ◆ Servo motor specifications and matching amplifiers 11
- ◆ Specifications and torque characteristics 12
- ◆ Braked motor specifications 17

3 Servo Amplifiers

- ◆ Specifications MR-J3-A/B 18
- ◆ Specifications MR-J3-T 20
- ◆ Overview of MR-J3-T Commands and Operation Modes 21
- ◆ MR-J3-A Servo Amplifier Connections with Peripheral Equipment 22
- ◆ MR-J3-B Servo Amplifier Connections with Peripheral Equipment 23

4 Options And Peripheral Equipment

- ◆ Connections with peripheral equipment 24
- ◆ Cables and Connectors for Servo amplifier (general) 26
- ◆ Cables and Connectors for servo amplifier (type specific) 29
- ◆ Battery, special cables and terminal blocks 30
- ◆ Pulse generator, parameter unit and software 31
- ◆ Noise filters and brake resistors 32
- ◆ MELSEC FX Positioning Units 33
- ◆ MELSEC System Q Positioning Units 34
- ◆ MELSEC System Q Motion CPUs 35

5 Applications

- ◆ Configuration of a SSCNET III System 36
- ◆ X-Y Table System Configurations 37

6 Dimensions

- ◆ Servo motors 38
- ◆ Servo amplifiers 40
- ◆ Noise filters, brake resistors 46

Appendix

- ◆ Index 47

Servo and Motion Systems

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

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

The servo motors and amplifiers take Mitsubishi Motion Control to new levels of precision with a wide range of motors

(MR-J3 series motors are fitted with 262144 pulse-per-revolution encoders) and wide amplifier range (up to 55 kW). All Mitsubishi servo and motion system hardware is complimented by a range of software packages allowing easy programming and set-up of the units.

What are the Components of a Servo System?

Servo motors

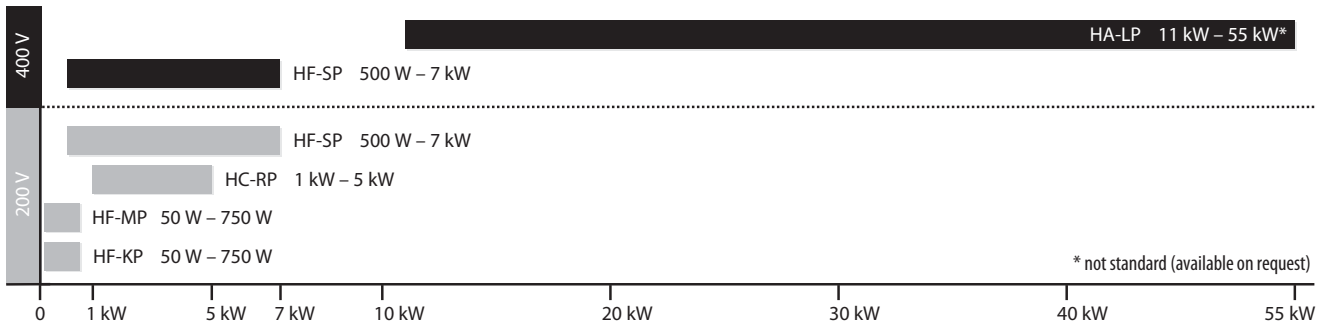
Utilising the most advanced concentrated winding techniques and latest technology, these brushless servo motors are among the most compact on the market.

Mitsubishi servo motors are made to high standards and offer a wide range of power,

speed and inertia ratings providing a motor for all applications.

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

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

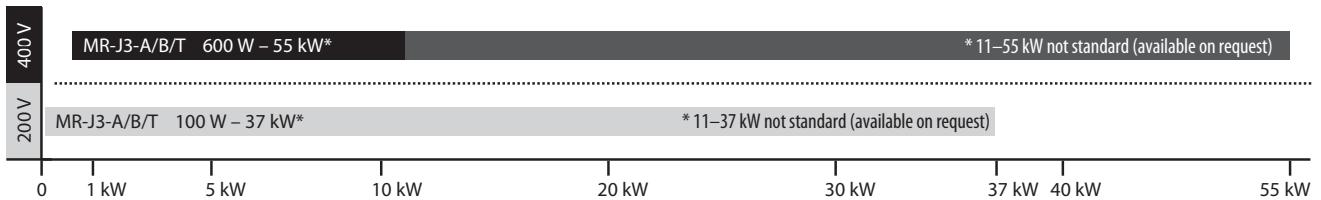


Servo amplifiers

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

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

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



Positioning controllers

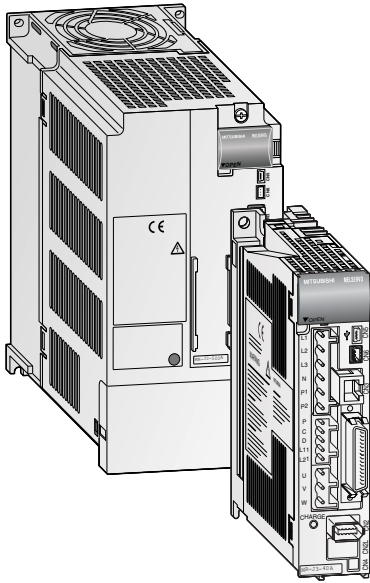
For the compact, cost effective, FX range of PLCs, the FX2N-10PG unit provides single-axis control with built-in positioning tables, fast external start and an output pulse rate of up to 1 MHz. The FX3U-20SSC-H is a positioning module for the MR-J3-B series. This module provides a quick and easy, but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

For larger, more complex applications the powerful Qn PLC range offers three QD75 Series modules (one, two and four axes). Using SSCNET III bus systems (for MR-J3-B fibre optical based SSCNET III is available) significant reduction in wiring saves costs. Thanks to the fibre optical medium of SSCNET III all noise problems are eliminated. All QD75 series controllers can provide functionality such as interpolation and speed-position operation etc..

Motion Controllers

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

MELSERVO MR-J3 Servo Amplifiers



MELSERVO

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

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

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

Features

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

Differences Between the Three MR-J3 Servo Amplifier Series

MR-J3-A (standard type)

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

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

Highlights

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

MR-J3-B (SSCNET III bus type)

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

Highlights

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

MR-J3-T (integrated positioning type)

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

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

Highlights

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

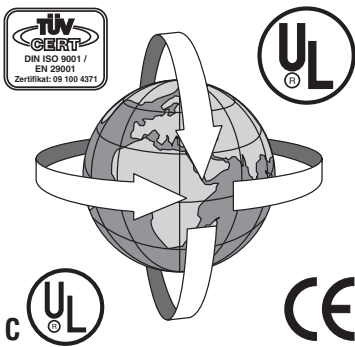
Overview of MR-J3 Features

Compliant and Safe

Complies with global industrial standards

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

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



Enhanced ability to withstand environmental hazards

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

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

Separate wiring for the control power supply

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

Compact and flexible

More compact servo motors

Mitsubishi servo motors keep getting smaller:

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

A wide variety of motors

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

Fully Equipped

Absolute detection as standard

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

Dynamic brake function

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

Integrated regenerative resistor

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

Control signal assignment feature (MR-J3-A)

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

Personal computer interface is standard

The MR-J3 comes with an integrated USB interface as standard equipment, enabling users to connect a personal computer to the MR-J3 to perform setup diagnostics and maintenance by MR-Configurator.

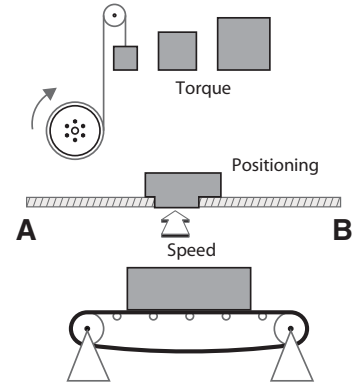
This powerful software tool contains numerous support functions for optimising and analysing the servo system:

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

Special Features

Model adaptive control

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



Automatic servo motor recognition

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

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

Encoder serial communications

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

Real-Time Auto-Tuning (RTAT)

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

Control Functions with Enhanced Tuning Technology

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

The powerful Auto Tuning function automatically and periodically adjusts all parameters of position, speed and

current controller in the background during operation.

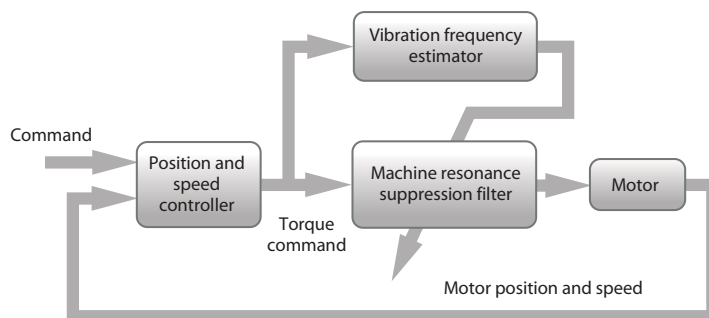
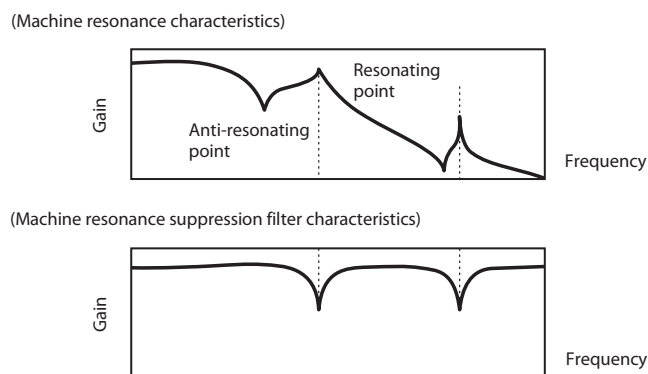
The controller concept is unique due to separate control loops for compensation of control deviations caused by distur-

bances or changing command values. Therefore manual controller adjustment is not required.

Adaptive Vibration Suppression and Mechanical Resonance Suppression Function

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

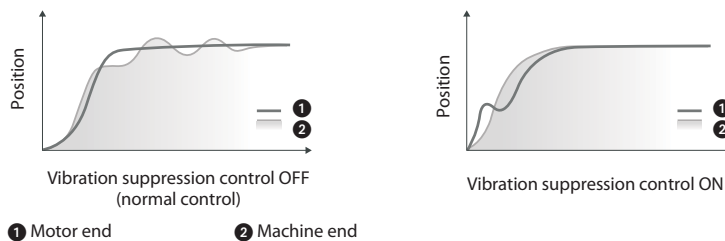
The automatic compensation of mechanical resonances is realised by a so-called Adaptive Filter II. This filter is implemented as a notch filter, detects resonance frequencies and reduces the controller settings (gains) within a certain bandwidth of the resonance point.



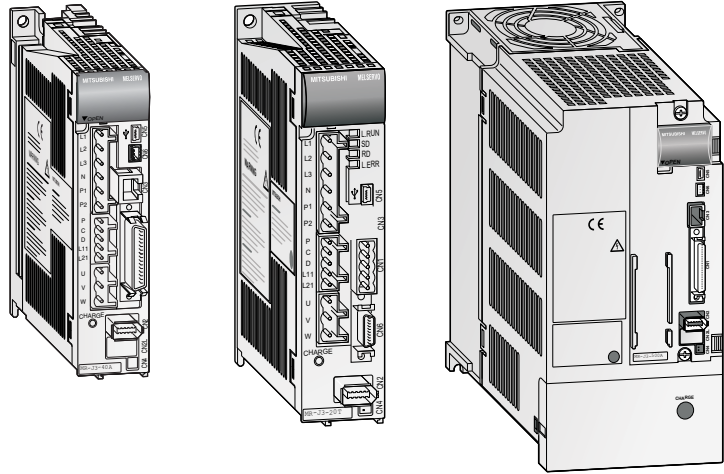
Advanced Vibration Suppression

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

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



Servo Amplifiers Model Designation



Servo Amplifiers 200 V

MR-J3 - A

Series
MR-J3

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

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

Code	Type
—	200 – 230 V AC power supply

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

Servo Amplifiers 400 V

MR-J3 - A 4

Series
MR-J3

Code	Compatible servo motors
	HF-SP <input type="checkbox"/>
60	524
100	1024
200	1524 / 2024
350	3524
500	5024
700	7024

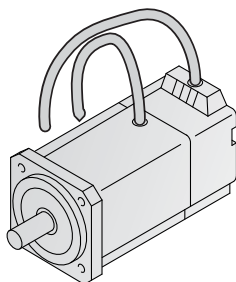
Code	Type
A	Standard general-purpose AC servo
B	SSCNET III compatible
T	CC-Link compatible built-in positioning function

Code	Type
4	380 – 480 V AC power supply

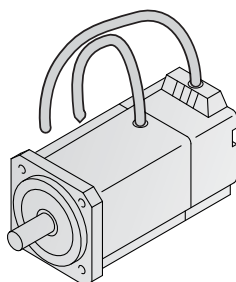
All amplifiers conform to the following standards: CE, UL, cUL

Servo Motors Model Designation

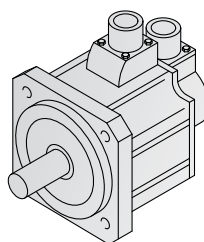
HF-MP series



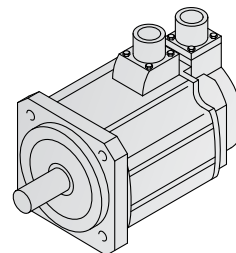
HF-KP series



HF-SP series



HC-RP series



Servo Motors 200 V

HF-KP



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

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

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

Code	Electromagnetic brake
—	None
B	●

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

* available on request

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

Servo Motors 400 V

HF-SP



Symbol	Motor series
HF-SP	Medium inertia, medium capacity
HA-LP*	Medium-inertia, high 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	400 V type
4	400 V type

Code	Electromagnetic brake
—	None
B	●

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

* available on request

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

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

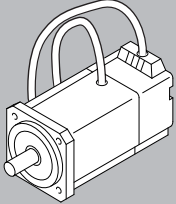
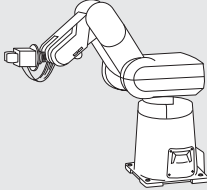
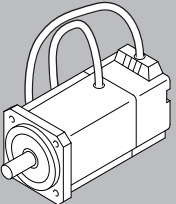
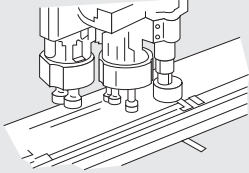
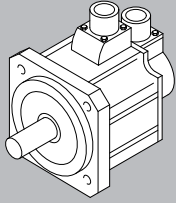
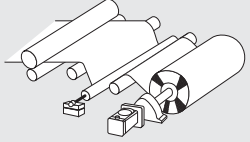
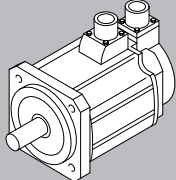
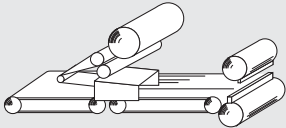
Servo Motor Features and Typical Applications

Absolute high-resolution encoder as standard equipment

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

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

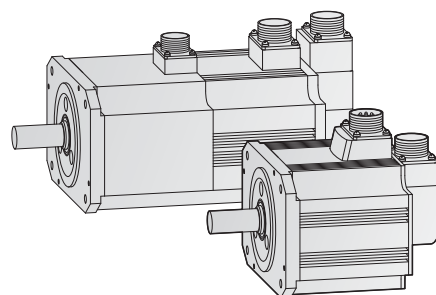
Overview

Model designation	Features	Application example	
K 	Low inertia Larger motor inertia moment makes this unit well suited for machines with fluctuating load inertia moment or machines with low rigidity such as conveyors.	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● 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).	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Roll feeders ● Loaders and unloaders ● High-frequency conveyor machinery 	 Wrapping machinery

Servo Motor Specifications and Matching Amplifiers

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

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



200 V Servo Motors

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

Note: Further motor types are available on request.

400 V Servo Motors

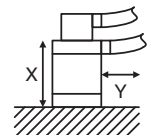
Motor series 400 V	Rated speed [r/min]	Rated output capacity [kW]	Servo motor model	Servo motor type		Amplifier pairing MR-J3							Reference page		
				Voltage	Protective structure	—	—	—	60A4/B4 60T	—	100A4/B4 100T/T4	200A4/B4 200T/T4		350A4/B4 350T/T4	500A4/B4 500T/T4
S	2000	0.5	HF-SP524	400 V AC	IP67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

Note: Further motor types are available on request.

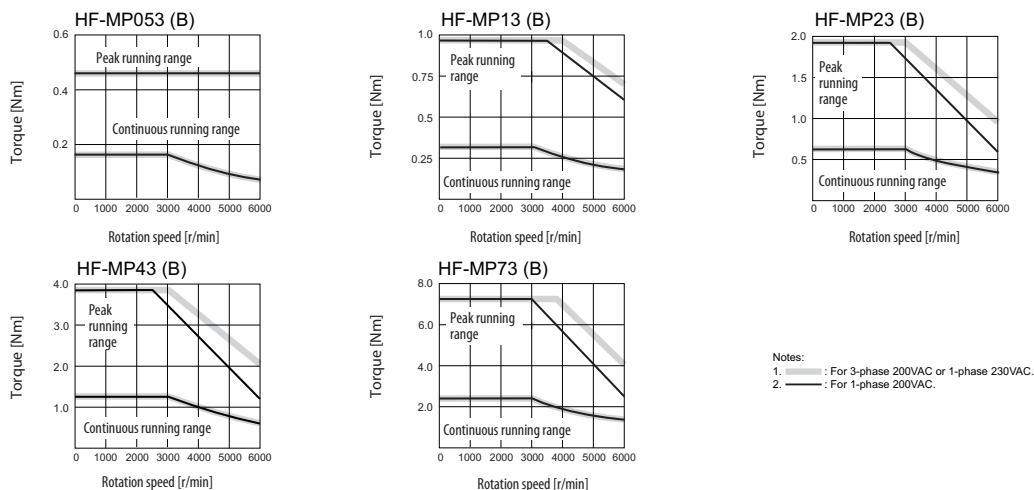
HF-MP (B) Series Servo Motor Specifications (200 V Type)

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

- ① The power facility capacity varies depending on the power supply's impedance.
- ② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.
(a)/(b) When a motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range. When a motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load inertia moment is (a) 26-fold (b) 15-fold or less and the effective torque is within the rated torque range.
- ③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table
- ④ The shaft-through portion is excluded.
- ⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.
- ⑥ For servo motors with electromagnetic brake please refer to page 17.



