MITSUBISHI ELECTRIC

Changes for the Better

Automating the World

FACTORY AUTOMATION

Mitsubishi Electric AC Servo System MELSERVO-JET

Innovate Together

MITSUBISHI ELECTRIC SERVO SYSTEM

MELSERVO-JET

Our Factory Automation business is focused on "Automating the World" to make it a better, more sustainable environment supporting manufacturing and society, celebrating diversity and contributing towards an active and fulfilling role.

Mitsubishi Electric is involved in many areas including the following:

Energy and Electric Systems
A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance
Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems
Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems
Maximizing productivity and efficiency with cutting-edge automation technology.

SUSTAINABLE DEVELOPMENT GOALS

The Mitsubishi Electric Group is actively solving social issues, such as decarbonization and labor shortages, by providing production sites with energy-saving equipment and solutions that utilize automation systems, thereby helping towards a sustainable society.

Contents

OVERVIEW

Compliance with the indicated global standards and regulations is current as of the release date of this catalog.
Contact your local sales office for the latest information.


MELSERVO-JET
MR-JET-10G
MR-JET-100G
SRV
SON
N/W
RUN
ERR
LA A
LA B
CHARGE

Create new value with MELSERVO-JET. Unlock performance with a total drive solution.

Optimize system performance

Easy, Simple & Practical

- Simple top & bottom wiring
- Quick tuning
- Unified height and depth across all servo amplifier capacities
- Safety sub-function through direct connection

Superior Performance

- Speed frequency response: 3.2 kHz
- Encoder resolution: 24 bit
- Maximum torque: 350 %

Better Flexibility

- Supports EtherCAT®
- Batteryless absolute position encoder

Crafted from a different perspective, increase your productivity with a next

The MELSERVO-JET Series servo system performs basic functions at a high level, while its high-speed, high-precision capabilities help increase the productivity of your machines.

CC-Link IE TSN

MELSEC iQ-F series　MELSEC iQ-R series

FX5-SSC-G　RD78GH　RD78G

Motion Module

Minimum operation cycle *1	Max. number of control axes *1
31.25 μs	256 axes

*1. The values are applicable when RD78GH is used.

CC-Link IE TSN　EtherCAT

Personal Computer Embedded Type Servo System Controller

Motion Control Software SWM-G(-N1)

Minimum operation cycle *2	Max. number of control axes
125 μs	128 axes

*2. The minimum operation cycle depends on the number of control axes and the CPU of the personal computer.

CC-Link IE TSN

CC-Link IE TSN supports TCP/IP communications and applies it to industrial architectures through its support of TSN enabling real-time communications. With its flexible system architecture and extensive setup and troubleshooting features make CC-Link IE TSN ideal for building an IIoT infrastructure across the manufacturing enterprise.

* TSN: Time Sensitive Networking
* IIoT: Industrial Internet of Things

CC-Link IE TSN

Servo System Controllers

Motion modules and Motion Control Software are available in our product lines. Select a controller suitable for your machine.

Motion Modules

The following operation modes are selectable: Simple Motion mode that enables utilization of existing projects and PLCopen® motion control FB mode that enables structured programming. MELSEC iQ-R series Motion modules utilize a multi-core processor to achieve enhanced performance.

Motion Control Software

Installed on a personal computer, Motion Control Software can perform motion control.

generation servo system

CC-Link IE TSN EtherCAT®

Servo amplifiers
MR-JET-G (CC-Link IE TSN)
MR-JET-G-N1 (EtherCAT®)

Speed frequency response	Minimum communication cycle
3.2*3 kHz	125 μs

*3. This value is applicable when an HK series servo motor is used.

HK series rotary servo motor NEW

Max. speed *4	Encoder	Encoder resolution
6700 r/min	Batteryless absolute position encoder	24 bits

*4. The speed varies by the model type.

Servo Amplifiers

The MELSERVO-JET series high-performance servo amplifiers feature a unique control engine that is more powerful than ever before.
These servo amplifiers can connect to CC-Link IE TSN to perform high-speed, high-precision control.
The servo amplifiers also support CC-Link IE Field Network Basic.
EtherCAT® is supported by MR-JET-G-N1.

MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-JET

Rotary Servo Motors

The HK series rotary servo motors are equipped with a 24-bit resolution batteryless absolute position encoder as standard.

Batteryless Absolute Position Encoders

Mitsubishi Electric's unique multi-revolution detection method allows the saving of absolute position data without a battery.

Compact Servo Motors

The HK series servo motor (HK-KN13) reduces the motor length by approximately 24 % compared to the previous model in HG-KN series.

Single Connector/One-Touch Lock/Single Cable Type

The servo motor power supply, encoder, and electromagnetic brake can be connected using only a single cable.
The one-touch lock makes wiring easy.

Innovate Together

CONTROLLER

Programmable Controllers

MELSEC iQ-R

MELSEC iQ-F

CC-Link IE TSN-Compatible Motion Modules

RD78G

RD78GH

FX5-SSC-G

INTERFACE

CC-Link IE TSN

CC-Link IE TSN

SERVO AMPLIFIER

CC-Link IE TSN-Compatible Servo Amplifiers

MR-JET-G

* MR-JET-G is also compatible with CC-Link IE Field Network Basic.

SERVO MOTOR

Rotary Servo Motors

NEW

Small capacity, low inertia

HK-KN Series

Capacity: 0.05 to 2 kW

NEW

Medium capacity, medium inertia

HK-SN Series

Capacity: 3.5 to 7 kW

NEW

Small and medium capacity, high inertia

HK-FN Series

Capacity: 0.1 to 3 kW

SOLUTION

e-F@ctory

We take full advantage of Mitsubishi Electric's technological capability that achieved development of FA devices, along with our connectivity technology which makes it possible to connect FA with IT.
e-F@ctory optimizes manufacturing overall by connecting all devices and equipment, and then analyzing and utilizing the vast amount of data collected.

Create new value with MELSERVO-JET.
Unlock performance with a total drive solution.

CC-Link IE TSN-Compatible Motion Control Software

SWM-G(-N1)

* SWM-G-N1 is also compatible with EtherCAT®.

SOFTWARE

- MELSOFT **GX Works3**
- MELSOFT **MR Configurator2**
- MELSOFT **Motorizer**

Graphic Operation Terminals

GOT2000

EtherCAT®

EtherCAT®

EtherCAT®-Compatible Servo Amplifiers

MR-JET-G-N1

* Use an EtherCAT®-compatible master module.

Rotary Servo Motors

Small capacity, low inertia
HG-KNS Series
Capacity: 0.1 to 0.75 kW

Medium capacity, medium inertia
HG-SNS Series
Capacity: 0.5 to 3.0 kW

Linear Servo Motors

Core type
LM-H3 Series
Rating: 70 to 720 N

Core type
LM-AJ Series
Rating: 68.1 to 446.8 N

Coreless type
LM-AU Series
Rating: 28 to 350 N

e-F@ctory Alliance

Through powerful alliances between Mitsubishi Electric, who boasts a broad-ranging product appeal in the FA domain, and partners that participate in the FA partnership program (e-F@ctory Alliance) promoted by Mitsubishi Electric, we will achieve new business creation and new monozukuri.

Product Lines

■Servo System Controllers

Servo system controllers		Maximum number of control axes	Features
Motion modules	RD78G RD78GH 	RD78G: 4, 8, 16, 32, 64 RD78GH: 128, 256 (Note 2)	MELSEC iQ-R series CC-Link IE TSN-compatible Motion module • Performs motion control (positioning, synchronous, cam, speed, and torque control) • Maximum number of connectable stations: 120 • Minimum operation cycle RD78G: 62.5 [µs], RD78GH: 31.25 [µs] (Note 3) • Number of slots occupied RD78G: 1, RD78GH: 2
	FX5-SSC-G 	FX5-40SSC-G: 4 FX5-80SSC-G: 8	MELSEC iQ-F series CC-Link IE TSN-compatible Motion module • Performs motion control (positioning, synchronous, cam, speed, and torque control) • Maximum number of connectable stations FX5-40SSC-G: 20, FX5-80SSC-G: 24 • Minimum operation cycle: 500 [µs] • Number of connectable modules: 4 modules/FX5U or FX5UC
Motion Control Software	SWM-G(-N1) (Note 4) 	16, 32, 64, 128	CC-Link IE TSN-compatible Motion Control Software for personal computers (Note 1) • Performs motion control (positioning, synchronous, cam, speed, and torque control) • Maximum number of connectable stations: 128 • Includes Real Time OS (RTX64), which enables SWM-G to perform a real-time operation without being affected by the operation on Windows® • Programming language: Visual C++®

Notes: 1. A personal computer and Visual Studio® are not included and must be prepared by the user.
2. When MR-JET-G servo amplifiers are used for all axes, the maximum number of the control axes is 120.
3. When an MR-JET-G is connected to the controller, the minimum operation cycle is 125 µs.
4. SWM-G-N1 is also compatible with EtherCAT®.

■Servo Amplifiers

●: Supported –: Not supported

Servo amplifiers	Power supply specifications	Rated output [kW] (Note 1)	Command interface (Note 2)	Control mode			Fully closed loop control	Safety sub-functions
				Position	Velocity	Torque		
MR-JET-G 	200 V AC	0.1, 0.2, 0.4, 0.75, 1, 2, 3	CC-Link IE TSN	●	●	●	●	–
MR-JET-G4-HS 	400 V AC	0.6, 1, 2, 3.5, 5, 7						●
MR-JET-G-N1 	200 V AC	0.1, 0.2, 0.4, 0.75, 1, 2, 3	EtherCAT®					–
MR-JET-G4-HSN1 	400 V AC	0.6, 1, 2, 3.5, 5, 7						●

Notes: 1. The value listed is the servo amplifier rated output. Refer to "Combinations of Rotary Servo Motors and Servo Amplifiers" for compatible servo motors.
2. MR-JET-G is also compatible with CC-Link IE Field Network Basic.

■Rotary Servo Motors

●: Supported

Rotary servo motor series		Rated speed (maximum speed) [r/min] (Note 2)	Rated output [kW] (Note 4)	With an electro-magnetic brake (B)	With an oil seal (J)	IP rating (Note 1)	Features
HK series	HK-KN series 	2000/3000 (3000/6700)	0.05, 0.1, 0.15, 0.2, 0.4, 0.6, 0.75,1.0, 1.5, 2.0 0.1, 0.2, 0.4, 0.6, 0.75, 1.0, 1.5, 2.0	●	●	IP67	Small capacity, low inertia Batteryless absolute position encoder Has a single connector
	HK-FN series 	1500/2000/3000 (2300/4000/6700)	0.1, 0.2, 0.4, 0.75, 1.0, 1.5, 2.0, 3.0	●	●	IP67	Small and medium capacity, high inertia Batteryless absolute position encoder Has a single connector (0.1 to 0.75 kW)
	HK-SN series 	3000 (6000)	3.5, 5.0, 7.0	●	●	IP67	Medium capacity, medium inertia Batteryless absolute position encoder
HG series	HG-KNS series 	3000 (6000)	0.1, 0.2, 0.4, 0.75	●	●	IP65	Small capacity, low inertia Absolute position encoder (Note 3)
	HG-SNS series 	2000 (3000)	0.5, 1.0, 1.5, 2.0, 3.0	●	●	IP67	Medium capacity, medium inertia Absolute position encoder (Note 3)

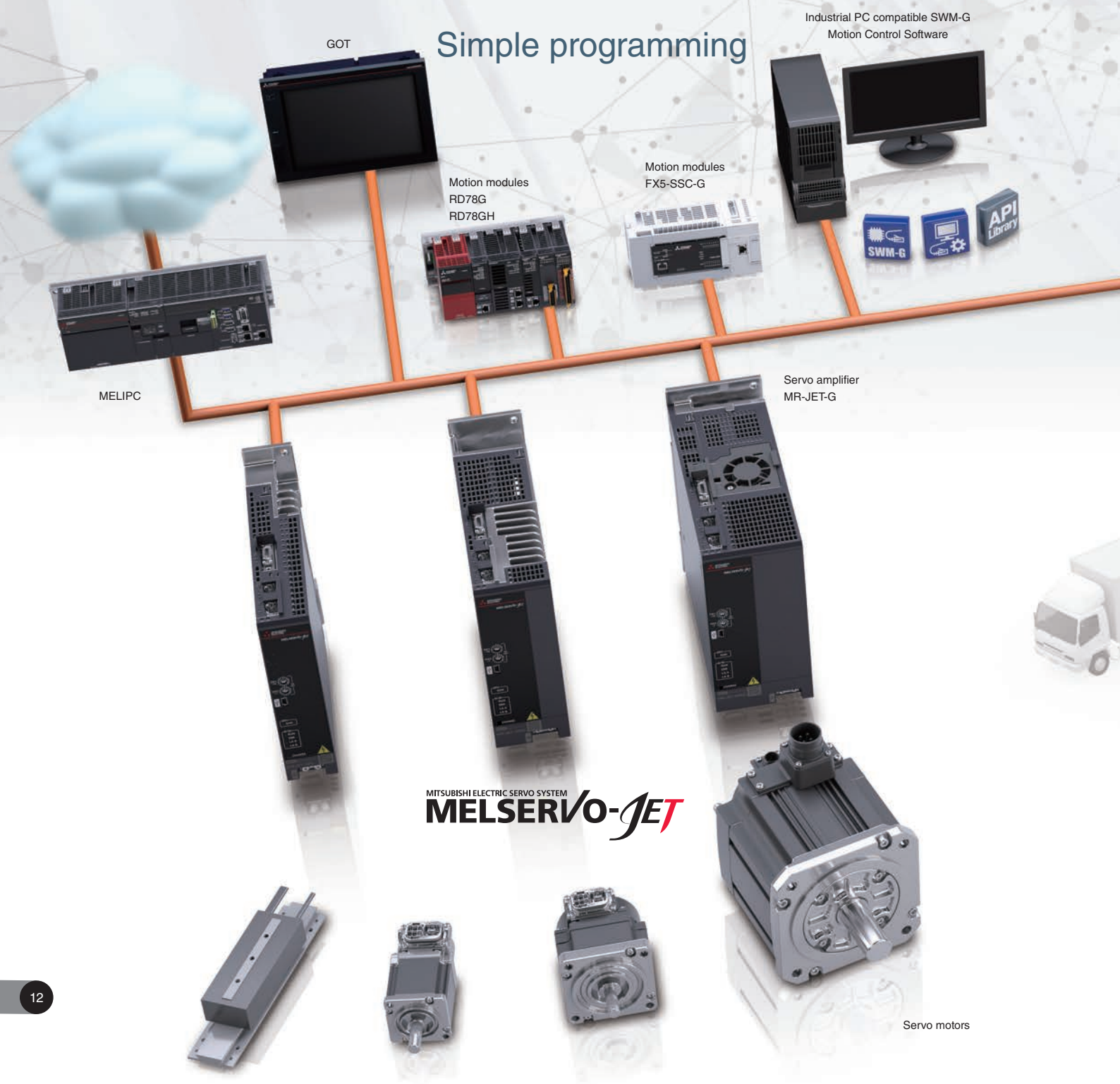
Notes: 1. The shaft-through portion is excluded.
2. The value in brackets indicates the maximum speed. The speed varies by the model type. Refer to "Rotary Servo Motors Specifications" for details.
3. A battery is required when configuring an absolute position detection system.
4. ▭ : For 400 V.

■Linear Servo Motors

Linear servo motor series		Maximum speed [m/s]	Continuous thrust [N]	Maximum thrust [N]	Features	Application examples
Core type	LM-H3 series 	3.0	70, 120, 240, 360, 480, 720	175, 300, 600, 900, 1200, 1800	Suitable for space-saving Compact size and high thrust Maximum speed: 3 m/s	Mounters Wafer cleaning systems FPD assembly machines Material handlings
	LM-AJ series 	2.0 to 6.5	68.1, 117.0, 136.2, 174.5, 223.4, 234.0, 348.9, 446.8	214.7, 369.0, 429.4, 550.2, 704.5, 738.1, 1100.4, 1409.1	Low installation height, and suitable for compact X-Y tables	Semiconductor manufacturing systems FPD assembly machines
Coreless type	LM-AU series 	2.0 to 4.5	28, 44, 57, 85, 88, 113, 132, 176, 264, 350	122, 274, 280, 411, 549, 561, 842, 970, 1684, 1764	No cogging and small speed fluctuation No magnetic attraction force structure extends life of the linear guides.	Screen printing systems Scanning exposure systems Inspection systems Material handlings

Construct a high-performance servo system using our extensive product line

We understand that each system is different and has unique drive control requirements.
To meet these demands, we have expanded the product line for our next-generation servo system to offer engineering software, servo system controllers, servo amplifiers, servo motors, and a variety of other components.
Mitsubishi Electric is dedicated to satisfying all of our customers' needs.



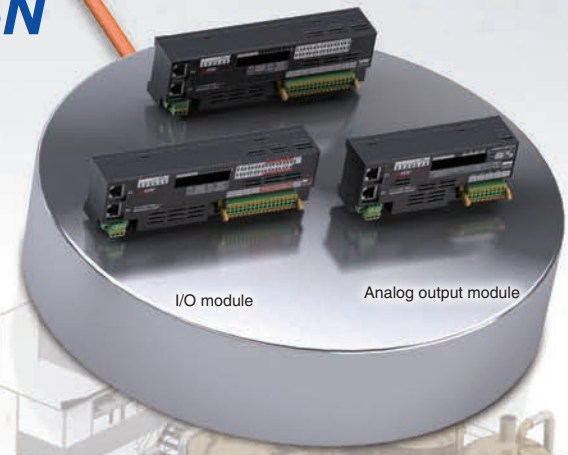
Collaborating with our extensive group of partners allows us to flexibly support your system needs

Servo systems are constructed using iQ Platform devices such as controllers, servo drivers, actuators, and sensors, and collaboration with our partner companies allows us to expand the number of possibilities available to customers. For example, partner products such as stepping motors, direct drive motors, vision systems, and various types of software are available to keep your equipment on the cutting edge.

Collaboration with partners

Single network

CC-Link IE TSN


Safety I/O combined module

I/O module

Analog output module


Inverter

CC-Link IE TSN safety communication function Deterministic control even when mixed with TCP/IP communication and safety control communication

CC-Link IE TSN enables mixing of safety and non-safety communications.*1 Safety sub-functions (STO, SS1, SS2, SOS, SLS, SBC, SSM, SDI, SLI, SLT)*2 are also supported for drive-control devices that are on the network.
Deterministic performance of cyclic communication is maintained even when mixed with slower information data (non real-time). This enables TCP/IP communication devices to be used without affecting overall control.

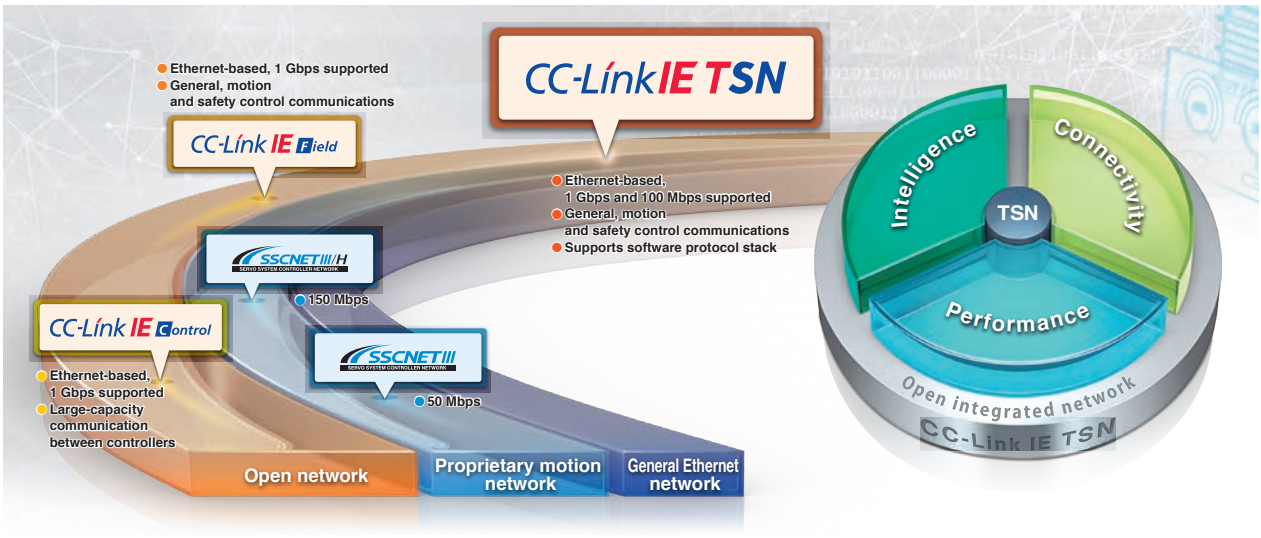
*1. Some devices cannot be connected to CC-Link IE TSN depending on the system configuration.
*2. Supported safety sub-functions vary depending on the system configuration.

Open integrated networking across the manufacturing enterprise

CC-Link IE TSN

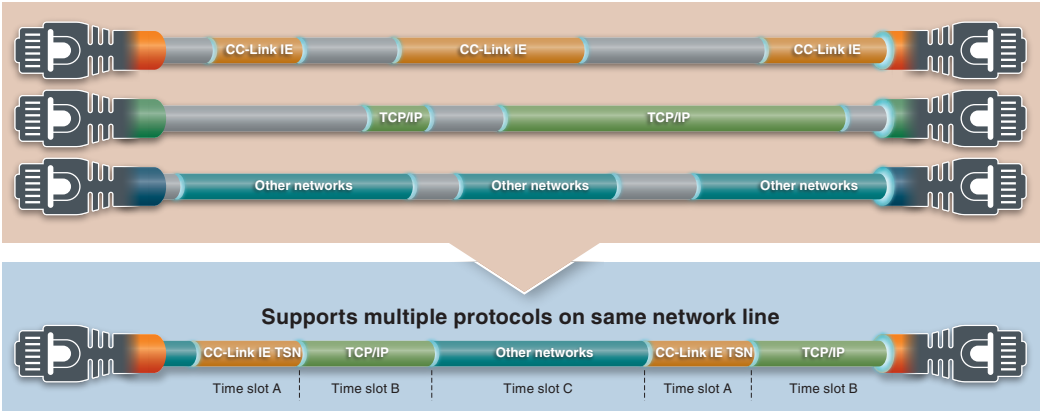
CC-Link IE TSN supports TCP/IP communications and applies it to industrial architectures through its support of TSN enabling real-time communications. With its flexible system architecture and extensive setup and troubleshooting features make CC-Link IE TSN ideal for building an IIoT infrastructure across the manufacturing enterprise.

* TSN: Time Sensitive Networking
* IIoT: Industrial Internet of Things



Real-Time Network Performance Even When Integrated with Information Data

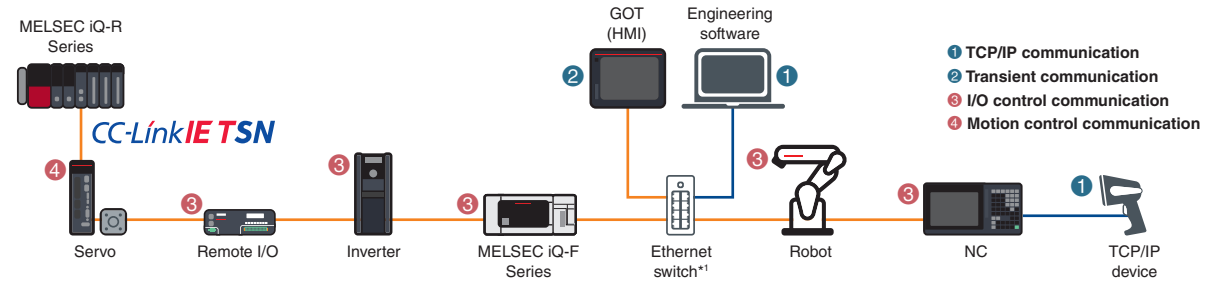
TSN technology enables mixing of deterministic communications with IT system information data on the same network. Giving higher priority to CC-Link IE TSN cyclic communications and TCP/IP communications by allocating increased network bandwidth, devices using general Ethernet communications can be connected on the same network while maintaining real-time control communication performance.

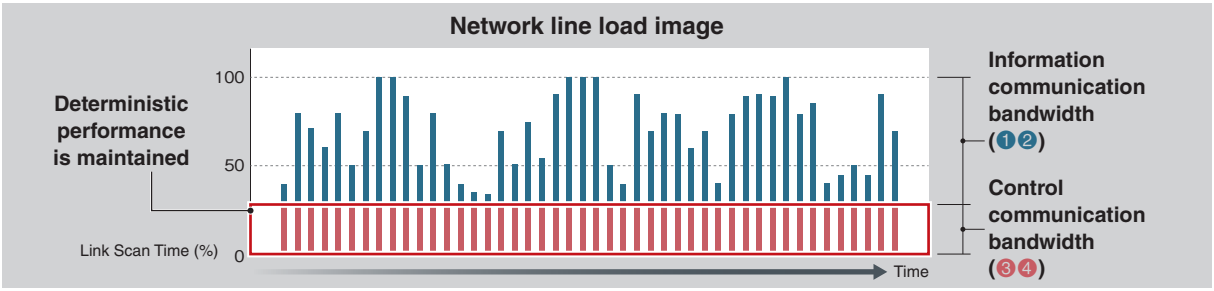


Deterministic Control Even When Mixed with TCP/IP Communication

Deterministic performance of cyclic communication is maintained even when mixed with slower information data (non real-time). This enables TCP/IP communication devices to be used without affecting overall control.

* Some devices cannot be connected to CC-Link IE TSN depending on the system configuration.

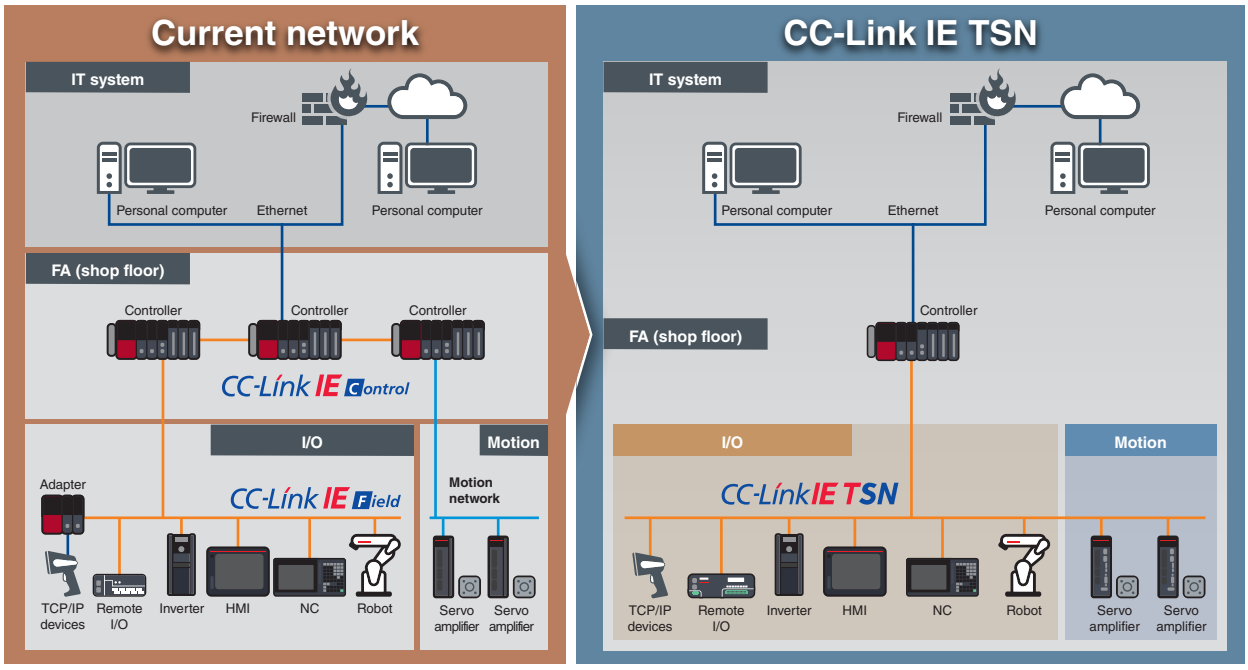




*1. Class B switching hub supporting CC-Link IE TSN recommended by the CC-Link Partner Association.

Integrated Network

Current network systems use multiple networks to enable communication between IT and control systems on the shop floor.
CC-Link IE TSN is a one-stop solution for integrating different networks, thereby realizing flexibility in topology and reducing wiring cost.

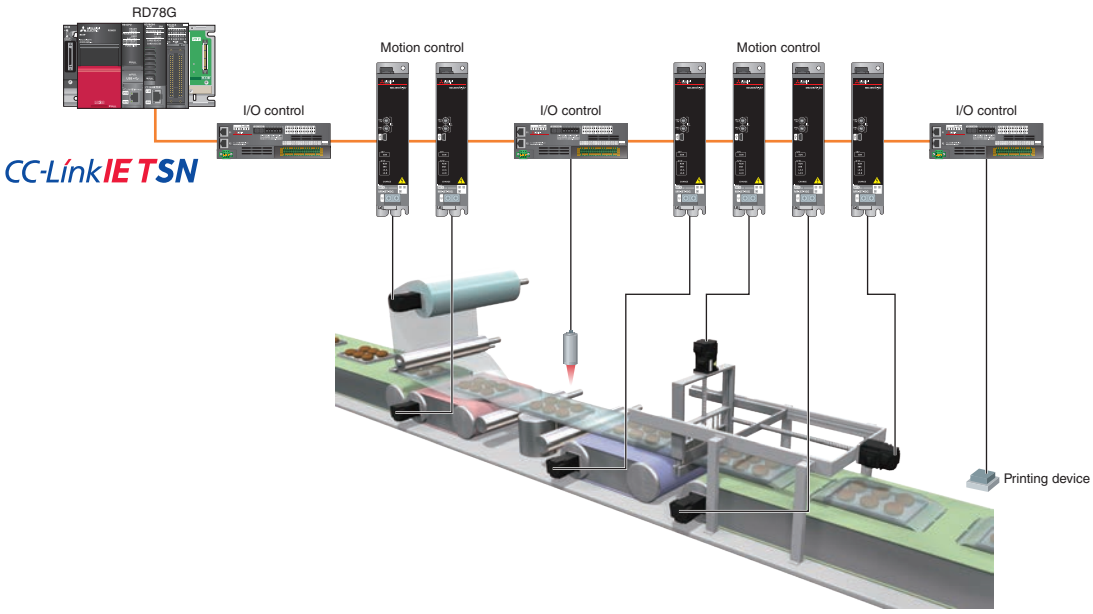


Network configuration example (includes functions and products planned for future support/release.)

High-Speed, High-Accuracy Motion Control

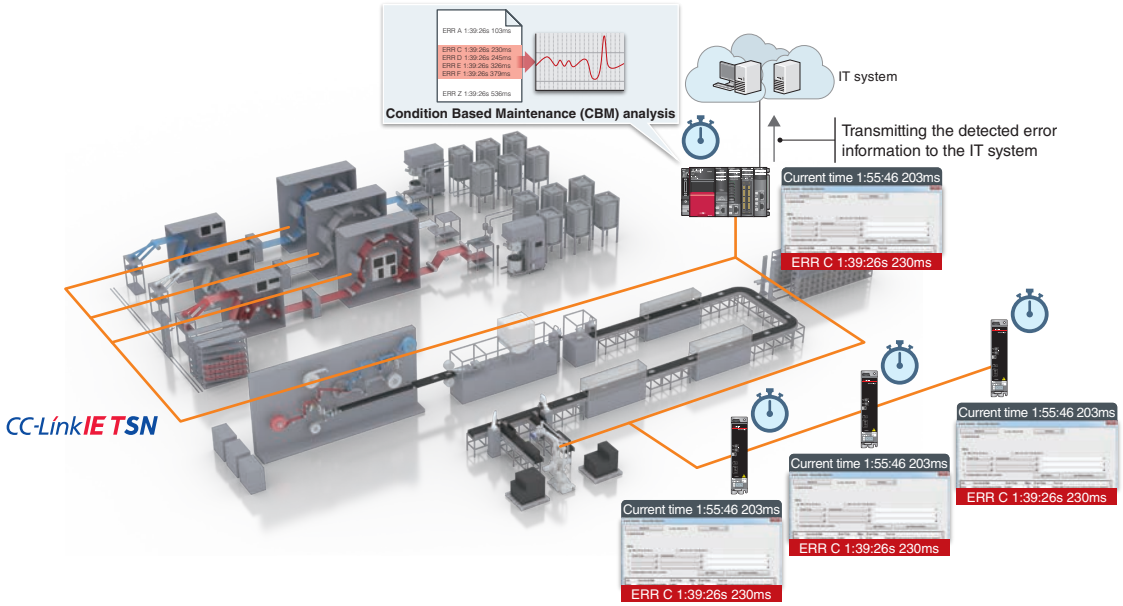
CC-Link IE TSN controls I/O modules while also maintaining high-speed motion control. The single network boosts machine performance.

- Motion control (high-speed processing)
- I/O control (low-speed processing)



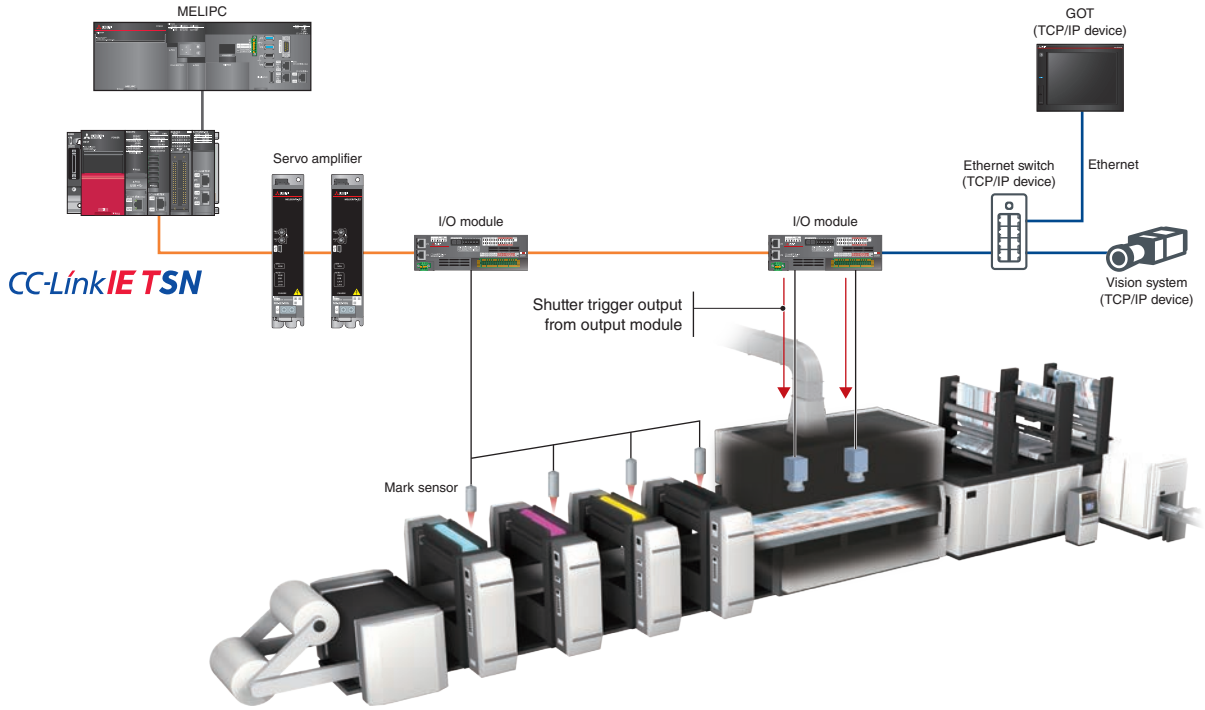
Time Synchronization

Set time is completely synchronized among servo amplifiers, Motion modules, and PLC CPUs. This time synchronization enables accurate recording of the event history in chronological order, making it simple to identify the cause of errors.



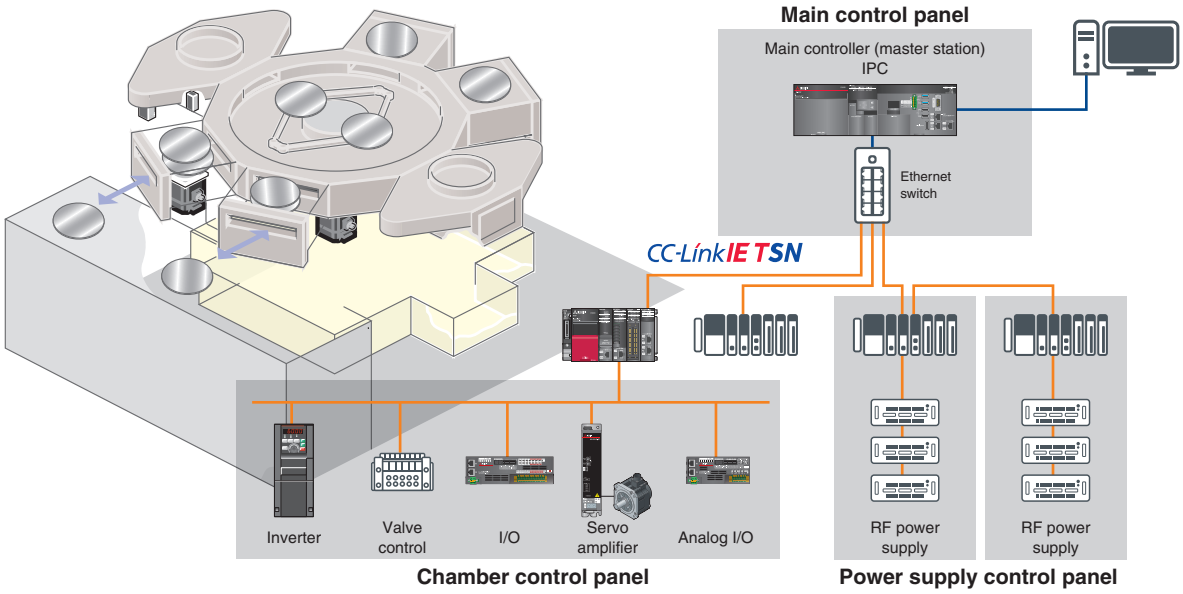
Seamless Connectivity Between TCP/IP Devices and a Servo System

TCP/IP communication (information communication) can be mixed in the same line with the real-time control communications of CC-Link IE TSN.
CC-Link IE TSN device stations and TCP/IP devices can be connected on the same network, achieving a flexible and integrated network system.
Note that the TCP/IP devices must be connected after servo amplifiers and I/O modules.



Large-Capacity Data Communications

CC-Link IE TSN is a high-speed, large-capacity 1 Gbps communications network that is capable of sending and receiving large amounts of data, such as manufacturing, quality, and control data from the production process. The network can transmit large recipe data or traceability data at high speeds without degrading the performance of servo system communications. In addition, Ethernet supported devices can directly and seamlessly connect to controllers on the same network line.



Network configuration example (includes functions and products planned for future support/release.)

An engineering environment that provides common, consistent usability throughout all product development phases

Programmable Controller Engineering Software

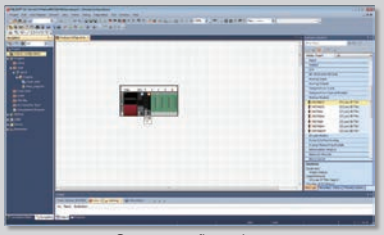
MELSOFT GX Works3

Program creation is largely dependent on the ability of the programmer; therefore, an enormous amount of time is often spent on creating a servo program where a high level of programming expertise is required.
"MELSOFT GX Works3" introduces a more intuitive, efficient, and user-friendly programming environment that revolutionizes the programming process and minimizes hassles.

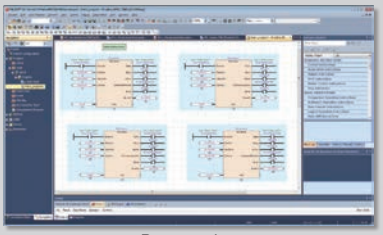
Engineering Environment for Maximizing Your Machine Performance

- Mitsubishi Electric offers a complete, consistent engineering environment which covers all aspects of the product development cycle - from network configuration all the way to programming with function blocks, startup, and maintenance.

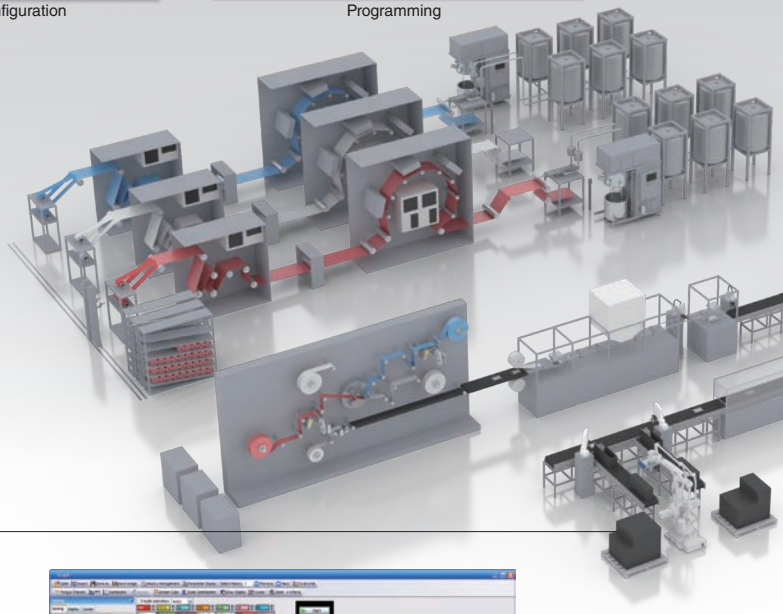
System Design → **Programming**


System configuration


Network configuration

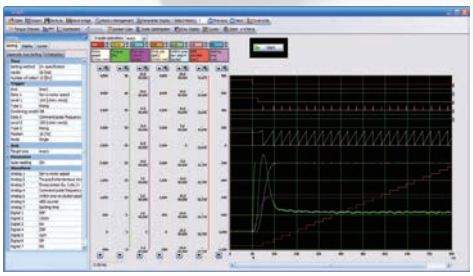

Programming

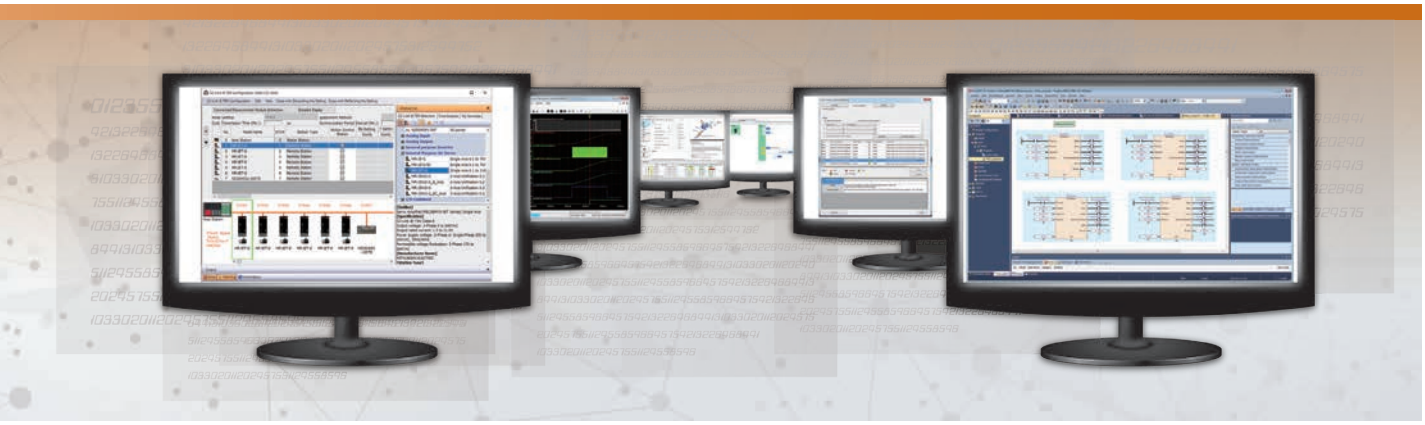
e-Manual



Useful Servo Software

[MELSOFT MR Configurator2]
The software has a variety of features which help users start up and conduct maintenance for servo amplifiers. Parameter settings, monitor display, diagnosis, test operation, and servo adjustments are easily performed.

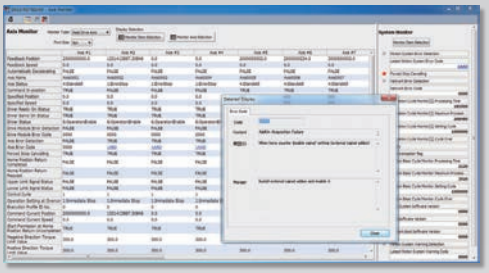




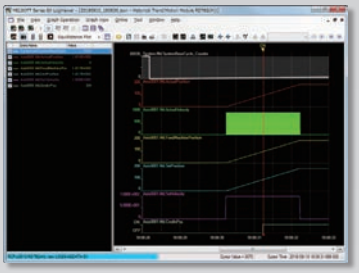
● All-in-one engineering platform MELSOFT GX Works3 allows you to set different modules in a single project, including the setting of a wide range of areas from servo amplifier parameters to PLC CPU data.

Debug

Maintenance

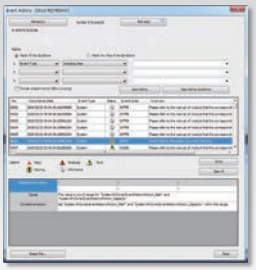


Monitor



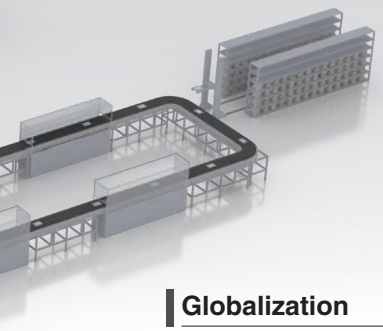
Real-time monitor

Servo adjustment*1



Event history

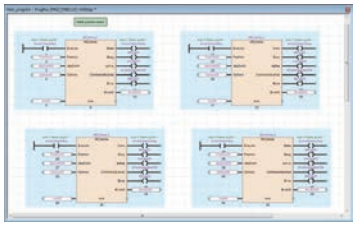
*1. The servo adjustment is enabled via MR Configurator2.



Globalization

[PLCopen® Motion Control FB]

PLCopen® Motion Control FB is a standardized interface, and therefore people other than the program designer can understand the programming, leading to reduced design and maintenance time.

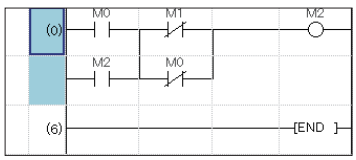


[Conforms to IEC 61131-3]

MELSOFT GX Works3 realizes structured programming such as ladder and ST, making project standardization across multiple users even easier.

[Multi-language support for global operations]

To adhere to today's global production needs, MELSOFT GX Works3 supports multi-language features at various levels, from the multiple language software menu system to device comment language switching features.
Supported languages: English, Japanese, and Chinese.



Heritage

Simple Motion Mode Simple Motion

The Simple Motion mode is an operation mode that enables the Motion module to utilize an existing project for driving servo amplifiers via CC-Link IE TSN. Reusing existing projects helps reduce program development time.

CC-Link IE TSN
Motion Module

MELSEC iQ-R series
RD78G

MELSEC iQ-F series
FX5-SSC-G

Motion profile table

Advanced synchronous control

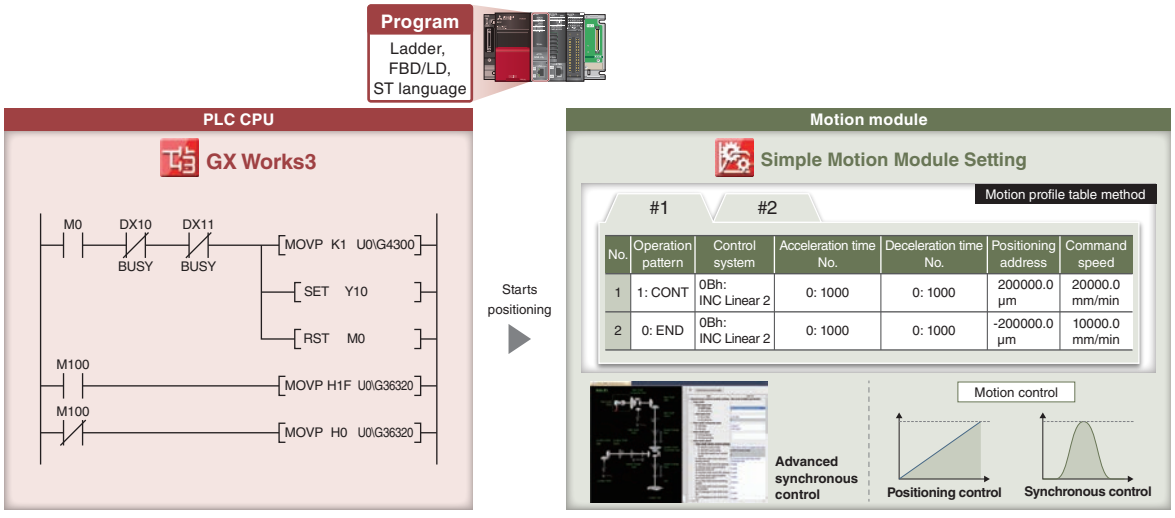
Digital oscilloscope

Select

Features of Simple Motion Mode

- Positioning control can be easily performed with motion profile tables. Synchronous control can be executed only with parameter settings.
- Remote devices are connected via CC-Link IE TSN and programmed from PLC CPUs.
- Data that is synchronized with the motion operation cycle can be collected with the digital oscilloscope. The collected data is displayed in waveforms for operation verification.

An example of programming by a PLC CPU



Product Lines

CC-Link IE TSN
MELSEC iQ-R series

RD78G4: 4 axes
RD78G8: 8 axes
RD78G16: 16 axes

CC-Link IE TSN
MELSEC iQ-F series

FX5-40SSC-G: 4 axes
FX5-80SSC-G: 8 axes

PLCopen® Motion Control FB Mode PLCopen®

The PLCopen® motion control FB mode is an operation mode that supports programming with PLCopen® Motion Control FBs, enabling structured/component programming for standardization.
When selecting this mode, the Motion module executes motion control with various advanced technologies such as programming using PLCopen® Motion Control FBs in ST language and logging of motion control data.

Select

CC-Link IE TSN
Motion Module
MELSEC iQ-R series
RD78GH
RD78G

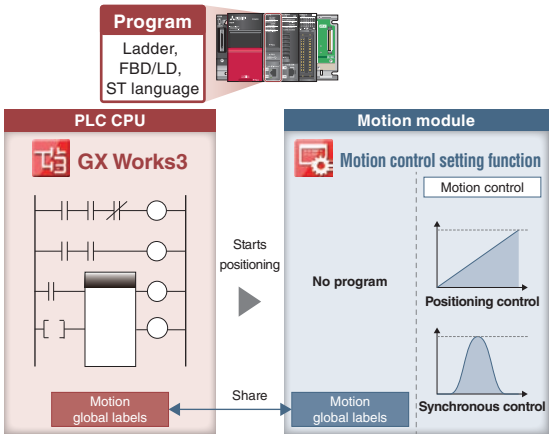
- ST language
- PLCopen® Motion Control FB
- Logging
- Advanced synchronous control FB

Features of PLCopen® Motion Control FB Mode

- The Motion modules are programmed in ST language. PLC CPUs are in ladder, FBD/LD, and ST language.
- The library of PLCopen® Motion Control FBs, which are compliant with international standards, is available for programming.
- Users can analyze the operation status with logging data on GX LogViewer, which improves debug efficiency.

An example of programming by PLC CPU

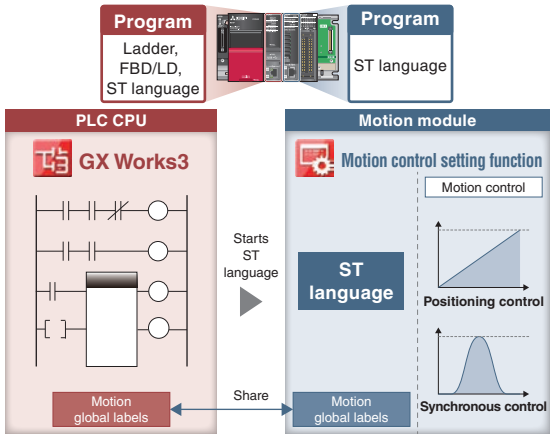
[Programming by PLC CPU only]



A PLC CPU program starts operation of the Motion module, eliminating the need for users to create another program for the Motion module, reducing programming burden.

An example of programming by each module

[Programming by PLC CPU and Motion modules]



Motion modules can execute operations in place of the PLC CPU. This reduces the operation burden on the PLC CPU and results in a shorter cycle time.

Product Lines

CC-Link IE TSN
MELSEC iQ-R series

RD78GHV: 128 axes
RD78GHW: 256 axes

CC-Link IE TSN
MELSEC iQ-R series

RD78G4: 4 axes
RD78G8: 8 axes
RD78G16: 16 axes
RD78G32: 32 axes
RD78G64: 64 axes

Taking evolution to the next step with Simple Motion mode

Simple Motion Mode Simple Motion

CC-Link IE TSN
Motion Module

MELSEC iQ-R series
RD78G

MELSEC iQ-F series
FX5-SSC-G

Combined with a CC-Link IE TSN-compatible servo amplifier, the Motion modules create a high-performance servo system that improves machine capability.

- Connects remote I/O modules and FR-A800-GN inverters via CC-Link IE TSN.
- Connects TCP/IP devices, enabling a flexible system configuration.
- Possible to reuse the existing projects of Simple Motion modules.

Product Lines Simple Motion

MELSEC iQ-R series

RD78G4
RD78G8
RD78G16

- Maximum number of control axes: RD78G16: 16 axes/module
- Minimum operation cycle*1: 250 [µs]

MELSEC iQ-F series

FX5-40SSC-G
FX5-80SSC-G

- Maximum number of control axes: FX5-80SSC-G: 8 axes/module
- Minimum operation cycle*1: 500 [µs]
- Maximum number of connected modules*2: 4 modules/system

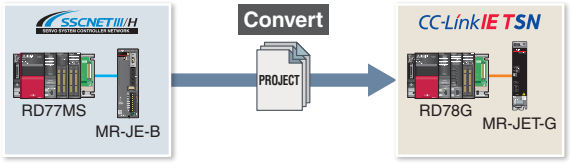
*1. The operation cycle varies by the number of control axes and the models.
*2. This refers to the total number of the Motion modules and one FX5-CCLGN-MS (master station).

Reuse of Existing Projects

The existing projects of a Simple Motion module can be reused. This enables reduction in program development time.

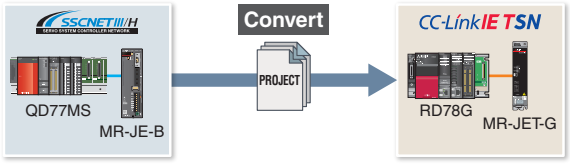
RD77MS➡RD78G

Select [Change Module] in the navigation menu of GX Works3 to convert the Simple Motion module project to a Motion module project.
After the conversion, set the network parameters, servo amplifier parameters, and other parameters.



QD77MS➡RD78G

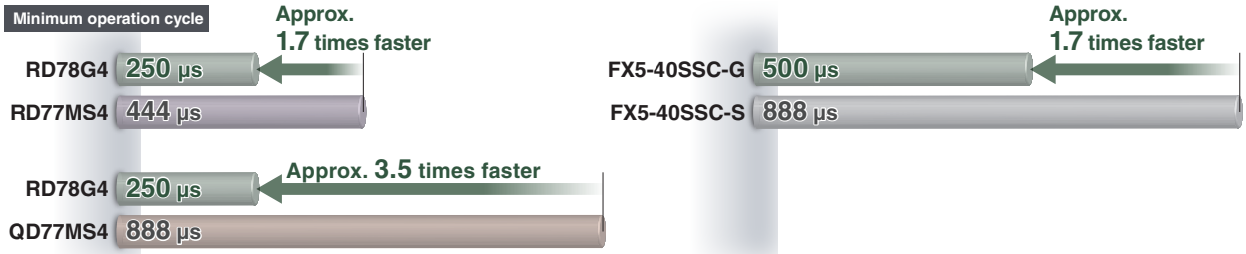
Select [Import Simple Motion Module Data] in the navigation menu of GX Works3 to import the parameters of QD77MS.
After the import, set the network parameters, servo amplifier parameters, and other parameters.



Improved Performance

Simple Motion

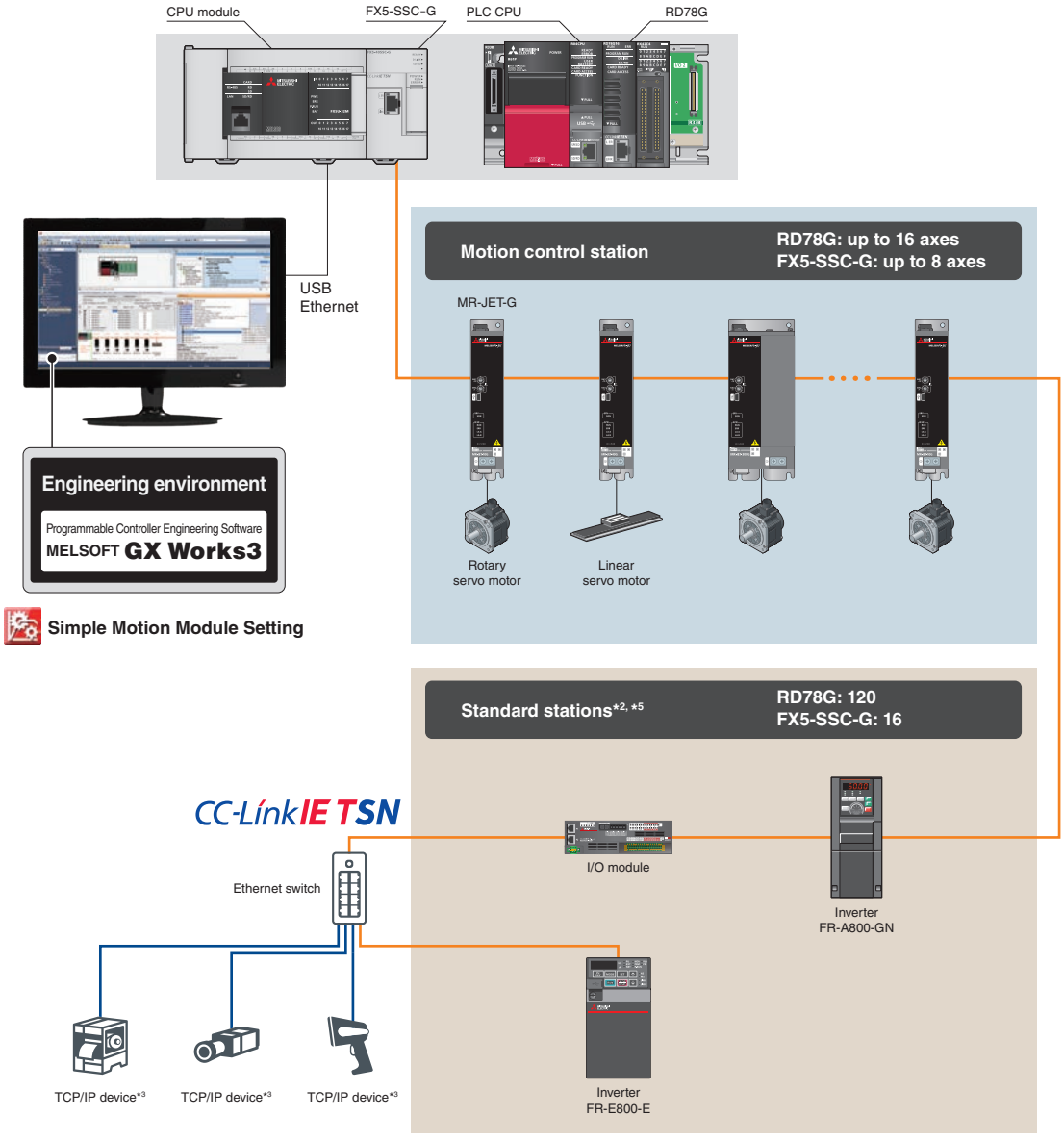
The minimum operation cycle of RD78G in Simple Motion mode is approximately 1.7 to 3.5 times faster than that of the previous models. The data from the servo amplifiers and input/output signals can be received at high speeds, which reduces the cycle time.



System Configuration

Simple Motion

The Motion module can function as a master station of CC-Link IE TSN.*1
This feature enables users to create a system more flexibly by connecting various devices, such as servo amplifiers, remote I/O modules, and TCP/IP devices, to the Motion module.*4



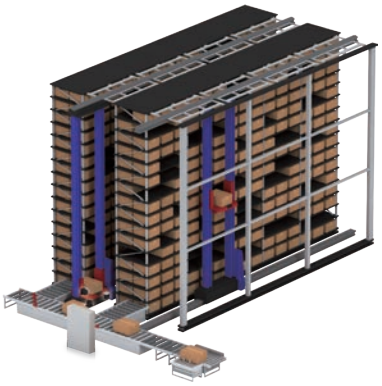
*1. Sub-master station is not supported.
*2. Standard stations refer to device stations other than motion control stations on CC-Link IE TSN.
*3. TCP/IP devices are not included in the standard stations.
*4. Refer to manuals for precautions when CC-Link IE TSN Class B and A devices are mixed.
*5. RD78G can connect up to 120 stations, which is the total number of the motion control stations and standard stations. FX5-SSC-G can connect 16 standard stations and the motion control stations.

Positioning Control

Simple Motion

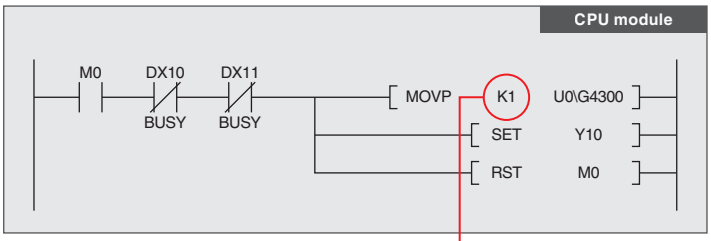
Positioning control is easily executed using a motion profile table.

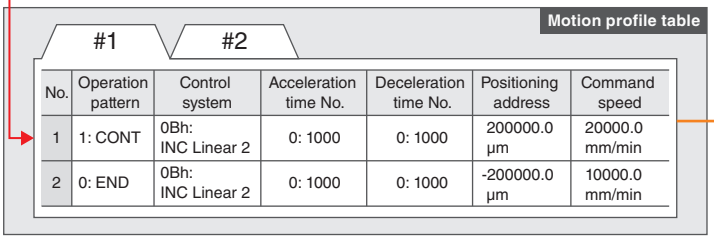
- To meet various application needs, the Motion module offers various types of positioning control, such as linear interpolation, 2-axis circular interpolation, fixed-pitch feed, and continuous path control.
- Positioning control can be executed easily by setting the positioning address, the speed, and other setting items in a sequence program.
- Powerful sub-functions, such as M-code output, skip, speed change, and target position change functions, are available.



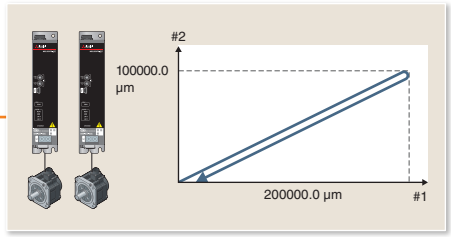
Programming

The Motion module easily executes positioning operation with the instruction in a sequence program that starts a positioning data of the motion profile table.



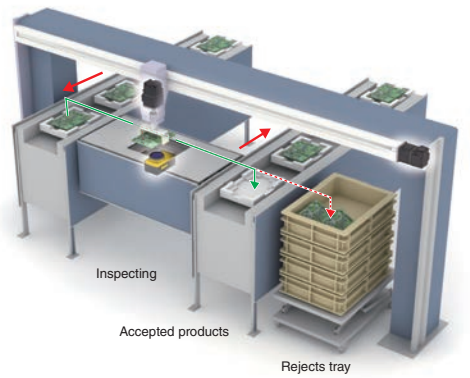


No.	Operation pattern	Control system	Acceleration time No.	Deceleration time No.	Positioning address	Command speed
1	1: CONT	0Bh: INC Linear 2	0: 1000	0: 1000	200000.0 µm	20000.0 mm/min
2	0: END	0Bh: INC Linear 2	0: 1000	0: 1000	-200000.0 µm	10000.0 mm/min



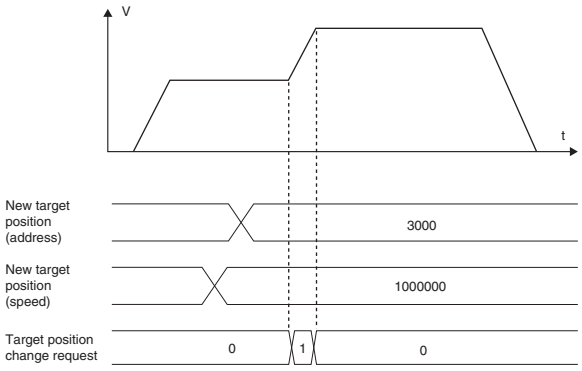
Target Position Change Function

The target position can be changed at any time even when the products are being moved (1-axis linear control). The product is examined with the vision system while being moved to the next line. If a faulty product is found, the target position is changed so that the faulty product is put in a separate tray for those rejected.



Normal transfer route for accepted products
Change to the rejects tray route

[Time chart]

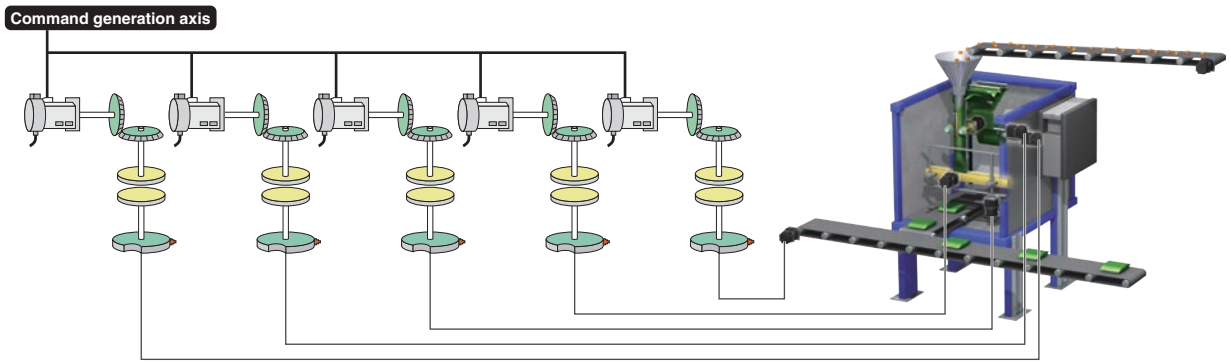


Advanced Synchronous Control

Simple Motion

Synchronous control can be achieved using software instead of controlling mechanically with gears, shafts, clutches, speed change gears, cams, etc.

- Synchronous control can be flexibly started/ended for each axis, enabling the synchronous control axis and positioning control axis to be used within the same program.
- Command generation axis, servo input axis, or synchronous encoder axis can be set as the input axis.
- The output axis is operated with a cam. The following three operations can be performed with the cam functions: linear operation, two-way operation, and feed operation.
- An encoder *1 is connected via a servo amplifier and used as a synchronous encoder axis.

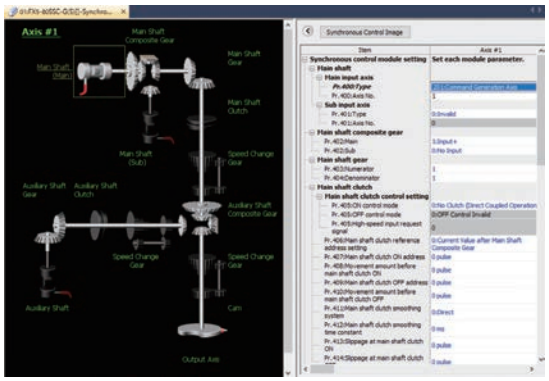


*1. For supported synchronous encoders, refer to each manual of the controllers and the servo amplifiers.

[Command generation axis]

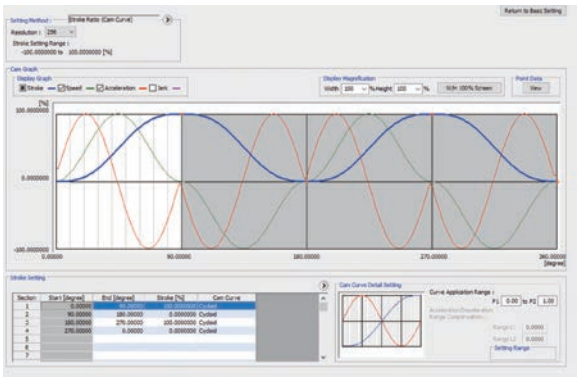
Command generation axis is the axis that performs only the command generation.
It is controlled independently of other axes connected to servo amplifiers. (not counted as a control axis)

Parameter Settings



Synchronous control is executed by setting parameters of the input axis, output axis, gear, and clutch for synchronous control and turning on the synchronous control start signal.

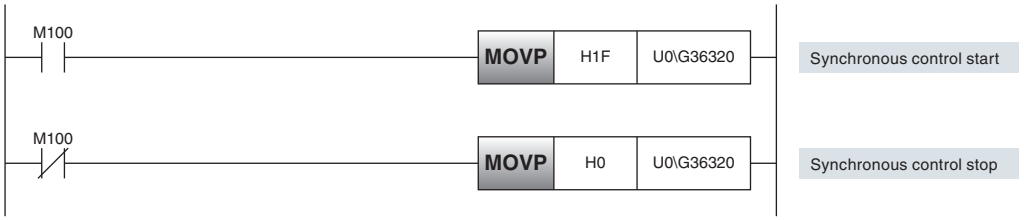
Cam Data (Operation Profile Data)



The cam graph can be flexibly and easily created through drag & drop. The waveform is changed according to the pointer's movement.

Start/Stop

Synchronous control can be executed after synchronous parameters are set for each output axis. When synchronous control start signal is turned on, the synchronous control parameters are analyzed, and the status is changed to during synchronous control. The output axis is operated by the commands transmitted from the input axis.



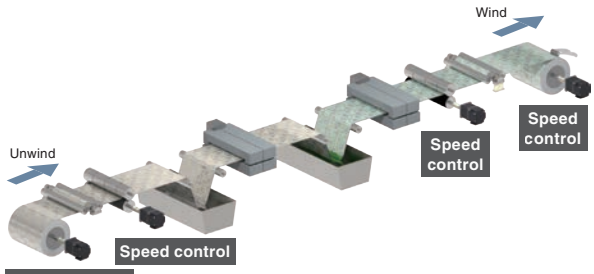
Selectable Speed Control to Best Fit Your System Needs

Simple Motion

Two types of speed control are available: speed control that includes position loop and speed control that does not include position loop.

Speed Control That Does Not Include Position Loop

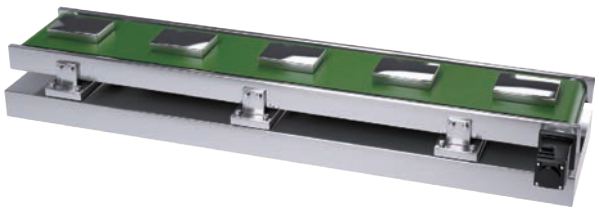
- Control mode setting of the servo amplifier: velocity control mode
- Minimizes speed deviation by flexibly responding to speed changes, such as those that occur when the load changes.
- Suitable for machines which keep driving the motors at constant speed, such as a wind/unwind machine.



Converting machine

Speed Control That Includes Position Loop

- Control mode setting of the servo amplifier: position control mode
- Suitable for operations that repeatedly switch between speed and position control.



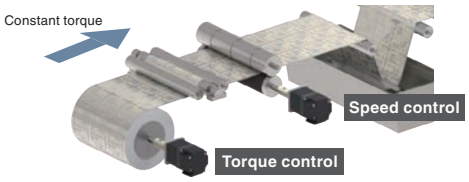
Belt conveyor

Torque Control

Simple Motion

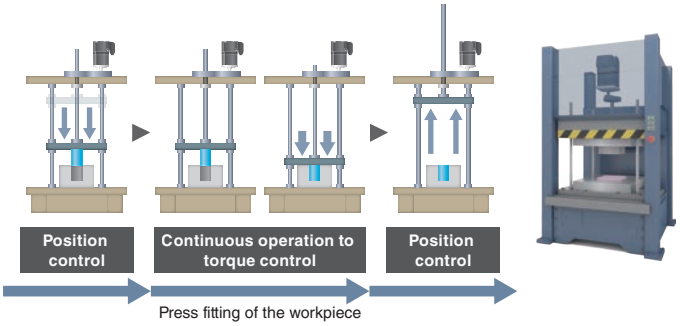
Torque Control

The axes in torque control are controlled to run at the constant torque by following the torque command.
When the load is light and the speed increases to the set limit, the torque control switches to speed control.



Continuous Operation to Torque Control

The axes are controlled to run at the constant torque by following the torque command while the current position is being tracked.
The position control can be switched smoothly to the torque control without stopping the servo motor.



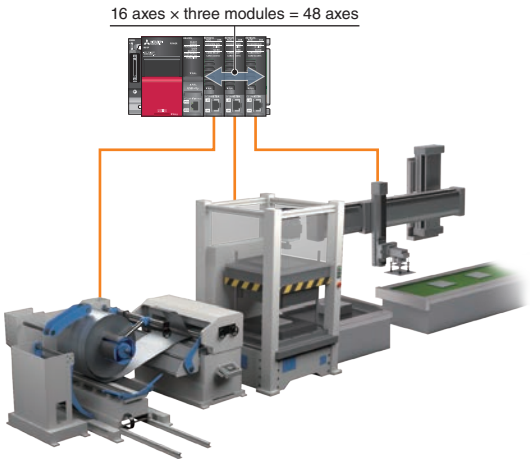
Press fitting of the workpiece

Auxiliary Functions

Simple Motion

Inter-Module Synchronization*1

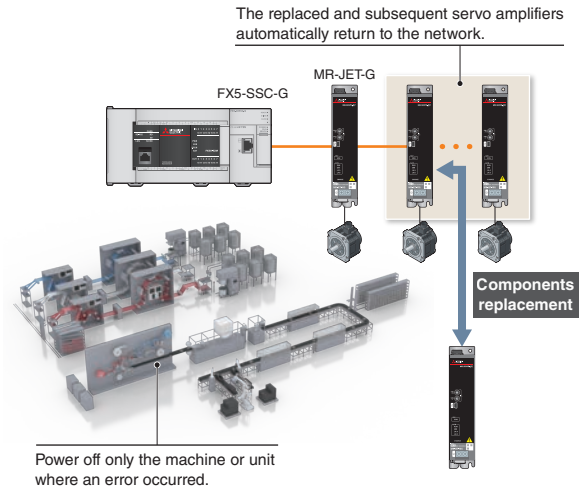
The inter-module synchronization function can synchronize the control timing between multiple Motion modules on the same base unit.
Even different machines can be synchronized through this function when each machine uses Motion modules.



*1. The function is available with RD78G.

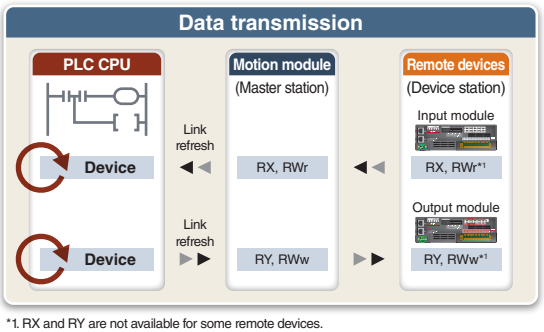
Automatic Return

When device stations are back to normal status after disconnected due to a data link error, this function automatically returns the disconnected stations to the network and restarts data link.
Only the machine where an error occurred can be turned off, and parts can be replaced without turning off the power of the entire system.

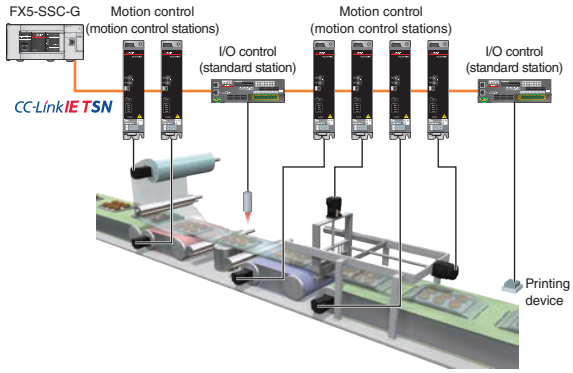


Read/Write Operation of Standard Stations

- The PLC CPU sends/receives link devices to/from standard stations (device stations other than the motion control stations) through a Motion module.
- One-to-one communication is possible between the master and device stations.
- The PLC CPU can be programmed using the signals of the device stations.

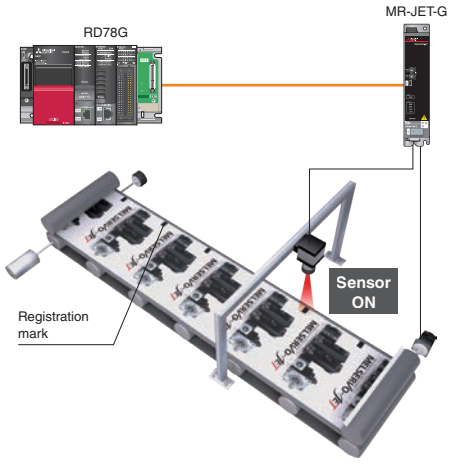


*1. RX and RY are not available for some remote devices.



Mark Detection

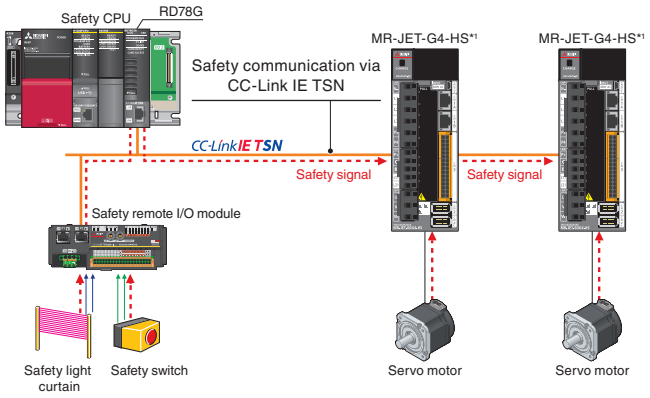
This function latches data responding to a trigger signal input to a servo amplifier.
The compensation amount is calculated based on the latched data, and the error is compensated using a compensation axis.
A high-accuracy mark detection at 1 µs is possible.



CC-Link IE TSN Safety Communication Function

Simple Motion

CC-Link IE TSN enables building a system where safety and non-safety communications are mixed.
In the following system which integrates safety and non-safety communications, the safety CPU checks the safety signals received via the safety remote I/O module and outputs the safety signals (STO, etc.) to the servo amplifiers. Outputting safety signals via the network eliminates the need for wiring of safety signals to a safety controller and a servo amplifier.
The CC-Link IE TSN safety communication function is available with iQ-R series Motion modules.

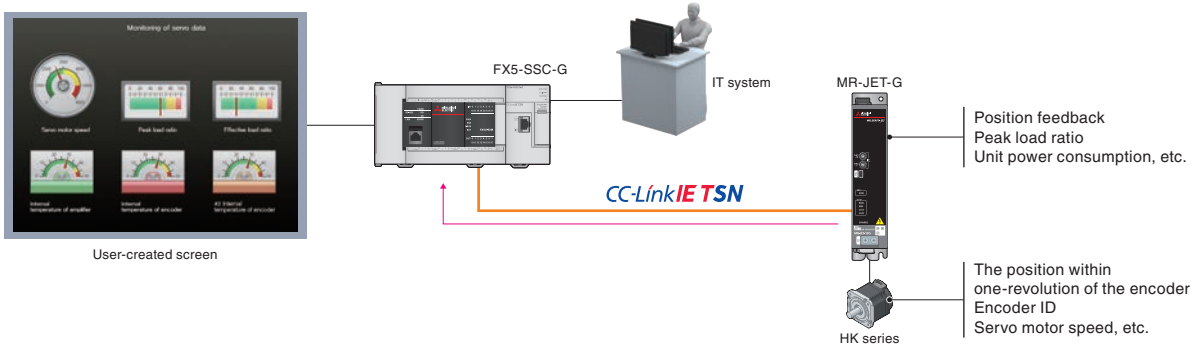


*1. For servo amplifiers that support the safety communication function, refer to "Safety Sub-Functions" in section 1 of this catalog.

Optional Data Monitor

Simple Motion

Servo operation is monitored with extensive servo data acquired via CC-Link IE TSN. The acquired data can be transferred to IT system or transferred and displayed on any user-created GOT screen in the network. The target data for monitoring can be flexibly changed during operation.



A Wide Variety of Features

Simple Motion

JOG operation

Moves a workpiece in the designated direction while the JOG start signal is ON.
JOG operation can be executed without completing home position return.

Stop operation functions

The forced stop, the axis stop, and the forced stop of servo amplifiers are available.

Absolute position system

Restores the absolute position of the designated axis.
Once the home position return is executed at the start of the system, it is unnecessary to perform the home position return again when the power is turned ON next time.

Virtual servo amplifier

Enables operations of a virtual servo amplifier as if an actual unit is connected.
When the virtual servo amplifier is set as a servo input axis of synchronous control, the Motion module executes synchronous control with virtually generated input commands.
In addition, this function is used to simulate an axis without an actual connection.

Stroke limit functions

Establish the physical movable range for a machine. The hardware stroke limit function and the software stroke limit function are available.

Home position return control

Establishes a position as the starting point (or "Home position") of positioning control and performs positioning toward that starting point.

Target position change

Changes a target position to a newly designated target position at any timing during the position control (1-axis linear control).

Torque limit function

Limits the torque generated by the servo motor. This function is used to protect the gear reducer and limit the pushing force applied to a stopper. It can control torque so that excessive force will not be applied to loads and machines.

Acceleration/deceleration processing function

Adjusts the acceleration/deceleration of each motion control so that the acceleration/deceleration curve is suitable for the machine.

Event history

Saves the error information and the operation for the module as an event in the CPU module and the Motion module.

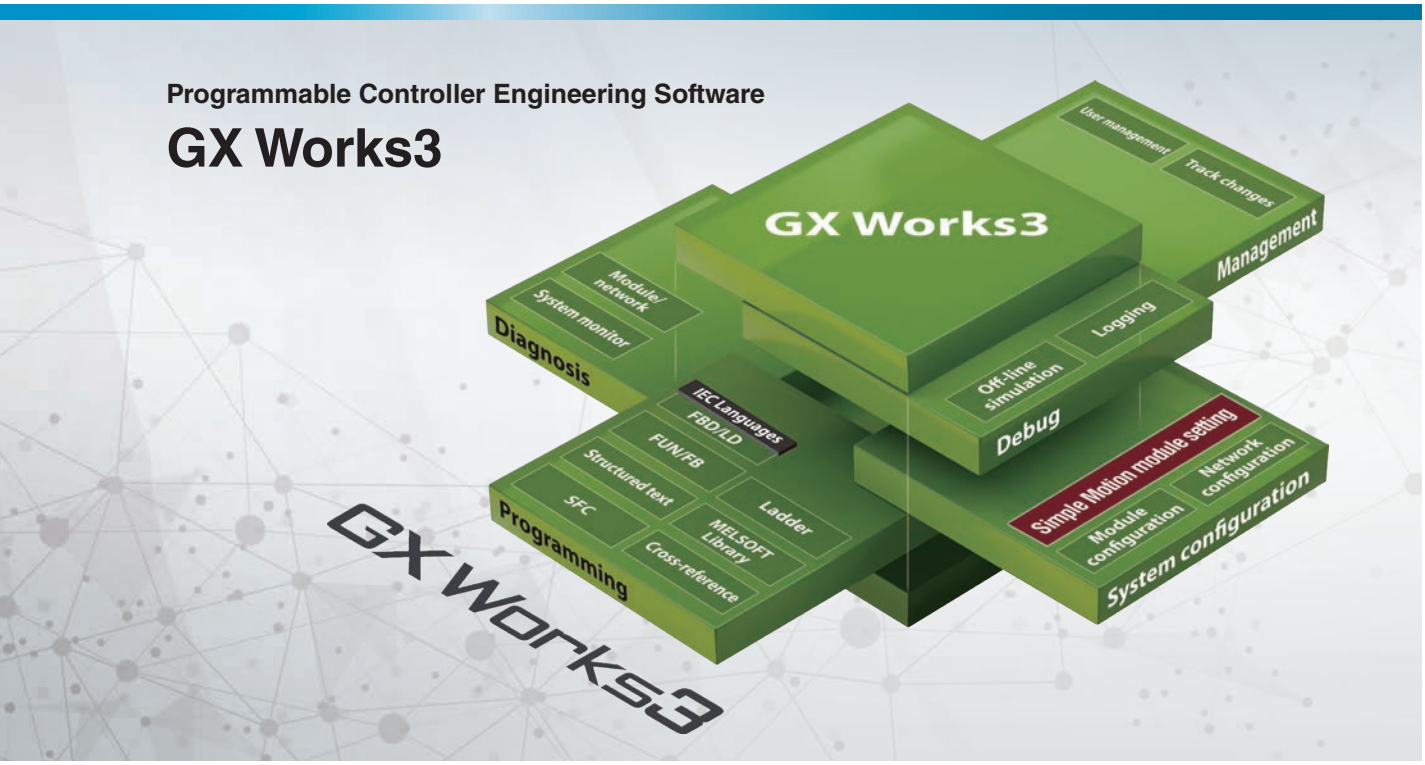
Override

Changes the command speed by a specified percentage (0 to 300 %) for all controls to be executed.

One software, many possibilities

Programmable Controller Engineering Software

GX Works3



MELSOFT GX Works3 covers various aspects of development processes - parameter settings, servo adjustments, and debugging of Motion modules as well as sequence program creation. This software offers an engineering environment that provides comfortable design environment.

Engineering Environment

Simple Motion

Various features are integrated into GX Works3, which allows users not only to easily create projects but also maintain consistency through the entire development processes.

System Design

- System configuration by simply selecting modules from a list
- Easy parameter settings for each module
- Parameters settable for reduction ratio and electronic gear

Programming

- Easy positioning data creation with a variety of functions
- Synchronous control only with parameter settings
- Highly flexible cam data creation

Debug

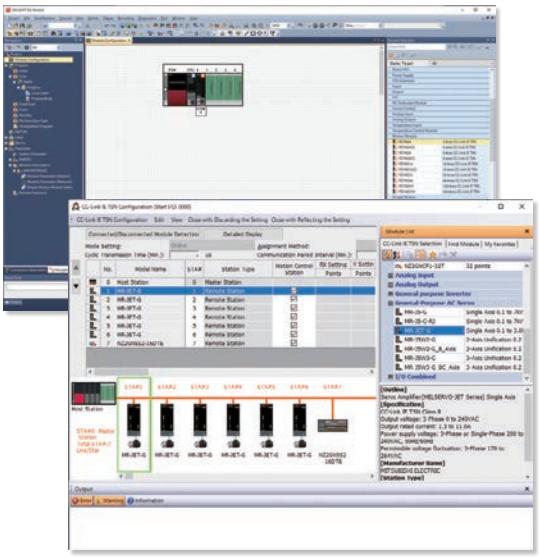
- Simulation without actual devices
- Automatic servo adjustments
- Digital oscilloscope that allows operation verification and quick troubleshooting

Maintenance

System Design

System Design

Module configuration



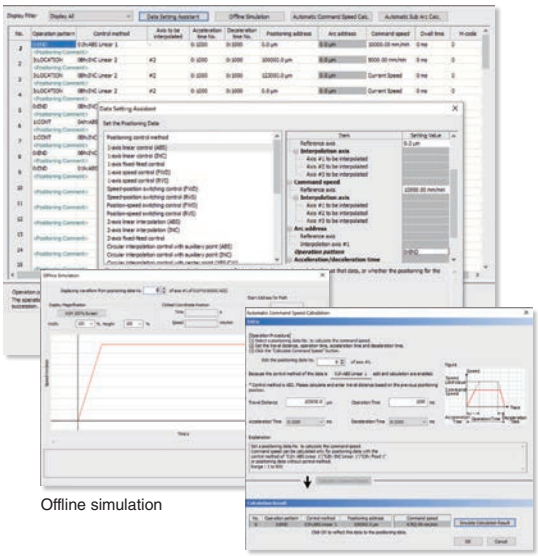
Network configuration

- Module configuration
- Network configuration
- Data settings for servo amplifiers
- Settings for remote I/O modules
- Parameter conversion function

Programming (Positioning)

Programming

Positioning data setting



Offline simulation

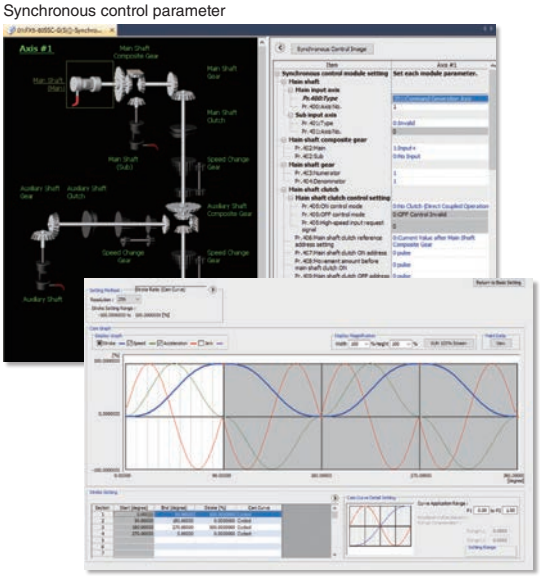
Automatic calculation of command speed

- Programming with Ladder, SFC, FBD/LD
- Positioning data settings
- Offline simulation, automatic calculation of command speed

Programming (Advanced Synchronous Control)

Programming

Synchronous control parameter



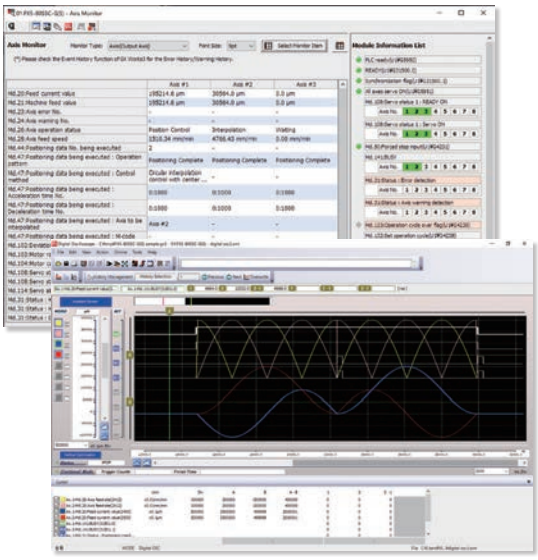
Cam data creation

- Synchronous control parameter
- Cam data creation, cam data list

Debug/Maintenance

Debug Maintenance

Axis monitor



Digital oscilloscope

- Event history
- Current value history, start history, axis monitor
- Servo monitor
- Digital oscilloscope

Unlock new system capabilities together with CC-Link IE TSN

PLCopen® Motion Control FB Mode

PLCopen®

CC-Link IE TSN

Motion Module

RD78GH
RD78G

These Motion modules with multiple-core processors enable to configure a high-speed, large system by supporting the CC-Link IE TSN real-time open network.