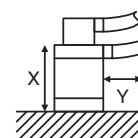
HF-MP Series Servo Motor Torque Characteristics



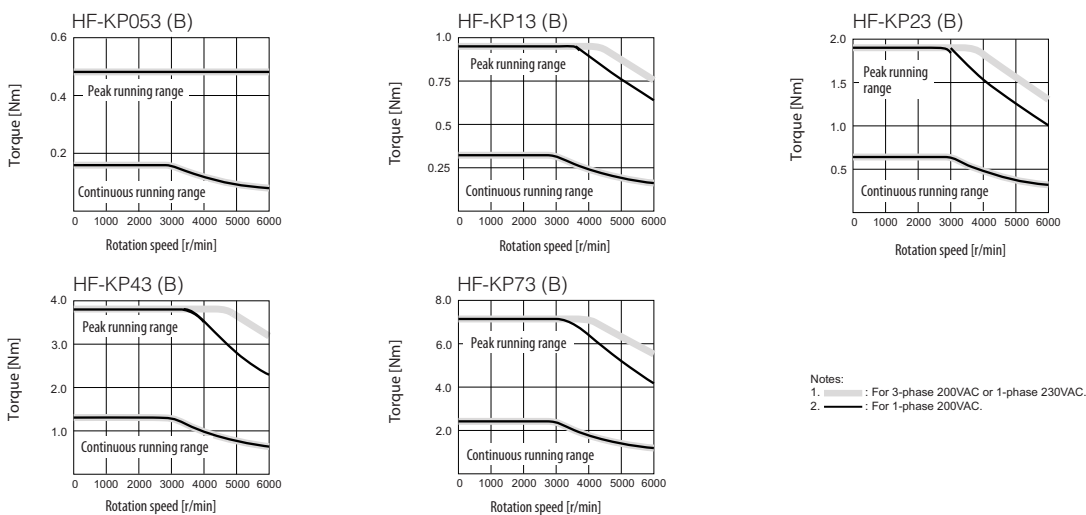
HF-KP (B) Series Servo Motor Specifications (200 V Type)

Servo motor model	HF-KP053 (B) ⑥	HF-KP13 (B) ⑥	HF-KP23(B) ⑥	HF-KP43 (B) ⑥	HF-KP73(B) ⑥	
Servo amplifier model	MR-J3-10A/B/T	MR-J3-10A/B/T	MR-J3-20A/B/T	MR-J3-40A/B/T	MR-J3-70A/B/T	
Power facility capacity [kVA] ①	0.3	0.3	0.5	0.9	1.3	
Continuous characteristics	rated output [W]	50	100	200	400	750
	rated torque [Nm]	0.16	0.32	0.64	1.3	2.4
Maximum torque [Nm]	0.48	0.95	1.9	3.8	7.2	
Rated rotation speed [rpm]	3000	3000	3000	3000	3000	
Maximum rotation speed [rpm]	6000	6000	6000	6000	6000	
Permissible instantaneous rotation speed	6900	6900	6900	6900	6900	
Power rate at continuous speed [kW/s]	4.87	11.5	16.9	38.6	39.9	
Rated current [A]	0.9	0.8	1.4	2.7	5.2	
Maximum current [A]	2.7	2.4	4.2	8.1	15.6	
Moment of inertia J [$\times 10^{-4}$ kg m ²] ②	standard	0.052	0.088	0.24	0.42	1.43
	with electromagnetic brake	0.054	0.090	0.31	0.50	1.63
Regeneration braking frequency [1/min]	② (a)	② (b)	448	249	140	
Recommended load/ motor inertia ratio ③	15	15	24	22	15	
Speed/ position detector	18-bit encoder (resolution per encoder/servo motor rotation: 262144 p/rev.					
Structure	Totally enclosed, non-ventilated (protection rating: IP65) ④					
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)				
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)				
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust				
	elevation/vibration ⑤	1000 m or less above sea level; X: 49 m/s ² , Y: 49 m/s ²				
Weight [kg]	standard motor ⑥	0.35	0.56	0.94	1.5	2.9
	Order information (without brake) Art. no.	161507	160211	161508	161509	161510

- ① The power facility capacity varies depending on the power supply's impedance.
- ② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.
(a)/(b) When a motor decelerates to a stop from the rated speed, the regenerative frequency will not be limited if the effective torque is within the rated torque range. When a motor decelerates to a stop from the maximum speed, the regenerative frequency will not be limited if the load inertia moment is (a) 26-fold (b) 15-fold or less and the effective torque is within the rated torque range.
- ③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table
- ④ The shaft-through portion is excluded.
- ⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.
- ⑥ For servo motors with electromagnetic brake please refer to page 17.



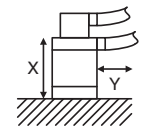
HF-KP Series Servo Motor Torque Characteristics



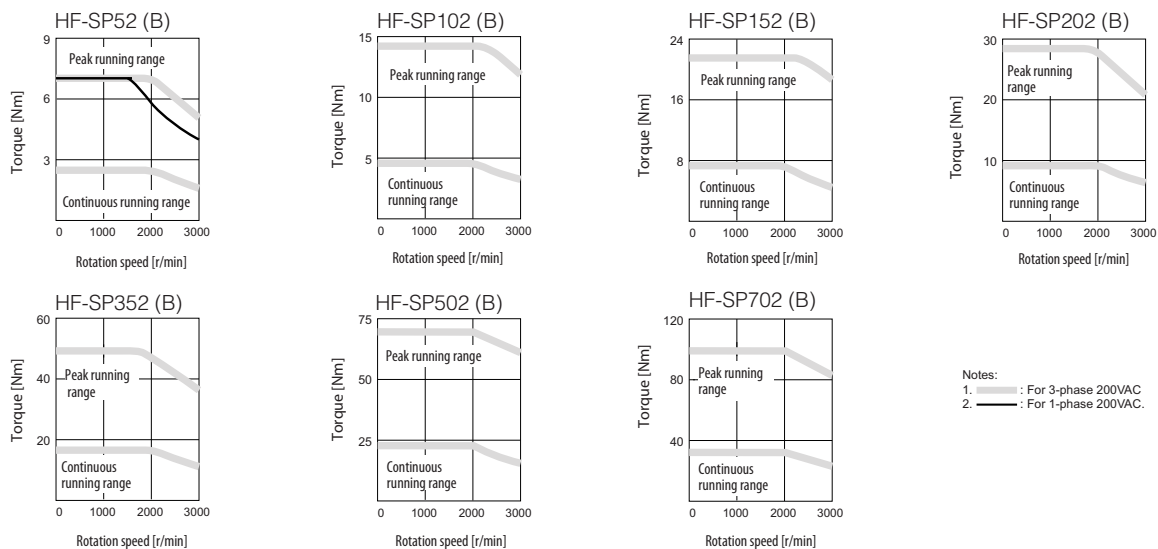
HF-SP Series Servo Motor Specifications (200 V Type)

Servo motor model	HF-SP52 (B) ⑥	HF-SP102 (B) ⑥	HF-SP152 (B) ⑥	HF-SP202 (B) ⑥	HF-SP352 (B) ⑥	HF-SP502 (B) ⑥	HF-SP702 (B) ⑥
Servo amplifier model	MR-J3-60A/B/T	MR-J3-100A/B/T	MR-J3-200A/B/T	MR-J3-200A/B/T	MR-J3-350A/B/T	MR-J3-500A/B/T	MR-J3-700A/B/T
Power facility capacity [kVA] ①	1.0	1.7	2.5	3.5	5.5	7.5	10
Continuous rated output [W]	0.5	1.0	1.5	2.0	3.5	5.0	7.0
characteristics rated torque [Nm]	2.39	4.77	7.16	9.55	16.7	23.9	33.4
Maximum torque [Nm]	7.16	14.3	21.5	28.6	50.1	71.6	100
Rated rotation speed [rpm]	2000	2000	2000	2000	2000	2000	2000
Maximum rotation speed [rpm]	3000	3000	3000	3000	3000	3000	3000
Permissible instantaneous rotation speed	3450	3450	3450	3450	3450	3450	3450
Power rate at continuous speed [kW/s]	9.34	19.2	28.8	23.8	37.2	58.8	72.5
Rated current [A]	2.9	5.3	8.0	10	16	24	33
Maximum current [A]	8.7	15.9	24	30	48	72	99
Moment of inertia standard	6.1	11.9	17.8	38.3	75.0	97.0	154
J [$\times 10^{-4}$ kg m ²] ② with electromagnetic brake	8.3	14.0	20.0	47.9	84.7	107	164
Regeneration braking frequency [1/min]	60	62	152	71	33	37	31
Recommended load/ motor inertia ratio	Less than 15 times the servo motors inertia moment ③						
Speed/ position detector	18-bit encoder (resolution per encoder/servo motor rotation: 262144 p/rev.)						
Structure	Totally enclosed, non-ventilated (protection rating: IP67) ④						
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)					
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)					
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust					
	elevation/vibration ⑤	1000 m or less above sea level; X: 24.5 m/s ² , Y: 24.5 m/s ²		1000 m or less above sea level; X: 24.5 m/s ² , Y: 49 m/s ²		1000 m or less above sea level; X: 24.5 m/s ² , Y: 29.4 m/s ²	
Weight [kg] standard motor ⑥	4.8	6.5	8.3	12	19	22	32
Order information (without brake) Art. no.	161525	161526	161527	161528	161529	161530	161531

- ① The power facility capacity varies depending on the power supply's impedance.
- ② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.
- ③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table
- ④ The shaft-through portion is excluded.
- ⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.
- ⑥ For servo motors with electromagnetic brake please refer to page 17.



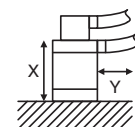
HF-SP Series Servo Motor Torque Characteristics



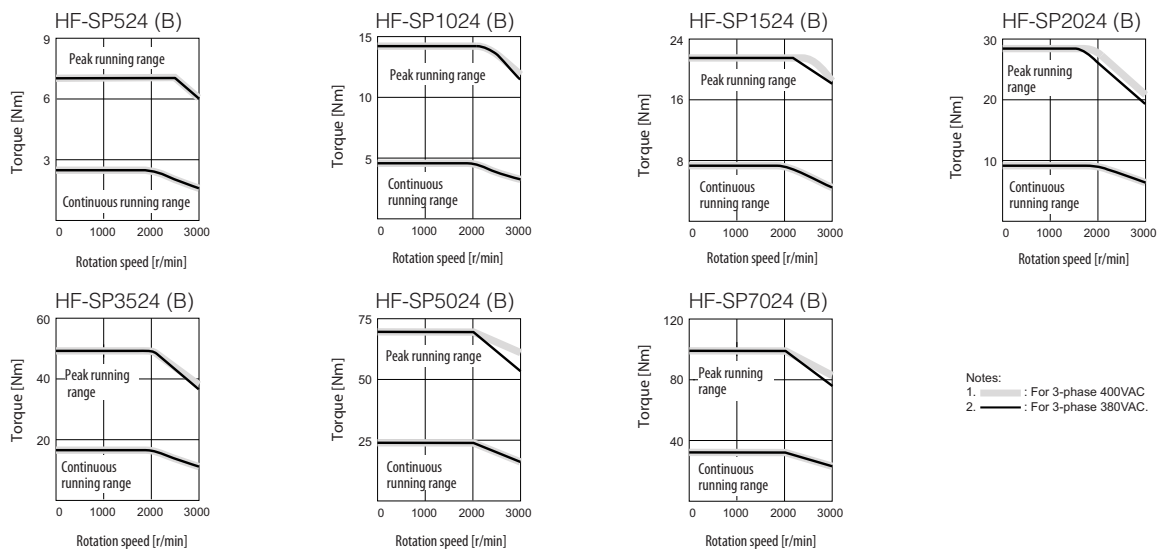
HF-SP Series Servo Motor Specifications (400 V Type)

Servo motor model	HF-SP524 (B) ⑥	HF-SP1024 (B) ⑥	HF-SP1524 (B) ⑥	HF-SP2024 (B) ⑥	HF-SP3524 (B) ⑥	HF-SP5024 (B) ⑥	HF-SP7024 (B) ⑥	
Servo amplifier model	MR-J3-60A4/B4	MR-J3-100A4/B4	MR-J3-200A4/B4	MR-J3-200A4/B4	MR-J3-350A4/B4	MR-J3-500A4/B4	MR-J3-700A4/B4	
Power facility capacity [kVA] ①	1.0	1.7	2.5	3.5	5.5	7.5	10	
Continuous characteristics								
rated output [W]	0.5	1.0	1.5	2.0	3.5	5.0	7.0	
rated torque [Nm]	2.39	4.77	7.16	9.55	16.7	23.9	33.4	
Maximum torque [Nm]	7.16	14.3	21.5	28.6	50.1	71.6	100	
Rated rotation speed [rpm]	2000	2000	2000	2000	2000	2000	2000	
Maximum rotation speed [rpm]	3000	3000	3000	3000	3000	3000	3000	
Permissible instantaneous rotation speed	3450	3450	3450	3450	3450	3450	3450	
Power rate at continuous speed [kW/s]	9.34	19.2	28.8	23.8	37.2	58.8	72.5	
Rated current [A]	1.5	2.9	4.1	5	8.4	12	16	
Maximum current [A]	4.5	8.7	12	15	25	36	48	
Moment of inertia J [$\times 10^{-4}$ kg m ²] ②								
standard	6.1	11.9	17.8	38.3	75.0	97.0	154	
with electromagnetic brake	8.3	14.0	20.0	47.9	84.7	107	164	
Regeneration braking frequency [1/min]	90	46	154	72	37	34	28	
Recommended load/ motor inertia ratio	Less than 15 times the servo motors inertia moment ③							
Speed/ position detector	18-bit encoder (resolution per encoder/servo motor rotation: 262144 p/rev.)							
Structure	Totally enclosed, non-ventilated (protection rating: IP67) ④							
Environment	ambient temperature	Operation: 0 – 40 °C (no freezing); Storage: -15 – 70 °C (no freezing)						
	ambient humidity	Operation: 80 % RH max. (no condensation); Storage: 90 % RH max. (no condensation)						
	atmosphere	Indoors (no direct sunlight); no corrosive gas, no inflammable gas, no oil mist, no dust						
	elevation/vibration ⑤	1000 m or less above sea level; X: 24.5 m/s ² , Y: 24.5 m/s ²		1000 m or less above sea level; X: 24.5 m/s ² , Y: 49 m/s ²		1000 m or less above sea level; X: 24.5 m/s ² , Y: 29.4 m/s ²		
Weight [kg]	standard motor ⑥	4.8	6.7	8.5	13	19	22	32
Order information (without brake) Art. no.	192042	192043	192054	192055	192056	192057	192058	

- ① The power facility capacity varies depending on the power supply's impedance.
- ② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.
- ③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table
- ④ The shaft-through portion is excluded.
- ⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.
- ⑥ For servo motors with electromagnetic brake please refer to page 17.



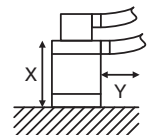
HF-SP Series Servo Motor Torque Characteristics



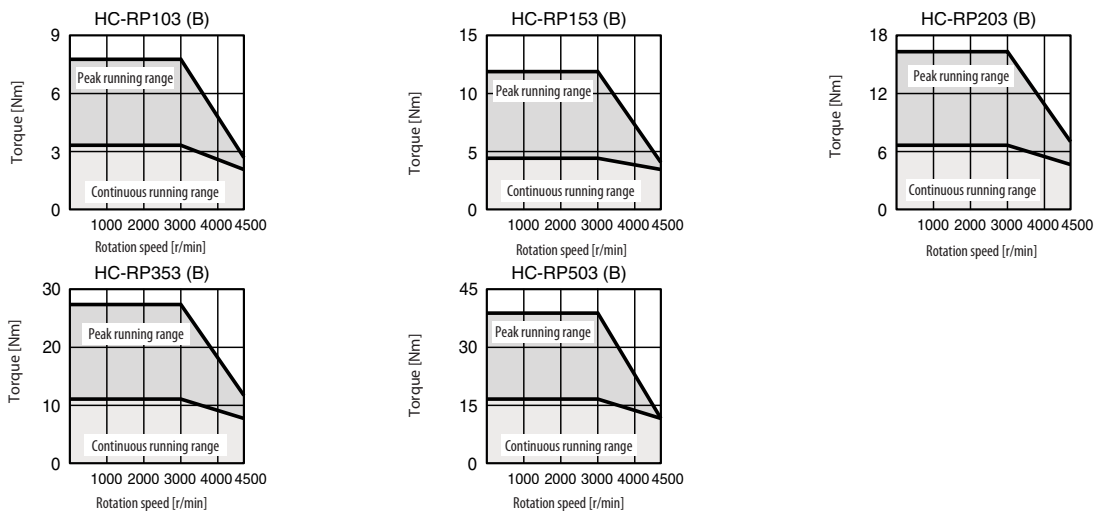
HC-RP Series Servo Motor Specifications (200 V Type)

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

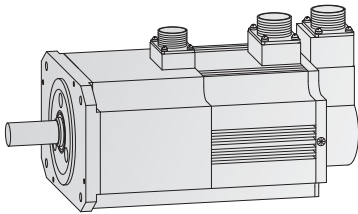
- ① The power facility capacity varies depending on the power supply's impedance.
- ② The regenerative braking frequency shown is the permissible frequency for decelerating a stand-alone motor from rated rpm to a stop. When under load, however, the value becomes the table value divided by (m+1) where m is the load inertia moment divided by the motor inertia moment. When the rated rpm is exceeded, the regenerative brake frequency is inversely proportional to the square of (operating speed/rated speed). When the operating speed varies frequently or when regeneration is constant (as with vertical feeds), find the regeneration heat generated (W) while operating. The heat should not exceed the tolerable regenerative power (W). Refer to the section "OPTIONS AND PERIPHERAL EQUIPMENT" in this catalog for details on the tolerable regenerative power (W). Optimal regenerative resistor varies for each system. Select the most suitable regenerative resistor by using the capacity selection software.
- ③ Please contact Mitsubishi if the load/motor of inertia moment ratio exceeds the value in the table
- ④ The shaft-through portion is excluded.
- ⑤ The vibration direction is shown in the right side diagram. The numeric value indicates the maximum value of the component (commonly the bracket on the antiload side). Fretting of the bearing occurs easily when the motor stops, so please maintain vibration to approximately one-half the allowable value.
- ⑥ For servo motors with electromagnetic brake please refer to page 17.



HC-RP Series Servo Motor Torque Characteristics



■ Braked Motor Specifications



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

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

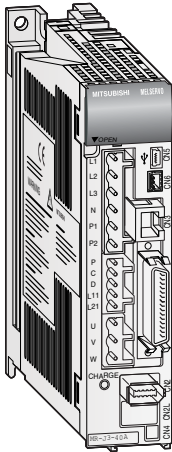
Motor model (200 V)	HF-MP					HF-KP					HF-SP					HC-RP									
	053B	13B	23B	43B	73B	053B	13B	23B	43B	73B	52B	102B	152B	202B	352B	502B	702B	103B	153B	203B	353B	503B			
Type	Spring-loaded safety brake					Spring-loaded safety brake					Spring-loaded safety brake					Spring-loaded safety brake						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

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

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

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

MR-J3 Servo Amplifier Specifications (200 V Type)



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

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

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

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

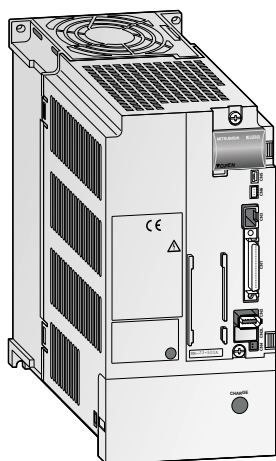
Common specifications MR-J3-A/B		10A	20A	40A	60A	70A	100A	200A	350A	500A	700A	
		10B	20B	40B	60B	70B	100B	200B	350B	500B	700B	
Power supply	voltage / frequency ①	3-phase 200 – 230 V AC, 50 / 60 Hz; 1-phase 230 V AC, 50 / 60 Hz					3-phase 200 – 230 V AC, 50 / 60 Hz					
	permissible voltage fluctuation	3-phase 200 – 230 V AC: 170 – 253 V AC, 1-phase 230 V AC: 207 – 253 V AC					3-phase 170 – 253 V AC					
	permissible frequency fluctuation	± 5 %										
Control system		Sinusoidal PWM control / current control system										
Dynamic brake		Built-in										
Speed frequency response		900Hz										
Protective functions		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage / sudden power outage protection, overspeed protection, excess error protection.										
Structure		Self-cooling, open (IP00)					Fan-cooling, open (IP00)					
Environment	ambient temperature	Operation: 0 – 55 °C (no freezing), storage: -20 – 65 °C (no freezing)										
	ambient humidity	Operation: 90 % RH max. (no condensation), storage: 90 % RH max. (no condensation)										
	atmosphere	Inside control panel; no corrosive gas, no flammable gas, no oil mist, no dust										
	elevation	1000 m or less above sea level										
	oscillation	5.9 m/s ² (0.6 G) max.										
Weight [kg]		0.8	0.8	1.0	1.0	1.4	1.4	2.3	2.3	4.6	6.2	
Dimensions (W x H x D)		40x168x135	40x168x135	40x168x170	40x168x170	60x168x185	60x168x185	90x168x195	90x168x195	130x250x200	172x300x200	
Order information												
A type	Art. no.	160210	161485	161486	161487	161488	161489	161490	161491	161492	161493	
B type	Art. no.	161497	161498	161499	161500	161501	161502	161503	161504	161505	161506	

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

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

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

MR-J3 Servo Amplifier Specifications (400 V Type)



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

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

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

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

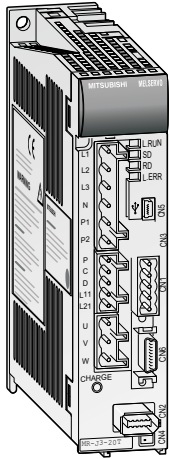
① Rated output capacity and rated rotation speed of the servo motor used in combination with the servo amplifier are as indicated when using the power voltage and frequency listed. Output and speed cannot be guaranteed when the power supply voltage is less than specified.