- Performs positioning control such as linear interpolation using function blocks. The programming is easy: users just need to set positioning data to the function blocks.
- Connects to various modules such as servo amplifiers and I/O modules via CC-Link IE TSN. This connectivity allows you to configure a servo system more flexibly.
- Supports a consistent engineering environment that is capable of handling tasks ranging from system design to debugging and maintenance.

Product Lines

PLCopen®

CC-Link IE TSN
MELSEC iQ-R series

RD78GHV
RD78GHW

- Maximum number of control axes:
  RD78GHV: 128 axes/module
  RD78GHW: 256 axes/module
- Minimum operation cycle *1: 31.25 µs
- ST language program capacity:
  Built-in ROM max. 64 MB
  + SD memory card

RD78GHV/RD78GHW are designed with a quad-core processor that enables higher-speed control. These Motion modules can be directly programmed to distribute load control with PLC CPUs.
This ensures that performance will not be degraded even when the number of axes is increased.

CC-Link IE TSN
MELSEC iQ-R series

RD78G4/RD78G8
RD78G16/RD78G32
RD78G64

- Maximum number of control axes:
  RD78G64: 64 axes/module
- Minimum operation cycle *1: 62.5 µs
- ST language program capacity:
  Built-in ROM max. 16 MB + SD memory card

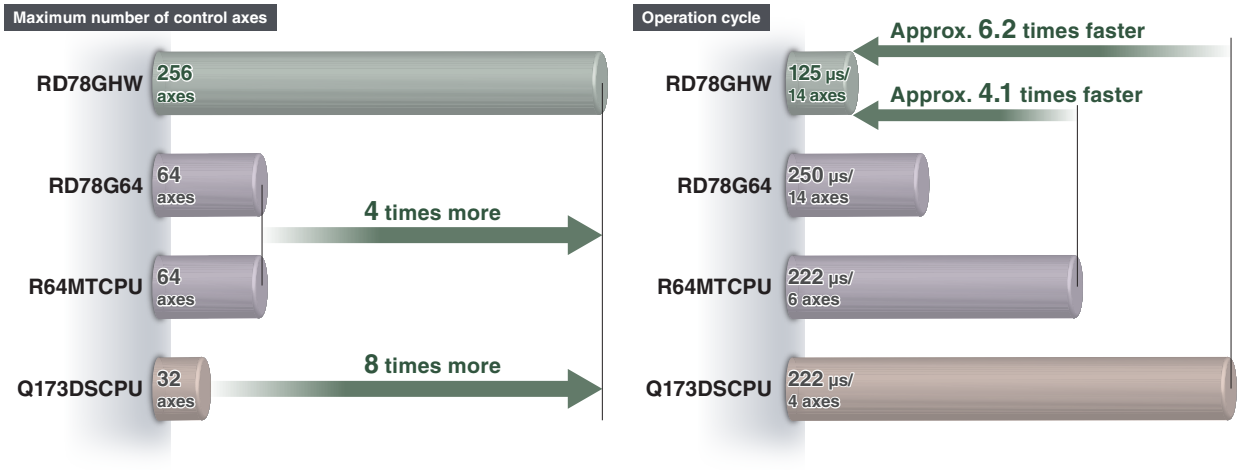
RD78G4/RD78G8/RD78G16/RD78G32/RD78G64 are designed with a dual-core processor and can be programmed to enable various types of control, such as positioning, synchronous, cam, speed, and torque control.

*1. The operation cycle varies by the number of control axes and the models.

Improved Performance

PLCopen®

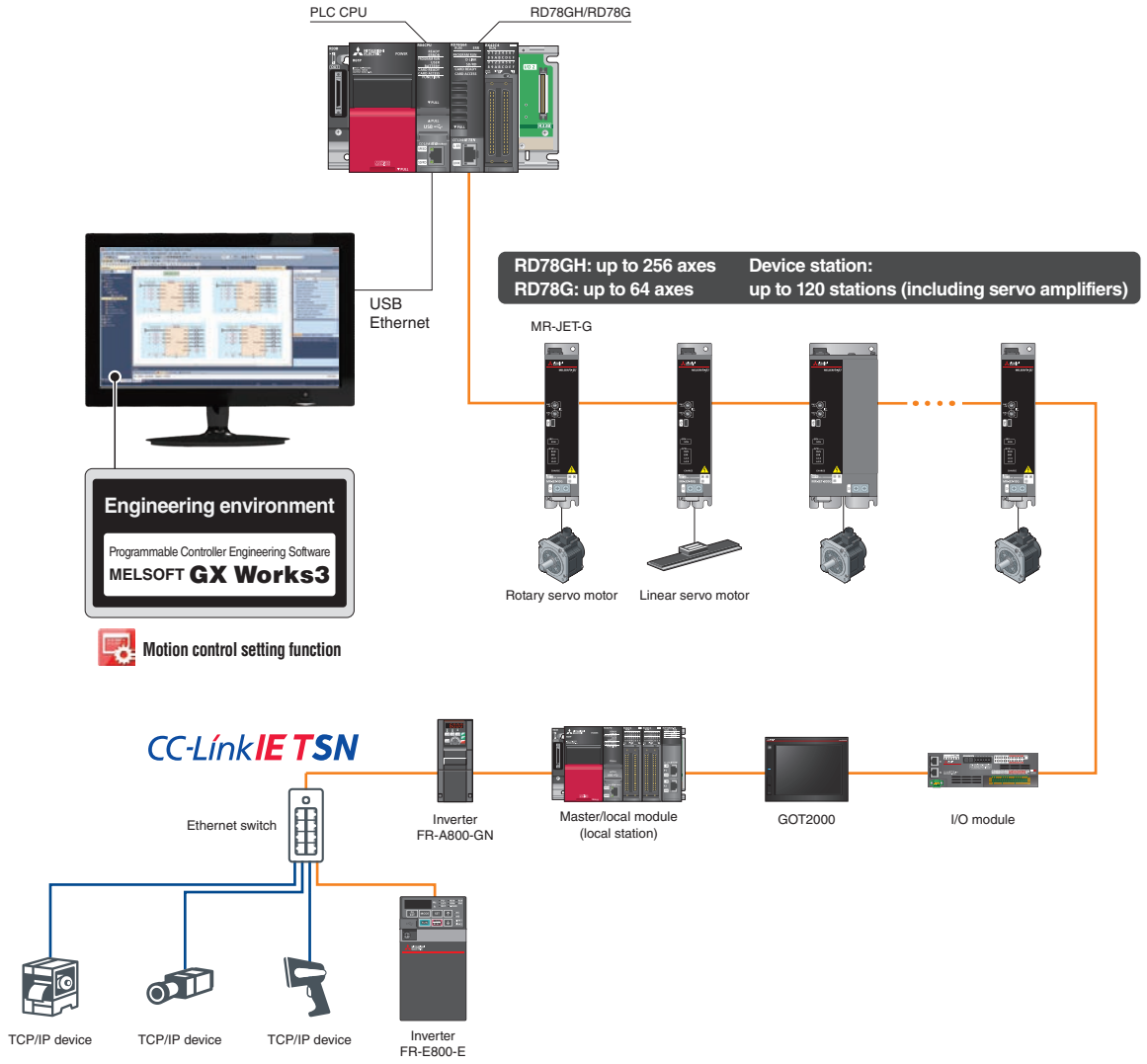
The minimum operation cycle of RD78GH in PLCopen® motion control FB mode is approximately 4.1 to 6.2 times faster than that of the previous models, and the number of maximum control axes is 4 to 8 times more. The data from the servo amplifiers and input/output signals can be received at high speeds, which reduces the cycle time.



System Configuration

PLCopen®

The Motion Module executes motion control while functioning as a master station of CC-Link IE TSN.*1
This feature enables users to create a system more flexibly by connecting various devices, such as servo amplifiers, remote I/O modules, and TCP/IP devices, to the Motion module.*2

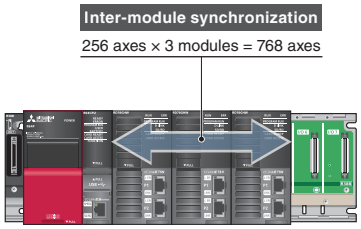


*1. Sub-master station is not supported.
*2. Refer to manuals for precautions when CC-Link IE TSN Class B and A devices are mixed.

Inter-Module Synchronization

PLCopen®

The inter-module synchronization function can synchronize the control timing between multiple Motion modules on the same base unit.
Even different machines can be synchronized through this function when each machine uses Motion modules.



Positioning Control

PLCopen®

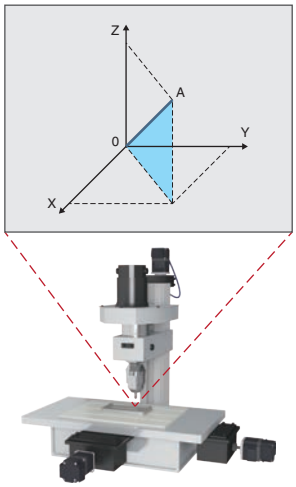
Two types of positioning control are available: single-axis and multi-axis positioning control.
This variety allows you to meet various control needs.

Item	Control types	
Single-axis control	Positioning	Absolute positioning
		Relative positioning
	Homing	
	JOG operation	

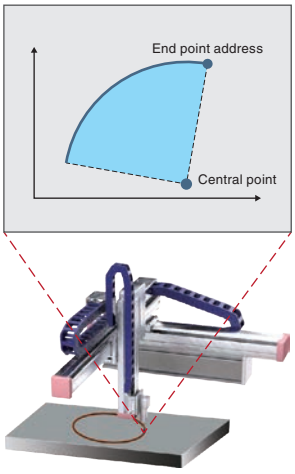
Item	Control types	
Multi-axis control	Linear interpolation	Absolute linear interpolation
		Relative linear interpolation
	Circular interpolation	Absolute circular interpolation
		Relative circular interpolation
	Multiple axes positioning data operation	

Main Control

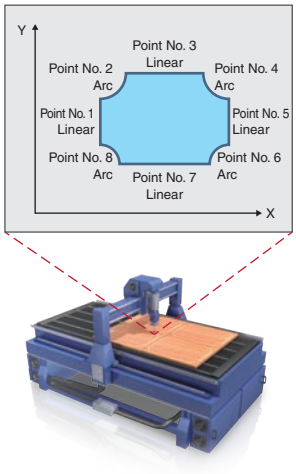
Linear interpolation



Circular interpolation



Multiple axes positioning data operation



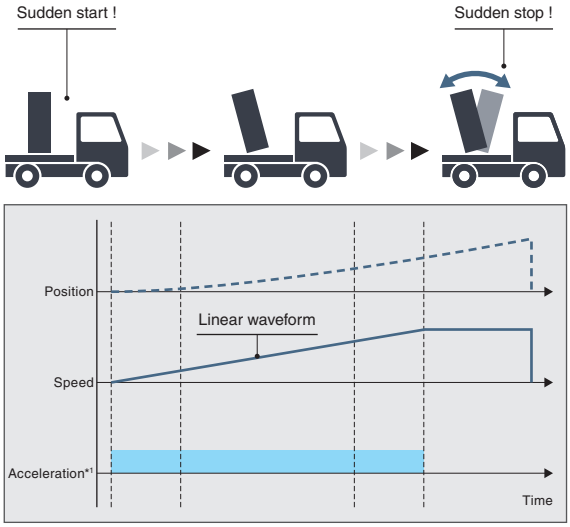
Acceleration/Deceleration Methods

PLCopen®

Three types of acceleration/deceleration methods are available: trapezoidal acceleration/deceleration, jerk acceleration/deceleration, and acceleration/deceleration time fixed.

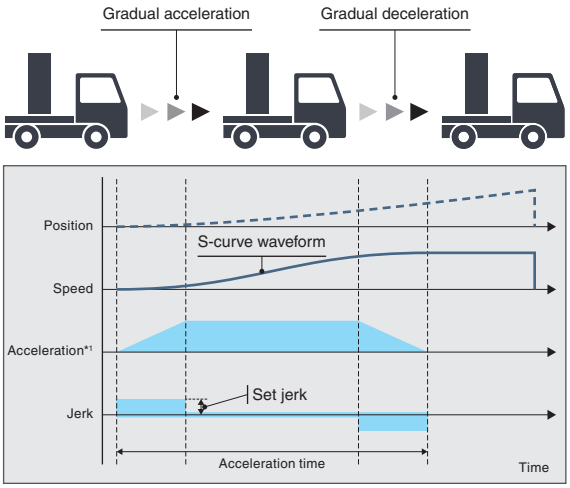
Trapezoidal acceleration/deceleration

After starting, maximum acceleration is maintained until the target speed is reached.
For example, when a vehicle loaded with a workpiece accelerates suddenly, the workpiece will swing back and forth due to the impact of the sudden acceleration.
To reduce impacts and vibrations in a case such as this, the vehicle must accelerate at a slower rate.
The speed creates a trapezoidal shape.



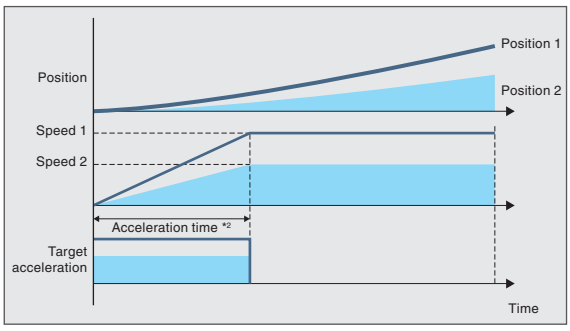
Jerk acceleration/deceleration

The acceleration changes gradually.
For example, when a vehicle loaded with a workpiece accelerates gradually, the load will not swing back and forth after acceleration.
The jerk is maintained during acceleration. When the vehicle has almost reached the target speed, the jerk is decelerated. Adjusting jerk in this way achieves smooth acceleration/deceleration while also shortening the time it takes to reach the target speed.
The speed creates a S-curve shape.



Acceleration/deceleration time fixed method

This method executes acceleration/deceleration based on the time specified, regardless of the commanded speed.



*1. Input acceleration.
*2. Specify acceleration time.

MEMO

Synchronous Control

PLCopen®

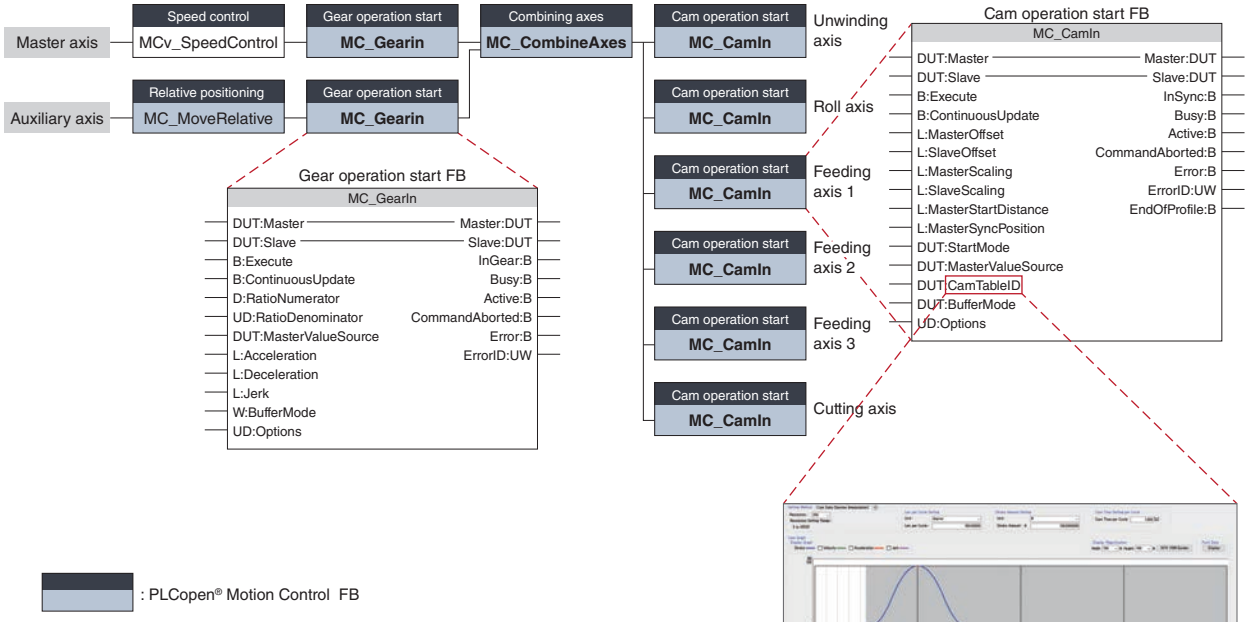
Synchronous control is performed using function blocks that operate as software-based mechanical modules such as gears, shafts, speed change gears, and cams.

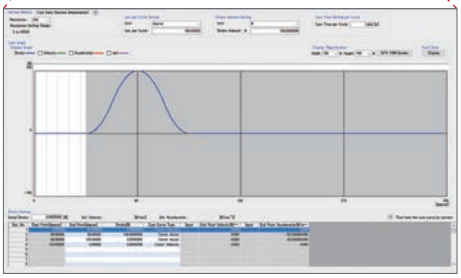
- Positioning and synchronous control can be performed together in the same program.
- Synchronous control using a synchronous encoder as an input axis is also possible.
- The output axis is operated based on cam data (operation profile).

Flexibly Combining Synchronous Modules

The number and the combination of the synchronous modules are flexibly selected, achieving optimized operation.

[An example of packing machine program]



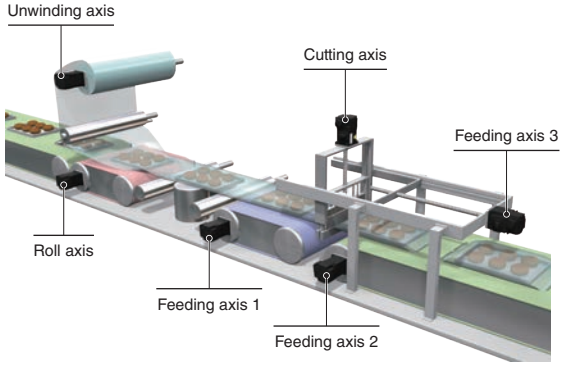


Cam data (operation profile)

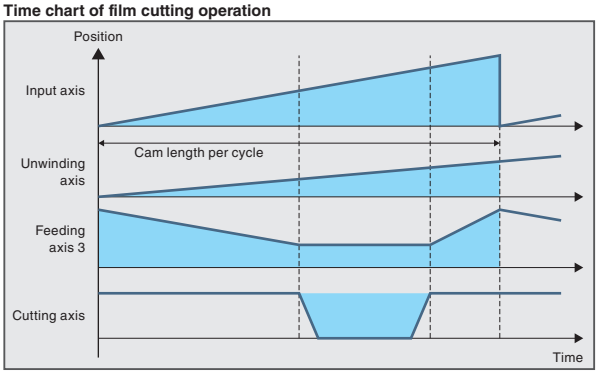
Application examples

[Packing machines]

This application synchronizes all the axes, from the cutting axis through the unwinding axis, with the master axis.
Cutting operation is performed with the cutting axis and the feeding axis 3.

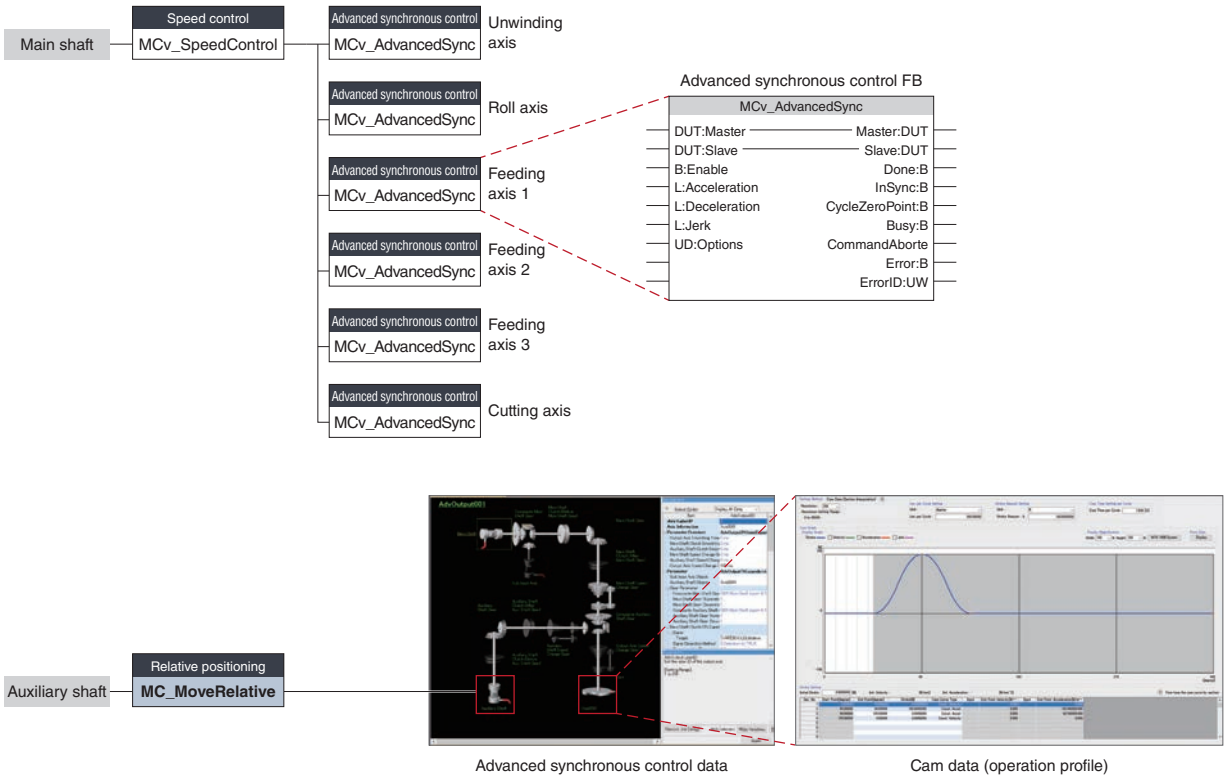


Time chart of film cutting operation



Advanced Synchronous Control FB Settings with Graphic-Based Interface

Synchronous control can be executed by setting synchronous modules with parameters and starting the advanced synchronous control FB. Synchronous modules such as the auxiliary shafts, gears, clutches, and speed change gears can be set with a graphic-based interface.

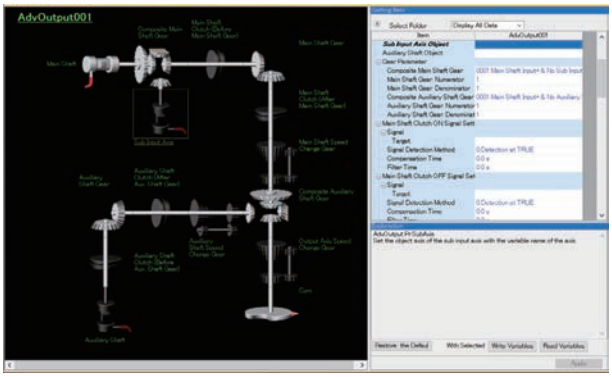


: PLCopen® Motion Control FB

Advanced synchronous control data

Images of enabled synchronous modules are highlighted, allowing easy verification of set data through visualization.

- Input axis data
- Synchronous parameter (output axis)
- Auxiliary shaft data
- Clutch data
- Gear data
- Speed change gear data
- Cam data (operation profile)
- Cam waveform type



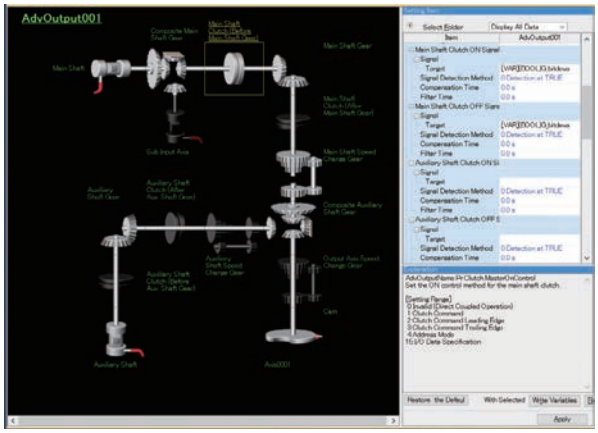
Clutch

The clutch is used to transmit/disengage command pulses from the main/auxiliary shaft input side through turning the clutch ON/OFF, which controls the operation/stop of the output axis.
The clutch can be set to the main shaft clutch and the auxiliary shaft clutch.

Clutch ON control mode	Clutch OFF control mode
Invalid (Direct coupled operation)	Invalid (OFF control invalid)
Clutch command	Clutch command (One-shot operation)
Clutch command leading edge	Clutch command leading edge
Clutch command trailing edge	Clutch command trailing edge
Address mode	Address mode
I/O data specification	I/O data specification

A clutch can be used through the advanced synchronous control FB.

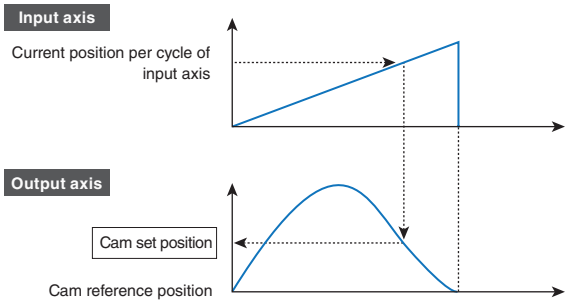
Advanced synchronous control data



Restarting synchronous control

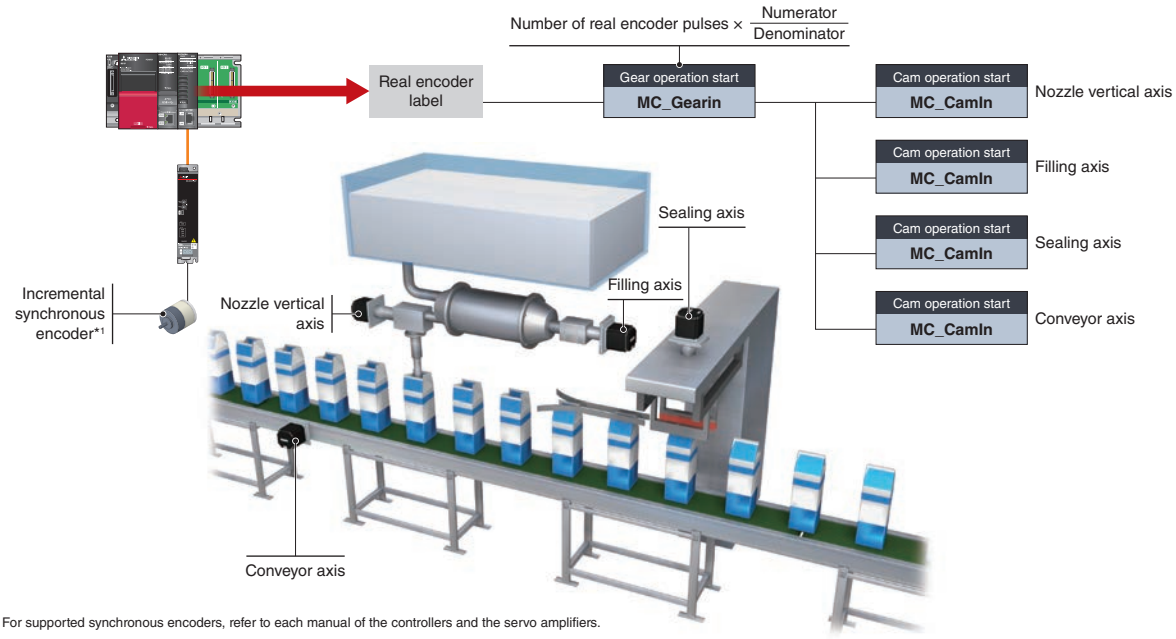
In case that the synchronous positions become misaligned due to an emergency stop, etc., synchronous control can be restarted by using the synchronous control analysis mode.

In the synchronous control analysis mode, the cam set position is updated on the basis of the input axis. The synchronous position can be aligned using the updated cam set position before starting synchronous control.



Synchronous Encoder

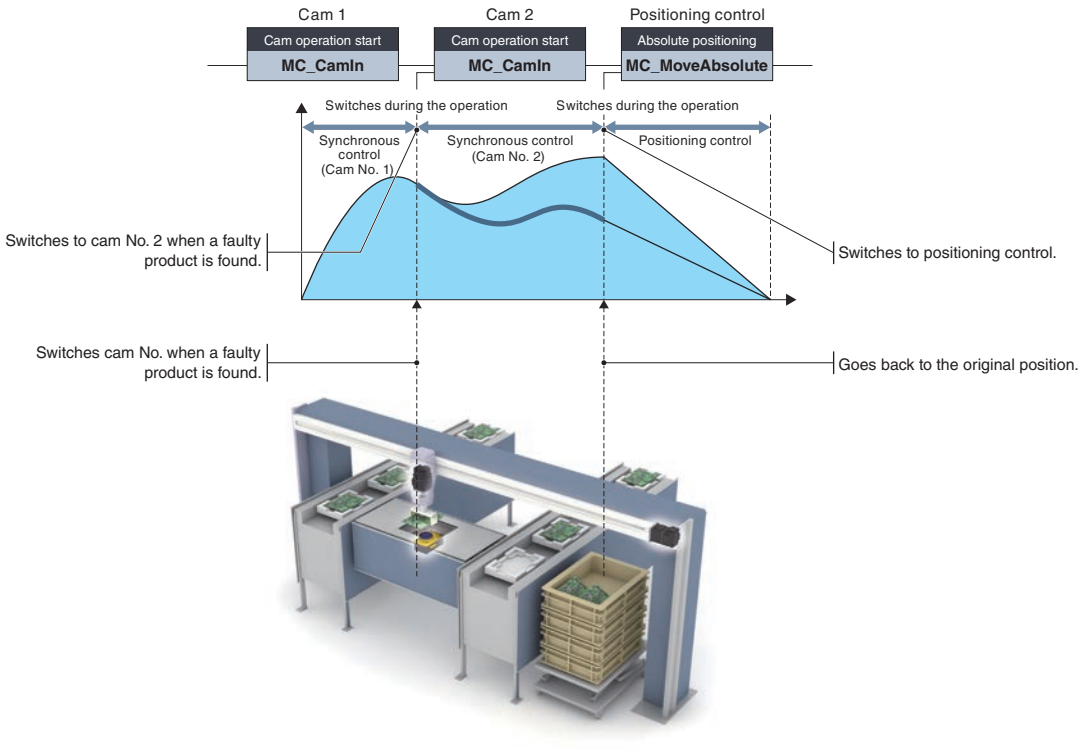
The Motion module easily performs synchronous control by setting a synchronous encoder to "Real encoder axis" and creating a program with function blocks.
The number of command pulses can be adjusted using the function block (MC_Gearin) or a parameter.
An encoder *1 is connected via a servo amplifier and used as a synchronous encoder axis.



*1. For supported synchronous encoders, refer to each manual of the controllers and the servo amplifiers.

Switching Cam Control

The cam being executed can be flexibly switched to another cam without stopping the servo motor. Similarly, cam control is smoothly switched to position control with no need of stopping the motor.



Cam Data (Operation Profile Data)

PLCopen®

Create cam data (operation profile data*1) according to your application. The created cam data is used to control an output axis.

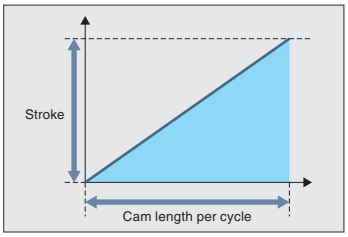
*1. "Operation profile data" is a general name for waveform data, which is used for various applications.

Cam Operation

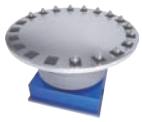
The following three cam operations are available: linear operation, two-way operation, and feed operation. Choose one according to your application.

Linear operation

The cam pattern is a linear line.
This pattern is used for a ball screw and a rotary table.



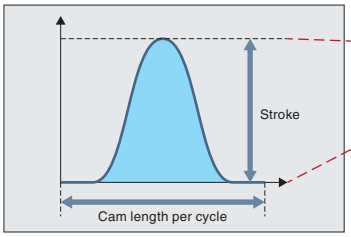
Ball screw [Unit: mm]

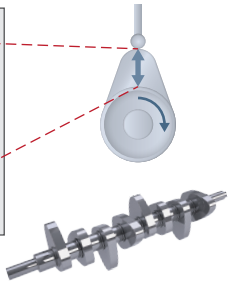


Rotary table [Unit: degree]

Two-way operation

The beginning and the end of the cam pattern are the same.
Mechanical cams fall into this category.

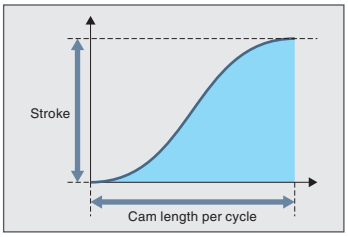


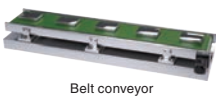


Crankshaft

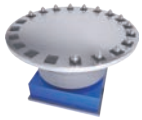
Feed operation

The beginning and the end of the cam pattern differ.
This pattern is used for fixed-amount feed operations and intermittent operations.
Set the end point for the feed operation to a position of your choice.





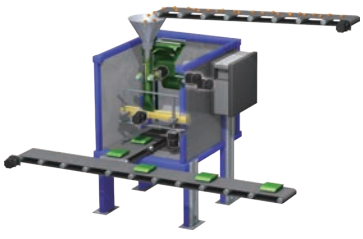
Belt conveyor



Rotary table [Unit: degree]

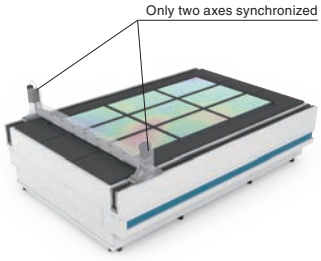
Application examples

[Machine with all axes synchronized]

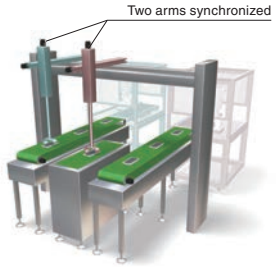


All the axes of the machine are in synchronization.

[Machine with only certain of the axes synchronized]



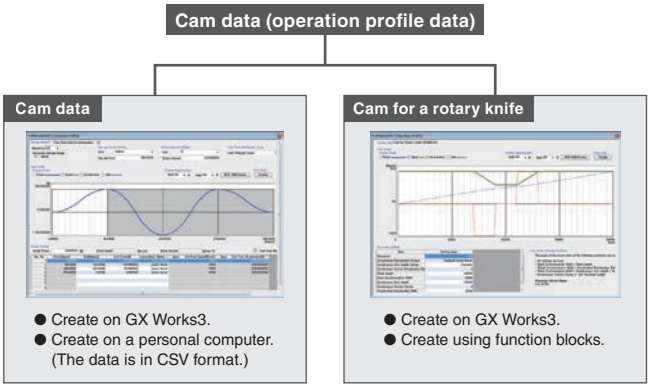
Only two axes are synchronized.
The other axes perform positioning operation while the two axes execute synchronous control.



The two arms can avoid interference by synchronizing with each other, shortening the cycle time.

Cam Data Types

The cam data (operation profile data) has the following two types.

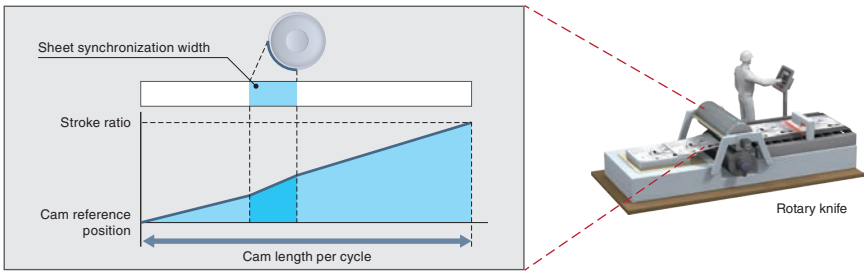


Easy Cam Creation for a Rotary Knife

Cam for a rotary knife is easily created by setting the sheet length and sheet synchronization width.

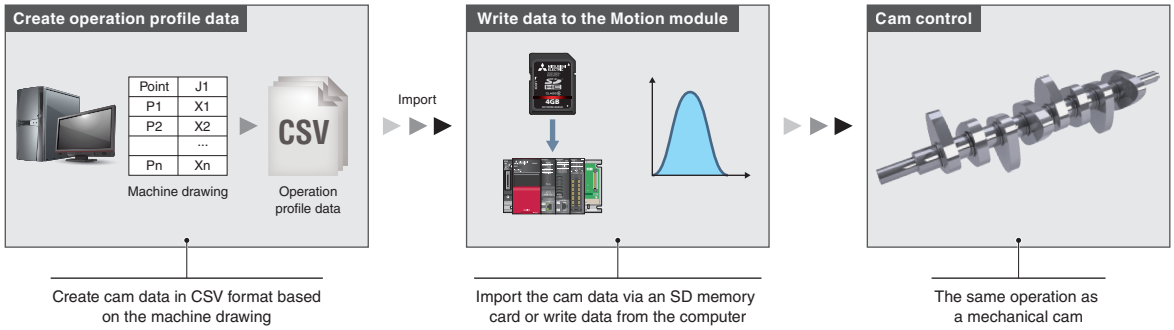
[Automatic cam creation from the motion control FB]
Setting the sheet length and sheet synchronization width, etc., to the function block and starting it create a cam automatically.

[Cam creation with MELSOFT GX Works3]
Setting the sheet length and sheet synchronization width, etc. creates a cam.



Cam Data in CSV Format

The cam data (operation profile data) in a CSV format on a personal computer can be imported directly to a Motion module.



Servo Amplifier Control Mode

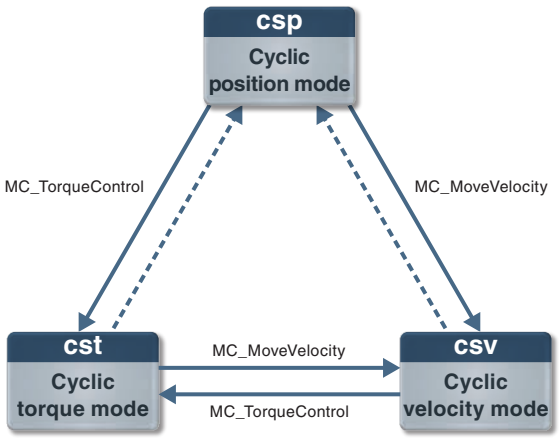
PLCopen®

The servo amplifier has three control modes: position, velocity, and torque control modes.
Execution of MC_MoveVelocity transitions the mode to the velocity control mode, and execution of MC_TorqueControl to the torque control mode.
In the velocity control mode or torque control mode, the mode transitions to the position control mode in the following cases.

- At stop completion or error occurrence
- When a Motion control FB is changed/aborted

[Control mode]

Position control mode: Moves to the target position (Speed control that includes position loop)
Velocity control mode: Drives at the specified speed (Speed control that does not include position loop)
Torque control mode: Drives at the specified torque



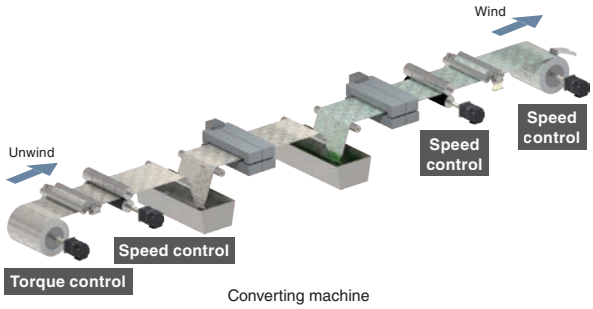
Selectable Speed Control to Best Fit Your System Needs

PLCopen®

Two types of speed control are available: speed control that includes position loop and speed control that does not include position loop.

Speed Control That Does Not Include Position Loop

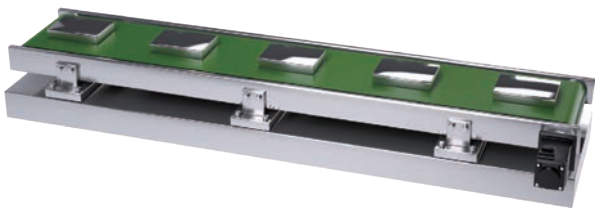
- Control mode setting of the servo amplifier: velocity control mode
- Minimizes speed deviation by flexibly responding to speed changes, such as those that occur when the load changes.
- Suitable for machines which keep driving the motors at constant speed, such as a wind/unwind machine.



Converting machine

Speed Control That Includes Position Loop

- Control mode setting of the servo amplifier: position control mode
- Suitable for operations that repeatedly switch between speed and position control.



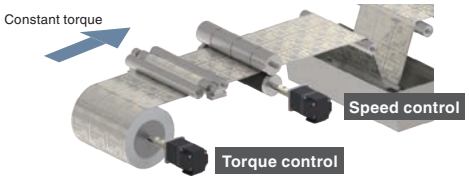
Belt conveyor

Torque Control

PLCopen®

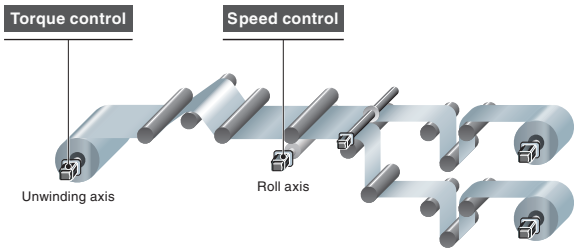
Torque Control Mode

The axes in torque control are controlled to run at the constant torque by following the torque command.
When the load is light and the speed increases to the set limit, the torque control switches to speed control.



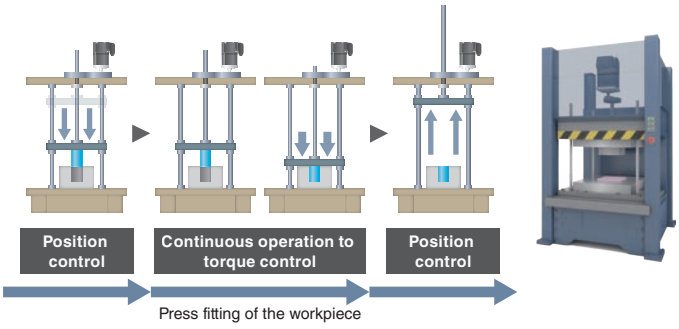
Application example

[Unwinding axis of converting machines]
Torque control unwinds film at constant tension to prevent wrinkling in the film.
The tension can be kept constant by sequentially controlling the torque commands.
This type of control is perfect for unwinding machines that need to keep the tension of unwound materials constant.



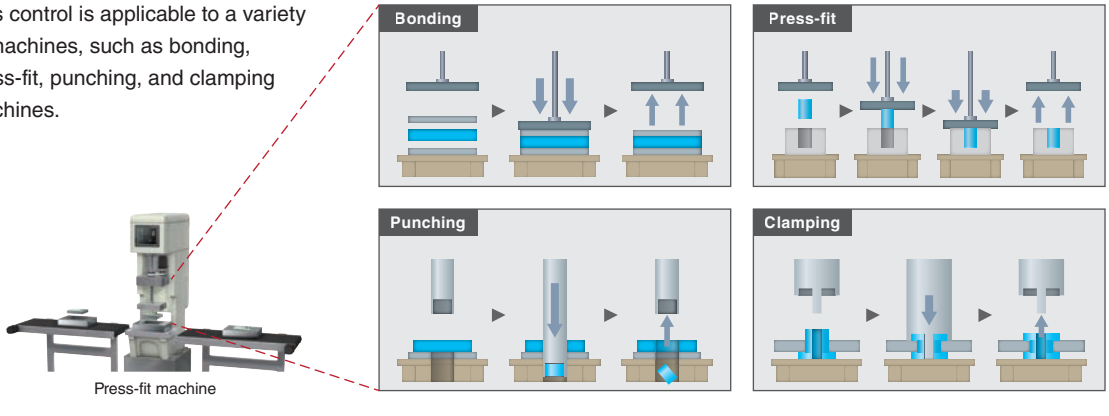
Continuous Operation to Torque Control Mode

The axes are controlled to run at the constant torque by following the torque command while the current position is being tracked.
The position control can be switched smoothly to the torque control without stopping the servo motor.



Application example

[An example of continuous operation to torque control]
This control is applicable to a variety of machines, such as bonding, press-fit, punching, and clamping machines.



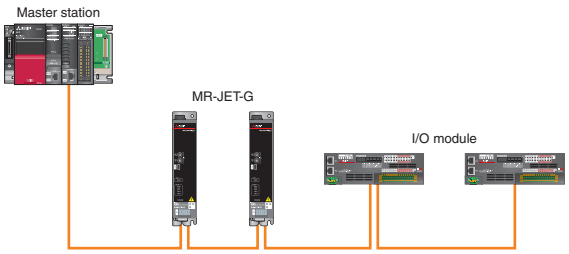
Flexible System Configuration with Multiple Topologies

PLCopen®

Line, star, and ring topologies are supported, allowing a flexible system configuration.

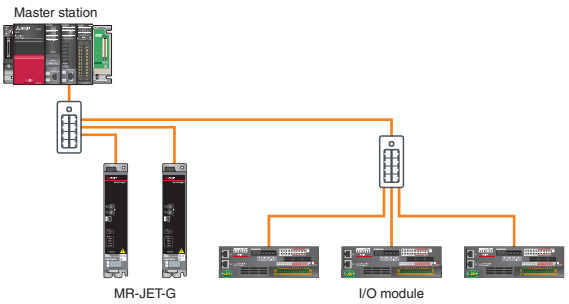
[Line topology]

Use a line topology for high-speed, high-performance control. This is realized when a system is configured with CC-Link IE TSN-compatible device stations only without additional branch lines.



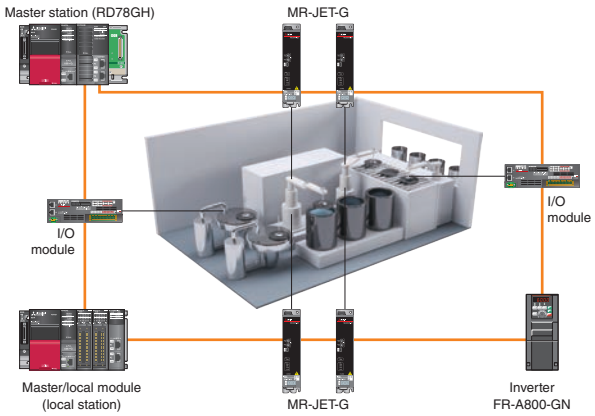
[Star topology]

Choose a star topology if a more flexible system configuration is needed. Using Ethernet switches, device stations can be easily distributed to achieve the desired system configuration.



[Ring topology]*1 NEW

A ring topology is ideal for systems requiring high reliability. Data communication continues via multi-directional communication with normal stations even if a cable is disconnected or an error occurs on a device station.



*1. Available with RD78GH

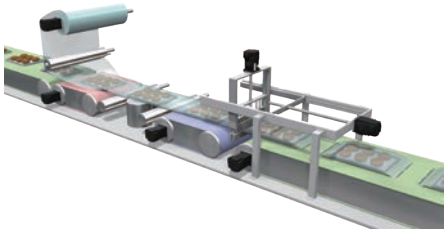
Servo System Recorder

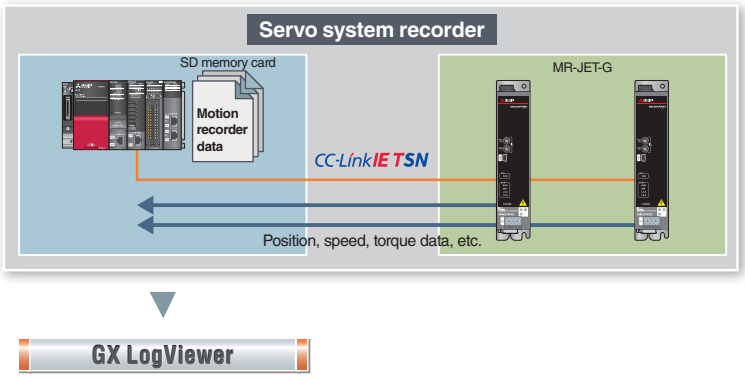
PLCopen®

The Motion module automatically collects data of all servo amplifiers when an error occurs. The collected data, such as the command and the feedback values, greatly helps you analyze the error cause.

- Automatic collection of data, such as position, speed, and torque data, without programming
- Collecting data of all axes helps you locate the error cause even when the error is caused by the other axes without an error.
- The co-recording function collects data even when an error occurs in other recording devices.

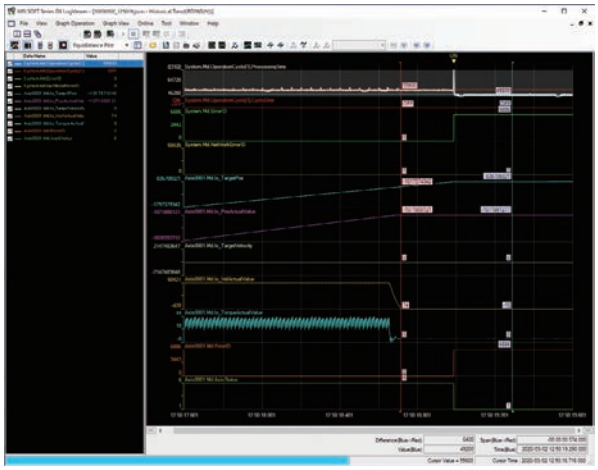
[Data collection]





GX LogViewer

The collected data can be checked on GX LogViewer.
The operation status before and after an error is displayed in waveforms, which allows more detailed analysis and identification of the error cause.

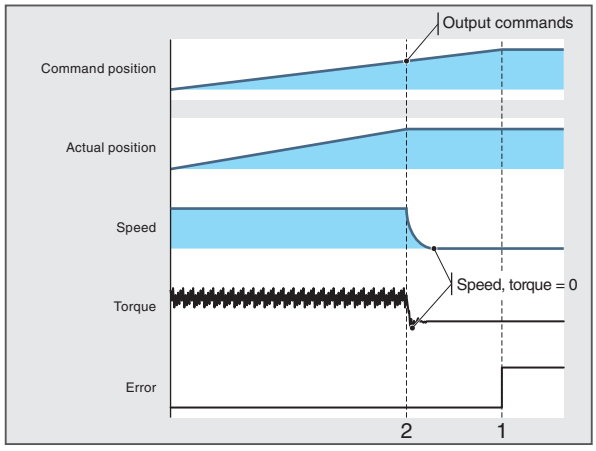


[Features]

- Displays the collected data and events graphically.
- Enables users to adjust a graph easily by automatic adjustment function and drag operation.

Analyzing Data

Analyzing operation transition of the Motion modules and the servo amplifiers before and after an error helps you locate the error cause.



[Example]

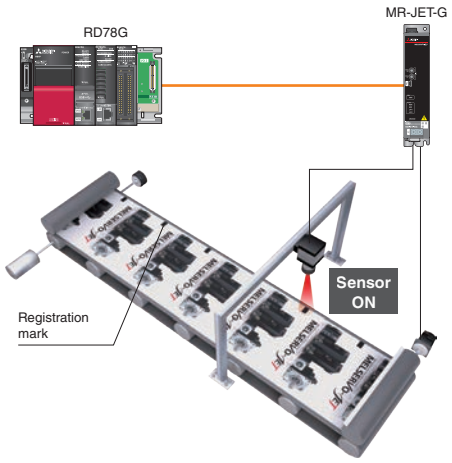
1. An error has occurred.
2. The speed and torque decreased even though the command position was increasing.

By analyzing the data in the recorder (1 and 2 above), users can find out a possible cause of the error, such as a disconnection of a power cable during operation.

Touch Probe Function

PLCopen®

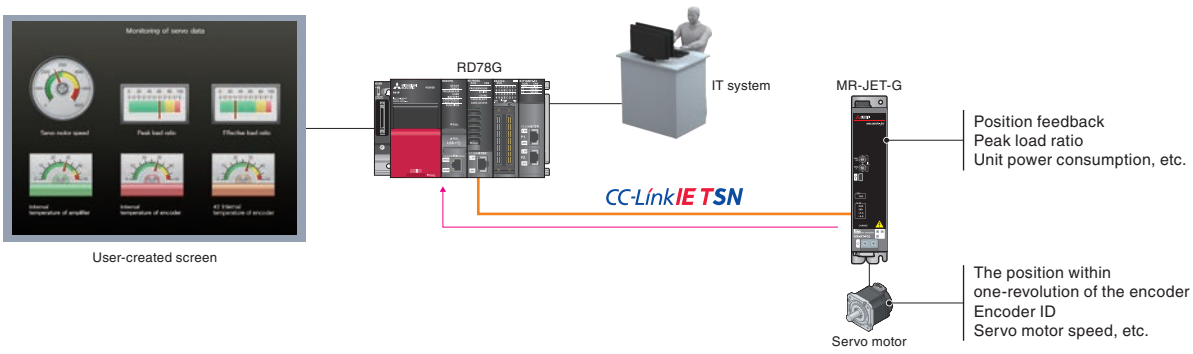
This function latches data responding to a trigger signal input to a servo amplifier.
The compensation amount is calculated based on the latched data, and the error is compensated using a compensation axis.
A high-accuracy touch probe at 1 µs is possible.



Monitoring of Servo Data

PLCopen®

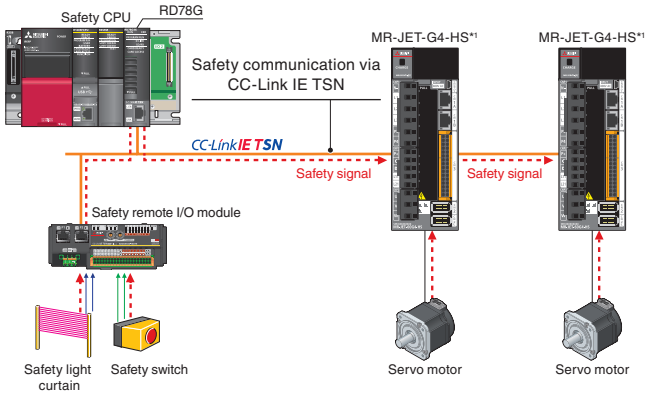
Servo data can be monitored during operation. Operation status of servo amplifiers and servo motors can be obtained via CC-Link IE TSN and transferred to IT system or displayed on any user-created GOT screen in the network.



CC-Link IE TSN Safety Communication Function

PLCopen®

CC-Link IE TSN enables building a system where safety and non-safety communications are mixed.
In the following system which integrates safety and non-safety communications, the safety CPU checks the safety signals received via the safety remote I/O module and outputs the safety signals (STO, etc.) to the servo amplifiers. Outputting safety signals via the network eliminates the need for wiring of safety signals to a safety controller and a servo amplifier. The CC-Link IE TSN safety communication function is available with iQ-R series Motion modules.



*1. For servo amplifiers that support the safety communication function, refer to "Safety Sub-Functions" in section 1 of this catalog.

A Wide Variety of Features

PLCopen®

JOG operation

The Motion module outputs commands to an axis and operates the axis to the specified direction while the positive/reverse rotation JOG command is inputted.

Absolute position system

Restores the absolute position of the designated axis.
Once the home position return is executed at the start of the system, it is unnecessary to perform the home position return again when the power is turned ON next time.

Stroke limit functions

Establish the physical movable range for a machine. The hardware stroke limit function and the software stroke limit function are available.

Target position change

A target position can be changed using the buffer mode.
During execution of an FB for position control, another FB to move to a new target position can be started at any timing.

Acceleration/deceleration processing function

Adjusts the acceleration/deceleration of each motion control so that the acceleration/deceleration curve is suitable for the machine.

Override

Sets the factor for the velocity and performs the control to change the target velocity.
The following two methods are available for changing the override factor: a method of using the dedicated FB and a method of changing the control data.

Stop operation functions

The forced stop, the axis stop, the axes group stop, and the forced stop of the servo amplifier are available.

Axis emulate

Enables operations of a virtual servo amplifier as if an actual unit is connected.
This function enables to debug the user program at the startup of the device or verify the positioning operation.

File transfer

Executes file operation and data backup/restore based on the specified command.

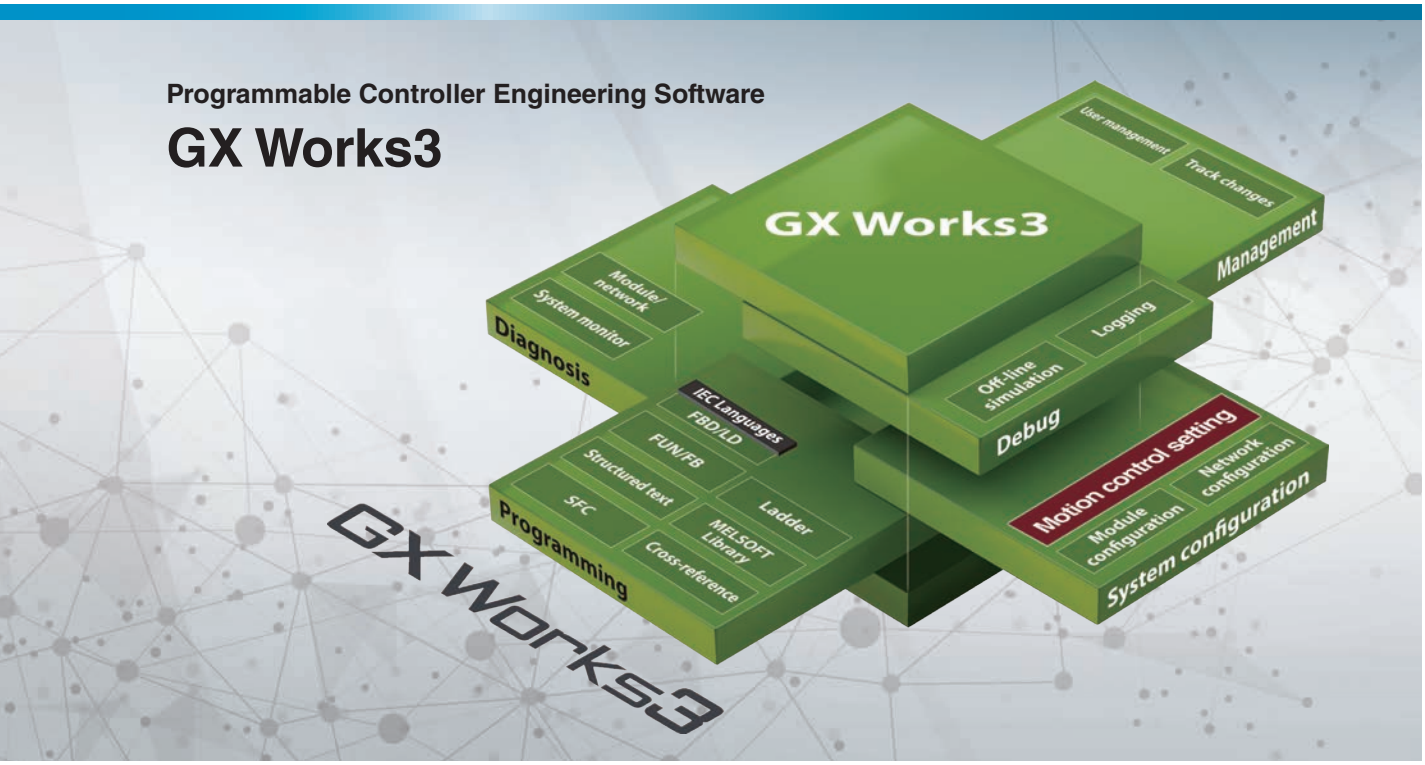
Torque limit function

Limits the torque generated by the servo motor. This function is used to protect the gear reducer and limit the pushing force applied to a stopper. It can control torque so that excessive force will not be applied to loads and machines.
The following two methods are available for changing the torque limit value: a method of using the dedicated FB and a method of changing the control data.

Event history

Saves the error information and the operation for the module as an event in the CPU module and the Motion module.

One software, many possibilities



MELSOFT GX Works3 covers various aspects of development processes - parameter settings, servo adjustments, and debugging of Motion modules as well as sequence program creation. This software offers an engineering environment that provides comfortable design environment.

Engineering Environment

Various features are integrated into GX Works3, which allows users not only to easily create projects but also maintain consistency through the entire development processes.

System Design → Programming → Debug → Maintenance

System Design

- Network configuration settings
- Automatic detection of network configuration

Programming

- Easy programming in ST language
- More intuitive programming, which eliminates the need to remember devices or buffer memory addresses
- Easy access to axis information
- Operation profile data

Debug

- Various monitor functions, such as axis monitor, and ST language program monitor
- A simulator that debugs a program without an actual machine
- Real-time monitor of GX LogViewer

Maintenance

- Various monitor functions, such as axis monitor, and event history
- Security key authentication

Network Configuration Settings

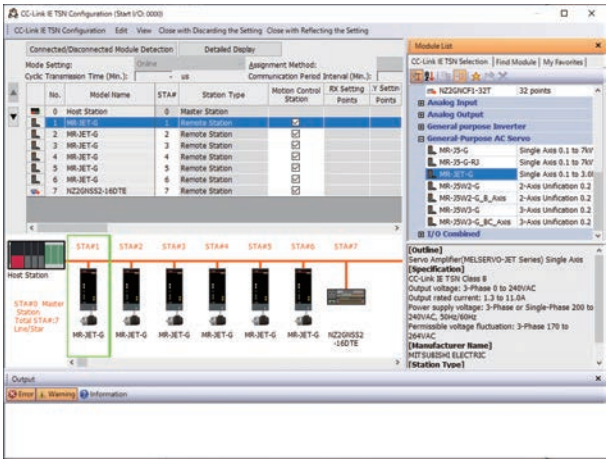
PLCopen®

[Network configuration settings]

- Intuitive network settings with drag-and-drop operations and a graphical screen view

[Automatic detection]

- By clicking the [Connected/Disconnected Module Detection] button, the connection status of device stations is automatically detected and the CC-Link IE TSN configuration screen is generated.

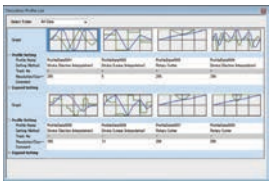


Operation Profile Data with Simple Settings

PLCopen®

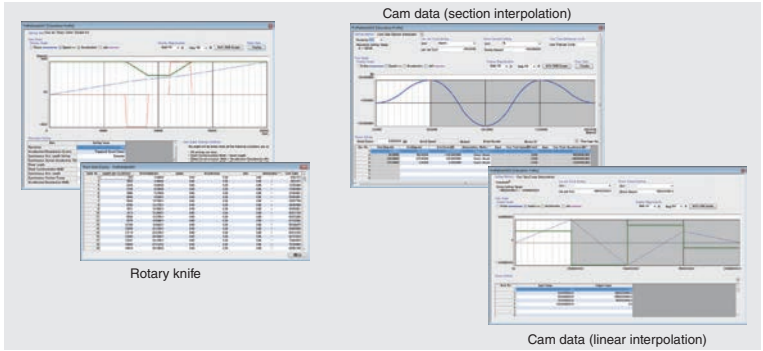
Operation profile data, such as cam data and cam for a rotary knife, is easily created.

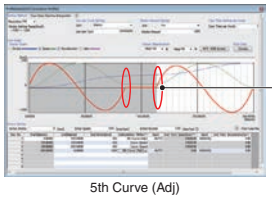
- The cam graph can be flexibly and easily created through drag & drop. The waveform is changed according to the pointer's movement.
- Stroke, speed, acceleration, and jerk can be set while monitoring the changes on the graph.
- By setting "5th Curve (Adj)" for the cam curve types, the speed on a section border becomes smooth.
- Operation profile data for a rotary knife can be automatically generated by settings sheet length, synchronization width, cam resolution, etc.
- The created operation profile data can be checked on the list.



Operation profile data list

Double-click





5th Curve (Adj)

The 5th curve settings make the speed between sections (in green) smooth.

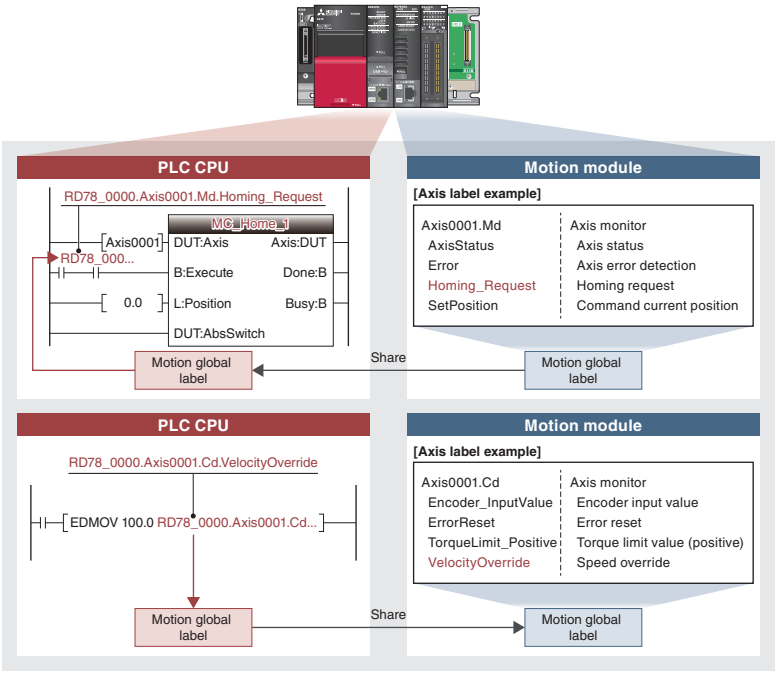
Easy Programming through Structured Text Language

PLCopen®

- Structured text programs are composed of function blocks, increasing program readability.
- Modularization of the programs increases their reusability.
- The consistent, common operability on a single engineering tool improves usability further.
- A wide selection of programming elements in the MELSOFT Library contributes to reducing programming time.
- The program is created by dragging & dropping programming elements, which simplifies the programming process.
- A startup time is reduced using the simulator of MELSOFT GX Works3 that can debug a program without an actual machine.

Programming Using Labels

- The control axes of the Motion modules and I/O signals are defined as label variables, which enables easy reuse of programs and helps to improve programming efficiency.
- The global labels created in the Motion module project can be used in PLC CPUs.



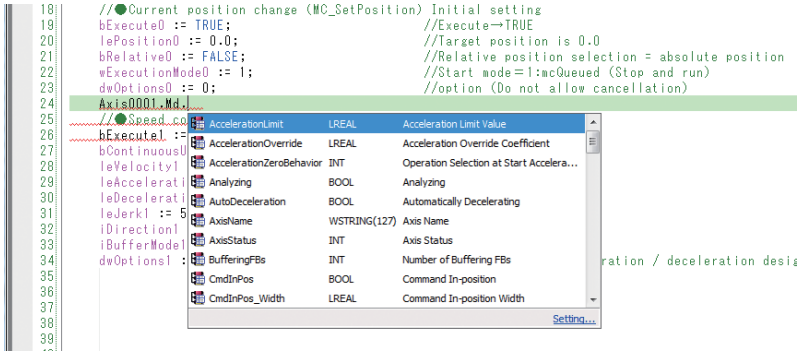
[Reading label data in Motion module]
The axis label data created in the Motion module can be read by the PLC CPU.

[Writing data to labels in Motion module]
Data in the PLC CPU program can be written to the axis labels in the Motion module.

Axis Information is Easily Accessible

- Axis label variables can be used as an argument to refer axes in positioning function blocks.
- IntelliSense® function reduces programming mistakes.
- Access by variable names increases readability.

[Structured text editor]



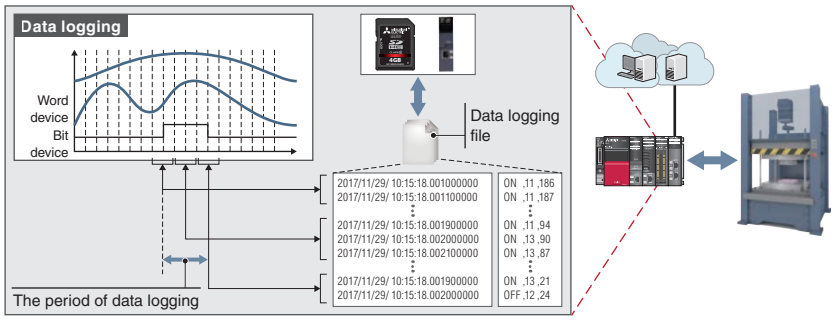
GX LogViewer with Enhanced Waveform Display

PLCopen®

The graph data of both PLC CPU modules and Motion modules can be checked on GX LogViewer. This tool helps you efficiently analyze data from two different modules. The following two functions are provided for logging: data logging function (offline) and real-time monitor.

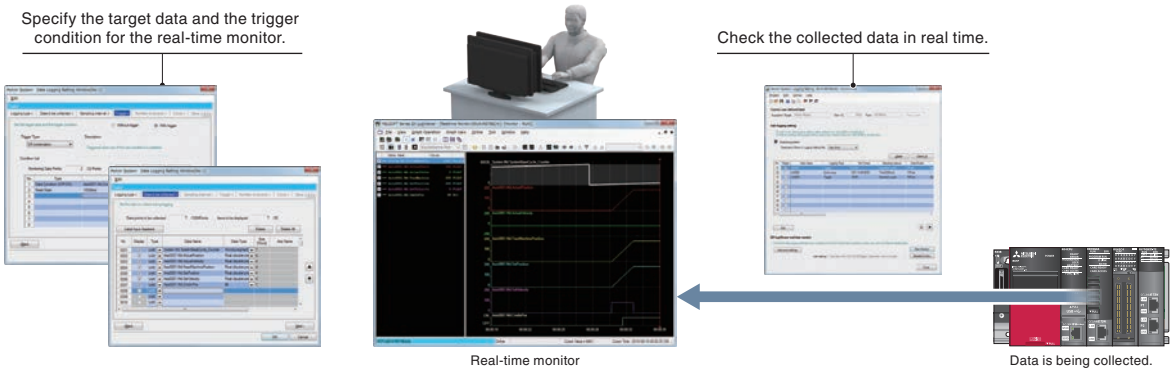
Data Logging Function

The function performs data logging by a specified time interval based on the logging setting (trigger condition, data collection) written to the Motion module from the engineering tool. The results are saved as a data logging file.
Up to 10 data settings can be simultaneously logged for the Motion module.
The operation status before and after an error is displayed in waveforms, which allows more detailed analysis and identification of the error cause.



Real-Time Monitor

Up to 32 data collected from a Motion module can be displayed in real time.

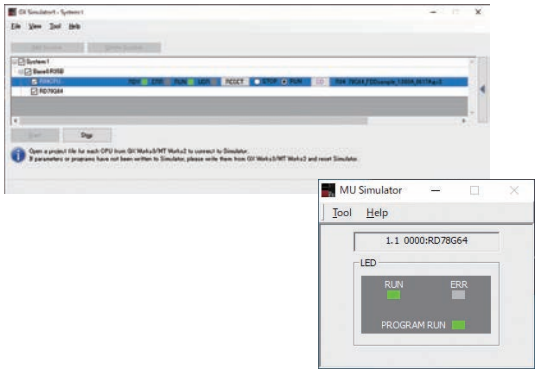


Easy Pre-Verification and Troubleshooting

PLCopen®

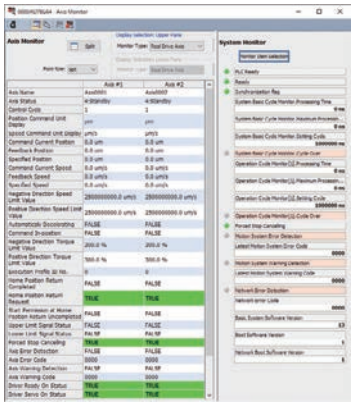
System Simulation

The system simulator enables the Motion module and PLC CPU programs to be simulated interactively.
A program operation can be checked without an actual machine during debugging process, which shortens the startup time.



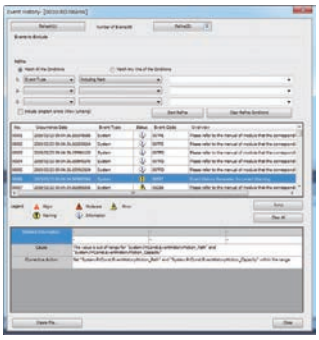
Axis Monitor

Users can customize the axis monitor items according to their machine, improving debug efficiency. The axis monitor can also be used during simulation.



Event History

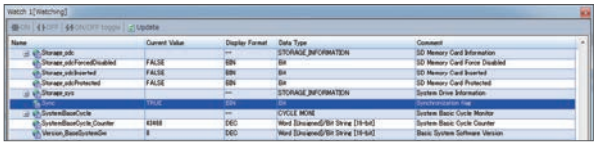
Event history lists information about executed operations and errors that have occurred on each module in chronological order, which helps to conduct troubleshooting.



Program Monitor

Debugging can be executed through both the program monitor and the watch window by using the common interface.

ST language program monitor



Watch window

Security Key Authentication Function

PLCopen®

The security key authentication prevents programs from being opened on personal computers where the security key has not been registered. Furthermore, because programs can be executed only by Motion modules with the security key registered, the integrity of customer technologies and other intellectual property is not compromised.

Software-based controller for high-precision motion control

CC-Link IE TSN
Motion Control Software
SWM-G

Installed on a personal computer, SWM-G Motion Control Software can perform motion and network control.

- Supports a CC-Link IE TSN servo control system with the personal computer where RTX64 (real-time extension) is installed. (RTX64 is included with SWM-G.)
- Meets various application needs by offering various types of motion control, such as positioning, synchronous, cam, speed, and torque control using API library for motion control.
- Utilizes network control to connect and set various device stations (remote I/O modules, etc.) and TCP/IP devices.

Product Lines

SWM-G

Download Motion Control Software from Mitsubishi Electric FA global website.

SWM-G Motion Control Software
- SWM-G Engine
- SWM-G API
- Network API
- SWM-G Operating Station
- Real Time OS

Free trial version SWM-G-W *4
- SWM-G-W Engine
- SWM-G API
- SWM-G-W Operating Station TRIAL

Purchase the USB key (license).

USB key

For 16 axes | For 32 axes | For 64 axes | For 128 axes

CC-Link IE TSN
Motion Control Software*1

SWM-G*3

- Maximum number of control axes: 128
- Minimum operation cycle*2: 125 µs
- Programming language: Visual C ++®

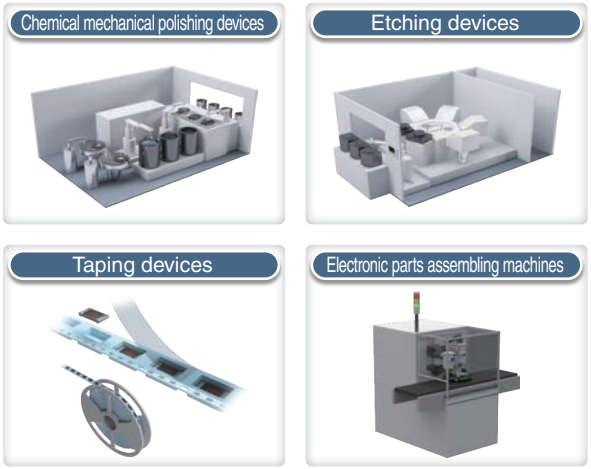
USB key for Motion Control Software

MR-SWMG16-U: 16 axes MR-SWMG32-U: 32 axes
MR-SWMG64-U: 64 axes MR-SWMG128-U: 128 axes

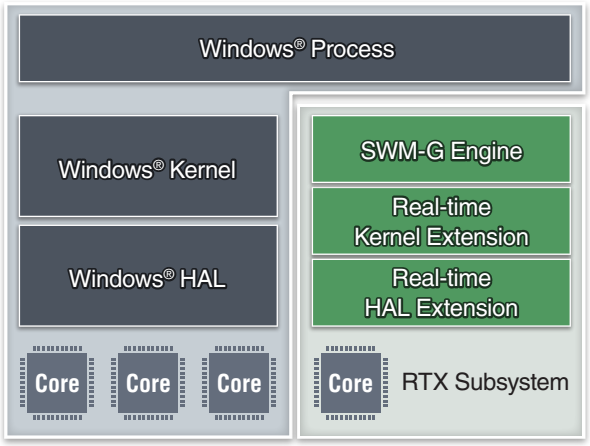
*1. SWM-G Motion Control Software includes SWM-G Engine, SWM-G API, Network API, SWM-G Operating Station, and Real Time OS (RTX64).
*2. The minimum operation cycle depends on the number of control axes and the CPU of the personal computer.
*3. SWM-G-N1 is also compatible with EtherCAT®.
*4. A USB key (license) is not required for the free trial version SWM-G-W. To obtain SWM-G-W, contact your local sales office.

Covering a Wide Range of Multi-Axis Applications

- SWM-G Motion Control Software is available in 16 to 128-axis control models, enabling multi-axis synchronization of various scales of machines.



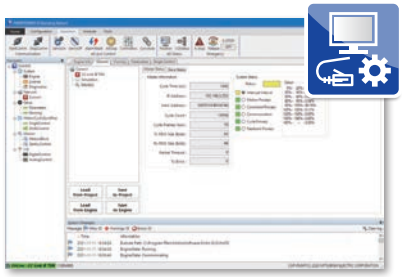
- A CPU core of the industrial personal computer is assigned for running SWM-G processing, and that enables SWM-G to perform a high-speed, real-time operation without being affected by the operation on Windows®.



Reduced Machine Design and Startup Time

- The integrated test tool SWM-G Operating Station covers the development processes of SWM-G from design to simulation, contributing to reduction in the total cost of ownership.
- The Operating Station enables users to check the communication settings and status of the master/remote stations, leading to reduced design time.

Single-axis control



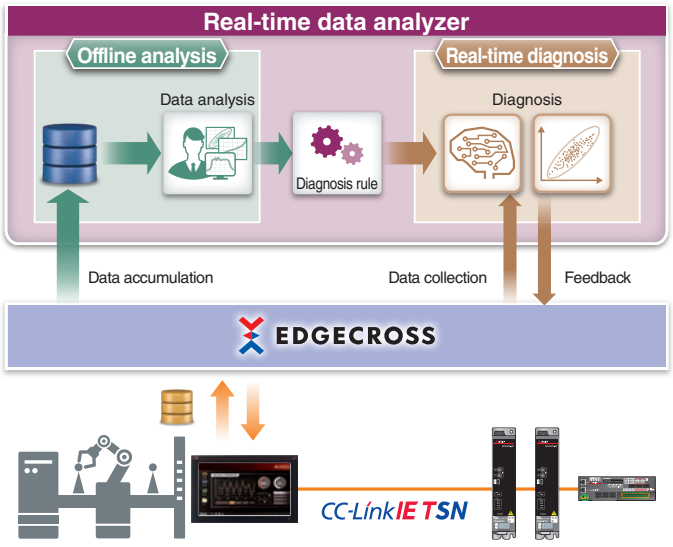
Master station communication monitor

Maintenance Solution by MELIPC with SWM-G Installed

When SWM-G is installed and operated on the MELIPC (industrial personal computer), the system offers a powerful maintenance solution utilizing the Edgecross-compatible software.

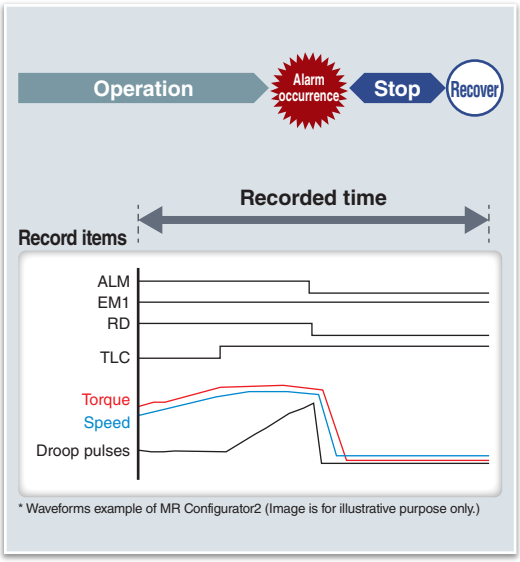
[Predictive/preventive maintenance]

- The user application collects data of machine diagnosis function, etc. from MR-JET-G through the communication API of SWM-G.
- The MELIPC analyzes the collected data by using the Edgecross-compatible real-time data analyzer.



[Corrective maintenance]

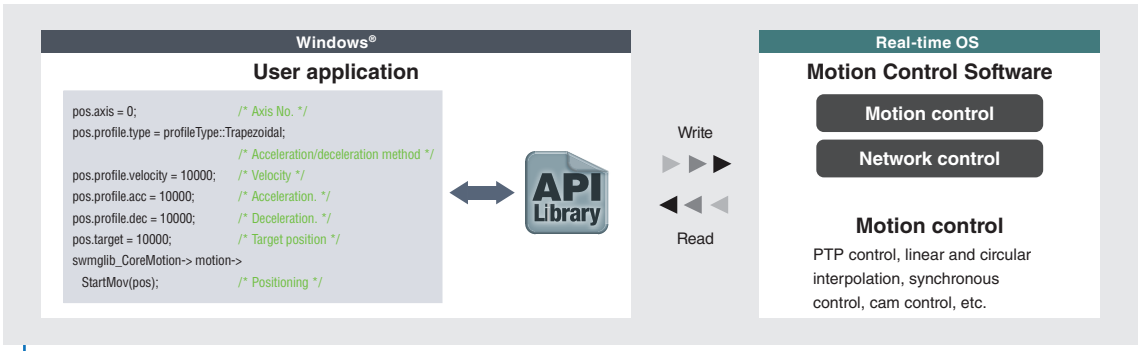
- SWM-G collects data from the drive recorder of MR-JET-G through TCP/IP communications, which reduces troubleshooting time.

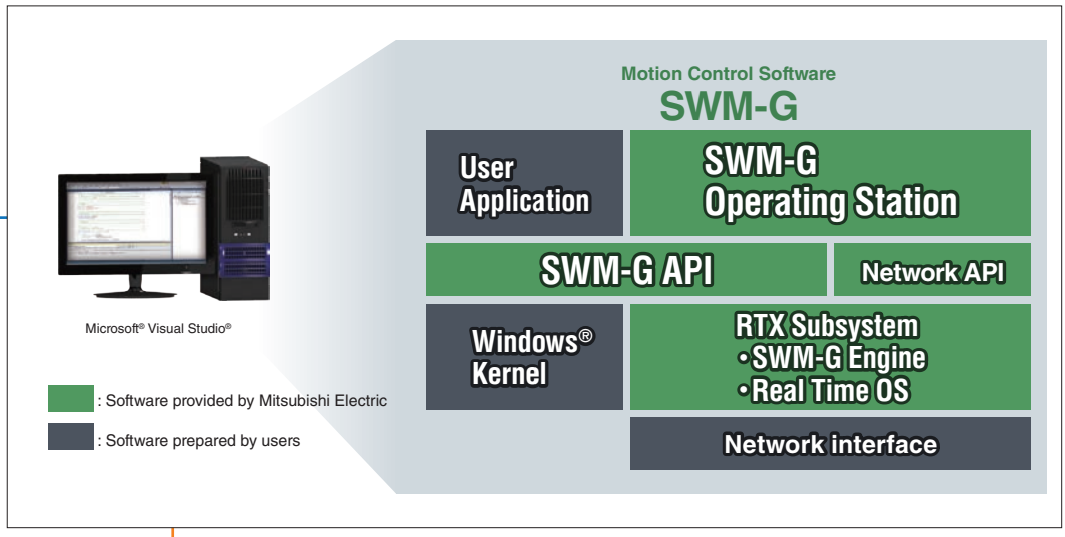


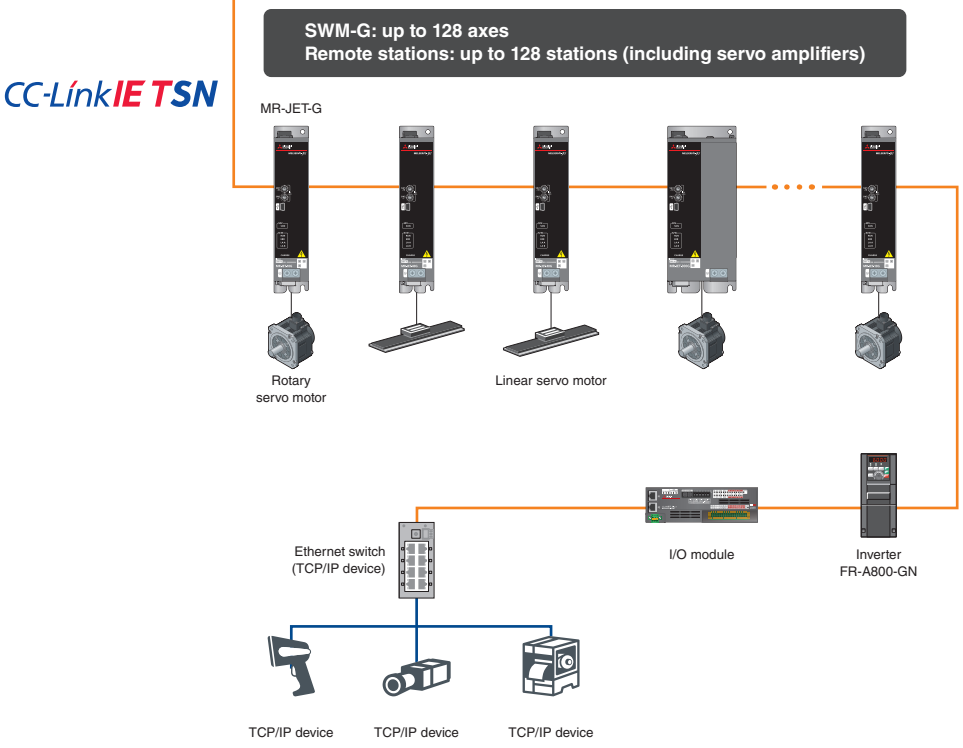
* Waveforms example of MR Configurator2 (Image is for illustrative purpose only.)

System Configuration

SWM-G Motion Control Software executes motion control while functioning as a master station of CC-Link IE TSN. *1
This feature enables users to create a system more flexibly by connecting various devices, such as servo amplifiers, remote I/O modules, and TCP/IP devices, to SWM-G.
High-speed control is achieved even when control at low- and high-speed communication cycles is mixed within the same control communication.







*1. The following functions are not provided: sub-master station, local station, multi-master configuration, backup/restore function, data communication function with standard stations, and safety communication.

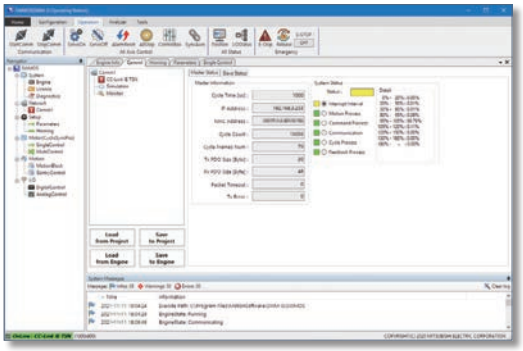
Integrated Test Tool SWM-G Operating Station

This tool provides a variety of features - parameter settings required for application development and the test operation for JOG, inching, and positioning operations. In addition, each axis status and sampled waveforms can be displayed to help user check the start timing and the operation pattern.

SWM-G Operating Station

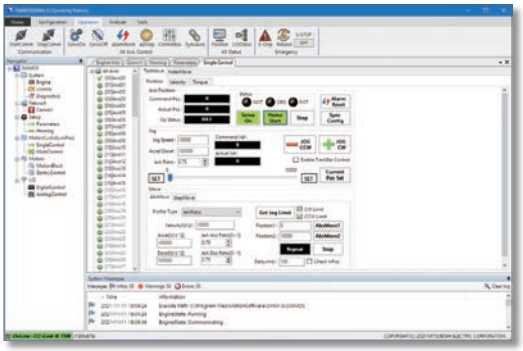
[Communication monitor]

- Displays a list of the master communication setting
- Displays the system status, allowing users to check communication status



[Single-axis control]

- Performs a test operation for single-axis control
- Performs a reciprocating operation that is often used for a test operation



Multiple Servo Amplifier Settings and Adjustments

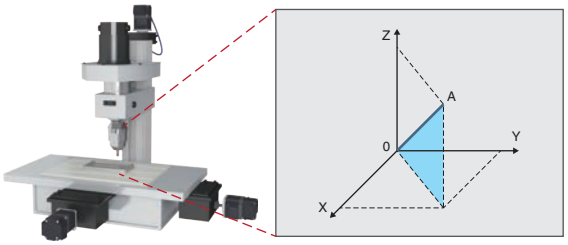
MR Configurator2 enables users to easily set and adjust multiple servo amplifiers through CC-Link IE TSN which enables mixing of TCP/IP communication and other communications.
Using MR Configurator2 with the integrated test tool, users can adjust servo amplifiers while checking the servo amplifier communication status.

- Supports MR-JET
- Manages a multi-axis system as one project
- Parameters and the machine diagnosis can be set for all axes in a batch on MR Configurator2.

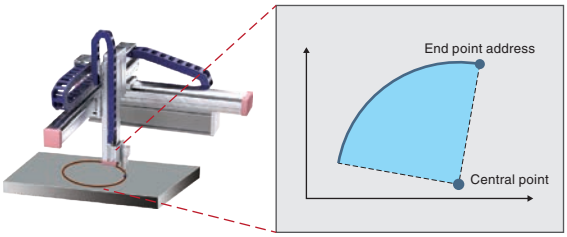
*MR Configurator2 is not included with SWM-G Motion Control Software.

Positioning Control

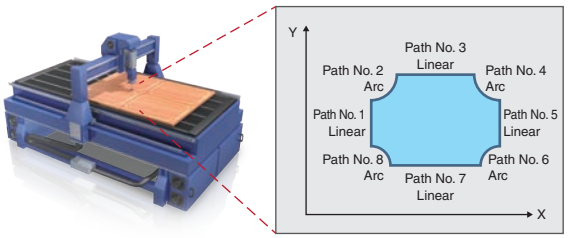
Linear interpolation



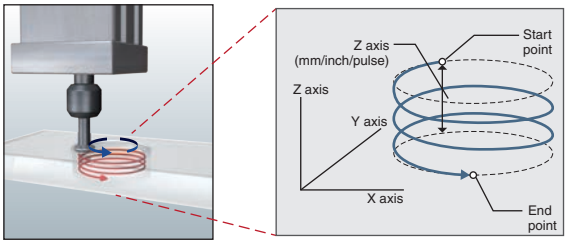
Circular interpolation



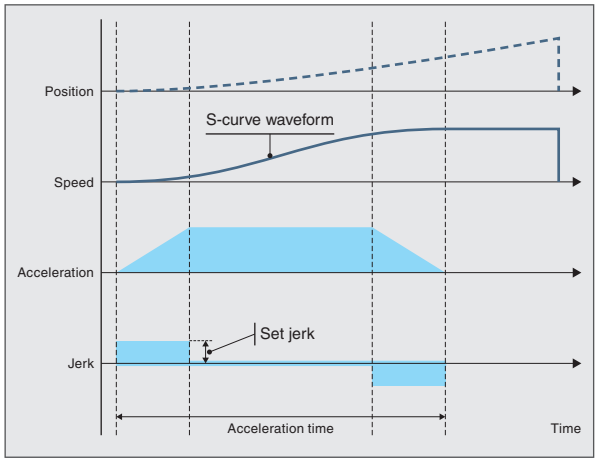
Continuous path control (path interpolation)



Helical interpolation

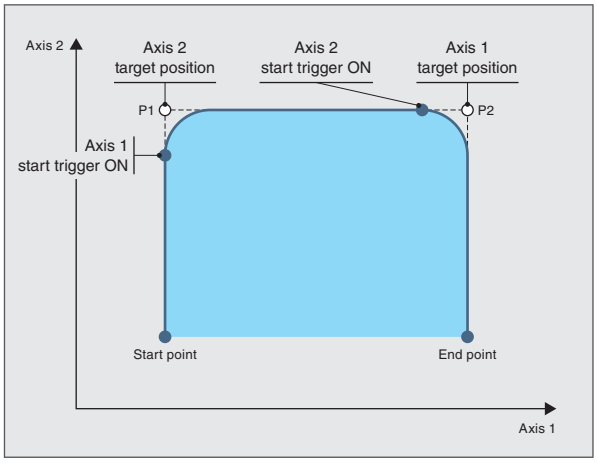


Jerk acceleration/deceleration



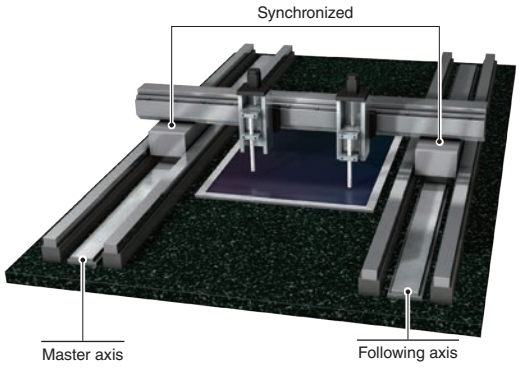
In this method, an axis can be accelerated gradually through adjusting jerk so that the vibrations of the machine can be minimized.
In the example above, the constant positive jerk is applied at the start of the operation to achieve smooth acceleration. When the axis is shifted to the constant-speed operation, the same amount of negative jerk is applied.
Adjusting jerk in this way achieves smooth acceleration/deceleration while also shortening the time it takes to reach the target speed.
The speed creates a S-curve shape.

Triggered motion



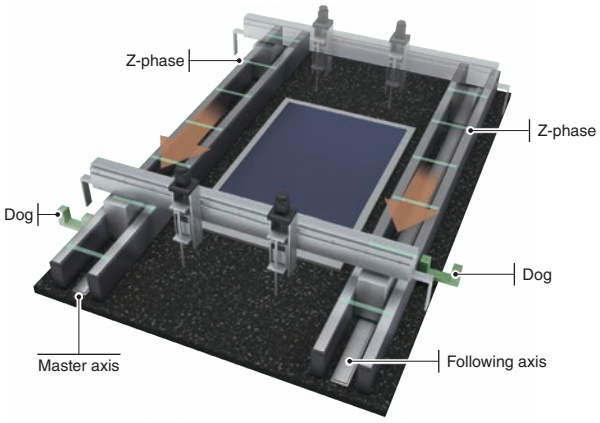
The triggered motion is a type of command that delays the execution of the motion command until the specified trigger condition is satisfied.
Axes can be started automatically based on the specified conditions by using this command, reducing the cycle time of conveyor systems, etc.
In the operation example above, right after the axis 2 starts execution of normal motion commands, the axis 1 executes the triggered motion command (delaying the execution of the command until the condition is satisfied).
When the condition is satisfied (start trigger ON) during the axis 2 operation, the axis 1 starts executing the motion command.

Synchronous control (tandem drive)



Motion Control Software enables tandem operation where the same commands can be outputted to master and following axes.

Gantry home position return



After the master and following axes pass their respective dogs, the gantry home position return stops both of the axes at the Z-phase of the master axis.
This method enables two or more axes to execute home position return simultaneously, supporting gantry systems.

A Wide Variety of Features

Hot connect (disconnection/reconnection)

The hot connect enables a topology change during operation without requesting a communication stop.
The user application disconnects and reconnects the network through API library.

Monitoring of servo data

The controller obtains the status data of MR-JET-G servo amplifiers, such as machine diagnosis information and encoder temperature, via CC-Link IE TSN. This enables visualization of machine status.

Position synchronous output (cam switch)

The output signal is turned on when a specified condition is satisfied. This function can be used as an alternative to a limit switch.

Touch probe (mark detection)

The current value of the servo motor can be read when the touch probe signal is inputted.
Software and hardware touch probes are available.
Select the touch probe according to your application.

Pitch error compensation

The set offset is applied at regularly spaced command positions. The position error of ball screws can be compensated, improving the operation accuracy.

Backlash compensation

The set offset is applied when the axis changes the travel direction.
The backlash of ball screws can be compensated, which improves operation accuracy of machines.

Acceleration/deceleration methods

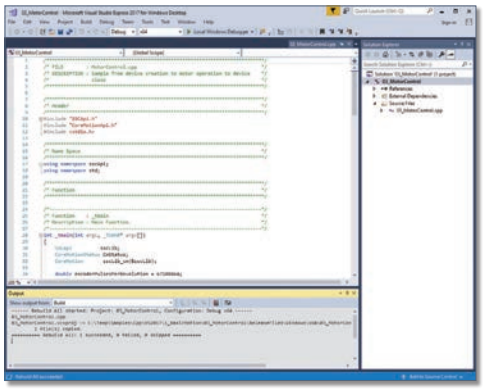
The controller offers 24 types of acceleration/deceleration methods, such as trapezoidal, S-curve, jerk ratio, parabolic, sine curve, time acceleration trapezoidal, etc.
Select the method according to your application.

Programming Utilizing API Library

SWM-G

■ Development environment *1 (Microsoft® Visual Studio®)

Add the SWM-G API library to the project of Microsoft® Visual Studio® and create a user program.



- C++, C# compile
- Debug of C language programs

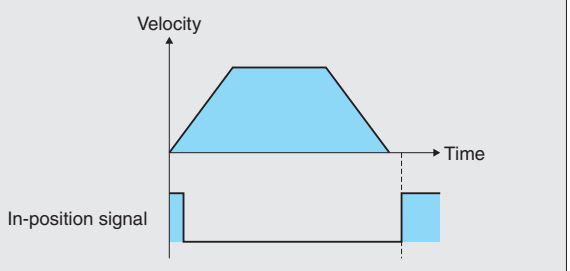
*1. Prepare a development environment with Microsoft® Visual Studio®.

■ A program that starts positioning

User program

```
void sample()
{
   Motion::PosCommand pos;

   /* Position command data settings */
   pos.axis = 0;                              /* Axis = axis 0 */
   pos.profile.type = ProfileType::Trapezoidal;       /* Acceleration = trapezoidal */
   pos.profile.velocity = 10000.0;            /* Velocity = 10000.0 [U/s] */
   pos.profile.acc = 10000.0;                         /* Acceleration = 10000.0 [U/s^2] */
   pos.profile.dec = 10000.0;                         /* Deceleration = 10000.0 [U/s^2] */
   pos.target = 30000.0;                      /* Travel distance = 30000.0 [U] */

   /* Relative positioning start */
   err = ssclib_cm.motion->StartMov(&pos);
   if (err != ErrorCode::None) { /* Error processing */ }

   /* Waiting for positioning completion */
   sscLib_cm.motion->Wait(0);
}
```

Servo amplifier

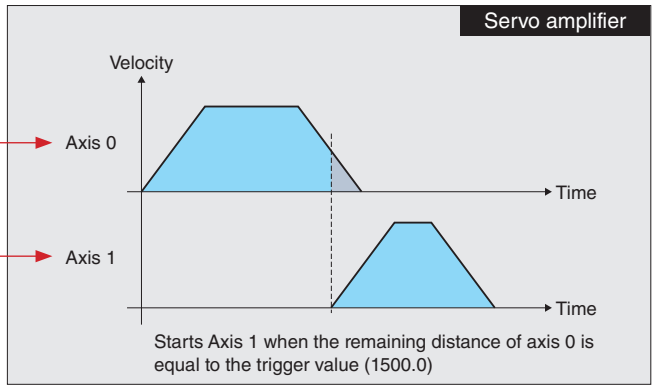


■ A program that continuously starts positioning of another axis based on the specified trigger condition

User program

```
void sample()
{
   Motion::PosCommand pos;
   Motion::TriggerPosCommand tpos;

   /* Position command data settings (axis 0) */
   pos.axis = 0;                              /* Axis = axis 0 */
   pos.profile.type = ProfileType::Trapezoidal;       /* Acceleration = trapezoidal */
   pos.profile.velocity = 10000.0;            /* Velocity = 10000.0 [U/s] */
   pos.profile.acc = 10000.0;                         /* Acceleration = 10000.0 [U/s^2] */
   pos.profile.dec = 10000.0;                         /* Deceleration = 10000.0 [U/s^2] */
   pos.target = 30000.0;                      /* Travel distance = 30000.0 [U] */

   /* Relative positioning start (axis 0) */
   err = ssclib_cm.motion->StartMov(&pos);
   if (err != ErrorCode::None) { /* Error processing */ }

   /* Triggered motion position command data settings (axis 1) */
   tpos.axis = 1;                             /* Axis = axis 1 */
   tpos.profile.type = ProfileType::Trapezoidal;      /* Acceleration = trapezoidal */
   tpos.profile.velocity = 10000.0;           /* Velocity = 10000.0 [U/s] */
   tpos.profile.acc = 10000.0;                        /* Acceleration = 10000.0 [U/s^2] */
   tpos.profile.dec = 10000.0;                        /* Deceleration = 10000.0 [U/s^2] */
   tpos.target = 20000.0;                     /* Travel distance = 20000.0 [U] */
   tpos.trigger.triggerAxis = 0;              /* Trigger axis = axis 0 */
   tpos.trigger.triggerType = TriggerType::RemainingDistance;    /* Trigger condition = remaining distance */
   tpos.trigger.triggerValue = 1500.0;        /* Remaining distance = 1500.0 [U] */

   /* Triggered motion relative positioning start (axis 1) */
   err = ssclib_cm.motion->StartMov(&tpos);
   if (err != ErrorCode::None) { /* Error processing */ }

   /* Waiting for positioning completion */
   sscLib_cm.motion->Wait(1);
}
```

Servo amplifier



Starts Axis 1 when the remaining distance of axis 0 is equal to the trigger value (1500.0)

All-in-One World Class Servo

CC-Link IE TSN

MR-JET-G

EtherCAT®

MR-JET-G-N1

Supports Ethernet-based CC-Link IE TSN, featuring high-speed, large-capacity communication (1 Gbps). Communication cycle of ≥ 125 µs and speed frequency response of 3.2 kHz enable advanced motion control.
The servo amplifiers also support CC-Link IE Field Network Basic.
MR-JET-G-N1 servo amplifiers support EtherCAT®. (100 Mbps)

Product Lines

■ Servo amplifier

●: Supported –: Not supported

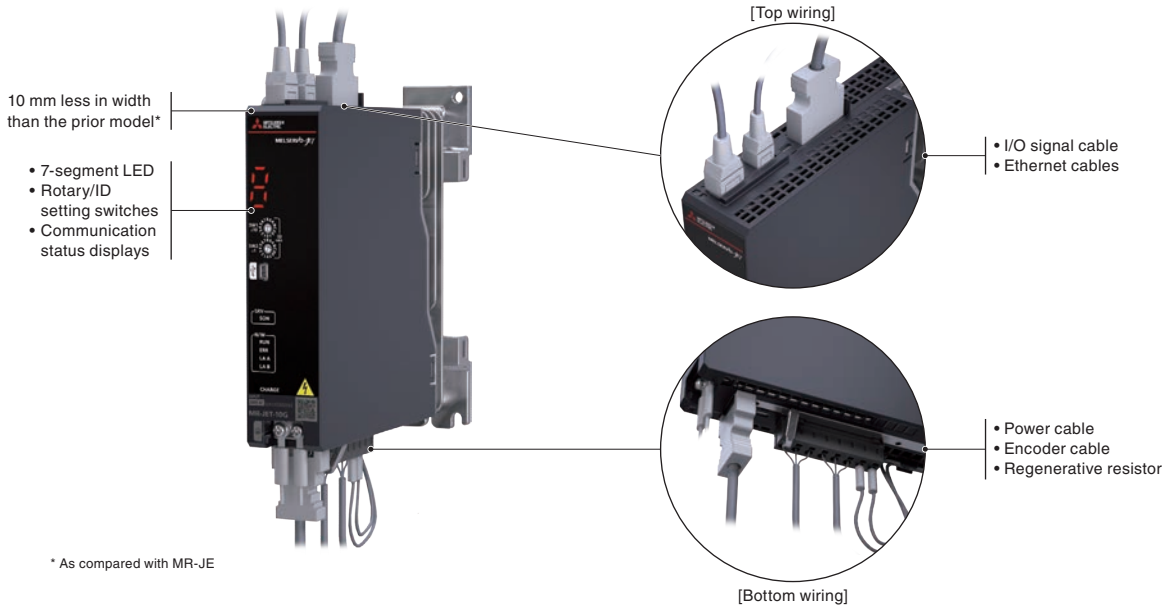
Model	Power supply specifications	Command interface (Note 1)	Rated output	Rotary servo motor	Linear servo motor	Control mode			Fully closed loop control	Safety sub-functions
						Position	Velocity	Torque		
MR-JET-G	200 V AC	CC-Link IE TSN	0.1 kW to 3 kW	●	●	●	●	●	●	–
MR-JET-G4-HS	400 V AC		0.6 kW to 7 kW		–					●
MR-JET-G-N1	200 V AC	EtherCAT®	0.1 kW to 3 kW	●	●	●	●	●	●	–
MR-JET-G4-HSN1	400 V AC		0.6 kW to 7 kW		–					●

Notes: 1. MR-JET-G also supports CC-Link IE Field Network Basic.

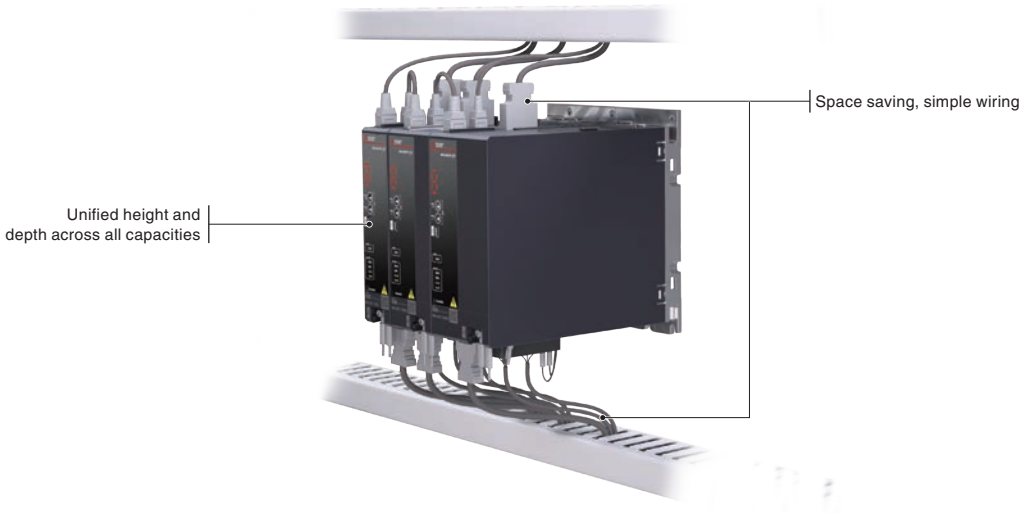
Compact Servo Amplifiers with Simple Wiring (200 V)

Simple, Efficient Wiring

The servo amplifier offers simple wiring by having connectors on the top and bottom surfaces, and allows all cables and wires to be routed through wiring ducts. LEDs and switches are located on the front surface of the servo amplifiers for easy operation.

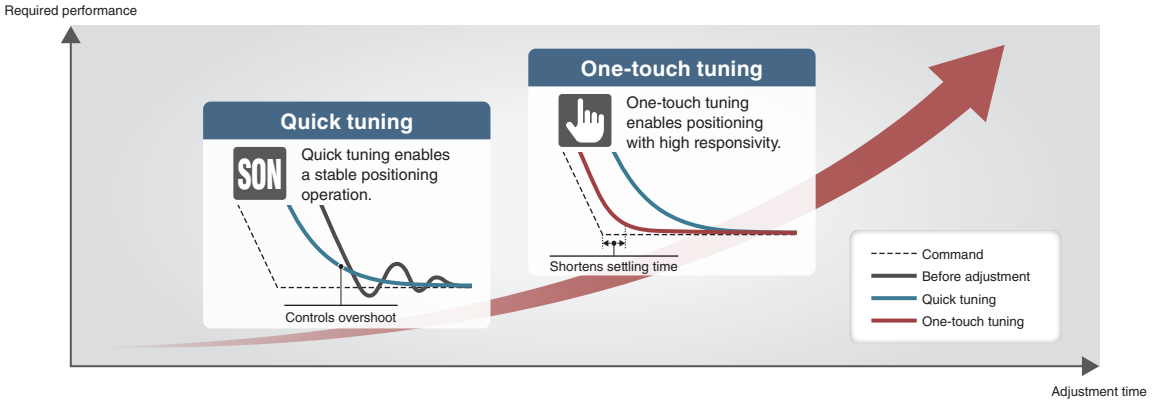


* As compared with MR-JE



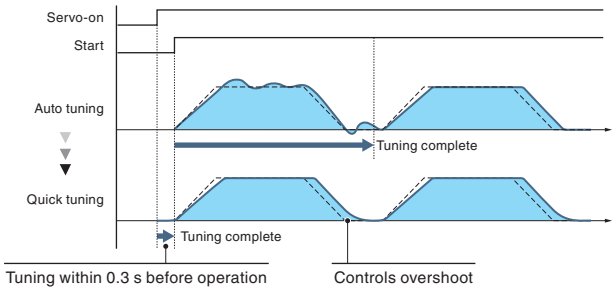
Tuning Functions

Use the tuning methods that are optimal for your machines.



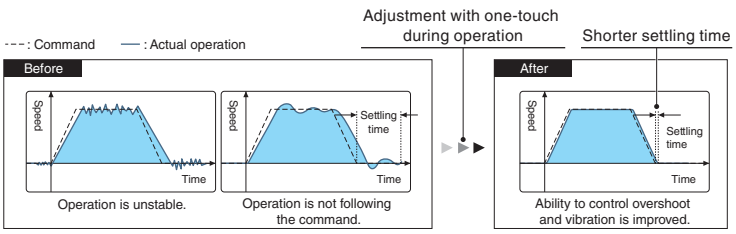
Quick Tuning

This function automatically performs easy-to-use auto tuning that controls vibration and overshoot just by turning on the servo-on command. Before normal operation, the servo amplifier sets control gain and machine resonance suppression filters in 0.3 seconds by inputting torque to the servo motor automatically. After completing the setting, the servo amplifier starts operation normally.



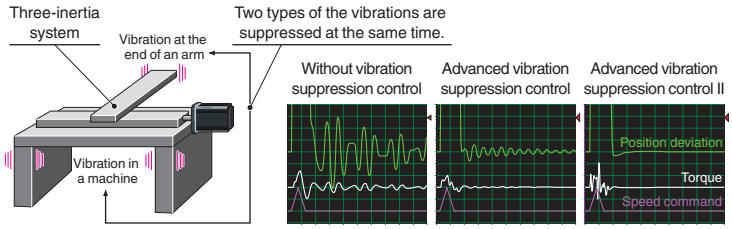
One-Touch Tuning

This function automatically completes servo gain adjustment according to the mechanical characteristics and reduces the settling time just by turning on the one-touch tuning. The servo gain adjustment includes the machine resonance suppression filter, advanced vibration suppression control II, and the robust filter. Controlling overshoot and vibration is improved, maximizing your machine performance.



Advanced Vibration Suppression Control II

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



Command Notch Filter

The frequency can be set close to the machine vibration frequency because the command notch filter has an applicable frequency range between approximately 1 Hz and 2000 Hz.

Machine Resonance Suppression Filter

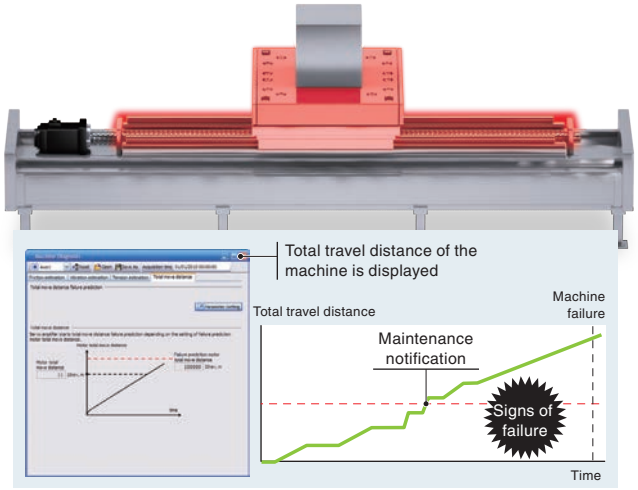
The expanded applicable frequency range is between 10 Hz and 8000 Hz. Five filters are simultaneously applicable, improving vibration suppression performance of a machine. The machine resonance frequency is detected by the machine analyzer function in MR Configurator2.

Preventive Maintenance

Machine Diagnosis (Mechanical Drive Components)

This function estimates when a machine failure will occur based on the total travel distance of the servo motor and notifies when it is time for replacement if the rated service life of the mechanical drive components is set.

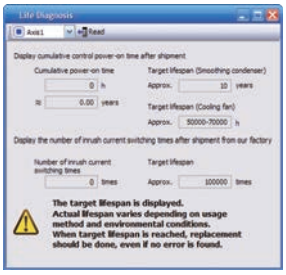
● Machine total travel distance failure prediction



Servo Amplifier Life Diagnosis

This function displays the cumulative energization time and the number of inrush relay on/off times. The data can be used to check the service life of the parts as a rough guide.

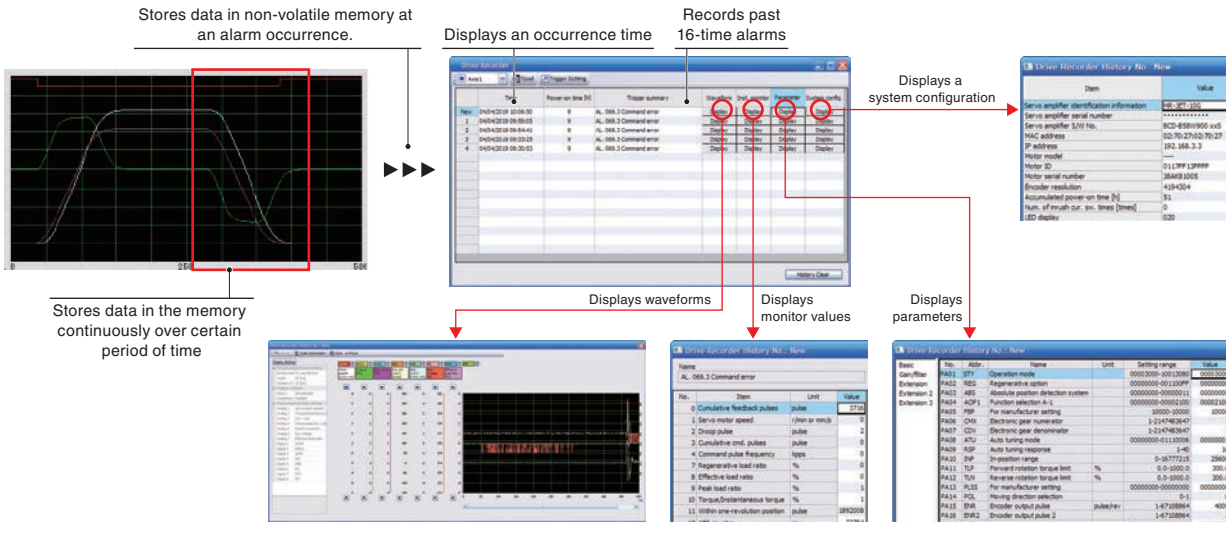
● Cumulative energization time (Smoothing condenser/cooling fan life span)
● The number of inrush relay on/off times (Inrush relay life)



Corrective Maintenance

Drive Recorder

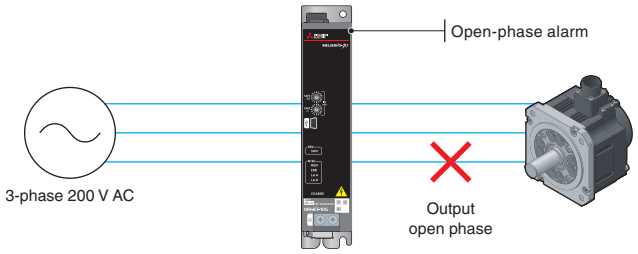
This function continuously monitors the servo status and records the status transition such as a trigger condition before and after an alarm for a fixed period of time. Reading the servo data on MR Configurator2 helps you analyze the cause of the alarm. In addition to the monitor values and the waveform of the past 16-time alarms in the alarm history, the system configuration and the servo parameters are displayed. Alarm occurrence time is also displayed when the servo amplifier and the controller are normally in communication on CC-Link IE TSN. The data can be outputted to a GX LogViewer format file.



Connection/Communication Diagnosis

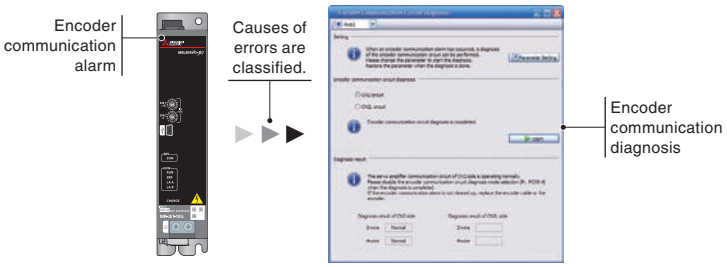
Disconnection Detection

The servo amplifiers detect an open phase condition on the output side. The alarm can be distinguished from other alarms such as the overload alarm, reducing the time required to restore the system.



Encoder Communication Diagnosis

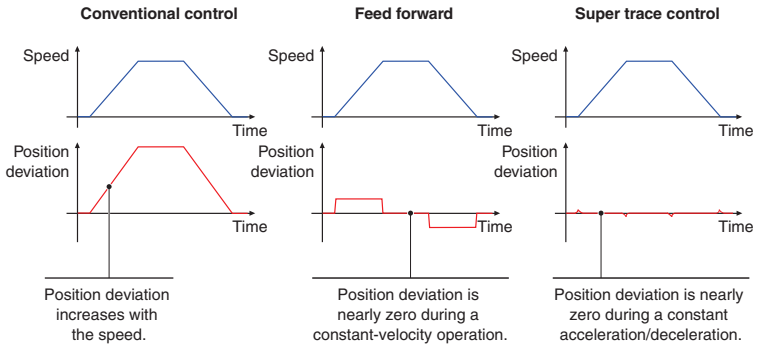
The encoder communication diagnosis checks the encoder communication circuit in the servo amplifier. This function is useful for classifying the cause of errors (such as disconnected encoder cables) when the encoder communication alarm occurs.



Path Control

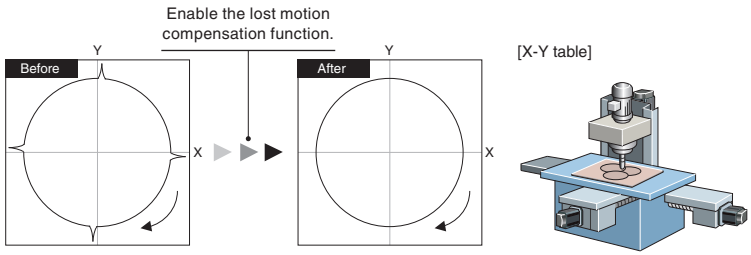
Super Trace Control

This function reduces a position deviation to nearly zero not only during constant-velocity operation, but also during constant acceleration/deceleration.
The path accuracy will be improved in high-rigidity machines.



Lost Motion Compensation

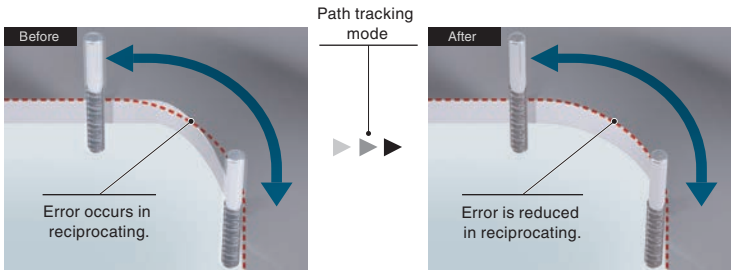
This function suppresses quadrant protrusion caused by friction and torsion generated when the servo motor rotates in a reverse direction. Therefore, the accuracy of circular path will be improved in path control used in XY table, etc.



Suppression of quadrant protrusion of circular path

Path Tracking Model Adaptive Control

This function reduces path errors which occur when the servo motor reciprocates. Normally, when positioning control is executed, the model adaptive control adjusts the control to shorten a settling time. Instead, this function reduces overshooting to improve path accuracy, which is suitable for machines that require high-accuracy path control such as processing machines.

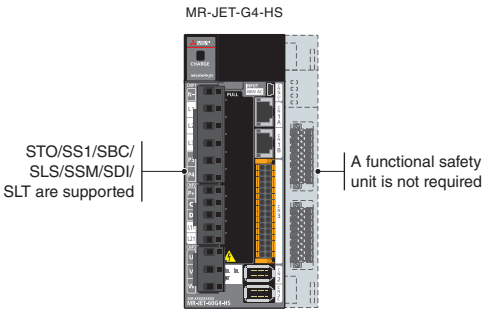


Safety Sub-Functions

Enhanced functions

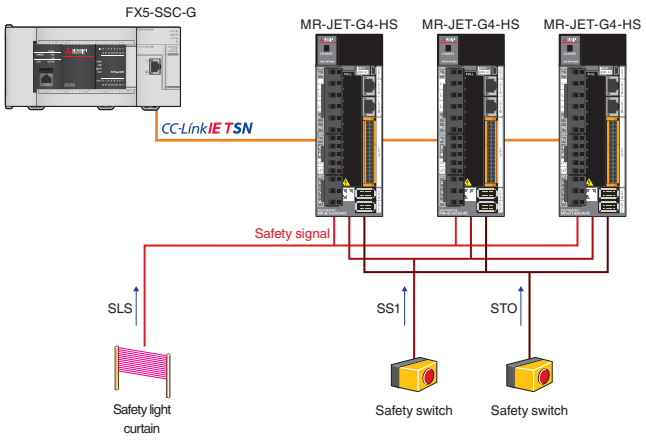
Safety Sub-Functions with Built-in Safety Functions

MR-JET-G4-HS has a built-in safety control part, supporting safety sub-functions by functional safety I/O signals or safety communication without a functional safety unit.
The servo amplifiers support the safety sub-functions of STO/SS1/SBC/SLS/SSM/SDI/SLT at a safety level of SIL 2 or SIL 3.



Safety Sub-Functions via Functional Safety I/O Signals

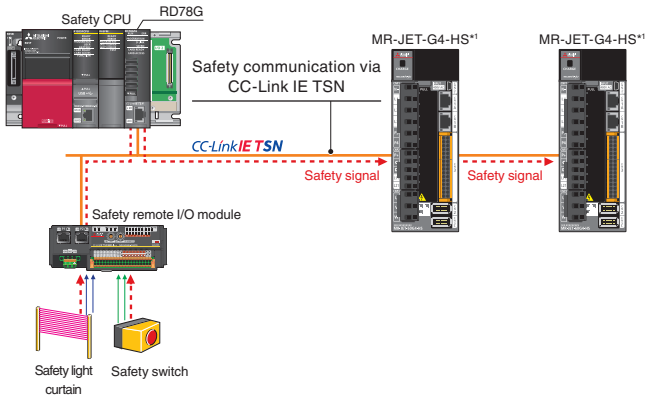
A safety system can be flexibly configured with MR-JET-G4-HS by directly connecting functional safety I/O signals to it without using a safety CPU or a safety remote I/O module.
The servo amplifier supports three points of functional safety I/O signals, enabling execution of multiple safety sub-functions.



Safety Communication Function via CC-Link IE TSN*2

CC-Link IE TSN enables building a system where safety and non-safety communications are mixed. When combined with R_SFCPU-SET safety CPU and RD78G Motion module, MR-JET-G4-HS can receive safety signal data of the safety CPU through CC-Link IE TSN. Wiring the safety signals to the servo amplifiers is not necessary.

*1. Refer to "Safety Sub-Functions" in section 1 of this catalog for the compatible servo amplifiers.
*2. MR-JET-G4-HSN1 supports Safety over EtherCAT® (safety data communication protocol) of EtherCAT® .

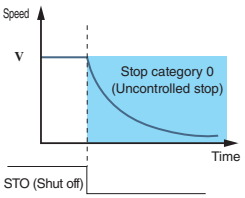


Safety Sub-Functions Compliant with IEC/EN 61800-5-2

MR-JET-G4-HS supports safety sub-functions, STO/SS1/SBC/SLS/SSM/SDI/SLT.

Safe torque off (STO)

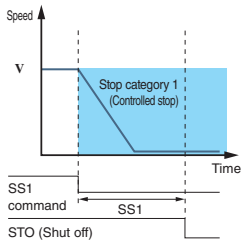
Responding to the input signal from external equipment, the STO function shuts off power to the servo motor electronically using the internal circuit (shuts off through secondary-side output).
This function corresponds to the Stop category 0 of IEC/EN 60204-1.



Execute the STO function in servo off state or when the servo motor is stopped.

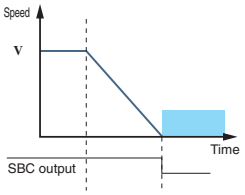
Safe stop 1 (SS1)

Responding to the input signal from external equipment, the servo motor starts to decelerate. After the set delay time for motor stop is passed, the STO function starts. Monitoring the servo motor deceleration based on the motor deceleration rate is also supported.
This function corresponds to the Stop category 1 of IEC/EN 60204-1.



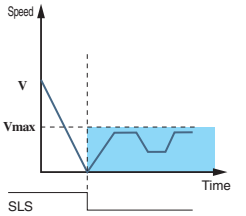
Safe brake control (SBC)

The SBC signals are outputted for external brake control.



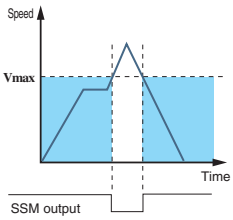
Safely-limited speed (SLS)

This function monitors the speed of the servo motor not to exceed the specified speed limit. If the speed exceeds the limit, the motor power is shut off by the STO.



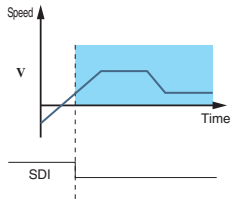
Safe speed monitor (SSM)

The SSM signals are outputted when the speed of the servo motor is below the specified speed limit.



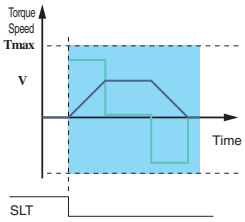
Safe direction (SDI)

This function monitors whether the servo motor moves in the command direction.
If the servo motor moves in a different direction from the command direction, the STO function is executed.



Safely-limited torque (SLT)

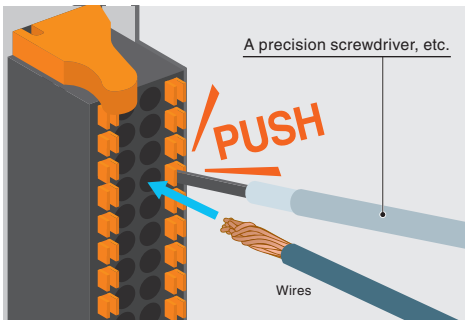
This function monitors the torque (or the thrust) of the servo motor not to deviate from the specified range. If the torque (or the thrust) exceeds the range, the STO function is executed.



: Function activation area

Simplified Wiring with Push-in Connector

MR-JET-G4-HS is equipped with a push-in connector for I/O signal as standard, simplifying wiring and reducing wiring time.

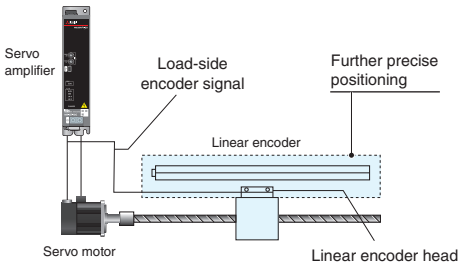


Supporting Flexible Driving System

Fully Closed Loop Control*1

Supporting a fully closed loop control system as standard, MR-JET-G servo amplifiers enable further precise positioning.

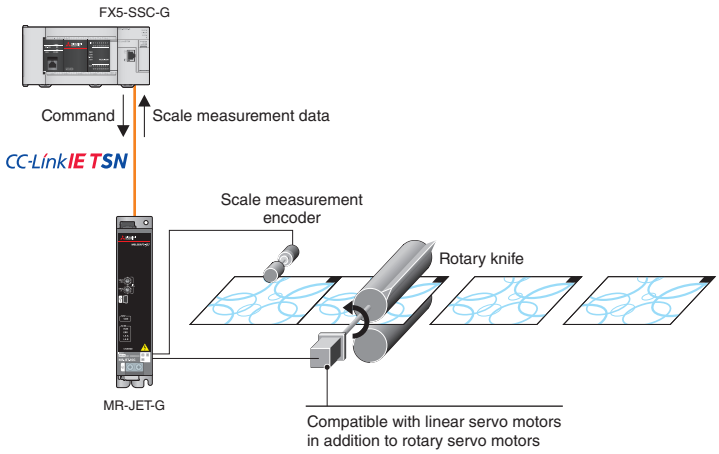
*1. The servo amplifiers are compatible with two-wire type serial encoders and pulse train interface (A/B/Z-phase differential output type) encoders.
Use the servo amplifier manufactured in July 2022 or later.



Scale Measurement Function

Enhanced functions

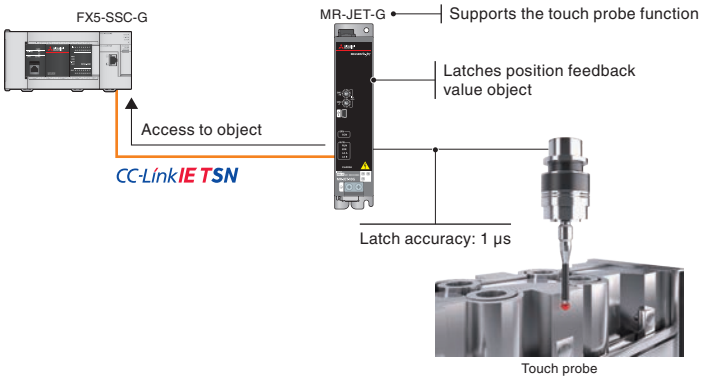
The scale measurement function transmits scale measurement data of a scale measurement encoder to a controller via network when the scale measurement encoder such as an A/B/Z-phase output type linear encoder or a rotary encoder is connected to a servo amplifier. This function enables flexible wiring from the scale measurement encoder.



Touch Probe Function*1

When a touch probe (sensor) that detects the position of workpieces is connected to a servo amplifier, the touch probe function latches (stores) the position detected by the touch probe. The controller reads and uses the latched value for position correction. The latch accuracy of this function is 1 µs.

*1. Use the servo amplifier manufactured in July 2022 or later.

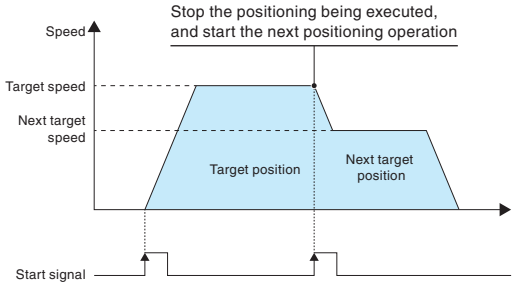


Positioning by Using a CC-Link IE TSN Master/Local Module*1

A CC-Link IE TSN master/local module*1 that supports CANopen can control the servo amplifiers.*2 The servo amplifiers support both the profile mode (position/velocity/torque) and the positioning mode (point table). *3
In the profile position mode, for example, the target positions and speeds can be set from the master station. The servo amplifier generates commands to the target positions with a start signal and starts positioning operations.

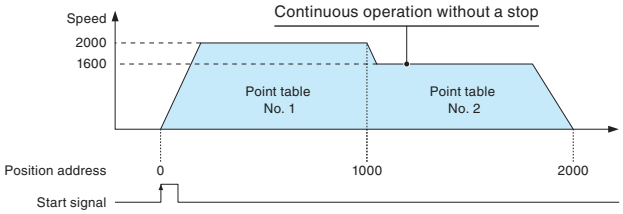
*1. For details of CC-Link IE TSN master/local modules, refer to the manuals of each module.
*2. RD78G/FX5-SSC-G Motion modules also support CANopen.
*3. For the modes supported by the master station, refer to the master station specifications.

[Profile position mode continuous operation]



[Profile position mode continuous operation (point table)]

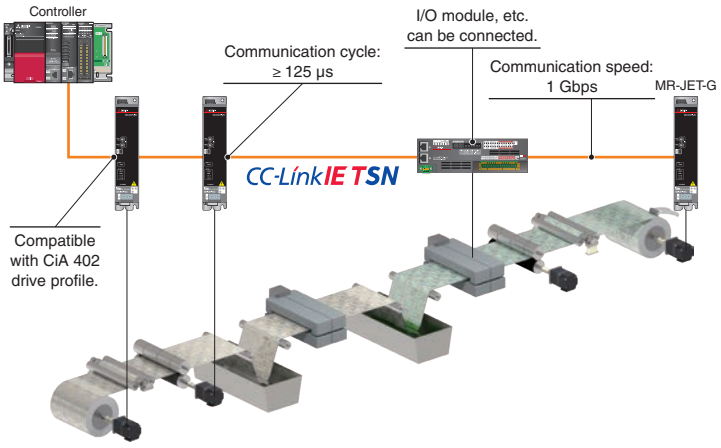
Point table No.	Position data	Servo motor speed	Acceleration time constant	Deceleration time constant	Dwell	Auxiliary function	M code
1	1000	2000	200	200	0	1	1
2	2000	1600	100	100	0	0	2
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
255	3000	3000	100	100	0	2	99



Command Interface

CC-Link IE TSN

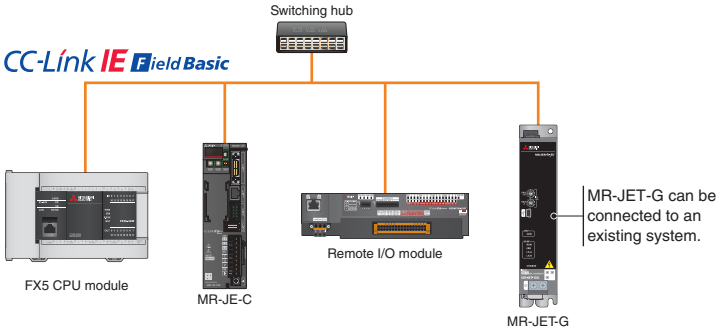
MR-JET-G receives commands (position/velocity/torque) from a CC-Link TSN-compatible controller at regular intervals through synchronous communication and drive the servo motors.
When combined with a Motion module or Motion Control Software, the servo amplifiers perform exact synchronous operation of axes and machines through high-speed, high-precision time synchronization.
The servo amplifiers support CiA 402 drive profile and enable the profile mode (position/velocity/torque) and the positioning mode (point table). When combined with the controllers supporting the profile mode, the servo amplifiers generate a positioning command to a target position, reducing loads of the controllers.



CC-Link IE Field Network Basic

CC-Link IE Field Network Basic-compatible master stations such as an FX5U CPU module can control MR-JET-G servo amplifiers. The servo amplifier can be operated as a CANopen device via a link device.
The profile mode (position/velocity/torque) and the positioning mode (point table) are supported.
MR-JET-G servo amplifiers can be connected to existing systems using MR-JE-C.
In addition, MR-JET-G supports the line topology.*1

*1. When a device which does not support the line topology is used, the line/star mixed topology is applicable.



EtherCAT®

Enhanced functions

Configure an EtherCAT® system with the high-performance MR-JET series servo amplifiers.
MR-JET-G-N1 servo amplifiers support EtherCAT®.

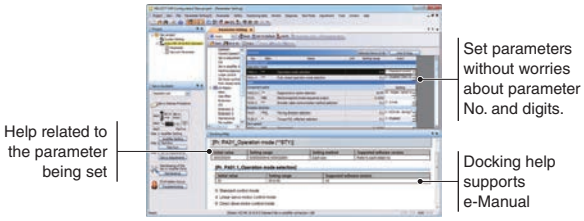
Communication specification	CANopen over EtherCAT® (CoE) Ethernet over EtherCAT® (EoE) Safety over EtherCAT® (FSoE)
Drive profile	CiA 402
Communication cycle	125 µs, 250 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms
Control mode	Cyclic synchronous position mode (csp)
	Cyclic synchronous velocity mode (csv)
	Cyclic synchronous torque mode (cst)
	Profile position mode (pp)
	Profile velocity mode (pv)
	Profile torque mode (tq)
	Homing mode (hm)

Servo Engineering Software MELSOFT MR Configurator2

Tuning, monitor display, diagnosis, reading/writing parameters, and test operations are easily performed on a personal computer. This powerful software tool supports a stable machine system and optimum control, and moreover, shortens setup time.

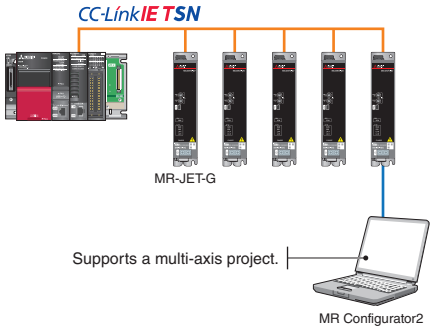
Parameter setting and docking help

Set parameters using the function display in the list without worries about the parameter No. and digits. Information related to the parameter being set is displayed in the docking help window. The latest e-Manual is also displayed in the docking help.



Supporting multi-axis project

Set parameters and monitor operation for multiple servo amplifiers through connecting to one of the servo amplifiers. Connecting via the Ethernet switching hub and the controller is also possible.



Tuning function

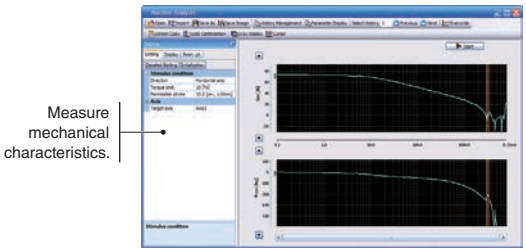
Adjust control gains finely on the [Tuning] window manually for further performance after the quick tuning and the one-touch tuning.

Graph function

Obtain graphs of 7 channels for analog and 8 channels for digital. Various servo statuses are displayed in the waveform at one measurement, supporting setting and adjustment. Convenient functions such as [Overwrite] for overwriting multiple data and [Select history] for displaying graph history are available. Two types of signals can be used as a trigger signal with an OR/AND condition.

Machine analyzer function

Input random torque to the servo motor automatically and analyze frequency characteristics (0.1 Hz to 8 kHz) of a machine system just by clicking the [Start] button. This function supports setting of machine resonance suppression filter, etc.

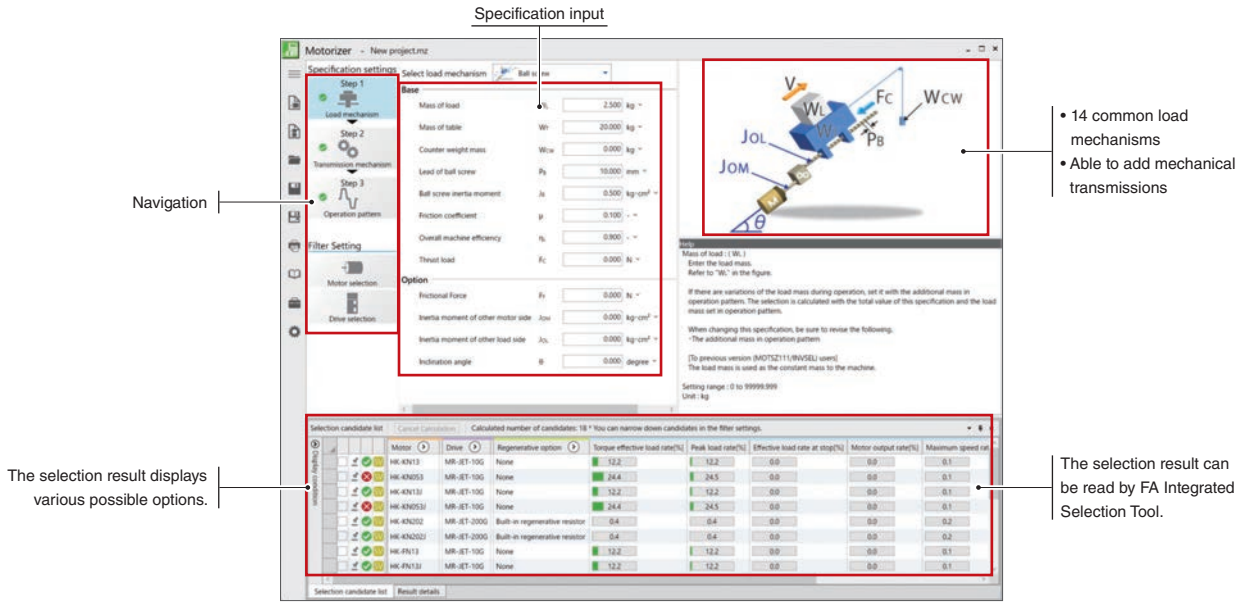


Software reset

Reset the software for the servo amplifier with this new function. Setting switches and parameters is enabled without turning off the main circuit power supply of the servo amplifier.

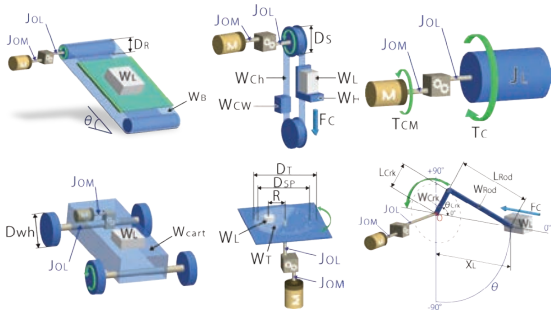
Drive System Sizing Software MELSOFT Motorizer

Select the most suitable servo motors, servo amplifiers, and regenerative options for your machine just by setting machine specifications and operation patterns. You can select a suitable combination from various results.
This software also supports multi-axis systems, enabling you to set operation patterns and select options for multiple axes.



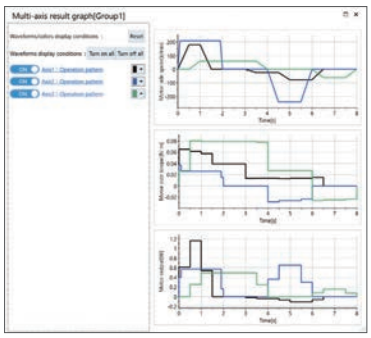
Flexible support for load mechanisms

- Select a load mechanism from 14 common types.
- Add transmission mechanisms such as a coupling.
- Set an inclination angle of the load mechanisms as desired.



Compatible with multi-axis systems

- Supports the multi-axis servo amplifiers and the converters.
- Set operation patterns for multiple axes.
- Select regenerative options for a multi-axis system.

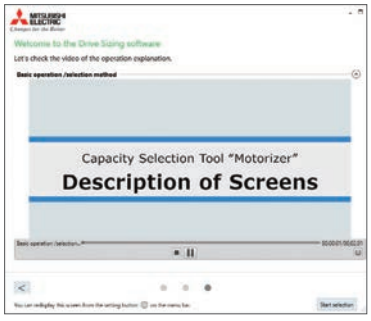


Selection of several patterns

- Displays a list of load to motor inertia ratio, peak torque, etc., of each selection.
- Compatible with the expanded combinations of the servo amplifiers and the servo motors.
- Set threshold values for judgment.
- Displays energy-saving effect by multi-axis system.

Tutorial video

- Illustrates how to use the software and select drive systems in the video.



FA Integrated Selection Tool

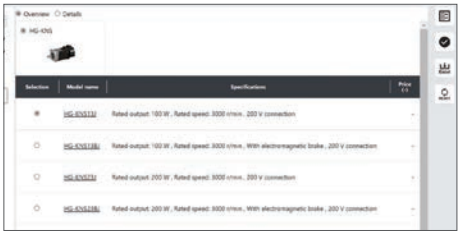
FA Integrated Selection Tool is available on the global website, so you can select multiple devices/entire system with one tool. Using "Select by device" or "Select by network" helps you to select devices such as programmable controllers and AC servos. Select necessary options such as encoder cables. Easily create system configuration diagrams and lists of necessary purchases to prevent mistakes when ordering.

Selection Tool

FA Integrated Selection Tool

Selection of controllers/servo motors/servo amplifiers

● Read selection results from Motorizer.

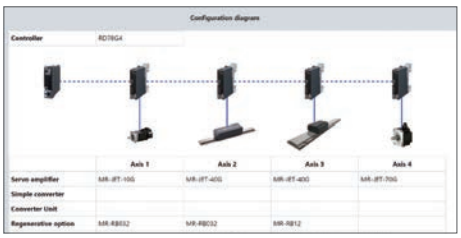


Selection of options

● Prevent selection mistakes.

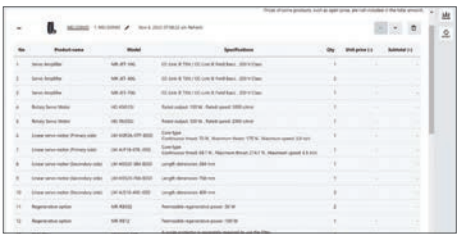
Configuration

● Check a configuration of each axis.



Purchase list

● Export to a file in Excel format.



e-Manual

Instruction manuals for the MELSERVO-JET series are available in e-Manual format. These manuals are linked with manuals for other products such as servo motors and controllers. The e-Manual lets you obtain necessary information quickly and also allows you to keep an enormous number of manuals as one database.
Currently supported languages: English, Chinese

Features

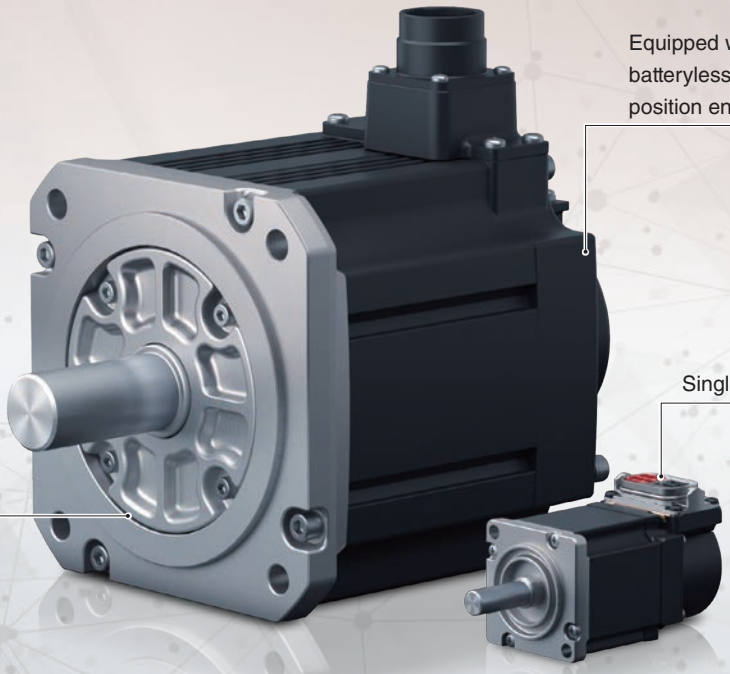
● Use all necessary manuals as one database
● Download and use manuals in your local environment
● Use the e-Manual application on tablets
● Download and update manuals quickly and easily
● Search for desired information across multiple manuals

Check manuals across the controllers, the servo amplifiers and the servo motors

A broader selection of capacities to match various applications for smart equipment

Rotary Servo Motors

HK Series



Small capacity, low inertia

HK-KN Series

Servo motors with a 24-bit batteryless absolute position encoder
Rated speed*1 [r/min]: 2000/3000
Maximum speed*1 [r/min]: 3000/6700
The servo motors have an all-in-one connector, making the connection simple.

*1. The speed varies by the model type.

Small/medium capacity, high inertia

HK-FN Series

Servo motors with a 24-bit batteryless absolute position encoder
Rated speed*1 [r/min]: 1500/2000/3000
Maximum speed*1 [r/min]: 2300/4000/6700
The servo motors (0.1 to 0.75 kW) have an all-in-one connector, making the connection simple.

*1. The speed varies by the model type.

Medium capacity, medium inertia

HK-SN Series

Servo motors with a 24-bit batteryless absolute position encoder
Rated speed*1 [r/min]: 3000
Maximum speed*1 [r/min]: 6000

*1. The speed varies by the model type.

Product Lines

The HK series product line includes the following series of rotary servo motors equipped with a batteryless absolute position encoder: HK-KN series (small capacity, low inertia), HK-FN series (small and medium capacity, high inertia), and HK-SN series (medium capacity, medium inertia).

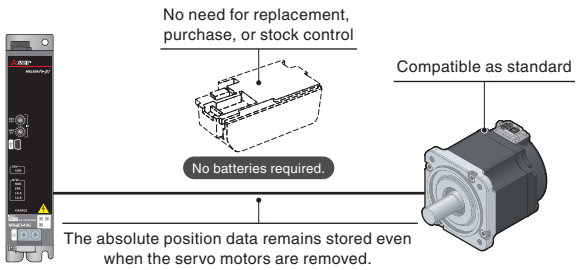
Series	Inertia	Servo amplifier power supply	Capacity
HK-KN	Low inertia	200 V AC	0.05 kW to 2.0 kW
		400 V AC	0.1 kW to 2.0 kW
HK-FN	High inertia	200 V AC	0.1 kW to 3.0 kW
HK-SN	Medium inertia	400 V AC	3.5 kW to 7.0 kW

0.1 kW 1.0 kW 10 kW

Batteryless Absolute Position Encoder as Standard

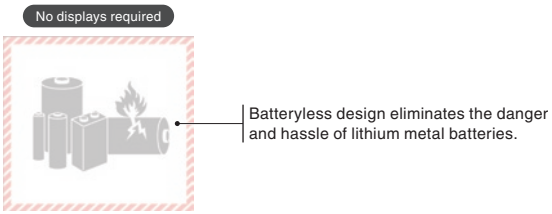
Eliminate the Need for Purchase/Replacement/Stock Control

Servo motors come equipped with a batteryless absolute position encoder as standard, making it possible to configure absolute position systems without the use of batteries or any other options.
Moreover, maintenance costs are reduced as a result of eliminating the battery replacement and stock control.



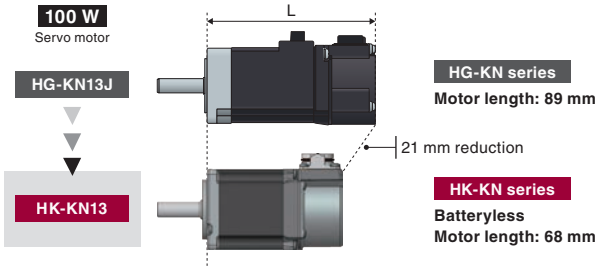
Save Time in Transporting

Position data remains stored even when the rotary servo motors are disconnected from the servo amplifiers. Thus, control cabinets can be separated from the machines without losing the position data, making it easy to transport machines for use at a new location.
The encoder does not require lithium metal batteries, allowing machines to be transported by air or sea without special handling.



Compact Servo Motors

HK-KN series servo motors come equipped with a batteryless absolute position encoder and are more compact than the previous generation HG-KN series, contributing to a compact machine design.



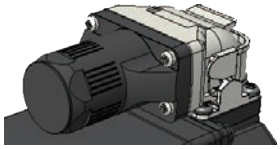
Single Connector/One-Touch Lock/Single Cable Type

Single Connector/One-Touch Lock/Single Cable Type

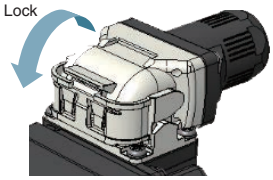
The single connector for the HK-KN/HK-FN *1 series combines the motor power supply, encoder, and electromagnetic brake into a single cable. The one-touch lock eliminates the need for tightening screws, making wiring easy. The servo motors are also compatible with the dual cable type. The cables can be mounted either horizontally or vertically according to your selection. Refer to "Options/Peripheral Equipment" for details of servo motor cables.

*1. The single connector is available for 0.1 to 0.75 kW of HK-FN series.

Horizontally mounted single cable type with one-touch lock

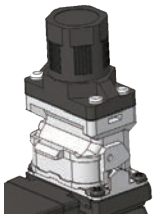


In the direction of the load side

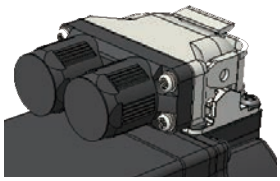


In the opposite direction of the load side

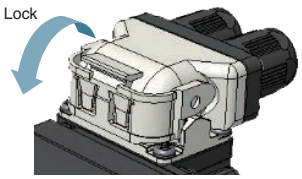
Vertically mounted single cable type with one-touch lock



Horizontally mounted dual cable type with one-touch lock

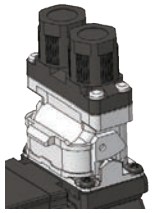


In the direction of the load side

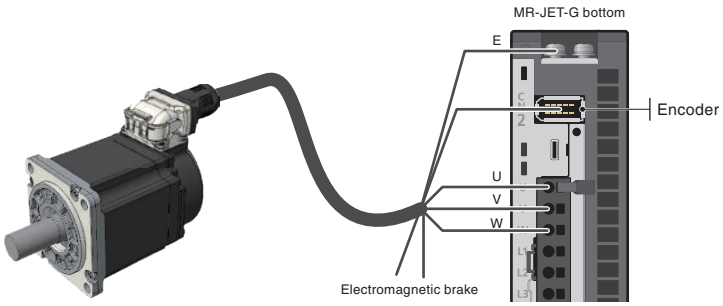


In the opposite direction of the load side

Vertically mounted dual cable type with one-touch lock



Connection example of one-touch lock with single cable type

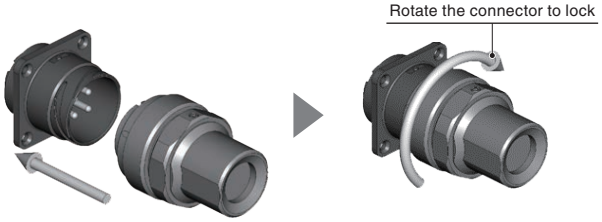


One-Touch Lock

HK-FN*1/HK-SN series servo motors boast a greatly simplified installation process through use of the one-touch lock system. The one-touch lock can be used to mount connectors for the motor power supply, encoder, and electromagnetic brake, which eliminates the need for tightening screws. The servo motors are compatible with both straight and angle type connectors and also supports traditional screw-tightened connectors.

*1. The one-touch lock is available for 1 to 3 kW of HK-FN series.

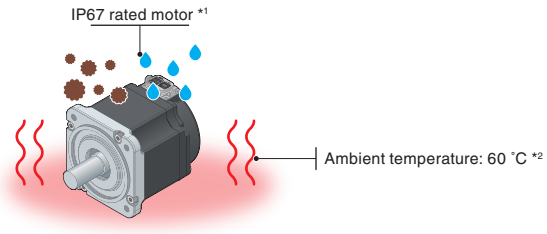
One-touch lock



Improved Environmental Resistance

Servo motors feature enhanced environmental resistance.
Ingress protection (IP) rating of the servo motors: IP67 *1
Designed for an ambient temperature of up to 60 ˚C.*2

*1. If the IP rating of the servo motor differs from those of option cables and connectors, overall IP rating depends on the lowest of all.
*2. Derate the speed/torque when using the servo motors at high ambient temperatures.



Rotary Servo Motors HG Series

Servo motors equipped with a high-resolution absolute position encoder (4,194,304 pulses/rev). *1
The servo motors have the same dimensions and use the same power and encoder cables as the prior MR-JE-compatible HG-KN/HG-SN series servo motors.

*1. A battery is required when configuring an absolute position detection system.

Small capacity, low inertia

Rated output
0.1 to 0.75 kW

HG-KNS Series

Servo motors with a 22-bit absolute position encoder
Rated speed: 3000 r/min
Maximum speed: 6000 r/min

Medium capacity, medium inertia

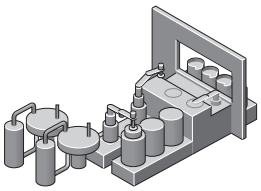
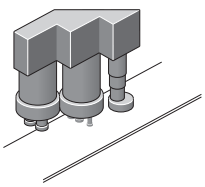
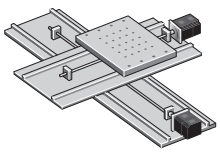
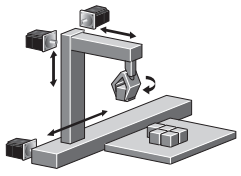
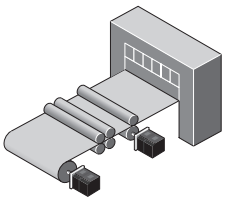
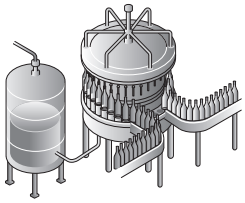
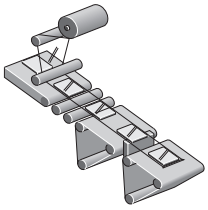
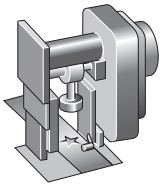
Rated output
0.5 to 3.0 kW

HG-SNS Series

Servo motors with a 22-bit absolute position encoder
Rated speed: 2000 r/min
Maximum speed: 3000 r/min*2

*2. The maximum speed varies by the models.

Application Examples

Semiconductor/FPD/photovoltaic manufacturing systems 	Mounters/bonders 	X-Y tables 	Robots 
Loaders/unloaders, feeders and sliders 	Food processing machines (filling machines, mixers, measuring machines, etc.) 	Food packaging machines 	Press machines 

Servo motors for high-speed, high-accuracy, linear drive systems

Linear Servo Motors

LM Series

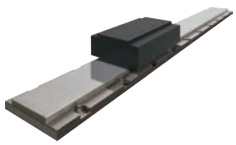
Product Lines

Three series are available depending on applications.

Core type

LM-H3 Series

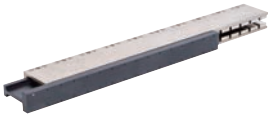
Max. speed: 3.0 m/s
Rated thrust: 70 to 720 N
Max. thrust: 175 to 1800 N
Suitable for space-saving, high speed and high acceleration/ deceleration.



Core type

LM-AJ Series

Max. speed: 2.0 to 6.5 m/s
Rated thrust: 68.1 to 446.8 N
Max. thrust: 214.7 to 1409.1 N
Low installation height, and suitable for compact X-Y tables.



Coreless type

LM-AU Series

Maximum speed: 2.0 to 4.5 m/s
Rated thrust: 28 to 350 N
Max. thrust: 122 to 1764 N
No cogging, small speed fluctuation.
No magnetic attraction force, longer service life of the linear guides.

Linear Servo Motors

Basic Performance

- Maximum speed: 2 m/s to 6.5 m/s
- Maximum thrust range: 122 N to 1800 N. Small size and high thrust are achieved by the increased winding density and the optimized core and magnet geometries as a result of electromagnetic field analysis.
- Three series are available: core (two series) and coreless (one series) types.
- The linear servo motors are compatible with a variety of serial interface linear encoders. The linear encoder resolution ranges from 1 nm and up.
- High-performance systems such as high-accuracy tandem synchronous control are achieved with CC-Link IE TSN.
- LM-H3 series features environmental resistance, designed for an altitude of 2000 m and an ambient temperature of up to 60 °C. *1, 2

*1. Derate the speed/thrust when using the linear servo motors at an altitude exceeding 1000 m and at high ambient temperatures.
*2. LM-AJ series/LM-AU series are designed for an altitude of 1000 m and an ambient temperature of up to 40 °C.

Higher Machine Performance

For higher machine performance

- Improved productivity due to high-speed driving part.

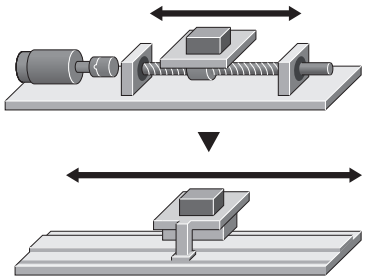
For easier use

- The linear servo motors enable a simple and compact machine with high rigidity.
- Smooth operation and clean systems are achieved.

For flexible machine configurations

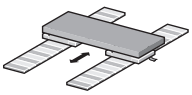
- Multi-head and tandem systems are easily configured.
- The linear servo motors are suitable for long-stroke applications.

[Offers more advantage than conventional ball screw driving systems]



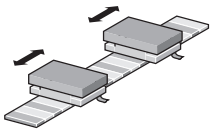
Application Examples

Optimum for a linear drive system which requires a high speed and high accuracy. Easily achieve a tandem configuration or multi-head configuration.



Tandem configuration

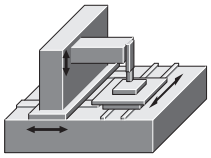
The linear servo motors configured in tandem are suitable for large systems that require highly accurate synchronous operation between two axes.



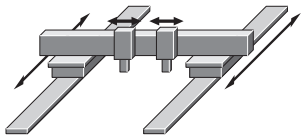
Multi-head configuration

Multi-head systems enable control of two motor coils independently, thereby simplifying machine mechanisms. This system is suitable for machines that require a short cycle time.

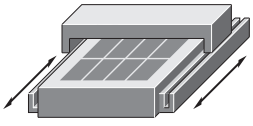
Machine tools XYZ stage



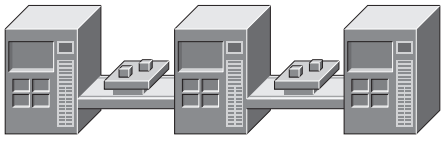
Semiconductor/FPD manufacturing systems
Electrical parts assembling/manufacturing systems



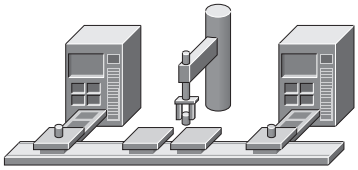
Screen printing systems and large FPD coaters



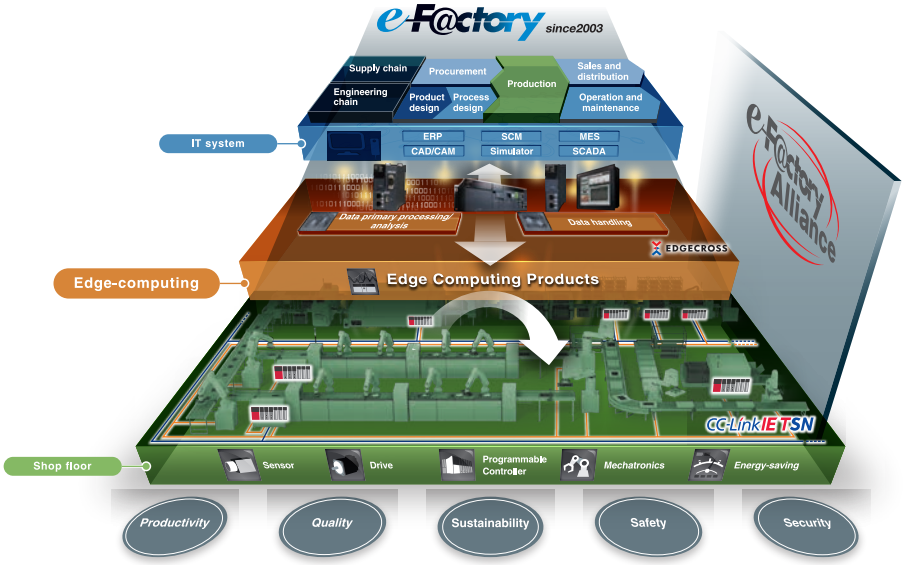
Material handling systems



Multi-head material handling between machines



FUTURE MANUFACTURING



The Future of Manufacturing as envisioned by Mitsubishi Electric, e-F@ctory: “Manufacturing” that evolves in response to environmental changes in an IoT enabled world.

Established In 2003, e-F@ctory created a Kaizen#1 automation methodology to help optimize and manage the increasingly complex business of “manufacturing”.
Continuously evolving itself, it also utilizes the expanded reach of IT, which has brought “cyber world” benefits of analysis, simulation and virtual engineering, and yet has also placed greater demands on the “physical” world for increased data sensing, collection and communication.
The continued success of e-F@ctory comes from understanding that each manufacturer has individual needs and investment plans but must still deliver; "Reduced management costs” (TCO); production flexibility to make a multitude of product in varying quantities; continuously enhanced quality. In short e-F@ctory’s goal is to deliver operational performance that is "a step ahead of the times", while enabling manufacturing to evolve in response to its environment. To do this it is supported by three key elements:

- The e-F@ctory Alliance Partners; who bring a wide range of software, devices, and system integration skills that enable the creation of the optimal e-F@ctory architecture.

- Advanced communication; utilizing open network technology like CC-Link IE, and communication middleware such as OPC, to open the door to device data, including legacy systems, while supporting high speed extraction.

- Platform thinking; to reduce the number of complex interfaces making it easier to bring together Robotics, Motion, Open programming languages (C language), PACs etc. strengthening the field of control, yet operating on industrial strength hardware.

e-F@ctory Alliance

e-F@ctory

Kaizen#1 = continuous improvement
TCO = Total Cost of Ownership

Mitsubishi Electric Partners

e-F@ctory Alliance

The e-F@ctory Alliance is a FA manufacturer partnering program that strongly links the connection compatibility of Mitsubishi Electric FA equipment utilizing excellent software and machinery offered by partners, thereby enabling systems to be built by systems integration partners and the proposal of optimal solutions to customers.

Mitsubishi Electric Servo System Partners

Servo system includes controllers, servo drivers, actuators, sensors, etc. The servo system takes a step further to accelerate the equipment revolution by collaborating with our partner companies. Now that a wide variety of partner products are available such as stepping motors, pressure-resistance, explosion-proof type motors, linear encoders, your system will be configured flexibly.
The Mitsubishi Electric Servo System Partner Association is a subcommittee of e-F@ctory Alliance.
Partner product lines supporting CC-Link IE TSN and MELSERVO have been and will continue to be expanded sequentially.

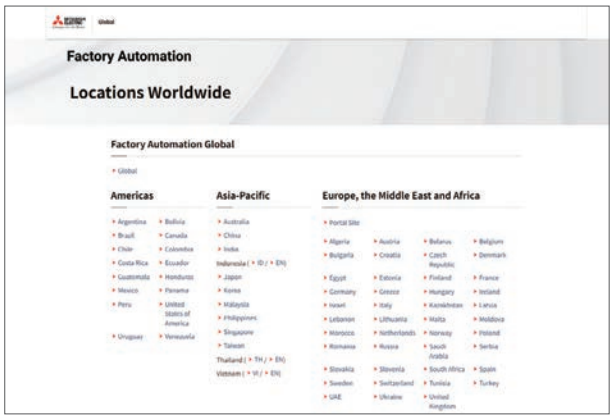
Mitsubishi Electric FA Global Website

Mitsubishi Electric Factory Automation provides a mix of services to support its customers worldwide, through a consolidated global website. It offers a selection of support tools and a window to its local Mitsubishi Electric sales and support network.

Global & Local Websites

Mitsubishi Electric Factory Automation
Global website
www.MitsubishiElectric.com/fa

Worldwide



[Local websites]

[Global website]

e-Manual

Instruction manuals are available in e-Manual format.

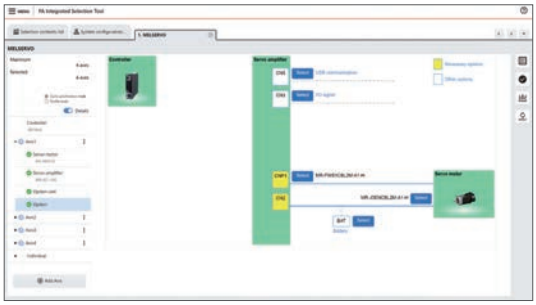
- Use the e-Manual application on tablets
- Download and update manuals quickly and easily
- Search for desired information across multiple manuals

Download on the App Store

GET IT ON Google Play

FA Integrated Selection Tool

FA Integrated Selection Tool is now available, so you can select options such as encoder cables and power cables which are required to use with controllers, servo motors, servo amplifiers, and regenerative options of your choice.



FA Integrated Selection Tool

1 Common Specifications

* Refer to p. 6-54 in this catalog for conversion of units.

Combinations of HK Series Rotary Servo Motors and Servo Amplifiers (Note 1)

200 V

○: Supported

Rotary servo motor (Note 2)			Servo amplifier MR-JET-						
			10G	20G	40G	70G	100G	200G	300G
HK-KN series (Note 3)	40 × 40	HK-KN053	○	-	-	-	-	-	-
		HK-KN13	○	-	-	-	-	-	-
		HK-KN1M3	-	○	-	-	-	-	-
	60 × 60	HK-KN23	-	○	-	-	-	-	-
		HK-KN43	-	-	○	-	-	-	-
		HK-KN63	-	-	-	○	-	-	-
	80 × 80	HK-KN7M3	-	-	-	○	-	-	-
		HK-KN103	-	-	-	-	○	-	-
	90 × 90	HK-KN153	-	-	-	-	-	○	-
		HK-KN203	-	-	-	-	-	○	-
		HK-KN202	-	-	-	-	-	○	-
HK-FN series (Note 3)	40 × 40	HK-FN13	○	-	-	-	-	-	-
	60 × 60	HK-FN23	-	○	-	-	-	-	-
		HK-FN43	-	-	○	-	-	-	-
	80 × 80	HK-FN7M3	-	-	-	○	-	-	-
	130 × 130	HK-FN102	-	-	-	-	○	-	-
		HK-FN152	-	-	-	-	-	○	-
	176 × 176	HK-FN202	-	-	-	-	-	○	-
		HK-FN301M	-	-	-	-	-	-	○

400 V

○: Supported

Rotary servo motor (Note 2)			Servo amplifier MR-JET-					
			60G4-HS	100G4-HS	200G4-HS	350G4-HS	500G4-HS	700G4-HS
HK-KN series	40 × 40	HK-KN134	○	-	-	-	-	-
	60 × 60	HK-KN234	○	-	-	-	-	-
		HK-KN434	○	-	-	-	-	-
		HK-KN634	○	-	-	-	-	-
	80 × 80	HK-KN7M34	-	○	-	-	-	-
		HK-KN1034	-	○	-	-	-	-
	90 × 90	HK-KN1534	-	-	○	-	-	-
		HK-KN2034	-	-	○	-	-	-
HK-SN series	130 × 130	HK-SN3534	-	-	-	○	-	-
		HK-SN5034	-	-	-	-	○	-
	176 × 176	HK-SN7034	-	-	-	-	-	○

Notes: 1. The combinations of MR-JET-G-N1 or MR-JET-G4-HSN1 and servo motors are the same as those described in this table.
2. The combinations of servo motors with an electromagnetic brake and servo amplifiers are the same as those described in this table.
3. Use the servo amplifiers with firmware version E8 or later. If the servo amplifiers with the previous firmware version are connected, an alarm occurs.

Combinations of HG Series Rotary Servo Motors and Servo Amplifiers (Note 1)

200 V

○: Supported

Rotary servo motor (Note 2)			Servo amplifier MR-JET-						
			10G	20G	40G	70G	100G	200G	300G
HG-KNS series	40 × 40	HG-KNS13J	○	-	-	-	-	-	-
	60 × 60	HG-KNS23J	-	○	-	-	-	-	-
		HG-KNS43J	-	-	○	-	-	-	-
	80 × 80	HG-KNS73J	-	-	-	○	-	-	-
HG-SNS series	130 × 130	HG-SNS52J	-	-	-	○	-	-	-
		HG-SNS102J	-	-	-	-	○	-	-
		HG-SNS152J	-	-	-	-	-	○	-
	176 × 176	HG-SNS202J	-	-	-	-	-	○	-
		HG-SNS302J	-	-	-	-	-	-	○

Notes: 1. The combinations of MR-JET-G-N1 and servo motors are the same as those described in this table.
2. The combinations of servo motors with an electromagnetic brake and servo amplifiers are the same as those described in this table.

Combinations of Linear Servo Motors and Servo Amplifiers (Note 1)

○: Supported

Linear servo motor			Servo amplifier MR-JET-		
	Primary side (coil)	Secondary side (magnet)	40G	70G	200G
LM-H3 series (Note 2)	LM-H3P2A-07P-BSS0	LM-H3S20-288-BSS0 LM-H3S20-384-BSS0 LM-H3S20-480-BSS0 LM-H3S20-768-BSS0	○	-	-
	LM-H3P3A-12P-CSS0	LM-H3S30-288-CSS0 LM-H3S30-384-CSS0 LM-H3S30-480-CSS0 LM-H3S30-768-CSS0	○	-	-
	LM-H3P3B-24P-CSS0		-	○	-
	LM-H3P3C-36P-CSS0		-	○	-
	LM-H3P3D-48P-CSS0		-	-	○
	LM-H3P7A-24P-ASS0	LM-H3S70-288-ASS0 LM-H3S70-384-ASS0 LM-H3S70-480-ASS0 LM-H3S70-768-ASS0	-	○	-
	LM-H3P7B-48P-ASS0		-	-	○
	LM-H3P7C-72P-ASS0		-	-	○
LM-AJ series (Note 2)	LM-AJP1B-07K-JSS0	LM-AJS10-080-JSS0 LM-AJS10-200-JSS0 LM-AJS10-400-JSS0	○	-	-
	LM-AJP1D-14K-JSS0		-	○	-
	LM-AJP2B-12S-JSS0	LM-AJS20-080-JSS0 LM-AJS20-200-JSS0 LM-AJS20-400-JSS0	○	-	-
	LM-AJP2D-23T-JSS0		-	○	-
	LM-AJP3B-17N-JSS0	LM-AJS30-080-JSS0 LM-AJS30-200-JSS0 LM-AJS30-400-JSS0	○	-	-
	LM-AJP3D-35R-JSS0		-	○	-
	LM-AJP4B-22M-JSS0	LM-AJS40-080-JSS0 LM-AJS40-200-JSS0 LM-AJS40-400-JSS0	○	-	-
	LM-AJP4D-45N-JSS0		-	○	-
LM-AU series (Note 3)	LM-AUP3A-03V-JSS0	LM-AUS30-120-JSS0 LM-AUS30-180-JSS0 LM-AUS30-240-JSS0 LM-AUS30-300-JSS0 LM-AUS30-600-JSS0	○	-	-
	LM-AUP3B-06V-JSS0		○	-	-
	LM-AUP3C-09V-JSS0		○	-	-
	LM-AUP3D-11R-JSS0		○	-	-
	LM-AUP4A-04R-JSS0	LM-AUS40-120-JSS0 LM-AUS40-180-JSS0 LM-AUS40-240-JSS0 LM-AUS40-300-JSS0 LM-AUS40-600-JSS0	-	○	-
	LM-AUP4B-09R-JSS0		-	○	-
	LM-AUP4C-13P-JSS0		-	○	-
	LM-AUP4D-18M-JSS0		-	○	-
	LM-AUP4F-26P-JSS0		-	-	○
	LM-AUP4H-35M-JSS0		-	-	○

Notes: 1. The combinations of MR-JET-G-N1 and servo motors are the same as those described in this table.
2. Use the servo amplifiers with firmware version B2 or later. If the servo amplifiers with the previous firmware version are connected, an alarm occurs.
3. Use the servo amplifiers with firmware version D0 or later. If the servo amplifiers with the previous firmware version are connected, an alarm occurs.

Safety Sub-Functions

Specifications of servo amplifiers

Item		Specifications
		MR-JET-G4-HS(N1)
Safety performance	Standards	EN ISO 13849-1:2015 Category 4 PL e, IEC 61508 SIL 3, EN IEC 62061:2021 maximum SIL 3, EN 61800-5-2
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (300a)
	Diagnostic coverage (DC)	DC = Medium, 96.5 %
	Probability of dangerous Failure per Hour (PFH)	PFH = 7.7×10^{-9} [1/h]
	Mission time (T_M) (Note 3)	T_M = 20 [years]

Function specifications

Item			Specifications
			MR-JET-G4-HS(N1)
Safety sub-functions	STO	Shut-off response time (STO input off → energy shut off)	8 ms or less (using input device) 60 ms or less (using CC-Link IE TSN/EtherCAT®) (Note 1, 4, 5)
	SS1	Deceleration delay time	0 ms to 60000 ms (functional safety parameter setting)
	SBC	Shut-off response time	8 ms or less (using input device) 60 ms or less (using CC-Link IE TSN/EtherCAT®) (Note 1, 4, 5)
	SLS1/2/3/4	Observation speed	0 r/min (mm/s) to 10000 r/min (mm/s) (functional safety parameter setting) (Note 6)
	SSM	Observation speed	0 r/min (mm/s) to 10000 r/min (mm/s) (functional safety parameter setting)
	SDI	Direction monitor delay time	0 ms to 60000 ms (functional safety parameter setting)
	SLT	Observation torque	-1000.0 % to 1000.0 % (functional safety parameter setting)
Input/ output function	Input device	Number of inputs (double wiring)	3 points
		Permissible time for mismatched double inputs	0 ms to 60000 ms (functional safety parameter setting) (Note 8)
		Noise elimination filter	1.000 ms to 32.000 ms (functional safety parameter setting)
		Test pulse off time (Note 7)	1 ms or less
		Test pulse interval (Note 7)	250 ms to 1000 ms
	Output device	Number of outputs (double wiring)	3 points
		Test pulse off time	0.500 ms to 2.000 ms (functional safety parameter setting)
		Test pulse interval	1 s or less
Safety communication function		Response time	250 ms (Note 2)
		Transmission interval monitor time	16.0 ms to 1000.0 ms (functional safety parameter setting) (using CC-Link IE TSN) (Note 1)
		FSoE Watchdog Time	16.0 ms to 65534.0 ms (object setting) (using EtherCAT®) (Note 1)
		Safety communication delay time	60 ms or less (using CC-Link IE TSN/EtherCAT®) (Note 1, 4)

Notes: 1. The listed value is applicable when the safety sub-functions through the network connection are executed.
2. This value is applicable when the transmission interval monitor time is 64.0 ms or less, or FSoE Watchdog Time is 60 ms or less.
3. The performance of special proof tests within the mission time of the product is regarded as not necessary, however, the diagnostic interval is suggested as at least one test per three months for Category 3 PL e, SIL 3 on IEC 61800-5-2:2016.
4. This value is applicable when the transmission interval monitor time is 32.0 ms or less, or FSoE Watchdog Time is 30 ms or less.
5. Set the communication cycle as follows:
   ●MR-JET-G4-HS: 125 µs or more
   ●MR-JET-G4-HSN1: 250 µs or more
6. The observation speed can be set separately.
7. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.
8. If it is set to 0 ms, no alarm occurs.