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

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

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

MR-J3-T Servo Amplifier Specifications



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

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

Typical applications are:

- Tool changer
- Rotary table systems

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

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

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

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

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

MR-J3-T General specifications	
Interface power supply	24 V DC ± 10 % (required current capacity: 150 mA) ^③
Control system	Sine-wave PWM control, current control system
Dynamic brake	Built-in ^④
Protective functions	Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal relay), servo motor overheat protection, encoder error protection, regenerative brake error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection
Cooling/protection	MR-J3-10T–60T; MR-J3-60T4–MR-J3-100T4: Self-cooling, open (IP00); MR-J3-70T–700T, MR-J3-200T4–700T4: Fan cooling, open (IP00)
Environment	ambient temperature ^⑤
	ambient humidity
Environment	atmosphere
	elevation
	vibration

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

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

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

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

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

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

Overview of MR-J3-T Commands and Operation Modes

Servo amplifier model MR-J3-T

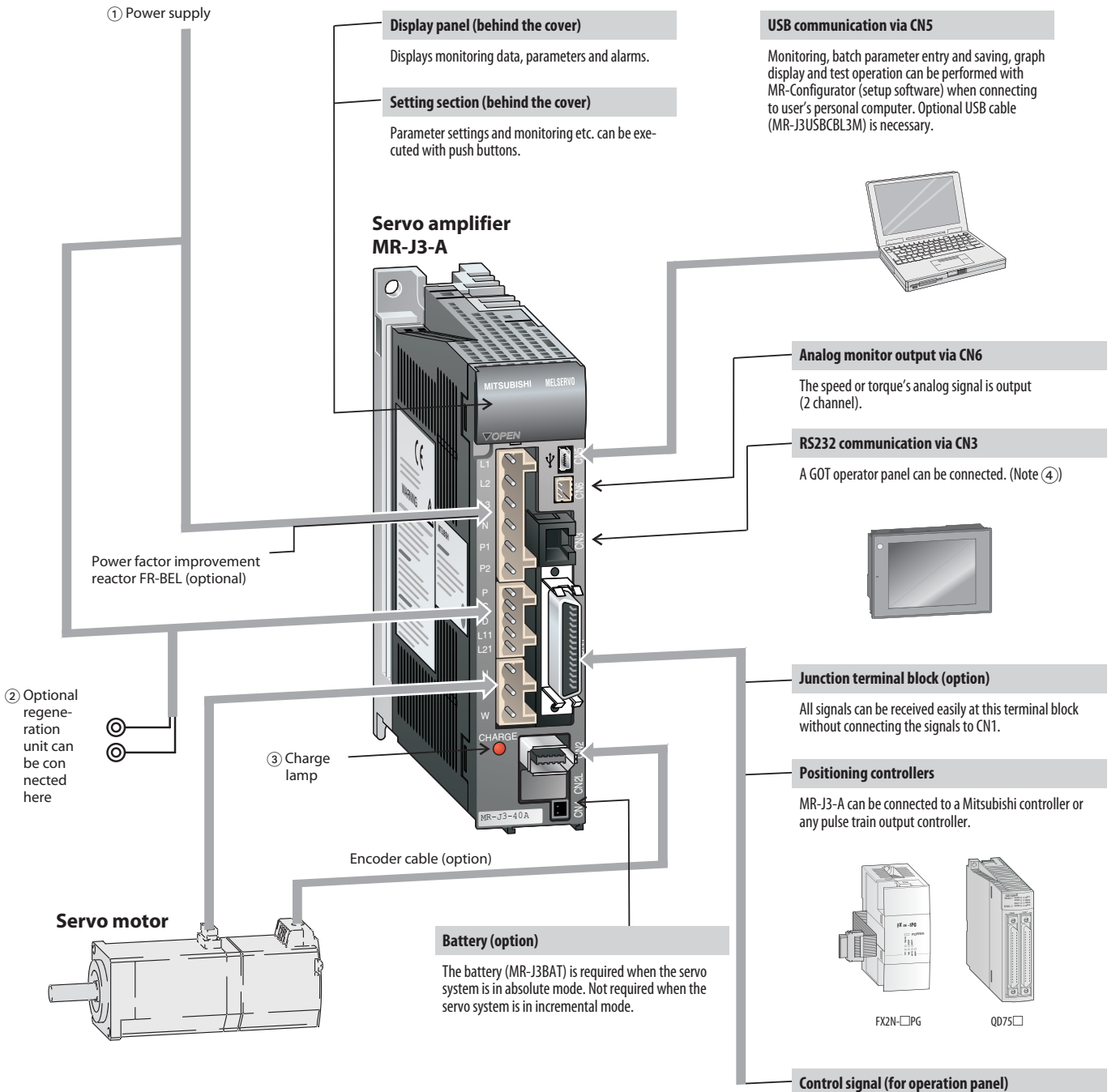
Command interface	CC-Link communication (Ver.1.10), DIO command (extension IO unit MR-J3-D01 is required), or RS-422 communication	
Command control	Remote register	Possible with CC-Link communication when 2 stations are occupied. Position command input: position command data is set with the remote register;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

MR-J3-A Servo Amplifier Connections with Peripheral Equipment

Peripheral equipment is connected to the MR-J3-A as shown below. To ensure fast, efficient configuration and reliable operation always use only the connecting

cables, expansion options and other accessories supplied or recommended by Mitsubishi.

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



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

② Regeneration unit (option)
 This unit can be installed in situations involving frequent regeneration and large load inertia moments. For more details refer to the MR-J3-A users manual.

③ Charge lamp
 Lights up when the main power supply is on. **Power lines should not be plugged or unplugged when this lamp is on.**

USB communication via CNS
 Monitoring, batch parameter entry and saving, graph display and test operation can be performed with MR-Configurator (setup software) when connecting to user's personal computer. Optional USB cable (MR-J3USB(CBL3M)) is necessary.

Analog monitor output via CN6
 The speed or torque's analog signal is output (2 channel).

RS232 communication via CN3
 A GOT operator panel can be connected. (Note ④)

Junction terminal block (option)
 All signals can be received easily at this terminal block without connecting the signals to CN1.

Positioning controllers
 MR-J3-A can be connected to a Mitsubishi controller or any pulse train output controller.

Control signal (for operation panel)
 Connected to the programmable controllers I/O port like FX1S, FX1N, FX2N, FX3U or the machine's operation panel.

④ RS422 Communication
 A personal computer can be connected using a RS-422/RS-232C converter and a conversion cable.

MR-J3-B Servo Amplifier Connections with Peripheral Equipment

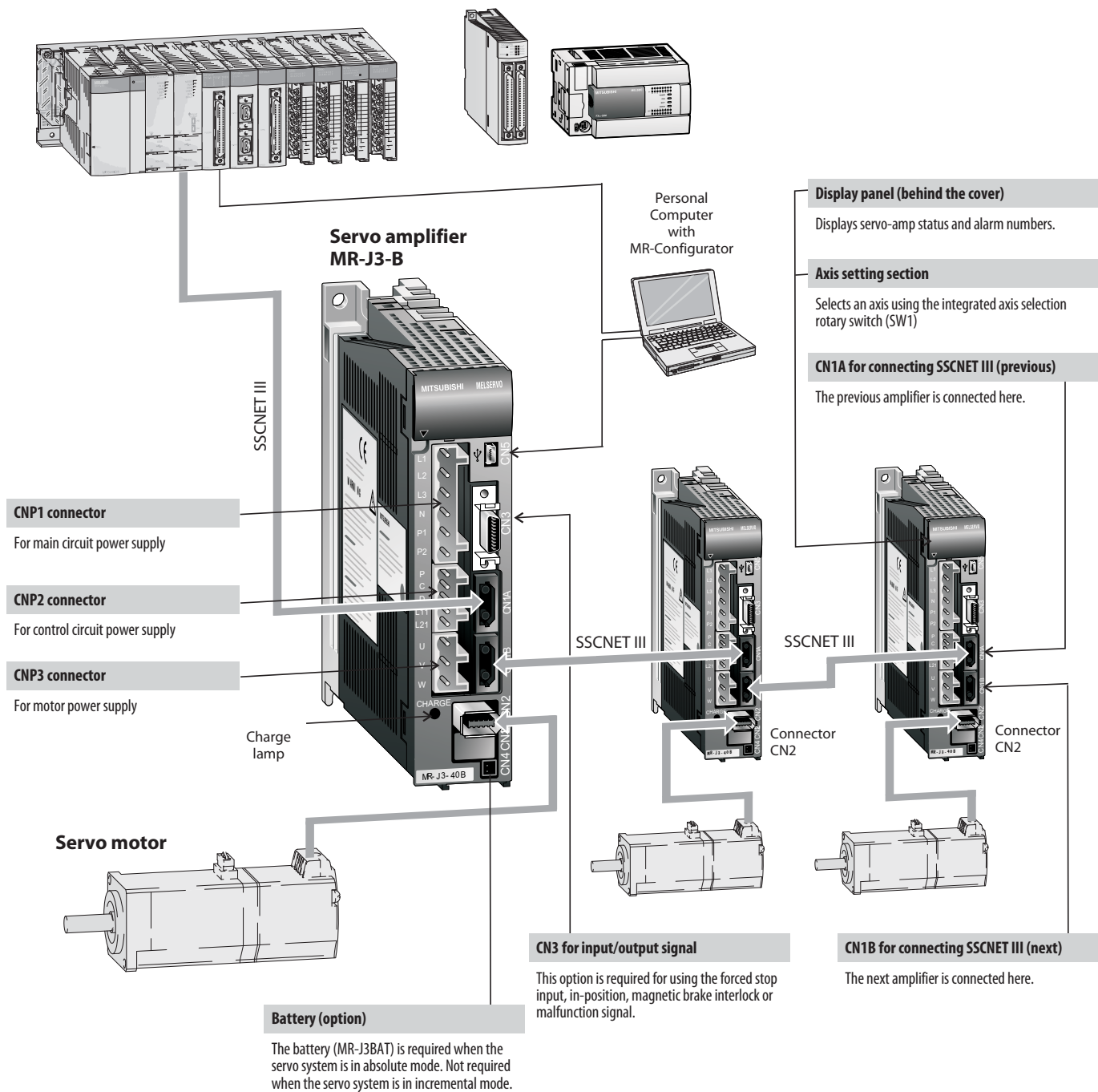
Peripheral equipment is connected to the MR-J3-B as shown below. Connectors, cables, options, and other necessary equipment are available so that users can set up MR-J3-B easily and begin using it

right away. Through its SSCNET III-compatible simple connections (optical fibre bus, 50 Mbps), the MR-J3-B series reduce wiring time and chances of wiring errors.

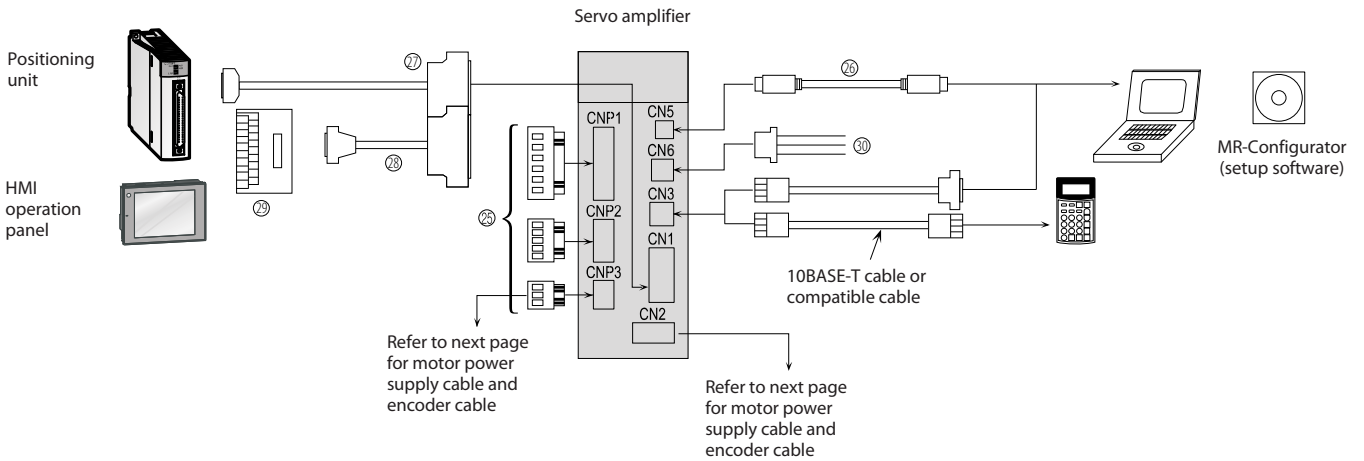
A complete overview with detailed specifications on all cables and accessories can be found in the next chapter.

Motion Controller MELSEC System Q:
Q172HCPU (for max. 8 axis control)
Q173HCPU (for max. 32 axis control)

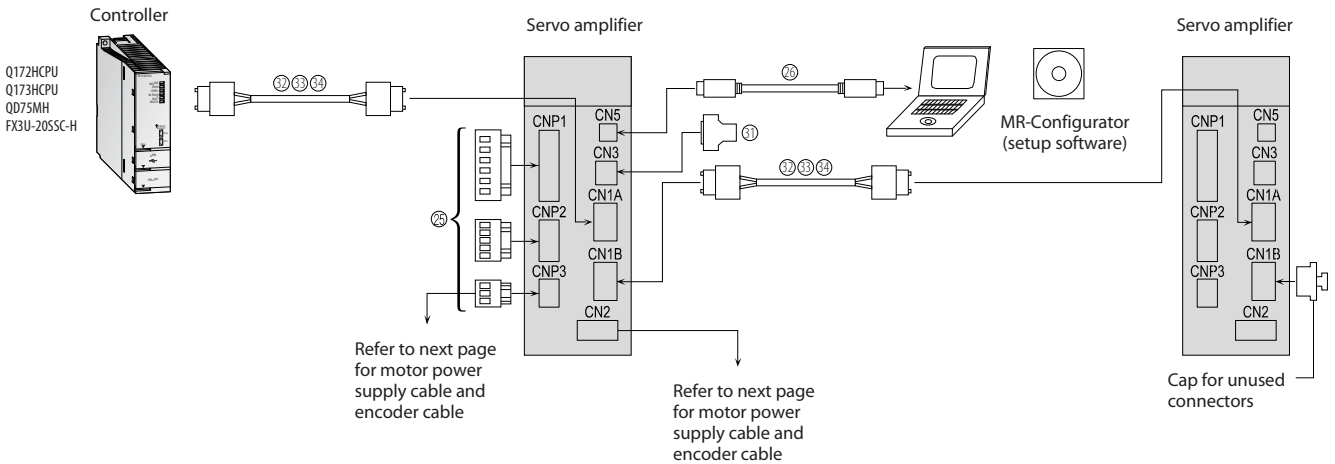
Motion-/ Positioning modules
MELSEC FX: e.g. FX3U-SSC-H
MELSEC System Q: e.g. QD75MH



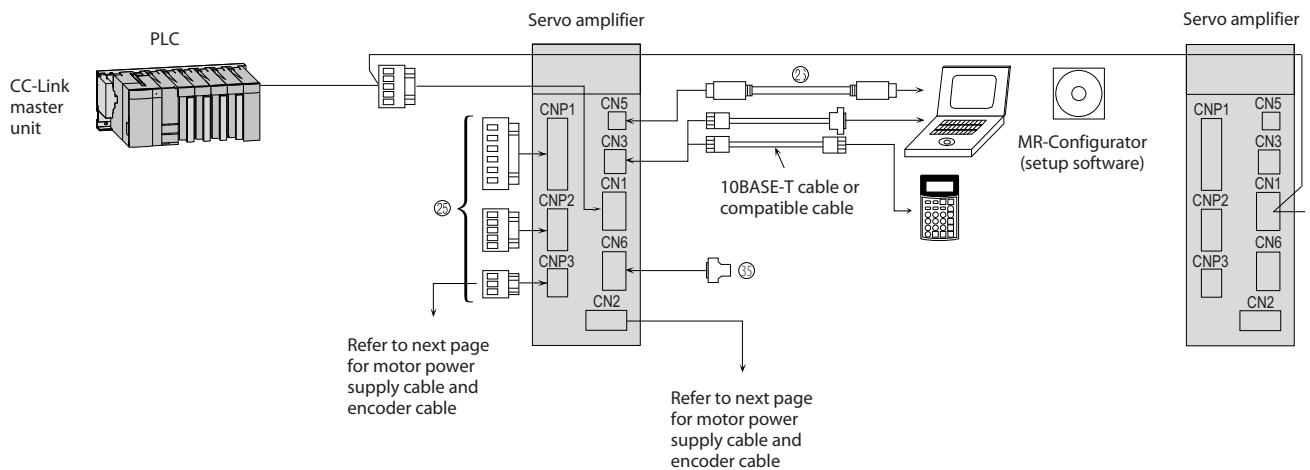
Cables and Connectors for MR-J3-A Servo Amplifiers



Cables and Connectors for MR-J3-B Servo Amplifiers



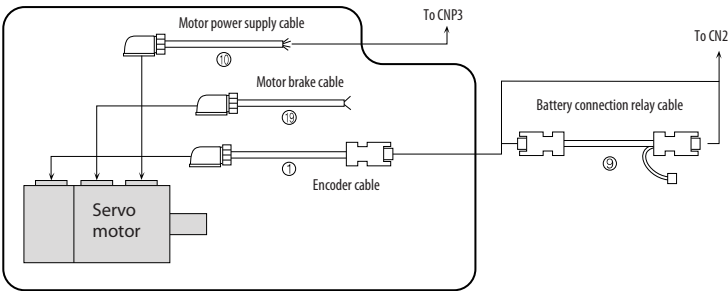
Cables and Connectors for MR-J3-T Servo Amplifiers