Safety Sub-Functions

List of supported safety sub-functions

Servo amplifier model	Connection method (connector)	Servo motor type	Safety sub-function (IEC/EN 61800-5-2)							
			STO	SS1		SBC	SLS (Note 3)	SSM (Note 3)	SDI (Note 3)	SLT
				SS1-t	SS1-r (Note 3)					
MR-JET-G4-HS(N1)	DI/O connection (Note 2) (CN3)	Rotary servo motor	Cat. 4 PL e, SIL 3	Cat. 4 PL e, SIL 3	Cat. 3 PL d, SIL 2	Cat. 4 PL e, SIL 3	Cat. 3 PL d, SIL 2	Cat. 3 PL d, SIL 2	Cat. 3 PL d, SIL 2	Cat. 3 PL d, SIL 2
	Network connection (Note 1, 4, 5) (CN1A/CN1B)									

Notes: 1. Combine the servo amplifier with an R_SFCPU safety CPU with firmware version 20 or later.
2. The listed safety levels are applicable when the following executes safety sub-function control with a diagnosis using test pulses.
●Safety CPU or safety controller that meets Category 4 PL e, SIL 3
When a forced stop switch, a safety switch, or an enable switch is directly connected to the servo amplifier and a diagnosis using test pulses is not executed, the safety level is Category 3 PL d, SIL 2.
3. A fully closed loop system does not support SS1-r, SLS, SSM, and SDI.
4. The safety sub-functions through the network connection are not available when the servo amplifiers use CC-Link IE Field Network Basic.
5. Set the communication cycle as follows:
●MR-JET-G4-HS: 125 µs or more
●MR-JET-G4-HSN1: 250 µs or more

Environment

Motion module

Item	Operation	Storage
Ambient temperature	0 ˚C to 55 ˚C (when not using the extended temperature range base unit) 0 ˚C to 60 ˚C (when using the extended temperature range base unit) (Note 2)	-25 ˚C to 75 ˚C (non-freezing)
Ambient humidity	5 %RH to 95 %RH (non-condensing)	
Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
Altitude	2000 m or less	
Vibration resistance	Under intermittent vibration (directions of X, Y, and Z axes): 5 Hz to 8.4 Hz, displacement amplitude 3.5 mm 8.4 Hz to 150 Hz, acceleration amplitude 9.8 m/s^2 Under continuous vibration: 5 Hz to 8.4 Hz, displacement amplitude 1.75 mm 8.4 Hz to 150 Hz, acceleration amplitude 4.9 m/s^2	

Servo amplifier

Item	Operation	Transportation	Storage
Ambient temperature	0 ˚C to 55 ˚C (non-freezing) Class 3K3 (IEC 60721-3-3)	-25 ˚C to 70 ˚C (non-freezing) Class 2K12 (IEC 60721-3-2)	-25 ˚C to 70 ˚C (non-freezing) Class 1K4 (IEC 60721-3-1)
Ambient humidity	5 %RH to 95 %RH (non-condensing)		
Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust		
Altitude/atmospheric pressure	Altitude: 2000 m or less (Note 1)	Overland/sea transportation, or transporting on an airplane whose cargo compartment is pressurized at 700 hPa or higher	Atmospheric pressure: 700 hPa to 1060 hPa (Equivalent to altitudes from -400 m to 3000 m)
Vibration resistance	Under intermittent vibration: 10 Hz to 57 Hz, displacement amplitude 0.075 mm 57 Hz to 150 Hz, acceleration amplitude 9.8 m/s^2 Class 3M1 (IEC 60721-3-3) Under continuous vibration (directions of X, Y, and Z axes): 10 Hz to 55 Hz, acceleration amplitude 5.9 m/s^2	2 Hz to 9 Hz, displacement amplitude (single amplitude) 7.5 mm 9 Hz to 200 Hz, acceleration amplitude 20 m/s^2 Class 2M3 (IEC 60721-3-2)	2 Hz to 9 Hz, displacement amplitude (single amplitude) 1.5 mm 9 Hz to 200 Hz, acceleration amplitude 5 m/s^2 Class 1M2 (IEC 60721-3-1)

Rotary servo motor (HK series)

Item	Operation	Storage
Ambient temperature	0 ˚C to 60 ˚C (non-freezing) (Note 5)	-15 ˚C to 70 ˚C (non-freezing)
Ambient humidity	10 %RH to 90 %RH (non-condensing)	
Ambience (Note 3)	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust, no object generating a strong magnetic field	
Altitude	2000 m or less (Note 4)	
External magnetic field	10 mT or less	
Vibration resistance	Refer to the specifications of each rotary servo motor.	

Rotary servo motor (HG series)

Item	Operation	Storage
Ambient temperature	0 ˚C to 40 ˚C (non-freezing)	-15 ˚C to 70 ˚C (non-freezing)
Ambient humidity	10 %RH to 80 %RH (non-condensing)	10 %RH to 90 %RH (non-condensing)
Ambience (Note 3)	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
Altitude	2000 m or less (Note 4)	
Vibration resistance	Refer to the specifications of each rotary servo motor.	

Notes: 1. Refer to "MR-JET User's Manual" for the restrictions on using the servo amplifiers at an altitude exceeding 1000 m and up to 2000 m.
2. The extended temperature range base unit is compatible with RD78G only.
3. Do not use the servo motors in the environment where the servo motors are exposed to oil mist, oil and/or water.
4. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" for the derating condition when using the servo motors at an altitude exceeding 1000 m and up to 2000 m.
5. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" for the restrictions on the ambient temperature.

Environment

Linear servo motor (LM-H3 series)

Item	Operation	Storage
Ambient temperature	0 ˚C to 60 ˚C (non-freezing) (Note 2)	-15 ˚C to 70 ˚C (non-freezing)
Ambient humidity	10 %RH to 80 %RH (non-condensing)	10 %RH to 90 %RH (non-condensing)
Ambience (Note 1)	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
Altitude	2000 m or less (Note 3)	
Vibration resistance	Refer to the specifications of each linear servo motor.	

Linear servo motor (LM-AJ series/LM-AU series)

Item	Operation	Storage
Ambient temperature	0 ˚C to 40 ˚C (non-freezing)	-15 ˚C to 70 ˚C (non-freezing)
Ambient humidity	10 %RH to 80 %RH (non-condensing)	10 %RH to 90 %RH (non-condensing)
Ambience (Note 1)	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust	
Altitude	1000 m or less	
Vibration resistance	Refer to the specifications of each linear servo motor.	

Notes: 1. Do not use the servo motors in the environment where the servo motors are exposed to oil mist, oil and/or water.
2. Refer to "Linear Servo Motor User's Manual (LM-H3/LM-U2/LM-F/LM-K2)" for the restrictions on the ambient temperature.
3. Refer to "Linear Servo Motor User's Manual (LM-H3/LM-U2/LM-F/LM-K2)" for the restrictions on using the linear servo motor at an altitude exceeding 1000 m and up to 2000 m.

MEMO

2 Servo System Controllers

* Refer to p. 6-54 in this catalog for conversion of units.

Motion Module RD78G (Simple Motion Mode)

Control specifications

Items in bold: differences

Item		Specifications			Comparison with the previous models (Simple Motion modules)	
		RD78G4	**RD78G8**	**RD78G16**	RD77MS	QD77MS
Maximum number of control axes [axis]		4	8	16	2, 4, 8, 16	2, 4, 16 (QD77MS2 and QD77MS4 use the buffer memory assignment for 4 axes)
Command interface		**CC-Link IE TSN**			SSCNET III/H	
Servo amplifier		**MR-JET-G**			MR-JE-B	
Operation cycle (operation cycle setting) [µs]		**250, 500, 1000, 2000, 4000**			444, 888, 1777, 3555	888, 1777
Interpolation function		Linear interpolation (up to 4 axes), 2-axis circular interpolation, helical interpolation				Linear interpolation (up to 4 axes), 2-axis circular interpolation
Control method		Positioning control, path control (linear, arc, and helical (Note 1)), speed control, speed-torque control, synchronous control, continuous operation to torque control				
Acceleration/deceleration processing		Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration				
Compensation function		Backlash compensation, electronic gear, near pass function				
Synchronous control		Synchronous encoder input, command generation axis, cam, phase compensation			Synchronous encoder input, cam, phase compensation	Synchronous encoder input, command generation axis, cam, phase compensation
Cam control	Maximum number of cam registrations (Note 2)	256				
	Cam data	Stroke ratio data format, coordinate data format				
	Cam auto-generation function	Cam for a rotary knife				
Positioning control method		Motion profile table				
Control unit		mm, inch, degree, pulse				
Number of positioning data		600 data (positioning data No. 1 to 600)/axis **(Set with MELSOFT GX Works3 or a sequence program (No. 1 to 600).)**			600 data (positioning data No. 1 to 600)/axis (Set with MELSOFT GX Works3 or a sequence program (No. 1 to 100).)	600 data (positioning data No. 1 to 600)/axis (Set with MELSOFT GX Works2 or a sequence program (QD77MS16 (No. 1 to 100), QD77MS2/QD77MS4 (No. 1 to 600).)
Backup		Parameters, positioning data, and block start data can be saved on flash ROM (batteryless backup)				
Home position return		**Driver home position return (Note 3)**			Proximity dog method, count method 1, count method 2, data set method, scale home position signal detection method, driver home position return (Note 3)	Proximity dog method, count method 1, count method 2, data set method, scale home position signal detection method
Positioning control		Linear interpolation control (up to 4 axes (Note 4) (vector speed, reference axis speed)), fixed-pitch feed control (up to 4 axes), 2-axis circular interpolation (auxiliary point-specified, central point-specified), helical interpolation control, speed control (up to 4 axes), speed-position switching control (INC mode, ABS mode), position-speed switching control, current value change (positioning data, start No. for a current value changing) NOP instruction, JUMP instruction (conditional, unconditional), LOOP, LEND, block start, condition start, wait start, simultaneous start, repeated start				
Manual control	JOG operation	Provided				
	Inching operation	Provided				
	Manual pulse generator operation	Up to 1 module (incremental), unit magnification (1 to 10000 times), **via a CPU (Note 6)**			Up to 1 module (incremental), unit magnification (1 to 10000 times), **an external input connection connector**	
Speed-torque control		Speed control not including position loop, torque control, continuous operation to torque control				
Absolute position system		Provided				
Synchronous encoder axis (Note 7)		Up to the number of axes of the connected servo amplifiers (via a servo amplifier or a CPU (Note 6))			Up to 4 channels (**An external input connection connector**, via a servo amplifier (Note 8), or via a CPU (Note 6))	
Speed limit function		Speed limit value, JOG speed limit value				
Torque limit function		Torque limit value same setting, torque limit value individual setting				
Forced stop function		Via a buffer memory, valid/invalid setting			**An external input connection connector** or via a buffer memory, valid/invalid setting	
Software stroke limit function		Movable range check with feed current value or with machine feed value				
Hardware stroke limit function		Provided				
Speed change function		Provided				

Motion Module RD78G (Simple Motion Mode)

Control specifications

Items in bold: differences

Item		Specifications			Comparison with the previous models (Simple Motion modules)	
		RD78G4	**RD78G8**	**RD78G16**	RD77MS	QD77MS
Override function		**0 to 300 %**				1 to 300 %
Acceleration/deceleration processing change		Acceleration/deceleration time				
Torque limit value change		Provided				
Target position change function		The target position address and the speed to the target position can be changed.				
M-code output function		WITH mode/AFTER mode				
Step function		Deceleration unit step, data No. unit step				
Skip function		Via a CPU or an external command signal				
Parameter initialization function		Provided				
External input signal select function		Via a CPU or a servo amplifier			**An external input connection connector**, via a CPU, or via a servo amplifier	
Mark detection function		Continuous detection mode, specified number of detections mode, ring buffer mode				
	Mark detection signal	**Up to the number of axes of the connected servo amplifiers**			20	4 (QD77MS2: 2 points)
	Number of mark detection settings	Up to 16				QD77MS16: up to 16 QD77MS4/QD77MS2: up to 4
Optional data monitor function		Up to 4 points/axis				
Functional safety (Note 9)		**Safety communication (network connection),** DI/DO connection of the servo amplifier			DI/DO connection of the servo amplifier	
Driver communication function (Note 10)		Provided				
Inter-module synchronization function		Provided				
Automatic return		**Provided**			Connect/disconnect function of SSCNET communication	
Digital oscilloscope function		Bit data: 16 channels (Note 5), word data: 16 channels (Note 5)				For QD77MS16, Bit data: 16 channels (Note 5), Word data: 16 channels (Note 5) For QD77MS4/QD77MS2, Bit data: 8 channels, Word data: 4 channels

Notes: 1. The helical interpolation is available with RD78G and RD77MS.
2. The number of cam registrations depends on the memory capacity, cam resolution, and number of coordinates.
3. The home position return method set in a driver (servo amplifier) is used.
4. 4-axis linear interpolation control is enabled only at the reference axis speed.
5. Eight channels of each word data and bit data can be displayed in real time.
6. Use a high-speed counter module.
7. For the compatible synchronous encoders, refer to the manuals for each controller and each servo amplifier.
8. This function is not supported by MR-JE servo amplifiers.
9. This function is supported only by MR-JET-G4-HS(N1).
10. This function is not supported by MR-JET/MR-JE servo amplifiers.

Motion Module FX5-SSC-G (Simple Motion Mode)

Control specifications

Items in bold: differences

Item		Specifications		Comparison with the previous models (Simple Motion modules)	
		FX5-40SSC-G	**FX5-80SSC-G**	FX5-40SSC-S	FX5-80SSC-S
Maximum number of control axes [axis]		4	8	4	8
Command interface		**CC-Link IE TSN**		SSCNET III/H	
Servo amplifier		**MR-JET-G**		MR-JE-B	
Operation cycle (operation cycle setting) [µs]		**500, 1000, 2000, 4000**		888, 1777	
Interpolation function		Linear interpolation (up to 4 axes), 2-axis circular interpolation			
Control method		Positioning control, path control (linear and arc), speed control, speed-torque control, synchronous control, continuous operation to torque control			
Acceleration/deceleration processing		Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration			
Compensation function		Backlash compensation, electronic gear, near pass function			
Synchronous control		Synchronous encoder input, command generation axis, cam, phase compensation			
Cam control	Maximum number of cam registrations (Note 1)	**128**		64	128
	Cam data	Stroke ratio data format, coordinate data format			
	Cam auto-generation function	Cam for a rotary knife			
Positioning control method		Motion profile table			
Control unit		mm, inch, degree, pulse			
Number of positioning data		600 data (positioning data No. 1 to 600)/axis			
Backup		Parameters, positioning data, and block start data can be saved on flash ROM (batteryless backup)			
Home position return		**Driver home position return** (Note 2)		Proximity dog method, count method 1, count method 2, data set method, scale home position signal detection method, driver home position return (Note 2)	
Positioning control		Linear interpolation control (up to 4 axes (Note 3) (vector speed, reference axis speed)), fixed-pitch feed control (up to 4 axes), 2-axis circular interpolation (auxiliary point-specified, central point-specified), speed control (up to 4 axes), speed-position switching control (INC mode, ABS mode), position-speed switching control (INC mode), current value change (positioning data, start No. for a current value changing) NOP instruction, JUMP instruction (conditional, unconditional), LOOP, LEND, block start, condition start, wait start, simultaneous start, repeated start			
Manual control	JOG operation	Provided			
	Inching operation	Provided			
	Manual pulse generator operation	Up to 1 module (incremental), unit magnification (1 to 10000 times), **via a CPU** (Note 5)		Up to 1 module (incremental), unit magnification (1 to 10000 times), **an external input connection connector**	
Speed-torque control		Speed control not including position loop, torque control, continuous operation to torque control			
Absolute position system		Provided			
Synchronous encoder axis (Note 6)		Up to 4 modules (via a servo amplifier or a CPU (Note 5))		Up to 4 modules (**An external input connection connector**, via a servo amplifier (Note 7), or via a CPU (Note 5))	
Speed limit function		Speed limit value, JOG speed limit value			
Torque change function		Forward/reverse torque limit value same setting, forward/reverse torque limit value individual setting			
Forced stop function		Via a buffer memory, valid/invalid setting			
Software stroke limit function		Movable range check with feed current value or with machine feed value			
Hardware stroke limit function		Provided			
Speed change function		Provided			
Override function		**0 to 300 %**		1 to 300 %	
Acceleration/deceleration processing change		Acceleration/deceleration time			
Torque limit value change		Provided			
Target position change function		The target position address and the speed to the target position can be changed.			
M-code output function		WITH mode/AFTER mode			
Step function		Deceleration unit step, data No. unit step			
Skip function		Via a CPU or an external command signal			
Parameter initialization function		Provided			
External input signal select function		Via a CPU or a servo amplifier			
Mark detection function		Continuous detection mode, specified number of detections mode, ring buffer mode			
	Mark detection signal	**Up to the number of axes of the connected servo amplifiers**		Up to 4 points	
	Number of mark detection settings	Up to 16			

Motion Module FX5-SSC-G (Simple Motion Mode)

Control specifications

Items in bold: differences

Item	Specifications		Comparison with the previous models (Simple Motion modules)	
	FX5-40SSC-G	**FX5-80SSC-G**	FX5-40SSC-S	FX5-80SSC-S
Optional data monitor function	Up to 4 points/axis			
Functional safety (Note 8)	DI/DO connection of the servo amplifier			
Driver communication function (Note 9)	-		Provided	
Automatic return	**Provided**		Connect/disconnect function of SSCNET communication	
Digital oscilloscope function	Bit data: 16 channels, word data: 16 channels (Note 4)			

Notes: 1. The number of cam registrations depends on the memory capacity, cam resolution, and number of coordinates.
2. The home position return method set in a driver (servo amplifier) is used.
3. 4-axis linear interpolation control is enabled only at the reference axis speed.
4. Eight channels of each word data and bit data can be displayed in real time.
5. Use the built-in high-speed counter of a CPU module or a high-speed pulse input/output module.
6. For the compatible synchronous encoders, refer to the manuals for each controller and each servo amplifier.
7. This function is not supported by MR-JE servo amplifiers.
8. This function is supported only by MR-JET-G4-HS(N1).
9. This function is not supported by MR-JET/MR-JE servo amplifiers.

Motion Module (RD78G/FX5-SSC-G) (Simple Motion Mode)

Synchronous control

Item		Number of settable axes				
		RD78G4	RD78G8	RD78G16	FX5-40SSC-G	FX5-80SSC-G
Servo input axis	[axes/module]	4	8	16	4	8
Command generation axis	[axes/module]	4	8	8	4	8
Synchronous encoder axis	[axes/module]	4	8	16	4	4
Composite main shaft gear	[module/output axis]	1				
Main shaft main input axis	[module/output axis]	1				
Main shaft sub input axis	[module/output axis]	1				
Main shaft gear	[module/output axis]	1				
Main shaft clutch	[module/output axis]	1				
Auxiliary shaft	[module/output axis]	1				
Auxiliary shaft gear	[module/output axis]	1				
Auxiliary shaft clutch	[module/output axis]	1				
Composite auxiliary shaft gear	[module/output axis]	1				
Speed change gear	[module/output axis]	1				
Output axis (cam axis)	[axes/module]	4	8	16	4	8

Cam control

Item			RD78G4	RD78G8	RD78G16	FX5-40SSC-G	FX5-80SSC-G
Memory capacity	Cam storage area		256 k bytes			128 k bytes	
	Cam working area		1024 k bytes				
Maximum number of registrations	Cam storage area		256 (Note 1)			4-axis module: 64 (Note 1) 8-axis module: 128 (Note 1)	
	Cam working area		256 (Note 1)				
Comment			Up to 32 characters for each cam data				
Cam data	Stroke ratio data type	Maximum number of cam registrations (Note 2)	See table below				
		Stroke ratio	-214.7483648 to 214.7483647 %				
	Coordinate data type	Maximum number of cam registrations (Note 2)	See table below				
		Coordinate data	Input value: 0 to 2147483647 Output value: -2147483648 to 2147483647				
Cam auto-generation function			Cam for a rotary knife				

Cam resolution	256	512	1024	2048	4096	8192	16384	32768
RD78G	256	128	64	32	16	8	4	2
FX5-SSC-G	128	64	32	16	8	4	2	-

Cam resolution	128	256	512	1024	2048	4096	8192	16384
RD78G	256	128	64	32	16	8	4	2
FX5-SSC-G	128	64	32	16	8	4	2	-

Notes: 1. The maximum number of registrations depends on the memory capacity, cam resolution, and number of coordinates.
2. This is the maximum number of cam registrations for the cam storage area.

Motion Module RD78GH/RD78G (PLCopen® Motion Control FB Mode)

Control specifications

Item		Specifications	
		Motion module	
		RD78GH	RD78G
Maximum number of control axes (Note 3)		RD78GHV: 128 axes RD78GHW: 256 axes	RD78G4: 4 axes RD78G8: 8 axes RD78G16: 16 axes RD78G32: 32 axes RD78G64: 64 axes
Maximum number of connectable stations		120 stations	
Command interface		CC-Link IE TSN	
Servo amplifier		MR-JET-G	
Operation cycle (operation cycle settings) (Note 1, 2) [µs]		31.25, 62.5, 125, 250, 500, 1000, 2000, 4000, 8000	62.5, 125, 250, 500, 1000, 2000, 4000, 8000
Axis		Real drive axis, virtual drive axis, real encoder axis, virtual encoder axis, virtual linked axis	
	Axes group	0: Unset 1 or later: the axes group No. for the setting axis	
	Real drive axis	Servo amplifier	
	Real encoder axis	Via a servo amplifier (Note 4)	
Interpolation function		Linear interpolation (2 to 4 axes), 2-axis circular interpolation	
Control method		Positioning control, direct control	
Acceleration/deceleration processing		Acceleration/deceleration specification method (acceleration, deceleration, jerk), time-fixed acceleration/deceleration method	
Compensation function		Driver unit conversion	
Synchronous control	Module	Master axis, cam, gear	
	Master axis	Real drive axis, virtual drive axis, real encoder axis, virtual encoder axis, virtual linked axis	
Operation profile (cam data)	Cam data	Cam data, cam for a rotary knife	
	Motion control FB (Cam auto-generation)	Cam for a rotary knife	
Control unit		pulse, m, degree, Revolution, inch, arbitrary unit character string	
Programming language		PLC CPU: ladder diagram, function block diagram/ladder diagram, structured text language Motion module: structured text language	
Backup		Parameters and programs can be saved on a flash ROM (batteryless backup)	
Start/stop operation		Start, stop, restart, buffer mode, forced stop	
Home position return control		Driver homing method, data set type homing	
Positioning control	Linear control	Linear interpolation (2 to 4 axes)	
	2-axis circular interpolation	Border point-specified, central point-specified, radius-specified circular interpolation	
Manual control		JOG operation	
Direct control	Speed control	Speed control not including position loop, speed control including position loop	
	Torque control	Torque control, continuous operation to torque control	
Absolute position system		Provided	
Speed limit function		Speed command range	
Torque limit function		Torque limit value (positive/negative direction)	
Forced stop function		Valid/Invalid setting	
Software stroke limit		Movable range check with an address of the set position or the feed machine position	
Hardware stroke limit		Provided	
Command speed change		Provided	
Current position change function		Provided	
Acceleration/deceleration processing change		Acceleration/deceleration, acceleration/deceleration time	
Torque limit value change		Provided	

Motion Module RD78GH/RD78G (PLCopen® Motion Control FB Mode)

Control specifications

Item	Specifications	
	Motion module	
	RD78GH	RD78G
Override function	Provided	
History data	Event history, position data history	
Logging	Data logging, real-time monitor	
Axis emulate	Provided	
Touch probe (mark detection)	Provided	
Monitoring of servo data	Cyclic transmission, transient transmission	
Servo system recorder	Provided	
Safety communication (Note 5)	Provided	
Driver communication function (Note 4)	Provided	
Inter-module synchronization function	Provided	

Notes: 1. The number of controllable axes varies depending on the operation cycle.
2. When an MR-JET servo amplifier is connected to RD78GH, the minimum operation cycle is 125 µs.
3. When MR-JET servo amplifiers are used for all axes, RD78GH controls a maximum of 120 axes.
4. This function is not supported by MR-JET servo amplifiers.
5. This function is supported only by MR-JET-G4-HS(N1).

Synchronous control specifications

Perform synchronous control with a combination of function blocks.
For the function blocks to be used, refer to "Function blocks (FB) list" of this catalog.

Program capacity and operation profile (cam) specifications

Item		RD78GH	RD78G
Program/data capacity (Note 1)		Built-in ROM max. 64 [MB] + SD memory card	Built-in ROM max. 16 [MB] + SD memory card
Maximum number of cam registration		60000 (1024 out of 60000 can be set on engineering tool)	
Cam data	Cam type	Cam data, cam for a rotary knife	
	Interpolation method	Section interpolation, linear interpolation, spline interpolation	
	Profile ID	1 to 60000	
	Resolution	8 to 65535 (any resolution within the range)	
	Units for cam length per cycle	mm, inch, pulse, degree	
	Units for stroke	%, mm, inch, pulse, degree	
Cam auto-generation		Cam for a rotary knife	

Notes: 1. Total capacity including system management area. The available capacity is smaller.

Motion Module RD78GH/RD78G (PLCopen® Motion Control FB Mode)

Function blocks (FB) list

Type	Motion control FB	Name
Management FBs	MC_GroupEnable	Axes Group Enabled
	MC_GroupDisable	Axes Group Disabled
	MC_Power	Operation Available
	MC_SetPosition	Current Position Change
	MCv_SetTorqueLimit	Torque Limit Value
	MC_SetOverride	Override Value Setting
	MC_ReadParameter	Parameter Read
	MC_WriteParameter	Parameter Write
	MC_Reset	Axis Error Reset
	MC_GroupReset	Axes Group Error Reset
	MC_TouchProbe	Touch Probe Enabled
	MC_AbortTrigger	Touch Probe Disabled
	MC_CamTableSelect	Cam Table Selection
	MCv_ChangeCycle	Current Value Change per Cycle
	MCv_AllPower	All Axes Operation Available
	MC_GroupSetOverride	Axes Group Override Value Setting
	MCv_MotionErrorReset	Motion Error Reset
	MCv_AdvPositionPerCycleCalc	Advanced Synchronous Control Position per Cycle Calculation
	MCv_AdvCamSetPositionCalc	Advanced Synchronous Control Cam Set Position Calculation
Operation FBs	MC_Home	OPR
	MC_Stop	Forced Stop
	MC_GroupStop	Group Forced Stop
	MC_MoveAbsolute	Absolute Value Positioning
	MC_MoveRelative	Relative Value Positioning
	MCv_Jog	JOG
	MC_MoveVelocity	Speed Control
	MC_TorqueControl	Torque Control
	MCv_SpeedControl	Speed Control (Including Position Loop)
	MCv_MoveLinearInterpolateAbsolute	Absolute Value Linear Interpolation Control
	MCv_MoveLinearInterpolateRelative	Relative Value Linear Interpolation Control
	MCv_MoveCircularInterpolateAbsolute	Absolute Value Circular Interpolation Control
	MCv_MoveCircularInterpolateRelative	Relative Value Circular Interpolation Control
	MC_CamIn	Cam Operation Start
	MC_GearIn	Gear Operation Start
	MC_CombineAxes	Addition/Subtraction Positioning
	MCv_BacklashCompensationFilter	Backlash Compensation Filter
	MCv_SmoothingFilter	Smoothing Filter
	MCv_DirectionFilter	Moving Direction Restriction Filter
	MCv_SpeedLimitFilter	Speed Limit Filter
	MCv_AdvancedSync	Advanced Synchronous Control
	MCv_MovePositioningData	Multiple Axes Positioning Data Operation
Standard FBs	MCv_ReadProfileData	Profile Read
	MCv_WriteProfileData	Profile Write

* The number of usable function blocks depends on the program capacity.

Motion Module

CC-Link IE TSN

Item		RD78GH	RD78G	FX5-40SSC-G	FX5-80SSC-G
Communications speed		1 Gbps/100 Mbps			
Maximum number of connectable stations per network		121 stations (including the master station)		21 stations (including the master and four motion control stations)	25 stations (including the master and eight motion control stations)
Connection cable		Ethernet cable (category 5e or higher, double shielded/STP), straight cable			
Maximum distance between stations		100 m			
Maximum number of networks		239			
Topology		Line topology, star topology, coexistence of line and star topologies, ring topology (Note 1, 2)	Line topology, star topology, coexistence of line and star topologies		
Communications method		Time-sharing method			
Maximum transient transmission capacity		1920 bytes			
Maximum link points per network	RX/RY	16K points		8K points	
	RWr/RWw	8K points		1K points	
Maximum link points per station	RX/RY	16K points		8K points	
	RWr/RWw	8K points		1K points	
Safety communications (Note 3)	Maximum number of safety connections per station	120 connections		-	
	Maximum number of link points per safety connection	8 words (input: 8 words, output: 8 words)		-	

Notes: 1. When using ring topology to configure a system that includes the MR-JET servo amplifier, up to 60 stations can be connected.
2. Ring topology is available in a system that is configured with CC-Link IE TSN Class B only. Ring topology is not available in a system that mixes CC-Link IE TSN Class B/A or that is configured with CC-Link IE TSN Class A only. For other restrictions, refer to "MELSEC iQ-R Motion Module User's Manual".
3. This function is supported only by MR-JET-G4-HS(N1).

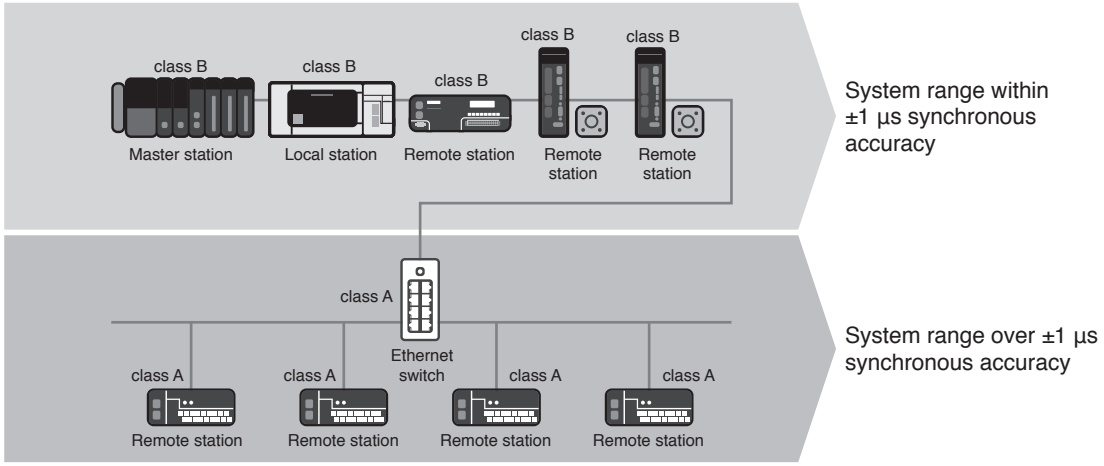
[Note when connecting devices]

Connect class A remote stations after class B remote stations.

CC-Link IE TSN Class

CC-Link IE TSN certifies nodes and switches to a specific class level according to its functionality and performance classification. Products can be classified as either class A or B. For the CC-Link IE TSN Class of each product, please check the CC-Link Partner Association website or the relevant product catalog or manual. Supported functions and system configuration may differ according to the CC-Link IE TSN Class of products used. For example, products compatible with class B are necessary to configure a high-speed motion control system. For details of configuring systems with both class A and class B devices, please refer to relevant master product manual.

System configuration



- Synchronous accuracy of a system varies relative to the combination of connected devices and switches CC-Link IE TSN Class
- Use class B Ethernet switch when configuring a star topology with class B devices
- Use class B devices when configuring a system within ±1 µs high-accuracy synchronization, connect class A devices to a separate branch line from class B devices (for details of system configuration, please refer to relevant master product manual)
- Mitsubishi Electric's block type remote modules comply both class B and A

Motion Module

Module specifications RD78GH/RD78G

Item		RD78GH	RD78G
Maximum number of control axes		RD78GHV: 128 axes RD78GHW: 256 axes	RD78G4: 4 axes RD78G8: 8 axes RD78G16: 16 axes RD78G32: 32 axes RD78G64: 64 axes
Maximum number of connectable stations		121 stations (including the master station)	
Servo amplifier connection method		CC-Link IE TSN	
CC-Link IE TSN Class		B	
Maximum distance between stations	[m]	100	
PERIPHERAL I/F		Via a CPU module (USB, Ethernet)	
Extended memory		SD memory card	
Number of ports for CC-Link IE TSN		2 ports	1 port
Number of I/O points occupied		48 points (I/O assignment: 16 points (empty slot) + 32 points)	32 points
Number of slots occupied		2 slots	1 slot
Internal current consumption (5 V DC)	[A]	2.33	1.93
Mass	[kg]	0.44	0.26
Dimensions	[mm]	106.0 (H) × 56.0 (W) × 110.0 (D)	106.0 (H) × 27.8 (W) × 110.0 (D)

Module specifications FX5-40SSC-G/FX5-80SSC-G

Item		FX5-40SSC-G	FX5-80SSC-G
Maximum number of control axes		4 axes	8 axes
Maximum number of connectable stations		21 stations (including the master and four motion control stations)	25 stations (including the master and eight motion control stations)
Servo amplifier connection method		CC-Link IE TSN	
CC-Link IE TSN Class		B	
Maximum distance between stations	[m]	100	
Maximum input current of external 24 V DC power	[A]	0.24	
Mass	[kg]	0.3	
Dimensions	[mm]	90 (H) × 50 (W) × 83 (D)	
Applicable CPU (Note 1)		FX5U, FX5UC (Note 2)	

Notes: 1. Use a CPU module with firmware version 1.230 or later.
The following CPU modules can be updated to that firmware version.
• CPU module with serial No. 17X**** or later
• FX5UC-32MT/DS-TS and FX5UC-32MT/DSS-TS with serial No. 178**** or later.
2. FX5-CNV-IFC is required to connect the Motion module to an FX5UC CPU module.

■Products on the Market

Manual Pulse Generator

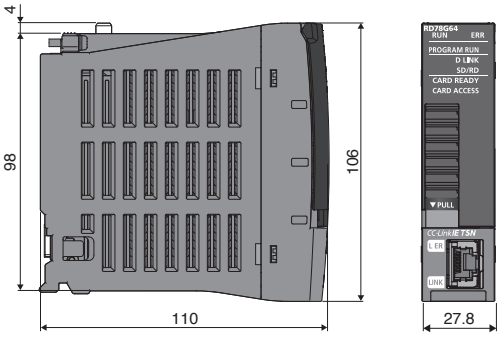
Mitsubishi Electric has confirmed the operation of the following manual pulse generator. Contact the manufacturer for details.

Product name	Model	Description	Manufacturer
Manual pulse generator	RE46A2CO2B	Number of pulses per revolution: 25 pulses/rev (100 pulses/rev after magnification by 4)	Tokyo Sokuteikizai Co.,Ltd.

Motion Module

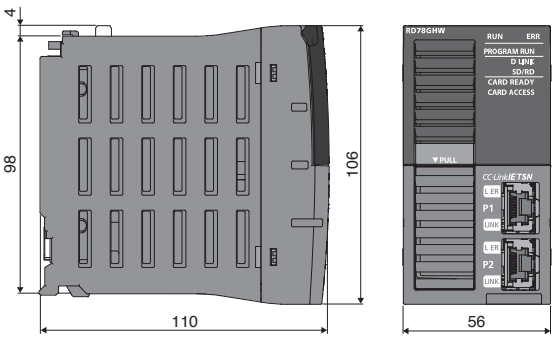
Dimensions

●RD78G4/RD78G8/RD78G16/
RD78G32/RD78G64



[Unit: mm]

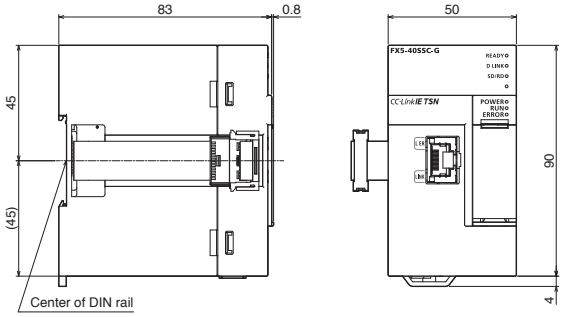
●RD78GHV/RD78GHW



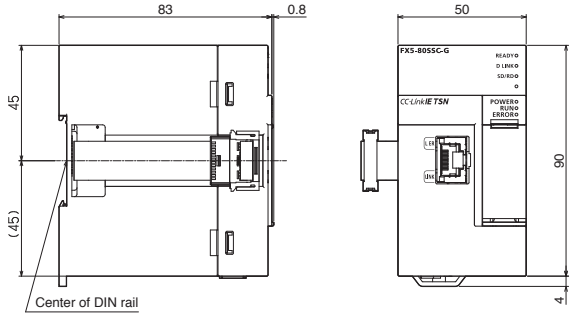
[Unit: mm]

Dimensions

●FX5-40SSC-G



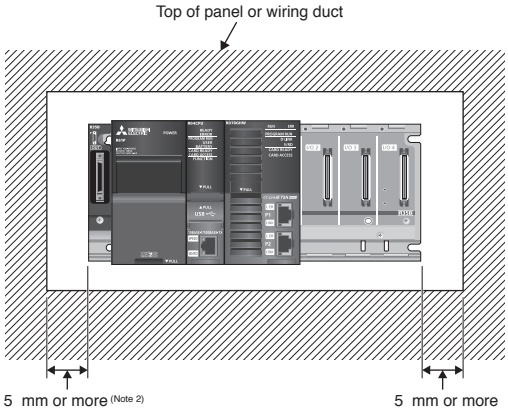
●FX5-80SSC-G

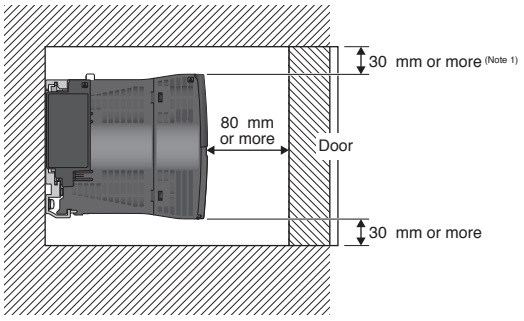


[Unit: mm]

Mounting

●RD78G4/RD78G8/RD78G16/RD78G32/RD78G64
RD78GHV/RD78GHW





Notes: 1. Provide clearance of 30 mm or more when the height of a wiring duct is 50 mm or less. In other cases, provide clearance of 40 mm or more.
2. Provide clearance of 20 mm or more when an extension cable is connected/removed without removing a power supply module.

Engineering Software

MELSOFT GX Works3 operating environment (Note 1)

Item		Description
OS		Microsoft® Windows® 11 (Home, Pro, Enterprise, Education) Microsoft® Windows® 10 (Home, Pro, Enterprise, Education, IoT Enterprise 2016 LTSB *1, IoT Enterprise 2019 LTSC *1) *1: 64-bit version only
CPU	Windows® 11	2 or more cores on a compatible 64-bit processor or System on a Chip (SoC)
	Windows® 10	Intel® Core™ 2 Duo Processor 2 GHz or more recommended
Required memory	Windows® 11	4 GB or more recommended
	Windows® 10	64-bit OS: 2 GB or more recommended 32-bit OS: 1 GB or more recommended
Required hard disk space		For installation: 22 GB or more free hard disk space For operation: 512 MB or more free virtual memory space
Monitor		Resolution 1024 × 768 or more

Notes: 1. Refer to Installation Instructions for precautions and restrictions regarding the operating environment.

Engineering software list

Item	Model	License type	Description
MELSOFT GX Works3	SW1DND-GXW3-EC	Site license (Note 3)	• Programmable Controller Engineering Software [MELSOFT GX Works3, GX Works2, GX Developer, PX Developer]
MELSOFT iQ Works	SW2DND-IQWK-EC	Site license (Note 3)	FA engineering software (Note 1) • System Management Software [MELSOFT Navigator] • Programmable Controller Engineering Software [MELSOFT GX Works3, GX Works2, GX Developer, PX Developer] • Motion Controller Engineering Software [MELSOFT MT Works2] • Screen Design Software [MELSOFT GT Works3] • Robot Programming Software [MELSOFT RT ToolBox3 (Note 2)] • Inverter Setup Software [MELSOFT FR Configurator2] • Servo Engineering Software [MELSOFT MR Configurator2] • C Controller setting and monitoring tool [MELSOFT CW Configurator]

Notes: 1. Refer to each product manual for the software supported by the model.
2. RT ToolBox3 mini (simplified version) will be installed if iQ Works product ID is used. When RT ToolBox3 (with simulation function) is required, please purchase RT ToolBox3 product ID.
3. Anyone can use the product as long as that person belongs to the business office (including overseas offices) of the corporation that purchased the product, or to the same public vocational training facility or other educational institution as the corporation.

Motion Control Software SWM-G(-N1)

Control specifications

Item		Specifications
Maximum number of control axes (Note 1)		16, 32, 64, 128 axes
Command interface		CC-Link IE TSN EtherCAT® (Note 3)
CC-Link IE TSN Class		B
Communication cycle (operation cycle settings) [µs]		125, 250, 500, 1000, 2000, 4000, 8000
Communication specifications		Mixture of hot connect, SDO communication, and TCP/IP communication
Development environment		• Microsoft® Visual Studio® 2017, 2019, 2022 • Programming languages supported by API library: C/C++, .NET (C#, VB.NET, etc.)
Functions	Control method	Position, speed, torque
	Positioning	Up to 128 axes simultaneously (absolute value command, relative value command), override
	Acceleration/deceleration processing	Trapezoidal, S-curve, jerk ratio, parabolic, sine, time acceleration trapezoidal, etc. (24 types)
	Interpolation function	2- to 4-axis linear interpolation, 2-axis/3-axis circular interpolation, 3-axis helical interpolation, PVT
	Continuous path	Combination of linear and circular interpolation, spline interpolation, pre-read speed automatic control, linear/circular continuous path with rotation stage
	JOG operation	Provided
	Real-time control	Event, triggered motion, position synchronous output
	Synchronous control	Simple synchronization, synchronous gear ratio, synchronous phase offset, synchronous compensation, dynamic establishment/cancellation of synchronization, multiple pairs (up to 64 pairs) of synchronization between 1 axis and multiple axes (synchronous group)
	Electronic cam	Cam curves of eight systems can be defined, cam curve per communication cycle, phase operation, clutch
	Home position return (Note 2)	Home position return using the Z-phase, home position sensor, limit sensor, limit proximity sensor, external input signal, mechanical end, and gantry axis can be performed.
	I/O size	Input: 8000 bytes, output: 8000 bytes
	Compensation function	Backlash/pitch error compensation, plane strain (straightness) compensation
	Auxiliary function	Touch probe, logging

Notes: 1. The maximum number of control axes differs among the USB keys for Motion Control Software.
2. SWM-G does not support the home position return mode of the servo amplifier.
3. SWM-G-N1 is also compatible with EtherCAT®.

CC-Link IE TSN

Item	Specifications
Communications speed [bps]	1 G/100 M (Note 1, 2)
Connectable stations per network	Up to 128 stations
Connection cable	Ethernet cable (category 5e or higher, double shielded/STP), straight cable
Maximum distance between stations [m]	100
Topology (Note 3)	Line topology, star topology, coexistence of line and star topologies
Communications method	Time-sharing method
Maximum transient transmission capacity	1920 bytes

Notes: 1. When two ports are available, a 1 Gbps device and a 100 Mbps device can be assigned to each port.
2. When devices of different CC-Link IE TSN Class are mixed, the functions and performance equivalent to those of the lower CC-Link IE TSN Class are applied to part of or the entire network.
3. Use class B Ethernet switch when configuring a star topology with class B devices.

Operating environment

Item		Specifications
Personal computer		Microsoft® Windows® supported personal computer
OS		Microsoft® Windows® 11 (Pro, Enterprise, IoT Enterprise) Microsoft® Windows® 10 (Pro, Enterprise, IoT Enterprise LTSC/LTSB) (64-bit)
CPU		Intel® Atom™ 2 GHz, 4Core or higher is recommended
Memory		4 GB or more
Required hard disk space		For installation: 5 GB or more
Network interface (network interface cards)	SWM-G	Intel® I210, I350, I211-AT, I225, I226, etc.
	SWM-G-N1	Intel® I210, I350, I211-AT, I217LM, I218V, I219 Realtek 8168/8111, etc.

Motion Control Software SWM-G(-N1)

Motion Control Software list

Product name		Model	Description
Motion Control Software (Note 1)	SWM-G	SW1DNN-SWMG-M	CC-Link IE TSN compatible • SWM-G Engine • SWM-G Operating Station • Network API • SWM-G API • Real Time OS (RTX64)
	SWM-G-N1	SW1DNN-SWMGN1-M	CC-Link IE TSN/EtherCAT® compatible • SWM-G Engine • SWM-G Operating Station • Network API • SWM-G API • EcConfigurator • Real Time OS (RTX64)
USB key for Motion Control Software	SWM-G	MR-SWMG16-U	Maximum number of control axes: 16 axes, USB key (license)
		MR-SWMG32-U	Maximum number of control axes: 32 axes, USB key (license)
		MR-SWMG64-U	Maximum number of control axes: 64 axes, USB key (license)
		MR-SWMG128-U	Maximum number of control axes: 128 axes, USB key (license)
	SWM-G-N1	MR-SWMG16N1-U	Maximum number of control axes: 16 axes, USB key (license)
		MR-SWMG32N1-U	Maximum number of control axes: 32 axes, USB key (license)
		MR-SWMG64N1-U	Maximum number of control axes: 64 axes, USB key (license)
		MR-SWMG128N1-U	Maximum number of control axes: 128 axes, USB key (license)

Notes: 1. Download and install Motion Control Software from Mitsubishi Electric FA global website.

API Library

Simpler programming by using a dedicated library suite for access to Motion Control Software.

■ Main functions of API library

Class	Function	Description
SSCApi	StartEngine	Starts SWM-G engine.
	StopEngine	Stops SWM-G engine.
	CreateDevice	Creates a device to interface with the SWM-G engine.
	CloseDevice	Closes a device.
	StartCommunication	Starts communication with the servo network.
	StopCommunication	Stops communication with the servo network.
CoreMotion	GetStatus	Reads the current system status from SWM-G engine.
AxisControl	SetServoOn	Executes servo on or servo off.
	SetAxisCommandMode	Sets the command mode of the axis.
	GetAxisCommandMode	Obtains the command mode of the axis.
	GetPosCommand	Obtains the commanded position of the axis.
	GetPosFeedback	Obtains the feedback position of the axis.
	GetVelCommand	Obtains the commanded velocity of the axis.
	GetVelFeedback	Obtains the feedback velocity of the axis.
Config	SetParam	Sets the system parameters.
	GetParam	Obtains the system parameters.
	SetAxisParam	Sets the axis parameters.
	GetAxisParam	Obtains the axis parameters.
	Export	Exports the system and axis parameters to xml file.
	Import	Imports the system and axis parameters from xml file.
Home	StartHome	Starts home position return.
	SetCommandPos	Sets the commanded position to a specified value.
Motion	StartPos	Executes positioning (absolute position).
	StartMov	Executes positioning (relative position).
	StartLinearIntplPos	Starts linear interpolation (absolute position).
	StartLinearIntplMov	Starts linear interpolation (relative position).
	StartCircularIntplPos	Starts circular interpolation (absolute position).
	StartCircularIntplMov	Starts circular interpolation (relative position).
	StartHelicalIntplPos	Starts helical interpolation (absolute position).
	StartHelicalIntplMov	Starts helical interpolation (relative position).
	StartJog	Starts JOG operation.
	Stop	Decelerates the axis to stop.
	ExecQuickStop	Decelerates the axis to stop with Quick Stop Dec parameter.
	ExecTimedStop	Decelerates the axis to stop with the specified time.
	Wait	Executes the blocking wait command.
	Pause	Pauses the positioning operation.
	Resume	Restarts the paused positioning operation.
	OverridePos	Overrides the target position (absolute position) during positioning operation.
	OverrideMov	Overrides the target position (relative position) during positioning operation.
	OverrideProfile	Overrides the velocity pattern during positioning, JOG operation, and speed control.
	StopJogAtPos	Decelerates the axis in JOG operation to stop at the specified position.

API Library

Simpler programming by using a dedicated library suite for access to Motion Control Software.

■ Main functions of API library

Class	Function	Description
Sync	SetSyncMasterSlave	Establishes synchronization between the master and following axes.
	ResolveSync	Cancels synchronization of the specified following axes.
Velocity	StartVel	Starts speed control.
	Stop	Stops speed control.
Torque	StartTrq	Starts torque control.
	StopTrq	Stops torque control.
AdvMotion	CreatePathIntplBuffer	Assigns the buffer memory for path interpolation to an axis.
	FreePathIntplBuffer	Frees up the buffer memory for path interpolation.
	StartPathIntplPos	Starts path control (absolute position).
	StartPathIntplMov	Starts path control (relative position).
	StartPathIntpl3DPos	Starts 3D path interpolation (absolute position).
	StartPathIntpl3DMov	Starts 3D path interpolation (relative position).
AdvSync	StartECAM	Starts E-CAM control.
	StopECAM	Stops E-CAM control.
Event	SetEvent	Sets an event.
	SetSoftwareTouchProbe	Sets the parameter of the software touch probe channel.
	GetSoftwareTouchProbeStatus	Obtains the parameters and the current status of software touch probe.
	SetHardwareTouchProbe	Sets the parameters of hardware touch probe.
	GetHardwareTouchProbeStatus	Obtains the parameters and the current status of hardware touch probe.
	StartPSO	Starts the position synchronous output channel.
Io	SetOutBit	Sets the output bit values.
	SetOutByte	Sets the output byte values.
	SetOutAnalogDataShort	Sets two-byte output data.
	GetInBit	Obtains the input bit values.
	GetInByte	Obtains the input byte values.
	GetInAnalogDataShort	Obtains two-byte input data.
UserMemory	SetMBit	Sets the user memory bit values.
	SetMByte	Sets the user memory byte values.
	SetMAnalogDataShort	Sets two-byte user memory data.
	GetMBit	Obtains the user memory bit value.
	GetMByte	Obtains the user memory byte value.
	GetMAnalogDataShort	Obtains two-byte user memory data.
Log	StartLog	Starts logging data.
	StopLog	Stops logging data.
	SetLog	Specifies the data to be collected by logging operation.
CCLink	StartHotconnect	Starts the hot connect.
	SdoDownload	Downloads the SDO data of the specified remote station.
	SdoUpload	Uploads the SDO data of the specified remote station.
	SetAxisMode	Sets the control mode of the axis of the specified remote station.
	StartAxisHM	Starts HM mode control of the axis of the specified remote station.
	SlmpSendBySlaveId	Transmits SLMP to the specified remote station.

MEMO

3 Servo Amplifiers

* Refer to p. 6-54 in this catalog for conversion of units.

Model Designation (Note 1)

M R - J E T - 1 0 G -

Mitsubishi Electric AC servo amplifier MELSERVO-JET series

Network compatible

Symbol	Rated output [kW]
10	0.1
20	0.2
40	0.4
60	0.6
70	0.75
100	1
200	2
300	3
350	3.5
500	5
700	7

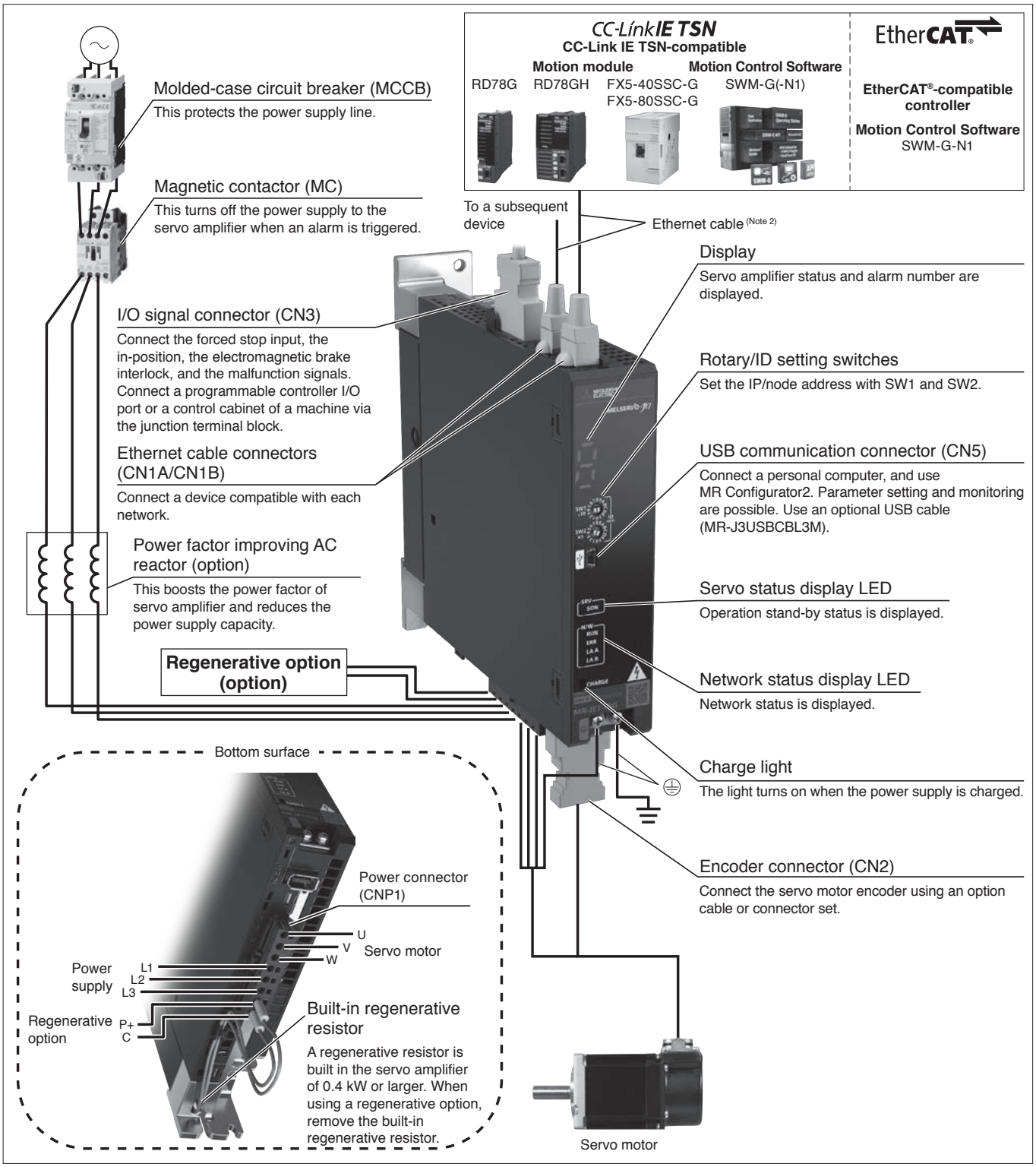
Symbol	Power supply
None	3-phase 200 V AC or 1-phase 200 V AC
4	3-phase 400 V AC

Symbol	Special specifications
None	CC-Link IE TSN-compatible standard
HS	CC-Link IE TSN-compatible, Safety sub-function, 3 points of functional safety I/O signals
N1	EtherCAT®-compatible standard
HSN1	EtherCAT®-compatible, Safety sub-function, 3 points of functional safety I/O signals

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.

MR-JET-G(-N1) Connections with Peripheral Equipment (Note 1)

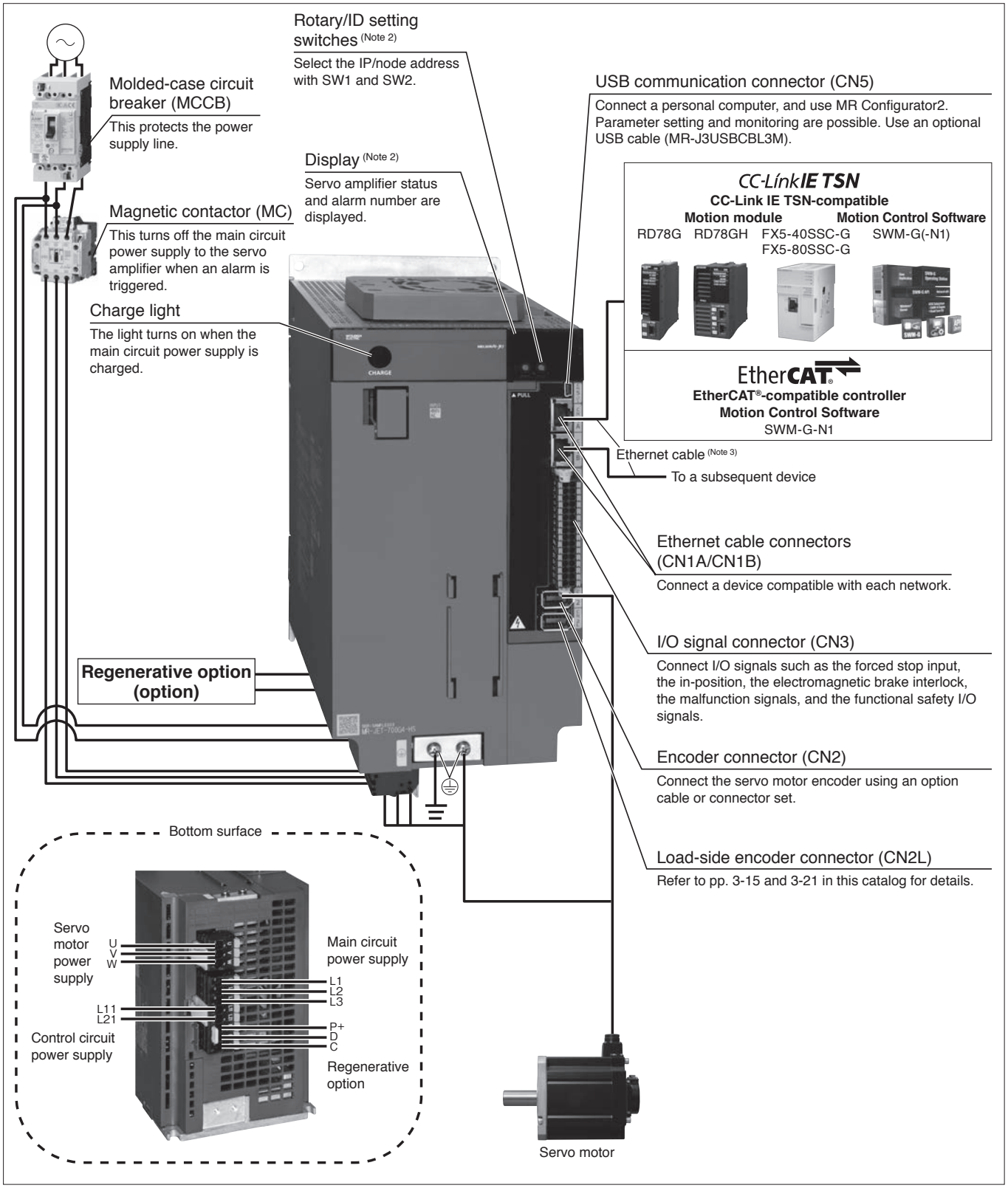
Peripheral equipment is connected to MR-JET-G(-N1) as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. Refer to "MR-JET User's Manual" for the actual connections.
2. For specifications of the Ethernet cable, refer to "Ethernet Cable Specifications" on p. 6-36 in this catalog.

MR-JET-G4-HS(N1) Connections with Peripheral Equipment (Note 1)

Peripheral equipment is connected to MR-JET-G4-HS(N1) as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



Notes: 1. The connection with the peripheral equipment is an example for MR-JET-700G4-HS(N1) servo amplifiers. Refer to "MR-JET User's Manual" for the actual connections.
2. This illustration shows the display cover closed.
3. For specifications of the Ethernet cable, refer to "Ethernet Cable Specifications" on p. 6-36 in this catalog.

MR-JET-G_ (Network Compatible) Specifications (200 V)

Servo amplifier model MR-JET-_(-N1)			10G	20G	40G	70G	100G	200G	300G
Output	Voltage		3-phase 0 V AC to 240 V AC						
	Rated current	[A]	1.3	1.8	2.8	5.8	6.0	11.0	11.0
Power supply input	Voltage/frequency (Note 1)		3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz (Note 6)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz
	Rated current (Note 5)	[A]	0.9 (1.5)	1.5 (2.5)	2.6 (4.5)	3.8 (6.5)	5.0 (10.5)	10.5 (15.8)	14.0
	Permissible voltage fluctuation		3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC (Note 6)		3-phase 170 V AC to 264 V AC
	Permissible frequency fluctuation		±5 % maximum						
Interface power supply			24 V DC ± 10 % (required current capacity: 0.3 A)						
Control method			Sine-wave PWM control/current control method						
Permissible regenerative power of the built-in regenerative resistor (Note 2, 3)		[W]	-		10	30		100	
Dynamic brake (Note 4)			Built-in						
CC-Link IE TSN Class B (Note 10) (MR-JET-G)	Communication cycle (Note 7, 12)		125 µs, 250 µs, 500 µs, 1 ms, 1.5 ms, 2 ms, 2.5 ms, 3 ms, 3.5 ms, 4 ms, 4.5 ms, 5 ms, 5.5 ms, 6 ms, 6.5 ms, 7 ms, 7.5 ms, 8 ms						
	Protocol version		1.0/2.0 (Note 11)						
CC-Link IE TSN Class A (Note 10, 11, 13) (MR-JET-G)	Communication cycle (Note 7)		500 µs to 500 ms						
	Protocol version		2.0						
EtherCAT® (MR-JET-G-N1)	Communication cycle (Note 7, 12)		125 µs, 250 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms						
CC-Link IE Field Network Basic (Note 11, 13) (MR-JET-G)			Supported						
Communication function	USB		Connect a personal computer (MR Configurator2 compatible)						
Positioning mode (Note 11, 12)			Point table method						
Fully closed loop control (Note 14)			Supported						
Load-side encoder interface			Mitsubishi Electric high-speed serial communication, A/B/Z-phase differential input signal						
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, quick tuning, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function, power monitoring function, lost motion compensation function, scale measurement function (Note 11), super trace control, continuous operation to torque control mode (Note 9, 11)						
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection						
Structure (IP rating)			Natural cooling, open (IP20)					Force cooling, open (IP20)	
Close mounting	3-phase power supply input		Possible (Note 8)						
	1-phase power supply input		Possible (Note 8)				Not possible		-
Mass		[kg]	0.8			1.6		2.1	

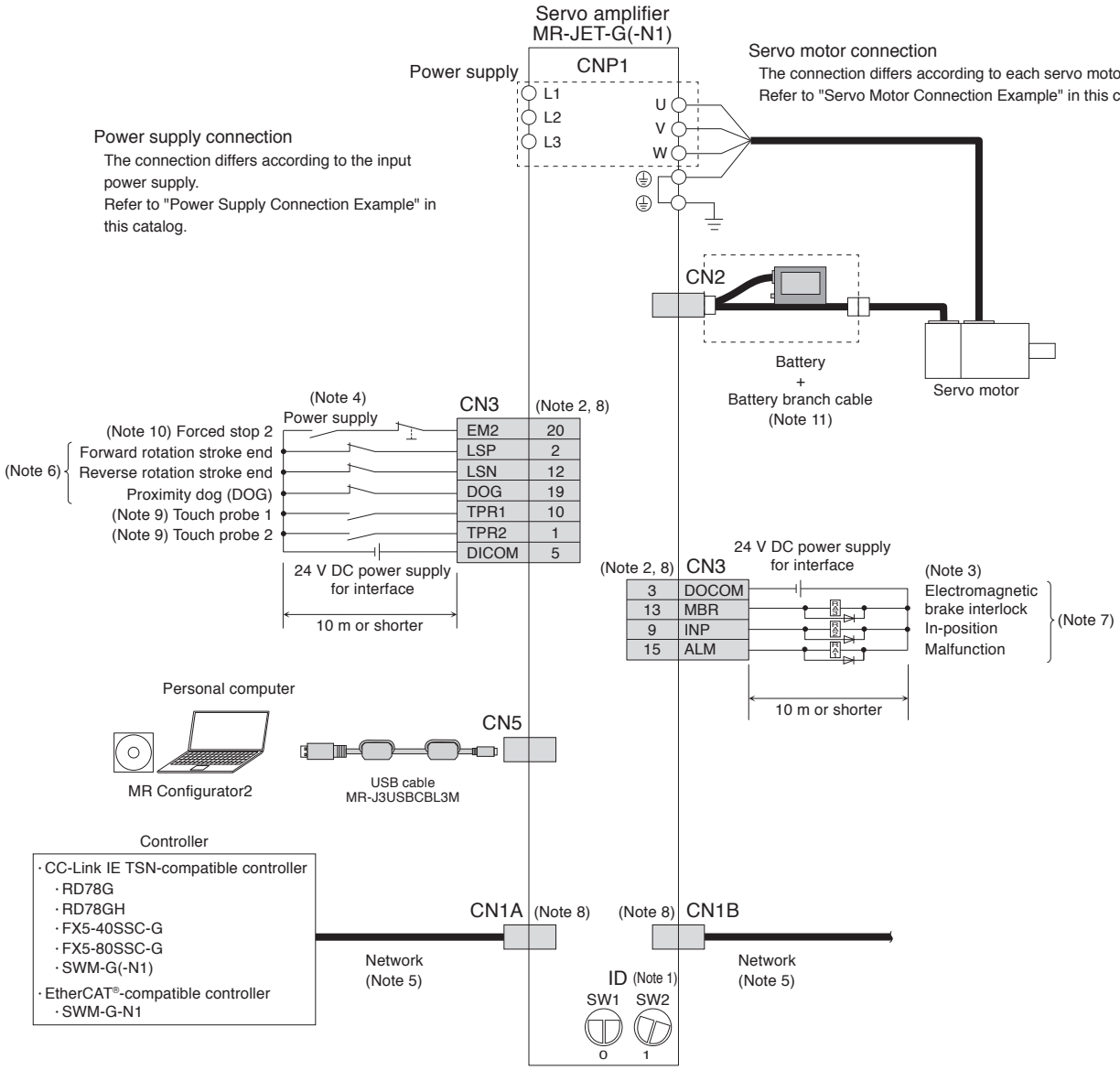
Notes:
1. Rated output and speed of a rotary servo motor; and continuous thrust and maximum speed of a linear servo motor are applicable when the servo amplifier is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our Drive System Sizing Software Motorizer.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when a regenerative option is used.
4. When using the dynamic brake, refer to "MR-JET User's Manual" for the permissible load to motor inertia ratio and the permissible load to mass ratio.
5. The values in brackets are the rated current for the 1-phase power supply input.
6. When the servo amplifier is used with a 1-phase power supply and combined with a servo motor of over 750 W, use the servo amplifiers at 75 % or less of the effective load ratio.
7. The communication cycle depends on the controller specifications and the number of device stations connected.
8. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use the servo amplifiers at 75 % or less of the effective load ratio.
9. The function is not available with MR-JET-G-N1.
10. A communication speed of 1 Gbps/100 Mbps can be selected. When 100 Mbps is selected, the minimum communication cycle is 500 µs.
11. For the servo amplifier firmware version supporting each function, refer to "MR-JET User's Manual".
12. For the restrictions on the communication cycle, refer to "Restrictions" in this catalog.
13. For the restrictions on the network, refer to "MR-JET User's Manual".
14. Use the servo amplifiers with firmware version C4 or later and manufactured in July 2022 or later.

MR-JET-G_ (Network Compatible) Specifications (400 V)

Servo amplifier model MR-JET-_(N1)			60G4-HS	100G4-HS	200G4-HS	350G4-HS	500G4-HS	700G4-HS
Output	Voltage		3-phase 0 V AC to 480 V AC					
	Rated current	[A]	2.3	2.8	5.5	8.6	14	17
Main circuit power supply input	Voltage/frequency (Note 1)	AC input	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz					
	Rated current	[A]	2.1	2.5	5.1	7.9	10.8	14.4
	Permissible voltage fluctuation	AC input	3-phase 323 V AC to 528 V AC					
	Permissible frequency fluctuation		±5 % maximum					
Control circuit power supply input	Voltage/frequency	AC input	1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz					
	Rated current	[A]	0.1				0.2	
	Permissible voltage fluctuation	AC input	1-phase 323 V AC to 528 V AC					
	Permissible frequency fluctuation		±5 % maximum					
	Power consumption	[W]	30				45	
Interface power supply			24 V DC ± 10 % (required current capacity: 0.3 A)					
Control method			Sine-wave PWM control/current control method					
Permissible regenerative power of the built-in regenerative resistor (Note 2, 3)		[W]	15	15	100	120	130	170
Dynamic brake (Note 4)			Built-in					
CC-Link IE TSN Class B (Note 7) (MR-JET-G4-HS)	Communication cycle (Note 5, 6)		125 µs, 250 µs, 500 µs, 1 ms, 1.5 ms, 2 ms, 2.5 ms, 3 ms, 3.5 ms, 4 ms, 4.5 ms, 5 ms, 5.5 ms, 6 ms, 6.5 ms, 7 ms, 7.5 ms, 8 ms					
	Protocol version		1.0/2.0					
CC-Link IE TSN Class A (Note 7, 8) (MR-JET-G4-HS)	Communication cycle (Note 5)		500 µs to 500 ms					
	Protocol version		2.0					
EtherCAT® (MR-JET-G4-HSN1)	Communication cycle (Note 5, 6)		125 µs, 250 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms					
CC-Link IE Field Network Basic (Note 8) (MR-JET-G4-HS)			Supported					
Communication function	USB		Connect a personal computer (MR Configurator2 compatible)					
Encoder output pulse			Compatible (A/B/Z-phase pulse)					
Positioning mode (Note 6)			Point table method					
Fully closed loop control			Supported					
Load-side encoder interface			Mitsubishi Electric high-speed serial communication, A/B/Z-phase differential input signal					
Servo functions			Advanced vibration suppression control II, adaptive filter II, robust filter, quick tuning, auto tuning, one-touch tuning, tough drive function, drive recorder function, machine diagnosis function (including failure prediction), power monitoring function, lost motion compensation function, scale measurement function, super trace control, continuous operation to torque control mode (Note 9)					
Protective functions			Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection, magnetic pole detection protection, linear servo control fault protection					
Safety sub-function, Safety performance			Refer to "Safety Sub-Functions" in section 1 of this catalog.					
Structure (IP rating)			Natural cooling, open (IP20) (Note 10)		Force cooling, open (IP20) (Note 10)		Force cooling, open (IP20)	
Close mounting			Not possible					
Mass		[kg]	1.6		2.2	2.3	5.1	5.3

Notes:
1. Rated output and speed of a rotary servo motor are applicable when the servo amplifier is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our Drive System Sizing Software Motorizer.
3. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when a regenerative option is used.
4. When using the dynamic brake, refer to "MR-JET User's Manual" for the permissible load to motor inertia ratio.
5. The communication cycle depends on the controller specifications and the number of device stations connected.
6. For the restrictions on the communication cycle, refer to "Restrictions" in this catalog.
7. A communication speed of 1 Gbps/100 Mbps can be selected. When 100 Mbps is selected, the minimum communication cycle is 500 µs.
8. For the restrictions on the network, refer to "MR-JET User's Manual".
9. The function is not available with MR-JET-G4-HSN1.
10. This product is certified as IP00.

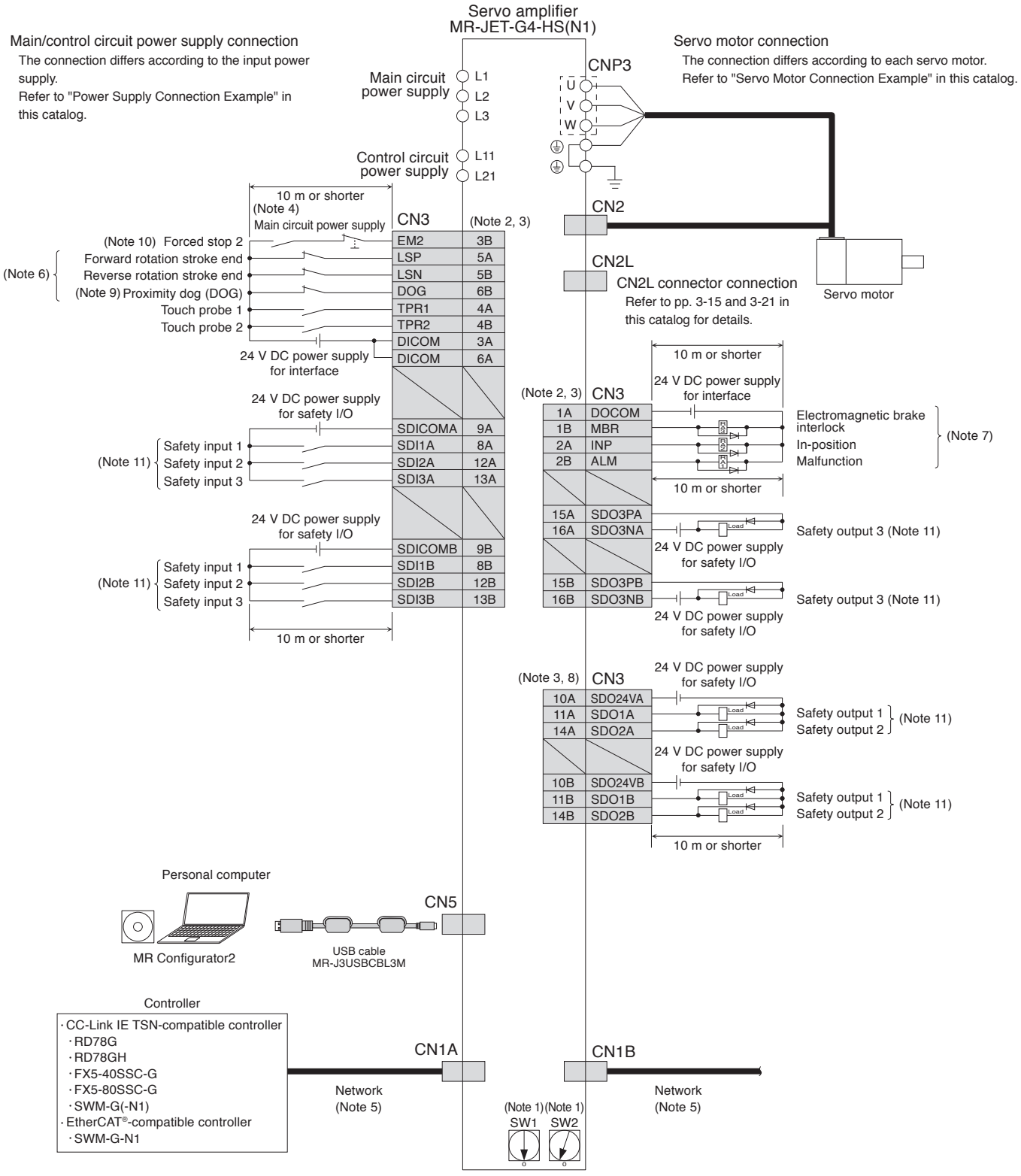
MR-JET-G(-N1) Standard Wiring Diagram Example



Notes:
1. The node address or the 4th octet of the IP address can be set to between 1 and 254 with a combination of the ID setting switches or the rotary switches (SW1 and SW2). Note that the number of the connectable device stations depends on the controller specifications.
2. This is for sink wiring. Source wiring is also possible.
3. When using a linear servo motor, use MBR (Electromagnetic brake interlock) for an external brake mechanism.
4. To prevent an unexpected restart of the servo amplifier, create a circuit to turn off EM2 (Forced stop 2) when the power is turned off.
5. When branching off CC-Link IE TSN (synchronous communication function) with a switching hub, use a switching hub (class B) recommended by CC-Link Partner Association. When a switching hub (class A) is used, there are restrictions on the topologies to be used. Refer to the controller manual for details.
6. Devices for these pins can be changed with [Pr. PD03], [Pr. PD04], and [Pr. PD05].
7. Devices for these pins can be changed with [Pr. PD07], [Pr. PD08], and [Pr. PD09].
8. Attach a cap to unused CN3/CN1A/CN1B connectors.
9. Use the servo amplifiers with firmware version C4 or later and manufactured in July 2022 or later.
10. The forced stop signal is issued for the servo amplifier. For overall system, apply the emergency stop on the controller side.
11. When configuring an absolute position detection system with a rotary servo motor having a battery backup type absolute position encoder, whether a battery (MR-BAT6V1SET-B) is required depends on the system configuration. In addition, use the battery branch cable (MR-BT6V4CBL03M) when using the battery. Refer to "Battery" in this catalog for information on whether a battery is required, details, and connections of the battery.

Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-JET-G4-HS(N1) Standard Wiring Diagram Example



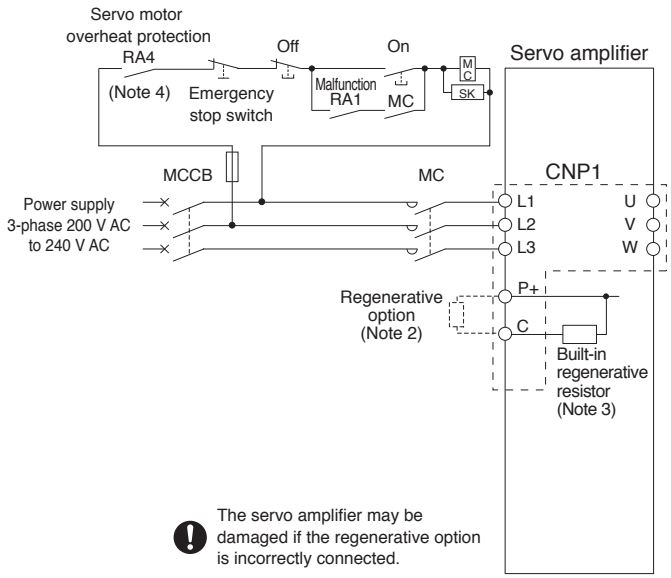
MR-JET-G4-HS(N1) Standard Wiring Diagram Example

Notes:
1. The node address or the 4th octet of the IP address can be set to between 1 and 254 with a combination of the ID setting switches or the rotary switches (SW1 and SW2). Note that the number of the connectable device stations depends on the controller specifications.
2. This is for sink wiring. Source wiring is also possible.
3. The frame of the CN3 connector is not connected to the protective earth (PE) terminal. Grounding with a shield connection clamp (SCC 15-F) is recommended. For details, refer to "Products on the Market for Servo Amplifiers" in this catalog.
4. To prevent an unexpected restart of the servo amplifier, create a circuit to turn off EM2 (Forced stop 2) when the main circuit power is turned off.
5. When branching off CC-Link IE TSN (synchronous communication function) with a switching hub, use a switching hub (class B) recommended by CC-Link Partner Association. When a switching hub (class A) is used, there are restrictions on the topologies to be used. Refer to the controller manual for details.
6. Devices for these pins can be changed with [Pr. PD03], [Pr. PD04], and [Pr. PD05].
7. Devices for these pins can be changed with [Pr. PD07], [Pr. PD08], and [Pr. PD09].
8. SDO1A, SDO2A, SDO1B, and SDO2B can be used only for source wiring.
9. This device can be changed to TPR3 (Touch probe 3) with [Pr. PD05]. When TPR3 is set, connect by using a normally open contact switch as the same as TPR1 (Touch probe 1) and TPR2 (Touch probe 2).
10. The forced stop signal is issued for the servo amplifier. For overall system, apply the emergency stop on the controller side.
11. The functional safety cannot be used with the factory setting. When using the functional safety, follow the instructions in "MR-JET User's Manual" and set the functional safety parameters.

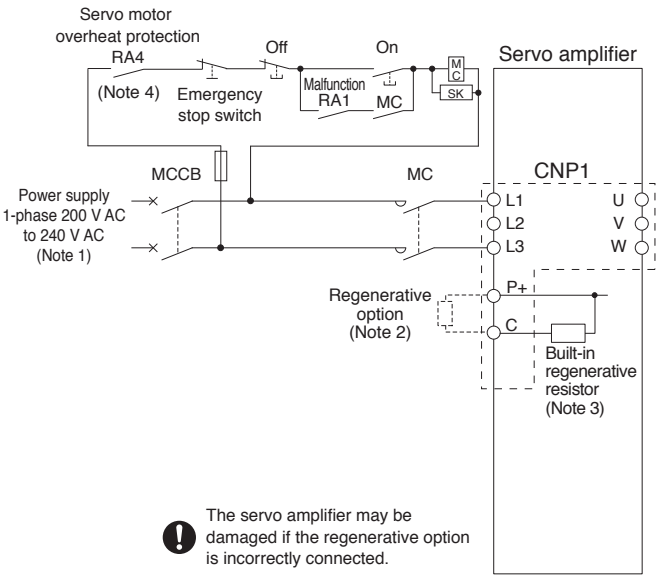
Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Power Supply Connection Example

●For 3-phase 200 V AC



●For 1-Phase 200 V AC

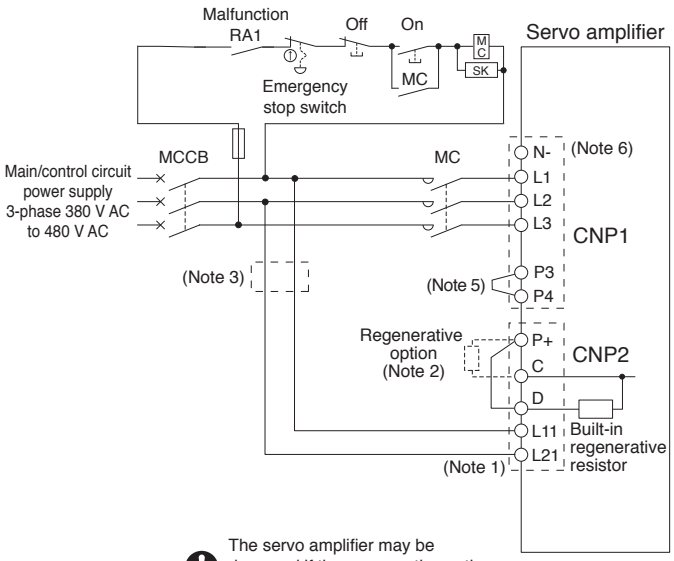


Notes: 1. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L3 terminals. Do not connect anything to L2.
2. When connecting a regenerative option externally, disconnect the wires for the built-in regenerative resistor (between P+ and C), and then remove the resistor.
3. The servo amplifiers of 0.2 kW or smaller do not have a built-in regenerative resistor.
4. When connecting a linear servo motor with a thermal protector, add a contact to shut off by being interlocked with the thermal protector output of the linear servo motor.

Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

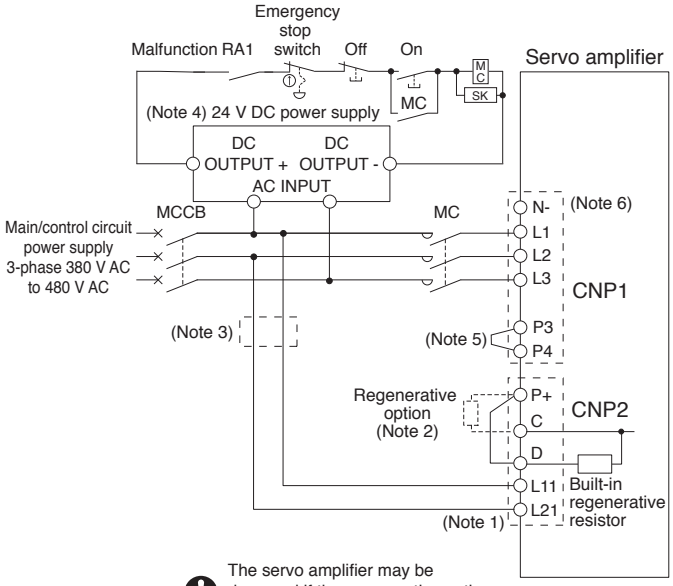
Power Supply Connection Example

●Driving on/off of main circuit power supply with AC power supply for 3-phase 400 V AC and 3.5 kW or smaller



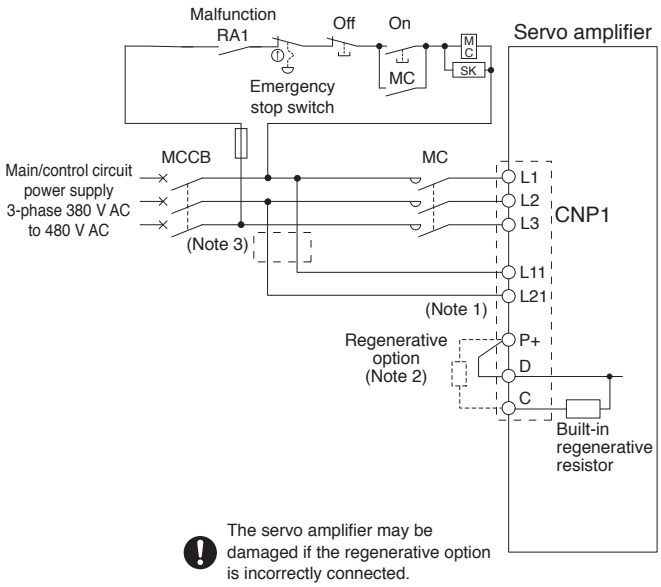
The servo amplifier may be damaged if the regenerative option is incorrectly connected.

●Driving on/off of main circuit power supply with DC power supply for 3-phase 400 V AC and 3.5 kW or smaller



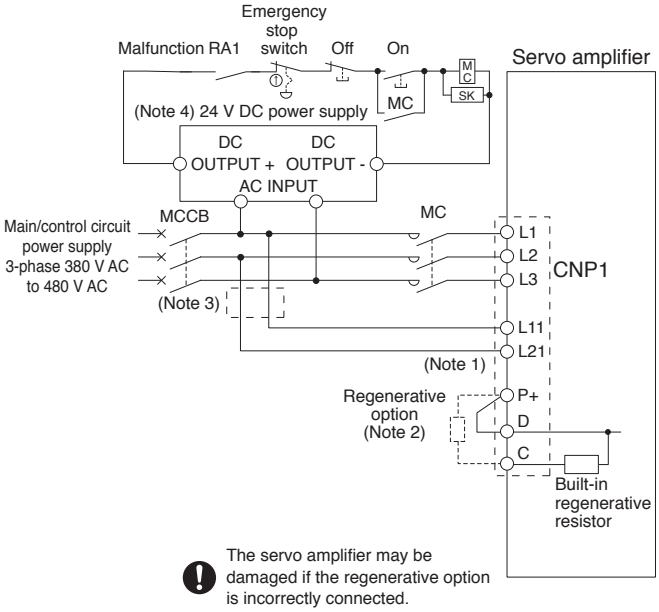
The servo amplifier may be damaged if the regenerative option is incorrectly connected.

●Driving on/off of main circuit power supply with AC power supply for 3-phase 400 V AC and 5 kW or larger



The servo amplifier may be damaged if the regenerative option is incorrectly connected.

●Driving on/off of main circuit power supply with DC power supply for 3-phase 400 V AC and 5 kW or larger



The servo amplifier may be damaged if the regenerative option is incorrectly connected.

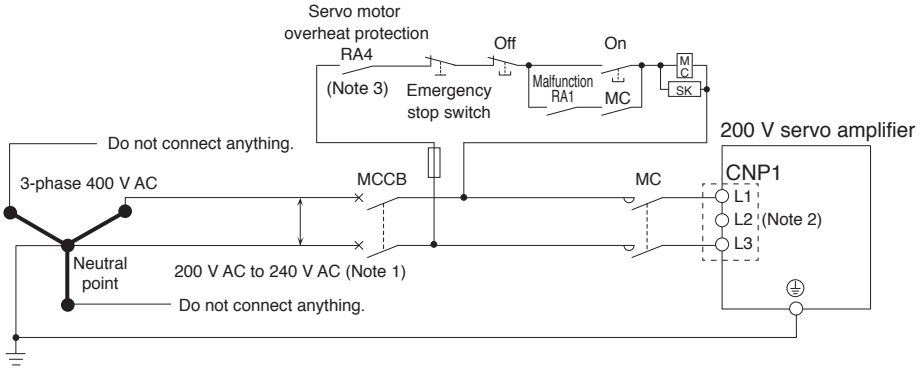
Notes: 1. Do not ground the servo amplifier between L11 and L21 even when the control circuit power supply is separated from the main circuit power supply using an uninterruptible power supply (UPS) or an isolation transformer.
2. Disconnect a short-circuit bar between P+ and D when connecting the regenerative option externally.
3. When wires used for L11 and L21 are thinner than those for L1, L2, and L3, use a molded-case circuit breaker or a fuse. Refer to "MR-JET User's Manual" for details.
4. Do not use the 24 V DC interface power supply for the magnetic contactor. Provide a dedicated power supply to the magnetic contactor.
5. Do not disconnect a short-circuit bar between P3 and P4.
6. Do not use N-.

Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

1-phase 200 V AC Power Supply Input Using a Neutral Point of 3-phase 400 V AC Power Supply

A 1-phase 200 V AC power can be supplied to the 200 V servo amplifier with a use of a neutral point of a 3-phase 400 V AC power supply. Use a step-down transformer as necessary to keep the power supply voltage between 200 V AC and 240 V AC.

> Do not input a 3-phase 400 V AC power supply directly to the 200 V servo amplifier. Doing so may cause the servo amplifier to malfunction.



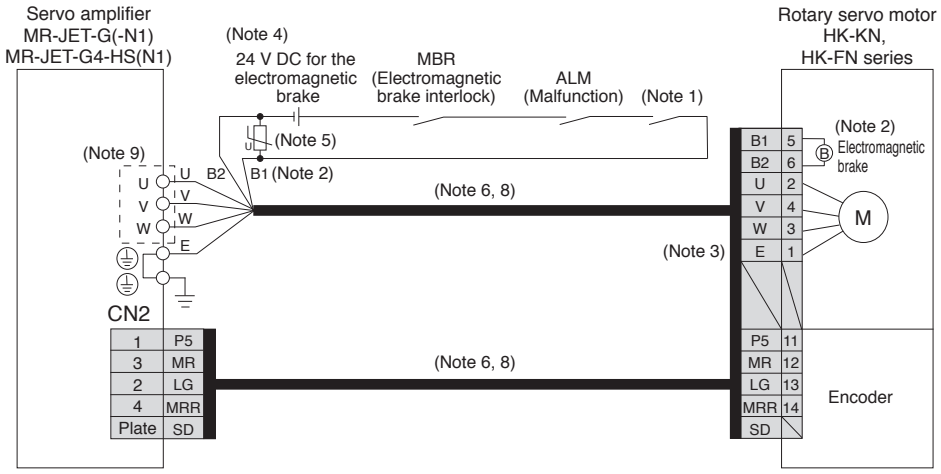
Notes: 1. Use a step-down transformer as necessary to keep the power supply voltage between 200 V AC and 240 V AC.
2. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L3 terminals. Do not connect anything to L2.
3. When connecting a linear servo motor with a thermal protector, add a contact to shut off by being interlocked with the thermal protector output of the linear servo motor.

> Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

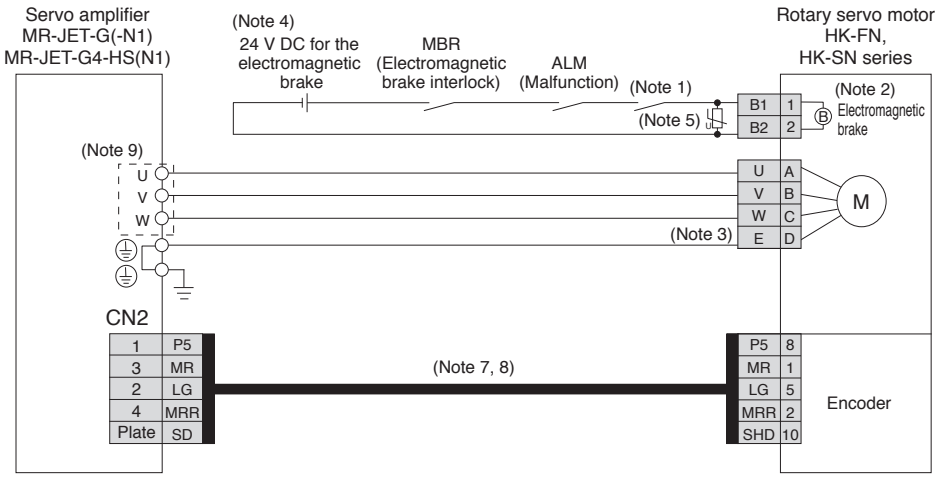
Servo Motor Connection Example (Rotary Servo Motor)

Semi Closed Loop Control System with MR-JET-G(-N1)/MR-JET-G4-HS(N1)

●For HK-KN series/HK-FN (0.1 kW to 0.75 kW) series



●For HK-FN (1.0 kW to 3.0 kW) series/HK-SN series



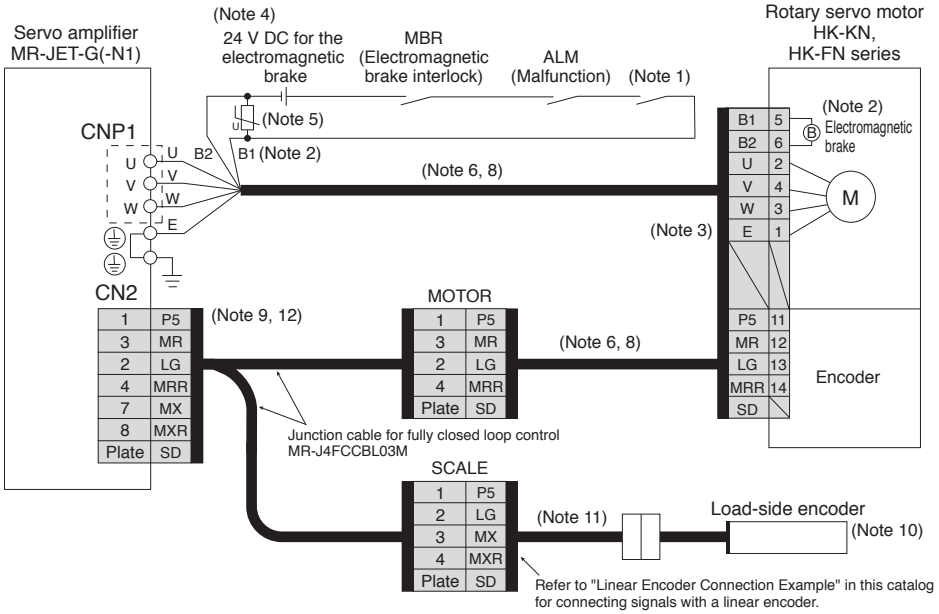
Notes: 1. Create the circuit in order to shut off by being interlocked with the emergency stop switch.
2. This is for the servo motors with an electromagnetic brake. The electromagnetic brake terminals do not have polarity.
3. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
4. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
5. Install a surge absorber between B1 and B2.
6. This is for using an option dual cable type. Single cable types are also available.
7. Encoder cables are available as an option.
8. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.
9. The connector varies depending on the servo amplifier. Refer to the dimensions of the relevant servo amplifier in this catalog for details.

Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

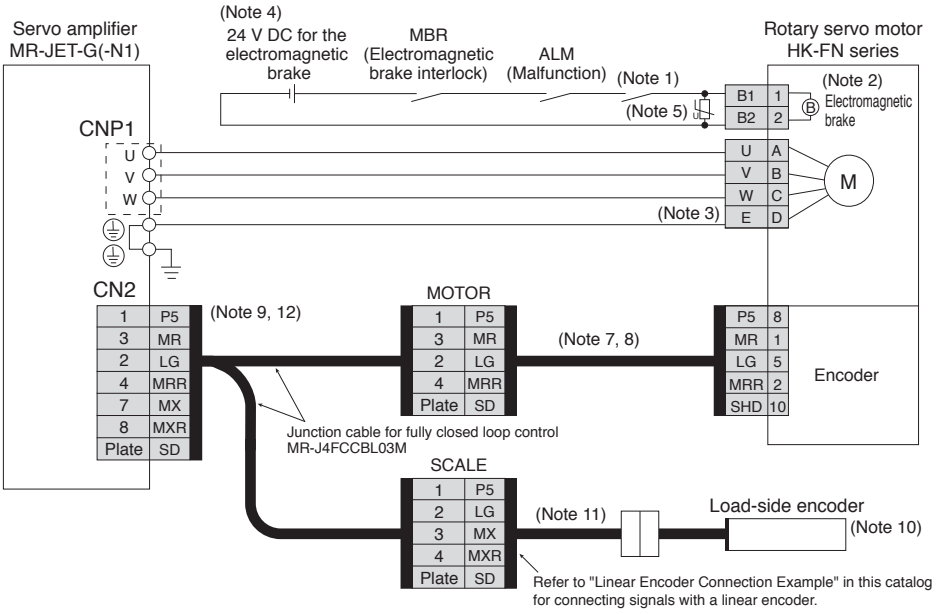
Servo Motor Connection Example (Rotary Servo Motor)

Fully Closed Loop Control System with MR-JET-G(-N1)

●For HK-KN series/HK-FN (0.1 kW to 0.75 kW) series



●For HK-FN (1.0 kW to 3.0 kW) series

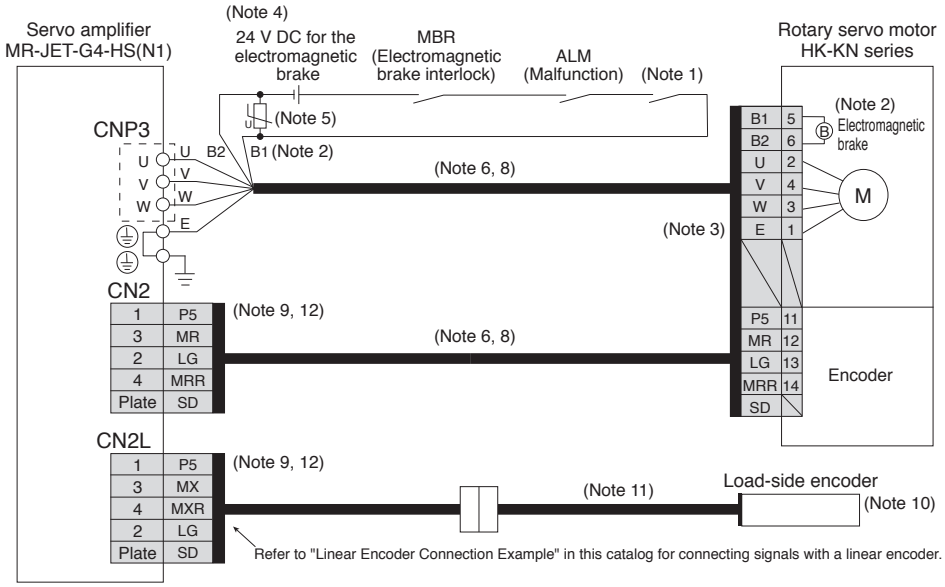


Notes: 1. Create the circuit in order to shut off by being interlocked with the emergency stop switch.
2. This is for the servo motors with an electromagnetic brake. The electromagnetic brake terminals do not have polarity.
3. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
4. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
5. Install a surge absorber between B1 and B2.
6. This is for using an option dual cable type. Single cable types are also available.
7. Encoder cables are available as an option.
8. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.
9. The load-side encoder and the servo motor encoder are compatible with two-wire type communication method. Four-wire type cannot be used.
10. For linear encoders, refer to "List of Linear Encoders" in this catalog. Refer to "MR-JET User's Manual" for the fully closed loop control with a rotary encoder.
11. Necessary encoder cables vary depending on the load-side encoder. Refer to "MR-JET User's Manual" and "Rotary Servo Motor User's Manual (For MR-JET)".
12. When configuring a fully closed loop control system, connect MR-J4FCCBL03M junction cable or a junction cable fabricated using MR-J3THMCN2 connector set to CN2 connector.

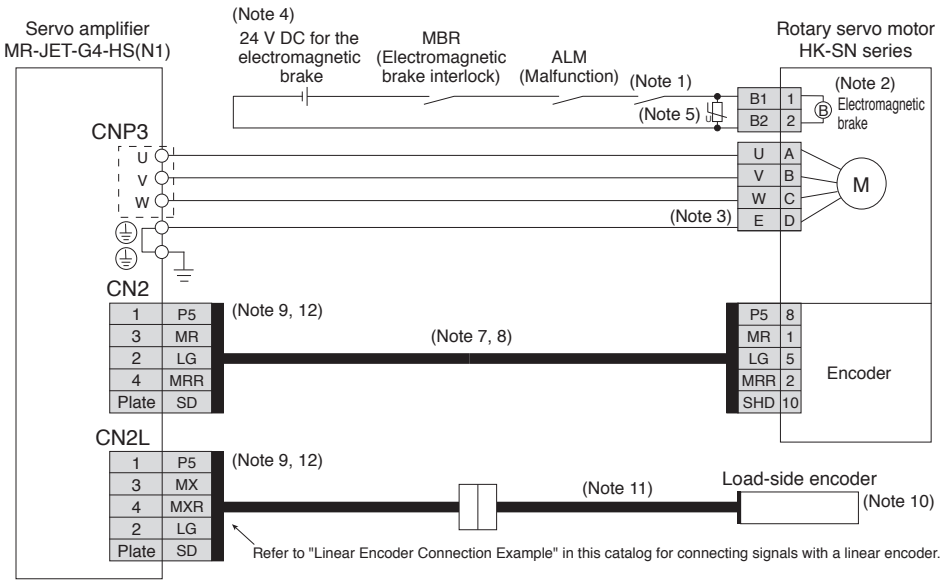
Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example (Rotary Servo Motor)
Fully Closed Loop Control System with MR-JET-G4-HS(N1)

●For HK-KN series



●For HK-SN series

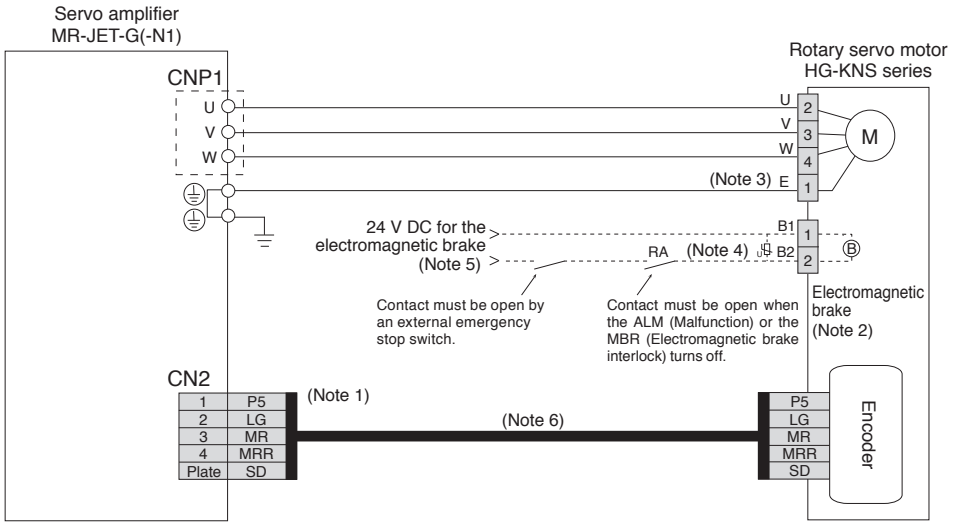


Notes:
1. Create the circuit in order to shut off by being interlocked with the emergency stop switch.
2. This is for the servo motors with an electromagnetic brake. The electromagnetic brake terminals do not have polarity.
3. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
4. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
5. Install a surge absorber between B1 and B2.
6. This is for using an option dual cable type. Single cable types are also available.
7. Encoder cables are available as an option.
8. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.
9. The load-side encoder and the servo motor encoder are compatible with two-wire type communication methods. Four-wire type cannot be used.
10. For linear encoders, refer to "List of Linear Encoders" in this catalog. Refer to "MR-JET User's Manual" for the fully closed loop control with a rotary encoder.
11. Necessary encoder cables vary depending on the load-side encoder. Refer to "MR-JET User's Manual" and "Rotary Servo Motor User's Manual (For MR-JET)".
12. When configuring a fully closed loop control system with MR-JET-G4-HS(N1), connect a servo motor encoder to CN2 connector and a load-side encoder to CN2L connector. Do not use MR-J4FCCBL03M junction cable or a junction cable fabricated using MR-J3THMCN2 connector set.

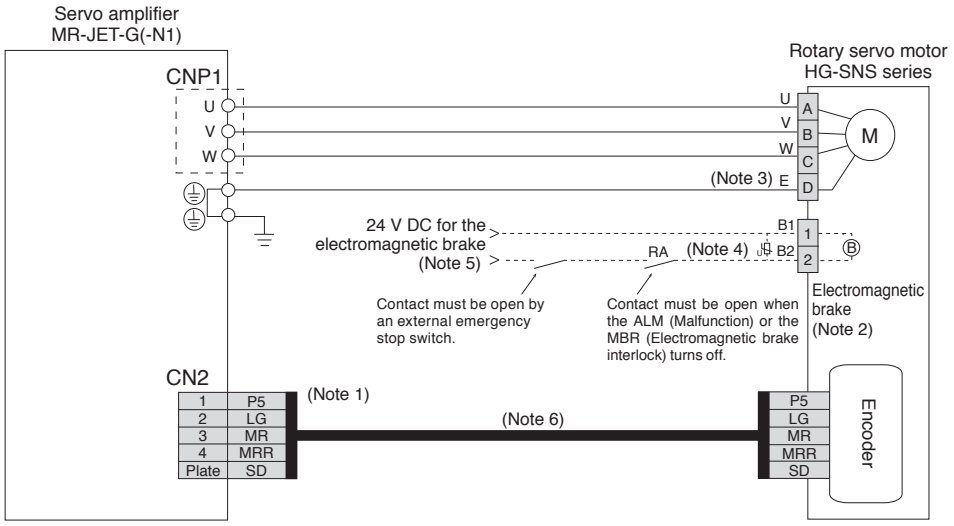
Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example (Rotary Servo Motor)
Semi Closed Loop Control System with MR-JET-G(-N1)

●For HG-KNS series



●For HG-SNS series

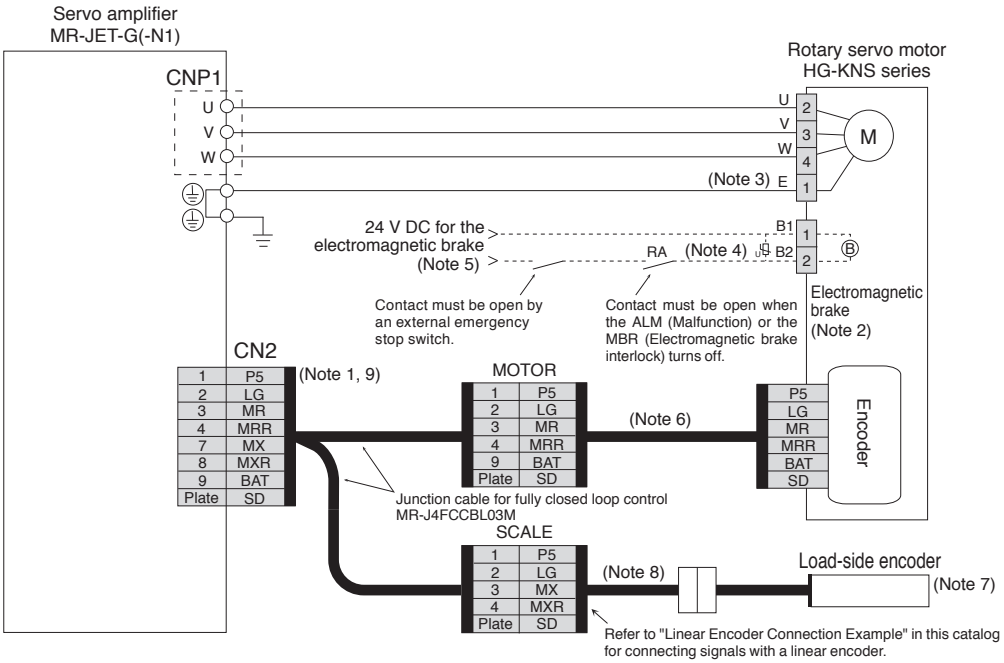


Notes: 1. The signals shown are applicable when a two-wire type encoder cable is used. A four-wire type is also compatible.
2. This is for the servo motors with an electromagnetic brake. The electromagnetic brake terminals do not have polarity.
3. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
4. Install a surge absorber between B1 and B2.
5. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
6. Encoder cables are available as an option. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.

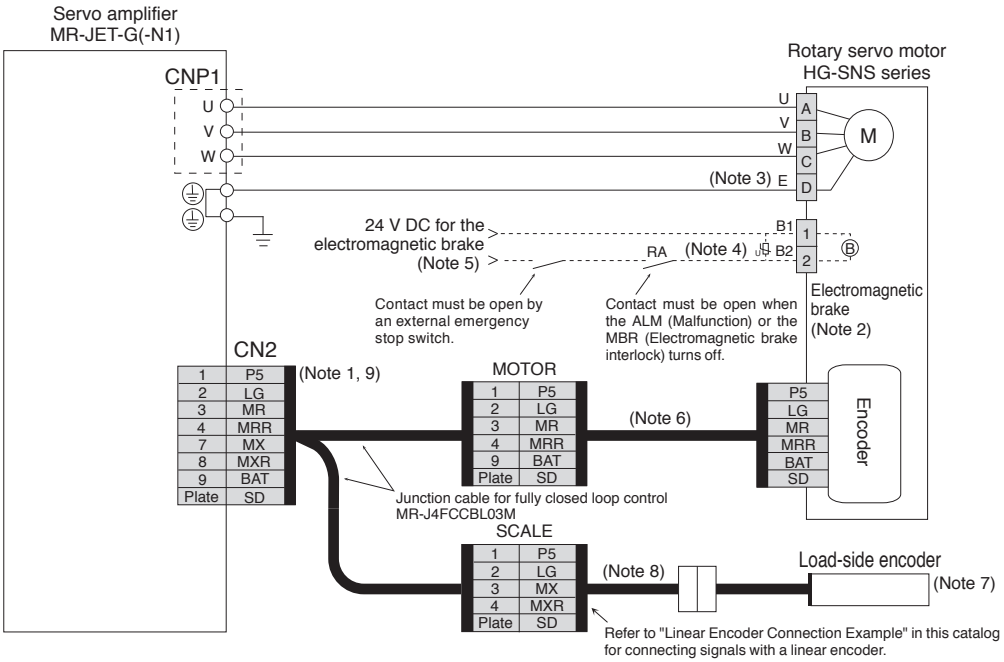
Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example (Rotary Servo Motor)
Fully Closed Loop Control System with MR-JET-G(-N1)

●For HG-KNS series



●For HG-SNS series

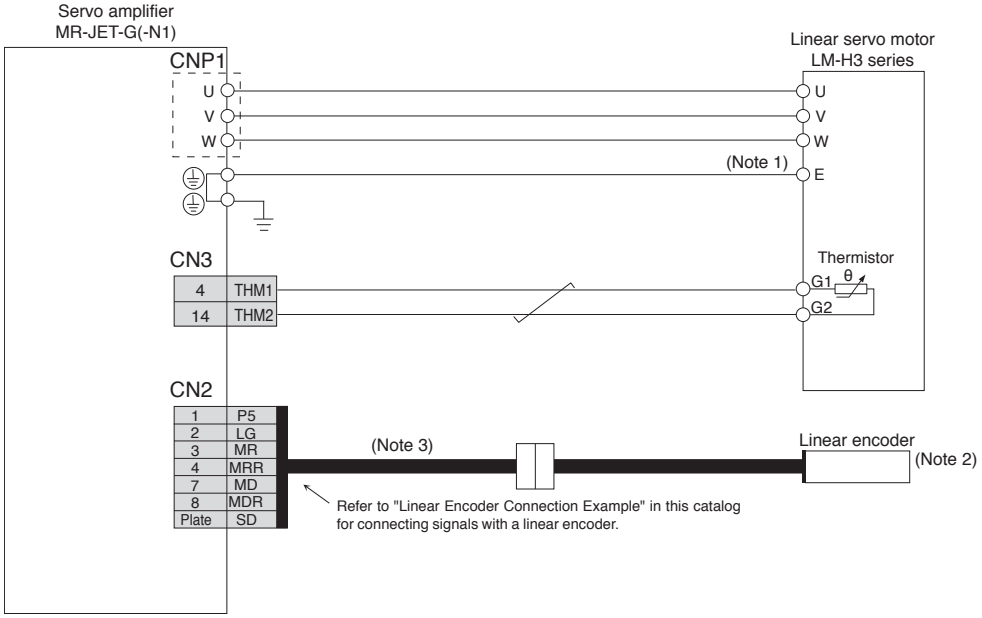


Notes: 1. The load-side encoder and the servo motor encoder are compatible with two-wire type communication method. Four-wire type cannot be used.
2. This is for the servo motors with an electromagnetic brake. The electromagnetic brake terminals do not have polarity.
3. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
4. Install a surge absorber between B1 and B2.
5. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
6. Encoder cables are available as an option. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.
7. For linear encoders, refer to "List of Linear Encoders" in this catalog. Refer to "MR-JET User's Manual" for the fully closed loop control with a rotary encoder.
8. Necessary encoder cables vary depending on the load-side encoder. Refer to "MR-JET User's Manual" and "Rotary Servo Motor User's Manual (For MR-JET)".
9. When configuring a fully closed loop control system, connect MR-J4FCCBL03M junction cable or a junction cable fabricated using MR-J3THMCN2 connector set to CN2 connector.

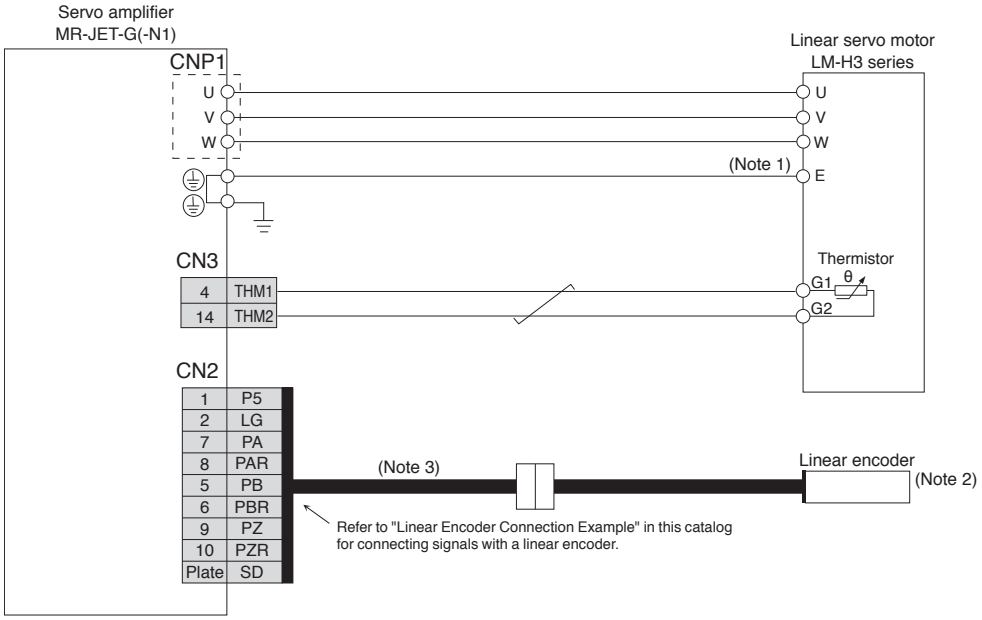
Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example (Linear Servo Motor: LM-H3 Series)
Linear Servo System with MR-JET-G(-N1)

●Connecting a serial linear encoder



●Connecting an A/B/Z-phase differential output linear encoder

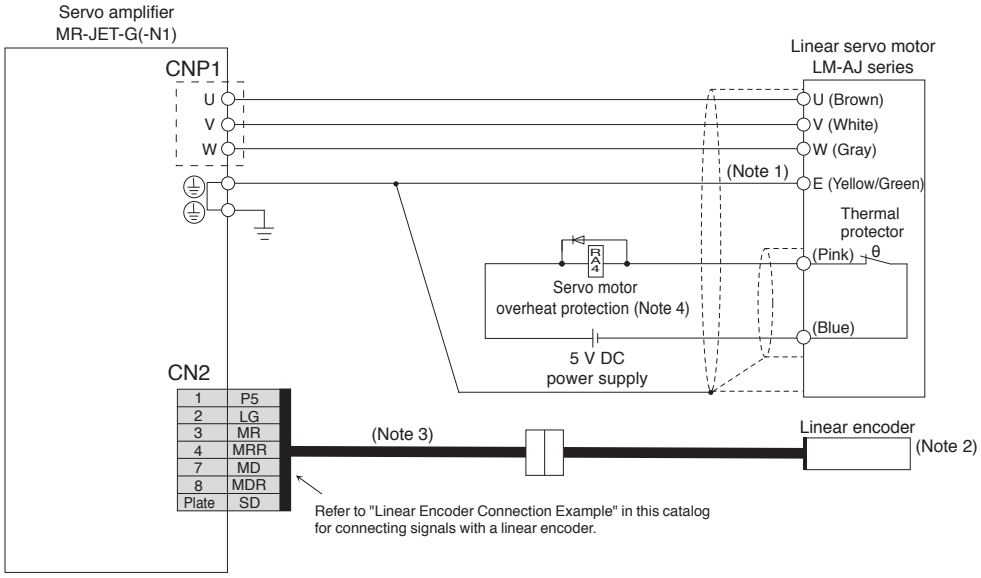


Notes: 1. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
2. For linear encoders, refer to "List of Linear Encoders" in this catalog.
3. Necessary cables vary depending on the linear encoder. Refer to "MR-JET Partner's Encoder User's Manual" for details.

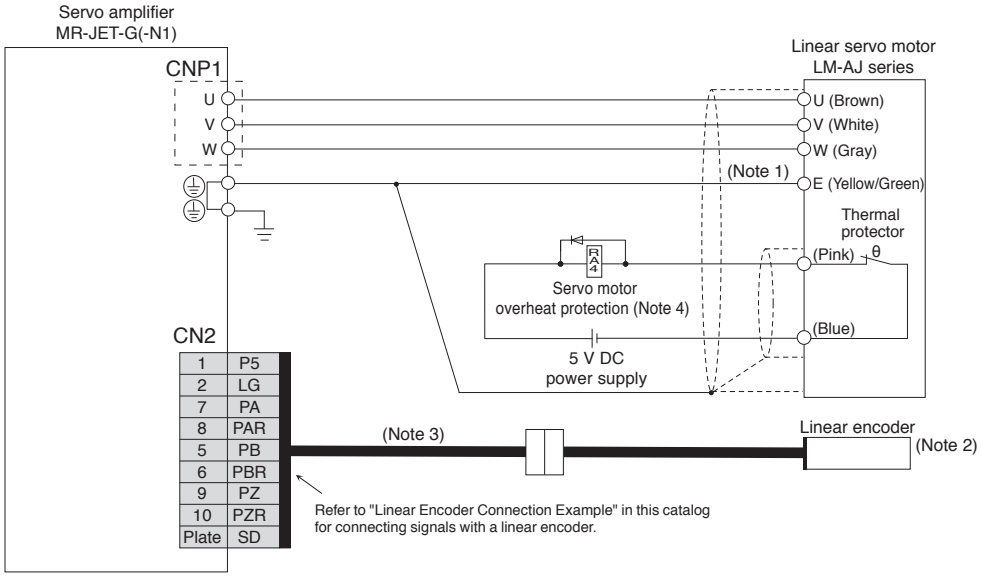
Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example (Linear Servo Motor: LM-AJ Series)
Linear Servo System with MR-JET-G(-N1)

●Connecting a serial linear encoder



●Connecting an A/B/Z-phase differential output linear encoder



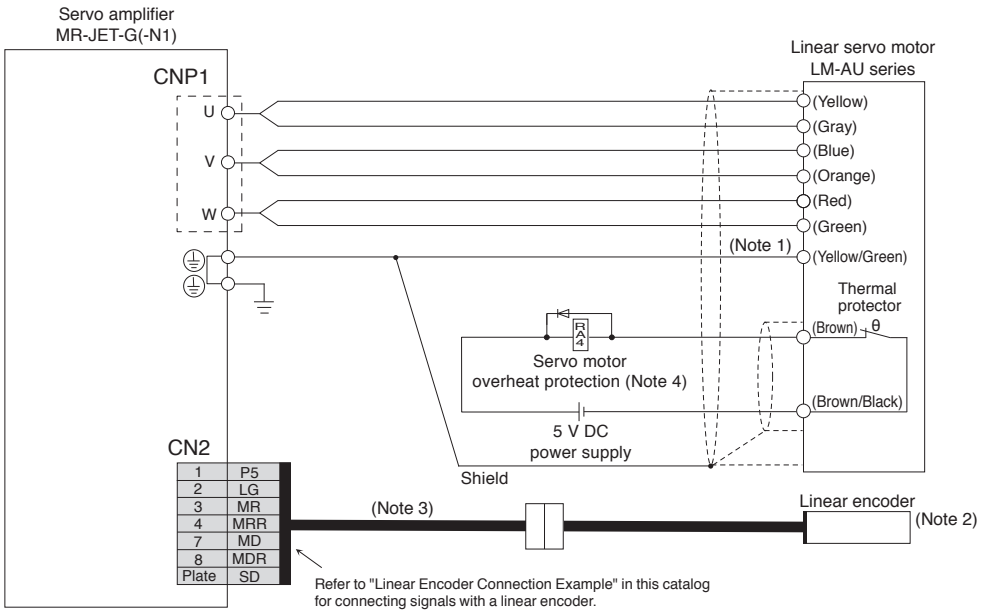
Notes: 1. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
2. For linear encoders, refer to "List of Linear Encoders" in this catalog.
3. Necessary cables vary depending on the linear encoder. Refer to "MR-JET Partner's Encoder User's Manual" for details.
4. Create a relay circuit to turn off the main circuit power supply when the thermal protector is opened by overheating. Use a relay designed for a flowing current of 1000 mA or less. If a mechanical relay is used, use a relay designed for a flowing current of 50 mA to 1000 mA.

Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

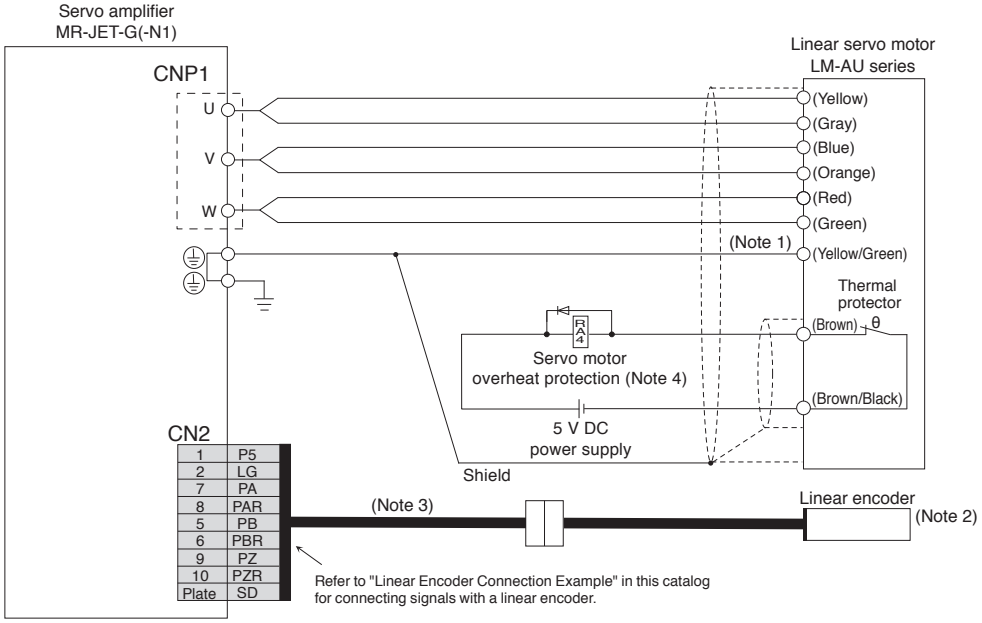
Servo Motor Connection Example (Linear Servo Motor: LM-AU Series)

Linear Servo System with MR-JET-G(-N1)

●Connecting a serial linear encoder



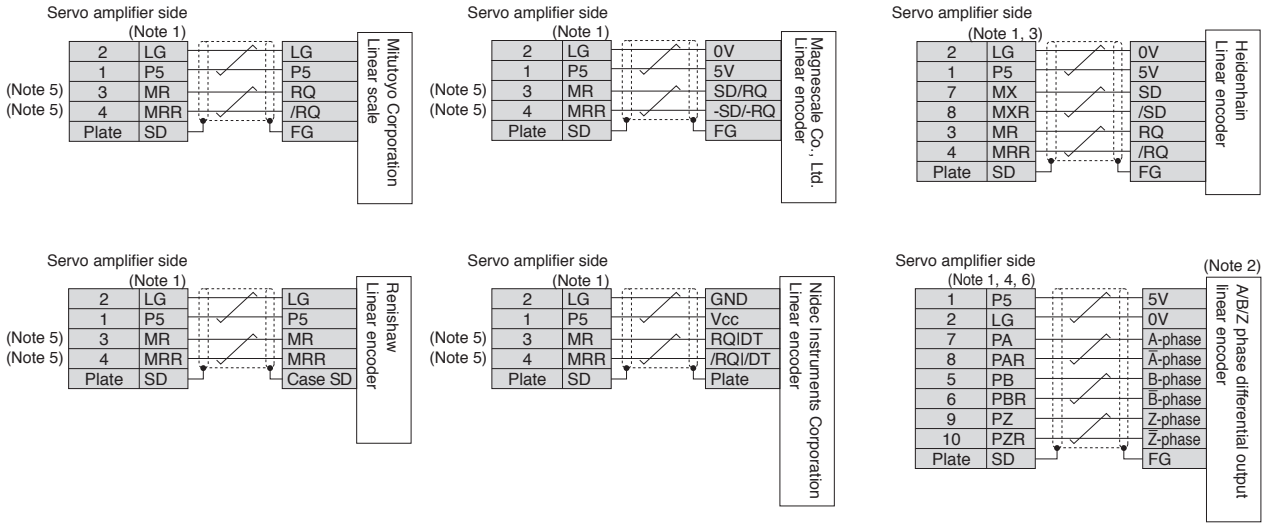
●Connecting an A/B/Z-phase differential output linear encoder



Notes: 1. Connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier for grounding the servo motor.
2. For linear encoders, refer to "List of Linear Encoders" in this catalog.
3. Necessary cables vary depending on the linear encoder. Refer to "MR-JET Partner's Encoder User's Manual" for details.
4. Create a relay circuit to turn off the main circuit power supply when the thermal protector is opened by overheating. Use a relay designed for a flowing current of 1000 mA or less. If a mechanical relay is used, use a relay designed for a flowing current of 50 mA to 1000 mA.

Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Linear Encoder Connection Example



Notes: 1. For the number of the wire pairs for LG and P5, refer to "MR-JET Partner's Encoder User's Manual".
2. If the encoder's current consumption exceeds 350 mA, supply power from an external source.
3. When the fully closed loop control system is configured with a rotary servo motor, the load-side encoder and the servo motor encoder are compatible with two-wire type communication method. Four-wire type cannot be used.
4. This is for MR-JET-G(-N1). For MR-JET-G4-HS(N1), refer to "MR-JET User's Manual" and "MR-JET Partner's Encoder User's Manual".
5. For the fully closed loop control, MR and MRR of the servo amplifier-side connectors will be connected to MX and MXR of the SCALE connectors of MR-J4FCCBL03M.
6. For the connection of the A/B/Z-phase differential output method using the fully closed loop control system or the scale measurement function, refer to "MR-JET User's Manual" and "MR-JET Partner's Encoder User's Manual".

Be sure to read through User's Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

External Encoder Connection Specifications

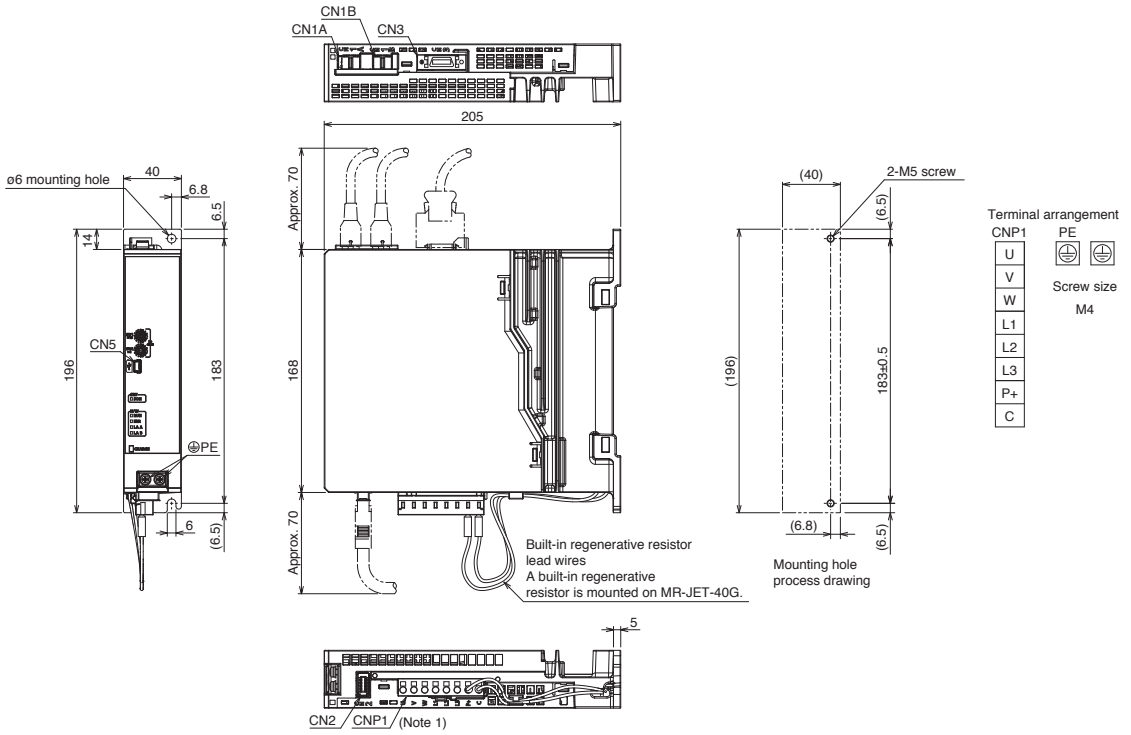
Refer to the following table for the encoder communication method compatible with each system and for the servo amplifier connector to which a load-side encoder should be connected.

System configuration	External encoder communication method	Connector to be connected	
		MR-JET-G(-N1)	MR-JET-G4-HS(N1)
Linear servo system (Note 3)	Two-wire type	CN2	
	Four-wire type		
	A/B/Z-phase differential output method		
Fully closed loop control system (Note 4)	Two-wire type	CN2 (Note 1)	CN2L
	Four-wire type		
	A/B/Z-phase differential output method (Note 2)	CN2	CN2L
Scale measurement function	Two-wire type		
	Four-wire type		
	A/B/Z-phase differential output method (Note 2)	CN2	CN2L

Notes: 1. MR-J4FCCBL03M junction cable is required.
2. For the connection of the A/B/Z-phase differential output method using the fully closed loop control system or the scale measurement function, refer to "MR-JET User's Manual" and "MR-JET Partner's Encoder User's Manual".
3. For the servo amplifier firmware version supporting each function, refer to "MR-JET User's Manual".
4. Use the servo amplifiers with firmware version C4 or later and manufactured in July 2022 or later.

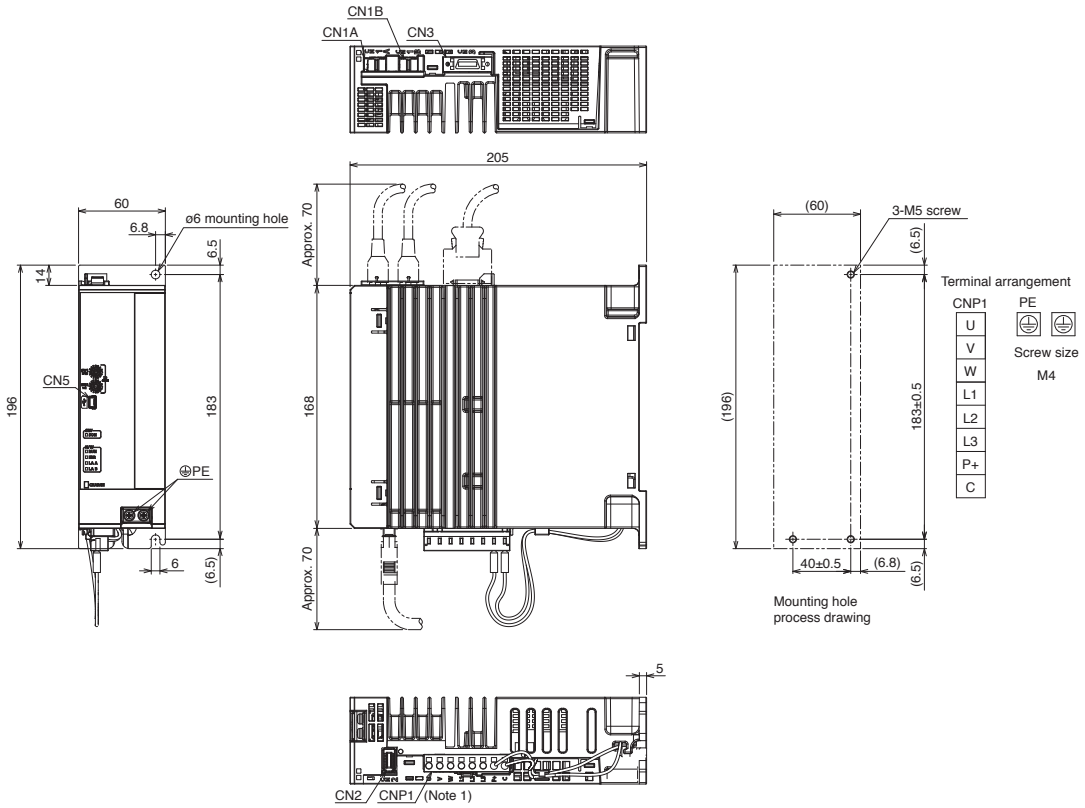
MR-JET-G_ Dimensions

●MR-JET-10G(-N1)
●MR-JET-20G(-N1)
●MR-JET-40G(-N1)



[Unit: mm]

●MR-JET-70G(-N1)
●MR-JET-100G(-N1)



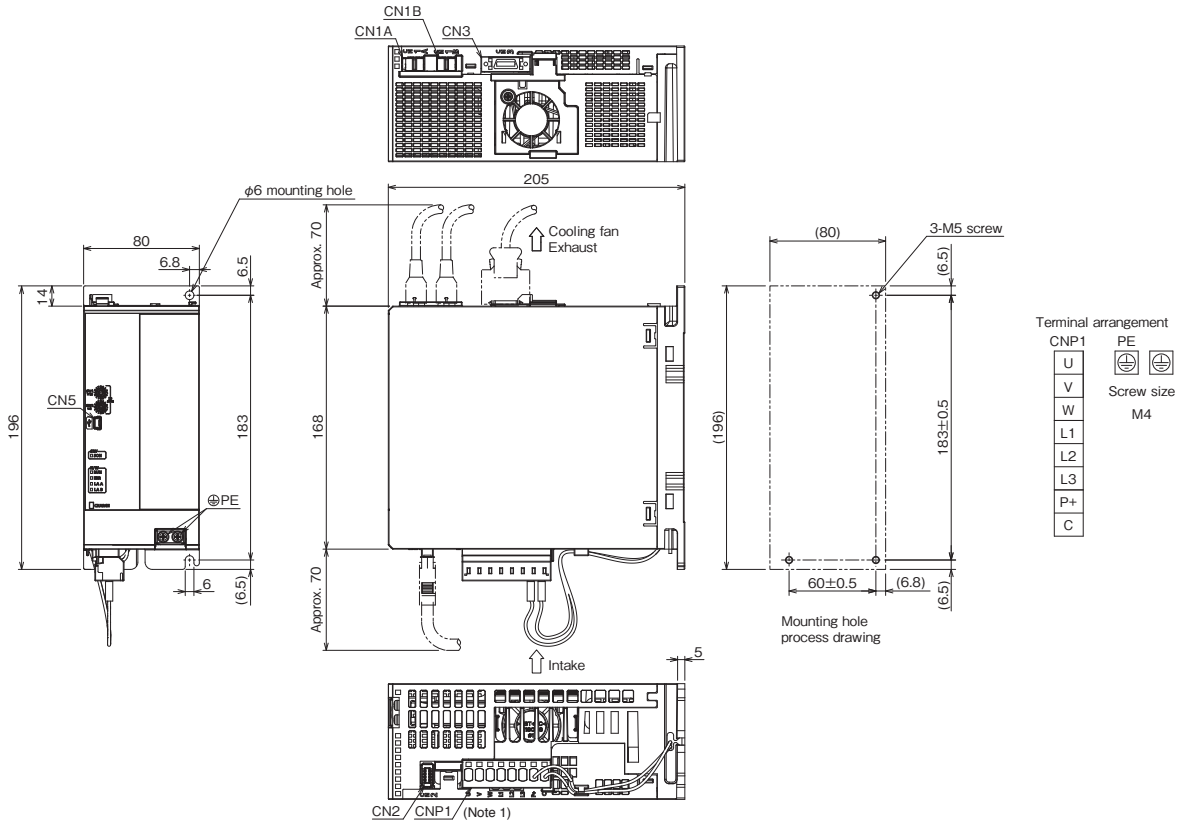
[Unit: mm]

Notes: 1. CNP1 connector is supplied with the servo amplifier.

MR-JET-G_ Dimensions

●MR-JET-200G(-N1)

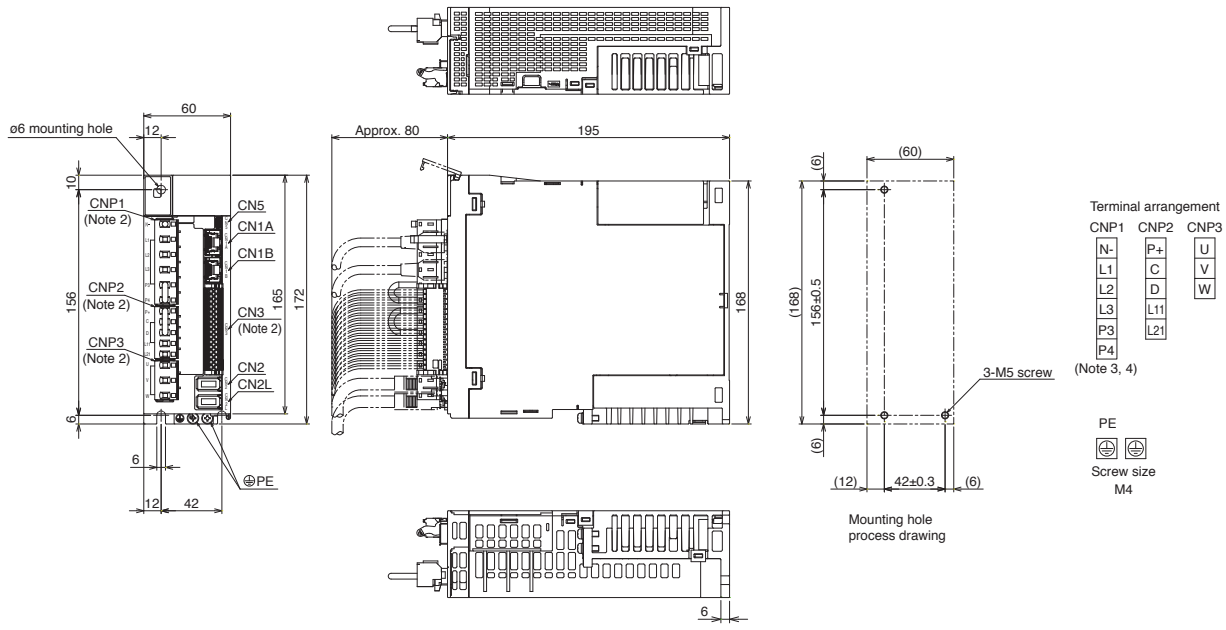
●MR-JET-300G(-N1)



[Unit: mm]

●MR-JET-60G4-HS(N1)

●MR-JET-100G4-HS(N1)

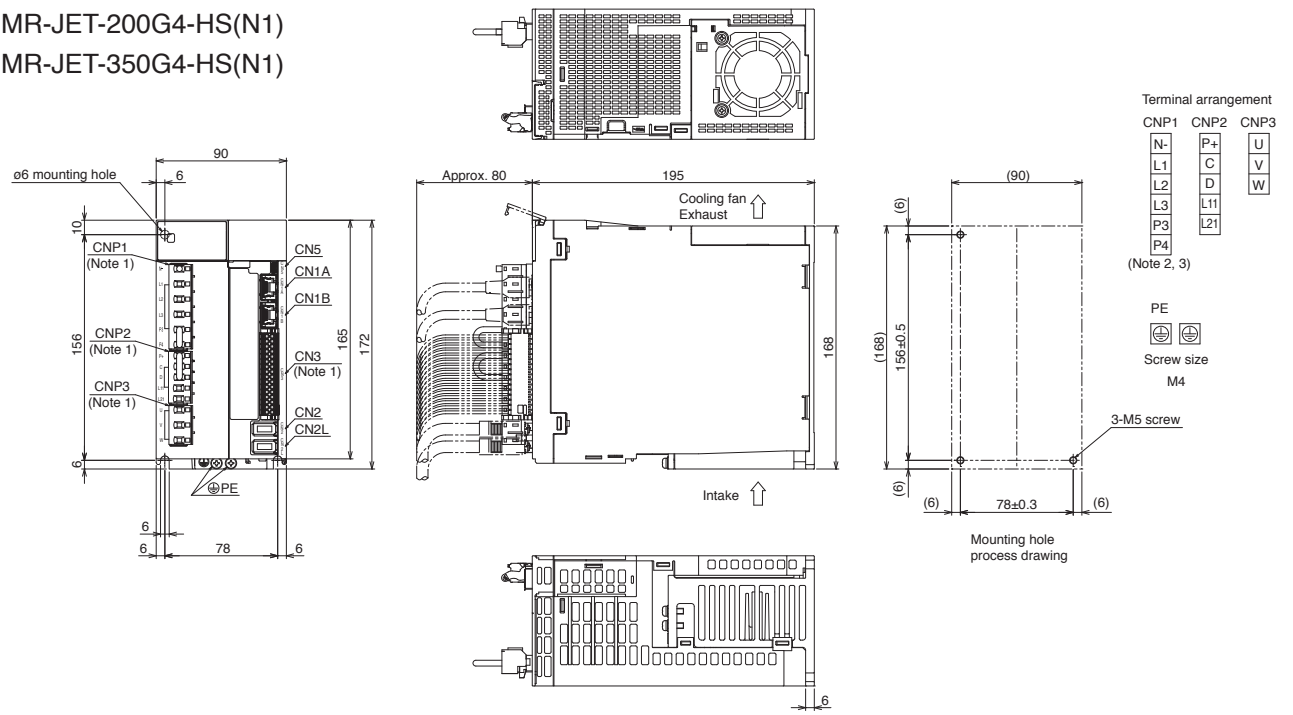


[Unit: mm]

Notes: 1. CNP1 connector is supplied with the servo amplifier.
2. CNP1, CNP2, CNP3, and CN3 connectors are supplied with the servo amplifier.
3. Do not disconnect a short-circuit bar between P3 and P4.
4. Do not use N-.

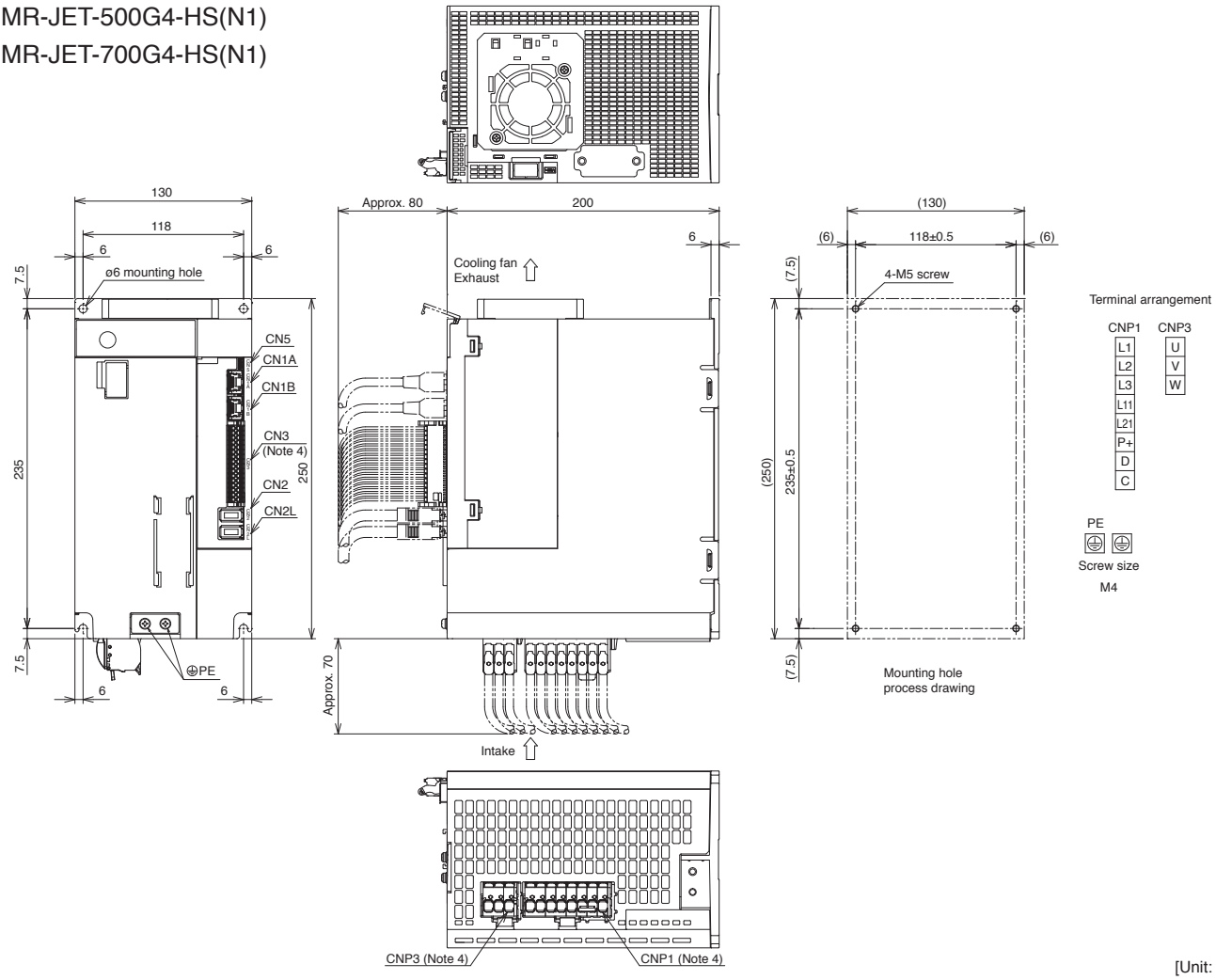
MR-JET-G_ Dimensions

●MR-JET-200G4-HS(N1)
●MR-JET-350G4-HS(N1)



[Unit: mm]

●MR-JET-500G4-HS(N1)
●MR-JET-700G4-HS(N1)



[Unit: mm]

Notes: 1. CNP1, CNP2, CNP3, and CN3 connectors are supplied with the servo amplifier.
2. Do not disconnect a short-circuit bar between P3 and P4.
3. Do not use N-.
4. CNP1, CNP3, and CN3 connectors are supplied with the servo amplifier.

Positioning Function: Point Table Method

Set the position and speed data to the point table, and select the point table No. with the command interface signal to start the positioning operation.

Item		Description
Command interface		Object dictionary
Operation specifications		Positioning by specifying the point table No. (255 points)
System		Signed absolute value command method
Position command input	Absolute value command method	Setting in the point table Setting range of feed length for one point: -2147483648 to 2147483647 [μm], -214748.3648 to 214748.3647 [inch], -2147483648 to 2147483647 [pulse], -360.000 to 360.000 [degree]
Speed command input		Set the servo motor speed in the point table. Set the acceleration/deceleration time constants and acceleration/deceleration in the point table. Set the S-pattern acceleration/deceleration time constant in [Pr. PT51]. The speed unit can be selected ([r/min], command unit/s) The acceleration/deceleration unit can be selected ([ms], command unit/s^2).
Torque limit		Set by the servo parameter or object dictionary.
Point table mode (pt)	One positioning operation	Point table No. input method Perform one positioning operation based on the position command and speed command.
	Continuous positioning operation	Speed change operation (2nd gear to 255th gear)/ Continuous positioning operation (2 points to 255 points)/ Continuous operation to the point table selected at startup/ Continuous operation to the point table No. 1
JOG operation mode (jg)	JOG operation	Perform inching operation in the network communication function based on the speed command.
Homing mode (hm) (Note 1)		Dog type (rear end detection, Z-phase reference), stopper type (stopper position reference), count type (front end detection, Z-phase reference), dog type (rear end detection, rear end reference), count type (front end detection, front end reference), dog cradle type, dog type last Z-phase reference, dog type front end reference, dogless Z-phase reference, Homing on negative limit switch and index pulse (method 1), Homing on positive limit switch and index pulse (method 2), Homing on positive home switch and index pulse (method 3, 4), Homing on negative home switch and index pulse (method 5, 6), Homing on home switch and index pulse (method 7, 8, 9, 10, 11, 12, 13, 14), Homing without index pulse (method 17, 18, 19, 20, 21, 22, 23, 24, 27, 28), Homing on index pulse (method 33, 34), Homing on current position (method 35, 37)
Function on positioning operation		Absolute position detection/external limit switch/software position limit/ function for positioning to the home, etc.

Notes: 1. For the servo amplifier firmware version supporting the methods of No. 9, 10, 13, 14, 17, 18, refer to "MR-JET User's Manual".

Positioning Function: Point Table Method

Absolute value command method: travels to a specified address (absolute value) with reference to the home position

Item	Setting range	Description
Point table No.	1 to 255	Specify a point table in which a target position, servo motor speed, acceleration/deceleration, acceleration time constant/deceleration time constant, dwell, auxiliary function, and M code will be set.
Target position (Note 1) (position data)	-2147483.648 to 2147483.647 [mm] -214748.3648 to 214748.3647 [inch] -360.000 to 360.000 [degree] -2147483648 to 2147483647 [pulse]	Set a travel distance. (1) When using as absolute position command method Set a target address (absolute value). (2) When using as relative position command method Set a travel distance. Reverse rotation command is applied with a minus sign.
Servo motor speed (Note 2)	0 to maximum speed [r/min] 0 to 2147483.647 [mm/s] 0 to 214748.3647 [inch/s] 0 to 2147483.647 [degree/s] 0 to 2147483647 [pulse/s]	Set a command speed for the servo motor in positioning.
Acceleration	0 to 2147483.647 [mm/s^2] 0 to 214748.3647 [inch/s^2] 0 to 2147483.647 [degree/s^2] 0 to 2147483647 [pulse/s^2]	Set an acceleration for the servo motor to reach the set speed. (Acceleration time [s] = Servo motor speed/Acceleration)
Acceleration time constant	0 to 20000 [ms]	Set a time period for the servo motor to reach the rated speed.
Deceleration	0 to 2147483.647 [mm/s^2] 0 to 214748.3647 [inch/s^2] 0 to 2147483.647 [degree/s^2] 0 to 2147483647 [pulse/s^2]	Set a deceleration for the servo motor to decelerate from the set speed to a stop. (Deceleration time [s] = Servo motor speed/Deceleration)
Deceleration time constant	0 to 20000 [ms]	Set a time period for the servo motor to decelerate from the set speed to a stop.
Dwell	0 to 20000 [ms]	Set a dwell. When the dwell is set, the position command for the next point table will be started after the position command for the selected point table is completed and the set dwell is passed. The dwell is disabled when the auxiliary function is set to 0 or 2. Continuous operation is enabled when the auxiliary function is set to 1, 3, 8, 9, 10, or 11 and the dwell is set to 0.
Auxiliary function	0 to 3, 8 to 11	Set auxiliary function. (1) When using the point table with the absolute position command method 0: Automatic operation for a selected point table is performed. 1: Automatic operation is performed to the next point table. 8: Automatic operation for a point table selected at startup is performed. 9: Automatic operation of the point table No. 1 is performed. (2) When using the point table with the relative position command method 2: Automatic operation for a selected point table is performed. 3: Automatic operation is performed to the next point table. 10: Automatic operation for a point table selected at startup is performed. 11: Automatic operation of the point table No. 1 is performed.
M code	0 to 255	Set a code to be outputted when the positioning is complete.

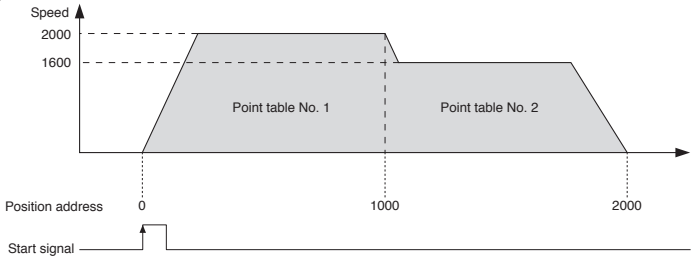
Notes: 1. Change the unit to mm/inch/degree/pulse with [Pr. PT01].
2. The speed unit is r/min for the rotary servo motors and mm/s for the linear servo motors.

Example of setting point table data

Point table example

Point table No.	Target position (position data)	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code
1	1000	2000	200	200	0	1	1
2	2000	1600	100	100	0	0	2
:	:	:	:	:	:	:	:
255	3000	3000	100	100	0	2	99

Operation



Restrictions

The restrictions on the communication cycle for the functions in the list are as follows.

Communication cycle

Category	Function	Communication cycle (minimum)
Control mode	Profile position mode (pp)	250 µs
	Profile velocity mode (pv)	250 µs
	Profile torque mode (tq)	250 µs
	Positioning mode (point table method)	250 µs

MEMO

4 Rotary Servo Motors

HK HK series **HG** HG series

* Refer to p. 6-54 in this catalog for conversion of units.
* The characteristics and numerical values without tolerances mentioned in this catalog are representative values.

HK Series Model Designation (200 V) (Note 1)

HK

●HK-KN series (low inertia, small capacity)

H K - K N 1 3 B

Symbol	Shaft shape
None	Standard (straight shaft)
D	D-cut shaft
L	L-cut shaft
K	Keyed shaft (with a key)
N	Keyed shaft (without a key)

Symbol	Oil seal (Note 2)
None	None
J	Installed

Symbol	Electromagnetic brake
None	None
B	Installed

Symbol	Rated speed [r/min]
2	2000
3	3000

Symbol	Rated output [kW]	Symbol	Rated output [kW]
05	0.05	6	0.6
1	0.1	7M	0.75
1M	0.15	10	1.0
2	0.2	15	1.5
4	0.4	20	2.0

●HK-FN series (high inertia, small/medium capacity)

H K - F N 1 3 B

Symbol	Shaft shape
None	Standard (straight shaft)
D	D-cut shaft
L	L-cut shaft
K	Keyed shaft (with a key)
N	Keyed shaft (without a key)

Symbol	Oil seal (Note 2)
None	None
J	Installed

Symbol	Electromagnetic brake
None	None
B	Installed

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

Symbol	Rated output [kW]	Symbol	Rated output [kW]
1	0.1	10	1.0
2	0.2	15	1.5
4	0.4	20	2.0
7M	0.75	30	3.0

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.
2. The dimensions of this series are the same regardless of whether or not an oil seal is installed.

HK Series Model Designation (400 V) (Note 1)

●HK-KN series (low inertia, small capacity)

H K - K N 1 3 4 B

Symbol	Shaft shape
None	Standard (straight shaft)
D	D-cut shaft
L	L-cut shaft
K	Keyed shaft (with a key)
N	Keyed shaft (without a key)

Symbol	Oil seal (Note 2)
None	None
J	Installed

Symbol	Electromagnetic brake
None	None
B	Installed

400 V

Symbol	Rated speed [r/min]
3	3000

Symbol	Rated output [kW]	Symbol	Rated output [kW]
1	0.1	7M	0.75
2	0.2	10	1.0
4	0.4	15	1.5
6	0.6	20	2.0

●HK-SN series (medium inertia, medium capacity)

H K - S N 35 3 4 B

Symbol	Shaft shape
None	Standard (straight shaft)
K	Keyed shaft (with a key)
N	Keyed shaft (without a key)

Symbol	Oil seal (Note 2)
None	None
J	Installed

Symbol	Electromagnetic brake
None	None
B	Installed

400 V

Symbol	Rated speed [r/min]
3	3000

Symbol	Rated output [kW]
35	3.5
50	5.0
70	7.0

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.
2. The dimensions of this series are the same regardless of whether or not an oil seal is installed.

HG Series Model Designation (200 V) (Note 1)

●HG-KNS series (low inertia, small capacity)

H G - K N S 1 3 B J

Symbol	Shaft shape
None	Standard (straight shaft)
D	D-cut shaft
K	Keyed shaft (with a key)

Symbol	Oil seal (Note 3)
J	Installed (Note 2)
None	None

Symbol	Electromagnetic brake
None	None
B	Installed

Symbol	Rated speed [r/min]
3	3000

Symbol	Rated output [kW]
1	0.1
2	0.2
4	0.4
7	0.75

●HG-SNS series (medium inertia, medium capacity)

H G - S N S 5 2 B J

Symbol	Shaft shape
None	Standard (straight shaft)
K	Keyed shaft (without a key)

Symbol	Oil seal (Note 4)
J	Installed (Note 2)
None	None

Symbol	Electromagnetic brake
None	None
B	Installed

Symbol	Rated speed [r/min]
2	2000

Symbol	Rated output [kW]
5	0.5
10	1.0
15	1.5
20	2.0
30	3.0

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.
2. An oil seal is installed as a standard for all servo motors.
3. The dimensions of this series vary depending on whether or not an oil seal is installed. Refer to the dimensions for details.
4. The dimensions of this series are the same regardless of whether or not an oil seal is installed.

HK-KN Series (Low Inertia, Small Capacity) (200 V) Specifications

HK

Flange size		[mm]	40 × 40			60 × 60		
Rotary servo motor model		HK-KN	053	13	1M3	23	43	63
Continuous running duty (Note 3)	Rated output	[kW]	0.05	0.1	0.15	0.2	0.4	0.6
	Rated torque (Note 4)	[N•m]	0.16 (Note 5)	0.32	0.48	0.64	1.3	1.9
Maximum torque		[N•m]	0.56	1.1	1.7	2.2	4.5	6.7
Rated speed (Note 3)		[r/min]	3000					
Maximum speed (Note 3)		[r/min]	6700					
Power rate at continuous rated torque	Without electromagnetic brake	[kW/s]	6.4	14.8	23.3	19.4	39.5	61.0
	With electromagnetic brake		5.8	14.0	22.4	16.0	36.7	58.0
Rated current		[A]	1.3	1.2		1.4	2.6	4.5
Maximum current		[A]	4.6	4.6	4.5	5.4	9.8	19
Moment of inertia J [$\times 10^{-4}$ kg•m^2]	Without electromagnetic brake		0.0394	0.0686	0.0977	0.209	0.410	0.598
	With electromagnetic brake		0.0434	0.0725	0.102	0.254	0.442	0.629
Recommended load to motor inertia ratio (Note 1)			20 times or less (Note 7)			15 times or less (Note 7, 8)	23 times or less	25 times or less
Speed/position detector			Batteryless absolute/incremental 24-bit encoder (resolution: 16,777,216 pulses/rev)					
Type			Permanent magnet synchronous motor					
Oil seal			None (Servo motors with an oil seal are available.) (Note 5)					
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)					
Thermistor			None					
Insulation class			155 (F)					
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2, 6)					
Vibration resistance *1		[m/s^2]	X: 49, Y: 49					
Vibration rank			V10 *3					
Permissible load for the shaft *2	L	[mm]	25			30		
	Radial	[N]	88			245		
	Thrust	[N]	59			98		
Mass (With/without oil seal)	Without electromagnetic brake	[kg]	0.27	0.37	0.47	0.77	1.2	1.5
	With electromagnetic brake		0.53	0.63	0.73	1.2	1.6	1.9

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
4. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
5. For HK-KN053W_J_ (with an oil seal), use the servo motor at a derating rate of 80 %.
6. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
7. This recommended load to motor inertia ratio is applicable for operating the servo motor at the rated speed. If operating speed exceeds the rated speed, check whether a regenerative option is required using Drive System Sizing Software Motorizer.
8. The recommended load to motor inertia ratio is 17 times or less when the motor speed is 2900 r/min or less.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

Model		HK-KN	053B	13B	1M3B	23B	43B	63B
Type (Note 3)			Spring actuated type safety brake					
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)					
Power consumption		[W] at 20 °C	6.4			7.9		
Electromagnetic brake static friction torque (Note 5)		[N•m]	0.48 or higher			1.9 or higher		
Permissible braking work	Per braking	[J]	5.6			22		
	Per hour	[J]	56			220		
Electromagnetic brake life (Note 2)	Number of braking times		20000					
	Work per braking	[J]	5.6			22		

Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

HK-KN Series (Low Inertia, Small Capacity) (200 V) Specifications

HK

Flange size		[mm]	80 × 80		90 × 90		
Rotary servo motor model		HK-KN	7M3	103	153	203	202
Continuous running duty (Note 3)	Rated output	[kW]	0.75	1.0	1.5	2.0	2.0
	Rated torque (Note 4)	[N•m]	2.4	3.2	4.8	6.4	9.5
Maximum torque		[N•m]	8.4	11.1	16.7	19.1	28.6
Rated speed (Note 3)		[r/min]	3000				2000
Maximum speed (Note 3)		[r/min]	6700	6500	6700	6000	3000
Power rate at continuous rated torque	Without electromagnetic brake	[kW/s]	41.6	60.3	52.0	71.7	111
	With electromagnetic brake		37.7	56.0	48.3	67.7	107
Rated current		[A]	4.7	5.0	8.7	11	9.0
Maximum current		[A]	20	21	34		30
Moment of inertia J	Without electromagnetic brake	[× 10^{-4} kg•m^2]	1.37	1.68	4.38	5.65	8.18
	With electromagnetic brake		1.51	1.81	4.72	5.99	8.53
Recommended load to motor inertia ratio (Note 1)			16 times or less	17 times or less	15 times or less		
Speed/position detector			Batteryless absolute/incremental 24-bit encoder (resolution: 16,777,216 pulses/rev)				
Type			Permanent magnet synchronous motor				
Oil seal			None (Servo motors with an oil seal are available.)				
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)				
Thermistor			None				
Insulation class			155 (F)				
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2, 5)				
Vibration resistance *1		[m/s^2]	X: 49, Y: 49		X: 24.5, Y: 24.5		
Vibration rank			V10 *3				
Permissible load for the shaft *2	L	[mm]	40				
	Radial	[N]	392				
	Thrust	[N]	147				
Mass (With/without oil seal)	Without electromagnetic brake	[kg]	2.2	2.4	3.6	4.4	5.9
	With electromagnetic brake		2.9	3.1	4.7	5.5	7.0

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
4. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
5. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

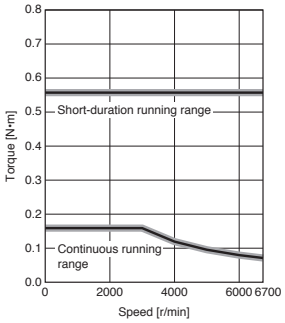
Model		HK-KN	7M3B	103B	153B	203B	202B
Type (Note 3)			Spring actuated type safety brake				
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)				
Power consumption		[W] at 20 °C	10		13.8		
Electromagnetic brake static friction torque (Note 5)		[N•m]	3.2 or higher		9.5 or higher		
Permissible braking work	Per braking	[J]	64		64		
	Per hour	[J]	640		640		
Electromagnetic brake life (Note 2)	Number of braking times		20000		5000		
	Work per braking	[J]	64		64		

Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

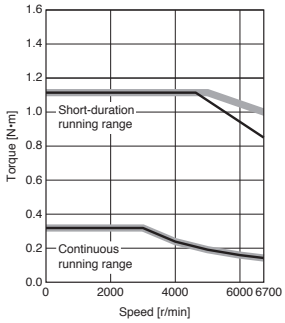
HK-KN Series (200 V) Torque Characteristics (Note 1)

: For 3-phase 200 V AC
: For 1-phase 200 V AC

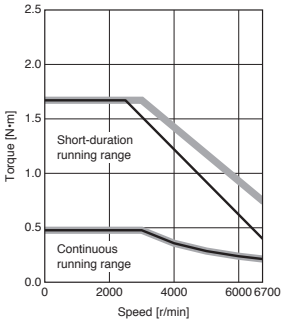
HK-KN053 (Note 2)



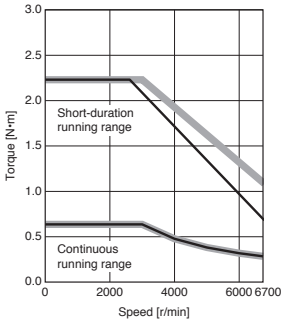
HK-KN13



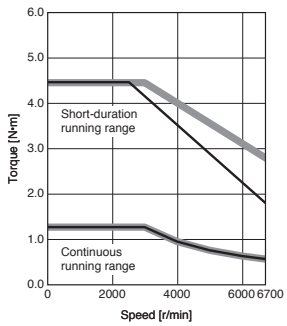
HK-KN1M3



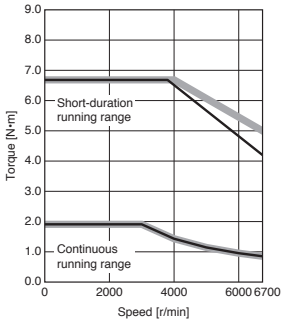
HK-KN23



HK-KN43



HK-KN63



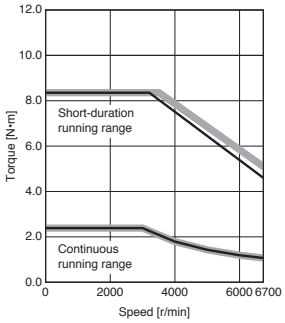
Notes: 1. Torque drops when the power supply voltage is below the specified value.
2. For HK-KN053W_J_ (with an oil seal), use the servo motor at a derating rate of 80 %.

HK-KN Series (200 V) Torque Characteristics (Note 1)

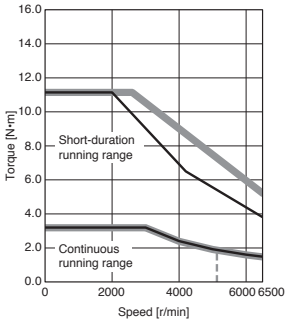
HK

: For 3-phase 200 V AC
: For 1-phase 200 V AC

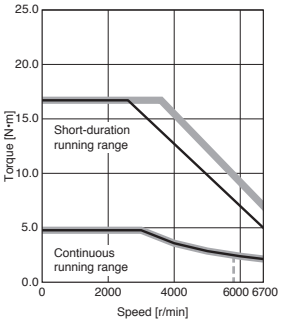
HK-KN7M3



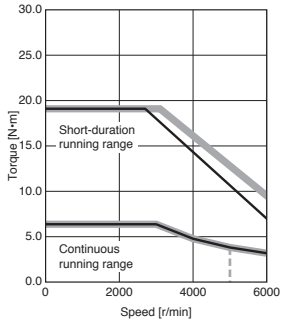
HK-KN103 (Note 2)



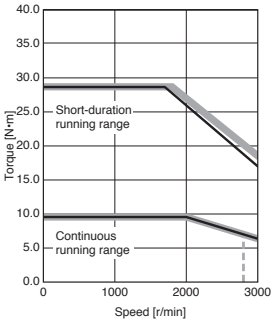
HK-KN153 (Note 2)



HK-KN203 (Note 2)



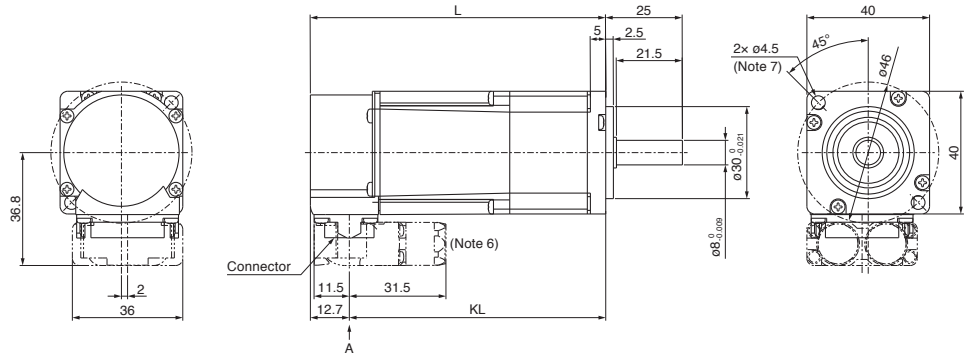
HK-KN202 (Note 2)

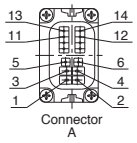


Notes: 1. Torque drops when the power supply voltage is below the specified value. - - - - : A rough indication of the possible continuous running range for 3-phase 170 V AC
2. When using a combination of the servo motors of over 750 W and MR-JET-100G_ or MR-JET-200G_ with a 1-phase power supply, use the servo amplifiers at 75 % or less of the effective load ratio.

HK-KN Series (200 V/400 V) Dimensions (Note 3, 4, 5)

HK-KN053(B), HK-KN13(B), HK-KN1M3(B),
HK-KN134(B)





Electromagnetic brake (Note 2)

Pin. No.	Signal name
5	B1
6	B2

Power supply

Pin. No.	Signal name
1	E
2	U
3	W
4	V

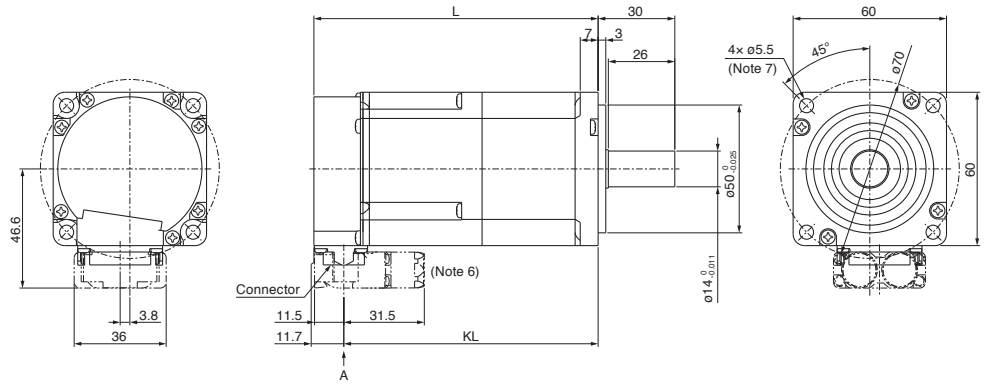
Encoder

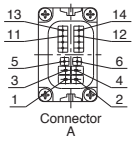
Pin. No.	Signal name
11	P5
12	MR
13	LG
14	MRR

Model	Variable dimensions (Note 1)	
	L	KL
HK-KN053(B)	55.5 (90.5)	42.8 (77.8)
HK-KN13(B) HK-KN134(B)	68 (103)	55.3 (90.3)
HK-KN1M3(B)	80.5 (115.5)	67.8 (102.8)

[Unit: mm]

HK-KN23(B), HK-KN43(B), HK-KN63(B),
HK-KN234(B), HK-KN434(B), HK-KN634(B)





Electromagnetic brake (Note 2)

Pin. No.	Signal name
5	B1
6	B2

Power supply

Pin. No.	Signal name
1	E
2	U
3	W
4	V

Encoder

Pin. No.	Signal name
11	P5
12	MR
13	LG
14	MRR

Model	Variable dimensions (Note 1)	
	L	KL
HK-KN23(B) HK-KN234(B)	67.5 (102.1)	55.8 (90.4)
HK-KN43(B) HK-KN434(B)	85.5 (120.1)	73.8 (108.4)
HK-KN63(B) HK-KN634(B)	103.5 (138.1)	91.8 (126.4)

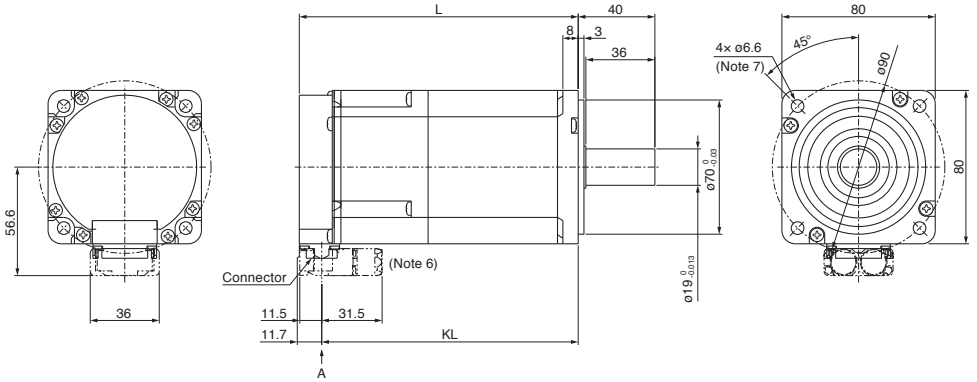
[Unit: mm]

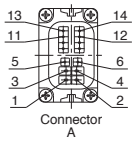
Notes: 1. The dimensions in brackets are for the models with an electromagnetic brake.
2. The electromagnetic brake terminals do not have polarity.
3. The dimensions are the same regardless of whether or not an oil seal is installed.
4. Use a friction coupling to fasten a load.
5. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.
6. The dimensions are applicable when a dual type motor cable is led to the load side. Refer to "HK-KN Series Connector Dimensions" for the dimensions when leading the cable to the opposite to the load side or leading vertically and when using a single type motor cable.
7. Use hexagon socket head cap screws when mounting the servo motor.

HK-KN Series (200 V/400 V) Dimensions (Note 3, 4, 5)

HK

HK-KN7M3(B), HK-KN103(B),
HK-KN7M34(B), HK-KN1034(B)





Electromagnetic brake (Note 2)

Pin. No.	Signal name
5	B1
6	B2

Power supply

Pin. No.	Signal name
1	E
2	U
3	W
4	V

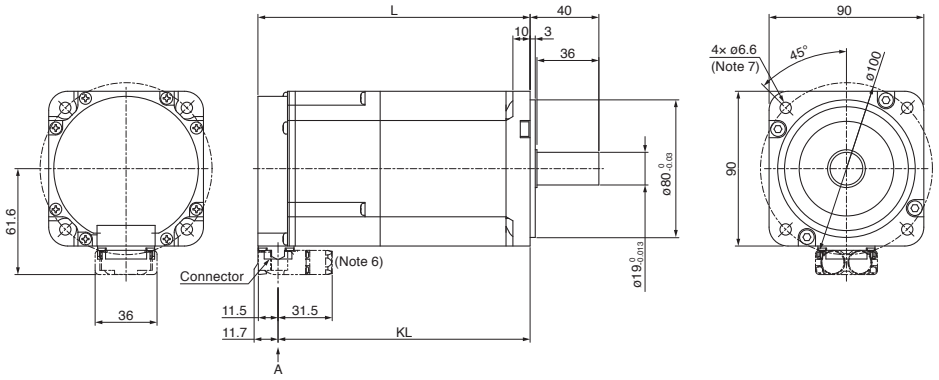
Encoder

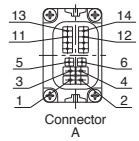
Pin. No.	Signal name
11	P5
12	MR
13	LG
14	MRR

Model	Variable dimensions (Note 1)	
	L	KL
HK-KN7M3(B) HK-KN7M34(B)	92.5 (128)	80.8 (116.3)
HK-KN103(B) HK-KN1034(B)	101.5 (137)	89.8 (125.3)

[Unit: mm]

HK-KN153(B), HK-KN203(B), HK-KN202(B),
HK-KN1534(B), HK-KN2034(B)





Electromagnetic brake (Note 2)

Pin. No.	Signal name
5	B1
6	B2

Power supply

Pin. No.	Signal name
1	E
2	U
3	W
4	V

Encoder

Pin. No.	Signal name
11	P5
12	MR
13	LG
14	MRR

Model	Variable dimensions (Note 1)	
	L	KL
HK-KN153(B) HK-KN1534(B)	118.9 (158.3)	107.2 (146.6)
HK-KN203(B) HK-KN2034(B)	136.9 (176.3)	125.2 (164.6)
HK-KN202(B)	172.9 (212.3)	161.2 (200.6)

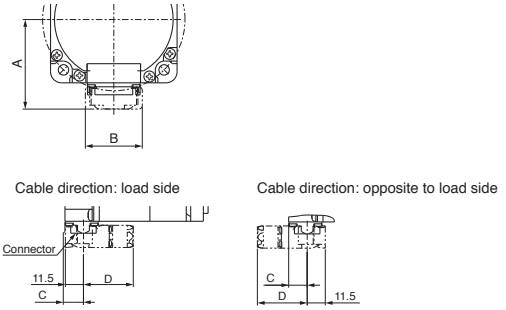
[Unit: mm]

Notes: 1. The dimensions in brackets are for the models with an electromagnetic brake.
2. The electromagnetic brake terminals do not have polarity.
3. The dimensions are the same regardless of whether or not an oil seal is installed.
4. Use a friction coupling to fasten a load.
5. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.
6. The dimensions are applicable when a dual type motor cable is led to the load side. Refer to "HK-KN Series Connector Dimensions" for the dimensions when leading the cable to the opposite to the load side or leading vertically and when using a single type motor cable.
7. Use hexagon socket head cap screws when mounting the servo motor.

HK-KN Series (200 V/400 V) Connector Dimensions

Cable direction: load side/opposite to load side

Model	Variable dimensions							
	Dual cable type				Single cable type			
	A	B	C	D	A	B	C	D
HK-KN053 HK-KN13 HK-KN1M3 HK-KN134	36.8	36	12.7	31.5	39.6	32	12.7	40
HK-KN23 HK-KN43 HK-KN63 HK-KN234 HK-KN434 HK-KN634	46.6		11.7		49.4		11.7	
HK-KN7M3 HK-KN103 HK-KN7M34 HK-KN1034	56.6				59.4			
HK-KN153 HK-KN203 HK-KN202 HK-KN1534 HK-KN2034	61.6				64.4			

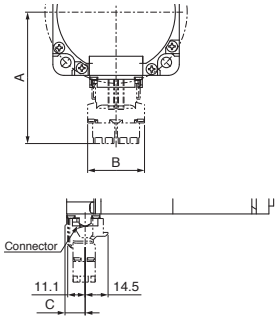


* The drawing shows a dual cable type as an example.

[Unit: mm]

Cable direction: vertical

Model	Variable dimensions					
	Dual cable type			Single cable type		
	A	B	C	A	B	C
HK-KN053 HK-KN13 HK-KN1M3 HK-KN134	63.4	36	12.7	71.9	32	12.7
HK-KN23 HK-KN43 HK-KN63 HK-KN234 HK-KN434 HK-KN634	73.2		11.7	81.7		11.7
HK-KN7M3 HK-KN103 HK-KN7M34 HK-KN1034	83.2			91.7		
HK-KN153 HK-KN203 HK-KN202 HK-KN1534 HK-KN2034	88.2			96.7		



* The drawing shows a dual cable type as an example.

[Unit: mm]

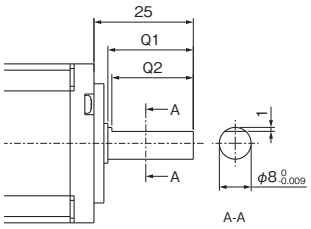
HK-KN Series (200 V/400 V) with Special Shaft Dimensions

HK

Servo motors with the following specifications are also available.

D: D-cut shaft (Note 1)

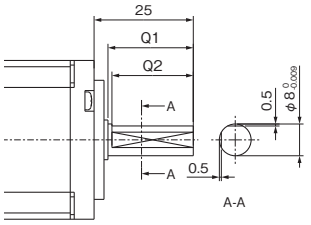
Model	Variable dimensions	
	Q1	Q2
HK-KN053D HK-KN13D HK-KN1M3D HK-KN134D	21.5	20.5



[Unit: mm]

L: L-cut shaft (Note 1)

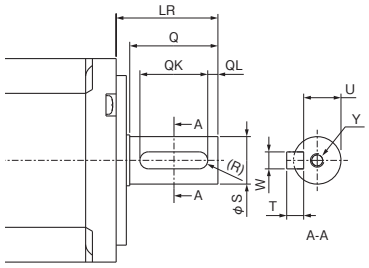
Model	Variable dimensions	
	Q1	Q2
HK-KN053L HK-KN13L HK-KN1M3L HK-KN134L	21.5	20.5



[Unit: mm]

K: Keyed shaft (with a double round-ended key) (Note 1, 2)

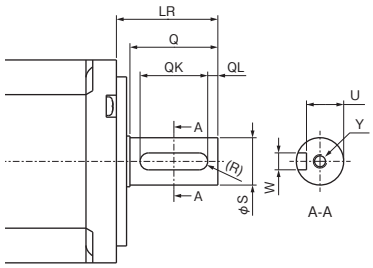
Model	Variable dimensions									
	S	LR	Q	W	QK	QL	U	R	T	Y
HK-KN053K HK-KN13K HK-KN1M3K HK-KN134K	8 0 -0.009	25	21.5	3	14	5	6.2 0 -0.085	1.5	3	M3×8
HK-KN23K HK-KN43K HK-KN63K HK-KN234K HK-KN434K HK-KN634K	14 0 -0.011	30	26	5	20	3	11 0 -0.085	2.5	5	M4×15
HK-KN7M3K HK-KN103K HK-KN153K HK-KN203K HK-KN202K HK-KN7M34K HK-KN1034K HK-KN1534K HK-KN2034K	19 0 -0.013	40	36	6	25	5	15.5 0 -0.1	3	6	M5×20



[Unit: mm]

K: Keyed shaft (without a key) (Note 1, 3)

Model	Variable dimensions								
	S	LR	Q	W	QK	QL	U	R	Y
HK-KN053N HK-KN13N HK-KN1M3N HK-KN134N	8 0 -0.009	25	21.5	3 -0.004 -0.029	14	5	6.2 0 -0.085	1.5	M3×8
HK-KN23N HK-KN43N HK-KN63N HK-KN234N HK-KN434N HK-KN634N	14 0 -0.011	30	26	5 0 -0.03	20	3	11 0 -0.085	2.5	M4×15
HK-KN7M3N HK-KN103N HK-KN153N HK-KN203N HK-KN202N HK-KN7M34N HK-KN1034N HK-KN1534N HK-KN2034N	19 0 -0.013	40	36	6 0 -0.03	25	5	15.5 0 -0.1	3	M5×20



[Unit: mm]

Notes: 1. Do not use the servo motors with a D-cut shaft, an L-cut shaft, or a keyed shaft for frequent start/stop applications as this may cause the damage to the shaft.
2. The key is included as an accessory and not mounted to the shaft.
3. The servo motor is supplied without a key. The user needs to prepare a key.

HK-FN Series (High Inertia, Small Capacity) (200 V) Specifications

HK

Flange size		[mm]	40 × 40	60 × 60		80 × 80
Rotary servo motor model		HK-FN	13	23	43	7M3
Continuous running duty (Note 3)	Rated output	[kW]	0.1	0.2	0.4	0.75
	Rated torque (Note 4)	[N•m]	0.32	0.64	1.3	2.4
Maximum torque		[N•m]	1.1	2.2	4.1	8.4
Rated speed (Note 3)		[r/min]	3000			
Maximum speed (Note 3)		[r/min]	6700			6500 (Note 6)
Power rate at continuous rated torque	Without electromagnetic brake	[kW/s]	10.4	9.9	27.1	33.9
	With electromagnetic brake		9.9	9.2	25.8	31.5
Rated current		[A]	0.8	1.4	2.9	4.1
Maximum current		[A]	3.0	4.9	9.8	16
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		0.0977	0.410	0.598	1.68
	With electromagnetic brake		0.102	0.442	0.629	1.81
Recommended load to motor inertia ratio (Note 1)			23 times or less (Note 7)	8 times or less (Note 7, 8)	15 times or less	20 times or less
Speed/position detector			Batteryless absolute/incremental 24-bit encoder (resolution: 16,777,216 pulses/rev)			
Type			Permanent magnet synchronous motor			
Oil seal			None (Servo motors with an oil seal are available.)			
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)			
Thermistor			None			
Insulation class			155 (F)			
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2, 5)			
Vibration resistance *1		[m/s^2]	X: 49, Y: 49			
Vibration rank			V10 *3			
Permissible load for the shaft *2	L	[mm]	25	30		40
	Radial	[N]	88	245		392
	Thrust	[N]	59	98		147
Mass [kg] (With/without oil seal)	Without electromagnetic brake		0.47	1.2	1.5	2.4
	With electromagnetic brake		0.73	1.6	1.9	3.1

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
4. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
5. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
6. The available maximum speed during continuous operation is 6000 r/min.
7. This recommended load to motor inertia ratio is applicable for operating the servo motor at the rated speed. If operating speed exceeds the rated speed, check whether a regenerative option is required using Drive System Sizing Software Motorizer.
8. The recommended load to motor inertia ratio is 11 times or less when the motor speed is 2500 r/min or less.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

Model		HK-FN	13B	23B	43B	7M3B
Type (Note 3)			Spring actuated type safety brake			
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)			
Power consumption		[W] at 20 °C	6.4	7.9		10
Electromagnetic brake static friction torque (Note 5)		[N•m]	0.48 or higher	1.9 or higher		3.2 or higher
Permissible braking work	Per braking	[J]	5.6	22		64
	Per hour	[J]	56	220		640
Electromagnetic brake life (Note 2)	Number of braking times		20000			
	Work per braking	[J]	5.6	22		64

Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

HK-FN Series (High Inertia, Medium Capacity) (200 V) Specifications

HK

Flange size		[mm]	130 × 130		176 × 176	
Rotary servo motor model		HK-FN	102	152	202	301M
Continuous running duty (Note 3)	Rated output	[kW]	1.0	1.5	2.0	3.0
	Rated torque (Note 4)	[N•m]	4.8	7.2	9.5	19.1
Maximum torque		[N•m]	14.3	21.5	28.6	57.3
Rated speed (Note 3)		[r/min]	2000			1500
Maximum speed (Note 3)		[r/min]	4000 (Note 5)	2500 (Note 6)	3500 (Note 7)	2300 (Note 8)
Power rate at continuous rated torque	Without electromagnetic brake	[kW/s]	13.5	22.9	17.0	51.5
	With electromagnetic brake		12.0	20.9	15.6	48.1
Rated current		[A]	5.4	5.3	9.0	11
Maximum current		[A]	17		29	34
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		16.9	22.4	53.6	70.8
	With electromagnetic brake		19.1	24.5	58.6	75.8
Recommended load to motor inertia ratio (Note 1)			12 times or less	30 times or less	14 times or less	25 times or less
Speed/position detector			Batteryless absolute/incremental 24-bit encoder (resolution: 16,777,216 pulses/rev)			
Type			Permanent magnet synchronous motor			
Oil seal			None (Servo motors with an oil seal are available.)			
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)			
Thermistor			None			
Insulation class			155 (F)			
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)			
Vibration resistance *1		[m/s^2]	X: 24.5, Y: 49			X: 24.5, 29.4
Vibration rank			V10 *3			
Permissible load for the shaft *2	L	[mm]	55		79	
	Radial	[N]	980		2058	
	Thrust	[N]	490		980	
Mass (With/without oil seal)	Without electromagnetic brake	[kg]	9.1	11	16	20
	With electromagnetic brake		11	13	21	25

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
4. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
5. The available maximum speed during continuous operation is 3500 r/min.
6. The available maximum speed during continuous operation is 2400 r/min.
7. The available maximum speed during continuous operation is 3000 r/min.
8. The available maximum speed during continuous operation is 2000 r/min.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

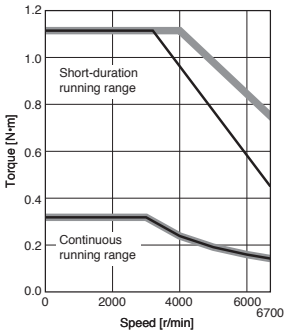
Model		HK-FN	102B	152B	202B	301MB
Type (Note 3)			Spring actuated type safety brake			
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)			
Power consumption		[W] at 20 °C	20		34	
Electromagnetic brake static friction torque (Note 5)		[N•m]	8.5 or higher		44 or higher	
Permissible braking work	Per braking	[J]	400		4500	
	Per hour	[J]	4000		45000	
Electromagnetic brake life (Note 2)	Number of braking times		20000			
	Work per braking	[J]	200		1000	

Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

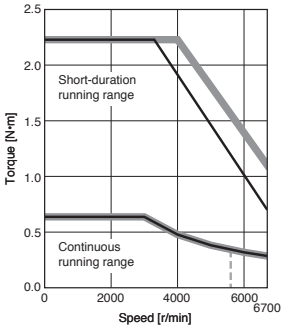
HK-FN Series (200 V) Torque Characteristics (Note 1)

: For 3-phase 200 V AC
: For 1-phase 200 V AC

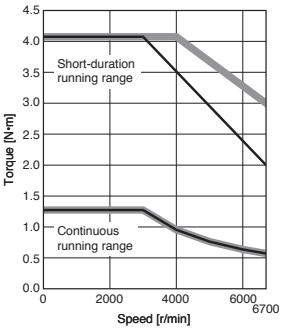
HK-FN13



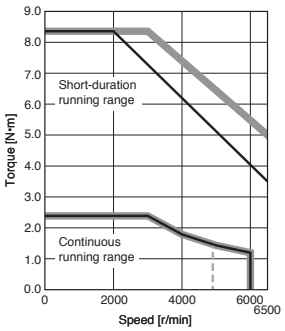
HK-FN23



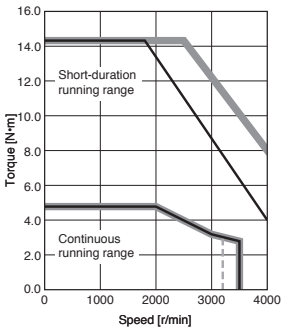
HK-FN43



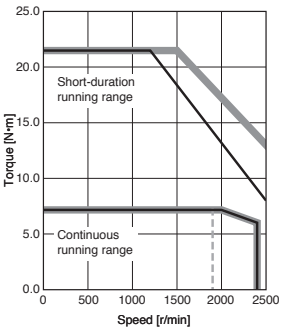
HK-FN7M3



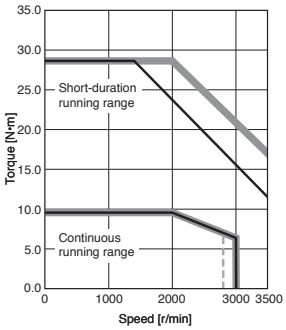
HK-FN102 (Note 2)



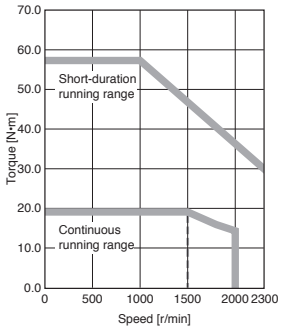
HK-FN152 (Note 2)



HK-FN202 (Note 2)



HK-FN301M

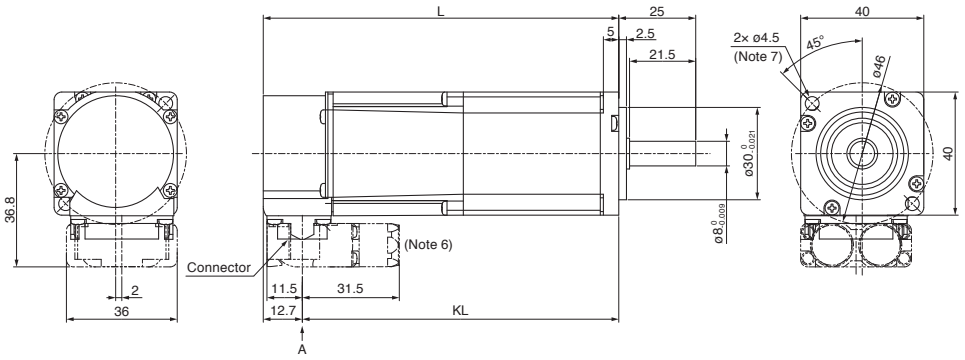


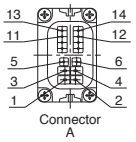
Notes: 1. Torque drops when the power supply voltage is below the specified value. - - - -: A rough indication of the possible continuous running range for 3-phase 170 V AC
2. When using a combination of the servo motors of over 750 W and MR-JET-100G_ or MR-JET-200G_ with a 1-phase power supply, use the servo amplifiers at 75 % or less of the effective load ratio.

HK-FN Series (200 V) Dimensions (Note 3, 4, 5)

HK

HK-FN13(B)





Electromagnetic brake (Note 2)

Pin. No.	Signal name
5	B1
6	B2

Power supply

Pin. No.	Signal name
1	E
2	U
3	W
4	V

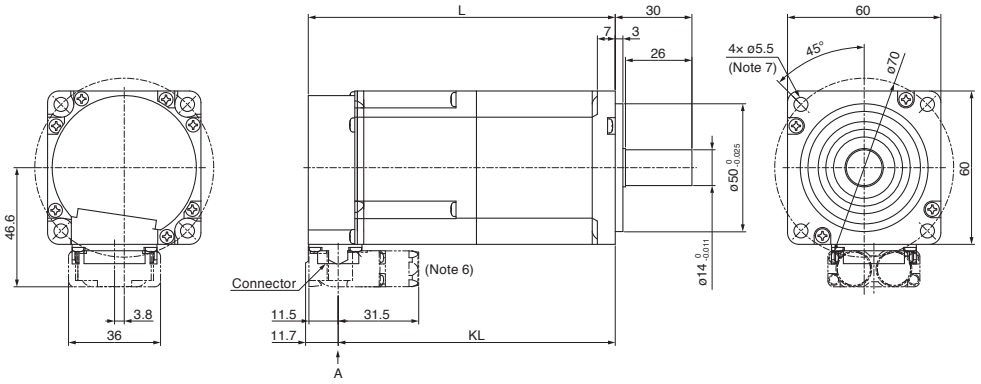
Encoder

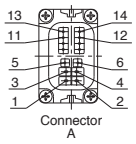
Pin. No.	Signal name
11	P5
12	MR
13	LG
14	MRR

Model	Variable dimensions (Note 1)	
	L	KL
HK-FN13(B)	80.5 (115.5)	67.8 (102.8)

[Unit: mm]

HK-FN23(B), HK-FN43(B)





Electromagnetic brake (Note 2)

Pin. No.	Signal name
5	B1
6	B2

Power supply

Pin. No.	Signal name
1	E
2	U
3	W
4	V

Encoder

Pin. No.	Signal name
11	P5
12	MR
13	LG
14	MRR

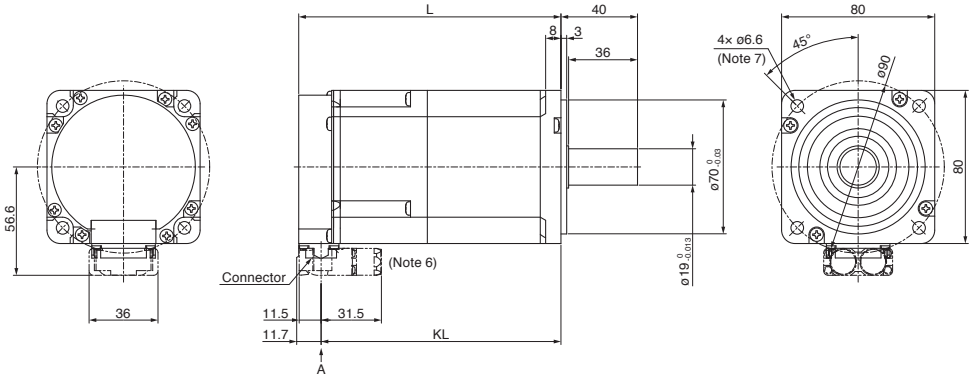
Model	Variable dimensions (Note 1)	
	L	KL
HK-FN23(B)	85.5 (120.1)	73.8 (108.4)
HK-FN43(B)	103.5 (138.1)	91.8 (126.4)

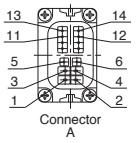
[Unit: mm]

Notes:
1. The dimensions in brackets are for the models with an electromagnetic brake.
2. The electromagnetic brake terminals do not have polarity.
3. The dimensions are the same regardless of whether or not an oil seal is installed.
4. Use a friction coupling to fasten a load.
5. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.
6. The dimensions are applicable when a dual type motor cable is led to the load side. Refer to "HK-FN Series Connector Dimensions" for the dimensions when leading the cable to the opposite to the load side or leading vertically and when using a single type motor cable.
7. Use hexagon socket head cap screws when mounting the servo motor.

HK-FN Series (200 V) Dimensions (Note 3, 4, 5)

HK-FN7M3(B)





Electromagnetic brake (Note 2)

Pin. No.	Signal name
5	B1
6	B2

Power supply

Pin. No.	Signal name
1	E
2	U
3	W
4	V

Encoder

Pin. No.	Signal name
11	P5
12	MR
13	LG
14	MRR

Model	Variable dimensions (Note 1)	
	L	KL
HK-FN7M3(B)	101.5 (137)	89.8 (125.3)

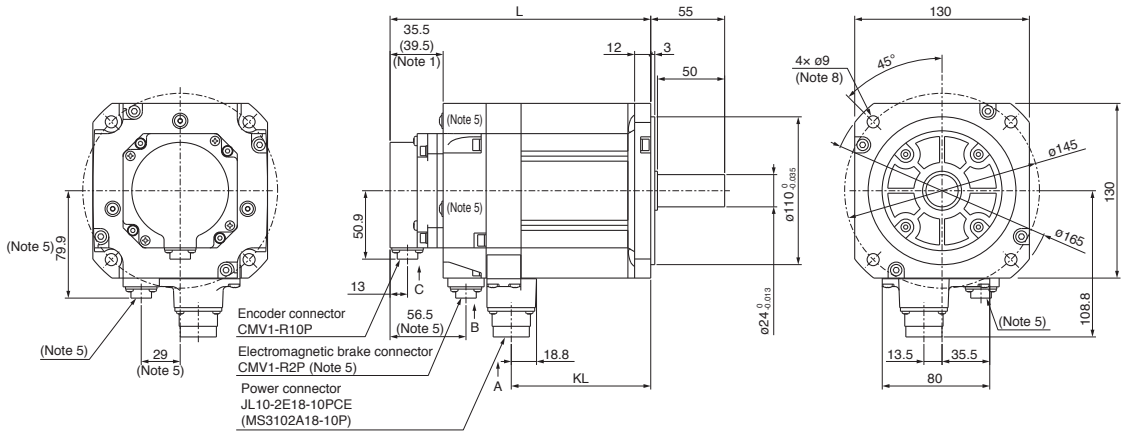
[Unit: mm]

Notes:
1. The dimensions in brackets are for the models with an electromagnetic brake.
2. The electromagnetic brake terminals do not have polarity.
3. The dimensions are the same regardless of whether or not an oil seal is installed.
4. Use a friction coupling to fasten a load.
5. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.
6. The dimensions are applicable when a dual type motor cable is led to the load side. Refer to "HK-FN Series Connector Dimensions" for the dimensions when leading the cable to the opposite to the load side or leading vertically and when using a single type motor cable.
7. Use hexagon socket head cap screws when mounting the servo motor.

HK-FN Series (200 V) Dimensions (Note 3, 4, 7)

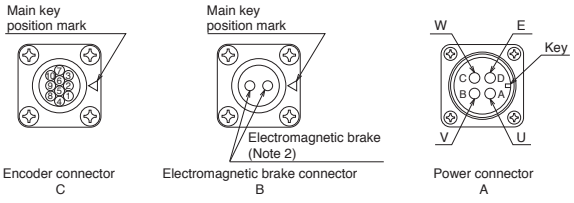
HK

HK-FN102(B), HK-FN152(B)



Encoder

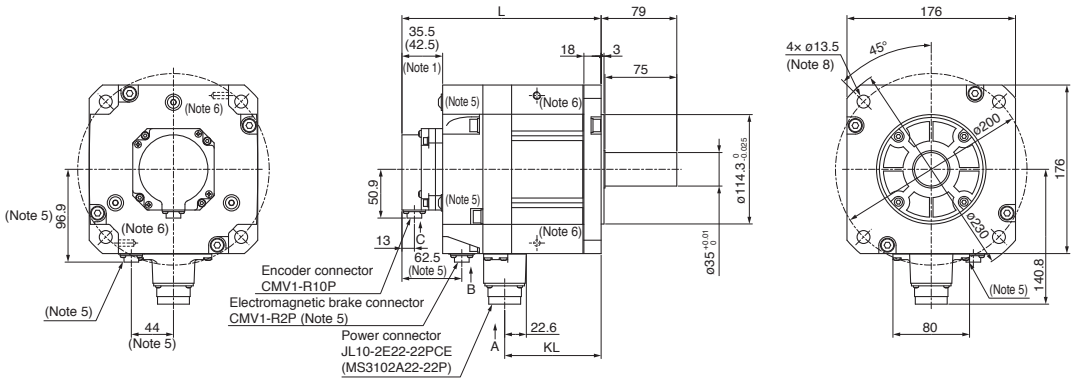
Pin No.	Signal name	Pin No.	Signal name
1	MR	6	-
2	MRR	7	-
3	-	8	P5
4	-	9	-
5	LG	10	SHD



Model	Variable dimensions (Note 1)	
	L	KL
HK-FN102(B)	159.5 (194)	103.8
HK-FN152(B)	181.5 (216)	125.8

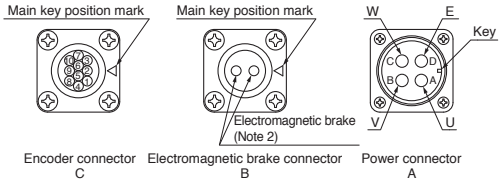
[Unit: mm]

HK-FN202(B), HK-FN301M(B)



Encoder

Pin No.	Signal name	Pin No.	Signal name
1	MR	6	-
2	MRR	7	-
3	-	8	P5
4	-	9	-
5	LG	10	SHD



Model	Variable dimensions (Note 1)	
	L	KL
HK-FN202(B)	158.5 (208)	100.7
HK-FN301M(B)	178.5 (228)	120.7

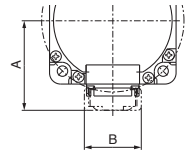
[Unit: mm]

Notes: 1. The dimensions in brackets are for the models with an electromagnetic brake.
2. The electromagnetic brake terminals do not have polarity.
3. The dimensions are the same regardless of whether or not an oil seal is installed.
4. Use a friction coupling to fasten a load.
5. Only for the models with an electromagnetic brake.
6. It has screw holes (M8) for eyebolts.
7. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.
8. Use hexagon socket head cap screws when mounting the servo motor.

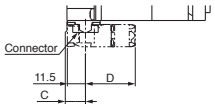
HK-FN Series (200 V) Connector Dimensions

Cable direction: load side/opposite to load side

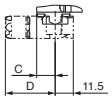
Model	Variable dimensions							
	Dual cable type				Single cable type			
	A	B	C	D	A	B	C	D
HK-FN13	36.8	36	12.7	31.5	39.6	32	12.7	40
HK-FN23 HK-FN43	46.6		11.7		49.4		11.7	
HK-FN7M3	56.6				59.4			



Cable direction: load side



Cable direction: opposite to load side

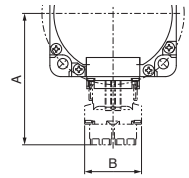


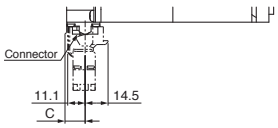
* The drawing shows a dual cable type as an example.

[Unit: mm]

Cable direction: vertical

Model	Variable dimensions					
	Dual cable type			Single cable type		
	A	B	C	A	B	C
HK-FN13	63.4	36	12.7	71.9	32	12.7
HK-FN23 HK-FN43	73.2		11.7	81.7		11.7
HK-FN7M3	83.2			91.7		





* The drawing shows a dual cable type as an example.

[Unit: mm]

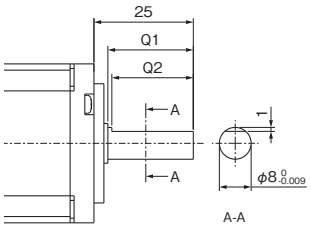
HK-FN Series (200 V) with Special Shaft Dimensions

HK

Servo motors with the following specifications are also available.

D: D-cut shaft (Note 1)

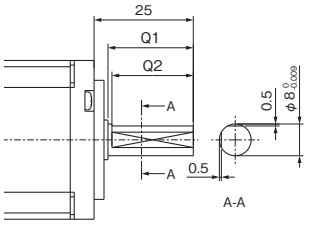
Model	Variable dimensions	
	Q1	Q2
HK-FN13D	21.5	20.5



[Unit: mm]

L: L-cut shaft (Note 1)

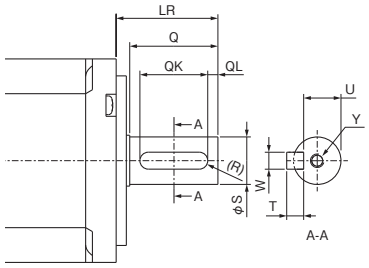
Model	Variable dimensions	
	Q1	Q2
HK-FN13L	21.5	20.5



[Unit: mm]

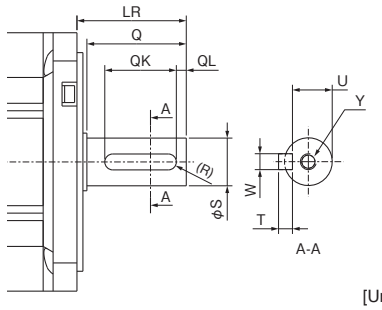
K: Keyed shaft (with a double round-ended key) (Note 1, 2)

Model	Variable dimensions									
	S	LR	Q	W	QK	QL	U	R	T	Y
HK-FN13K	8 0 -0.009	25	21.5	3	14	5	6.2 0 -0.085	1.5	3	M3×8
HK-FN23K HK-FN43K	14 0 -0.011	30	26	5	20	3	11 0 -0.085	2.5	5	M4×15
HK-FN7M3K	19 0 -0.013	40	36	6	25	5	15.5 0 -0.1	3	6	M5×20



[Unit: mm]

Model	Variable dimensions									
	S	LR	Q	W	QK	QL	U	R	T	Y
HK-FN102K HK-FN152K	24 0 -0.013	55	50	8	36	5	20 0 -0.1	4	7	M8×20
HK-FN202K HK-FN301MK	35 +0.010 0	79	75	10	55	5	30 0 -0.12	5	8	M8×20



[Unit: mm]

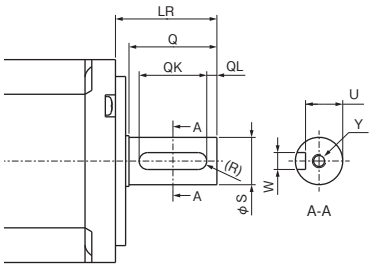
Notes: 1. Do not use the servo motors with a D-cut shaft, an L-cut shaft, or a keyed shaft for frequent start/stop applications as this may cause the damage to the shaft.
2. The key is included as an accessory and not mounted to the shaft.

HK-FN Series (200 V) with Special Shaft Dimensions

Servo motors with the following specifications are also available.

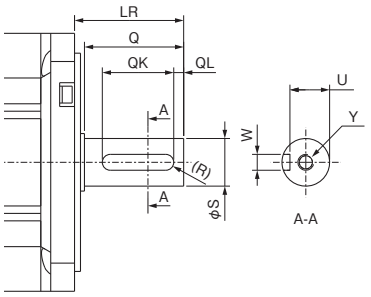
N: Keyed shaft (without a key) (Note 1, 2)

Model	Variable dimensions								
	S	LR	Q	W	QK	QL	U	R	Y
HK-FN13N	$8^{0}_{-0.009}$	25	21.5	$3^{-0.004}_{-0.029}$	14	5	$6.2^{0}_{-0.085}$	1.5	M3×8
HK-FN23N HK-FN43N	$14^{0}_{-0.011}$	30	26	$5^{0}_{-0.03}$	20	3	$11^{0}_{-0.085}$	2.5	M4×15
HK-FN7M3N	$19^{0}_{-0.013}$	40	36	$6^{0}_{-0.03}$	25	5	$15.5^{0}_{-0.1}$	3	M5×20



[Unit: mm]

Model	Variable dimensions								
	S	LR	Q	W	QK	QL	U	R	Y
HK-FN102N HK-FN152N	$24^{0}_{-0.013}$	55	50	$8^{0}_{-0.036}$	36	5	$20^{0}_{-0.1}$	4	M8×20
HK-FN202N HK-FN301MN	$35^{+0.010}_{0}$	79	75	$10^{0}_{-0.036}$	55	5	$30^{0}_{-0.12}$	5	M8×20



[Unit: mm]

Notes: 1. Do not use the servo motors with a keyed shaft for frequent start/stop applications as this may cause the damage to the shaft.
2. The servo motor is supplied without a key. The user needs to prepare a key.

HK-KN Series (Low Inertia, Small Capacity) (400 V) Specifications (Note 6)

HK

Flange size		[mm]	40 × 40	60 × 60		
Rotary servo motor model		HK-KN	134	234	434	634
Continuous running duty (Note 3)	Rated output	[kW]	0.1	0.2	0.4	0.6
	Rated torque (Note 4)	[N•m]	0.32	0.64	1.3	1.9
Maximum torque		[N•m]	1.1	2.2	4.5	6.7
Rated speed (Note 3)		[r/min]	3000			
Maximum speed (Note 3)		[r/min]	6700			
Power rate at continuous rated torque [kW/s]	Without electromagnetic brake		14.8	19.4	39.5	61.0
	With electromagnetic brake		14.0	16.0	36.7	58.0
Rated current		[A]	1.2	1.4	1.3	2.3
Maximum current		[A]	4.6	5.4	4.9	9.1
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		0.0686	0.209	0.410	0.598
	With electromagnetic brake		0.0725	0.254	0.442	0.629
Recommended load to motor inertia ratio (Note 1)			20 times or less	23 times or less (Note 7)	23 times or less	20 times or less (Note 8)
Speed/position detector			Batteryless absolute/incremental 24-bit encoder (resolution: 16,777,216 pulses/rev)			
Type			Permanent magnet synchronous motor			
Oil seal			None (Servo motors with an oil seal are available.)			
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)			
Thermistor			None			
Insulation class			155 (F)			
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2, 5)			
Vibration resistance *1		[m/s^2]	X: 49, Y: 49			
Vibration rank			V10 *3			
Permissible load for the shaft *2	L	[mm]	25	30		
	Radial	[N]	88	245		
	Thrust	[N]	59	98		
Mass [kg] (With/without oil seal)	Without electromagnetic brake		0.37	0.77	1.2	1.5
	With electromagnetic brake		0.63	1.2	1.6	1.9

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
4. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
5. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
6. For dimensions, connector dimensions, and special shaft dimensions, refer to pp. 4-9 to 4-12 in this catalog.
7. The recommended load to motor inertia ratio is 28 times or less when the motor speed is 6000 r/min or less.
8. The recommended load to motor inertia ratio is 30 times or less when the motor speed is 3000 r/min or less.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

Model		HK-KN	134B	234B	434B	634B
Type (Note 3)			Spring actuated type safety brake			
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)			
Power consumption		[W] at 20 °C	6.4	7.9		
Electromagnetic brake static friction torque (Note 5)		[N•m]	0.48 or higher	1.9 or higher		
Permissible braking work	Per braking	[J]	5.6	22		
	Per hour	[J]	56	220		
Electromagnetic brake life (Note 2)	Number of braking times		20000			
	Work per braking	[J]	5.6	22		

Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

HK-KN Series (Low Inertia, Small Capacity) (400 V) Specifications (Note 6)

HK

Flange size		[mm]	80 × 80		90 × 90	
Rotary servo motor model		HK-KN	7M34	1034	1534	2034
Continuous running duty (Note 3)	Rated output	[kW]	0.75	1.0	1.5	2.0
	Rated torque (Note 4)	[N•m]	2.4	3.2	4.8	6.4
Maximum torque		[N•m]	8.4	11.1	16.7	19.1
Rated speed (Note 3)		[r/min]	3000			
Maximum speed (Note 3)		[r/min]	6700	6500	6700	6000
Power rate at continuous rated torque	Without electromagnetic brake	[kW/s]	41.6	60.3	52.0	71.7
	With electromagnetic brake		37.7	56.0	48.3	67.7
Rated current		[A]	2.4	2.5	4.4	5.3
Maximum current		[A]	9.7	10	17	17
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		1.37	1.68	4.38	5.65
	With electromagnetic brake		1.51	1.81	4.72	5.99
Recommended load to motor inertia ratio (Note 1)			9 times or less (Note 7)	7 times or less (Note 8)	11 times or less (Note 8)	10 times or less (Note 8)
Speed/position detector			Batteryless absolute/incremental 24-bit encoder (resolution: 16,777,216 pulses/rev)			
Type			Permanent magnet synchronous motor			
Oil seal			None (Servo motors with an oil seal are available.)			
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)			
Thermistor			None			
Insulation class			155 (F)			
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2, 5)			
Vibration resistance *1		[m/s^2]	X: 49, Y: 24.5			
Vibration rank			V10 *3			
Permissible load for the shaft *2	L	[mm]	40			
	Radial	[N]	392			
	Thrust	[N]	147			
Mass [kg] (With/without oil seal)	Without electromagnetic brake		2.2	2.4	3.6	4.4
	With electromagnetic brake		2.9	3.1	4.7	5.5

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion."
3. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
4. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
5. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
6. For dimensions, connector dimensions, and special shaft dimensions, refer to pp. 4-9 to 4-12 in this catalog.
7. The recommended load to motor inertia ratio is 20 times or less when the motor speed is 3000 r/min or less.
8. The recommended load to motor inertia ratio is 30 times or less when the motor speed is 3000 r/min or less.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

Model		HK-KN	7M34B	1034B	1534B	2034B
Type (Note 3)			Spring actuated type safety brake			
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)			
Power consumption		[W] at 20 °C	10		13.8	
Electromagnetic brake static friction torque (Note 5)		[N•m]	3.2 or higher		9.5 or higher	
Permissible braking work	Per braking	[J]	64			
	Per hour	[J]	640			
Electromagnetic brake life (Note 2)	Number of braking times		20000		5000	
	Work per braking	[J]	64			

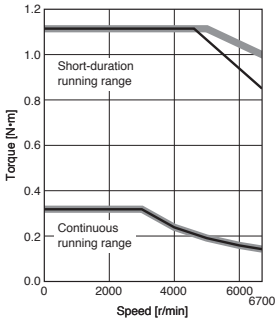
Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

HK-KN Series (400 V) Torque Characteristics (Note 1)

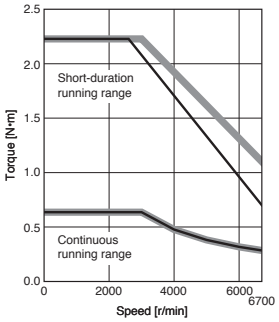
HK

: For 3-phase 400 V AC
: For 3-phase 380 V AC

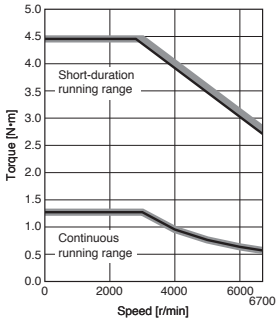
HK-KN134



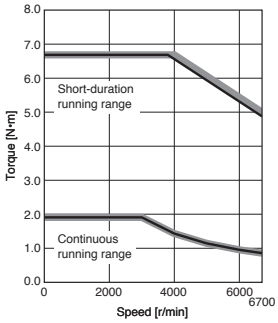
HK-KN234



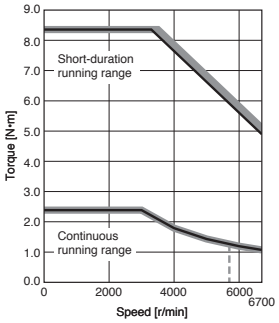
HK-KN434



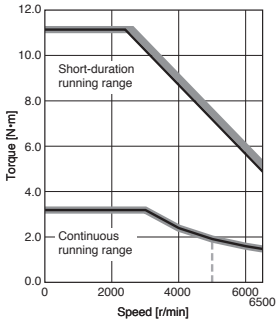
HK-KN634



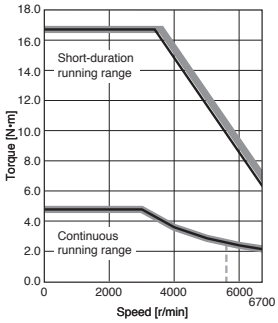
HK-KN7M34



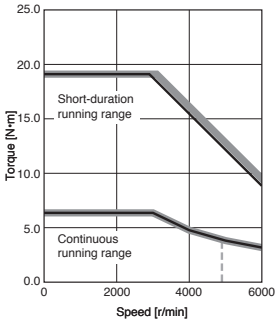
HK-KN1034



HK-KN1534



HK-KN2034



Notes: 1. Torque drops when the power supply voltage is below the specified value. - - - - : A rough indication of the possible continuous running range for 3-phase 323 V AC

HK-SN Series (Medium Inertia, Medium Capacity) (400 V) Specifications

HK

Flange size		[mm]	130 × 130		176 × 176
Rotary servo motor model		HK-SN	3534	5034	7034
Continuous running duty (Note 3)	Rated output	[kW]	3.5	5.0	7.0
	Rated torque (Note 4)	[N•m]	11.1	15.9	22.3
Maximum torque		[N•m]	33.4	47.7	60.2
Rated speed (Note 3)		[r/min]	3000		
Maximum speed (Note 3)		[r/min]	5000	6000	5000
Power rate at continuous rated torque [kW/s]	Without electromagnetic brake		73.4	91.4	70.1
	With electromagnetic brake		65.0	84.7	65.5
Rated current		[A]	6.8	12	14
Maximum current		[A]	23	35	41
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		16.9	27.7	70.8
	With electromagnetic brake		19.1	29.9	75.8
Recommended load to motor inertia ratio (Note 1)			10 times or less	7 times or less	6 times or less
Speed/position detector			Batteryless absolute/incremental 24-bit encoder (resolution: 16,777,216 pulses/rev)		
Type			Permanent magnet synchronous motor		
Oil seal			None (Servo motors with an oil seal are available.)		
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)		
Thermistor			None		
Insulation class			155 (F)		
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)		
Vibration resistance *1		[m/s^2]	X: 24.5, Y: 49		X: 24.5, Y: 29.4
Vibration rank			V10 *3		
Permissible load for the shaft *2	L	[mm]	55		79
	Radial	[N]	980		2058
	Thrust	[N]	490		980
Mass [kg] (With/without oil seal)	Without electromagnetic brake		9.1	13	20
	With electromagnetic brake		11	15	25

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
4. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

Model		HK-SN	3534B	5034B	7034B
Type (Note 3)			Spring actuated type safety brake		
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)		
Power consumption		[W] at 20 °C	23		34
Electromagnetic brake static friction torque (Note 5)		[N•m]	16 or higher		44 or higher
Permissible braking work	Per braking	[J]	400		4500
	Per hour	[J]	4000		45000
Electromagnetic brake life (Note 2)	Number of braking times		5000		20000
	Work per braking	[J]	400		1000

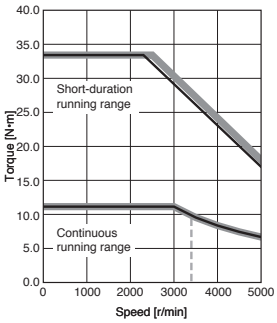
Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

HK-SN Series (400 V) Torque Characteristics (Note 1)

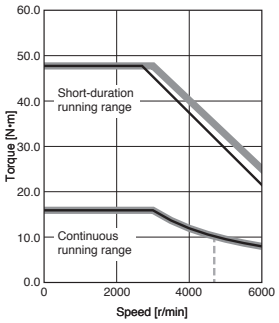
HK

: For 3-phase 400 V AC
: For 3-phase 380 V AC

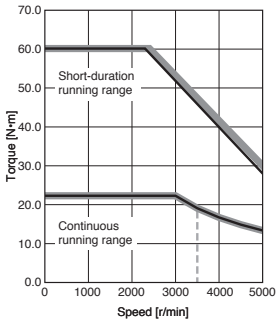
HK-SN3534



HK-SN5034



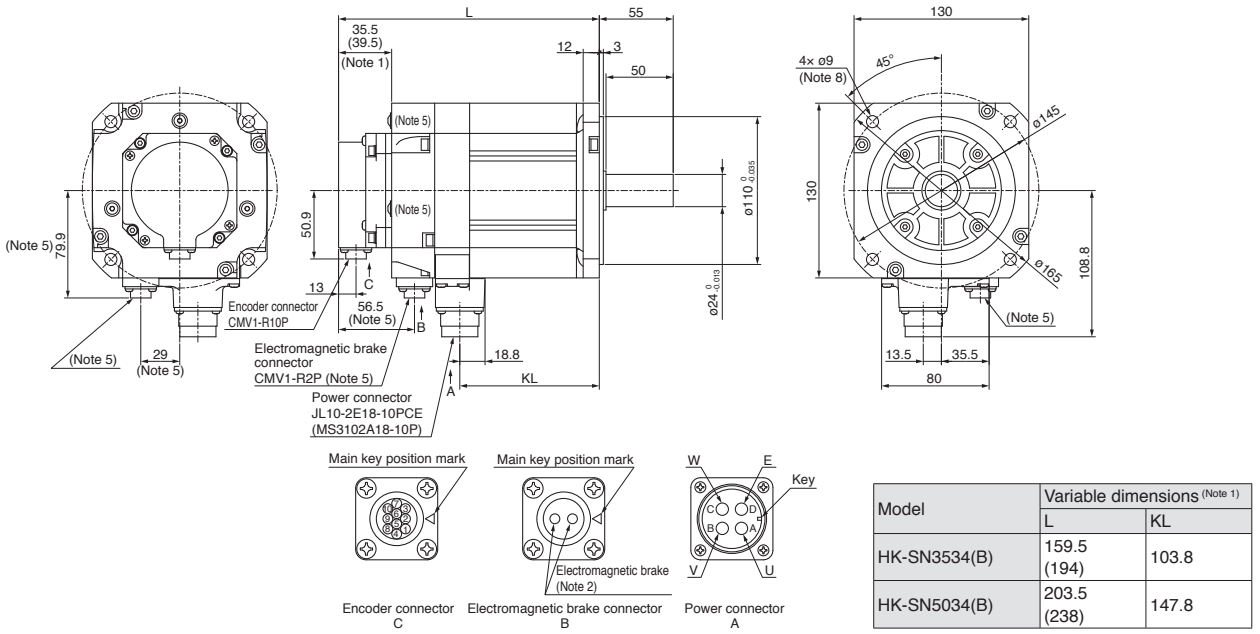
HK-SN7034



Notes: 1. Torque drops when the power supply voltage is below the specified value. - - - - : A rough indication of the possible continuous running range for 3-phase 323 V AC

HK-SN Series (400 V) Dimensions (Note 3, 4, 7)

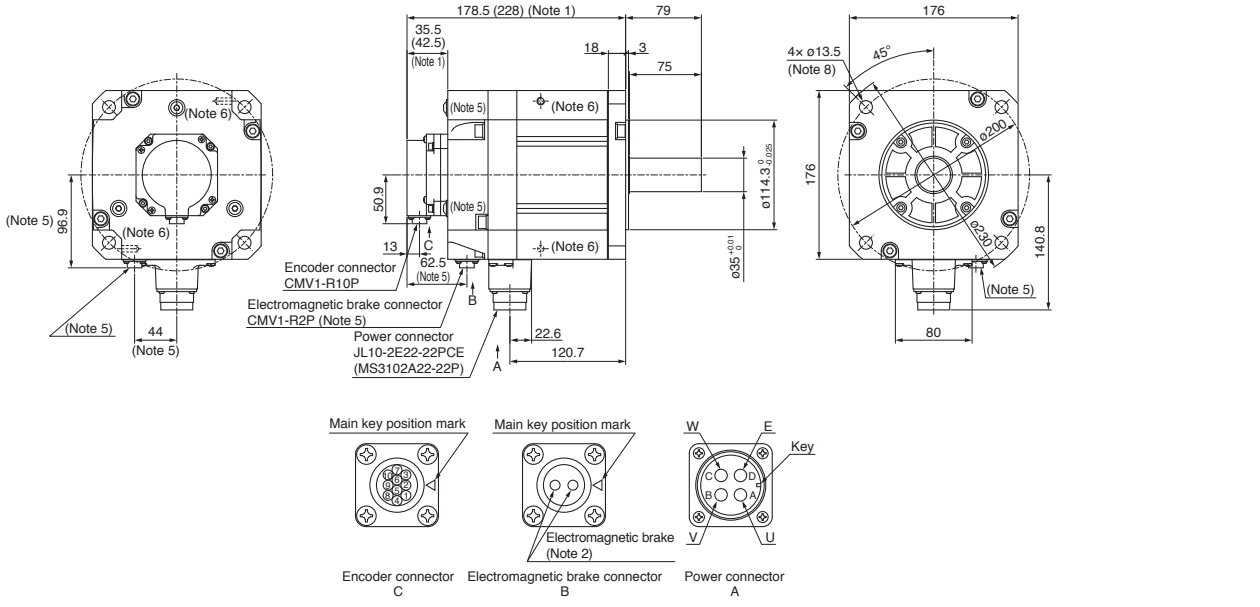
HK-SN3534(B), HK-SN5034(B)



Model	Variable dimensions (Note 1)	
	L	KL
HK-SN3534(B)	159.5 (194)	103.8
HK-SN5034(B)	203.5 (238)	147.8

[Unit: mm]

HK-SN7034(B)



[Unit: mm]

Notes:
1. The dimensions in brackets are for the models with an electromagnetic brake.
2. The electromagnetic brake terminals do not have polarity.
3. The dimensions are the same regardless of whether or not an oil seal is installed.
4. Use a friction coupling to fasten a load.
5. Only for the models with an electromagnetic brake.
6. It has screw holes (M8) for eyebolts.
7. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.
8. Use hexagon socket head cap screws when mounting the servo motor.

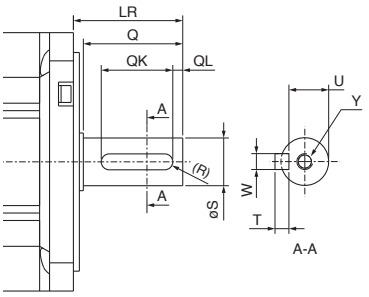
HK-SN Series (400 V) with Special Shaft Dimensions

HK

Servo motors with the following specifications are also available.

K: Keyed shaft (with a double round-ended key) (Note 1, 2)

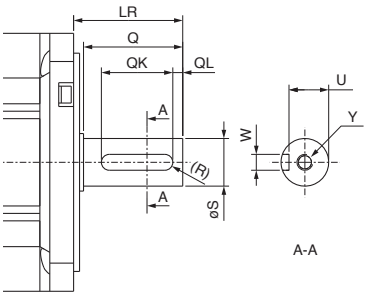
Model	Variable dimensions									
	S	LR	Q	W	QK	QL	U	R	T	Y
HK-SN3534K HK-SN5034K	$24^{0}_{-0.013}$	55	50	8	36	5	$20^{0}_{-0.1}$	4	7	M8×20
HK-SN7034K	$35^{+0.010}_{0}$	79	75	10	55	5	$30^{0}_{-0.12}$	5	8	M8×20



[Unit: mm]

N: Keyed shaft (without a key) (Note 1, 3)

Model	Variable dimensions								
	S	LR	Q	W	QK	QL	U	R	Y
HK-SN3534N HK-SN5034N	$24^{0}_{-0.013}$	55	50	$8^{0}_{-0.036}$	36	5	$20^{0}_{-0.1}$	4	M8×20
HK-SN7034N	$35^{+0.010}_{0}$	79	75	$10^{0}_{-0.036}$	55	5	$30^{0}_{-0.12}$	5	M8×20



[Unit: mm]

Notes: 1. Do not use the servo motors with a keyed shaft for frequent start/stop applications as this may cause the damage to the shaft.
2. The key is included as an accessory and not mounted to the shaft.
3. The servo motor is supplied without a key. The user needs to prepare a key.

HG-KNS Series (Low Inertia, Small capacity) (200 V) Specifications

HG

Flange size		[mm]	40 × 40	60 × 60		80 × 80
Rotary servo motor model		HG-KNS	13J	23J	43J	73J
Continuous running duty (Note 4)	Rated output	[kW]	0.1	0.2	0.4	0.75
	Rated torque (Note 3)	[N•m]	0.32	0.64	1.3	2.4
Maximum torque		[N•m]	0.95	1.9	3.8	7.2
Rated speed (Note 4)		[r/min]	3000			
Maximum speed (Note 4)		[r/min]	6000			
Power rate at continuous rated torque [kW/s]	Without electromagnetic brake		12.9	18.0	43.2	44.5
	With electromagnetic brake		12.0	16.4	40.8	41.0
Rated current		[A]	0.8	1.3	2.6	4.8
Maximum current		[A]	2.4	3.9	7.8	14
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		0.0783	0.225	0.375	1.28
	With electromagnetic brake		0.0843	0.247	0.397	1.39
Recommended load to motor inertia ratio (Note 1)			15 times or less (Note 6)		15 times or less	
Speed/position detector			Absolute/incremental 22-bit encoder (battery backup type) (Note 5) (resolution: 4,194,304 pulses/rev)			
Type			Permanent magnet synchronous motor			
Oil seal			Installed (Servo motors without an oil seal are available.)			
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)			
Thermistor			None			
Insulation class			130 (B)			
Structure			Totally enclosed, natural cooling (IP rating: IP65) (Note 2)			
Vibration resistance *1		[m/s^2]	X: 49, Y: 49			
Vibration rank			V10 *3			
Permissible load for the shaft *2	L	[mm]	25	30		40
	Radial	[N]	88	245		392
	Thrust	[N]	59	98		147
Mass (with oil seal) [kg]	Without electromagnetic brake		0.57	0.98	1.5	3.0
	With electromagnetic brake		0.77	1.4	1.9	4.0
Mass (without oil seal) [kg]	Without electromagnetic brake		0.54	0.91	1.4	2.8
	With electromagnetic brake		0.74	1.3	1.8	3.8

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
4. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
5. When configuring an absolute position detection system with a rotary servo motor having a battery backup type absolute position encoder, whether a battery (MR-BAT6V1SET-B) is required depends on the system configuration. In addition, use the battery branch cable (MR-BT6V4CBL03M) when using the battery. Refer to "Battery" in this catalog for information on whether a battery is required, details, and connections of the battery.
6. This recommended load to motor inertia ratio is applicable for operating the servo motor at the rated speed. If operating speed exceeds the rated speed, check whether a regenerative option is required using Drive System Sizing Software Motorizer.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

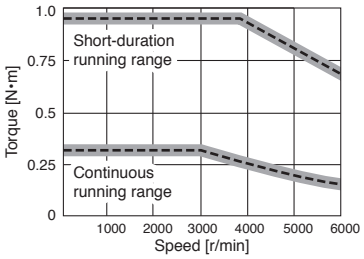
Model		HG-KNS	13BJ	23BJ	43BJ	73BJ
Type (Note 3)			Spring actuated type safety brake			
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)			
Power consumption		[W] at 20 °C	6.3	7.9		10
Electromagnetic brake static friction torque (Note 5)		[N•m]	0.32 or higher	1.3 or higher		2.4 or higher
Permissible braking work	Per braking	[J]	5.6	22		64
	Per hour	[J]	56	220		640
Electromagnetic brake life (Note 2)	Number of braking times		20000			
	Work per braking	[J]	5.6	22		64

Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

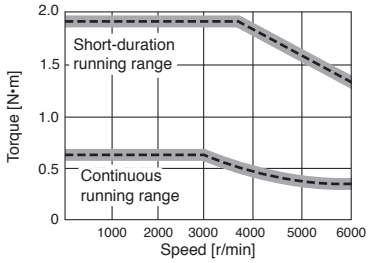
HG-KNS Series (200 V) Torque Characteristics (Note 1)

: For 3-phase 200 V AC
- - - - : For 1-phase 230 V AC

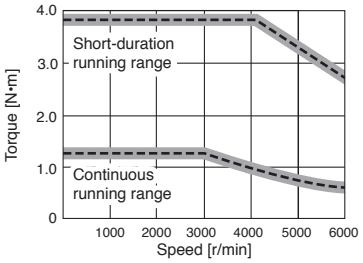
HG-KNS13J



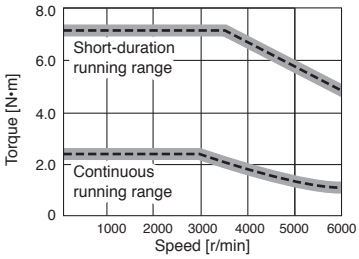
HG-KNS23J



HG-KNS43J



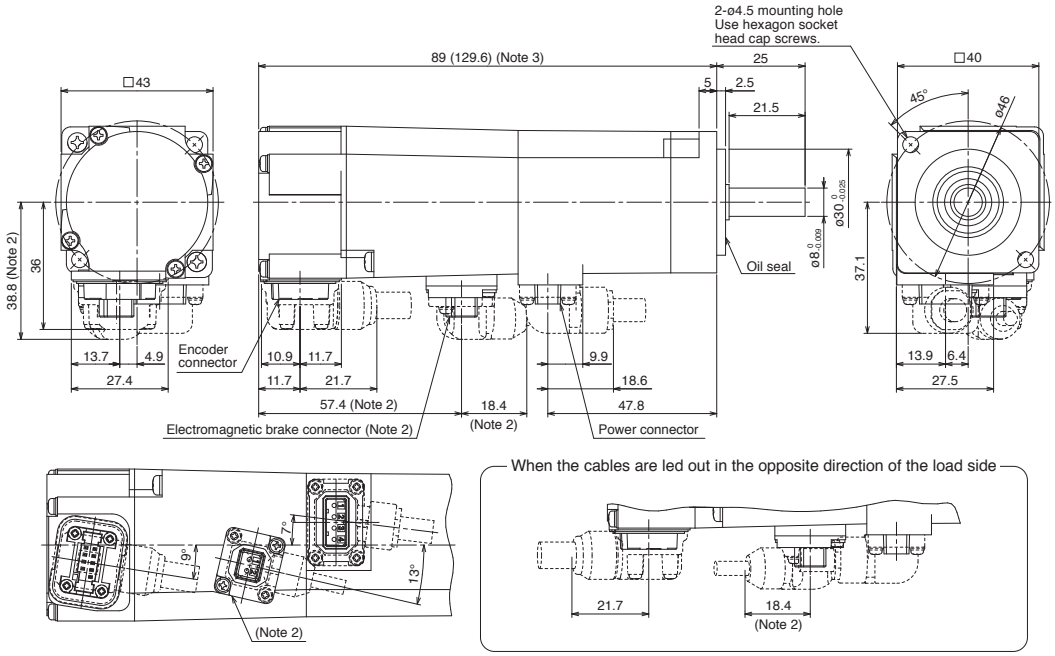
HG-KNS73J



Notes: 1. Torque drops when the power supply voltage is below the specified value.

HG-KNS Series (200 V) Dimensions (Note 4, 5)

HG-KNS13(B)J



Power connector

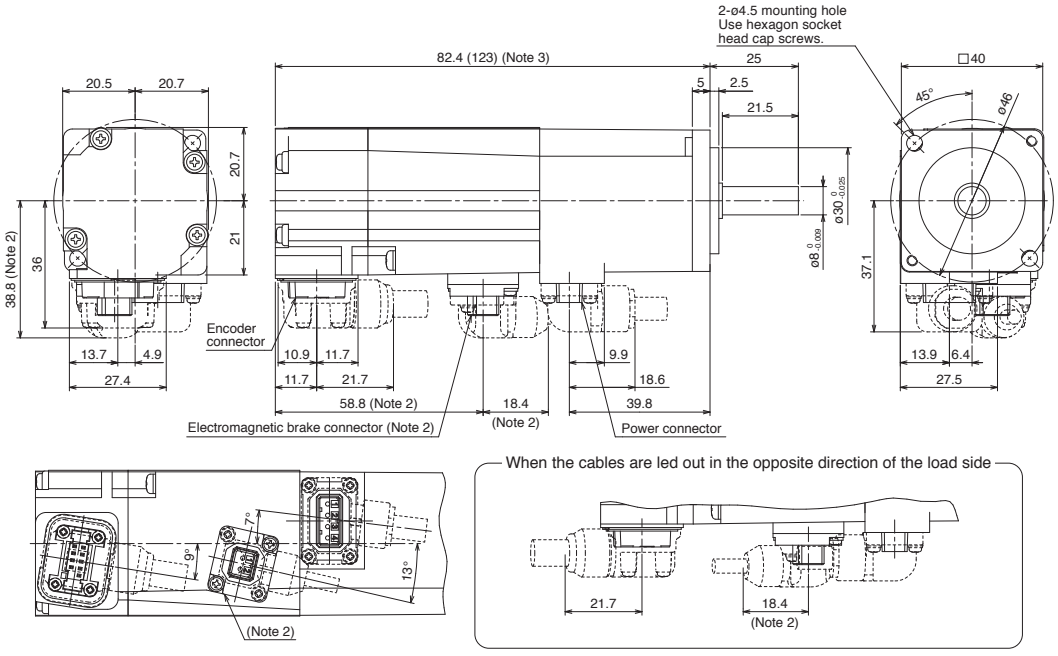
Pin No.	Signal name
1	E
2	U
3	V
4	W

Electromagnetic brake connector (Note 1)

Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

HG-KNS13(B)



Power connector

Pin No.	Signal name
1	E
2	U
3	V
4	W

Electromagnetic brake connector (Note 1)

Pin No.	Signal name
1	B1
2	B2

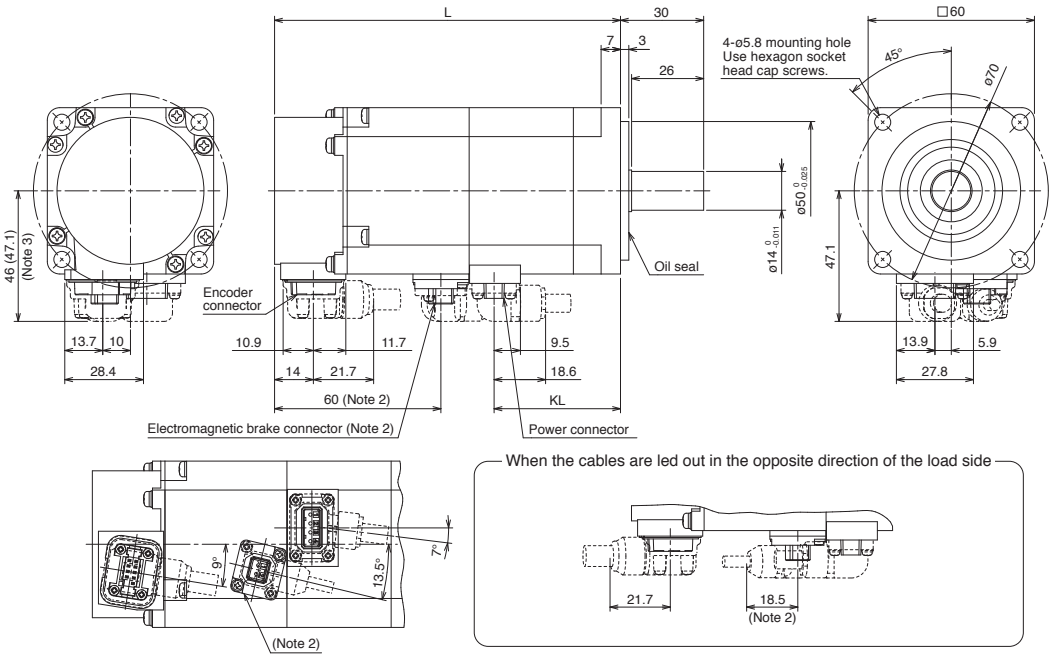
[Unit: mm]

Notes: 1. The electromagnetic brake terminals do not have polarity.
2. Only for the models with an electromagnetic brake.
3. The dimensions in brackets are for the models with an electromagnetic brake.
4. Use a friction coupling to fasten a load.
5. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.

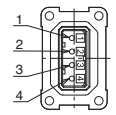
HG-KNS Series (200 V) Dimensions (Note 4, 5)

HG

HG-KNS23(B)J, HG-KNS43(B)J

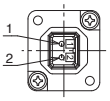


Power connector



Pin No.	Signal name
1	E
2	U
3	V
4	W

Electromagnetic brake connector (Note 1)

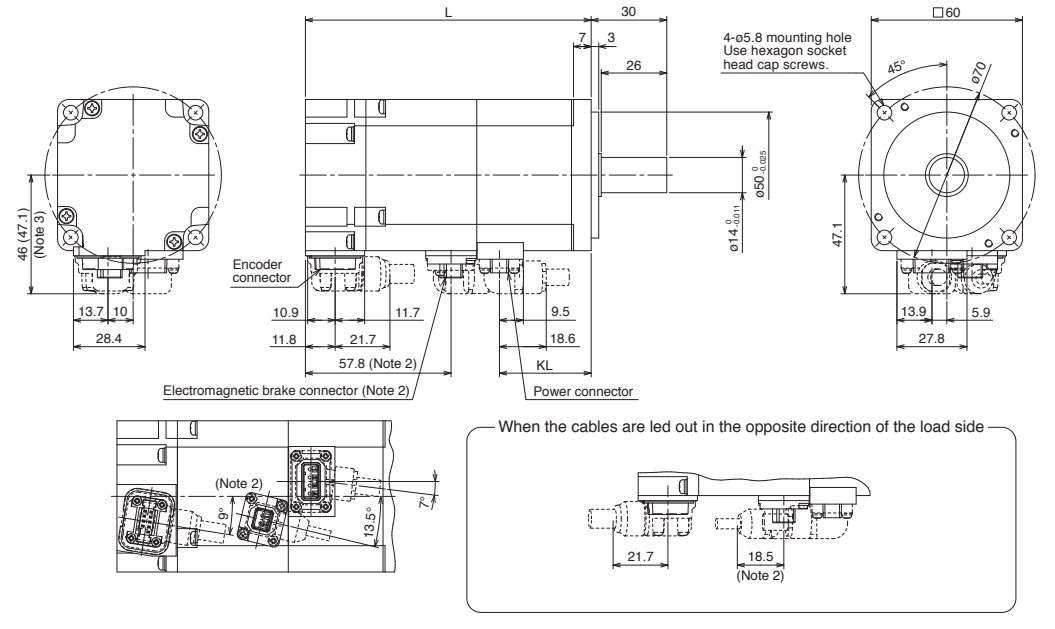


Pin No.	Signal name
1	B1
2	B2

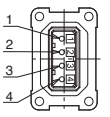
Model	Variable dimensions (Note 3)	
	L	KL
HG-KNS23(B)J	88 (124.8)	45.6
HG-KNS43(B)J	109.7 (146.5)	67.3

[Unit: mm]

HG-KNS23(B), HG-KNS43(B)

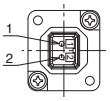


Power connector



Pin No.	Signal name
1	E
2	U
3	V
4	W

Electromagnetic brake connector (Note 1)



Pin No.	Signal name
1	B1
2	B2

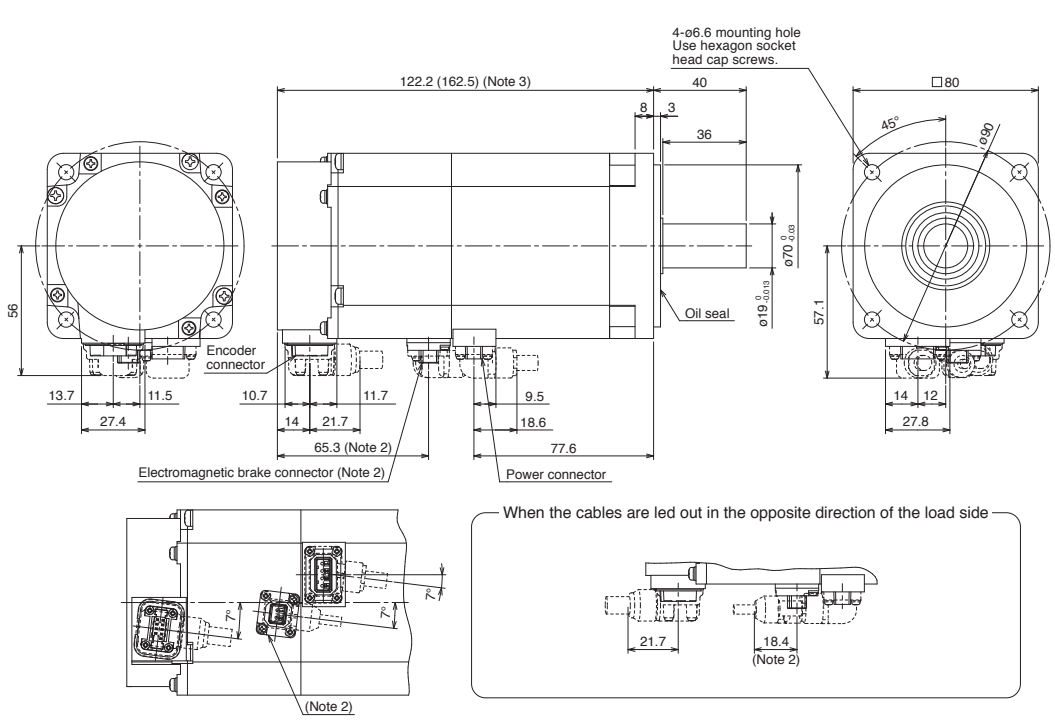
Model	Variable dimensions (Note 3)	
	L	KL
HG-KNS23(B)	76.6 (113.4)	36.4
HG-KNS43(B)	98.3 (135.1)	58.1

[Unit: mm]

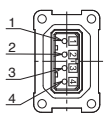
Notes: 1. The electromagnetic brake terminals do not have polarity.
2. Only for the models with an electromagnetic brake.
3. The dimensions in brackets are for the models with an electromagnetic brake.
4. Use a friction coupling to fasten a load.
5. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.

HG-KNS Series (200 V) Dimensions (Note 4, 5)

HG-KNS73(B)J

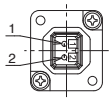


Power connector



Pin No.	Signal name
1	E
2	U
3	V
4	W

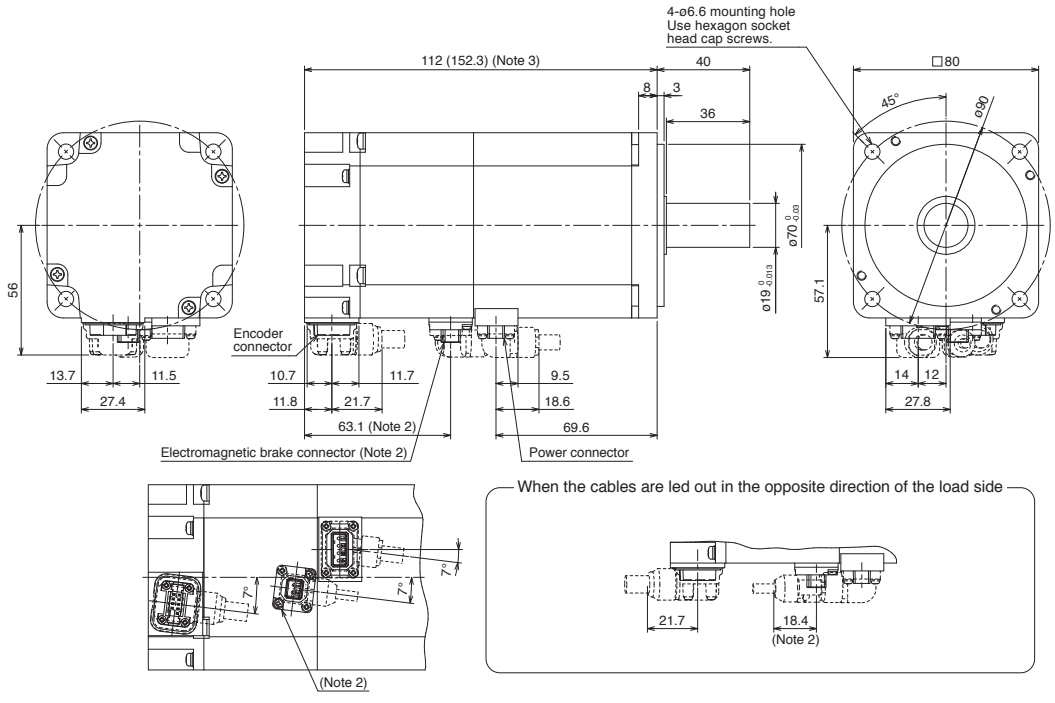
Electromagnetic brake connector (Note 1)



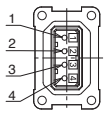
Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

HG-KNS73(B)

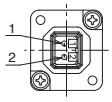


Power connector



Pin No.	Signal name
1	E
2	U
3	V
4	W

Electromagnetic brake connector (Note 1)



Pin No.	Signal name
1	B1
2	B2

[Unit: mm]

Notes: 1. The electromagnetic brake terminals do not have polarity.
2. Only for the models with an electromagnetic brake.
3. The dimensions in brackets are for the models with an electromagnetic brake.
4. Use a friction coupling to fasten a load.
5. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.

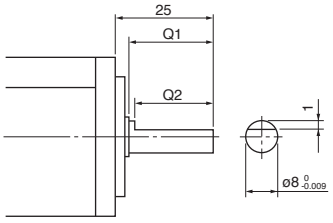
HG-KNS Series (200 V) with Special Shaft Dimensions

HG

Servo motors with the following specifications are also available.

D: D-cut shaft (Note 1)

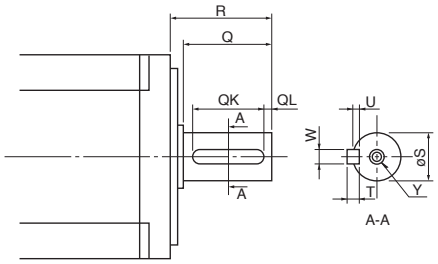
Model	Variable dimensions	
	Q1	Q2
HG-KNS13JD	21.5	20.5



[Unit: mm]

K: Keyed shaft (with a double round-ended key) (Note 1, 2)

Model	Variable dimensions								
	T	S	R	Q	W	QK	QL	U	Y
HG-KNS23JK HG-KNS43JK	5	14 0 -0.011	30	26	5	20	3	3	M4 screw depth 15
HG-KNS73JK	6	19 0 -0.013	40	36	6	25	5	3.5	M5 screw depth 20



[Unit: mm]

Notes: 1. Do not use a servo motor with a D-cut shaft or a keyed shaft for frequent start/stop applications as this may cause the damage to the shaft.
2. The key is included as an accessory and not mounted to the shaft.

HG-SNS Series (Medium Inertia, Medium Capacity) (200 V) Specifications

HG

Flange size [mm]			130 × 130			176 × 176	
Rotary servo motor model		HG-SNS	52J	102J	152J	202J	302J
Continuous running duty (Note 4)	Rated output	[kW]	0.5	1.0	1.5	2.0	3.0
	Rated torque (Note 3)	[N•m]	2.39	4.77	7.16	9.55	14.3
Maximum torque		[N•m]	7.16	14.3	21.5	28.6	42.9
Rated speed (Note 4)		[r/min]	2000				
Maximum speed (Note 4)		[r/min]	3000				2500
Power rate at continuous rated torque [kW/s]	Without electromagnetic brake		7.85	19.7	32.1	19.5	26.1
	With electromagnetic brake		6.01	16.5	28.2	16.1	23.3
Rated current		[A]	2.9	5.6	9.4	9.6	11
Maximum current		[A]	9.0	17	29	31	33
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		7.26	11.6	16.0	46.8	78.6
	With electromagnetic brake		9.48	13.8	18.2	56.5	88.2
Recommended load to motor inertia ratio (Note 1)			15 times or less				
Speed/position detector			Absolute/incremental 22-bit encoder (battery backup type) (Note 5) (resolution: 4,194,304 pulses/rev)				
Type			Permanent magnet synchronous motor				
Oil seal			Installed (Servo motors without an oil seal are available.)				
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)				
Thermistor			None				
Insulation class			155 (F)				
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)				
Vibration resistance *1		[m/s^2]	X: 24.5, Y: 24.5			X: 24.5, Y: 49	
Vibration rank			V10 *3				
Permissible load for the shaft *2	L	[mm]	55			79	
	Radial	[N]	980			2058	
	Thrust	[N]	490			980	
Mass [kg] (with/without oil seal)	Without electromagnetic brake		4.8	6.2	7.3	11	16
	With electromagnetic brake		6.7	8.2	9.3	17	22

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 of "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
4. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
5. When configuring an absolute position detection system with a rotary servo motor having a battery backup type absolute position encoder, whether a battery (MR-BAT6V1SET-B) is required depends on the system configuration. In addition, use the battery branch cable (MR-BT6V4CBL03M) when using the battery. Refer to "Battery" in this catalog for information on whether a battery is required, details, and connections of the battery.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 4-39 in this catalog for details about asterisks 1 to 3.

Electromagnetic brake specifications (Note 1)

Model		HG-SNS	52BJ	102BJ	152BJ	202BJ	302BJ
Type (Note 3)			Spring actuated type safety brake				
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)				
Power consumption		[W] at 20 °C	20			34	
Electromagnetic brake static friction torque (Note 5)		[N•m]	8.5 or higher			44.0 or higher	
Permissible braking work	Per braking	[J]	400			4500	
	Per hour	[J]	4000			45000	
Electromagnetic brake life (Note 2)	Number of braking times		20000				
	Work per braking	[J]	200			1000	

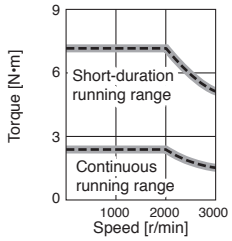
Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

HG-SNS Series (200 V) Torque Characteristics (Note 1)

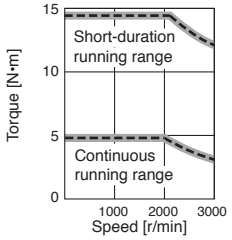
HG

: For 3-phase 200 V AC
: For 1-phase 230 V AC

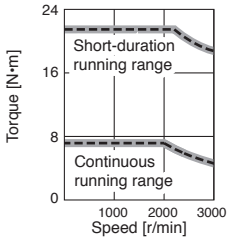
HG-SNS52J



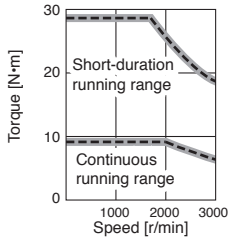
HG-SNS102J (Note 2)



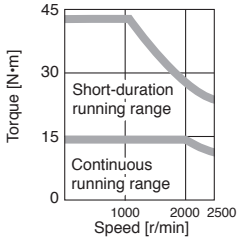
HG-SNS152J (Note 2)



HG-SNS202J (Note 2)



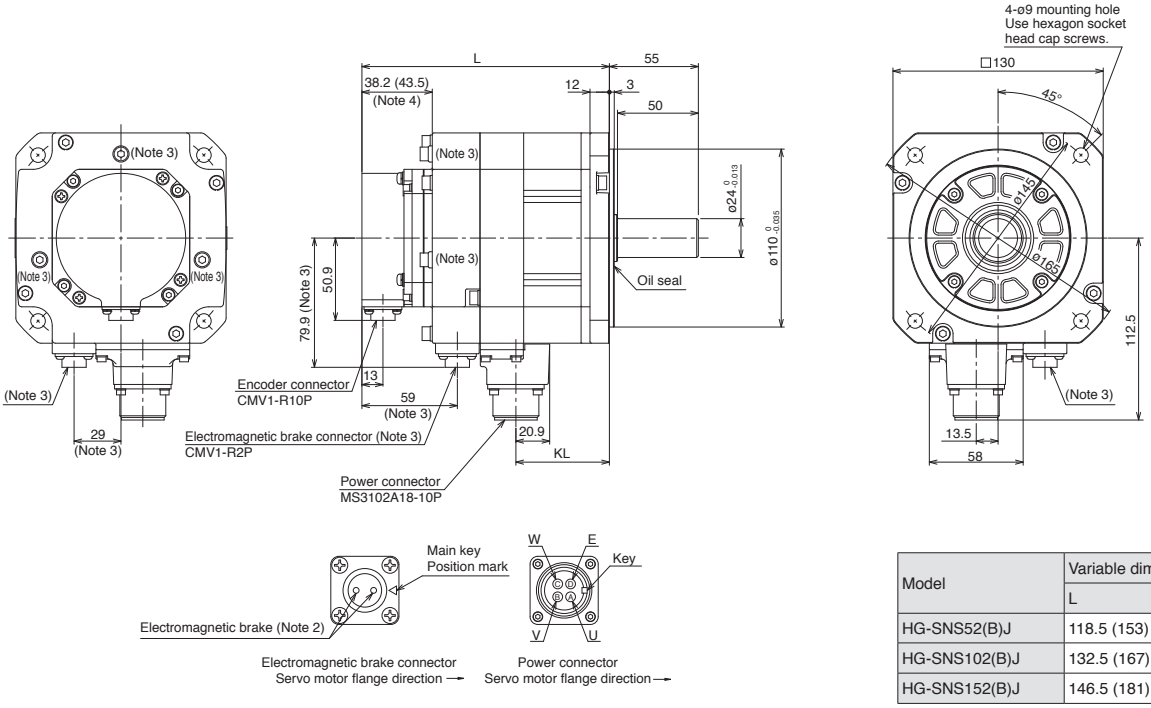
HG-SNS302J



Notes: 1. Torque drops when the power supply voltage is below the specified value.
2. When using a combination of the servo motors of over 750 W and MR-JET-100G_ or MR-JET-200G_ with a 1-phase power supply, use the servo amplifiers at 75 % or less of the effective load ratio.

HG-SNS Series (200 V) Dimensions (Note 1, 5, 7)

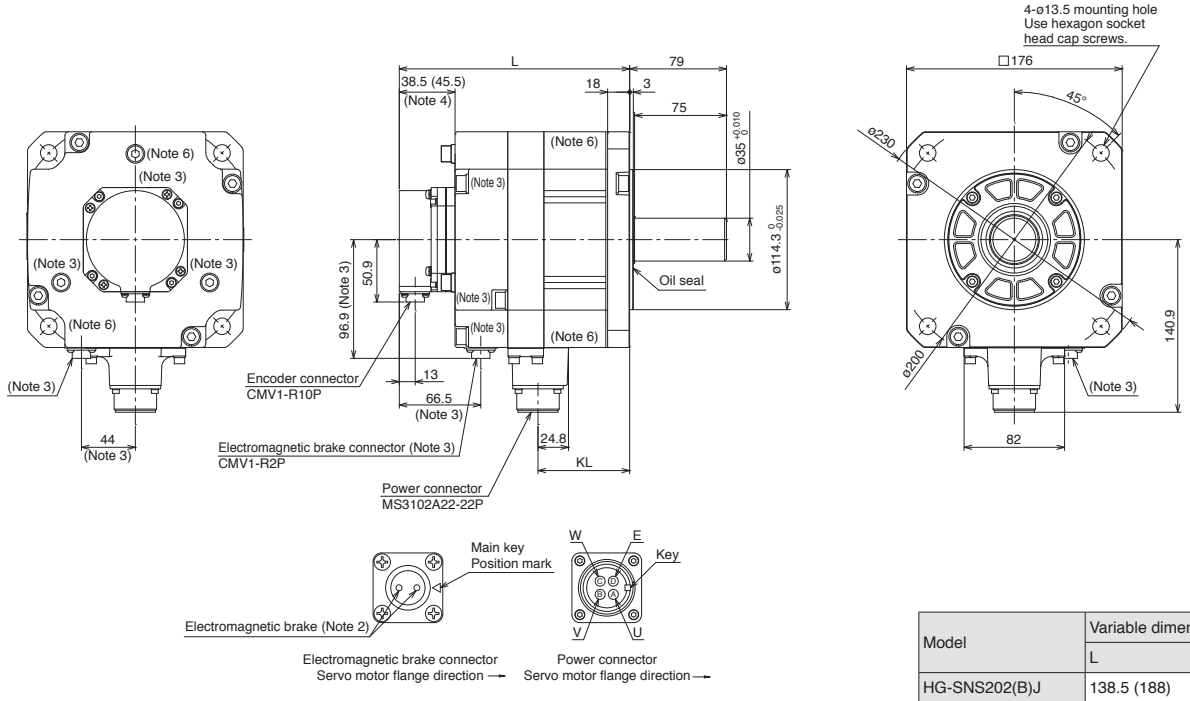
HG-SNS52(B)J, HG-SNS102(B)J, HG-SNS152(B)J



Model	Variable dimensions (Note 4)	
	L	KL
HG-SNS52(B)J	118.5 (153)	57.8
HG-SNS102(B)J	132.5 (167)	71.8
HG-SNS152(B)J	146.5 (181)	85.8

[Unit: mm]

HG-SNS202(B)J, HG-SNS302(B)J



Model	Variable dimensions (Note 4)	
	L	KL
HG-SNS202(B)J	138.5 (188)	74.8
HG-SNS302(B)J	162.5 (212)	98.8

[Unit: mm]

Notes:
1. Dimensions of the HG-SNS series are the same regardless of whether or not an oil seal is installed.
2. The electromagnetic brake terminals do not have polarity.
3. Only for the models with an electromagnetic brake.
4. The dimensions in brackets are for the models with an electromagnetic brake.
5. Use a friction coupling to fasten a load.
6. HG-SNS302(B)J has screw holes (M8) for eyebolts.
7. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.

HG-SNS Series (200 V) with Special Shaft Dimensions

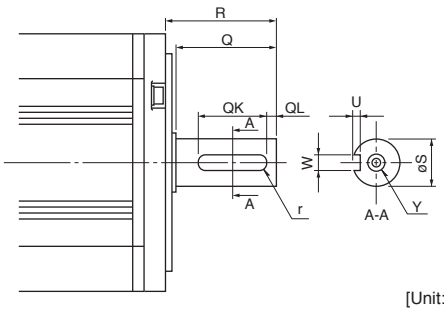
HG

Servo motors with the following specifications are also available.

K: Keyed shaft (without a key) (Note 1, 2)

Model	Variable dimensions								
	S	R	Q	W	QK	QL	U	r	Y
HG-SNS52JK HG-SNS102JK HG-SNS152JK	$24^{0}_{-0.013}$	55	50	$8^{0}_{-0.036}$	36	5	$4^{+0.2}_{0}$	4	M8 screw depth 20
HG-SNS202JK HG-SNS302JK	$35^{+0.010}_{0}$	79	75	$10^{0}_{-0.036}$	55	5	$5^{+0.2}_{0}$	5	

Notes: 1. Do not use a servo motor with a keyed shaft for frequent start/stop applications as this may cause the damage to the shaft.
2. The servo motor is supplied without a key. The user needs to prepare a key.

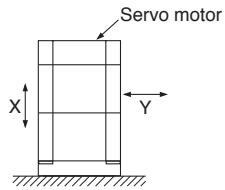


[Unit: mm]

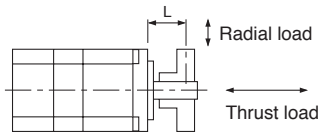
Annotations for Rotary Servo Motor Specifications

HK HG

*1. The vibration direction is shown in the diagram below. The numerical value indicates the maximum value of the component (commonly the bracket in the opposite direction of the load side).
Fretting tends to occur on the bearing when the servo motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.

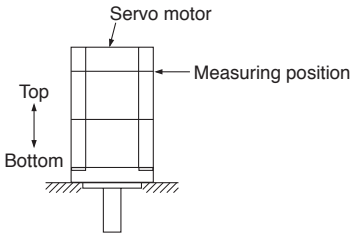


*2. Refer to the diagram below for the permissible load for the shaft. Ensure that loads applied on the shaft do not exceed the values specified in the table. The values in the table are applicable when each load is applied singly.

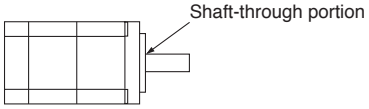


L: Distance between the flange mounting surface and the center of load

*3. V10 indicates that the amplitude of the servo motor itself is 10 μm or less. The following shows mounting orientation and measuring position of the servo motor during the measurement:



*4. Refer to the diagram below for the shaft-through portion.



Power Supply Capacity

HK HG

The power supply capacity of servo amplifier is the same when used with either a 3-phase power supply input or a 1-phase power supply input.
When the servo motor runs at less than the rated speed, the power supply capacity is smaller than the value in the table.

HK series (200 V)

Rotary servo motor		Servo amplifier	Power supply capacity [kVA] (Note 1)
HK-KN	HK-KN053	MR-JET-10G	0.3
	HK-KN13	MR-JET-10G	0.3
	HK-KN1M3	MR-JET-20G	0.5
	HK-KN23	MR-JET-20G	0.5
	HK-KN43	MR-JET-40G	0.9
	HK-KN63	MR-JET-70G	1.3
	HK-KN7M3	MR-JET-70G	1.3
	HK-KN103	MR-JET-100G	1.9
	HK-KN153	MR-JET-200G	2.6
	HK-KN203	MR-JET-200G	3.2
	HK-KN202	MR-JET-200G	3.3
HK-FN	HK-FN13	MR-JET-10G	0.3
	HK-FN23	MR-JET-20G	0.5
	HK-FN43	MR-JET-40G	0.9
	HK-FN7M3	MR-JET-70G	1.4
	HK-FN102	MR-JET-100G	1.8
	HK-FN152	MR-JET-200G	2.5
	HK-FN202	MR-JET-200G	3.1
	HK-FN301M	MR-JET-300G	3.1

Notes: 1. The power supply capacity varies depending on the power supply impedance.

HG series (200 V)

Rotary servo motor		Servo amplifier	Power supply capacity [kVA] (Note 1)
HG-KNS	HG-KNS13J	MR-JET-10G	0.3
	HG-KNS23J	MR-JET-20G	0.5
	HG-KNS43J	MR-JET-40G	0.9
	HG-KNS73J	MR-JET-70G	1.3
HG-SNS	HG-SNS52J	MR-JET-70G	1.0
	HG-SNS102J	MR-JET-100G	1.7
	HG-SNS152J	MR-JET-200G	2.5
	HG-SNS202J	MR-JET-200G	3.5
	HG-SNS302J	MR-JET-300G	4.8

Notes: 1. The power supply capacity varies depending on the power supply impedance.

HK series (400 V)

Rotary servo motor		Servo amplifier	Power supply capacity [kVA] (Note 1)
HK-KN	HK-KN134	MR-JET-60G4-HS	0.4
	HK-KN234	MR-JET-60G4-HS	0.6
	HK-KN434	MR-JET-60G4-HS	1.1
	HK-KN634	MR-JET-60G4-HS	1.3
	HK-KN7M34	MR-JET-100G4-HS	1.8
	HK-KN1034	MR-JET-100G4-HS	2.3
	HK-KN1534	MR-JET-200G4-HS	3.1
	HK-KN2034	MR-JET-200G4-HS	4.0
HK-SN	HK-SN3534	MR-JET-350G4-HS	5.5
	HK-SN5034	MR-JET-500G4-HS	7.5
	HK-SN7034	MR-JET-750G4-HS	10

Notes: 1. The power supply capacity varies depending on the power supply impedance.

5 Linear Servo Motors

* Refer to p. 6-54 in this catalog for conversion of units.
* The characteristics and numerical values without tolerances mentioned in this catalog are representative values.