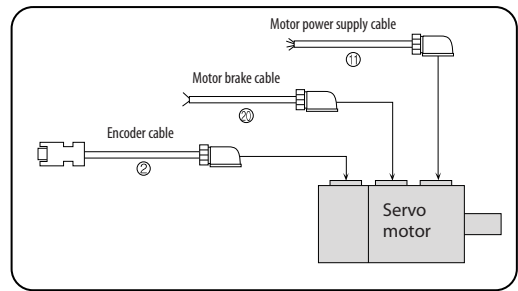
Cables and Connectors for Servo Motors

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

Cables leading in the direction of the motor shaft

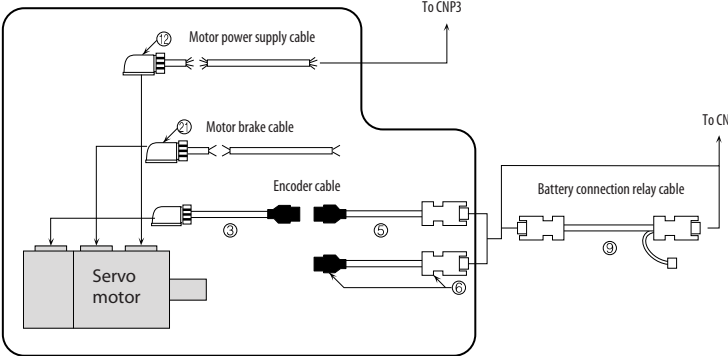


Cables leading in the opposite direction of the motor shaft

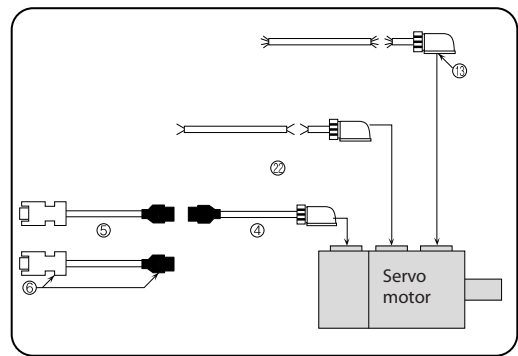


For HF-KP/HF-MP servo motor series: encoder cable length > 10 m

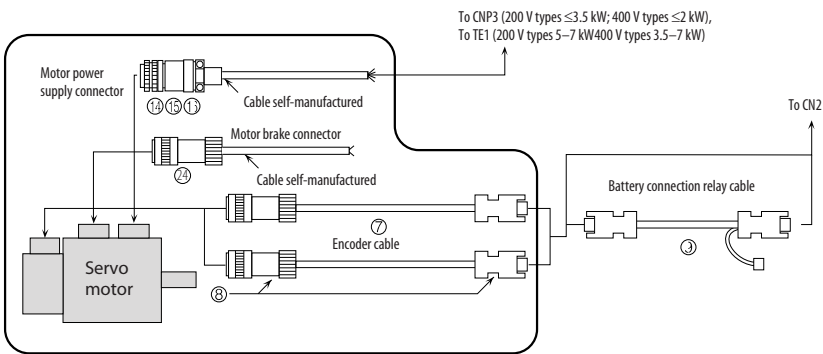
Cables leading in the direction of the motor shaft



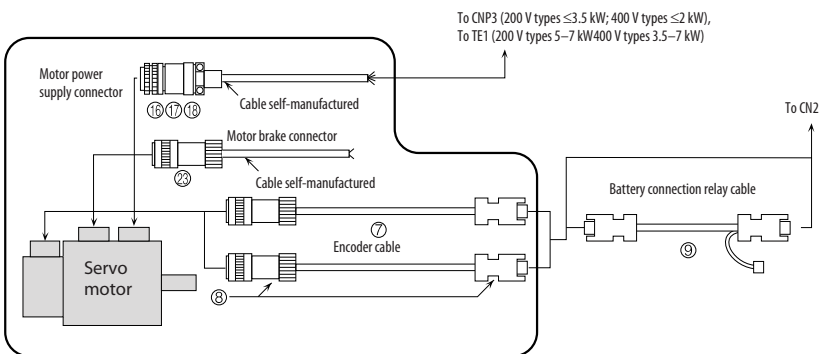
Cables leading in the opposite direction of the motor shaft





For HF-SP servo motor series



For HC-RP servo motor series

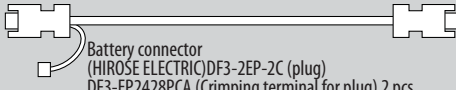
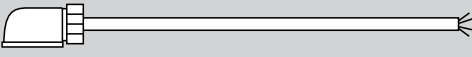
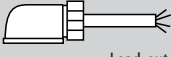
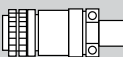




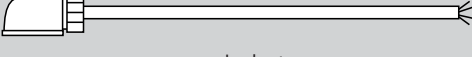


Cables and Connectors for Servo amplifier (general)

Item	Description	Model	Protection	Length	Art. no.	
Encoder cables and connector sets for CN2	① Encoder cable for HF-KP/HF-MP series Lead out in direction of motor shaft	Encoder connector (Tyco Electronics AMP) 1674320-1 Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex)	MR-J3ENCBL□M-A1-H □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	160312 161547 161548
	② Encoder cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft		MR-J3ENCBL□M-A1-L □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	161549 161550 161551
	③ Motor-side encoder cable for HF-KP/HF-MP series Lead out in direction of motor shaft	Encoder connector (Tyco Electronics AMP) 1674320-1 Junction connector (Tyco Electronics AMP) 1473226-1 (with ring) (contact) 1-172169-9 (housing) 316454-1 (cable clamp)	MR-J3JCBLO3M-A1-L Cable length: 0.3m ①	IP20	0.3 m	161557
	④ Motor-side encoder cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft		MR-J3JCBLO3M-A2-L Cable length: 0.3m ①	IP20	0.3 m	154367
	⑤ Encoder connector set for HC-SFS, HC-RFS series motors	Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex)	MR-EKCBL□M-H □=cable length: 20, 30, 40, 50 m ① MR-EKCBL□M-L □=cable length: 20, 30 m ①	IP20	20 m 30 m 40 m 50 m 20 m 30 m	161559 161560 on request on request 161561 161562
	⑥ Junction connector, amplifier connector ② for HF-KP/HF-MP series	Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) Amplifier connector 54599-1019 (connector set, Molex), or 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M) <Applicable cable example> Wire size: 0.3 mm ² (AWG22) Completed cable outer diameter: φ 8.2 mm Crimping tool (91529-1) is required.	MR-ECNM	IP20	—	161572
	⑦ Encoder cable for HF-SP/HC-RP/HA-LP series	Encoder connector (DDK) <For 10 m or shorter cable> CM10-SP10S-M (straight plug) CM10-#22SC(C1)-100 (socket contact) Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex) <For exceeding 10 m> CM10-SP10S-M (straight plug) CM10-#22SC(C2)-100 (socket contact)	MR-J3ENSCLB□M-H □=cable length: 2, 5, 10, 20, 30, 40, 50 m ① MR-J3ENSCLB□M-L □=cable length: 2, 5, 10, 20, 30 m ①	IP67	2 m 5 m 10 m 20 m 30 m 40 m 50 m 2 m 5 m 10 m 20 m 30 m	160226 161563 161564 161565 161566 on request 161567 161568 161569 161570 161571
	⑧ Encoder connector set for HF-SP/HC-RP/HA-LP series	Encoder connector (DDK) CM10-SP10S-M (straight plug) CM10-#22SC(S1)-100 (socket contact) Amplifier connector 36210-0100PL (receptacle, 3 M) 36310-3200-008 (shell kit, 3 M), or 54599-1019 (connector set, Molex) <Applicable cable example> Wire size: 0.5 mm ² (AWG20) or smaller Completed cable outer diameter: φ 6.0 to 9.0 mm	MR-J3SCNS	IP67	—	161576

Notes:

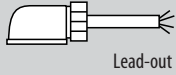
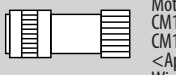


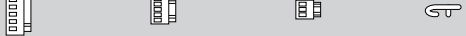
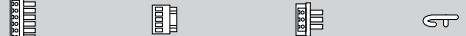
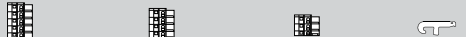

- ① -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
- ② Refer to the MR-J3 users manual for details on manufacturing the cable.

Item	Description	Model	Protection	Length	Art. no.	
Encoder cables and connector sets for CN2	⑨ Battery connection relay cable  Amplifier CN2 connector (3 M or an equivalent product) 36210-0100PL (receptacle) 36310-3200-008 (shell kit) Junction connector (3 M) 36110-3000FD (plug) 36310-F200-008 (shell kit) Battery connector (HIROSE ELECTRIC)DF3-2EP-2C (plug) DF3-EP2428PCA (Crimping terminal for plug) 2 pcs. Not required when the servo system is used in incremental mode. Refer to the section "Battery and special cables" for details.	MR-J3BTCBL03M Cable length: 0.3 m	—	0.3 m	160327	
	⑩ Power supply cable for HF-KP/HF-MP series Lead out in direction of motor shaft.	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04S11-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-PWS1CBL□M-A1-H □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	160227 161592 161593
Select one from ⑩ to ⑱ for the motor power supply	⑪ Power supply cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft.	 Lead-out	MR-PWS1CBL□M-A1-L □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	161594 / 161595 / 161596
	⑫ Power supply cable for HF-KP/HF-MP series Lead out in direction of motor shaft.	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04S11-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-PWS1CBL□M-A2-H □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	160228 / 161597 / 161598
Select one from ⑩ to ⑱ for the motor power supply	⑬ Power supply cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft.	 Lead-out	MR-PWS1CBL□M-A2-L □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	161599 / 161600 / 161601
	⑭ Power supply connector for HF-SP51, 81, HF-SP52, 102, 152, HF-SP524, 1024, 1524	 Motor power supply connector (DDK) CE05-6A18-10SD-D-BSS (plug) (straight) CE3057-10A-1-D (cable clamp) <Applicable cable example> Wire size: 2 mm ² (AWG14) to 3.5 mm ² (AWG12) Completed cable outer diameter: φ 10.5 to 14.1 mm	MR-PWCNS4 (Straight type)	IP67	—	161573
⑮ Power supply connector for HF-SP202, 352, 502, HF-SP2024, 3524, 5024	 Motor power supply connector (DDK) CE05-6A22-22SD-D-BSS (plug) (straight) CE3057-12A-1-D (cable clamp) <Applicable cable example> Wire size: 5.5 mm ² (AWG10) to 8 mm ² (AWG8) Completed cable outer diameter: φ 12.5 to 16 mm	MR-PWCNS5 (Straight type)	IP67	—	161574	
⑯ Power supply connector for HF-SP702, 7024, HA-LP702	 Motor power supply connector (DDK) CE05-6A32-17SD-D-BSS (plug) (straight) CE3057-20A-1-D (cable clamp) <Applicable cable example> Wire size: 14 mm ² (AWG6) to 22 mm ² (AWG4) Completed cable outer diameter: φ 22 to 23.8 mm	MR-PWCNS3 (Straight type)	IP67	—	136358	
⑰ Power supply connector for HC-RP103, 153, 203	 Motor power supply connector (DDK) CE05-6A22-23SD-D-BSS (plug) (straight) CE3057-12A-2-D (cable clamp) <Applicable cable example> Wire size: 2 mm ² (AWG14) to 3.5 mm ² (AWG12) Completed cable outer diameter: φ 9.5 to 13 mm	MR-PWCNS1 (Straight type)	IP67	—	64036	
⑱ Power supply connector for HC-RP353, 503, HA-LP502	 Motor power supply connector (DDK) CE05-6A24-10SD-D-BSS (plug) (straight) CE3057-16A-2-D (cable clamp) <Applicable cable example> Wire size: 5.5 mm ² (AWG10) to 8 mm ² (AWG8) Completed cable outer diameter: φ 13 to 15.5 mm	MR-PWCNS2 (Straight type)	IP67	—	64035	
Select one for the motor electromagnetic brake	⑲ Brake cable for HF-KP/HF-MP series Lead out in direction of motor shaft.	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04S11-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-BKS1CBL□M-A1-H □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	161604 161605 161606
	⑳ Brake cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft.	 Lead-out	MR-BKS1CBL□M-A1-L □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	161607 161608 161609
			MR-BKS1CBL□M-A1-H □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	160311 161610 161611
			MR-BKS1CBL□M-A1-L □=cable length: 2, 5, 10 m ①	IP65	2 m 5 m 10 m	161612 161613 161614

Notes:

- ① -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
- ④ The battery connection relay cable has a built-in diode. Only this cable must be used.


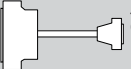


Cables and Connectors for servo amplifier (general)


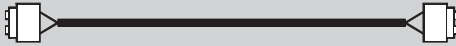
Item	Description	Model	Protection	Length	Art. no.	
Select one for the motor electro-magnetic brake	㉑ Brake cable for HF-KP/HF-MP series Lead out in direction of motor shaft 	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04S11-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-BKS2CBL03M-A1-L Cable length: 0.3 m ①	IP55	0.3 m	161615
	㉒ Brake cable for HF-KP/HF-MP series Lead out in opposite direction of motor shaft 	Motor power supply connector (Japan Aviation Electronics Industry) JN4FT04S11-R (plug) ST-TMH-S-C1B-100-(A534G) (socket contact)	MR-BKS2CBL03M-A2-L Cable length: 0.3 m ①	IP55	0.3 m	161616
	㉓ Brake connector for HF-SP series 	Motor brake connector (DDK) (soldered type) CM10-SP2S-L (straight plug), CM10-#22SC (S2)-100 (socket contact) <Applicable cable example> Wire size: 1.25 mm ² (AWG16) or smaller Completed cable outer diameter: φ 9.0 to 11.6 mm	MR-BKCNS1 (Straight type)	IP67	—	161575
	㉔ Brake connector for HA-LP12K1B, 12K14B, 11K1MB, 15K1MB, 11K1M4B, 15K1M4B, HA-LP11K2B, 15K2B, 22K2B, 11K24B, 15K24B, 22K24B 	Motor brake connector D/MS3106A10SL-4S (D190) (plug, DDK) YS010-5 to 8 (cable connector (straight), Daiwa Dengyo) <Applicable cable example> Wire size: 0.3 mm ² (AWG22) to 1.25 mm ² (AWG16) Completed cable outer diameter: φ 5 to 8.3 mm	MR-BKCN (Straight type)	IP65	—	64034
For CNP1, CNP2, CNP3	For 1kW or smaller (200VAC) 	CNP1 connector 54928-0670 (connector) (Molex or an equivalent product) CNP2 connector 54927-0520 (connector) (Molex or an equivalent product) CNP3 connector 54928-0370 (connector) (Molex or an equivalent product) Insertion tool 54932-0000 (Molex or an equivalent product)	—	—	on request	
	For 2kW, 3.5kW (200VAC) 	CNP1 connector PC4/6-STF-7.62-CRWH (connector) (PHOENIX or an equivalent product) CNP2 connector 54927-0520 (connector) (Molex or an equivalent product) CNP3 connector PC4/3-STF-7.62-CRWH (connector) (PHOENIX or an equivalent product) Insertion tool 54932-0000 (Molex or an equivalent product)	(Standard accessory: Insertion type) ②	—	—	on request
	For 2kW or smaller (400VAC) 	CNP1 connector 721-207/026-000 (plug) (WAGO or an equivalent product) CNP2 connector 721-205/026-000 (plug) (WAGO or an equivalent product) CNP3 connector 721-203/026-000 (plug) (WAGO or an equivalent product) Insertion tool 231-131(WAGO or an equivalent product)	—	—	—	on request
For CN5	㉖ USB cable 	Amplifier connector mini-B connector (5 pins) Personal computer connector A connector	MR-J3USBCBL3M Cable length: 3 m	—	3m	160229




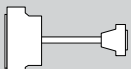

Notes:

- ① -H and -L indicate a bending life. -H indicates a long bending life, and -L indicates a standard bending life.
- ② The connector type terminal blocks are available for 200V 3.5kw or smaller and 400V 2kW or smaller servo amplifiers. For 200V 5kw or larger and 400V 3.5kW or larger, screw type connector blocks are used.

Cables and Connectors for servo amplifier (type specific)

Item	Description	Model	Protection	Length	Art. no.	
Servo amplifier series MR-J3 A						
For CN1	⑳ CN1 connector	 Amplifier connector (3 M or an equivalent product) 10150-3000PE (connector) 10350-52F0-008 (shell kit)	MR-J3CN1	—	—	160225
	㉘ Cable for junction terminal block TB-20	 Amplifier connector (3 M or an equivalent product) 10150-6000EL (connector) 10350-3210-000 (shell kit) ㉙	MR-J2TBL□M □=cable length: 0.5, 1 m	—	0.5 m 1 m	61216 61218
	㉙ Cable for junction terminal block TB-50		MR-J2M-CN1TBL□M □=cable length: 0.5, 1m	—	0.5 m 1 m	146794 189864
	㉚ Junction terminal block		TB20-S TB20-C TB50-S TB50-C	—	—	149148 149023 in preparation in preparation
For CN6	㉛ Monitor-Kabel		MR-J3CN6CBL1M Kabellänge: 1 m	—	1 m	161578

Servo amplifier series MR-J3-B						
For CN3	㉜ Input/output signal connector	 Amplifier connector (3M or an equivalent product) 10120-3000PE (connector) 10320-52F0-008 (shell kit) ㉝	MR-CCN1	—	—	60041
For CN1A For CN1B	㉞ SSCNET III cable (standard)	 Connector: PF-2D103 (Japan Aviation Electronics Industry) Connector: PF-2D103 (Japan Aviation Electronics Industry)	MR-J3BUS□M □=cable length: 015, 03, 05, 1, 3	—	0.15 m 0.3 m 1 m 3 m	161579 161580 161581 161582 161583
			MR-J3BUS□M-A □=Kabellänge: 5, 10, 20	—	5 m 10 m 20 m	161584 161585 161586
	㉟ SSCNET III cable (long flex)		MR-J3BUS□M-B □=cable length: 30, 40, 50	—	30 m 40 m 50 m	161587 161588 161589

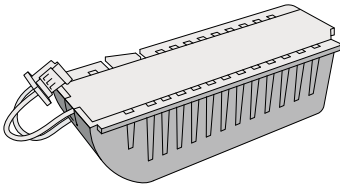
Servo amplifier series MR-J3-T						
For CN6	㊱ CN6 connector	 Amplifier connector (3 M or an equivalent product) 10126-3000PE (connector) 10326-52F0-008 (shell kit)	MR-J2CMP2	—	—	149764
For CN20 ㊲	㊳ Input/output signal connector	 Amplifier connector (3 M or an equivalent product) 10120-3000PE (connector) 10320-52F0-008 (shell kit) ㊴	MR-CCN1	—	—	60041
	㊵ Input/output signal connector	 Amplifier connector (3 M or an equivalent product) 10150-3000PE (connector) 10350-52F0-008 (shell kit)	MR-J3CN1	—	—	160225
For CN10 ㊶	㊷ Cable for junction terminal block TB-20	 Amplifier connector (3 M or an equivalent product) 10150-6000EL (connector) 10350-3210-000 (shell kit) ㊸	MR-J2TBL□M □=cable length: 0.5, 1 m	—	0.5 m 1 m	61216 61218
	㊹ Cable for junction terminal block TB-50		MR-J2M-CN1TBL□M □=cable length: 0.5, 1 m	—	0.5 m 1 m	146794 189864
	㊺ Junction terminal block		TB20-S TB20-C TB50-S TB50-C	—	—	149148 149023 in preparation in preparation

Notes:

- ㊳ The connector and the shell kit are press bonding type. Models for soldered type are 10120-3000PE (connector) and 10350-52F0-008 (shell kit).
- ㊴ The connector and the shell kit are soldered type. Models for press bonding type are 10120-6000EL (connector) and 10320-3210-000 (shell kit).
- ㊶ CN10 and CN20 are only available with extension I/O unit MR-J3-D01.

Encoder cables, battery connection relay cable, power supply cables, brake cables, USB cable and servo amplifier power supply connector set from ㊱ to ㊹ are same for the servo amplifier series MR-J3-A, MR-J3-B and MR-J3-T.

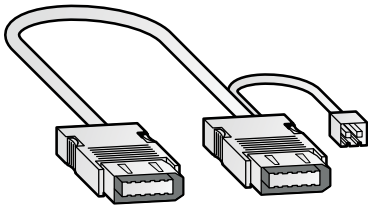
Buffer Battery



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

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

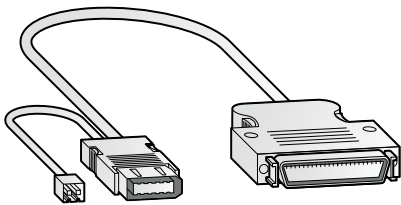
Battery Connection Relay Cable



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

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

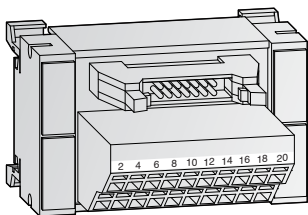
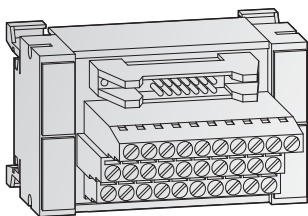
Diagnostic Cable



This cable is required when using the amplifier diagnostic function of MR-Configurator (Setup software). Can be used only in combination with an MR-J3-A servo amplifier.

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

Terminal Blocks

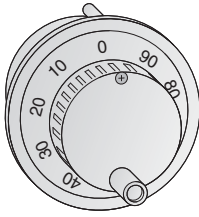


These terminal blocks TB-20/TB-50 are adapter modules that simplify the wiring of the inputs and outputs of the servo amplifiers.

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

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

Manual Pulse Generator

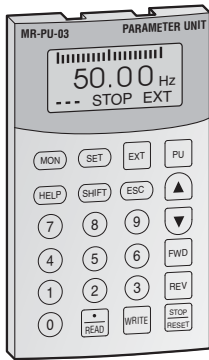


MR-HDP01

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

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

Parameter Unit



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

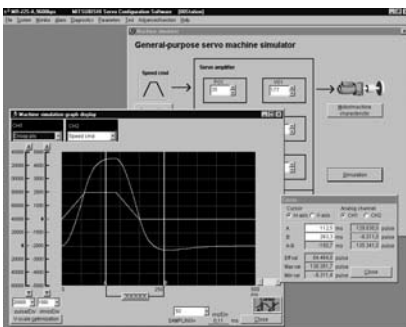
By connecting the parameter unit to the servo amplifier, data setting, test opera-

tion, parameter setting, etc. can be performed without using MR-Configurator.

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

Functions	MR-PRU03
Parameter mode	Basic setting parameters, gain/filter parameters, extension setting parameters, input/output setting parameters
Monitor Mode	MR-J3-□T□ Current position, command position, command remaining distance, point table No., cumulative feedback pulses, droop pulses, regenerative load ratio, effective load ratio, peak load ratio, instantaneous torque, within one revolution position, ABS counter, servo motor speed, bus voltage, load inertia moment ratio
Diagnosis mode	External input/output display, motor information
Alarm mode	Current alarm, alarm history
Test operation mode	JOG operation, positioning operation, D0 forced output, motor-less operation, single-step feed
Point table mode	Position data, servo motor speed, acceleration/deceleration time constant, dwell time, auxiliary function, M code
Order information	Art. no. 208805

Setup Software (MR-Configurator)

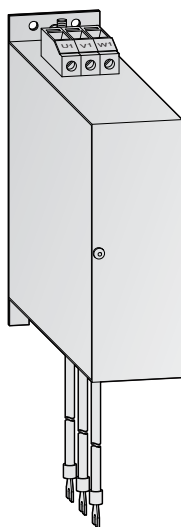


The comfortable setup software for Windows based personal computers allows perfect tuning of the servo amplifiers and the connected servo motors.

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

Functions	MR-Configurator
Monitor	Batch display, input/output I/F display, high speed monitor, graph display
Parameters	Parameter setting, device setting, tuning, display of change list, display of detailed information, converter, parameter copy
Diagnostics	Rotation failure reason display, system information display, tuning data display, absolute data display, axes name setting, amplifier diagnostic
Alarms	Alarm display, alarm history, display of data that generated alarm
Test operations	JOG operation, positioning operation, operation without motor, forced digital output, program operation using simple language
Advanced function	Machine analyser, gain search, machine simulation
Others	Automatic operation, help display, project and data administration
Order information	Art. no. 191431

■ Noise Filters



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

The filter units are designed to reduce mains conducted RFI emissions to meet the European standard EN 61800-3. More details are enclosed in the installation sheet of the MR-J3 filters.

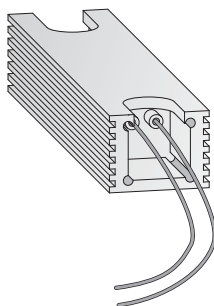
Filter ①	Servo amplifier	Power loss [W]	Rated current [A]	Leakage current ② [mA]	Weight [kg]	Order number
MF-2F230-006.230MFa	MR-J3-10A/B/T – MR-J3-60A/B/T	10	6	< 26	0.45	189332
MF-2F230-006.230MFb	MR-J3-70A/B/T	10	6	< 26	0.45	189331
MF-3F480-010.233MF	MR-J3-60A4/B4/T4, MR-J3-100A/B/T and MR-J3-100A4/B4/T4	9	10	< 7	1.0	208775
MF-3F480-015.230MF3	MR-J3-200A/B/T and MR-J3-200A4/B4/T4	12	15	< 4②	1.5	203463
MF-3F480-015.233MF	MR-J3-350A4/B4/T4	16	15	< 20	2.0	208776
MF-3F480-025.230MF3③	MR-J3-350A/B/T, MR-J3-500A4/B4/T4 and MR-J3-700A4/B4/T4	20	25	< 4	3.0	203854
MF-3F480-050.230MF3	MR-J3-500A/B/T and MR-J3-700A/B/T	40	50	< 4②	4.0	203855

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

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

③ No foot print filter

■ Brake Resistors



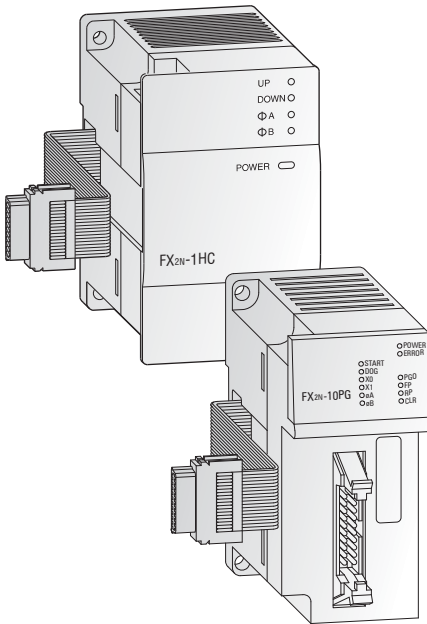
If the regenerative power exceeds the power of the built-in resistor, the following listed optional brake resistors can be used.

Resistor	Servo amplifier	Power capacity [W]	Resistance (Ω)	Weight [kg]	Dimensions (W x H x D)	Order number
MR-RFH75-40	MR-J3-10A/B/T – MR-J3-60A/B/T, MR-J3-70A/B/T and MR-J3-100A/B/T	150	40	0.16	36 x 27 x 90	137279
MR-RFH220-40	MR-J3-70A/B/T and MR-J3-100A/B/T	400	40	0.42	36 x 27 x 200	137278
MR-RFH400-13	MR-J3-200A/B/T, MR-J3-350A/B/T and MR-J3-500A/B/T	600	13	0.73	36 x 27 x 320	137277
MR-RFH400-6.7	MR-J3-700A/B/T	600	6.7	0.73	36 x 27 x 320	137275
MR-PWR-R T 400-120	MR-J3-60A4/B4/T4 and MR-J3-100A4/B4/T4	400	120	0.4	36 x 27 x 200	154746
MR-PWR-R T 600-47	MR-J3-200A4/B4/T4 and MR-J3-350A4/B4/T4	600	47	0.64	36 x 27 x 320	154751
MR-PWR-R T 600-26	MR-J3-500A4/B4/T4 and MR-J3-700A4/B4/T4	600	26	0.64	36 x 27 x 320	154752

MELSEC FX Positioning Units

The high-speed counter and single axis positioning modules described below can be used in combination with the FX series

PLCs. This provides a cost effective solution for small servo/motion applications.



High-speed counter FX2N-1HC

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

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

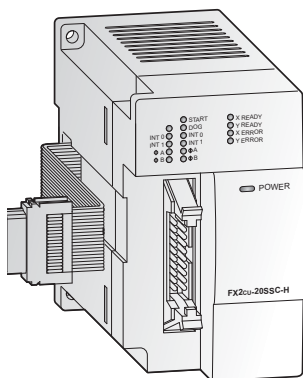
Single-axis positioning module

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

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

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

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



SSCNET III module FX3U-20SSC-H

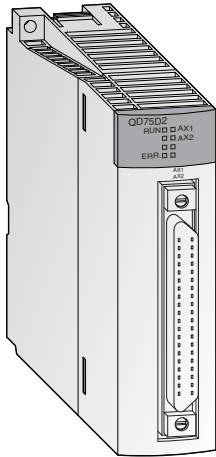
The SSCNET module FX3U-20SSC-H can be used in combination with a FX3U programmable controller to achieve a cost effective solution for high precision, high speed positioning. The plug- and-play fiber optic SSCNET III cabling reduces setup time and increases control distance for positioning operations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

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

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

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

MELSEC System Q Positioning Units



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

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

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

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

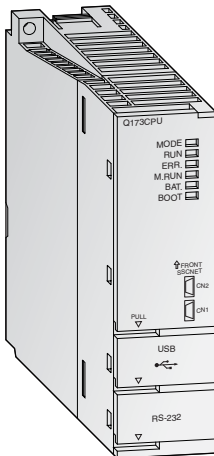
The modules provide positioning with open collector control. The modules generate the travel command via the pulse chain. The speed is proportional to the pulse frequency and the distance travelled is proportional to the pulse length.

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

Specifications	QD75D1	QD75D2	QD75D4
Number of control axes	1	2	4
Interpolation	—	2 axis linear and circular interpolation	2, 3, or 4 axis linear and 2 axis circular interpolation
Positioning data itmes	600 per axis		
Output type	Differential driver	Differential driver	Differential driver
Output signal	Pulse chain	Pulse chain	Pulse chain
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 -2 147 483 648 – 2 147 483 647 pulse method: -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 0 – 2 147 483 647 pulse swiching control : 0 – 21 4748 364.7 µm 0 – 21 474.83647 inch 0 – 21 474.83647 degree
Positioning 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 deceleration time	1 – 8388608 ms		
I/O points	32	32	32
Dimensions (W x H x D)	mm 27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90
Order information	Art. no. 129675	129676	129677
Accessories	40-pin connector and ready to use connection cables and system terminals; Programming software: GX Configurator QP, art. no.: 132219		

Specifications	QD75MH1	QD75MH2	QD75MH4
Number of control axes	1	2	4
Interpolation	—	2 axis linear and circular interpolation	2, 3, or 4 axis linear and 2 axis circular interpolation
Positioning data itmes	600 per axis		
Output type	SSCNET III	SSCNET III	SSCNET III
Output signal	BUS	BUS	BUS
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 -2 147 483 648 – 2 147 483 647 pulse method: -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 0 – 2 147 483 647 pulse swiching control : 0 – 21 4748 364.7 µm 0 – 21 474.83647 inch 0 – 21 474.83647 degree
Positioning 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 deceleration time	1 – 8388608 ms		
I/O points	32	32	32
Dimensions (W x H x D)	mm 27.4 x 98 x 90	27.4 x 98 x 90	27.4 x 98 x 90
Order information	Art. no. 165761	165762	165763
Accessories	40-pin connector and ready to use connection cables and system terminals; Programming software: GX Configurator QP, art. no.: 132219		

MELSEC System Q Motion CPUs



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

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

Special features:

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

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

MELSEC System Q Motion System Modules

Servo external signals interface module Q172LX

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

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

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

Serial absolute synchronous encoder interface module Q172EX and Q172EX-S2

The serial absolute synchronous encoder interface module Q172EX is a Motion system module for receiving and evaluating up to two serial absolute-value encoders. (Incremental encoders cannot be connected.) Via an external encoder (Q170ENC) it is possible to feed a setpoint source to the Motion system, which in turn is programmed as a guide axis.

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

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

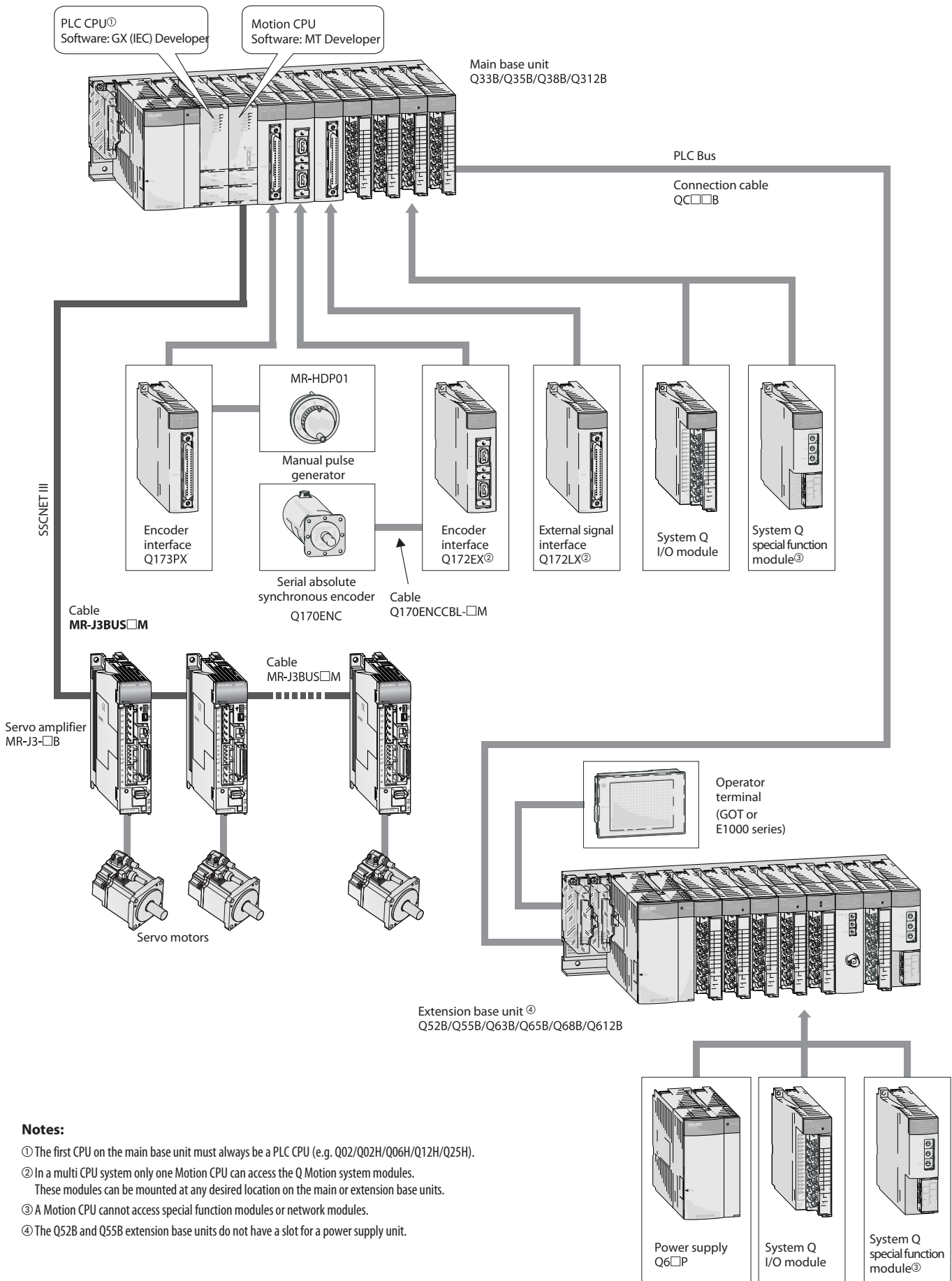
Manual pulse generator interface module Q173PX

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

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

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

■ Configuration of a SSCNET III System



Notes:

- ① The first CPU on the main base unit must always be a PLC CPU (e.g. Q02/Q02H/Q06H/Q12H/Q25H).
- ② In a multi CPU system only one Motion CPU can access the Q Motion system modules. These modules can be mounted at any desired location on the main or extension base units.
- ③ A Motion CPU cannot access special function modules or network modules.
- ④ The Q52B and Q55B extension base units do not have a slot for a power supply unit.

X-Y Table System Configurations

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

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

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

System 1: FX2N-10PG based system

Products	Function
FX2N-16MR-ES/UL	PLC
FX2N-10PG	Pulse train output module
FX2N-10PG	Pulse train output module
MR-J3-10A	Servo Amplifier
HF-KP13	Motor
MR-J3-60A	Servo Amplifier
HF-SP52	Motor

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

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

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

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

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

System 2: QD75MH based system

Products	Function
Q00J	Q PLC
QD75-MH2	Positioning Controller
MR-J3-10B	Servo Amplifier
HF-KP13	Motor
MR-J3-40B	Servo Amplifier
HF-SP52	Motor
MR-BAT	Servo Amplifier Battery

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

Furthermore, as the Servo amplifiers are connected by a bus system, all Servo data, such as current position, torque etc. can all be monitored back at the main controller

(Q00J PLC) as the data is automatically updated on the QD75MH module.

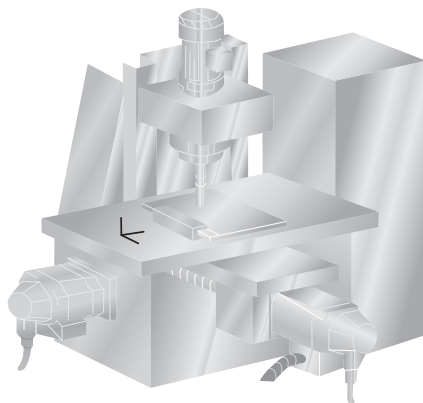
Also, all of the internal Servo parameters can be set from the PLC, again due to the bus system used.