Model Designation (Note 1)

●LM-H3 series

L M - H 3 P 2 A - 0 7 P - __ (Primary side: coil)

Symbol	Linear servo motor model
BSS0	LM-H3P2A-07P
CSS0	LM-H3P3A-12P
	LM-H3P3B-24P
	LM-H3P3C-36P
	LM-H3P3D-48P
ASS0	LM-H3P7A-24P
	LM-H3P7B-48P
	LM-H3P7C-72P

Symbol	Maximum speed [m/s]
P	3.0

Symbol	Continuous thrust [N]
07	70
12	120
24	240
36	360
48	480
72	720

Symbol	Length (nominal) [mm]
A	128
B	224
C	320
D	416

Symbol	Width (nominal) [mm]
2	50
3	65
7	100

Primary side (coil)

L M - H 3 S 2 0 - 2 8 8 - __ (Secondary side: magnet)

Symbol	Linear servo motor model
BSS0	LM-H3S20-288
	LM-H3S20-384
	LM-H3S20-480
	LM-H3S20-768
CSS0	LM-H3S30-288
	LM-H3S30-384
	LM-H3S30-480
	LM-H3S30-768
ASS0	LM-H3S70-288
	LM-H3S70-384
	LM-H3S70-480
	LM-H3S70-768

Symbol	Length (nominal) [mm]
288	288
384	384
480	480
768	768

Symbol	Width (nominal) [mm]
2	42
3	60
7	95

Secondary side (magnet)

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.

Model Designation (Note 1)

●LM-AJ series

L M - A J P 1 B - 0 7 K - __ (Primary side: coil)

Symbol	Linear servo motor model
JSS0	LM-AJP1B-07K
	LM-AJP1D-14K
	LM-AJP2B-12S
	LM-AJP2D-23T
	LM-AJP3B-17N
	LM-AJP3D-35R
	LM-AJP4B-22M
	LM-AJP4D-45N

Symbol	Maximum speed [m/s]
M	2.0
N	2.5
R	3.5
S	4.0
T	5.0
K	6.5

Symbol	Continuous thrust [N]
07	68.1
12	117.0
14	136.2
17	174.5
22	223.4
23	234.0
35	348.9
45	446.8

Symbol	Length (nominal) [mm]
B	96
D	176

Symbol	Width (nominal) [mm]
1	50
2	75
3	100
4	125

(Primary side: coil)

L M - A J S 1 0 - 0 8 0 - __ (Secondary side: magnet)

Symbol	Linear servo motor model
JSS0	LM-AJS10-080
	LM-AJS10-200
	LM-AJS10-400
	LM-AJS20-080
	LM-AJS20-200
	LM-AJS20-400
	LM-AJS30-080
	LM-AJS30-200
	LM-AJS30-400
	LM-AJS40-080
	LM-AJS40-200
	LM-AJS40-400

Symbol	Length (nominal) [mm]
080	80
200	200
400	400

Symbol	Width (nominal) [mm]
1	50
2	75
3	100
4	125

(Secondary side: magnet)

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.

Model Designation (Note 1)

●LM-AU series

L M - A U P 3 A - 0 3 V - __ (Primary side: coil)

Symbol	Linear servo motor model
JSS0	LM-AUP3A-03V
	LM-AUP3B-06V
	LM-AUP3C-09V
	LM-AUP3D-11R
	LM-AUP4A-04R
	LM-AUP4B-09R
	LM-AUP4C-13P
	LM-AUP4D-18M
	LM-AUP4F-26P
	LM-AUP4H-35M

Symbol	Maximum speed [m/s]
M	2.0
P	3.0
R	3.5
V	4.5

Symbol	Continuous thrust [N]
03	28
04	44
06	57
09 (Note 2)	85
	88
11	113
13	132
18	176
26	264
35	350

Symbol	Length (nominal) [mm]
A	61
B	121
C	181
D	241
F	361
H	481

Symbol	Width (nominal) [mm]
3	58.9
4	79.2

(Primary side: coil)

L M - A U S 3 0 - 1 2 0 - __ (Secondary side: magnet)

Symbol	Linear servo motor model
JSS0	LM-AUS30-120
	LM-AUS30-180
	LM-AUS30-240
	LM-AUS30-300
	LM-AUS30-600
	LM-AUS40-120
	LM-AUS40-180
	LM-AUS40-240
	LM-AUS40-300
	LM-AUS40-600

Symbol	Length (nominal) [mm]
120	120
180	180
240	240
300	300
600	600

Symbol	Width (nominal) [mm]
3	50.8
4	76.2

(Secondary side: magnet)

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.
2. The continuous thrust for LM-AUP3C-09V-JSS0 is 85 N.
The continuous thrust for LM-AUP4B-09R-JSS0 is 88 N.

MEMO

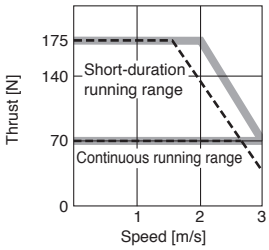
LM-H3 Series Specifications

Linear servo motor model Primary side (coil)	LM-H3	P2A-07P-BSS0	P3A-12P-CSS0	P3B-24P-CSS0	P3C-36P-CSS0	P3D-48P-CSS0	P7A-24P-ASS0	P7B-48P-ASS0	P7C-72P-ASS0
Linear servo motor model Secondary side (magnet)	LM-H3	S20-288-BSS0 S20-384-BSS0 S20-480-BSS0 S20-768-BSS0	S30-288-CSS0 S30-384-CSS0 S30-480-CSS0 S30-768-CSS0				S70-288-ASS0 S70-384-ASS0 S70-480-ASS0 S70-768-ASS0		
Cooling method		Natural cooling							
Thrust	Continuous (Note 2) [N]	70	120	240	360	480	240	480	720
	Maximum [N]	175	300	600	900	1200	600	1200	1800
Maximum speed (Note 1) [m/s]		3.0							
Magnetic attraction force [N]		630	1100	2200	3300	4400	2200	4400	6600
Rated current [A]		1.8	1.7	3.4	5.1	6.8	3.4	6.8	10.2
Maximum current [A]		5.8	5.0	9.9	14.9	19.8	9.6	19.1	28.6
Recommended load to motor mass ratio (Note 3)		35 times or less							
Type		Permanent magnet synchronous motor							
Thermistor		Built-in							
Insulation class		155 (F)							
Structure		Open (IP rating: IP00)							
Vibration resistance [m/s^2]		49							
Mass	Primary side (coil) [kg]	0.9	1.3	2.3	3.3	4.3	2.2	3.9	5.6
	Secondary side (magnet) [kg]	288 mm/pc: 0.7 384 mm/pc: 0.9 480 mm/pc: 1.1 768 mm/pc: 1.8	288 mm/pc: 1.0 384 mm/pc: 1.4 480 mm/pc: 1.7 768 mm/pc: 2.7				288 mm/pc: 2.8 384 mm/pc: 3.7 480 mm/pc: 4.7 768 mm/pc: 7.4		

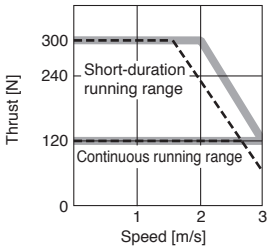
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. Use the linear servo motor at 70 % or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.
3. This is the ratio of the load to the linear servo motor primary side mass. Contact your local sales office if the load to motor mass ratio exceeds the value in the table.

LM-H3 Series Thrust Characteristics

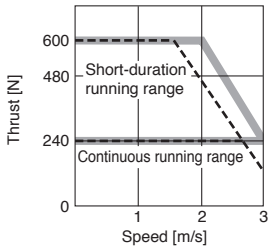
LM-H3P2A-07P-BSS0 (Note 1, 2, 3)



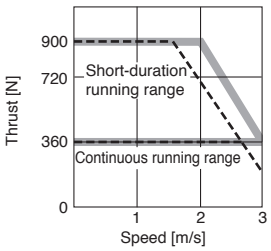
LM-H3P3A-12P-CSS0 (Note 1, 2, 3)



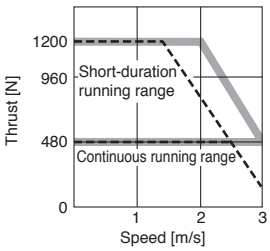
LM-H3P3B-24P-CSS0 (Note 1, 2, 3)



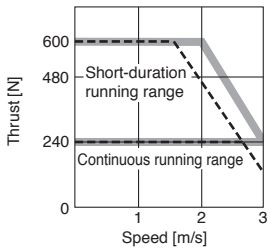
LM-H3P3C-36P-CSS0 (Note 1, 2, 3)



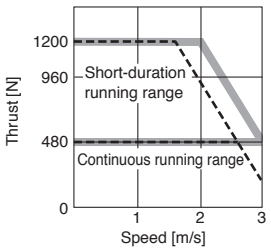
LM-H3P3D-48P-CSS0 (Note 1, 2, 3)



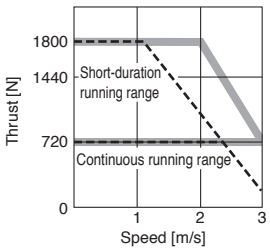
LM-H3P7A-24P-ASS0 (Note 1, 2, 3)



LM-H3P7B-48P-ASS0 (Note 1, 2, 3)



LM-H3P7C-72P-ASS0 (Note 1, 2, 3)



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

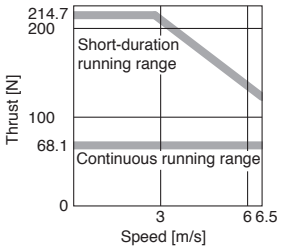
LM-AJ Series Specifications

Linear servo motor model Primary side (coil)	LM-AJ	P1B-07K-JSS0	P1D-14K-JSS0	P2B-12S-JSS0	P2D-23T-JSS0	P3B-17N-JSS0	P3D-35R-JSS0	P4B-22M-JSS0	P4D-45N-JSS0
Linear servo motor model Secondary side (magnet)	LM-AJ	S10-080-JSS0 S10-200-JSS0 S10-400-JSS0		S20-080-JSS0 S20-200-JSS0 S20-400-JSS0		S30-080-JSS0 S30-200-JSS0 S30-400-JSS0		S40-080-JSS0 S40-200-JSS0 S40-400-JSS0	
Cooling method		Natural cooling							
Thrust	Continuous (Note 2) [N]	68.1	136.2	117.0	234.0	174.5	348.9	223.4	446.8
	Maximum [N]	214.7	429.4	369.0	738.1	550.2	1100.4	704.5	1409.1
Maximum speed (Note 1)	[m/s]	6.5		4.0	5.0	2.5	3.5	2.0	2.5
Magnetic attraction force	[N]	378.8	757.6	651.1	1302.1	970.7	1941.4	1242.9	2485.9
Rated current	[A]	2.3	4.6	2.3	4.6	2.3	4.6	2.3	4.6
Maximum current	[A]	9.0	18.0	9.0	18.0	9.0	18.0	9.0	18.0
Recommended load to motor mass ratio (Note 3)		10 times or less	25 times or less	20 times or less	25 times or less	30 times or less			
Type		Permanent magnet synchronous motor							
Thermistor		None							
Thermal protector		Built-in							
Insulation class		105 (A)							
Structure		Open (IP rating: IP00)							
Vibration resistance	[m/s^2]	49							
Mass	Primary side (coil) [kg]	0.6	1.1	0.9	1.7	1.2	2.3	1.5	2.9
	Secondary side (magnet) [kg]	80 mm/pc: 0.26 200 mm/pc: 0.65 400 mm/pc: 1.30		80 mm/pc: 0.40 200 mm/pc: 1.00 400 mm/pc: 2.00		80 mm/pc: 0.56 200 mm/pc: 1.40 400 mm/pc: 2.80		80 mm/pc: 0.70 200 mm/pc: 1.70 400 mm/pc: 3.50	

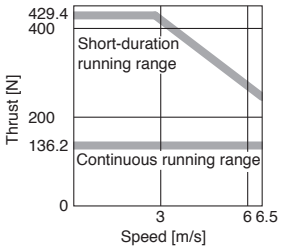
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. Use the linear servo motor at 70 % or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.
3. This is the ratio of the load to the linear servo motor primary side mass. Contact your local sales office if the load to motor mass ratio exceeds the value in the table.

LM-AJ Series Thrust Characteristics

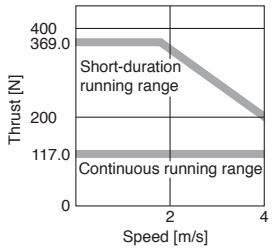
LM-AJP1B-07K-JSS0 (Note 1, 2, 3)



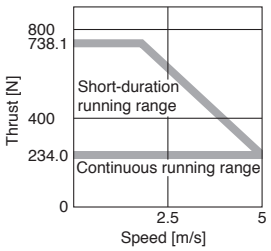
LM-AJP1D-14K-JSS0 (Note 1, 2, 3)



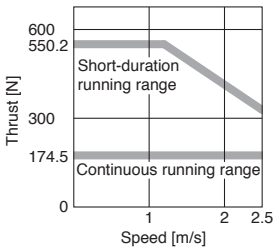
LM-AJP2B-12S-JSS0 (Note 1, 2, 3)



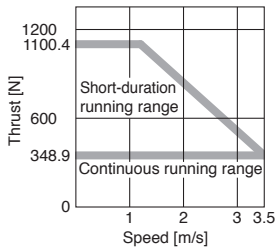
LM-AJP2D-23T-JSS0 (Note 1, 2, 3)



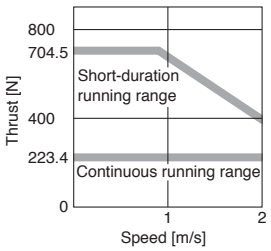
LM-AJP3B-17N-JSS0 (Note 1, 2, 3)



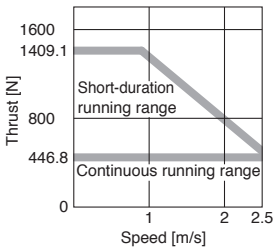
LM-AJP3D-35R-JSS0 (Note 1, 2, 3)



LM-AJP4B-22M-JSS0 (Note 1, 2, 3)



LM-AJP4D-45N-JSS0 (Note 1, 2, 3)



Notes: 1. ▬ : For 3-phase 200 V AC
2. Contact your local sales office for the thrust characteristics for 1-phase 200 V AC.
3. Thrust drops when the power supply voltage is below the specified value.

LM-AU Series Specifications

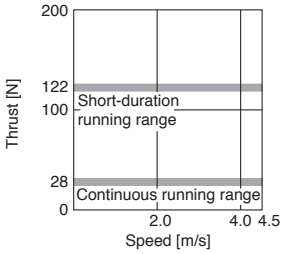
Linear servo motor model Primary side (coil)		LM-AU	P3A-03V-JSS0	P3B-06V-JSS0	P3C-09V-JSS0	P3D-11R-JSS0
Linear servo motor model Secondary side (magnet)		LM-AU	S30-120-JSS0 S30-180-JSS0 S30-240-JSS0 S30-300-JSS0 S30-600-JSS0			
Cooling method			Natural cooling			
Thrust	Continuous (Note 2)	[N]	28	57	85	113
	Maximum	[N]	122	274	411	549
Maximum speed (Note 1)		[m/s]	4.5			3.5
Magnetic attraction force		[N]	0			
Rated current		[A]	1.8			
Maximum current		[A]	9.2			
Recommended load to motor mass ratio (Note 3)			35 times or less		25 times or less	20 times or less
Type			Permanent magnet synchronous motor			
Thermistor			None			
Thermal protector			Built-in			
Insulation class			105 (A)			
Structure			Open (IP rating: IP00)			
Vibration resistance		[m/s^2]	49			
Mass	Primary side (coil)	[kg]	0.22	0.45	0.68	0.91
	Secondary side (magnet)	[kg]	120 mm/pc: 1.0 180 mm/pc: 1.5 240 mm/pc: 2.0 300 mm/pc: 2.5 600 mm/pc: 5.0			

Linear servo motor model Primary side (coil)		LM-AU	P4A-04R-JSS0	P4B-09R-JSS0	P4C-13P-JSS0	P4D-18M-JSS0	P4F-26P-JSS0	P4H-35M-JSS0
Linear servo motor model Secondary side (magnet)		LM-AU	S40-120-JSS0 S40-180-JSS0 S40-240-JSS0 S40-300-JSS0 S40-600-JSS0					
Cooling method			Natural cooling					
Thrust	Continuous (Note 2)	[N]	44	88	132	176	264	350
	Maximum	[N]	280	561	842	970	1684	1764
Maximum speed (Note 1)		[m/s]	3.5		3.0	2.0	3.0	2.0
Magnetic attraction force		[N]	0					
Rated current		[A]	1.9				3.7	
Maximum current		[A]	13.0				26.0	
Recommended load to motor mass ratio (Note 3)			35 times or less					
Type			Permanent magnet synchronous motor					
Thermistor			None					
Thermal protector			Built-in					
Insulation class			105 (A)					
Structure			Open (IP rating: IP00)					
Vibration resistance		[m/s^2]	49					
Mass	Primary side (coil)	[kg]	0.28	0.56	0.89	1.2	1.8	2.4
	Secondary side (magnet)	[kg]	120 mm/pc: 1.8 180 mm/pc: 2.7 240 mm/pc: 3.6 300 mm/pc: 4.5 600 mm/pc: 8.9					

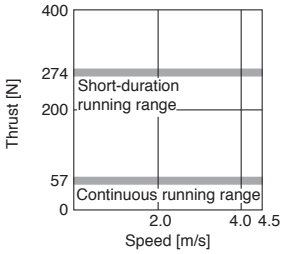
Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. Use the linear servo motor at 70 % or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.
3. This is the ratio of the load to the linear servo motor primary side mass. Contact your local sales office if the load to motor mass ratio exceeds the value in the table.

LM-AU Series Thrust Characteristics

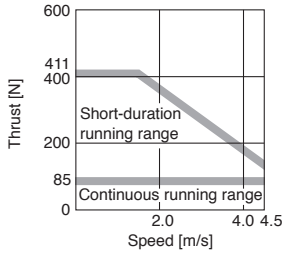
LM-AUP3A-03V-JSS0 (Note 1, 2, 3)



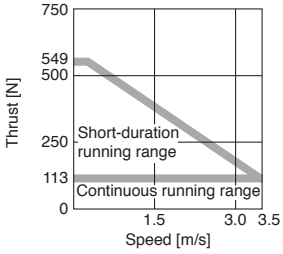
LM-AUP3B-06V-JSS0 (Note 1, 2, 3)



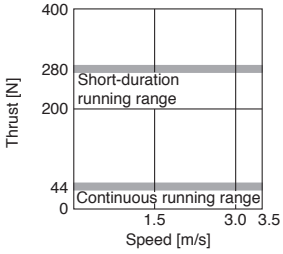
LM-AUP3C-09V-JSS0 (Note 1, 2, 3)



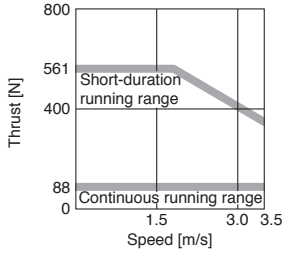
LM-AUP3D-11R-JSS0 (Note 1, 2, 3)



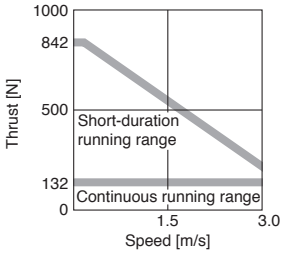
LM-AUP4A-04R-JSS0 (Note 1, 2, 3)



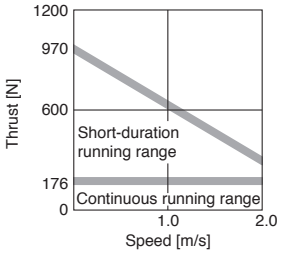
LM-AUP4B-09R-JSS0 (Note 1, 2, 3)



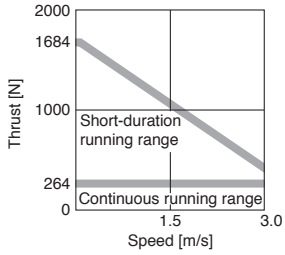
LM-AUP4C-13P-JSS0 (Note 1, 2, 3)



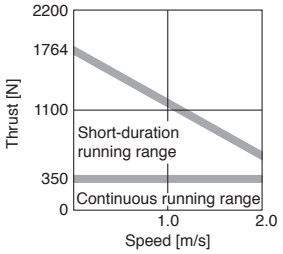
LM-AUP4D-18M-JSS0 (Note 1, 2, 3)



LM-AUP4F-26P-JSS0 (Note 1, 2, 3)



LM-AUP4H-35M-JSS0 (Note 1, 2, 3)



Notes: 1. ▬ : For 3-phase 200 V AC
2. Contact your local sales office for the thrust characteristics for 1-phase 200 V AC.
3. Thrust drops when the power supply voltage is below the specified value.

Power Supply Capacity

The power supply capacity of servo amplifier is the same when used with either a 3-phase power supply input or a 1-phase power supply input.
When the servo motor runs at less than the rated speed, the power supply capacity is smaller than the value in the table.

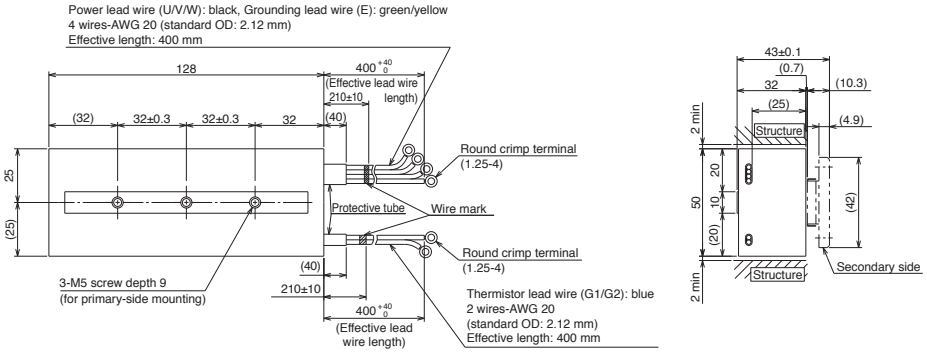
Linear servo motor (primary side)		Servo amplifier	Power supply capacity [kVA] (Note 1)
LM-H3 series	LM-H3P2A-07P-BSS0	MR-JET-40G	0.9
	LM-H3P3A-12P-CSS0		
	LM-H3P3B-24P-CSS0	MR-JET-70G	1.3
	LM-H3P3C-36P-CSS0	MR-JET-70G	1.9
	LM-H3P3D-48P-CSS0	MR-JET-200G	3.5
	LM-H3P7A-24P-ASS0	MR-JET-70G	1.3
	LM-H3P7B-48P-ASS0	MR-JET-200G	3.5
	LM-H3P7C-72P-ASS0	MR-JET-200G	3.8
LM-AJ series	LM-AJP1B-07K-JSS0	MR-JET-40G	0.9
	LM-AJP1D-14K-JSS0	MR-JET-70G	1.3
	LM-AJP2B-12S-JSS0	MR-JET-40G	0.9
	LM-AJP2D-23T-JSS0	MR-JET-70G	1.3
	LM-AJP3B-17N-JSS0	MR-JET-40G	0.9
	LM-AJP3D-35R-JSS0	MR-JET-70G	1.3
	LM-AJP4B-22M-JSS0	MR-JET-40G	0.9
	LM-AJP4D-45N-JSS0	MR-JET-70G	1.3
LM-AU series	LM-AUP3A-03V-JSS0	MR-JET-40G	0.9
	LM-AUP3B-06V-JSS0	MR-JET-40G	0.9
	LM-AUP3C-09V-JSS0	MR-JET-40G	0.9
	LM-AUP3D-11R-JSS0	MR-JET-40G	1.2
	LM-AUP4A-04R-JSS0	MR-JET-70G	1.3
	LM-AUP4B-09R-JSS0	MR-JET-70G	1.3
	LM-AUP4C-13P-JSS0	MR-JET-70G	1.3
	LM-AUP4D-18M-JSS0	MR-JET-70G	1.3
	LM-AUP4F-26P-JSS0	MR-JET-200G	3.5
	LM-AUP4H-35M-JSS0	MR-JET-200G	3.5

Notes: 1. The power supply capacity varies depending on the power supply impedance.

MEMO

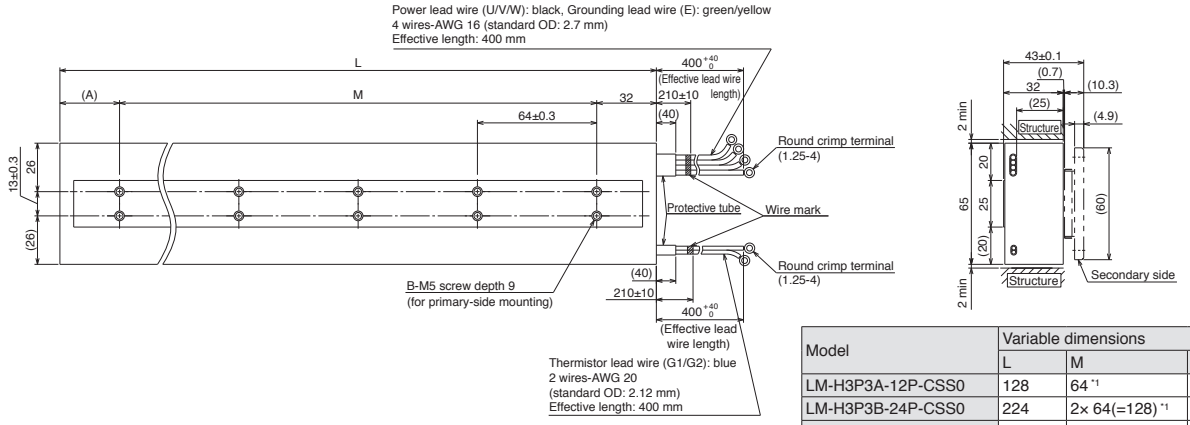
LM-H3 Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-H3P2A-07P-BSS0



[Unit: mm]

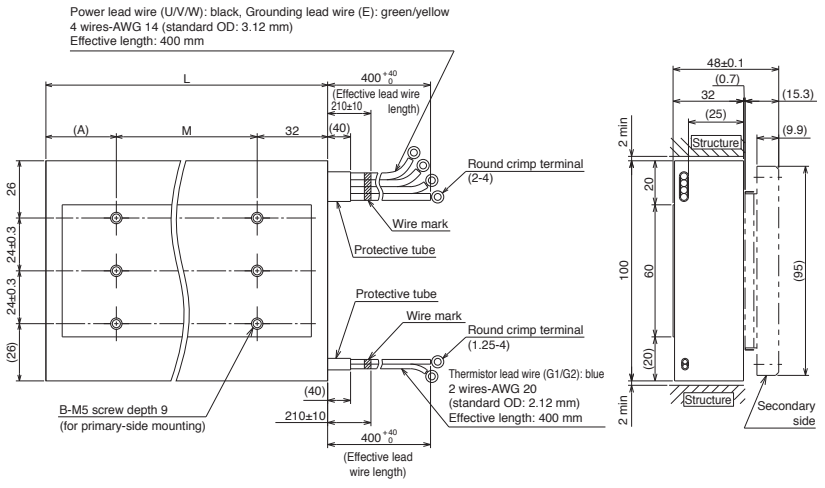
●LM-H3P3A-12P-CSS0 ●LM-H3P3B-24P-CSS0 ●LM-H3P3C-36P-CSS0
●LM-H3P3D-48P-CSS0



Model	Variable dimensions			
	L	M	A	B
LM-H3P3A-12P-CSS0	128	64 *1	32	4
LM-H3P3B-24P-CSS0	224	2× 64(=128) *1	64	6
LM-H3P3C-36P-CSS0	320	4× 64(=256) *1	32	10
LM-H3P3D-48P-CSS0	416	5× 64(=320) *1	64	12

*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

●LM-H3P7A-24P-ASS0 ●LM-H3P7B-48P-ASS0 ●LM-H3P7C-72P-ASS0



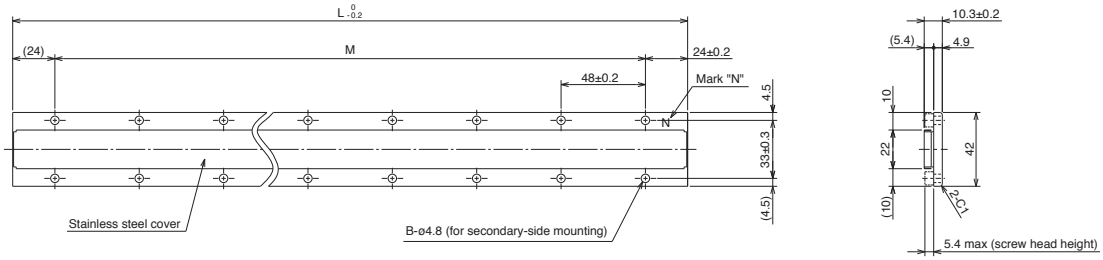
Model	Variable dimensions			
	L	M	A	B
LM-H3P7A-24P-ASS0	128	64 *1	32	6
LM-H3P7B-48P-ASS0	224	2× 64(=128) *1	64	9
LM-H3P7C-72P-ASS0	320	4× 64(=256) *1	32	15

*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

Notes: 1. Power, grounding, and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-H3 Series Secondary Side (Magnet) Dimensions

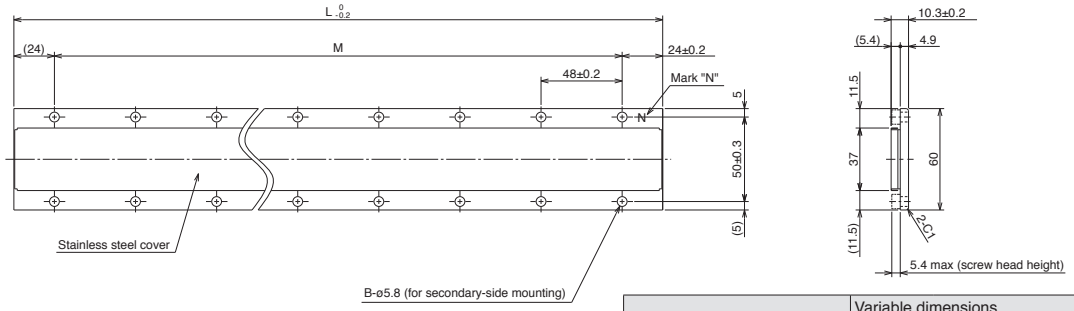
●LM-H3S20-288-BSS0 ●LM-H3S20-384-BSS0 ●LM-H3S20-480-BSS0
●LM-H3S20-768-BSS0



Model	Variable dimensions		
	L	M	B
LM-H3S20-288-BSS0	288	5× 48(=240) *1	12
LM-H3S20-384-BSS0	384	7× 48(=336) *1	16
LM-H3S20-480-BSS0	480	9× 48(=432) *1	20
LM-H3S20-768-BSS0	768	15× 48(=720) *1	32

*1. Pitch tolerance between holes at both ends: ±0.2 [Unit: mm]

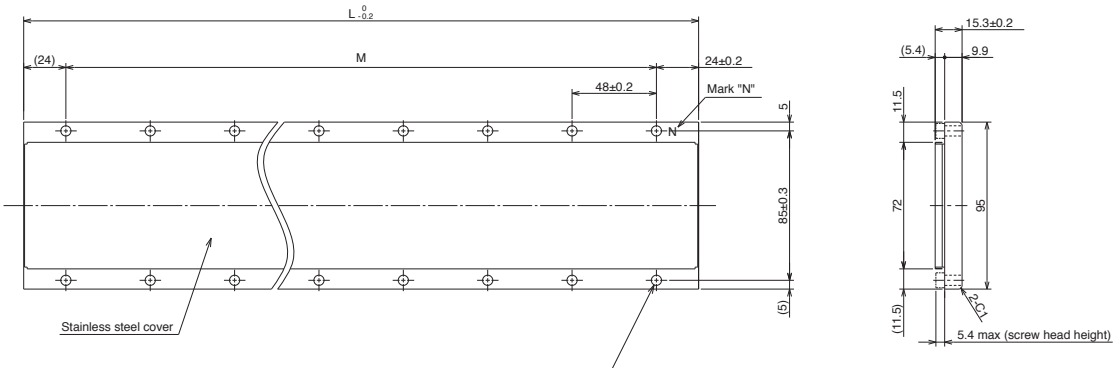
●LM-H3S30-288-CSS0 ●LM-H3S30-384-CSS0 ●LM-H3S30-480-CSS0
●LM-H3S30-768-CSS0



Model	Variable dimensions		
	L	M	B
LM-H3S30-288-CSS0	288	5× 48(=240) *1	12
LM-H3S30-384-CSS0	384	7× 48(=336) *1	16
LM-H3S30-480-CSS0	480	9× 48(=432) *1	20
LM-H3S30-768-CSS0	768	15× 48(=720) *1	32

*1. Pitch tolerance between holes at both ends: ±0.2 [Unit: mm]

●LM-H3S70-288-ASS0 ●LM-H3S70-384-ASS0 ●LM-H3S70-480-ASS0
●LM-H3S70-768-ASS0

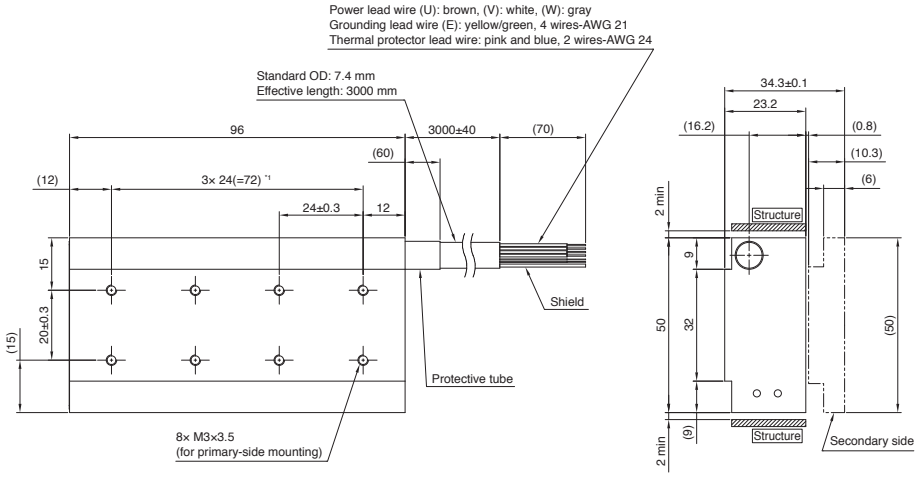


Model	Variable dimensions		
	L	M	B
LM-H3S70-288-ASS0	288	5× 48(=240) *1	12
LM-H3S70-384-ASS0	384	7× 48(=336) *1	16
LM-H3S70-480-ASS0	480	9× 48(=432) *1	20
LM-H3S70-768-ASS0	768	15× 48(=720) *1	32

*1. Pitch tolerance between holes at both ends: ±0.2 [Unit: mm]

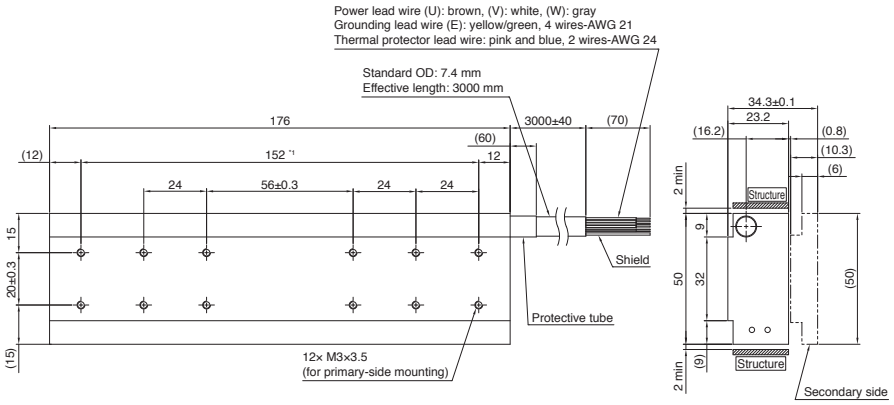
LM-AJ Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-AJP1B-07K-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

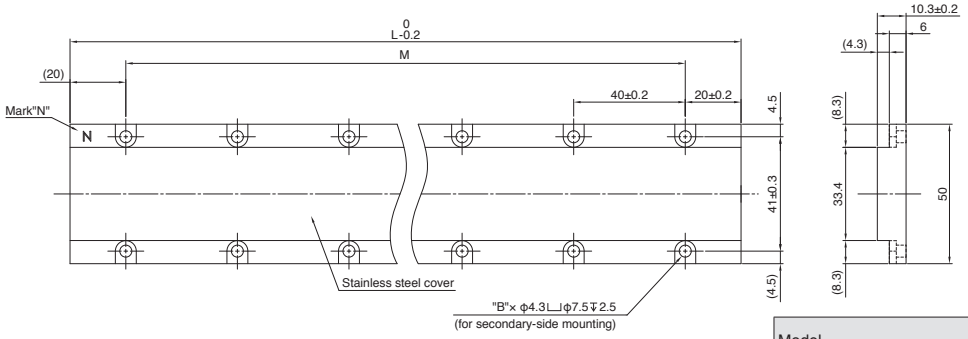
●LM-AJP1D-14K-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

LM-AJ Series Secondary Side (Magnet) Dimensions

●LM-AJS10-080-JSS0 ●LM-AJS10-200-JSS0 ●LM-AJS10-400-JSS0



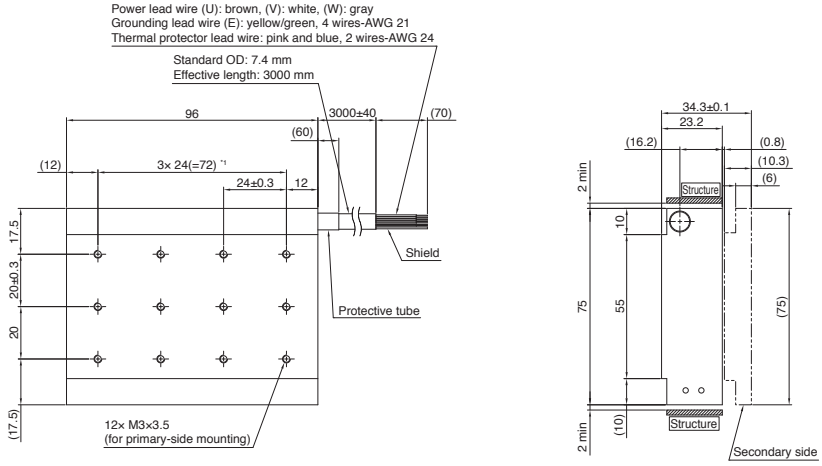
Model	Variable dimensions		
	L	M	B
LM-AJS10-080-JSS0	80	1× 40(=40) *1	4
LM-AJS10-200-JSS0	200	4× 40(=160) *1	10
LM-AJS10-400-JSS0	400	9× 40(=360) *1	20

*1. Pitch tolerance between holes at both ends: ±0.2 [Unit: mm]

Notes: 1. Power, grounding, and thermal protector lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

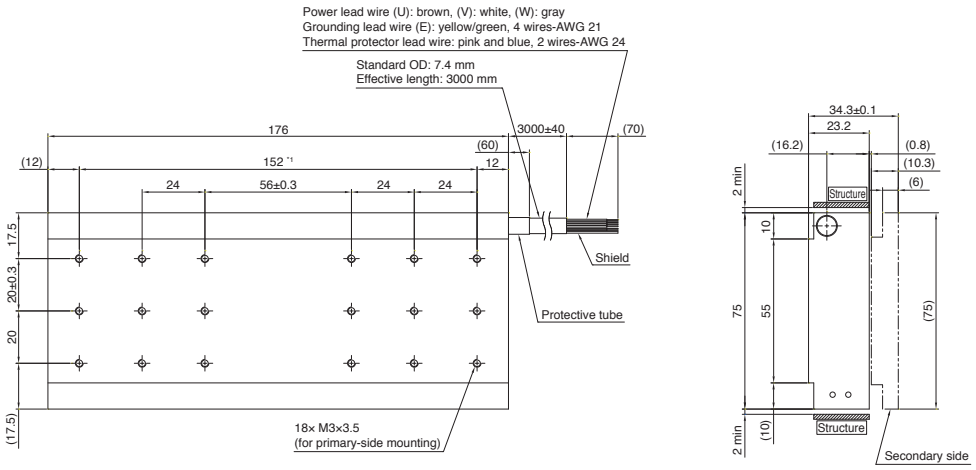
LM-AJ Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-AJP2B-12S-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

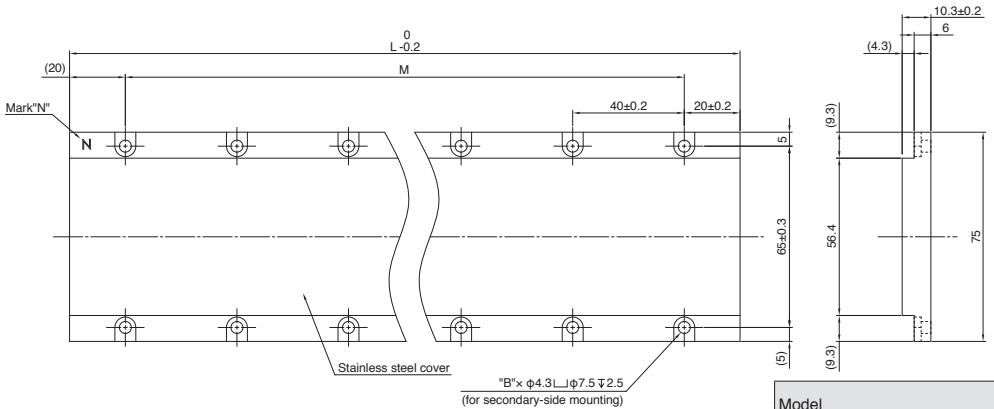
●LM-AJP2D-23T-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

LM-AJ Series Secondary Side (Magnet) Dimensions

●LM-AJS20-080-JSS0 ●LM-AJS20-200-JSS0 ●LM-AJS20-400-JSS0



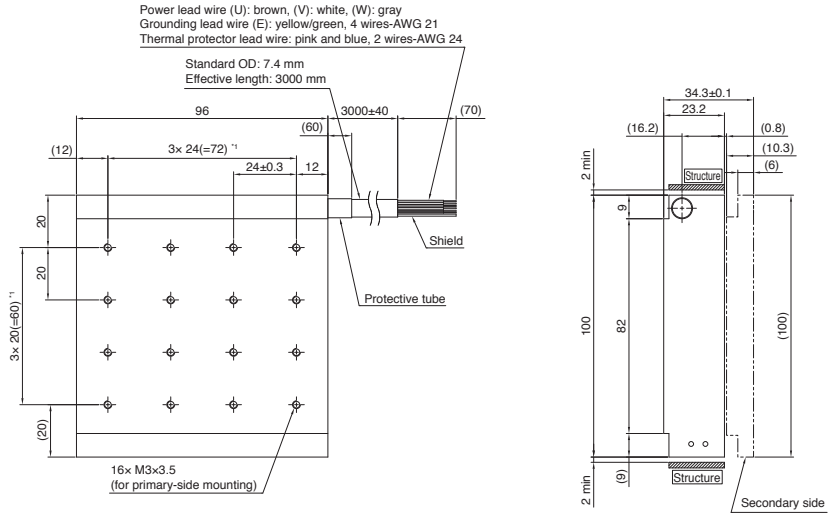
Model	Variable dimensions		
	L	M	B
LM-AJS20-080-JSS0	80	1× 40(=40) *1	4
LM-AJS20-200-JSS0	200	4× 40(=160) *1	10
LM-AJS20-400-JSS0	400	9× 40(=360) *1	20

*1. Pitch tolerance between holes at both ends: ±0.2 [Unit: mm]

Notes: 1. Power, grounding, and thermal protector lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

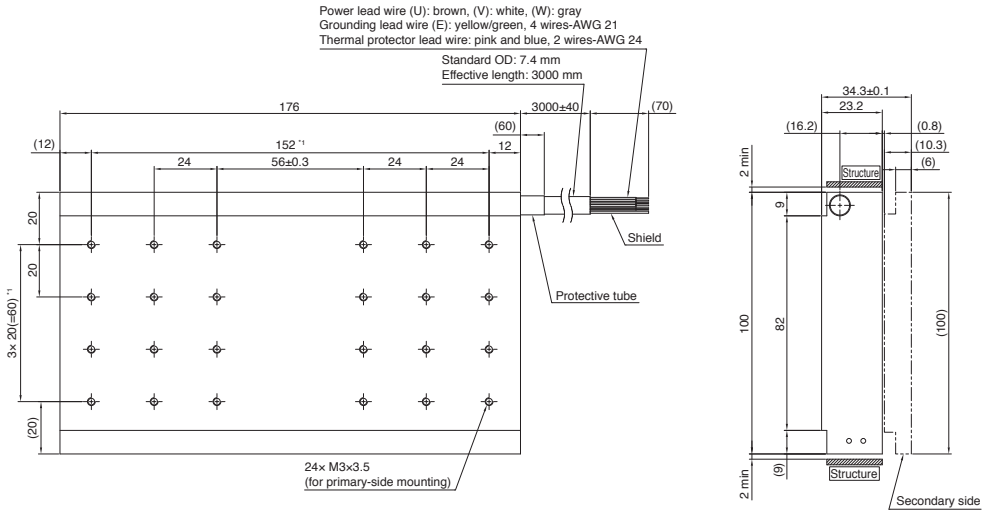
LM-AJ Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-AJP3B-17N-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

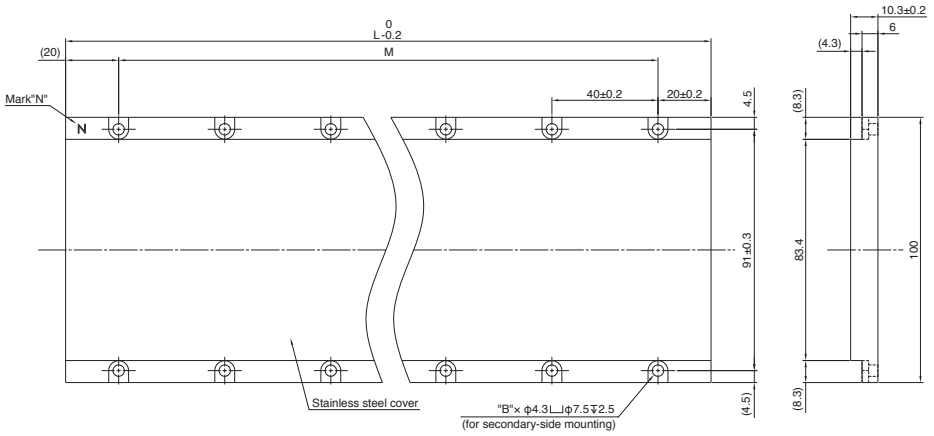
●LM-AJP3D-35R-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

LM-AJ Series Secondary Side (Magnet) Dimensions

●LM-AJS30-080-JSS0 ●LM-AJS30-200-JSS0 ●LM-AJS30-400-JSS0



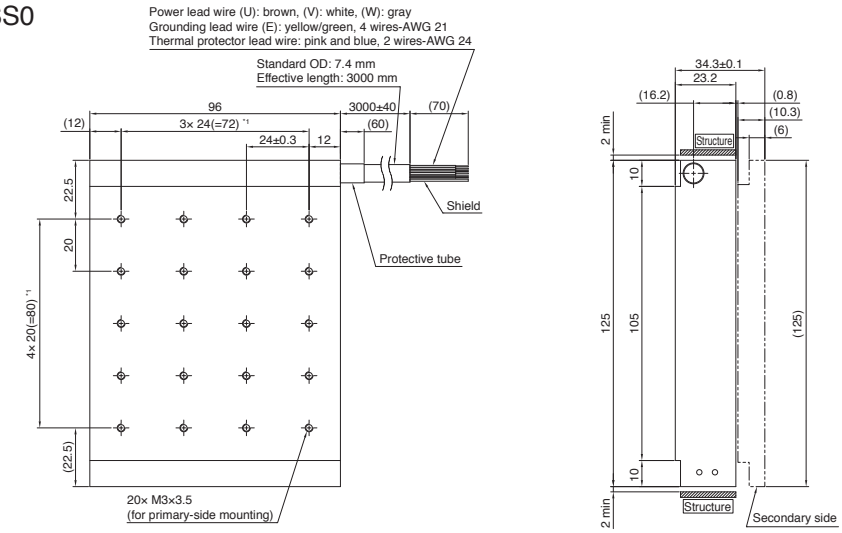
Model	Variable dimensions		
	L	M	B
LM-AJS30-080-JSS0	80	1× 40(=40) *1	4
LM-AJS30-200-JSS0	200	4× 40(=160) *1	10
LM-AJS30-400-JSS0	400	9× 40(=360) *1	20

*1. Pitch tolerance between holes at both ends: ±0.2 [Unit: mm]

Notes: 1. Power, grounding, and thermal protector lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

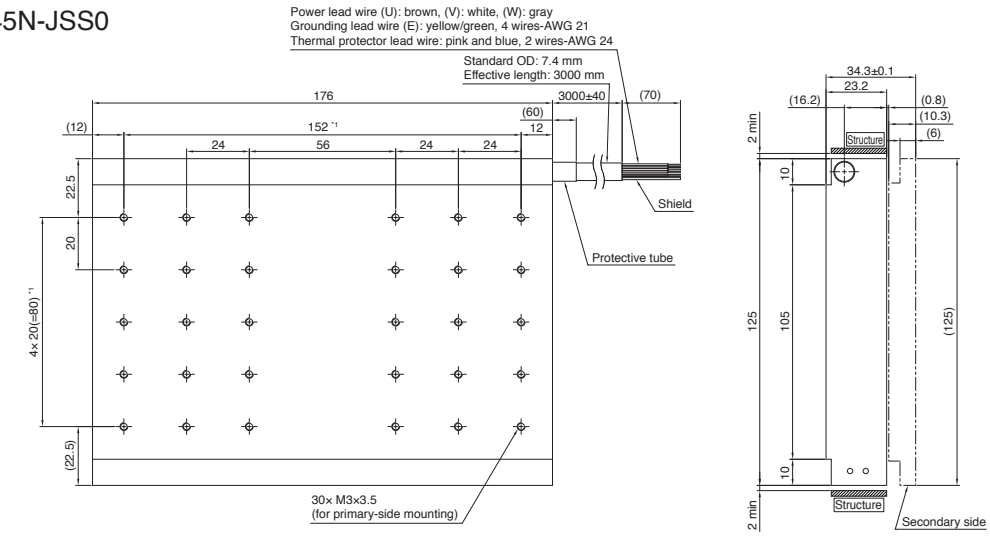
LM-AJ Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-AJP4B-22M-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

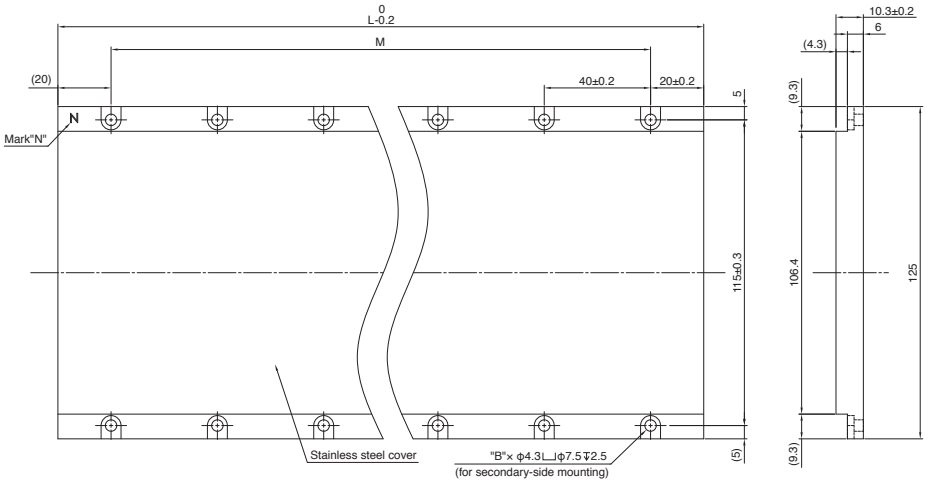
●LM-AJP4D-45N-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

LM-AJ Series Secondary Side (Magnet) Dimensions

●LM-AJS40-080-JSS0 ●LM-AJS40-200-JSS0 ●LM-AJS40-400-JSS0



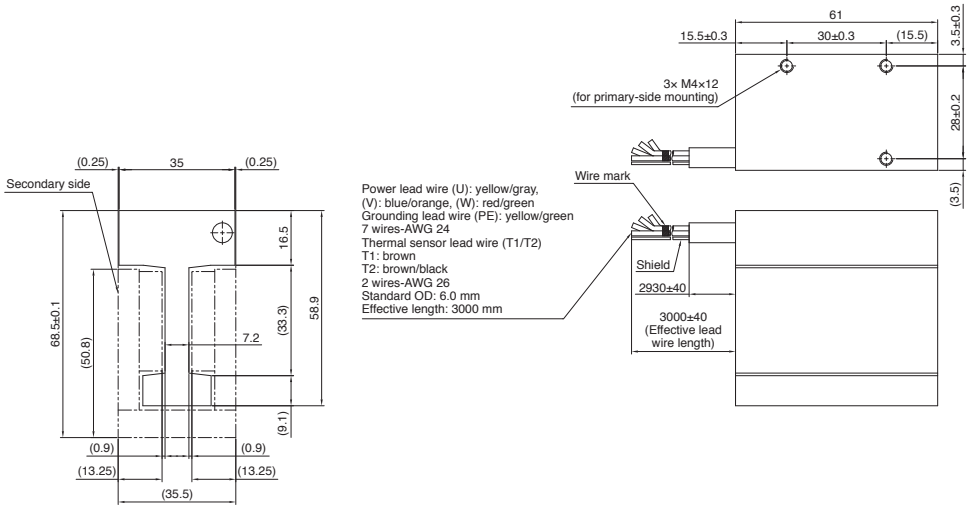
Model	Variable dimensions		
	L	M	B
LM-AJS40-080-JSS0	80	1× 40(=40) *1	4
LM-AJS40-200-JSS0	200	4× 40(=160) *1	10
LM-AJS40-400-JSS0	400	9× 40(=360) *1	20

*1. Pitch tolerance between holes at both ends: ±0.2 [Unit: mm]

Notes: 1. Power, grounding, and thermal protector lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

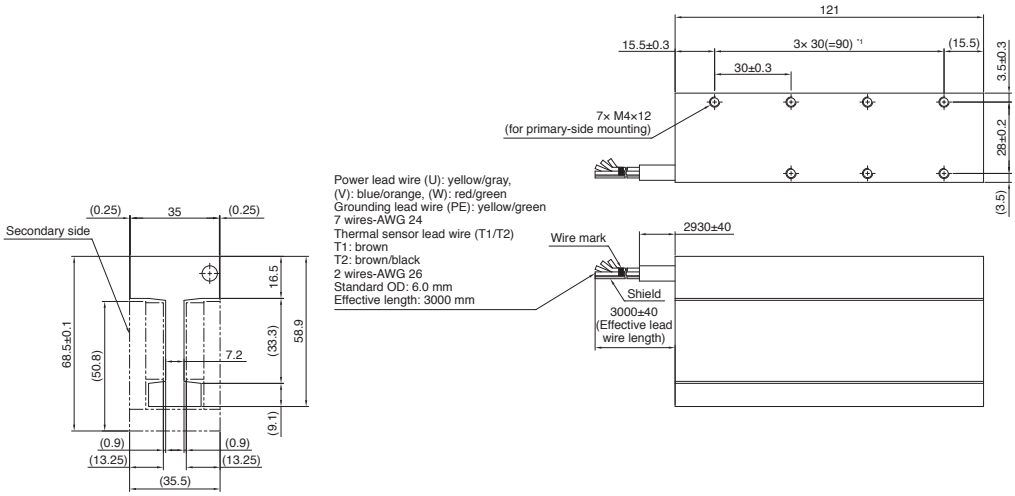
LM-AU Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-AUP3A-03V-JSS0



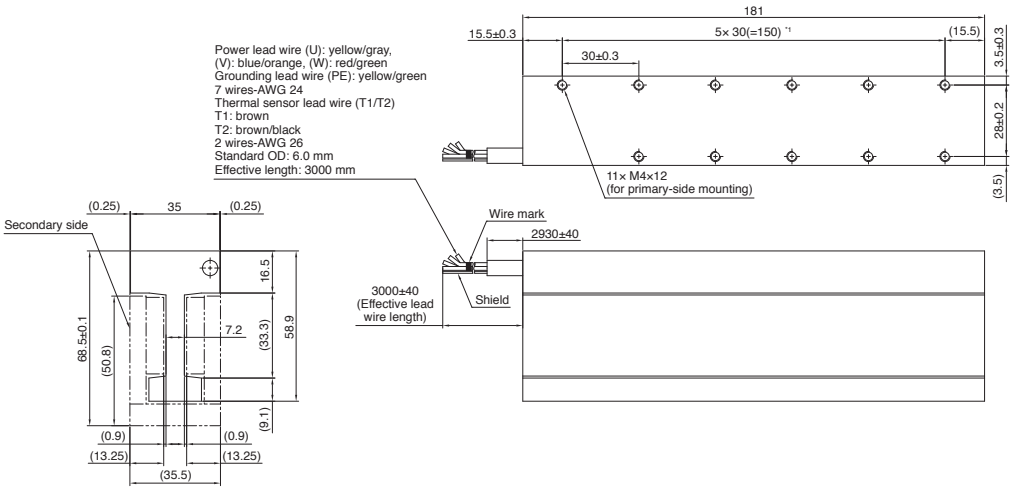
[Unit: mm]

●LM-AUP3B-06V-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

●LM-AUP3C-09V-JSS0

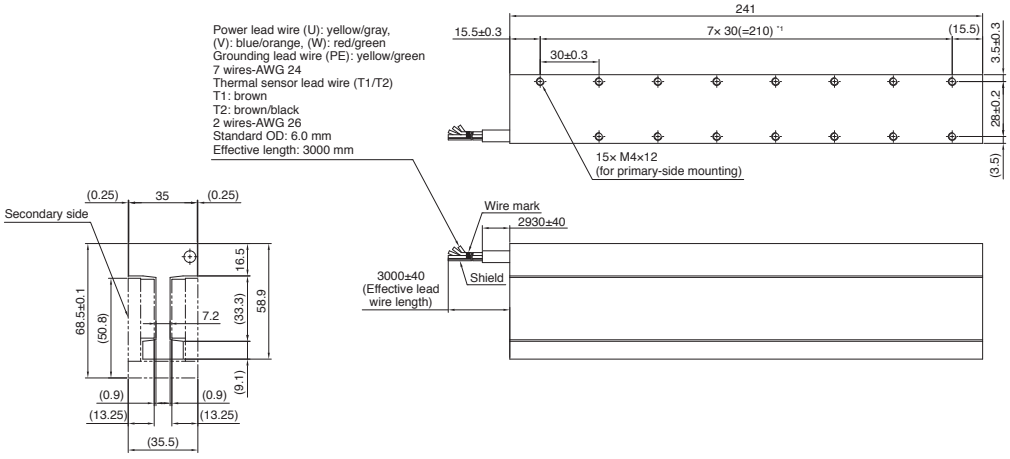


*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

Notes: 1. Power, grounding, and thermal sensor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

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

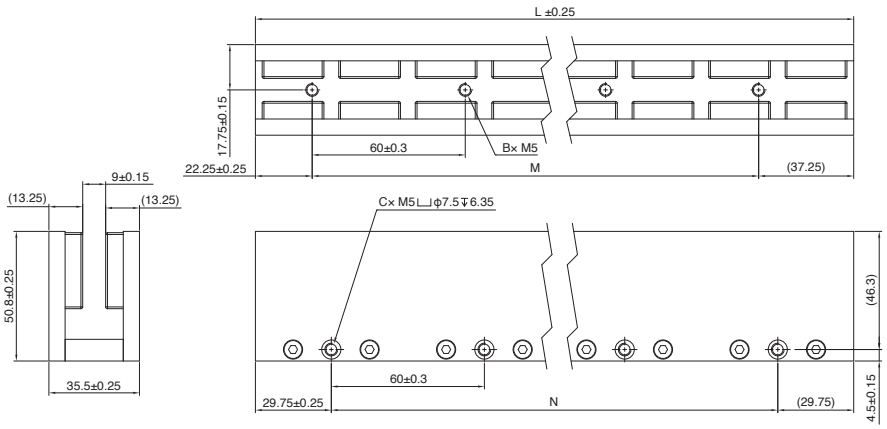
●LM-AUP3D-11R-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

LM-AU Series Secondary Side (Magnet) Dimensions

●LM-AUS30-120-JSS0 ●LM-AUS30-180-JSS0 ●LM-AUS30-240-JSS0
●LM-AUS30-300-JSS0 ●LM-AUS30-600-JSS0



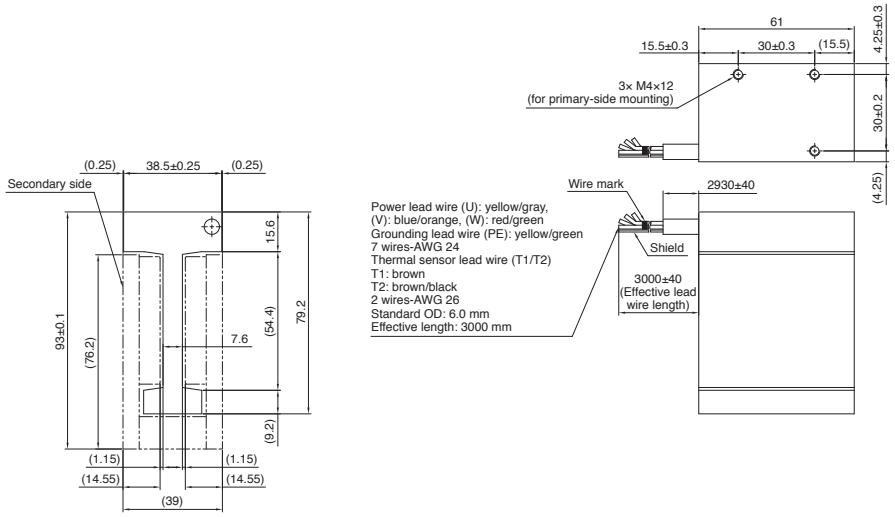
Model	Variable dimensions				
	L	M	N	B	C
LM-AUS30-120-JSS0	119.5	60 *1	60 *1	2	2
LM-AUS30-180-JSS0	179.5	2× 60(=120) *1	2× 60(=120) *1	3	3
LM-AUS30-240-JSS0	239.5	3× 60(=180) *1	3× 60(=180) *1	4	4
LM-AUS30-300-JSS0	299.5	4× 60(=240) *1	4× 60(=240) *1	5	5
LM-AUS30-600-JSS0	599.5	9× 60(=540) *1	9× 60(=540) *1	10	10

*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

Notes: 1. Power, grounding, and thermal sensor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

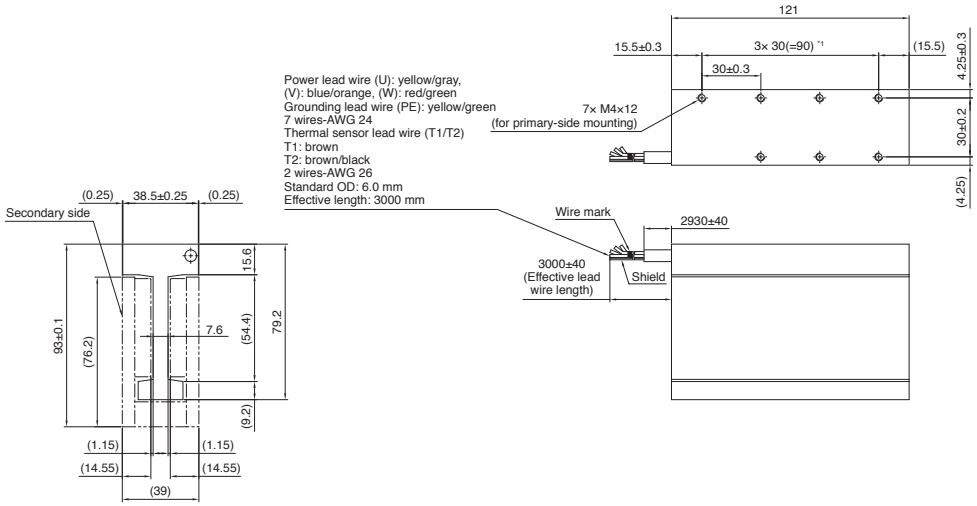
LM-AU Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-AUP4A-04R-JSS0



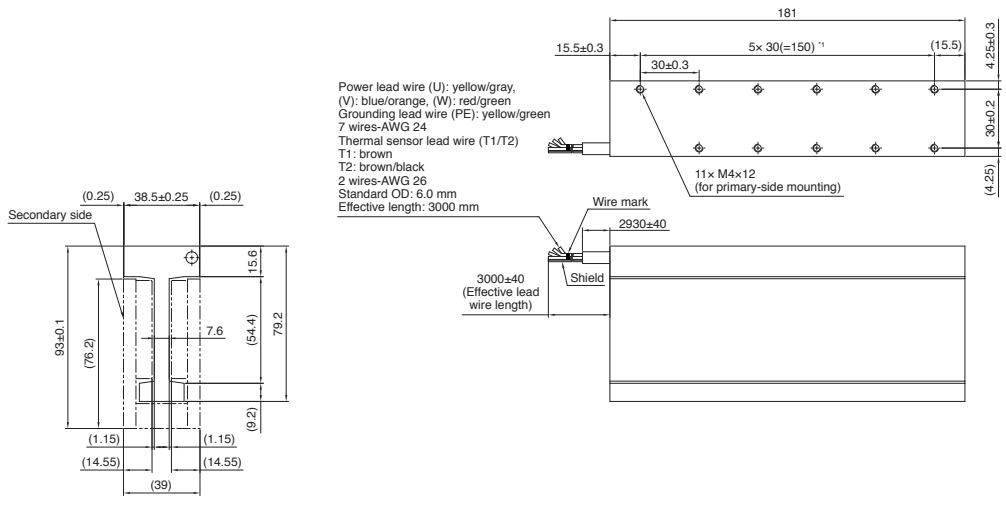
[Unit: mm]

●LM-AUP4B-09R-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

●LM-AUP4C-13P-JSS0



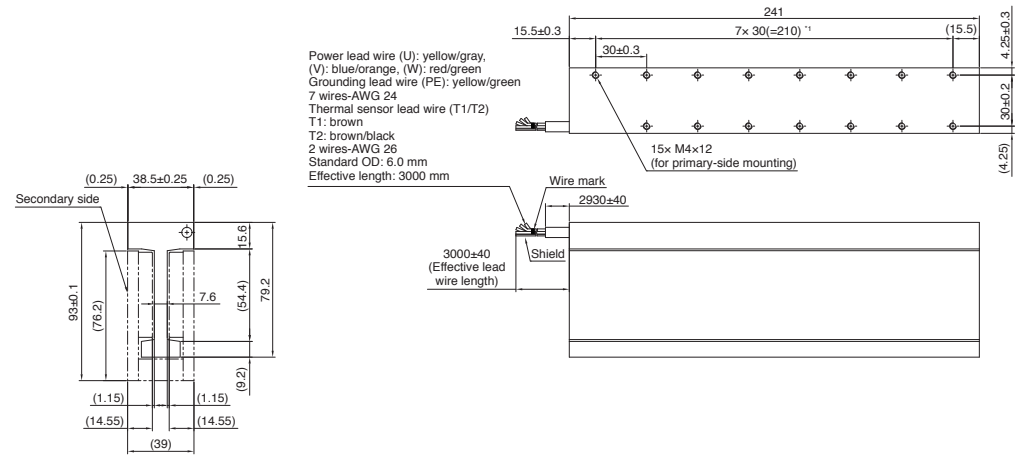
*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

Notes: 1. Power, grounding, and thermal sensor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.

2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

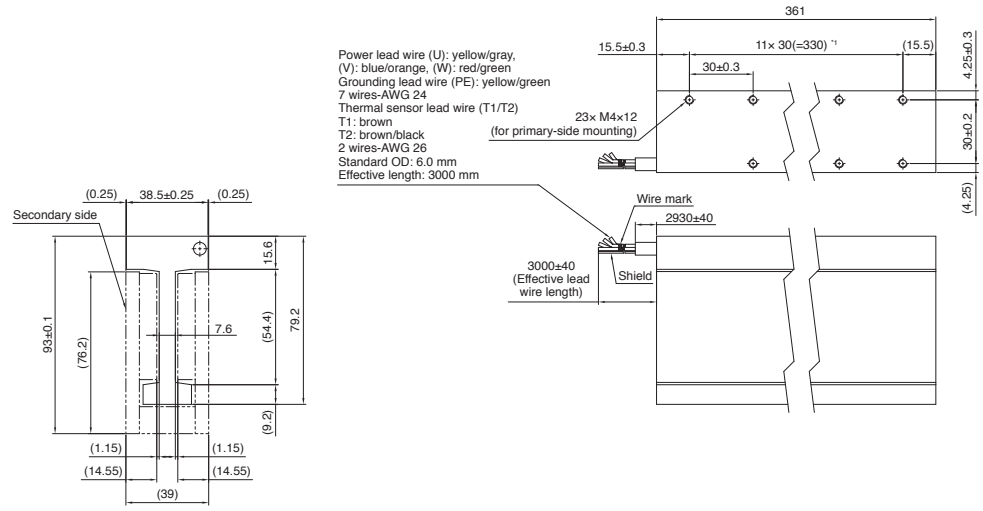
LM-AU Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-AUP4D-18M-JSS0



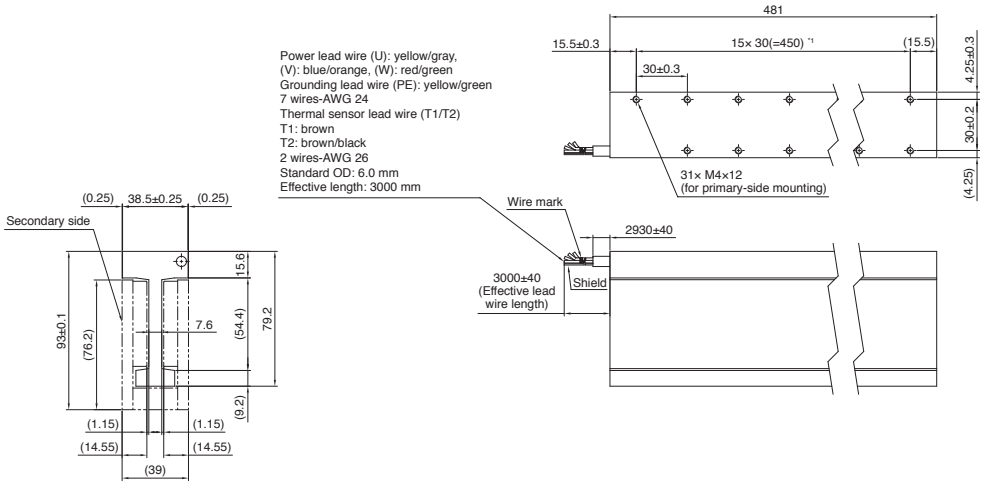
*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

●LM-AUP4F-26P-JSS0



*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

●LM-AUP4H-35M-JSS0

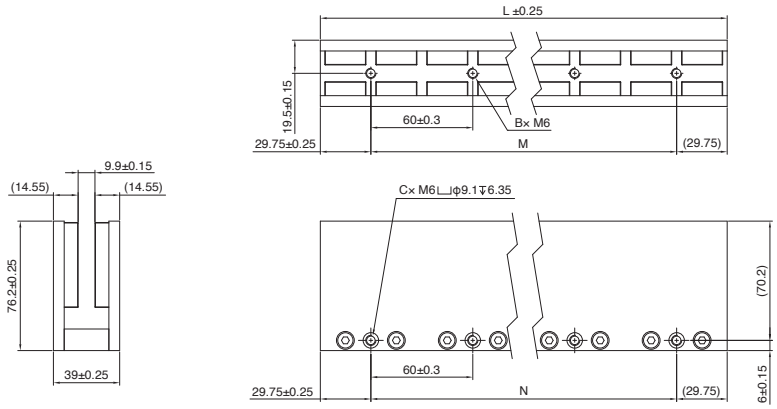


*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

Notes: 1. Power, grounding, and thermal sensor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.
2. Minimum bending radius of the lead wire equals to 10 times the standard overall diameter of the lead wire.

LM-AU Series Secondary Side (Magnet) Dimensions

●LM-AUS40-120-JSS0 ●LM-AUS40-180-JSS0 ●LM-AUS40-240-JSS0
●LM-AUS40-300-JSS0 ●LM-AUS40-600-JSS0



Model	Variable dimensions				
	L	M	N	B	C
LM-AUS40-120-JSS0	119.5	60 *1	60 *1	2	2
LM-AUS40-180-JSS0	179.5	2× 60(=120) *1	2× 60(=120) *1	3	3
LM-AUS40-240-JSS0	239.5	3× 60(=180) *1	3× 60(=180) *1	4	4
LM-AUS40-300-JSS0	299.5	4× 60(=240) *1	4× 60(=240) *1	5	5
LM-AUS40-600-JSS0	599.5	9× 60(=540) *1	9× 60(=540) *1	10	10

*1. Pitch tolerance between holes at both ends: ±0.3 [Unit: mm]

List of Linear Encoders (Note 1)

Contact your local sales office for compatible linear encoders.

Mitsubishi Electric high-speed serial communication-compatible absolute type

Manufacturer	Model	Resolution	Rated speed (Note 2)	Maximum effective measurement length (Note 3)	Communication method (Note 4)
Magnescale Co., Ltd.	SR77	0.05 µm/ 0.01 µm	3.3 m/s	2040 mm	Two-wire type
	SR87			3040 mm	
	SR27A	0.01 µm	3.3 m/s	2040 mm	Two-wire type/ Four-wire type (Note 5)
	SR67A			3640 mm	
	SmartSCALE SQ47	0.005 µm	3.3 m/s	3740 mm	
	SmartSCALE SQ57			3770 mm	
Mitutoyo Corporation	AT343A	0.05 µm	2.0 m/s	3000 mm	Two-wire type
	AT543A-SC		2.5 m/s	2200 mm	
	AT545A-SC	20 µm/4096 (Approx. 0.005 µm)	2.5 m/s	2200 mm	
	ST743A	0.1 µm	5.0 m/s	6000 mm	
	ST744A				
	ST748A				
	ST1341A	0.01 µm	8.0 m/s	12000 mm	
	ST1342A	0.001 µm		4200 mm	
Renishaw	RESOLUTE RL40M	1 nm	100 m/s	2100 mm	Two-wire type
		50 nm		20990 mm	
	EVOLUTE EL40M	50 nm/100 nm/500 nm	100 m/s	10010 mm	
Heidenhain	LC 495M	0.001 µm/ 0.01 µm	3.0 m/s	2040 mm	Four-wire type
	LC 496M				
	LC 195M			4240 mm	
	LC 196M				
	LIC 4193M	0.001 µm/ 0.005 µm/ 0.01 µm	10.0 m/s	3040 mm	Two-wire type/ Four-wire type (Note 5)
	LIC 4195M			28440 mm	
	LIC 4197M			6040 mm	
	LIC 4199M			1020 mm	
	LIC 3197M	0.01 µm	10.0 m/s	10000 mm	
	LIC 3199M				
	LIC 2197M	0.05 µm/ 0.1 µm	10.0 m/s	6020 mm	
	LIC 2199M			6020 mm	
RSF Elektronik	MC15M	0.05 µm/ 0.1 µm	10.0 m/s	3020 mm	
Nidec Machine Tool Corporation	MPFA-HZ-M01	0.1 µm	30.0 m/s	8000 mm	Two-wire type

Notes:
1. Contact the relevant linear encoder manufacturer for details on operating environment and specifications of the linear encoder such as ambient temperature, vibration resistance and IP rating.
2. The listed values are the manufacturer's specifications. When combined with MR-JET-_ servo amplifiers, the specification value is either the listed value or the servo motor maximum speed, whichever is lower.
3. The listed values are the manufacturer's specifications. The maximum length of the encoder cable between a linear encoder and a servo amplifier is 30 m. For a linear encoder manufactured by Nidec Machine Tool Corporation, the maximum length of the encoder cable between the linear encoder and a servo amplifier is 20 m.
4. The compatible communication method varies by the servo amplifier and operation mode. Refer to "External Encoder Connection Specifications" in this catalog.
5. For fully closed loop control, the load-side encoder and the servo motor encoder are compatible only with two-wire type communication method. Four-wire type cannot be used.

List of Linear Encoders (Note 1)

Contact your local sales office for compatible linear encoders.

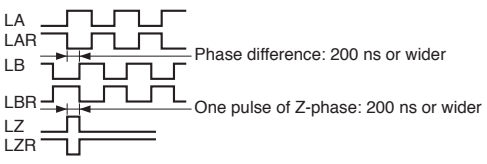
Mitsubishi Electric high-speed serial communication-compatible incremental type

Manufacturer	Model	Resolution	Rated speed (Note 2)	Maximum effective measurement length (Note 3)	Communication method (Note 4)
Magnescale Co., Ltd.	SR75	0.05 µm/ 0.01 µm	3.3 m/s	2040 mm	Two-wire type
	SR85			3040 mm	
	SL710 + PL101-RM/RHM	0.1 µm	10.0 m/s	100000 mm	
	SQ10 + PQ10 + MQ10	0.1 µm/ 0.05 µm	10.0 m/s	3800 mm	Two-wire type/ Four-wire type (Note 9)
	BL50H + BD700	400 nm/400-fold subdivision (1 nm) (Note 12) 400 nm/800-fold subdivision (0.5 nm) (Note 12, 13)	3 m/s	1070 mm	Two-wire type
Heidenhain	LIDA 483 + EIB 3091M (16384-fold subdivision) (Note 7)	20 µm/16384-fold subdivision (Approx. 1.22 nm)	4.0 m/s	3040 mm	Four-wire type
	LIDA 485 + EIB 3091M (16384-fold subdivision) (Note 7)			30040 mm	
	LIDA 487 + EIB 3091M (16384-fold subdivision) (Note 7)			6040 mm	
	LIDA 489 + EIB 3091M (16384-fold subdivision) (Note 7)			1020 mm	
	LIDA 287 + EIB 3091M (16384-fold subdivision) (Note 7)	200 µm/16384-fold subdivision (Approx. 12.2 nm)		10000 mm	
	LIDA 289 + EIB 3091M (16384-fold subdivision) (Note 7)				
	LIF 481 + EIB 3091M (4096-fold subdivision)	4 µm/4096-fold subdivision (Approx. 0.977 nm)	1.6 m/s	1640 mm (Note 11)	
	LIP 6081 + EIB 3091M (4096-fold subdivision)			3040 mm (Note 11)	
Nidec Instruments Corporation	PSLH041	0.1 µm	5.0 m/s	2400 mm	Two-wire type
Nidec Machine Tool Corporation	MPFA-HI-M01 (Note 6)	0.1 µm	30.0 m/s	10000 mm (Note 8)	Two-wire type

A/B/Z-phase differential output type (Note 10, 14)

Manufacturer	Model	Resolution	Rated speed (Note 2)	Maximum effective measurement length (Note 3)	Communication method (Note 4)
Not designated	-	0.001 µm to 5 µm (Note 5)	Depends on the linear encoder	Depends on the linear encoder	A/B/Z-phase differential output method

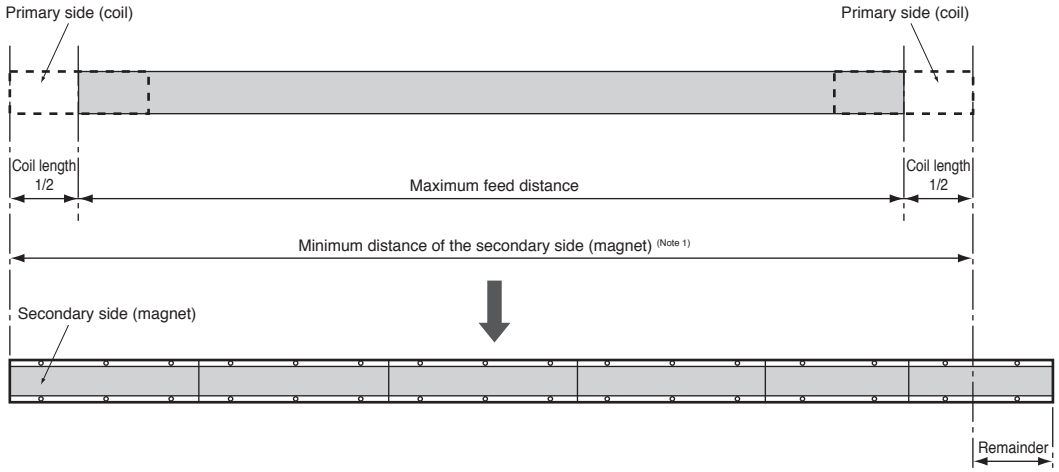
Notes:
1. Contact the relevant linear encoder manufacturer for details on operating environment and specifications of the linear encoder such as ambient temperature, vibration resistance and IP rating.
2. The listed values are the manufacturer's specifications. When combined with MR-JET-_ servo amplifiers, the specification value is either the listed value or the servo motor maximum speed, whichever is lower.
3. The listed values are the manufacturer's specifications. The maximum length of the encoder cable between a linear encoder and a servo amplifier is 30 m. For a linear encoder manufactured by Nidec Machine Tool Corporation, the maximum length of the encoder cable between the linear encoder and a servo amplifier is 20 m.
4. The compatible communication method varies by the servo amplifier and operation mode. Refer to "External Encoder Connection Specifications" in this catalog.
5. Select the linear encoder within this range.
6. There are some restrictions on this linear encoder. When using it, contact your local sales office.
7. For this combination, it is recommended using EIB 3091M with a subdivision of 16384. EIB 3091M with a subdivision of 4096 is also available. Contact the manufacturer for details.
8. For the measurement length over 10000 mm, contact Nidec Machine Tool Corporation.
9. A fully closed loop control system does not support the A/B/Z-phase differential output type encoder.
10. For fully closed loop control, the load-side encoder and the servo motor encoder are compatible only with two-wire type communication method. Four-wire type cannot be used.
11. The maximum effective measurement length varies depending on the scale to be used. Contact the manufacturer for details.
12. The supported resolution is 1 nm or 0.5 nm. The resolution is 1 nm for 400-fold subdivision, and it is 0.5 nm for 800-fold subdivision. Contact the manufacturer for details.
13. The LM-AJ series are the only linear servo motors that support a resolution of 0.5 nm.
14. The phase difference of the A-phase pulse and the B-phase pulse, and the width of the Z-phase pulse must be 200 ns or wider. The output pulse of A-phase and B-phase of the A/B/Z-phase differential output linear encoder is in the multiply-by-four count method. For linear encoders without Z-phase, some of the homing modes cannot be used. Refer to "MR-JET User's Manual" for details.



Determining the Number of the Secondary-Side (Magnet) Blocks

The number of the secondary-side (magnet) blocks is determined according to the total distance calculated from the following equation:

(Total length of aligned secondary side (magnet)) ≥ (Maximum feed distance) + (Length of the primary side (coil))



Notes: 1. Pitch tolerance between any two holes must be within ±0.2 mm. When two or more secondary sides (magnets) are mounted lined up, there may be a gap between each block, depending on the mounting method and the number of the blocks.

MEMO

6 Options/Peripheral Equipment

HK HK series **HG** HG series

* Options and peripheral equipment for servo amplifiers are the same regardless of the network. Refer to the servo amplifiers with the same rated output.
* Refer to p. 6-54 in this catalog for conversion of units.

Cable and Connector Selection Table for HK Series Rotary Servo Motors

HK

Necessary option cables and connectors vary depending on the servo motor series.
Refer to the following tables for necessary options.

Cables for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series servo motors

Cable type	Cable length	IP rating (Note 1)	Electromagnetic brake wires	Cable direction	Bending life (Note 5)	Model	Reference
Dual cable type	10 m or shorter (direct connection type)	IP65 (Note 3)	Available	In the direction of the load side	Long bending life	MR-AEPB2CBL_M-A1-H	p. 6-6
					Standard	MR-AEPB2CBL_M-A1-L	
				In the opposite direction of the load side	Long bending life	MR-AEPB2CBL_M-A2-H	
					Standard	MR-AEPB2CBL_M-A2-L	
				Vertical (Note 4)	Long bending life	MR-AEPB2CBL_M-A5-H	
					Standard	MR-AEPB2CBL_M-A5-L	
			Not available	In the direction of the load side	Long bending life	MR-AEP2CBL_M-A1-H	
					Standard	MR-AEP2CBL_M-A1-L	
				In the opposite direction of the load side	Long bending life	MR-AEP2CBL_M-A2-H	
					Standard	MR-AEP2CBL_M-A2-L	
				Vertical (Note 4)	Long bending life	MR-AEP2CBL_M-A5-H	
					Standard	MR-AEP2CBL_M-A5-L	
	Over 10 m (junction type) (Note 2)	IP20	Available	In the direction of the load side	Long bending life	MR-AEPB2J10CBL03M-A1-L, MR-AEKCBL_M-H	p. 6-7
					Standard	MR-AEPB2J10CBL03M-A1-L, MR-AEKCBL_M-L	
				In the opposite direction of the load side	Long bending life	MR-AEPB2J10CBL03M-A2-L, MR-AEKCBL_M-H	
					Standard	MR-AEPB2J10CBL03M-A2-L, MR-AEKCBL_M-L	
				Vertical (Note 4)	Long bending life	MR-AEPB2J10CBL03M-A5-L, MR-AEKCBL_M-H	
					Standard	MR-AEPB2J10CBL03M-A5-L, MR-AEKCBL_M-L	
			Not available	In the direction of the load side	Long bending life	MR-AEP2J10CBL03M-A1-L, MR-AEKCBL_M-H	
					Standard	MR-AEP2J10CBL03M-A1-L, MR-AEKCBL_M-L	
				In the opposite direction of the load side	Long bending life	MR-AEP2J10CBL03M-A2-L, MR-AEKCBL_M-H	
					Standard	MR-AEP2J10CBL03M-A2-L, MR-AEKCBL_M-L	
				Vertical (Note 4)	Long bending life	MR-AEP2J10CBL03M-A5-L, MR-AEKCBL_M-H	
					Standard	MR-AEP2J10CBL03M-A5-L, MR-AEKCBL_M-L	
		IP65 (Note 3)	Available	In the direction of the load side	Long bending life	MR-AEPB2J20CBL03M-A1-L, MR-AENSCBL_M-H	p. 6-8
					Standard	MR-AEPB2J20CBL03M-A1-L, MR-AENSCBL_M-L	
				In the opposite direction of the load side	Long bending life	MR-AEPB2J20CBL03M-A2-L, MR-AENSCBL_M-H	
					Standard	MR-AEPB2J20CBL03M-A2-L, MR-AENSCBL_M-L	
				Vertical (Note 4)	Long bending life	MR-AEPB2J20CBL03M-A5-L, MR-AENSCBL_M-H	
					Standard	MR-AEPB2J20CBL03M-A5-L, MR-AENSCBL_M-L	
			Not available	In the direction of the load side	Long bending life	MR-AEP2J20CBL03M-A1-L, MR-AENSCBL_M-H	
					Standard	MR-AEP2J20CBL03M-A1-L, MR-AENSCBL_M-L	
				In the opposite direction of the load side	Long bending life	MR-AEP2J20CBL03M-A2-L, MR-AENSCBL_M-H	
					Standard	MR-AEP2J20CBL03M-A2-L, MR-AENSCBL_M-L	
				Vertical (Note 4)	Long bending life	MR-AEP2J20CBL03M-A5-L, MR-AENSCBL_M-H	
					Standard	MR-AEP2J20CBL03M-A5-L, MR-AENSCBL_M-L	

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. The two types of cables indicated are required.
3. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
4. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.
5. Long bending life cables and standard cables are for moving parts and fixed parts respectively.

Cable and Connector Selection Table for HK Series Rotary Servo Motors

HK

Cables for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series servo motors

Cable type	Cable length	IP rating (Note 1)	Electromagnetic brake wires	Cable direction	Bending life (Note 5)	Model	Reference
Single cable type	10 m or shorter (direct connection type)	IP65 (Note 3)	Available	In the direction of the load side	Long bending life	MR-AEPB1CBL_M-A1-H	p. 6-9
					Standard	MR-AEPB1CBL_M-A1-L	
				In the opposite direction of the load side	Long bending life	MR-AEPB1CBL_M-A2-H	
					Standard	MR-AEPB1CBL_M-A2-L	
				Vertical (Note 4)	Long bending life	MR-AEPB1CBL_M-A5-H	
					Standard	MR-AEPB1CBL_M-A5-L	
			Not available	In the direction of the load side	Long bending life	MR-AEP1CBL_M-A1-H	
					Standard	MR-AEP1CBL_M-A1-L	
				In the opposite direction of the load side	Long bending life	MR-AEP1CBL_M-A2-H	
					Standard	MR-AEP1CBL_M-A2-L	
				Vertical (Note 4)	Long bending life	MR-AEP1CBL_M-A5-H	
					Standard	MR-AEP1CBL_M-A5-L	

Cables for HK-FN (1.0 kW to 3.0 kW) series/HK-SN series servo motors

Application	Compatible servo motor	IP rating (Note 1)	Bending life (Note 5)	Length	Model	Reference
Encoder	HK-FN102, 152, 202, 301M HK-SN series	IP67	Long bending life	2 m to 10 m	MR-J3ENSCBL_M-H	p. 6-8
				20 m to 50 m	MR-AENSCBL_M-H	
			Standard	2 m to 10 m	MR-J3ENSCBL_M-L	
				20 m to 30 m	MR-AENSCBL_M-L	

Connectors for HK-FN (1.0 kW to 3.0 kW) series/HK-SN series servo motors

Application	Compatible servo motor	IP rating (Note 1)	Connector shape	Type of connection	Model (Note 2)	Reference
Encoder	HK-FN102, 152, 202, 301M HK-SN series	IP67	Straight	One-touch	MR-J3SCNS	p. 6-9
				Screw	MR-ENCNS2	p. 6-10
			Angle	One-touch	MR-J3SCNSA	
				Screw	MR-ENCNS2A	
Power supply	HK-FN102, 152 HK-SN3534, 5034	IP67	Straight	One-touch	MR-APWCNS4	
	HK-FN202, 301M HK-SN7034			One-touch	MR-APWCNS5	
Electromagnetic brake	HK-FN102B, 152B, 202B, 301MB HK-SN series	IP67	Straight	One-touch	MR-BKCNS1	
				Screw	MR-BKCNS2	
			Angle	One-touch	MR-BKCNS1A	
				Screw	MR-BKCNS2A	

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Use the option connector set indicated to fabricate a cable.
3. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
4. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.
5. Long bending life cables and standard cables are for moving parts and fixed parts respectively.