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

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

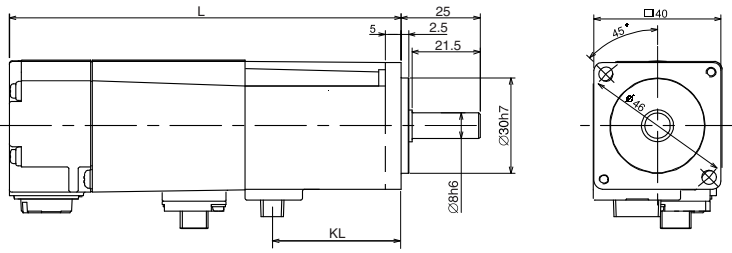
- SSCNET III capability
- Easy of set-up
- High functionality
- Expandability
- Module Options
- Reduced Wiring

X-Y table control



■ Servo motors

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

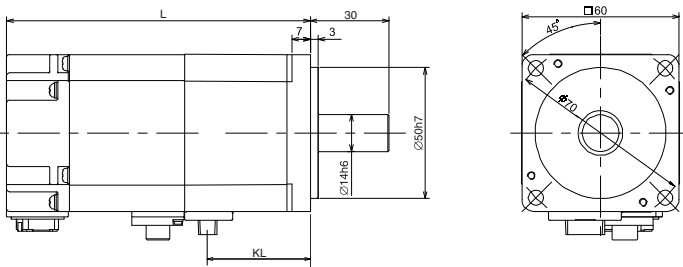


Type	L [mm]	KL [mm]
HF-MP053 (B)	66.4 (107.5)	24.5
HF-MP13 (B)	82.4 (123.5)	40.5
HF-KP053 (B)	66.4 (107.5)	24.5
HF-KP13 (B)	82.4 (123.5)	40.5

Dimensions for motors with brake in brackets ().

Unit: mm

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

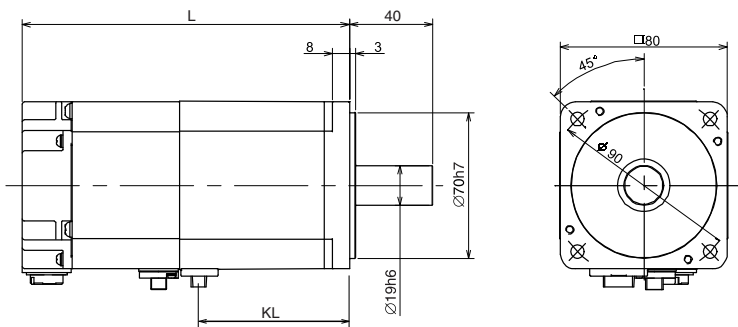


Type	L [mm]	KL [mm]
HF-MP23 (B)	82.4 (116.1)	39.3
HF-MP43 (B)	98.5 (138.0)	61.2
HF-KP23 (B)	82.4 (116.1)	39.3
HF-KP43 (B)	98.5 (138.0)	61.2

Dimensions for motors with brake in brackets ().

Unit: mm

HF-MP73 (B), HF-KP73 (B)

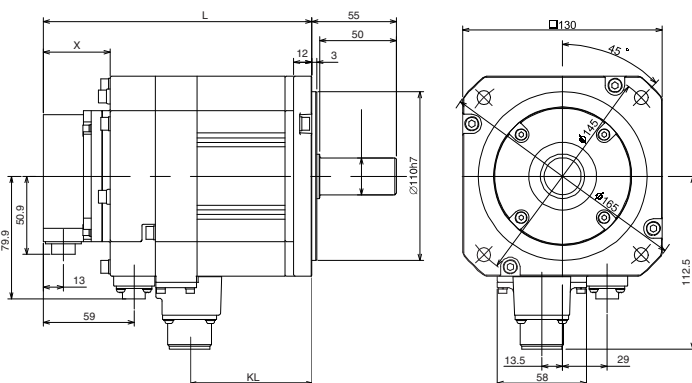


Type	L [mm]	KL [mm]
HF-MP73 (B)	113.8 (157.0)	72.3
HF-KP73 (B)	113.8 (157.0)	72.3

Dimensions for motors with brake in brackets ().

Unit: mm

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

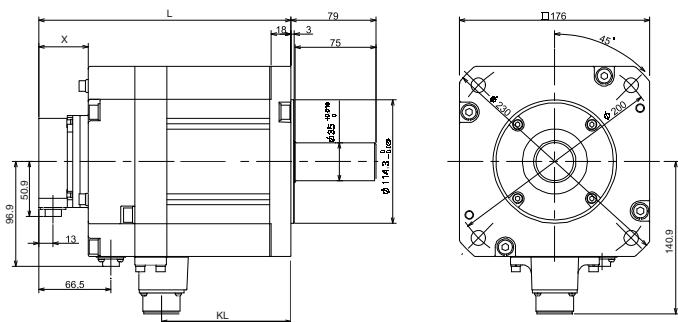


Type	L [mm]	KL [mm]	X [mm]
HF-SP52 (B)	118.5 (153.0)	57.8	38.2 (43.5)
HF-SP102 (B)	140.5 (175.0)	79.8	38.2 (43.5)
HF-SP152 (B)	162.5 (197.0)	101.8	38.2 (43.5)

Dimensions for motors with brake in brackets ().

Unit: mm

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

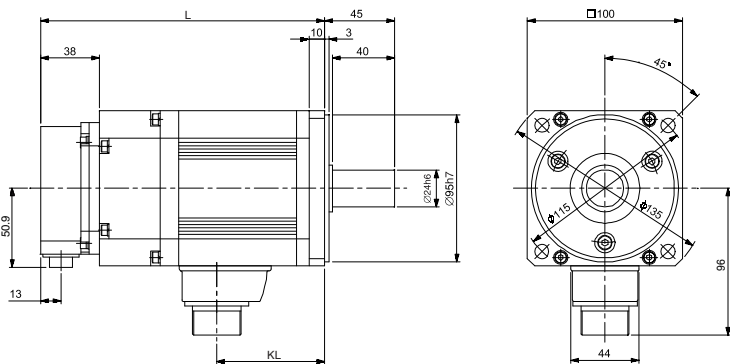


Type	L [mm]	KL [mm]	X [mm]
HF-SP202 (B)	143.5 (193.0)	79.8	38.5 (45.5)
HF-SP352 (B)	183.5 (233.0)	119.8	38.5 (45.5)
HF-SP502 (B)	203.5 (253.0)	139.8	38.5 (45.5)
HF-SP702 (B)	263.5 (313.0)	191.8	38.5 (45.5)

Dimensions for motors with brake in brackets ().

Unit: mm

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

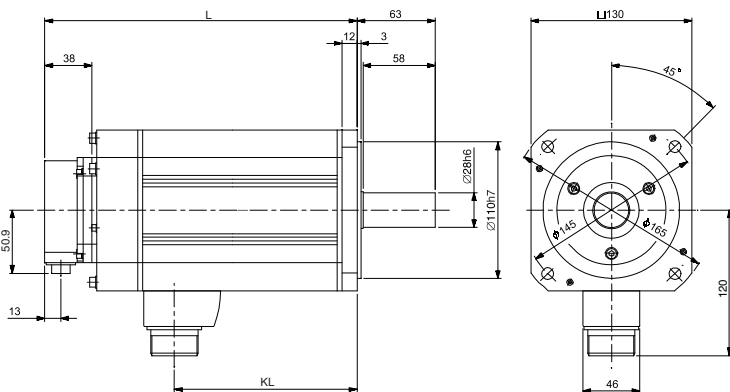


Type	L [mm]	KL [mm]
HC-RP103 (B)	145.5 (183.5)	69.5
HC-RP153 (B)	170.5 (208.5)	94.5
HC-RP203 (B)	195.5 (233.5)	119.5

Dimensions for motors with brake in brackets ().

Unit: mm

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

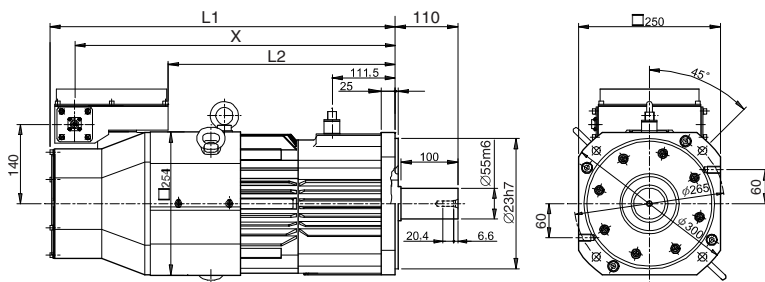


Type	L [mm]	KL [mm]
HC-RP353 (B)	215.5 (252.5)	148
HC-RP503 (B)	272.5 (309.5)	205

Dimensions for motors with brake in brackets ().

Unit: mm

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



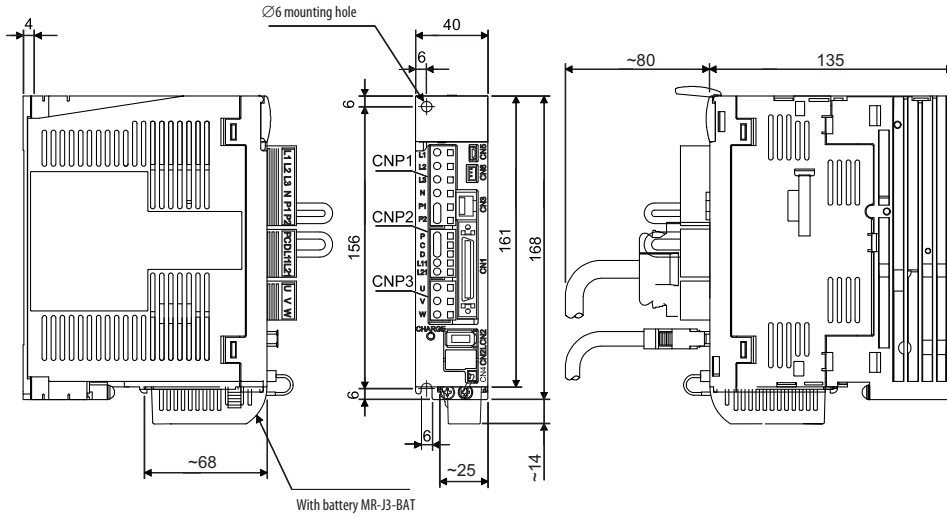
Type	L1 [mm]	L2 [mm]	X
HA-LP11K2[4] (B)	480 (550)	262 (334)	426 (498)
HA-LP15K2[4] (B)	495 (610)	289 (400)	454 (565)
HA-LP22K2[4] (B)	555 (670)	346 (457)	511 (622)

Dimensions for motors with brake in brackets ().

Unit: mm

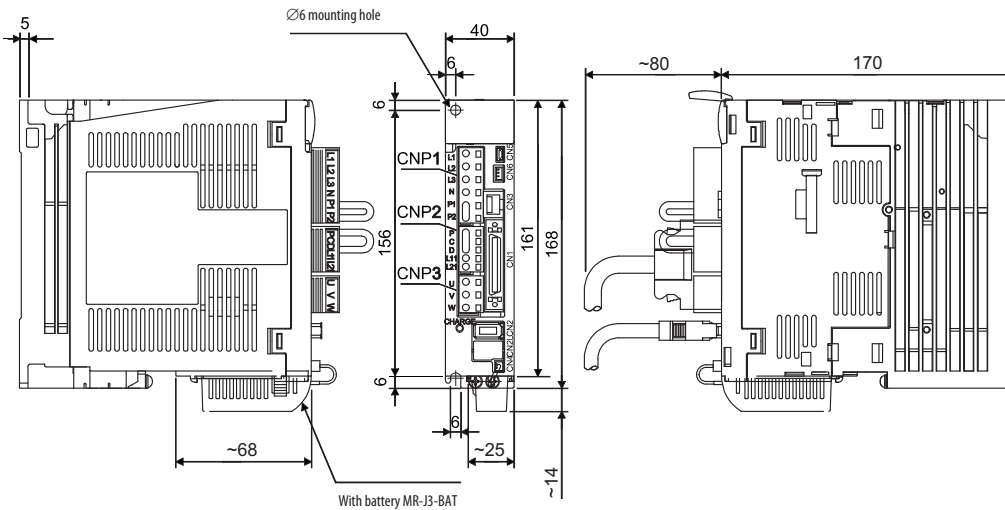
■ Servo amplifiers MR-J3-A/B

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



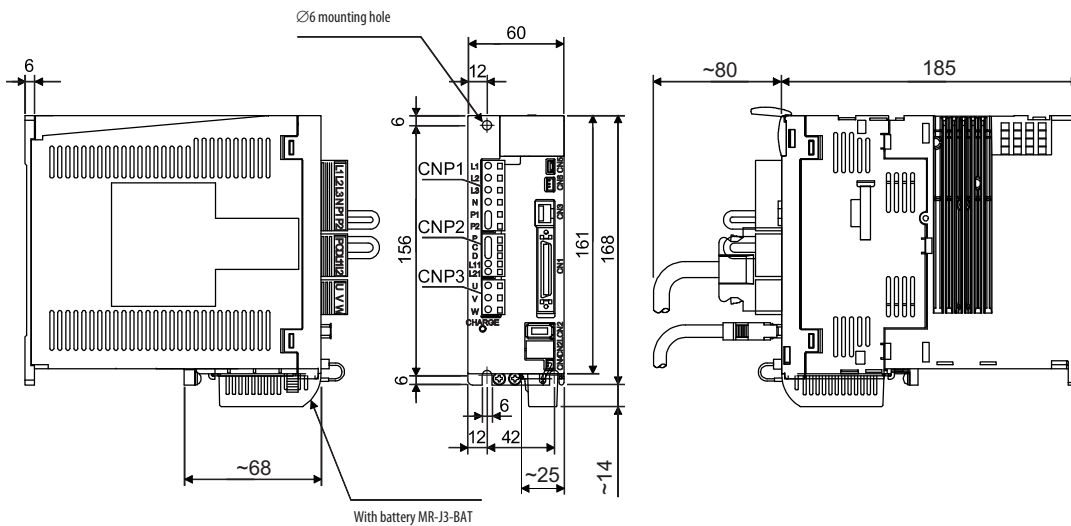
Unit: mm

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



Unit: mm

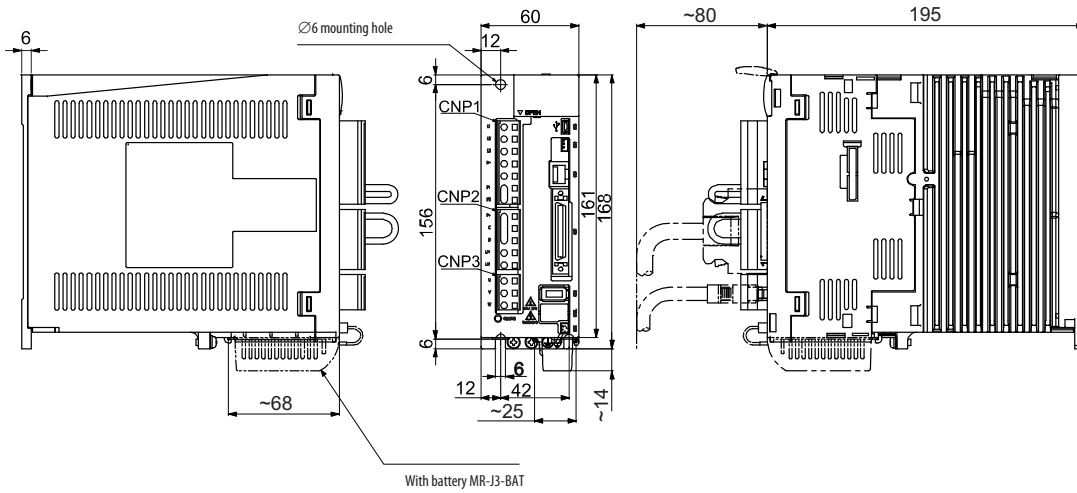
MR-J3-A-70A/B and MR-J3-100A/B



Unit: mm

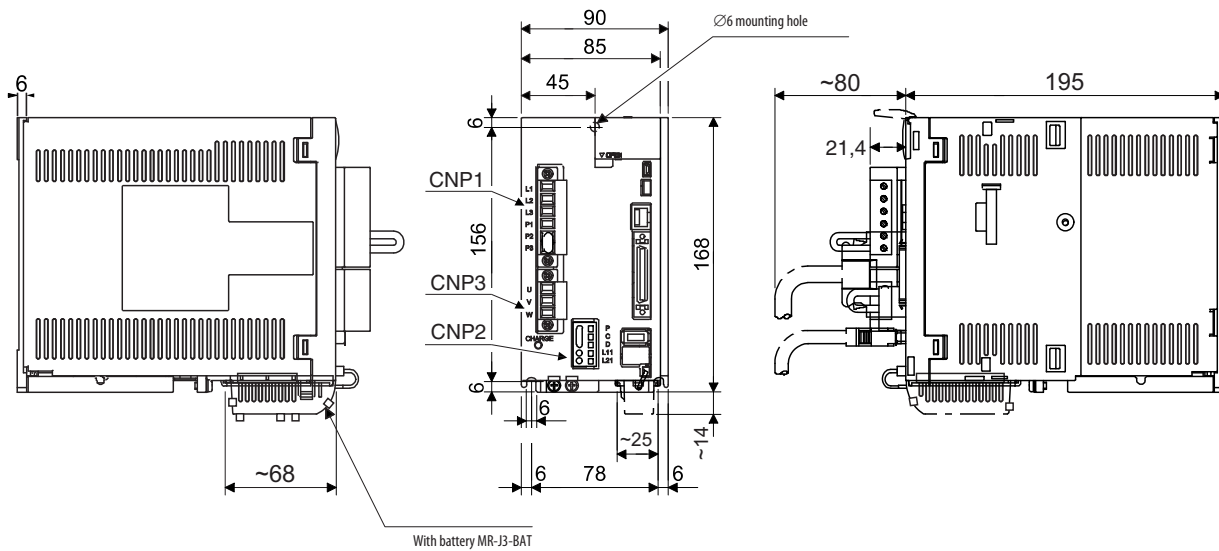
6 DIMENSIONS

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



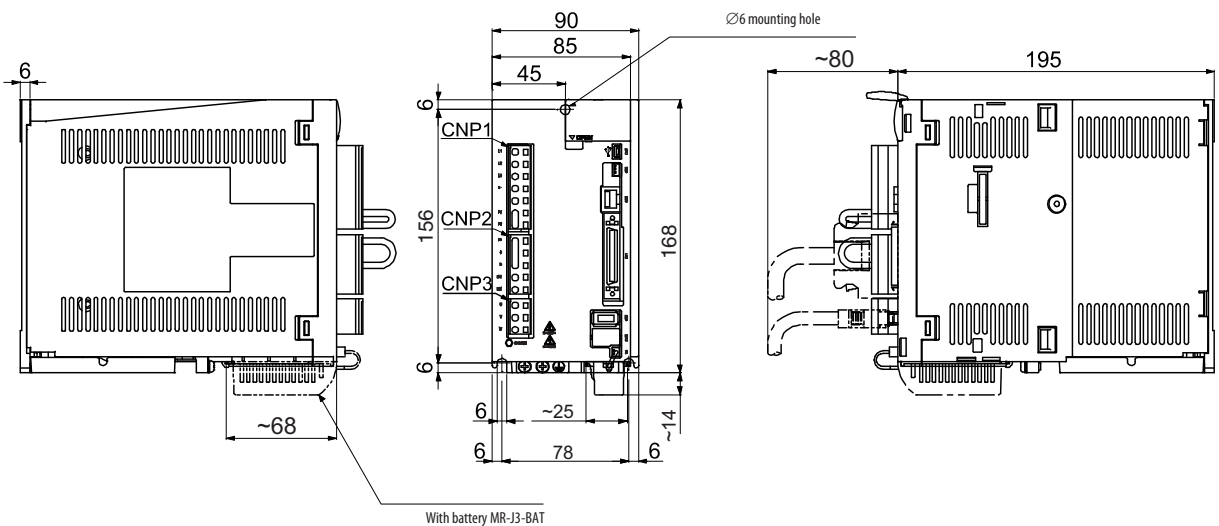
Unit: mm

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



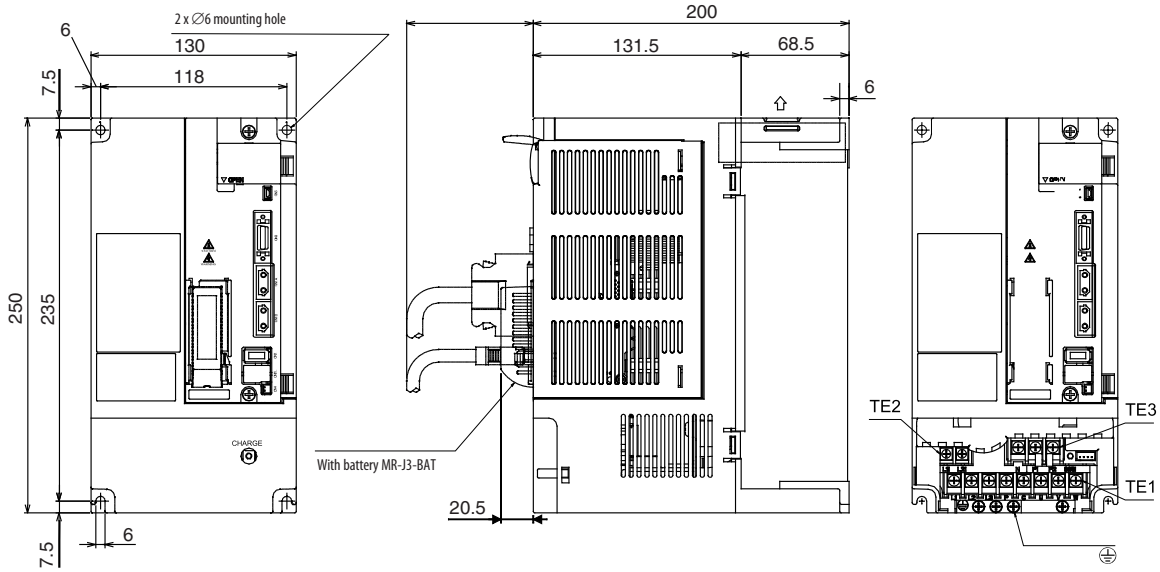
Unit: mm

MR-J3-200A4/B4



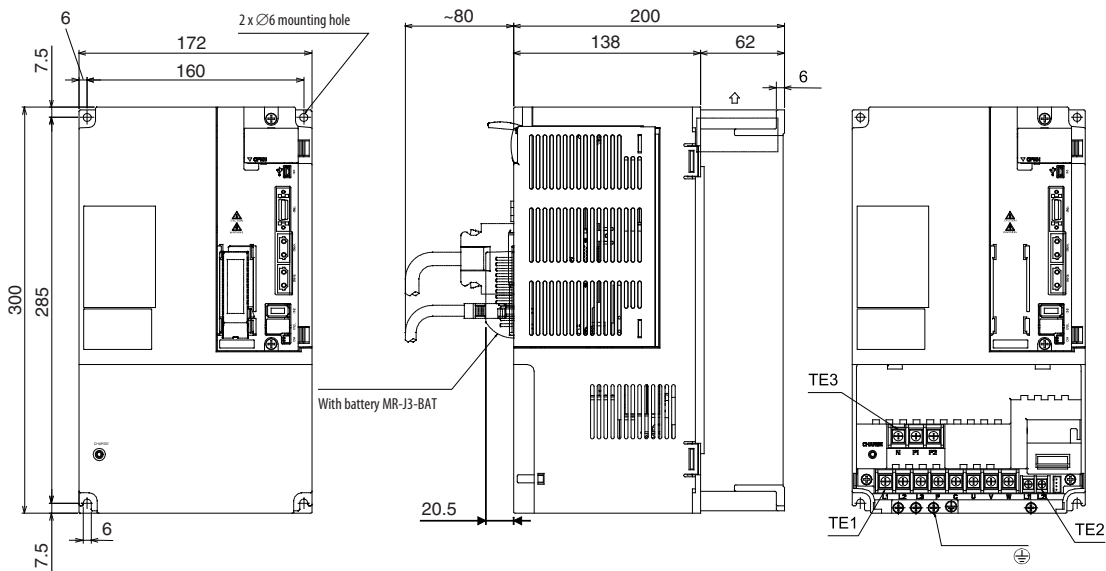
Unit: mm

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



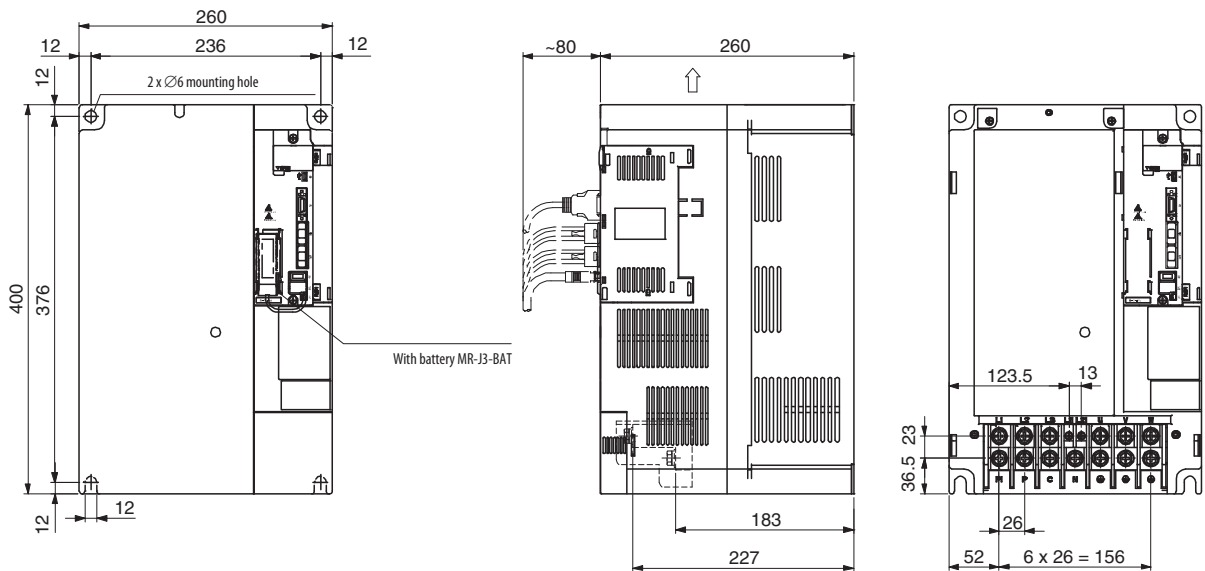
Unit: mm

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



Unit: mm

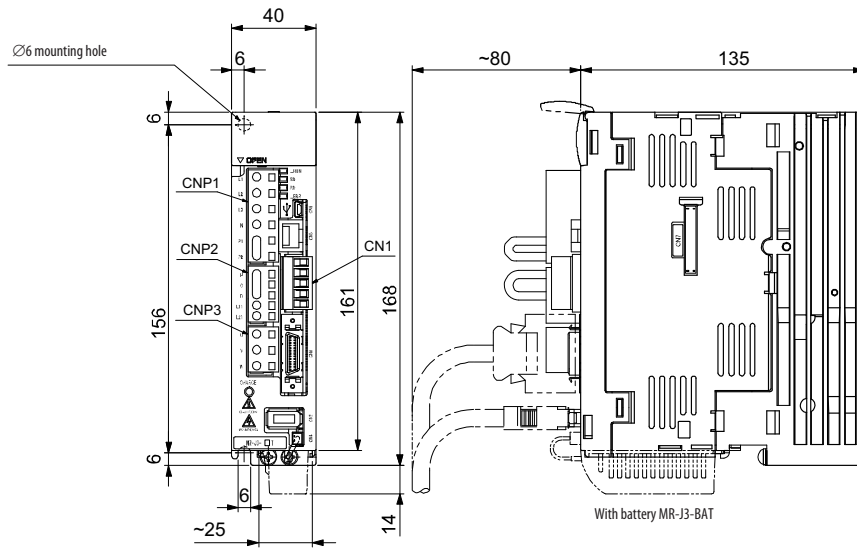
MR-J3-11KB to MR-J3-22KB and MR-J3-11KB4 to MR-J3-22KB4



Unit: mm

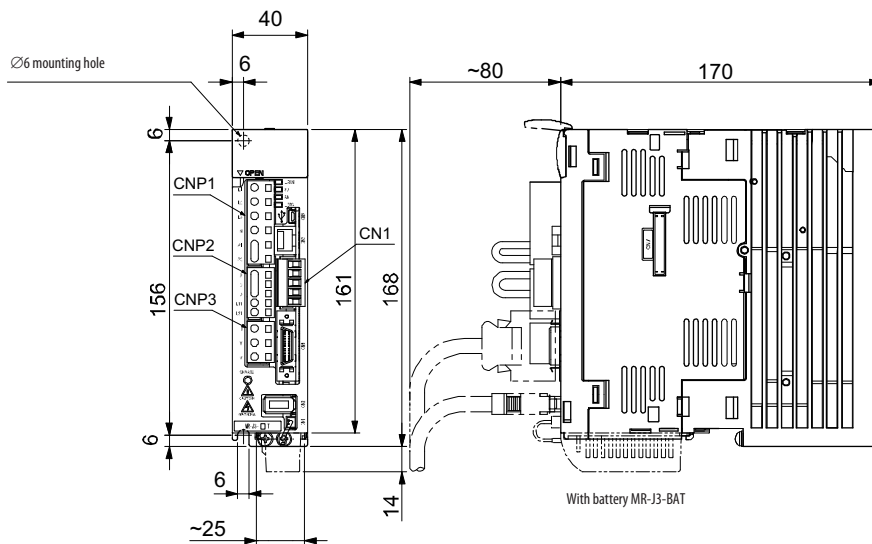
■ Servo amplifiers MR-J3-T

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



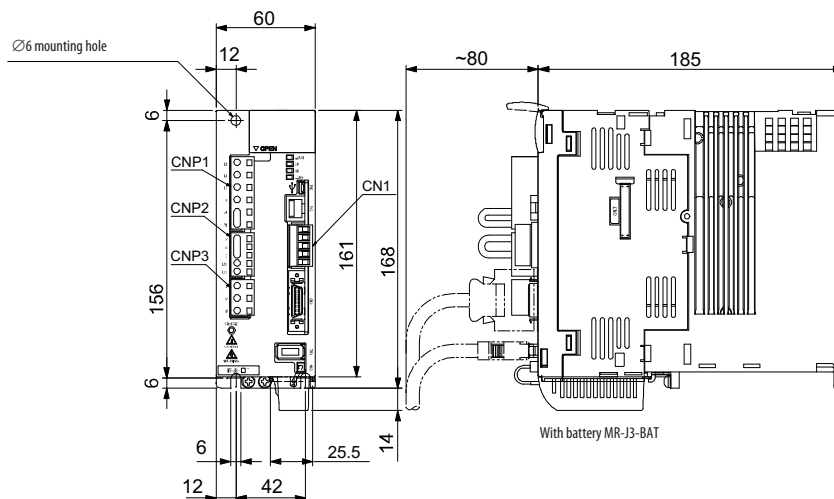
Unit: mm

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



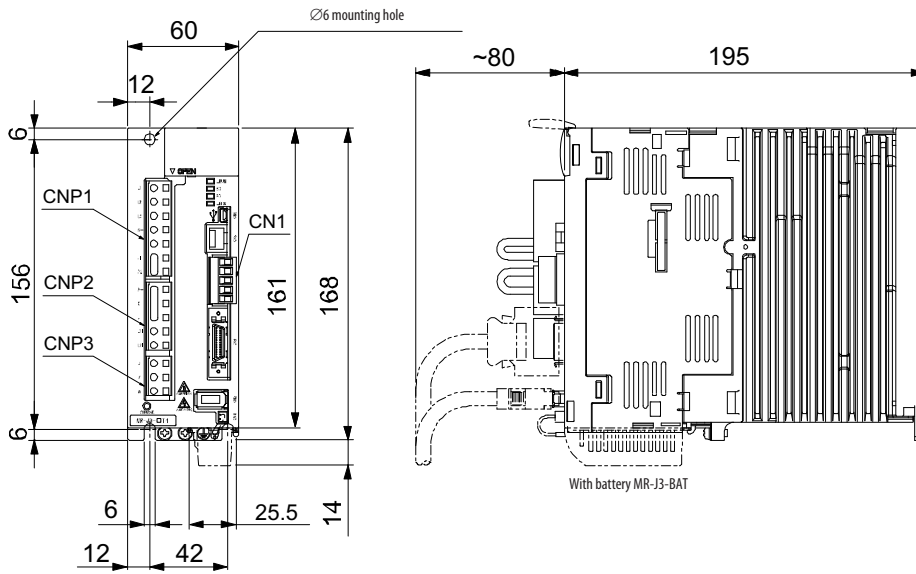
Unit: mm

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



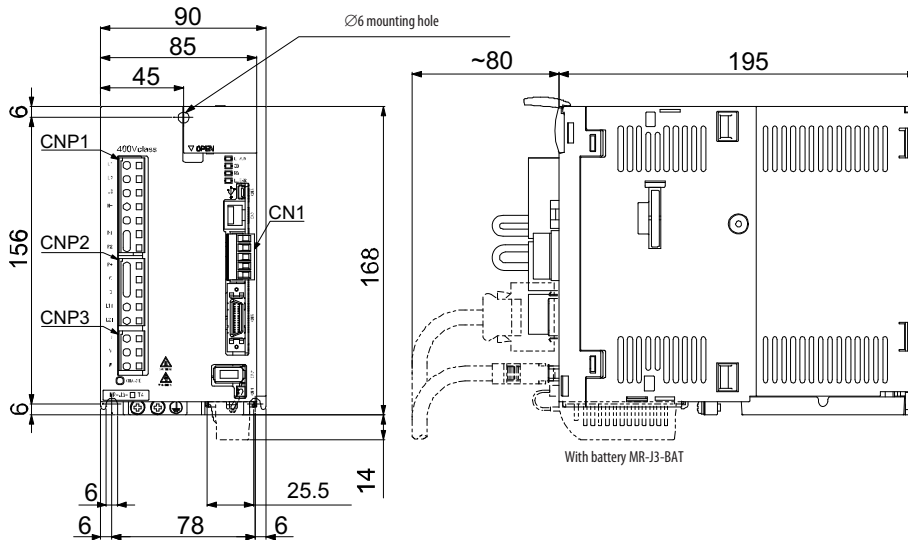
Unit: mm

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



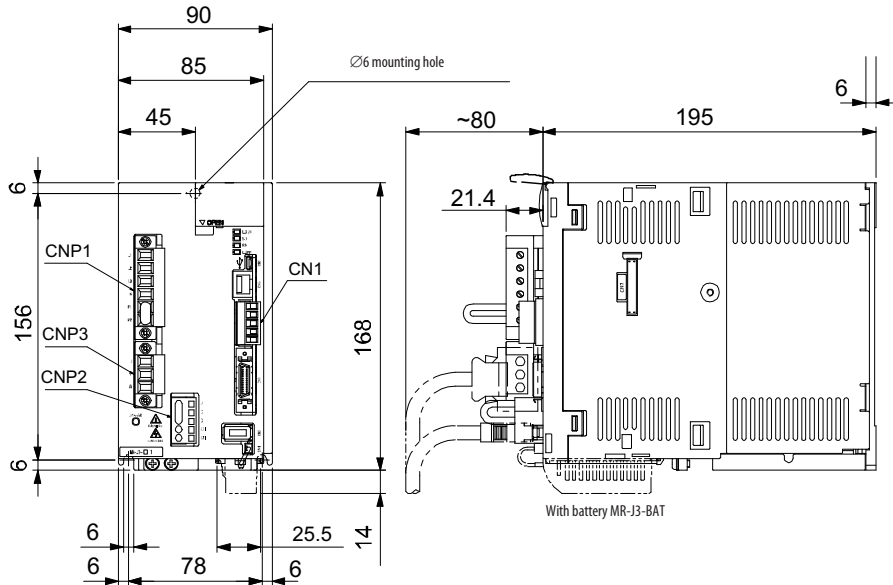
Unit: mm

MR-J3-200T(4)



Unit: mm

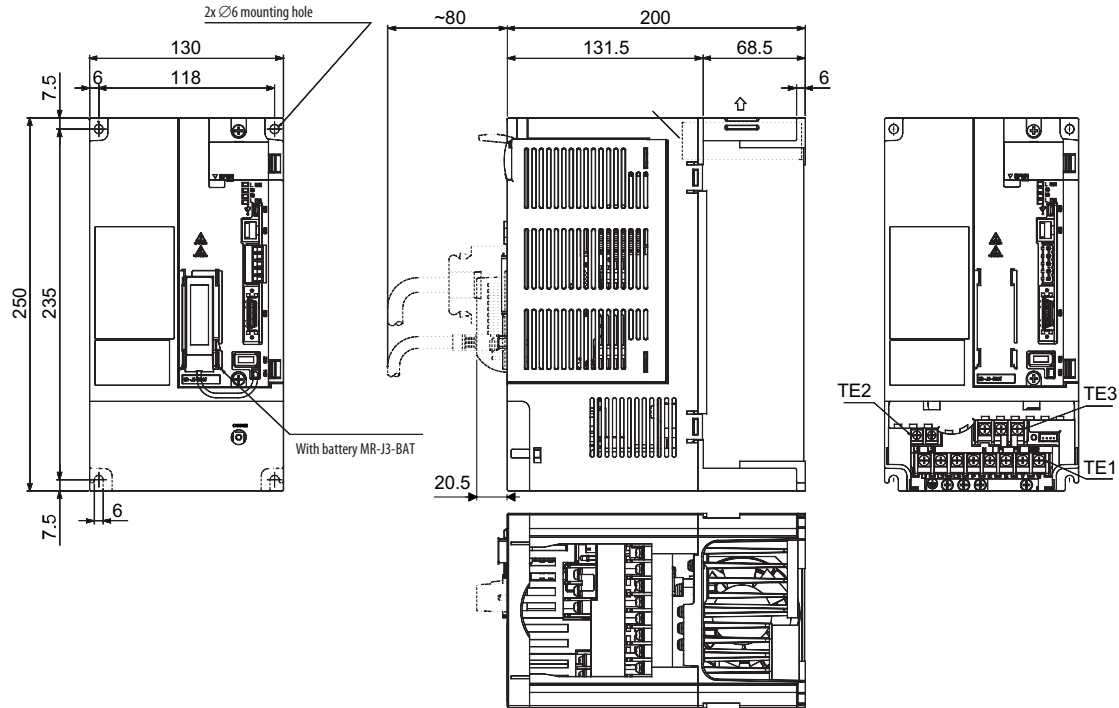
MR-J3-350T



Unit: mm

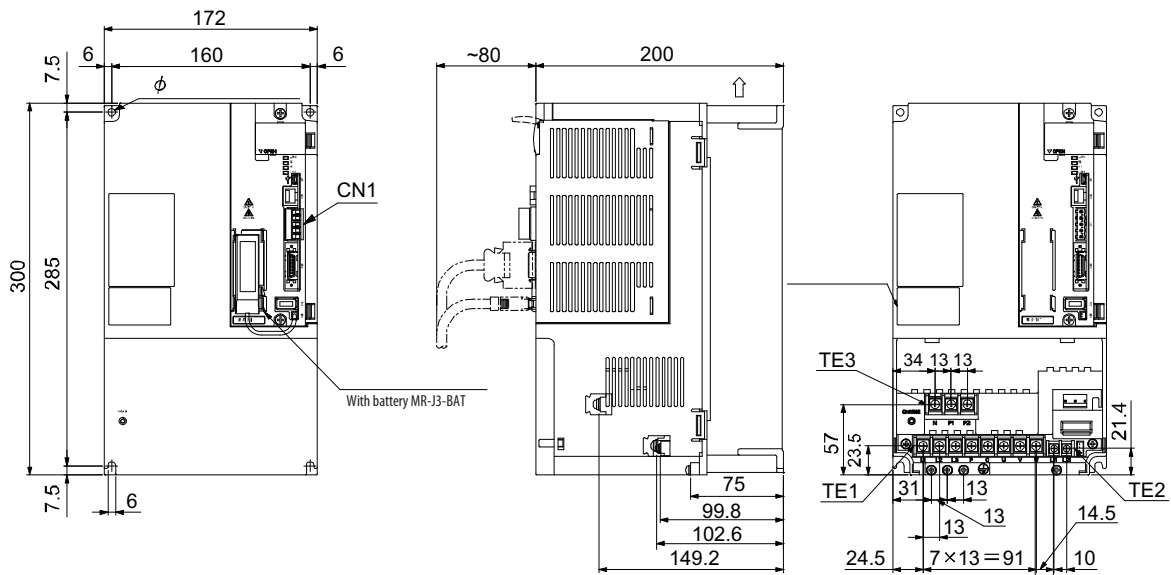
6 DIMENSIONS

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



Unit: mm

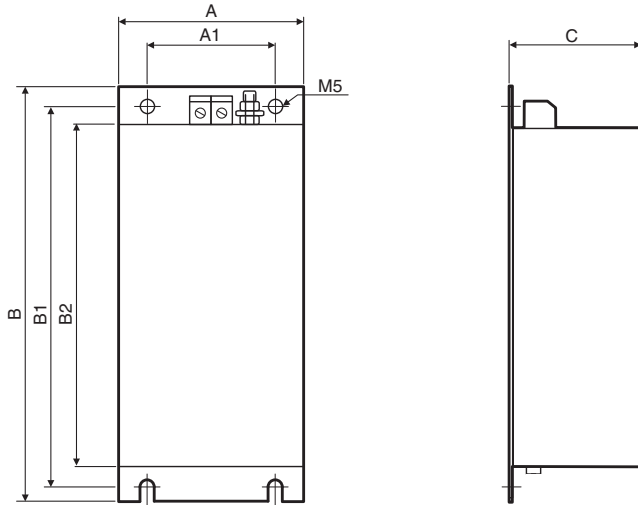
MR-J3-700T(4)



Unit: mm

Noise Filters

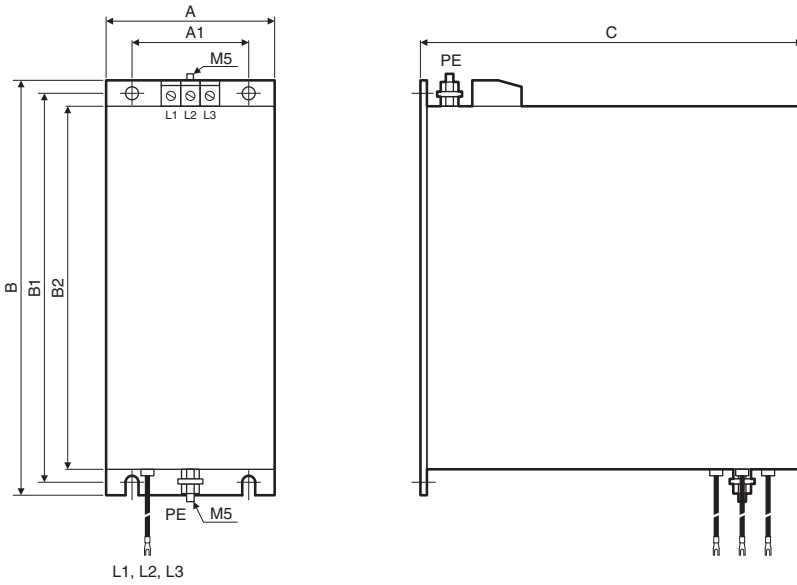
MF-2F230-006.230MFa to MF-3F480-015.230MF3



Type	A	A1	B	B1	B2	C
MF-2F230-006.230MFa	40	28	200	190	170	40
MF-2F230-006.230MFb	60	42	200	190	170	40
MF-3F480-015.233MF	130	118	282	270	-	66
MF-3F480-010.233MF	60	42	202	192	172	55
MF-3F480-015.230MF3	90	78	204	192	172	55

Unit: mm

MF-3F480-025.230MF3, MF-3F480-050.230MF3

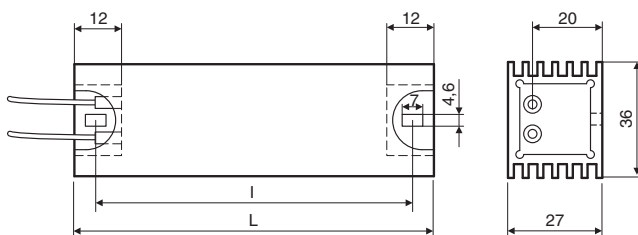


Type	A	A1	B	B1	B2	C
MF-3F480-025.230MF3	76	60	168	156	140	195
MF-3F480-050.230MF3	75	45	250	235	220	200

Unit: mm

Brake Resistors

MR-RFH, MR-PWR-R

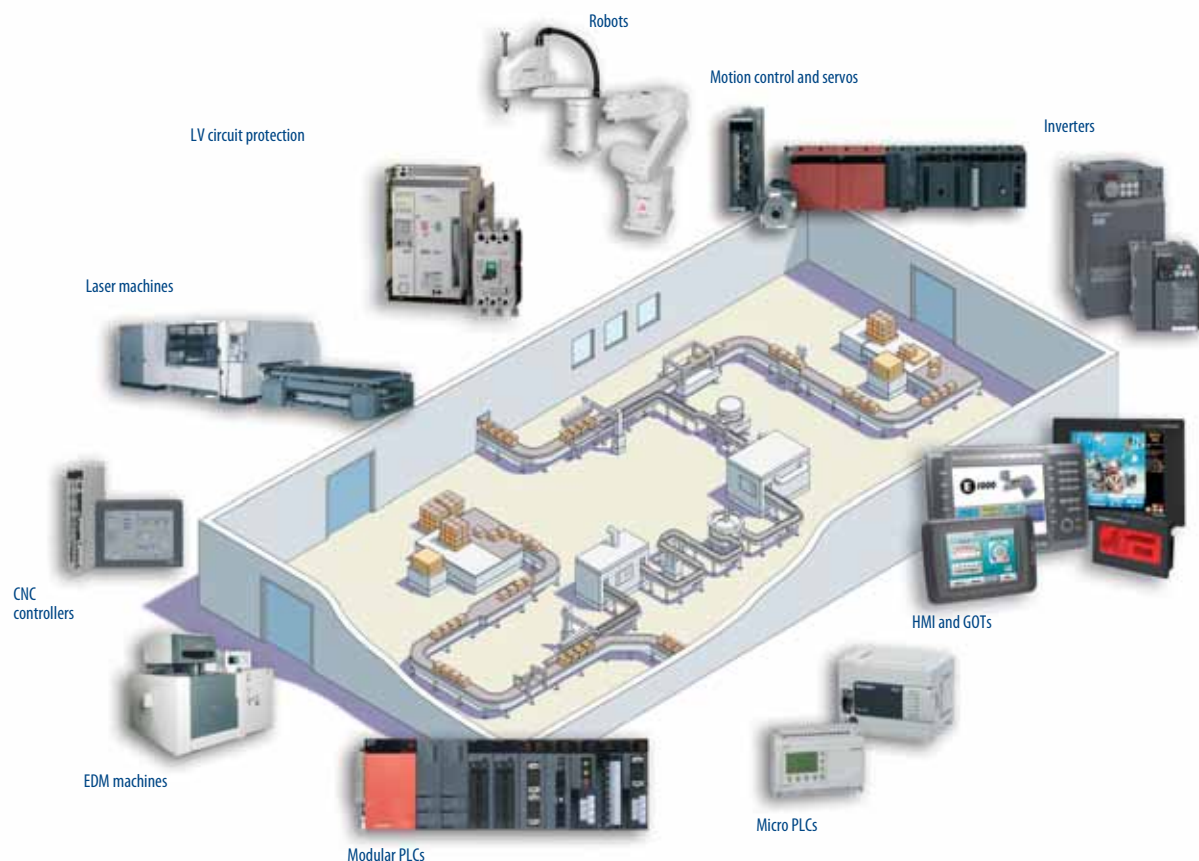


Type	L	l
MR-RFH75-40	90	79
MR-RFH220-40	200	189
MR-RFH400-13	320	309
MR-RFH400-6.7	320	309
MR-PWR-R T 400-120	200	189
MR-PWR-R T 600-47	320	309
MR-PWR-R T 600-26	320	309

Unit: mm

A	
Adaptive Vibration Suppression	7
Auto-Tuning	7
B	
Battery	30
Battery Connection Cable	30
Brake Resistors	32
Braked Motors	17
C	
Cables and Connectors	
Servo amplifier	24
Servo motors	25
Commands and Operation Modes MR-J3-T	21
Configuration of a SSCNET III System	36
Connection	
Cables and Connectors	24
MR-J3-A	22
MR-J3-B	23
SSCNET III	36
Control Functions	7
D	
Diagnostic Cable	30
Dimensions	
Brake resistors	46
Noise filters	46
Servo amplifier	40
Servo motors	38
E	
Electromagnetic Brake	17
F	
Features	6
H	
HC-RP Series Servo Motor (200 V)	16
HF-KP Series Servo Motor (200 V)	13
HF-MP Series Servo Motor (200 V)	12
HF-SP Series Servo Motor (200 V)	14
HF-SP Series Servo Motor (400 V)	15
I	
I/O Interfaces	22
M	
Manual Pulse Generator	31
Model Designation	8
Motors	10
MR-J3-A/B specifications (200 V)	18
MR-J3-A/B specifications (400 V)	19
MR-J3-T specifications (200 V/400 V)	20
N	
Noise Filters	32
O	
Options	
Brake Resistors	32
Buffer Battery	30
Cables and Connectors	24
Noise Filters	32
Parameter Unit	31
Positioning Units	33
System Q Motion CPUs	35
Terminal Blocks	30
P	
Parameter Unit	31
Positioning Units	33
Programming (Software)	31
R	
Real-Time Auto-Tuning	7
S	
Servo Amplifiers	
Connectors	22
Features	6
Model Designation	8
Specifications	18
System Description	4
Types	5
Servo Motors	
Features and Applications	10
Matching Amplifiers	11
Model Designation	9
Motors with electromagnetic Brake	17
Specifications	11
Software	31
Specifications	
Braked Motors	17
Servo Amplifier	18
Servo Motors	12
SSCNET III Configuration	36
T	
Terminal Blocks	30
X	
X-Y Table System Configurations	37

A world of automation solutions



Mitsubishi offer a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines

A name to trust

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation represents space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment, home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on a Mitsubishi automation solution – because we know first hand about the need for reliable, efficient, easy-to-use automation and control.

As one of the world's leading companies with a global turnover of 3.4 trillion Yen (approximately \$30.8 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

Global partner. Local friend.

EUROPEAN BRANCHES

MITSUBISHI ELECTRIC EUROPE B.V. CZECH REPUBLIC
Radlicka 714/113 a
CZ-158 00 Praha 5
Phone: +420 251 551 470

MITSUBISHI ELECTRIC EUROPE B.V. FRANCE
25, Boulevard des Bouvets
F-92741 Nanterre Cedex
Phone: +33 (0)1 / 55 68 55 68

MITSUBISHI ELECTRIC EUROPE B.V. GERMANY
Gothaer Straße 8
D-40880 Ratingen
Phone: +49 (0)2102 / 486-0

MITSUBISHI ELECTRIC EUROPE B.V. IRELAND
Westgate Business Park, Ballymount
IRL-Dublin 24
Phone: +353 (0)1 419 88 00

MITSUBISHI ELECTRIC EUROPE B.V. ITALY
Viale Colleoni 7
I-20041 Agrate Brianza (MI)
Phone: +39 039 / 60 53 1

MITSUBISHI ELECTRIC EUROPE B.V. SPAIN
Carretera de Rubí 76-80
E-08190 Sant Cugat del Vallés (Barcelona)
Phone: 902 131121 // +34 935653131

MITSUBISHI ELECTRIC EUROPE B.V. UK
Travellers Lane
UK-Hatfield, Herts. AL10 8XB
Phone: +44 (0)1707 / 27 61 00

EUROPEAN REPRESENTATIVES

GEVA AUSTRIA
Wiener Straße 89
AT-2500 Baden
Phone: +43 (0)2252 / 85 55 20

TEHNIKON BELARUS
Oktyabrskaya 16/5, Off. 703-711
BY-220030 Minsk
Phone: +375 (0)17 / 210 46 26

Koning & Hartman b.v. BELGIUM
Woluwelaan 31
BE-1800 Vilvoorde
Phone: +32 (0)2 / 257 02 40

AKHNATON BULGARIA
4 Andrej Ljapchev Blvd. Pb 21
BG-1756 Sofia
Phone: +359 (0)2 / 817 6004

INEA CR d.o.o. CROATIA
Losinjska 4 a
HR-10000 Zagreb
Phone: +385 (0)1 / 36940-01/-02/-03

AutoCont C.S., s.r.o. CZECH REPUBLIC
Technologická 374/6
CZ-708 00 Ostrava Pustkovec
Phone: +420 (0)59 / 5691 150

B:TECH, a.s. CZECH REPUBLIC
U Borové 69
CZ-58001 Havlíčkův Brod
Phone: +420 (0)569 777 777

Beijer Electronics A/S DENMARK
Lykkegårdsvej 17, 1.
DK-4000 Roskilde
Phone: +45 (0)46 / 75 76 66

Beijer Electronics Eesti OÜ ESTONIA
Pärnu mnt.160i
EE-11317 Tallinn
Phone: +372 (0)6 / 51 81 40

Beijer Electronics OY FINLAND
Jaakonkatu 2
FIN-01620 Vantaa
Phone: +358 (0)207 / 463 500

UTECO A.B.E.E. GREECE
5, Mavrogenous Str.
GR-18542 Piraeus
Phone: +30 211 / 1206 900

MELTRADE Ltd. HUNGARY
Fertő utca 14.
HU-1107 Budapest
Phone: +36 (0)1 / 431-9726

Kazpromautomatiks Ltd. KAZAKHSTAN
Mustafina Str. 7/2
KAZ-470046 Karaganda
Phone: +7 7212 / 50 11 50

Beijer Electronics SIA LATVIA
Vestienas iela 2
LV-1035 Riga
Phone: +371 (0)784 / 2280

Beijer Electronics UAB LITHUANIA
Savanoriu Pr. 187
LT-02300 Vilnius
Phone: +370 (0)5 / 232 3101

INTEHŠIS srl MOLDOVA
bld. Traian 23/1
MD-2060 Kishinev
Phone: +373 (0)22 / 66 4242

Koning & Hartman b.v. NETHERLANDS
Haarlerbergweg 21-23
NL-1101 CH Amsterdam
Phone: +31 (0)20 / 587 76 00

Beijer Electronics AS NORWAY
Postboks 487
NO-3002 Drammen
Phone: +47 (0)32 / 24 30 00

MPL Technology Sp. z o.o. POLAND
Ul. Krakowska 50
PL-32-083 Balice
Phone: +48 (0)12 / 630 47 00

Sirius Trading & Services ROMANIA
Aleea Lacul Morii Nr. 3
RO-060841 Bucuresti, Sector 6
Phone: +40 (0)21 / 430 40 06

AVTOMATIKA SEVER RUSSIA
Lva Tolstogo str. 7, off. 311
RU-197376 St. Petersburg
Phone: +7 812 / 718 3238

CONSYS RUSSIA
Promyshlennaya st. 42
RU-198099 St. Petersburg
Phone: +7 812 / 325 36 53

Drive Technique STC RUSSIA
1-st Magistralny tupik, 10, bld 1
RU-123290 Moscow
Phone: +7 495 / 786-21 00

ELECTROTECHNICAL SYSTEMS RUSSIA
Derbenevskaya st. 11A, Office 69
RU-115114 Moscow
Phone: +7 495 / 744 55 54

Craft Con. & Engineering d.o.o. SERBIA
Bulevar Svetog Cara Konstantina 80-86
SER-18106 Nis
Phone: +381 (0)18 / 292-24-4/5, 523 962

INEA SR d.o.o. SERBIA
Karadjordjeva 12/260
SER-113000 Smederevo
Phone: +381 (0)26 / 617 163

AutoCont Control, s.r.o. SLOVAKIA
Aleea Laskova 47
SK-02601 Dolny Kubin
Phone: +421 (0)43 / 5868210

CS MTrade Slovensko, s.r.o. SLOVAKIA
Vajanského 58
SK-92101 Piestany
Phone: +421 (0)33 / 7742 760

INEA d.o.o. SLOVENIA
Stegne 11
SI-1000 Ljubljana
Phone: +386 (0)1 / 513 8100

Beijer Electronics AB SWEDEN
Box 426
SE-20124 Malmö
Phone: +46 (0)40 / 35 86 00

Econotec AG SWITZERLAND
Hinterdorfstr. 12
CH-8309 Nürensdorf
Phone: +41 (0)44 / 838 48 11

GTS TURKEY
Darulaceze Cad. No. 43 KAT. 2
TR-34384 Okmeydanı-Istanbul
Phone: +90 (0)212 / 320 1640

CSC Automation Ltd. UKRAINE
15, M. Raskova St., Fl. 10, Office 1010
UA-02002 Kiev
Phone: +380 (0)44 / 494 33 55

SHERF Motion Techn. Ltd. ISRAEL
Rehov Hamerkava 19
IL-58851 Holon
Phone: +972 (0)3 / 559 54 62

CBI Ltd. SOUTH AFRICA
Private Bag 2016
ZA-1600 Isando
Phone: +27 (0)11 / 928 2000



Mitsubishi Electric Europe B.V. /// FA - European Business Group /// Gothaer Straße 8 /// D-40880 Ratingen /// Germany
Tel.: +49(0)2102-4860 /// Fax: +49(0)2102-4861120 /// info@mitsubishi-automation.com /// www.mitsubishi-automation.com

Specifications subject to change /// Art.-Nr. 209265-A /// 09.2008
All trademarks and copyrights acknowledged.