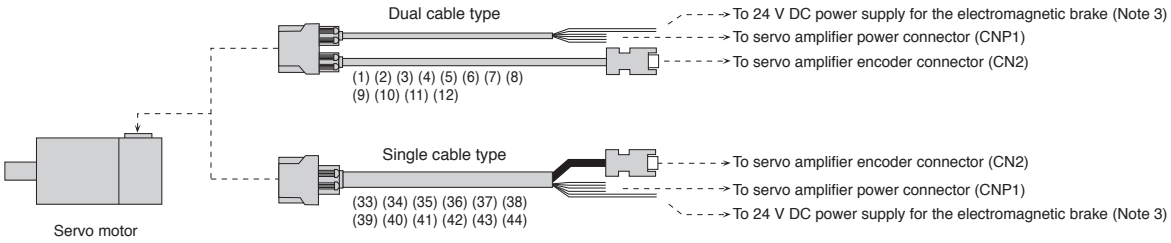
Configuration Example for HK Series Rotary Servo Motors (Note 2)

HK

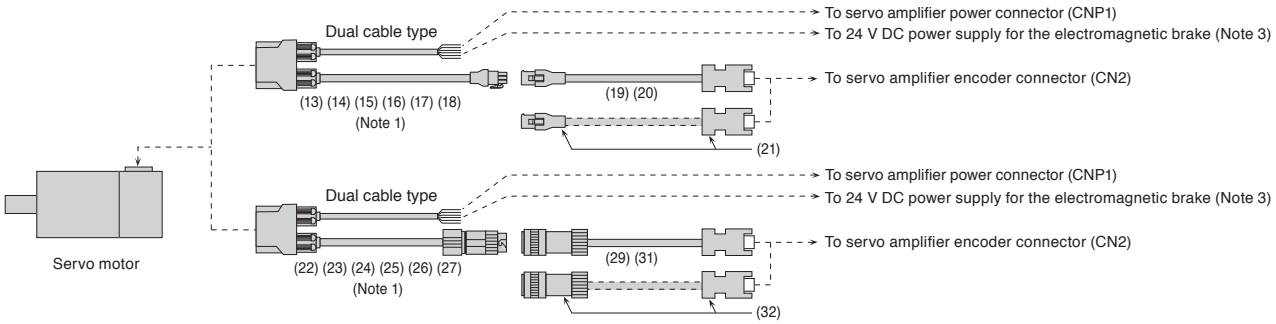
HK-KN series/HK-FN (0.1 kW to 0.75 kW) series

(Cable direction: load side/opposite to load side/vertical) (Note 4, 5)

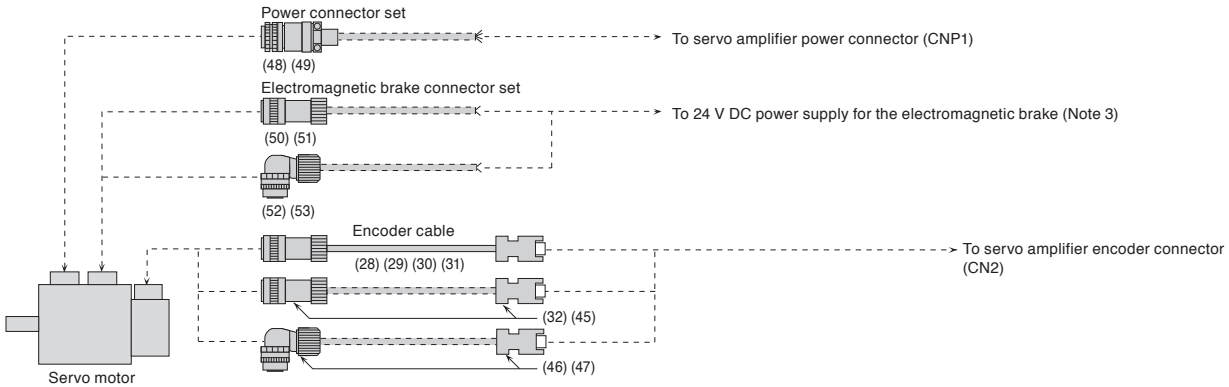
●Cable length of 10 m or shorter



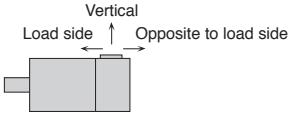
●Cable length of over 10 m



HK-FN (1.0 kW to 3.0 kW) series/HK-SN series



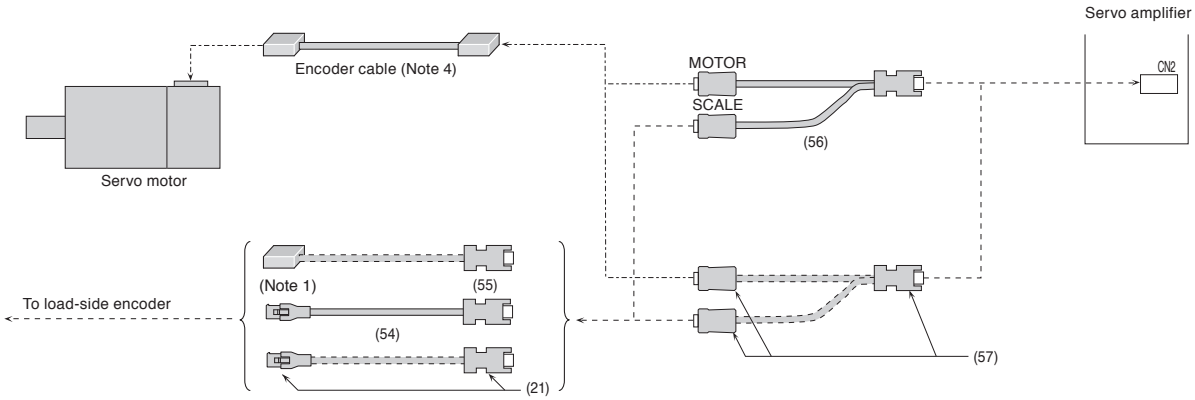
Notes: 1. Secure this cable as it does not have a long bending life.
2. Cables drawn with dashed lines need to be fabricated by users. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.
3. This is for the servo motors with an electromagnetic brake.
4. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.
5. The cable direction in the configuration examples is in the opposite direction to the load side.
Cables can be led out in the direction of the load side, the opposite to the load side, and vertical, depending on the option to be used.
These cable directions are shown below.



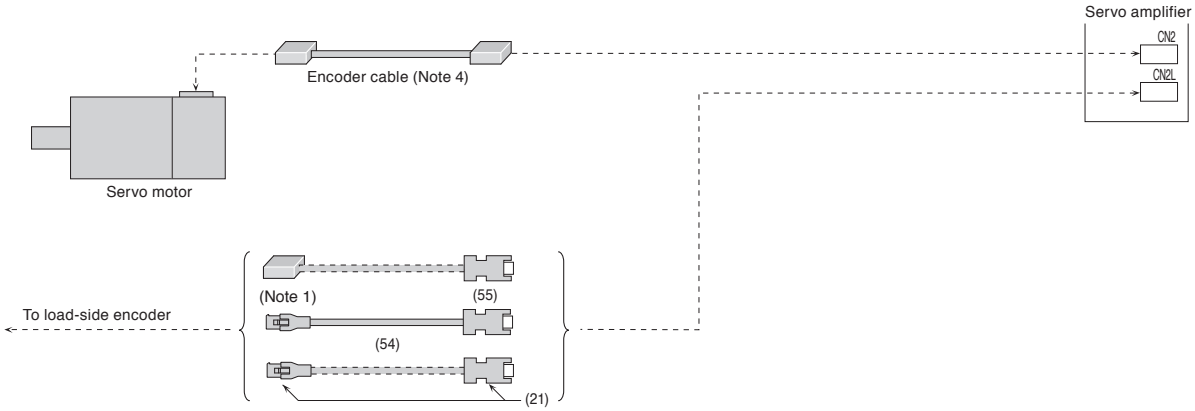
Configuration Example for HK Series Rotary Servo Motors (Note 2)

HK

Fully closed loop control (Note 3, 5)
(MR-JET-G and rotary servo motors)



Fully closed loop control (Note 3, 5)
(MR-JET-G4-HS and rotary servo motors)

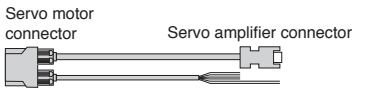
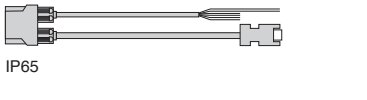
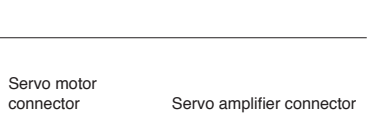
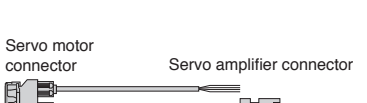
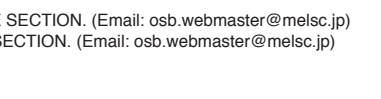


Notes: 1. Contact the relevant linear encoder manufacturers for connectors to connect with the head cables.
2. Cables drawn with dashed lines need to be fabricated by users. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.
3. Connections other than mentioned are the same as those for each rotary servo motor. Refer to cables and connectors for relevant servo motors in this catalog.
4. Necessary encoder cables vary depending on the servo motor series. Refer to cables and connectors for relevant servo motors in this catalog.
5. For connections when an A/B/Z-phase differential output linear encoder is used, refer to "MR-JET Partner's Encoder User's Manual."
Refer to the manual when fabricating the branch cables to connect an A/B/Z-phase differential output linear encoder.

Cables and Connectors for HK Series Rotary Servo Motors

HK

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

No.	Item	Application	Bending life (Note 4)	Cable length	Model	Description/IP rating (Note 1)
(1)	Motor cable (Note 2, 3) (dual cable type/ direct connection type for 10 m or shorter)	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires	Long bending life	2 m	MR-AEPB2CBL2M-A1-H	 IP65
				5 m	MR-AEPB2CBL5M-A1-H	
				10 m	MR-AEPB2CBL10M-A1-H	
(2)			Standard	2 m	MR-AEPB2CBL2M-A1-L	
				5 m	MR-AEPB2CBL5M-A1-L	
				10 m	MR-AEPB2CBL10M-A1-L	
(3)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires	Long bending life	2 m	MR-AEPB2CBL2M-A2-H	 IP65
				5 m	MR-AEPB2CBL5M-A2-H	
				10 m	MR-AEPB2CBL10M-A2-H	
(4)			Standard	2 m	MR-AEPB2CBL2M-A2-L	
				5 m	MR-AEPB2CBL5M-A2-L	
				10 m	MR-AEPB2CBL10M-A2-L	
(5)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead (Note 5) With electromagnetic brake wires	Long bending life	2 m	MR-AEPB2CBL2M-A5-H	 IP65
				5 m	MR-AEPB2CBL5M-A5-H	
				10 m	MR-AEPB2CBL10M-A5-H	
(6)			Standard	2 m	MR-AEPB2CBL2M-A5-L	
				5 m	MR-AEPB2CBL5M-A5-L	
				10 m	MR-AEPB2CBL10M-A5-L	
(7)		HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires	Long bending life	2 m	MR-AEP2CBL2M-A1-H	 IP65
				5 m	MR-AEP2CBL5M-A1-H	
				10 m	MR-AEP2CBL10M-A1-H	
(8)			Standard	2 m	MR-AEP2CBL2M-A1-L	
				5 m	MR-AEP2CBL5M-A1-L	
				10 m	MR-AEP2CBL10M-A1-L	
(9)		HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires	Long bending life	2 m	MR-AEP2CBL2M-A2-H	 IP65
				5 m	MR-AEP2CBL5M-A2-H	
				10 m	MR-AEP2CBL10M-A2-H	
(10)			Standard	2 m	MR-AEP2CBL2M-A2-L	
				5 m	MR-AEP2CBL5M-A2-L	
				10 m	MR-AEP2CBL10M-A2-L	
(11)		HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead (Note 5) Without electromagnetic brake wires	Long bending life	2 m	MR-AEP2CBL2M-A5-H	 IP65
				5 m	MR-AEP2CBL5M-A5-H	
				10 m	MR-AEP2CBL10M-A5-H	
(12)			Standard	2 m	MR-AEP2CBL2M-A5-L	
				5 m	MR-AEP2CBL5M-A5-L	
				10 m	MR-AEP2CBL10M-A5-L	

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
3. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
4. Long bending life cables and standard cables are for moving parts and fixed parts respectively.
5. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.

Cables and Connectors for HK Series Rotary Servo Motors

HK

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

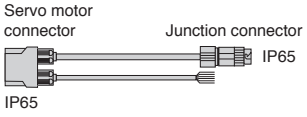
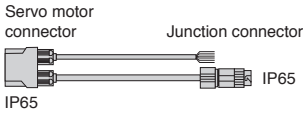
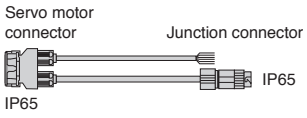
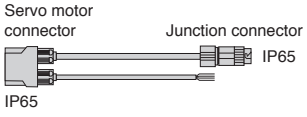
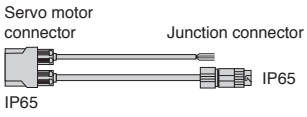
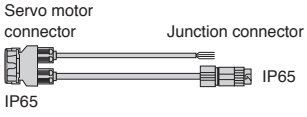
No.	Item	Application	Bending life (Note 6)	Cable length	Model	Description/IP rating (Note 1)
(13)	Motor cable (Note 3, 5) (dual cable type/ junction type for over 10 m)	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires	Standard	0.3 m	MR-AEPB2J10CBL03M-A1-L	Servo motor connector — Junction connector — IP20 IP65
(14)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires	Standard	0.3 m	MR-AEPB2J10CBL03M-A2-L	Servo motor connector — Junction connector — IP20 IP65
(15)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead (Note 7) With electromagnetic brake wires	Standard	0.3 m	MR-AEPB2J10CBL03M-A5-L	Servo motor connector — Junction connector — IP20 IP65
(16)		HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires	Standard	0.3 m	MR-AEP2J10CBL03M-A1-L	Servo motor connector — Junction connector — IP20 IP65
(17)		HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires	Standard	0.3 m	MR-AEP2J10CBL03M-A2-L	Servo motor connector — Junction connector — IP20 IP65
(18)		HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead (Note 7) Without electromagnetic brake wires	Standard	0.3 m	MR-AEP2J10CBL03M-A5-L	Servo motor connector — Junction connector — IP20 IP65
(19)	Encoder cable (Note 4, 5, 8)	HK-KN series HK-FN13, 23, 43, 7M3	Long bending life	20 m	MR-AEKCBL20M-H	Junction connector — Servo amplifier connector IP20
				30 m	MR-AEKCBL30M-H	
				40 m	MR-AEKCBL40M-H	
				50 m	MR-AEKCBL50M-H	
(20)			Standard	20 m	MR-AEKCBL20M-L	
				30 m	MR-AEKCBL30M-L	
(21)	Encoder connector set (Note 2, 4)	HK-KN series HK-FN13, 23, 43, 7M3 Connecting a load-side encoder	-	-	MR-ECNM	Junction connector — Servo amplifier connector IP20 Applicable cable Wire size: AWG 26 to 22 Cable OD: 7 mm to 9 mm

Notes:
1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. The crimping tool (91529-1) manufactured by TE Connectivity Ltd. Company is required. Contact the manufacturer directly.
3. Use this cable in combination with an option from (19) to (21).
4. When using this cable or connector set for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series, use it in combination with an option from (13) to (18).
5. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
6. Long bending life cables and standard cables are for moving parts and fixed parts respectively.
7. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.
8. Encoder cables are not subject to Low Voltage Directive (50 V AC to 1000 V AC and 75 V DC to 1500 V DC).

Cables and Connectors for HK Series Rotary Servo Motors

HK

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

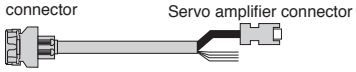
No.	Item	Application	Bending life (Note 8)	Cable length	Model	Description/IP rating (Note 1)
(22)	Motor cable (Note 4, 6, 7) (dual cable type/ junction type for over 10 m)	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires	Standard	0.3 m	MR-AEPB2J20CBL03M-A1-L	
(23)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires	Standard	0.3 m	MR-AEPB2J20CBL03M-A2-L	
(24)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead (Note 2) With electromagnetic brake wires	Standard	0.3 m	MR-AEPB2J20CBL03M-A5-L	
(25)		HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires	Standard	0.3 m	MR-AEP2J20CBL03M-A1-L	
(26)		HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires	Standard	0.3 m	MR-AEP2J20CBL03M-A2-L	
(27)		HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead (Note 2) Without electromagnetic brake wires	Standard	0.3 m	MR-AEP2J20CBL03M-A5-L	
(28)	Encoder cable (Note 3, 5, 6)	HK-FN102, 152, 202, 301M HK-SN series	Long bending life	2 m	MR-J3ENSCBL2M-H	
				5 m	MR-J3ENSCBL5M-H	
				10 m	MR-J3ENSCBL10M-H	
(29)		HK-KN series HK-FN series HK-SN series	Long bending life	20 m	MR-AENSCBL20M-H	
				30 m	MR-AENSCBL30M-H	
				40 m	MR-AENSCBL40M-H	
				50 m	MR-AENSCBL50M-H	
(30)		HK-FN102, 152, 202, 301M HK-SN series	Standard	2 m	MR-J3ENSCBL2M-L	
				5 m	MR-J3ENSCBL5M-L	
				10 m	MR-J3ENSCBL10M-L	
(31)		HK-KN series HK-FN series HK-SN series	Standard	20 m	MR-AENSCBL20M-L	
				30 m	MR-AENSCBL30M-L	

Notes:
1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.
3. Encoder cables are not subject to Low Voltage Directive (50 V AC to 1000 V AC and 75 V DC to 1500 V DC).
4. Use this cable in combination with (29), (31), or (32).
5. When using this cable or connector set for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series, use it in combination with an option from (22) to (27).
6. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
7. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
8. Long bending life cables and standard cables are for moving parts and fixed parts respectively.

Cables and Connectors for HK Series Rotary Servo Motors

HK

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

No.	Item	Application	Bending life (Note 4)	Cable length	Model	Description/IP rating (Note 1)
(32)	Encoder connector set (Note 6, 7, 8) (one-touch connection type)	HK-KN series HK-FN series HK-SN series (straight type)	-	-	MR-J3SCNS	Junction connector or encoder connector  Servo amplifier connector  IP67 Applicable cable Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm
(33)	Motor cable (Note 2, 3) (single cable type/ direct connection type for 10 m or shorter)	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires	Long bending life	2 m	MR-AEPB1CBL2M-A1-H	Servo motor connector Servo amplifier connector  IP65
				5 m	MR-AEPB1CBL5M-A1-H	
				10 m	MR-AEPB1CBL10M-A1-H	
(34)			Standard	2 m	MR-AEPB1CBL2M-A1-L	
				5 m	MR-AEPB1CBL5M-A1-L	
				10 m	MR-AEPB1CBL10M-A1-L	
(35)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires	Long bending life	2 m	MR-AEPB1CBL2M-A2-H	
				5 m	MR-AEPB1CBL5M-A2-H	
				10 m	MR-AEPB1CBL10M-A2-H	
(36)			Standard	2 m	MR-AEPB1CBL2M-A2-L	
				5 m	MR-AEPB1CBL5M-A2-L	
				10 m	MR-AEPB1CBL10M-A2-L	
(37)		HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead (Note 5) With electromagnetic brake wires	Long bending life	2 m	MR-AEPB1CBL2M-A5-H	Servo motor connector Servo amplifier connector  IP65
				5 m	MR-AEPB1CBL5M-A5-H	
				10 m	MR-AEPB1CBL10M-A5-H	
(38)			Standard	2 m	MR-AEPB1CBL2M-A5-L	
				5 m	MR-AEPB1CBL5M-A5-L	
				10 m	MR-AEPB1CBL10M-A5-L	
(39)		HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires	Long bending life	2 m	MR-AEP1CBL2M-A1-H	Servo motor connector Servo amplifier connector  IP65
				5 m	MR-AEP1CBL5M-A1-H	
				10 m	MR-AEP1CBL10M-A1-H	
(40)			Standard	2 m	MR-AEP1CBL2M-A1-L	
				5 m	MR-AEP1CBL5M-A1-L	
				10 m	MR-AEP1CBL10M-A1-L	
(41)		HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires	Long bending life	2 m	MR-AEP1CBL2M-A2-H	
				5 m	MR-AEP1CBL5M-A2-H	
				10 m	MR-AEP1CBL10M-A2-H	
(42)			Standard	2 m	MR-AEP1CBL2M-A2-L	
				5 m	MR-AEP1CBL5M-A2-L	
				10 m	MR-AEP1CBL10M-A2-L	
(43)		HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead (Note 5) Without electromagnetic brake wires	Long bending life	2 m	MR-AEP1CBL2M-A5-H	Servo motor connector Servo amplifier connector  IP65
				5 m	MR-AEP1CBL5M-A5-H	
				10 m	MR-AEP1CBL10M-A5-H	
(44)			Standard	2 m	MR-AEP1CBL2M-A5-L	
				5 m	MR-AEP1CBL5M-A5-L	
				10 m	MR-AEP1CBL10M-A5-L	

Notes:
1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
3. When IP67 cables are required, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
4. Long bending life cables and standard cables are for moving parts and fixed parts respectively.
5. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.
6. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
7. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.
8. When using this cable or connector set for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series, use it in combination with an option from (22) to (27).

Cables and Connectors for HK Series Rotary Servo Motors

HK

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

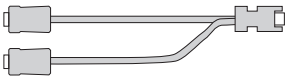
No.	Item	Application	Bending life	Cable length	Model	Description/IP rating (Note 1)
(45)	Encoder connector set (Note 2, 3, 4) (screw type)	HK-FN102, 152, 202, 301M HK-SN series (straight type)	-	-	MR-ENCNS2	Encoder connector Servo amplifier connector  IP67 Applicable cable Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm
(46)	Encoder connector set (Note 2, 3, 4) (one-touch connection type)	HK-FN102, 152, 202, 301M HK-SN series (angle type)	-	-	MR-J3SCNSA	Encoder connector Servo amplifier connector  IP67 Applicable cable Wire size: 0.5 mm² (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm
(47)	Encoder connector set (Note 2, 3, 4) (screw type)		-	-	MR-ENCNS2A	
(48)	Power connector set (Note 4, 5) (one-touch connection type)	HK-FN102, 152 HK-SN3534, 5034	-	-	MR-APWCNS4	Power connector  IP67 Applicable cable Wire size: 3.5 mm² (AWG 12) or smaller Cable OD: 11 mm to 14.1 mm
(49)	Power connector set (Note 4, 5) (one-touch connection type)	HK-FN202, 301M HK-SN7034	-	-	MR-APWCNS5	Power connector  IP67 Applicable cable Wire size: 8 mm² (AWG 8) or smaller Cable OD: 12.9 mm to 16 mm
(50)	Electromagnetic brake connector set (Note 3, 4) (one-touch connection type)	HK-FN102B, 152B, 202B, 301MB HK-SN series (straight type)	-	-	MR-BKCNS1	Electromagnetic brake connector  IP67 Applicable cable Wire size: 1.25 mm² (AWG 16) or smaller Cable OD: 9.0 mm to 11.6 mm
(51)	Electromagnetic brake connector set (Note 3, 4) (screw type)		-	-	MR-BKCNS2	
(52)	Electromagnetic brake connector set (Note 3, 4) (one-touch connection type)	HK-FN102B, 152B, 202B, 301MB HK-SN series (angle type)	-	-	MR-BKCNS1A	Electromagnetic brake connector  IP67 Applicable cable Wire size: 1.25 mm² (AWG 16) or smaller Cable OD: 9.0 mm to 11.6 mm
(53)	Electromagnetic brake connector set (Note 3, 4) (screw type)		-	-	MR-BKCNS2A	

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
3. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.
4. For fabricating cables with these connectors, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
5. When the screw type is required, refer to "Products on the Market for Rotary Servo Motors" in this catalog.

Cables and Connectors for HK Series Rotary Servo Motors

HK

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

No.	Item	Application	Bending life (Note 4)	Cable length	Model	Description/IP rating (Note 1)
(54)	Encoder cable (Note 2, 3, 5)	Connecting a load-side encoder	Long bending life	2 m	MR-EKCBL2M-H	Junction connector / Servo amplifier connector  IP20
				5 m	MR-EKCBL5M-H	
(55)	Encoder connector set	Connecting a load-side encoder	-	-	MR-J3CN2	Servo amplifier connector 
(56)	Junction cable for fully closed loop control	Branching a load-side encoder	Standard	0.3 m	MR-J4FCCBL03M	Junction connector / Servo amplifier connector 
(57)	Connector set	Branching a load-side encoder	-	-	MR-J3THMCN2	Junction connector / Servo amplifier connector 

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Use MR-EKCBL_M-H or MR-ECNM to connect to an output cable for AT343A, AT543A-SC or AT545A-SC scales manufactured by Mitutoyo Corporation.
3. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
4. Long bending life cables and standard cables are for moving parts and fixed parts respectively.
5. Encoder cables are not subject to Low Voltage Directive (50 V AC to 1000 V AC and 75 V DC to 1500 V DC).

Details of Option Connectors for HK Series Rotary Servo Motors

HK

Model	Servo motor connector	Servo amplifier connector
MR-AEPB2CBL_M-A1-H MR-AEPB2CBL_M-A1-L MR-AEPB2CBL_M-A2-H MR-AEPB2CBL_M-A2-L MR-AEP2CBL_M-A1-H MR-AEP2CBL_M-A1-L MR-AEP2CBL_M-A2-H MR-AEP2CBL_M-A2-L	 Connector set: MT50W-8D/2D4ES-CVLD(7.5) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Connector set: 54599-1016 (Molex, LLC) or Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

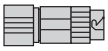
Model	Servo motor connector	Servo amplifier connector
MR-AEPB2CBL_M-A5-H MR-AEPB2CBL_M-A5-L MR-AEP2CBL_M-A5-H MR-AEP2CBL_M-A5-L	 Connector set: MT50W-8D/2D4ES-CVSD(7.5) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Connector set: 54599-1016 (Molex, LLC) or Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

Model	Servo motor connector	Junction connector
MR-AEPB2J10CBL03M-A1-L MR-AEPB2J10CBL03M-A2-L MR-AEP2J10CBL03M-A1-L MR-AEP2J10CBL03M-A2-L	 Connector set: MT50W-8D/2D4ES-CVLD(7.5) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Contact: 170361-4 Housing: 1-172169-9 Cable clamp: 316454-1 (TE Connectivity Ltd. Company)

Model	Servo motor connector	Junction connector
MR-AEPB2J10CBL03M-A5-L MR-AEP2J10CBL03M-A5-L	 Connector set: MT50W-8D/2D4ES-CVSD(7.5) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Contact: 170361-4 Housing: 1-172169-9 Cable clamp: 316454-1 (TE Connectivity Ltd. Company)

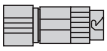
Model	Junction connector	Servo amplifier connector
MR-AEKCBL_M-H MR-AEKCBL_M-L	 Housing: 1-172161-9 Connector pin: 170359-1 (TE Connectivity Ltd. Company) or an equivalent product Cable clamp: MTI-0002 (Toa Electric Industrial Co., Ltd.)	 Connector set: 54599-1016 (Molex, LLC) or Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

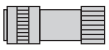
Model	Junction connector	Servo amplifier connector
MR-ECNM MR-EKCBL_M-H	 Housing: 1-172161-9 Connector pin: 170359-1 (TE Connectivity Ltd. Company) or an equivalent product Cable clamp: MTI-0002 (Toa Electric Industrial Co., Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

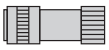
Model	Servo motor connector	Junction connector
MR-AEPB2J20CBL03M-A1-L MR-AEPB2J20CBL03M-A2-L MR-AEP2J20CBL03M-A1-L MR-AEP2J20CBL03M-A2-L	 Connector set: MT50W-8D/2D4ES-CVLD(7.5) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Cable receptacle: CMV1-CR10P-M2 (DDK Ltd.)

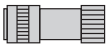
Details of Option Connectors for HK Series Rotary Servo Motors

HK

Model	Servo motor connector	Junction connector
MR-AEPB2J20CBL03M-A5-L MR-AEP2J20CBL03M-A5-L	 Connector set: MT50W-8D/2D4ES-CVSD(7.5) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Cable receptacle: CMV1-CR10P-M2 (DDK Ltd.)

Model	Encoder connector	Servo amplifier connector
MR-J3ENSCBL_M-H (Note 2) MR-J3ENSCBL_M-L (Note 2)	 Straight plug: CMV1-SP10S-M1 Socket contact: CMV1-#22ASC-C1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Junction connector/encoder connector	Servo amplifier connector
MR-AENSCBL_M-H (Note 2) MR-AENSCBL_M-L (Note 2)	 Straight plug: CMV1-SP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Connector set: 54599-1016 (Molex, LLC) or Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

Model	Junction connector/encoder connector	Servo amplifier connector
MR-J3SCNS (Note 1, 2, 3)	 Straight plug: CMV1-SP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

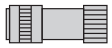
Model	Servo motor connector	Servo amplifier connector
MR-AEPB1CBL_M-A1-H MR-AEPB1CBL_M-A1-L MR-AEPB1CBL_M-A2-H MR-AEPB1CBL_M-A2-L MR-AEP1CBL_M-A1-H MR-AEP1CBL_M-A1-L MR-AEP1CBL_M-A2-H MR-AEP1CBL_M-A2-L	 Connector set: MT50W-8D/2D4ES-CVL(11.9) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Connector set: 54599-1016 (Molex, LLC) or Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

Model	Servo motor connector	Servo amplifier connector
MR-AEPB1CBL_M-A5-H MR-AEPB1CBL_M-A5-L MR-AEP1CBL_M-A5-H MR-AEP1CBL_M-A5-L	 Connector set: MT50W-8D/2D4ES-CVS(11.9) Contact for power supply: MT50E-1820SCFA Contact for signal: MT50D-2224SCFA (Hirose Electric Co., Ltd.)	 Connector set: 54599-1016 (Molex, LLC) or Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

Notes: 1. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
2. Some cables or connector sets may contain the connectors of different shapes. However, these connectors are all usable.
3. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.

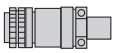
Details of Option Connectors for HK Series Rotary Servo Motors

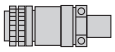
HK

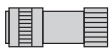
Model	Encoder connector	Servo amplifier connector
MR-ENCNS2 (Note 2, 3)	 Straight plug: CMV1S-SP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

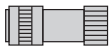
Model	Encoder connector	Servo amplifier connector
MR-J3SCNSA (Note 1, 2, 3)	 Angle plug: CMV1-AP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Encoder connector	Servo amplifier connector
MR-ENCNS2A (Note 2, 3)	 Angle plug: CMV1S-AP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Power connector	
MR-APWCNS4		Plug: JL10-6A18-10SE-EB (straight) Cable clamp: JL04-18CK(13)-R (Japan Aviation Electronics Industry, Limited)

Model	Power connector	
MR-APWCNS5		Plug: JL10-6A22-22SE-EB (straight) Cable clamp: JL04-2022CK(14)-R (Japan Aviation Electronics Industry, Limited)

Model	Electromagnetic brake connector	
MR-BKCNS1 (Note 1, 2)		Straight plug: CMV1-SP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS2 (Note 2)		Straight plug: CMV1S-SP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS1A (Note 1, 2)		Angle plug: CMV1-AP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS2A (Note 2)		Angle plug: CMV1S-AP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Notes: 1. Some cables or connector sets may contain the connectors of different shapes. However, these connectors are all usable.
2. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.
3. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.

Details of Option Connectors for HK Series Rotary Servo Motors

HK

Model	Servo amplifier connector		
MR-J3CN2	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)	or	Connector set: 54599-1019 (Molex, LLC)

Model	Junction connector	Servo amplifier connector
MR-J4FCCBL03M MR-J3THMCN2	 Plug: 36110-3000FD Shell kit: 36310-F200-008 (3M)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

Products on the Market for HK Series Rotary Servo Motors

HK

Contact the relevant manufacturers directly.
When fabricating a cable with the following connectors, refer to the relevant manufacturers' instruction manuals for wiring and assembling procedures.

Encoder connector (servo amplifier side)

Application	Connector (3M)
Servo amplifier CN2 connector	Receptacle: 36210-0100PL Shell kit: 36310-3200-008
	Connector (Molex, LLC)
	54599-1019 (gray)
	54599-1016 (black)

Connector for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series (for dual cable type)

Load-side/opposite to load-side lead　Vertical lead


Applicable servo motor	IP rating (Note 1)	Connector set (Hirose Electric Co., Ltd.)		Contact (Hirose Electric Co., Ltd.)	Applicable cable example
		Cable direction	Model		
HK-KN series HK-FN13, 23, 43, 7M3	IP67	In the direction of the load side/In the opposite direction of the load side	MT50W-8D/ 2D4ES-CVLD(7.5)	For power supply: MT50E-1820SCFA For signal: MT50D-2224SCFA	Refer to "Rotary Servo Motor User's Manual (For MR-JET)" for the applicable cables.
		Vertical (Note 3)	MT50W-8D/ 2D4ES-CVSD(7.5)		

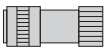
Connector for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series (for single cable type)

Load-side/opposite to load-side lead　Vertical lead


Applicable servo motor	IP rating (Note 1)	Connector set (Hirose Electric Co., Ltd.)		Contact (Hirose Electric Co., Ltd.)	Applicable cable example
		Cable direction	Model		
HK-KN series HK-FN13, 23, 43, 7M3	IP67	In the direction of the load side/In the opposite direction of the load side	MT50W-8D/ 2D4ES-CVL(11.9)	For power supply: MT50E-1820SCFA For signal: MT50D-2224SCFA	Refer to "Rotary Servo Motor User's Manual (For MR-JET)" for the applicable cables.
		Vertical (Note 3)	MT50W-8D/ 2D4ES-CVS(11.9)		

Encoder connector for HK-FN (1.0 kW to 3.0 kW) series/HK-SN series

Straight type　Angle type




Applicable servo motor	IP rating (Note 1)	Connector (DDK Ltd.)				Applicable cable example
		Type	Type of connection	Plug	Socket contact	Cable OD [mm]
HK-FN102, 152, 202, 301M HK-SN series	IP67	Straight	One-touch connection type	CMV1-SP10S-M1	Select a solder or press bonding type. (Refer to the table below.)	5.5 to 7.5
				CMV1-SP10S-M2		7.0 to 9.0
			Screw type	CMV1S-SP10S-M1		5.5 to 7.5
				CMV1S-SP10S-M2		7.0 to 9.0
		Angle	One-touch connection type	CMV1-AP10S-M1		5.5 to 7.5
				CMV1-AP10S-M2		7.0 to 9.0
			Screw type	CMV1S-AP10S-M1		5.5 to 7.5
				CMV1S-AP10S-M2		7.0 to 9.0

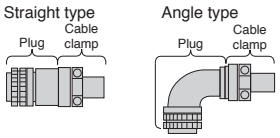
Contact	Socket contact (DDK Ltd.)	Wire size (Note 2)
Solder type	CMV1-#22ASC-S1-100	0.5 mm^2 (AWG 20) or smaller
Press bonding type	CMV1-#22ASC-C1-100	0.2 mm^2 to 0.5 mm^2 (AWG 24 to 20) Crimping tool (357J-53162T) is required.
	CMV1-#22ASC-C2-100	0.08 mm^2 to 0.2 mm^2 (AWG 28 to 24) Crimping tool (357J-53163T) is required.

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. The wire size shows wiring specifications of the connector.
3. When a vertically mounted cable is led out, the lock lever of the connector must be on the load side.

Products on the Market for HK Series Rotary Servo Motors

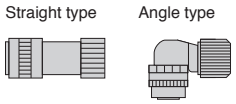
HK

Contact the relevant manufacturers directly.
When fabricating a cable with the following connectors, refer to the relevant manufacturers' instruction manuals for wiring and assembling procedures.



Power connector for HK-FN (1.0 kW to 3.0 kW) series/HK-SN series

Applicable servo motor	IP rating (Note 1)	Plug (Japan Aviation Electronics Industry, Limited)			Cable clamp (Japan Aviation Electronics Industry, Limited)	Applicable cable example	
		Type	Type of connection	Model		Wire size (Note 2)	Cable OD [mm]
HK-FN102, 152 HK-SN3534, 5034	IP67	Straight	One-touch connection type	JL10-6A18-10SE-EB	JL04-18CK(10)-R	3.5 mm² (AWG 12) or smaller	8 to 11
					JL04-18CK(13)-R		11 to 14.1
			Screw type	JL04V-6A18-10SE-EB-R	JL04-18CK(10)-R		8 to 11
					JL04-18CK(13)-R		11 to 14.1
		Angle	One-touch connection type	JL10-8A18-10SE-EB	JL04-18CK(10)-R		8 to 11
					JL04-18CK(13)-R		11 to 14.1
			Screw type	JL04V-8A18-10SE-EBH-R	JL04-18CK(10)-R		8 to 11
					JL04-18CK(13)-R		11 to 14.1
HK-FN202, 301M HK-SN7034		Straight	One-touch connection type	JL10-6A22-22SE-EB	JL04-2022CK(12)-R	8 mm² (AWG 8) or smaller	9.5 to 13
					JL04-2022CK(14)-R		12.9 to 16
			Screw type	JL04V-6A22-22SE-EB-R	JL04-2022CK(12)-R		9.5 to 13
					JL04-2022CK(14)-R		12.9 to 16
		Angle	One-touch connection type	JL10-8A22-22SE-EB	JL04-2022CK(12)-R		9.5 to 13
					JL04-2022CK(14)-R		12.9 to 16
			Screw type	JL04V-8A22-22SE-EBH-R	JL04-2022CK(12)-R		9.5 to 13
					JL04-2022CK(14)-R		12.9 to 16



Electromagnetic brake connector for HK-FN (1.0 kW to 3.0 kW) series/HK-SN series

Applicable servo motor	IP rating (Note 1)	Connector (DDK Ltd.)				Applicable cable example
		Type	Type of connection	Plug	Socket contact	Cable OD [mm]
HK-FN102B, 152B, 202B, 301MB HK-SN series	IP67	Straight	One-touch connection type	CMV1-SP2S-S	Select a solder or press bonding type. (Refer to the table below.)	4.0 to 6.0
				CMV1-SP2S-M1		5.5 to 7.5
				CMV1-SP2S-M2		7.0 to 9.0
				CMV1-SP2S-L		9.0 to 11.6
			Screw type	CMV1S-SP2S-S		4.0 to 6.0
				CMV1S-SP2S-M1		5.5 to 7.5
				CMV1S-SP2S-M2		7.0 to 9.0
				CMV1S-SP2S-L		9.0 to 11.6
		Angle	One-touch connection type	CMV1-AP2S-S		4.0 to 6.0
				CMV1-AP2S-M1		5.5 to 7.5
				CMV1-AP2S-M2		7.0 to 9.0
				CMV1-AP2S-L		9.0 to 11.6
			Screw type	CMV1S-AP2S-S		4.0 to 6.0
				CMV1S-AP2S-M1		5.5 to 7.5
				CMV1S-AP2S-M2		7.0 to 9.0
				CMV1S-AP2S-L		9.0 to 11.6

Contact	Socket contact (DDK Ltd.)	Wire size (Note 2)
Solder type	CMV1-#22BSC-S2-100	1.25 mm² (AWG 16) or smaller
Press bonding type	CMV1-#22BSC-C3-100	0.5 mm² to 1.25 mm² (AWG 20 to 16) Crimping tool (357J-53164T) is required.

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. The wire size shows wiring specifications of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for examples of wire size selection.

Cable and Connector Selection Table for HG Series Rotary Servo Motors

HG

Necessary option cables and connectors vary depending on the servo motor series.
Refer to the following tables for necessary options.

Selecting options for servo motor

Use the cables in the following tables.
For the cable descriptions, refer to the relevant letters in each list.

Capacity	Servo motor	Reference list		
		Encoder cable	Servo motor power cable	Electromagnetic brake cable (Note 1)
Small capacity	HG-KNS series	Column A in encoder cable list	Column A in servo motor power cable list	Column A in electromagnetic brake cable list
Medium capacity	HG-SNS series	Column B in encoder cable list	Column B in servo motor power cable list	Column B in electromagnetic brake cable list

Notes: 1. An electromagnetic brake cable is required only for servo motor with an electromagnetic brake.

Encoder cable list

	Cable length	IP rating (Note 1)	Cable direction	Bending life (Note 2)	Model	Reference
A	10 m or shorter (direct connection type)	IP65	In the direction of the load side	Long bending life	MR-J3ENCBL_M-A1-H	p. 6-23
				Standard	MR-J3ENCBL_M-A1-L	
			In the opposite direction of the load side	Long bending life	MR-J3ENCBL_M-A2-H	p. 6-23
				Standard	MR-J3ENCBL_M-A2-L	
	Over 10 m (junction type)	IP20	In the direction of the load side	Long bending life	Two types of cables are required: MR-J3JCBL03M-A1-L, MR-EKCBL_M-H	p. 6-23
				Standard	Two types of cables are required: MR-J3JCBL03M-A1-L, MR-EKCBL_M-L	
			In the opposite direction of the load side	Long bending life	Two types of cables are required: MR-J3JCBL03M-A2-L, MR-EKCBL_M-H	p. 6-23
				Standard	Two types of cables are required: MR-J3JCBL03M-A2-L, MR-EKCBL_M-L	
		IP65	In the direction of the load side	Long bending life	Two types of cables are required: MR-J3JSCBL03M-A1-L, MR-J3ENSCBL_M-H	p. 6-23 and 6-24
				Standard	Two types of cables are required: MR-J3JSCBL03M-A1-L, MR-J3ENSCBL_M-L	
			In the opposite direction of the load side	Long bending life	Two types of cables are required: MR-J3JSCBL03M-A2-L, MR-J3ENSCBL_M-H	p. 6-23 and 6-24
				Standard	Two types of cables are required: MR-J3JSCBL03M-A2-L, MR-J3ENSCBL_M-L	
B	2 m to 50 m	IP67	-	Long bending life	MR-J3ENSCBL_M-H	p. 6-24
	2 m to 30 m			Standard	MR-J3ENSCBL_M-L	

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Long bending life cables and standard cables are for moving parts and fixed parts respectively.

Cable and Connector Selection Table for HG Series Rotary Servo Motors

HG

Servo motor power cable list

	Cable length	IP rating (Note 1)	Cable direction	Bending life (Note 2)	Model	Reference
A	10 m or shorter (direct connection type)	IP65	In the direction of the load side	Long bending life	MR-PWS1CBL_M-A1-H	p. 6-25
				Standard	MR-PWS1CBL_M-A1-L	
			In the opposite direction of the load side	Long bending life	MR-PWS1CBL_M-A2-H	p. 6-25
				Standard	MR-PWS1CBL_M-A2-L	
	Over 10 m (junction type)	IP55	In the direction of the load side	Standard	Connect a user-fabricated cable to MR-PWS2CBL03M-A1-L (option cable).	p. 6-25
			In the opposite direction of the load side		Connect a user-fabricated cable to MR-PWS2CBL03M-A2-L (option cable).	p. 6-25

	IP rating (Note 1)	Compatible servo motor	Model	Reference
B	IP67	HG-SNS52J, 102J, 152J	Fabricate a cable that fits to MR-PWCNS4 (option connector set).	p. 6-25
		HG-SNS202J, 302J	Fabricate a cable that fits to MR-PWCNS5 (option connector set).	p. 6-25

Electromagnetic brake cable list

	Cable length	IP rating (Note 1)	Cable direction	Bending life (Note 2)	Model	Reference
A	10 m or shorter (direct connection type)	IP65	In the direction of the load side	Long bending life	MR-BKS1CBL_M-A1-H	p. 6-26
				Standard	MR-BKS1CBL_M-A1-L	
			In the opposite direction of the load side	Long bending life	MR-BKS1CBL_M-A2-H	p. 6-26
				Standard	MR-BKS1CBL_M-A2-L	
	Over 10 m (junction type)	IP55	In the direction of the load side	Standard	Connect a user-fabricated cable to MR-BKS2CBL03M-A1-L (option cable).	p. 6-26
			In the opposite direction of the load side		Connect a user-fabricated cable to MR-BKS2CBL03M-A2-L (option cable).	p. 6-26

	IP rating (Note 1)	Compatible servo motor	Model	Reference
B	IP67	HG-SNS series	Fabricate a cable that fits to MR-BKCNS1 or MR-BKCNS2 (option connector set) (straight type).	p. 6-26
			Fabricate a cable that fits to MR-BKCNS1A or MR-BKCNS2A (option connector set) (angle type).	p. 6-26

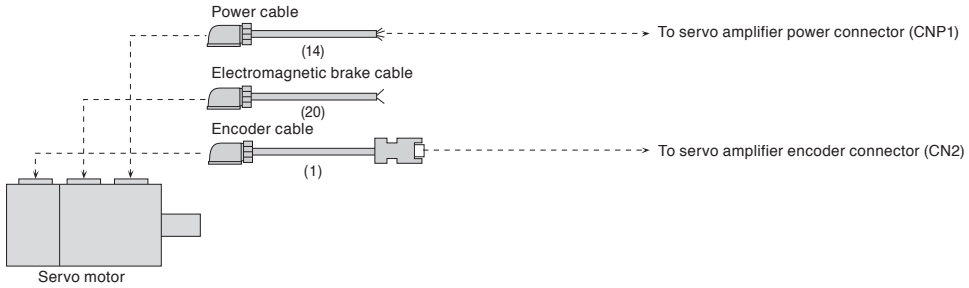
Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Long bending life cables and standard cables are for moving parts and fixed parts respectively.

Configuration Example for HG Series Rotary Servo Motors

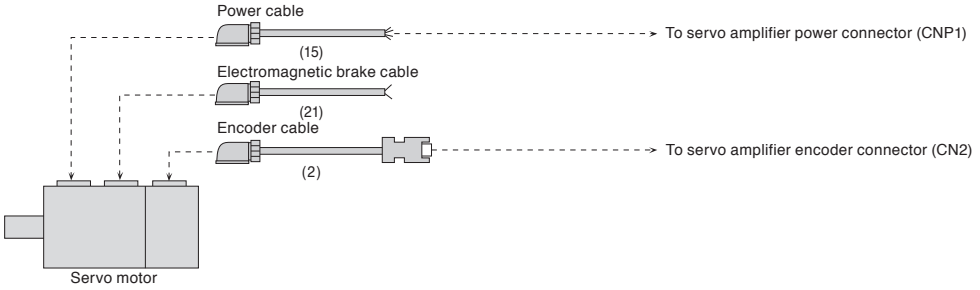
HG

HG-KNS series: encoder cable length 10 m or shorter

●For leading the cables out in the direction of the load side (Note 1)



●For leading the cables out in the opposite direction of the load side (Note 1)



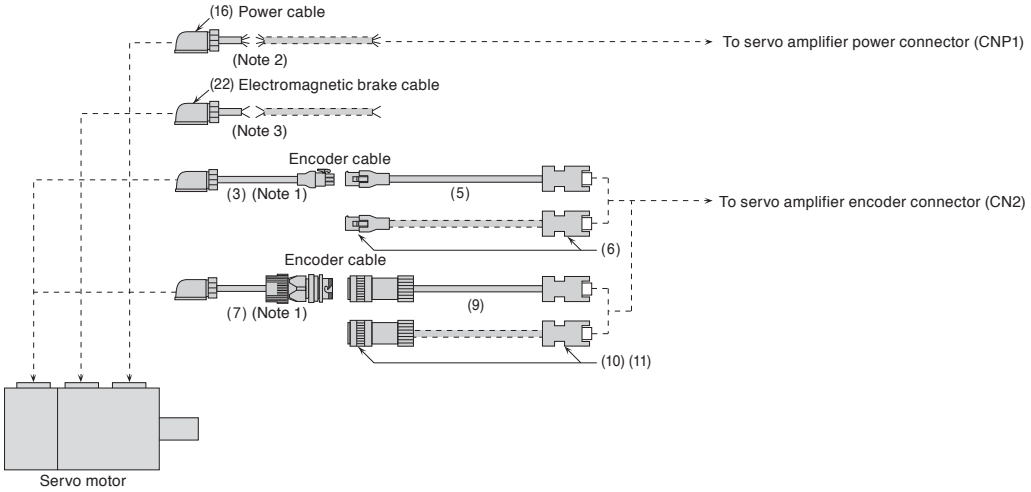
Notes: 1. Cables for leading two different directions may be used for one servo motor.

Configuration Example for HG Series Rotary Servo Motors (Note 5)

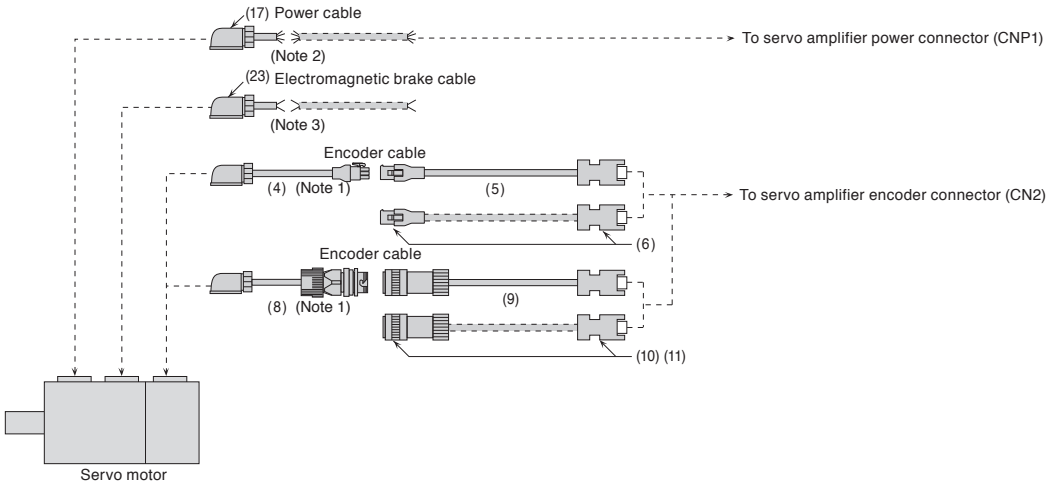
HG

HG-KNS series: encoder cable length over 10 m

●For leading the cables out in the direction of the load side (Note 4)



●For leading the cables out in the opposite direction of the load side (Note 4)

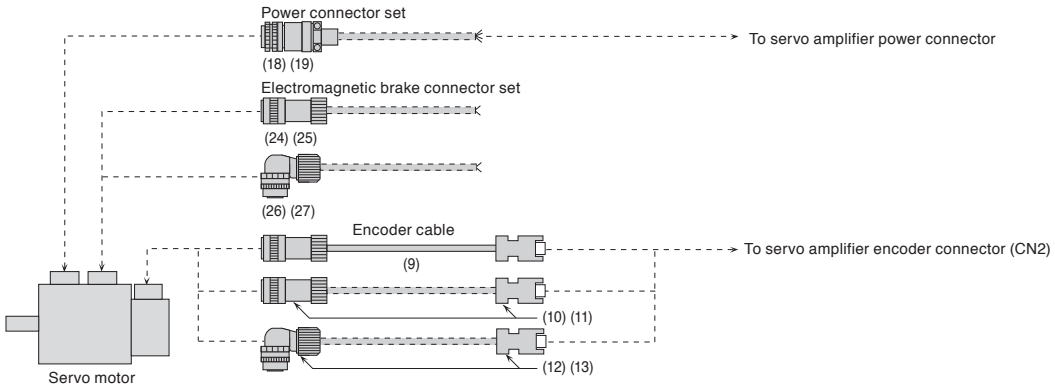


Notes: 1. Secure this cable as it does not have a long bending life.
2. Relay a cable using MR-PWS2CBL03M-A1-L or MR-PWS2CBL03M-A2-L. Secure this cable as it does not have a long bending life.
3. Relay a cable using MR-BKS2CBL03M-A1-L or MR-BKS2CBL03M-A2-L. Secure this cable as it does not have a long bending life.
4. Cables for leading two different directions may be used for one servo motor.
5. Cables drawn with dashed lines need to be fabricated by users. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.

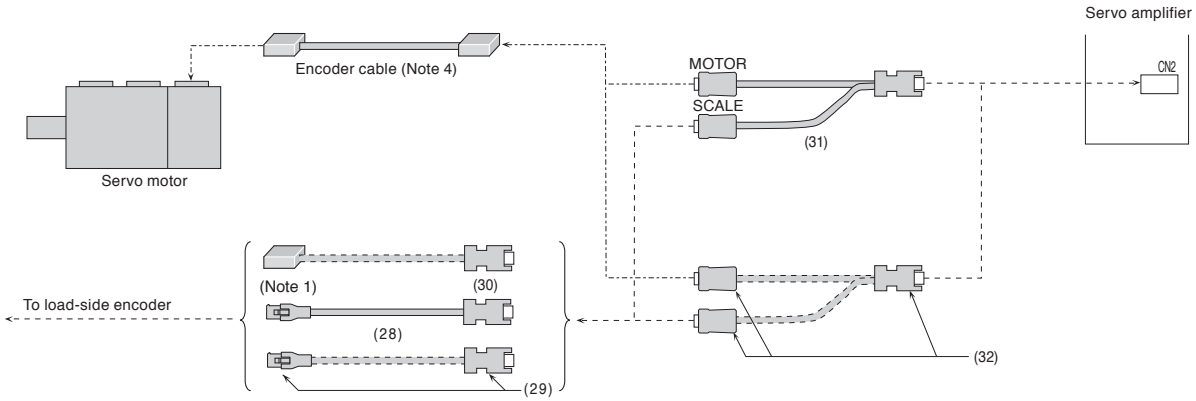
Configuration Example for HG Series Rotary Servo Motors (Note 2)

HG

HG-SNS series



Fully closed loop control (Note 3)



Notes: 1. Contact the relevant linear encoder manufacturers for connectors to connect with the head cables.
2. Cables drawn with dashed lines need to be fabricated by users. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when fabricating the cables.
3. Connections other than mentioned are the same as those for each rotary servo motor. Refer to cables and connectors for relevant servo motors in this catalog.
4. Necessary encoder cables vary depending on the servo motor series. Refer to cables and connectors for relevant servo motors in this catalog.

Cables and Connectors for HG Series Rotary Servo Motors

HG

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

No.	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(1)	Encoder cable (Note 2, 6, 7) (load-side lead)	MR-J3ENCBL2M-A1-H	2 m	IP65	HG-KNS series (direct connection type)	Encoder connector / Servo amplifier connector 
		MR-J3ENCBL5M-A1-H	5 m			
		MR-J3ENCBL10M-A1-H	10 m			
		MR-J3ENCBL2M-A1-L	2 m			
		MR-J3ENCBL5M-A1-L	5 m			
		MR-J3ENCBL10M-A1-L	10 m			
(2)	Encoder cable (Note 2, 6, 7) (opposite to load-side lead)	MR-J3ENCBL2M-A2-H	2 m	IP65	HG-KNS series (direct connection type)	
		MR-J3ENCBL5M-A2-H	5 m			
		MR-J3ENCBL10M-A2-H	10 m			
		MR-J3ENCBL2M-A2-L	2 m			
		MR-J3ENCBL5M-A2-L	5 m			
		MR-J3ENCBL10M-A2-L	10 m			
(3)	Encoder cable (Note 2, 6, 7) (load-side lead)	MR-J3JCBL03M-A1-L	0.3 m	IP20	HG-KNS series (junction type)	Encoder connector / Junction connector  Use this in combination with (5) or (6).
(4)	Encoder cable (Note 2, 6, 7) (opposite to load-side lead)	MR-J3JCBL03M-A2-L	0.3 m	IP20	HG-KNS series (junction type)	
(5)	Encoder cable (Note 2, 6, 7)	MR-EKCBL20M-H	20 m	IP20	HG-KNS series (junction type)	Junction connector / Servo amplifier connector  Use this in combination with (3) or (4).
		MR-EKCBL30M-H (Note 3)	30 m			
		MR-EKCBL40M-H (Note 3)	40 m			
		MR-EKCBL50M-H (Note 3)	50 m			
		MR-EKCBL20M-L	20 m			
		MR-EKCBL30M-L (Note 3)	30 m			
(6)	Encoder connector set (Note 5)	MR-ECNM	-	IP20	HG-KNS series (junction type)	Junction connector / Servo amplifier connector  Use this in combination with (3) or (4). Applicable cable Wire size: AWG 26 to 22 Cable OD: 7 mm to 9 mm
(7)	Encoder cable (Note 2, 6, 7) (load-side lead)	MR-J3JSCBL03M-A1-L	0.3 m	IP65 (Note 4)	HG-KNS series (junction type)	Encoder connector / Junction connector  Use this in combination with (9) or (10).
(8)	Encoder cable (Note 2, 6, 7) (opposite to load-side lead)	MR-J3JSCBL03M-A2-L	0.3 m	IP65 (Note 4)	HG-KNS series (junction type)	

Notes:
1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. -H and -L indicate a bending life. -H indicates a long bending life (for moving parts), and -L indicates a standard bending life (for fixed parts).
3. This encoder cable is available in four-wire type. Servo parameter setting is required to use the four-wire type encoder cable. Refer to "MR-JET User's Manual" for details.
4. The encoder cable is rated IP65 while the junction connector itself is rated IP67.
5. The crimping tool (91529-1) manufactured by TE Connectivity Ltd. Company is required. Contact the manufacturer directly.
6. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
7. Encoder cables are not subject to Low Voltage Directive (50 V AC to 1000 V AC and 75 V DC to 1500 V DC).

Cables and Connectors for HG Series Rotary Servo Motors

HG

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

No.	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(9)	Encoder cable (Note 2, 6, 8)	MR-J3ENSCBL2M-H	2 m	IP67	HG-KNS series (junction type) HG-SNS series (direct connection type)	Junction connector or encoder connector / Servo amplifier connector  Use this in combination with (7) or (8) for HG-KNS series.
		MR-J3ENSCBL5M-H	5 m			
		MR-J3ENSCBL10M-H	10 m			
		MR-J3ENSCBL20M-H	20 m			
		MR-J3ENSCBL30M-H	30 m			
		MR-J3ENSCBL40M-H	40 m			
		MR-J3ENSCBL50M-H	50 m			
		MR-J3ENSCBL2M-L	2 m			
		MR-J3ENSCBL5M-L	5 m			
		MR-J3ENSCBL10M-L	10 m			
		MR-J3ENSCBL20M-L	20 m			
		MR-J3ENSCBL30M-L	30 m			
(10)	Encoder connector set (Note 3, 5) (one-touch connection type)	MR-J3SCNS	-	IP67	HG-KNS series (junction type) HG-SNS series (direct connection type) (straight type)	Junction connector or encoder connector / Servo amplifier connector  Use this in combination with (7) or (8) for HG-KNS series. Applicable cable Wire size: 0.5 mm^2 (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm
(11)	Encoder connector set (Note 3, 4, 5, 7) (screw type)	MR-ENCNS2	-	IP67		
(12)	Encoder connector set (Note 3, 5, 7) (one-touch connection type)	MR-J3SCNSA	-	IP67	HG-SNS series (angle type)	Encoder connector / Servo amplifier connector  Applicable cable Wire size: 0.5 mm^2 (AWG 20) or smaller Cable OD: 5.5 mm to 9.0 mm
(13)	Encoder connector set (Note 3, 4, 5, 7) (screw type)	MR-ENCNS2A	-	IP67		

Notes:
1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. -H and -L indicate a bending life. -H indicates a long bending life (for moving parts), and -L indicates a standard bending life (for fixed parts).
3. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
4. A screw thread is cut on the encoder connector of HG-SNS series, and the screw type connector can be used.
5. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.
6. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
7. For fabricating cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
8. Encoder cables are not subject to Low Voltage Directive (50 V AC to 1000 V AC and 75 V DC to 1500 V DC).

Cables and Connectors for HG Series Rotary Servo Motors

HG

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

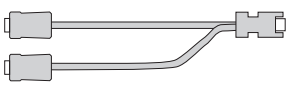
No.	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(14)	Power cable (Note 2, 4) (load-side lead)	MR-PWS1CBL2M-A1-H	2 m	IP65	HG-KNS series (direct connection type)	Power connector  Lead-out * The cable is not shielded.
		MR-PWS1CBL5M-A1-H	5 m			
		MR-PWS1CBL10M-A1-H	10 m			
		MR-PWS1CBL2M-A1-L (Note 3)	2 m			
		MR-PWS1CBL5M-A1-L (Note 3)	5 m			
		MR-PWS1CBL10M-A1-L (Note 3)	10 m			
(15)	Power cable (Note 2, 4) (opposite to load-side lead)	MR-PWS1CBL2M-A2-H	2 m	IP65	HG-KNS series (direct connection type)	
		MR-PWS1CBL5M-A2-H	5 m			
		MR-PWS1CBL10M-A2-H	10 m			
		MR-PWS1CBL2M-A2-L (Note 3)	2 m			
		MR-PWS1CBL5M-A2-L (Note 3)	5 m			
		MR-PWS1CBL10M-A2-L (Note 3)	10 m			
(16)	Power cable (Note 2) (load-side lead)	MR-PWS2CBL03M-A1-L	0.3 m	IP55	HG-KNS series (junction type)	Power connector  Lead-out * The cable is not shielded.
(17)	Power cable (Note 2) (opposite to load-side lead)	MR-PWS2CBL03M-A2-L	0.3 m	IP55	HG-KNS series (junction type)	
(18)	Power connector set (Note 5)	MR-PWCNS4	-	IP67	HG-SNS52J, 102J, 152J	Power connector  Applicable cable Wire size: 2 mm^2 to 3.5 mm^2 (AWG 14 to 12) Cable OD: 10.5 mm to 14.1 mm
(19)	Power connector set (Note 5)	MR-PWCNS5	-	IP67	HG-SNS202J, 302J	Power connector  Applicable cable Wire size: 5.5 mm^2 to 8 mm^2 (AWG 10 to 8) Cable OD: 12.5 mm to 16 mm

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. -H and -L indicate a bending life. -H indicates a long bending life (for moving parts), and -L indicates a standard bending life (for fixed parts).
3. Shielded power cable MR-PWS3CBL_M-A_-L is also available. Contact your local sales office.
4. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
5. For fabricating cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)

Cables and Connectors for HG Series Rotary Servo Motors

HG

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

No.	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(20)	Electromagnetic brake cable (Note 2, 5) (load-side lead)	MR-BKS1CBL2M-A1-H	2 m	IP65	HG-KNS series (direct connection type)	Electromagnetic brake connector  Lead-out * The cable is not shielded.
		MR-BKS1CBL5M-A1-H	5 m			
		MR-BKS1CBL10M-A1-H	10 m			
		MR-BKS1CBL2M-A1-L	2 m			
		MR-BKS1CBL5M-A1-L	5 m			
		MR-BKS1CBL10M-A1-L	10 m			
(21)	Electromagnetic brake cable (Note 2, 5) (opposite to load-side lead)	MR-BKS1CBL2M-A2-H	2 m	IP65	HG-KNS series (direct connection type)	
		MR-BKS1CBL5M-A2-H	5 m			
		MR-BKS1CBL10M-A2-H	10 m			
		MR-BKS1CBL2M-A2-L	2 m			
		MR-BKS1CBL5M-A2-L	5 m			
		MR-BKS1CBL10M-A2-L	10 m			
(22)	Electromagnetic brake cable (Note 2) (load-side lead)	MR-BKS2CBL03M-A1-L	0.3 m	IP55	HG-KNS series (junction type)	Electromagnetic brake connector  Lead-out * The cable is not shielded.
(23)	Electromagnetic brake cable (Note 2) (opposite to load-side lead)	MR-BKS2CBL03M-A2-L	0.3 m	IP55	HG-KNS series (junction type)	
(24)	Electromagnetic brake connector set (Note 4, 6) (one-touch connection type)	MR-BKCNS1	-	IP67	HG-SNS series (straight type)	Electromagnetic brake connector  Applicable cable Wire size: 1.25 mm² (AWG 16) or smaller Cable OD: 9.0 mm to 11.6 mm
(25)	Electromagnetic brake connector set (Note 3, 4, 6) (screw type)	MR-BKCNS2	-	IP67		
(26)	Electromagnetic brake connector set (Note 4, 6) (one-touch connection type)	MR-BKCNS1A	-	IP67	HG-SNS series (angle type)	Electromagnetic brake connector  Applicable cable Wire size: 1.25 mm² (AWG 16) or smaller Cable OD: 9.0 mm to 11.6 mm
(27)	Electromagnetic brake connector set (Note 3, 4, 6) (screw type)	MR-BKCNS2A	-	IP67		
(28)	Encoder cable (Note 2, 7)	MR-EKCBL2M-H (Note 5)	2 m	IP20	Connecting a load-side encoder	Junction connector Servo amplifier connector 
		MR-EKCBL5M-H (Note 5)	5 m			
(29)	Encoder connector set (Note 7, 8)	MR-ECNM	-	IP20	Connecting a load-side encoder	Junction connector Servo amplifier connector  Applicable cable Wire size: AWG 26 to 22 Cable OD: 7 mm to 9 mm
(30)	Encoder connector set	MR-J3CN2	-	-	Connecting a load-side encoder	Servo amplifier connector 
(31)	Junction cable for fully closed loop control	MR-J4FCCBL03M	0.3 m	-	Branching a load-side encoder	Junction connector Servo amplifier connector 
(32)	Connector set	MR-J3THMCN2	-	-	Branching a load-side encoder	Junction connector Servo amplifier connector 

Notes:
1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. -H and -L indicate a bending life. -H indicates a long bending life (for moving parts), and -L indicates a standard bending life (for fixed parts).
3. A screw thread is cut on the electromagnetic brake connector of HG-SNS series, and the screw type connector can be used.
4. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.
5. For unlisted lengths of the cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
6. For fabricating cables, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)
7. Use MR-EKCBL_M-H or MR-ECNM to connect to an output cable for AT343A, AT543A-SC or AT545A-SC scales manufactured by Mitutoyo Corporation.
8. The crimping tool (91529-1) manufactured by TE Connectivity Ltd. Company is required. Contact the manufacturer directly.

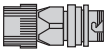
Details of Option Connectors for HG Series Rotary Servo Motors

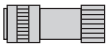
HG

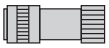
Model	Encoder connector	Servo amplifier connector
MR-J3ENCBL_M-A1-H (Note 2) MR-J3ENCBL_M-A1-L (Note 2) MR-J3ENCBL_M-A2-H (Note 2) MR-J3ENCBL_M-A2-L (Note 2)	 2174053-1 (TE Connectivity Ltd. Company)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Encoder connector	Junction connector
MR-J3JCBL03M-A1-L (Note 2) MR-J3JCBL03M-A2-L (Note 2)	 2174053-1 (TE Connectivity Ltd. Company)	 Contact: 1473226-1 (with ring) Housing: 1-172169-9 Cable clamp: 316454-1 (TE Connectivity Ltd. Company)

Model	Junction connector	Servo amplifier connector
MR-EKCBL_M-H MR-EKCBL_M-L MR-ECNM	 Housing: 1-172161-9 Connector pin: 170359-1 (TE Connectivity Ltd. Company) or an equivalent product Cable clamp: MTI-0002 (Toa Electric Industrial Co., Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Encoder connector	Junction connector
MR-J3JSCBL03M-A1-L (Note 2) MR-J3JSCBL03M-A2-L (Note 2)	 2174053-1 (TE Connectivity Ltd. Company)	 Cable receptacle: CMV1-CR10P-M1 (DDK Ltd.)

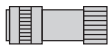
Model	Encoder connector	Servo amplifier connector
MR-J3ENSCBL_M-H (Note 2) MR-J3ENSCBL_M-L (Note 2)	 For 10 m or shorter cable Straight plug: CMV1-SP10S-M1 Socket contact: CMV1-#22ASC-C1-100 For 20 m or longer cable Straight plug: CMV1-SP10S-M1 (long bending life) CMV1-SP10S-M2 (standard) Socket contact: CMV1-#22ASC-C2-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Junction connector/encoder connector	Servo amplifier connector
MR-J3SCNS (Note 1, 2, 3)	 Straight plug: CMV1-SP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Notes: 1. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
2. Some cables or connector sets may contain the connectors of different shapes. However, these connectors are all usable.
3. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.

Details of Option Connectors for HG Series Rotary Servo Motors

HG

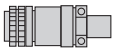
Model	Encoder connector	Servo amplifier connector
MR-ENCNS2 (Note 1, 3)	 Straight plug: CMV1S-SP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

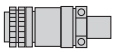
Model	Encoder connector	Servo amplifier connector
MR-J3SCNSA (Note 1, 2, 3)	 Angle plug: CMV1-AP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Encoder connector	Servo amplifier connector
MR-ENCNS2A (Note 1, 3)	 Angle plug: CMV1S-AP10S-M2 Socket contact: CMV1-#22ASC-S1-100 (DDK Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Power connector	
MR-PWS1CBL_M-A1-H (Note 2) MR-PWS1CBL_M-A1-L (Note 2) MR-PWS1CBL_M-A2-H (Note 2) MR-PWS1CBL_M-A2-L (Note 2)		Plug: KN4FT04SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

Model	Power connector	
MR-PWS2CBL03M-A1-L (Note 2) MR-PWS2CBL03M-A2-L (Note 2)		Plug: KN4FT04SJ2-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

Model	Power connector	
MR-PWCNS4		Plug: CE05-6A18-10SD-D-BSS (straight) Cable clamp: CE3057-10A-1-D (DDK Ltd.)

Model	Power connector	
MR-PWCNS5		Plug: CE05-6A22-22SD-D-BSS (straight) Cable clamp: CE3057-12A-1-D (DDK Ltd.)

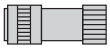
Model	Electromagnetic brake connector	
MR-BKS1CBL_M-A1-H MR-BKS1CBL_M-A1-L MR-BKS1CBL_M-A2-H MR-BKS1CBL_M-A2-L		Plug: JN4FT02SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

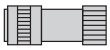
Model	Electromagnetic brake connector	
MR-BKS2CBL03M-A1-L MR-BKS2CBL03M-A2-L		Plug: JN4FT02SJ2-R Socket contact: ST-TMH-S-C1B-100-(A534G) (Japan Aviation Electronics Industry, Limited)

Notes: 1. Cable clamps and bushings for cable OD of 5.5 mm to 7.5 mm and of 7.0 mm to 9.0 mm are included in the set.
2. Some cables or connector sets may contain the connectors of different shapes. However, these connectors are all usable.
3. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.

Details of Option Connectors for HG Series Rotary Servo Motors

HG

Model	Electromagnetic brake connector	
MR-BKCNS1 (Note 1, 2)		Straight plug: CMV1-SP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS2 (Note 2)		Straight plug: CMV1S-SP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS1A (Note 1, 2)		Angle plug: CMV1-AP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Electromagnetic brake connector	
MR-BKCNS2A (Note 2)		Angle plug: CMV1S-AP2S-L Socket contact: CMV1-#22BSC-S2-100 (DDK Ltd.)

Model	Servo amplifier connector		
MR-J3CN2			
	Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)	or	Connector set: 54599-1019 (Molex, LLC)

Model	Junction connector	Servo amplifier connector
MR-J4FCCBL03M MR-J3THMCN2	 Plug: 36110-3000FD Shell kit: 36310-F200-008 (3M)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)

Notes: 1. Some cables or connector sets may contain the connectors of different shapes. However, these connectors are all usable.
2. The connector set contains a plug and contacts. Using contacts for other plugs may damage the connector. Use the enclosed contacts.

Products on the Market for HG Series Rotary Servo Motors

HG

Contact the relevant manufacturers directly.
When fabricating a cable with the following connectors, refer to the relevant manufacturers' instruction manuals for wiring and assembling procedures.

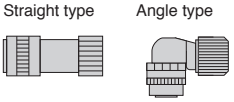
Encoder connector (servo amplifier side)

Application	Connector (3M)
Servo amplifier CN2 connector	Receptacle: 36210-0100PL Shell kit: 36310-3200-008
	Connector (Molex, LLC)
	54599-1019 (gray)
	54599-1016 (black)

Encoder connector for HG-KNS series

Applicable servo motor	IP rating (Note 1)	Connector (TE Connectivity Ltd. Company)	Crimping tool (TE Connectivity Ltd. Company)	Applicable cable example
HG-KNS series	IP65	2174053-1	For ground clip: 1596970-1 For receptacle contact: 1596847-1	Wire size: 0.13 mm² to 0.33 mm² (AWG 26 to 22) Cable OD: 6.8 mm to 7.4 mm Wire example: Fluorine resin wire (Vinyl jacket cable TPE. SVP 70/0.08 (AWG#22)-3P KB-2237-2 Bando Densen Co., Ltd. (Note 2) or an equivalent product)

Encoder connector for HG-SNS series



Applicable servo motor	IP rating (Note 1)	Connector (DDK Ltd.)				Applicable cable example
		Type	Type of connection	Plug	Socket contact	Cable OD [mm]
HG-SNS series	IP67	Straight	One-touch connection type	CMV1-SP10S-M1	Select a solder or press bonding type. (Refer to the table below.)	5.5 to 7.5
				CMV1-SP10S-M2		7.0 to 9.0
			Screw type	CMV1S-SP10S-M1		5.5 to 7.5
				CMV1S-SP10S-M2		7.0 to 9.0
		Angle	One-touch connection type	CMV1-AP10S-M1		5.5 to 7.5
				CMV1-AP10S-M2		7.0 to 9.0
			Screw type	CMV1S-AP10S-M1		5.5 to 7.5
				CMV1S-AP10S-M2		7.0 to 9.0

Contact	Socket contact (DDK Ltd.)	Wire size (Note 3)
Solder type	CMV1-#22ASC-S1-100	0.5 mm² (AWG 20) or smaller
Press bonding type	CMV1-#22ASC-C1-100	0.2 mm² to 0.5 mm² (AWG 24 to 20) Crimping tool (357J-53162T) is required.
	CMV1-#22ASC-C2-100	0.08 mm² to 0.2 mm² (AWG 28 to 24) Crimping tool (357J-53163T) is required.

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Contact Toa Electric Industrial Co., Ltd.
3. The wire size shows wiring specifications of the connector.

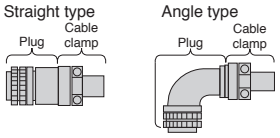
Products on the Market for HG Series Rotary Servo Motors

HG

Contact the relevant manufacturers directly.
When fabricating a cable with the following connectors, refer to the relevant manufacturers' instruction manuals for wiring and assembling procedures.

Power connector for HG-KNS series

Applicable servo motor	IP rating (Note 1)	Connector (Japan Aviation Electronics Industry, Limited)	Crimping tool (Japan Aviation Electronics Industry, Limited)	Applicable cable example
HG-KNS series	IP65	Plug: KN4FT04SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G)	For contactor: CT170-14-TMH5B	Wire size: 0.3 mm² to 0.75 mm² (AWG 22 to 18) Cable OD: 5.3 mm to 6.5 mm Wire example: Fluorine resin wire (Vinyl jacket cable RMFES-A (CL3X) AWG 19, 4 cores Dyden Corporation (Note 3) or an equivalent product)



Power connector for HG-SNS series

Applicable servo motor	IP rating (Note 1)	Plug (with backshell) (DDK Ltd.)		Cable clamp (DDK Ltd.)	Applicable cable example	
		Type	Model	Model	Wire size (Note 2)	Cable OD [mm]
HG-SNS52J, 102J, 152J	IP67	Straight	CE05-6A18-10SD-D-BSS	CE3057-10A-2-D	2.2 mm² to 3.5 mm² (AWG 14 to 12)	8.5 to 11
				CE3057-10A-1-D		10.5 to 14.1
	-		D/MS3106B18-10S	D/MS3057-10A	2.2 mm² to 3.5 mm² (AWG 14 to 12)	14.3 or smaller (bushing ID)
HG-SNS202J, 302J	IP67		CE05-6A22-22SD-D-BSS	CE3057-12A-2-D	5.5 mm² to 8 mm² (AWG 10 to 8)	9.5 to 13
				CE3057-12A-1-D		12.5 to 16
	-		D/MS3106B22-22S	D/MS3057-12A	5.5 mm² to 8 mm² (AWG 10 to 8)	15.9 or smaller (bushing ID)
HG-SNS52J, 102J, 152J	IP67	Angle	CE05-8A18-10SD-D-BAS	CE3057-10A-2-D	2.2 mm² to 3.5 mm² (AWG 14 to 12)	8.5 to 11
				CE3057-10A-1-D		10.5 to 14.1
	-		D/MS3108B18-10S	D/MS3057-10A	2.2 mm² to 3.5 mm² (AWG 14 to 12)	14.3 or smaller (bushing ID)
HG-SNS202J, 302J	IP67		CE05-8A22-22SD-D-BAS	CE3057-12A-2-D	5.5 mm² to 8 mm² (AWG 10 to 8)	9.5 to 13
				CE3057-12A-1-D		12.5 to 16
	-		D/MS3108B22-22S	D/MS3057-12A	5.5 mm² to 8 mm² (AWG 10 to 8)	15.9 or smaller (bushing ID)

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. The wire size shows wiring specifications of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for examples of wire size selection.
3. Contact Taisei Co., Ltd.

Products on the Market for HG Series Rotary Servo Motors

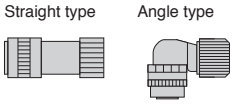
HG

Contact the relevant manufacturers directly.
When fabricating a cable with the following connectors, refer to the relevant manufacturers' instruction manuals for wiring and assembling procedures.

Electromagnetic brake connector for HG-KNS series

Applicable servo motor	IP rating (Note 1)	Connector (Japan Aviation Electronics Industry, Limited)	Crimping tool (Japan Aviation Electronics Industry, Limited)	Applicable cable example
HG-KNS series	IP65	Plug: JN4FT02SJ1-R Socket contact: ST-TMH-S-C1B-100-(A534G)	For contactor: CT170-14-TMH5B	Wire size: 0.3 mm² to 0.5 mm² (AWG 22 to 20) Cable OD: 3.6 mm to 4.8 mm Wire example: Fluorine resin wire (Vinyl jacket cable RMFES-A (CL3X) AWG 20, 2 cores Dyden Corporation (Note 2) or an equivalent product)

Electromagnetic brake connector for HG-SNS series



Applicable servo motor	IP rating (Note 1)	Connector (DDK Ltd.)				Applicable cable example
		Type	Type of connection	Plug	Socket contact	Cable OD [mm]
HG-SNS series	IP67	Straight	One-touch connection type	CMV1-SP2S-S	Select a solder or press bonding type. (Refer to the table below.)	4.0 to 6.0
				CMV1-SP2S-M1		5.5 to 7.5
				CMV1-SP2S-M2		7.0 to 9.0
				CMV1-SP2S-L		9.0 to 11.6
			Screw type	CMV1S-SP2S-S		4.0 to 6.0
				CMV1S-SP2S-M1		5.5 to 7.5
				CMV1S-SP2S-M2		7.0 to 9.0
				CMV1S-SP2S-L		9.0 to 11.6
		Angle	One-touch connection type	CMV1-AP2S-S		4.0 to 6.0
				CMV1-AP2S-M1		5.5 to 7.5
				CMV1-AP2S-M2		7.0 to 9.0
				CMV1-AP2S-L		9.0 to 11.6
			Screw type	CMV1S-AP2S-S		4.0 to 6.0
				CMV1S-AP2S-M1		5.5 to 7.5
				CMV1S-AP2S-M2		7.0 to 9.0
				CMV1S-AP2S-L		9.0 to 11.6

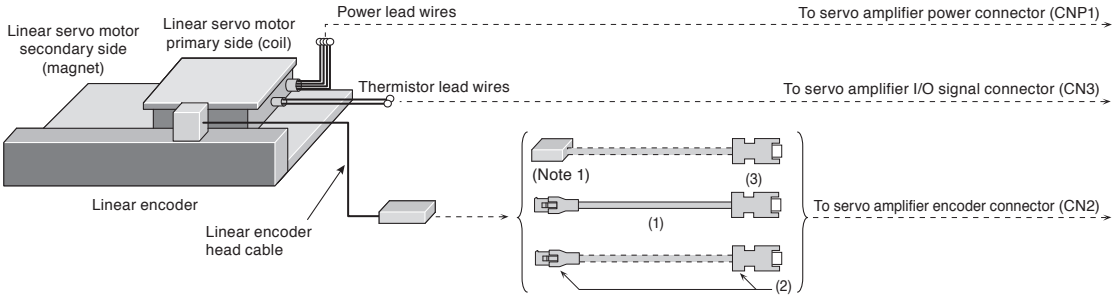
Contact	Socket contact (DDK Ltd.)	Wire size (Note 3)
Solder type	CMV1-#22BSC-S2-100	1.25 mm² (AWG 16) or smaller
Press bonding type	CMV1-#22BSC-C3-100	0.5 mm² to 1.25 mm² (AWG 20 to 16) Crimping tool (357J-53164T) is required.

Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. Contact Taisei Co., Ltd.
3. The wire size shows wiring specifications of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for examples of wire size selection.

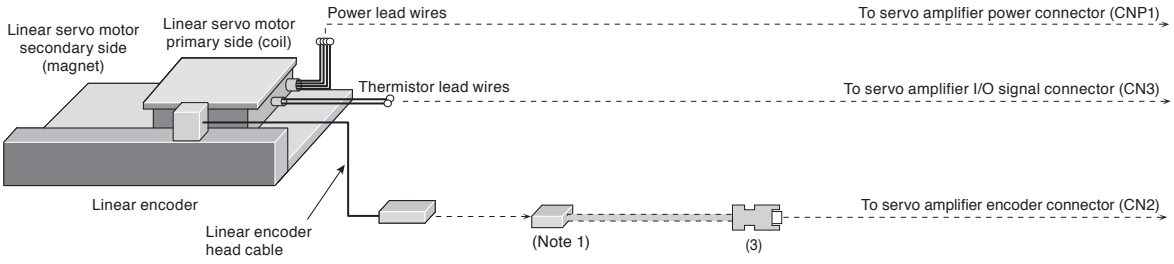
Configuration Example for LM Series Linear Servo Motors (Note 2)

LM-H3 series

●When using a serial linear encoder

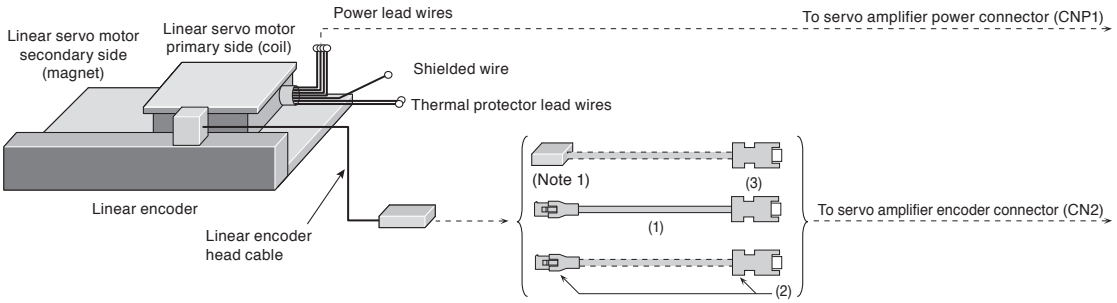


●When using an A/B/Z-phase differential output type linear encoder

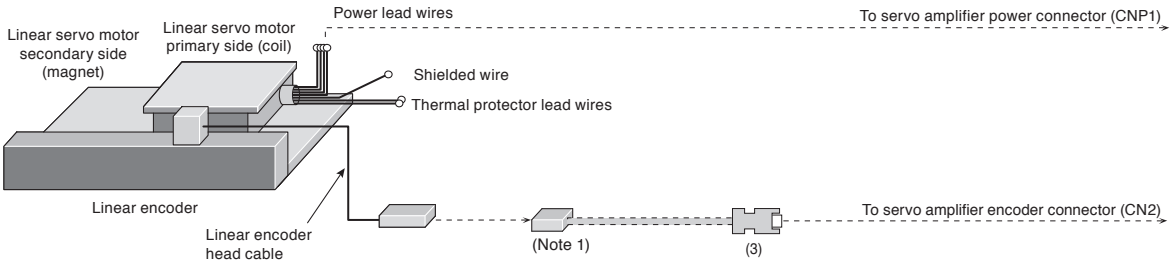


LM-AJ series/LM-AU series

●When using a serial linear encoder



●When using an A/B/Z-phase differential output type linear encoder



Notes: 1. Contact the relevant linear encoder manufacturers for connectors to connect with the head cables.
2. Cables drawn with dashed lines need to be fabricated by users. Refer to "Linear Servo Motor User's Manual" when fabricating the cables.

Cables and Connectors for LM Series Linear Servo Motors

Refer to "Details of Option Connectors for Servo Motors" in this catalog for the detailed models.

No.	Item	Model	Cable length	IP rating (Note 1)	Application	Description
(1)	Encoder cable (Note 3, 4, 5)	MR-EKCBL2M-H	2 m	IP20	Connecting a linear encoder	Junction connector Servo amplifier connector 
		MR-EKCBL5M-H	5 m			
(2)	Encoder connector set (Note 2, 3)	MR-ECNM	-	IP20	Connecting a linear encoder	Junction connector Servo amplifier connector  Applicable cable Wire size: AWG 26 to 22 Cable OD: 7 mm to 9 mm
(3)	Encoder connector set	MR-J3CN2	-	-	Connecting a linear encoder	Servo amplifier connector 

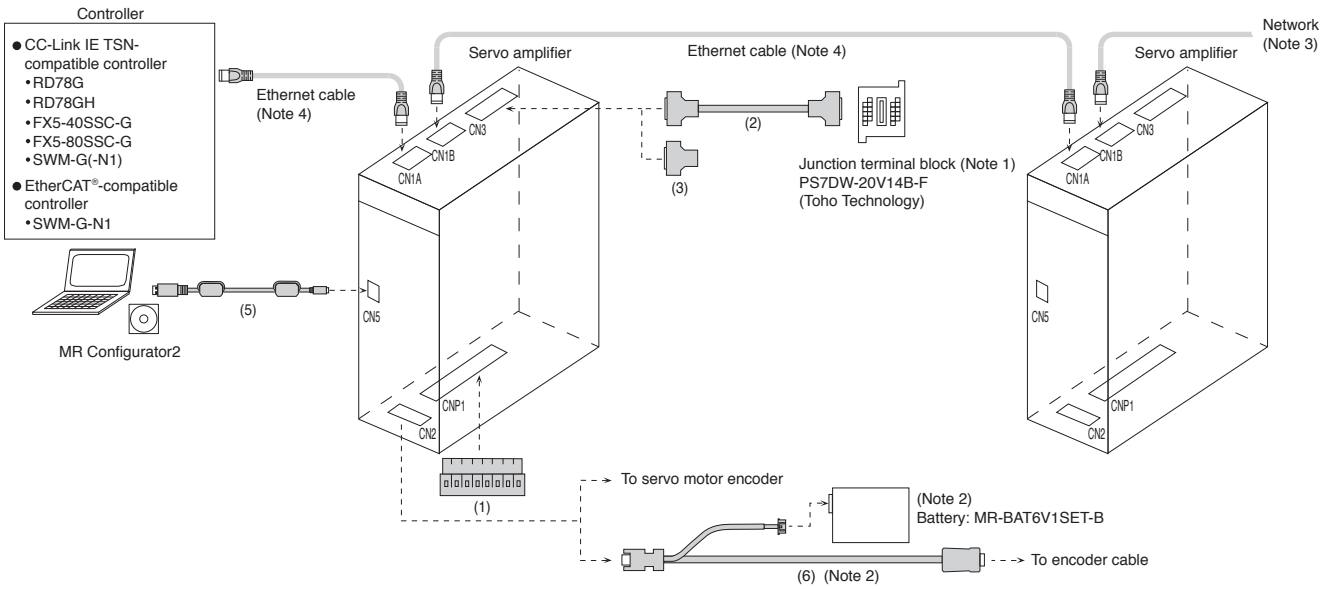
Notes: 1. The IP rating indicated is for the connector's protection against ingress of dust and water when coupled to a servo motor. If the IP rating of the servo motor differs from that of these connectors, overall IP rating depends on the lowest of all.
2. The crimping tool (91529-1) manufactured by TE Connectivity Ltd. Company is required. Contact the manufacturer directly.
3. Use MR-EKCBL_M-H or MR-ECNM to connect to an output cable for AT343A, AT543A-SC or AT545A-SC scales manufactured by Mitutoyo Corporation.
4. -H indicates a long bending life (for moving parts), and -L indicates a standard bending life (for fixed parts).
5. Encoder cables are not subject to Low Voltage Directive (50 V AC to 1000 V AC and 75 V DC to 1500 V DC).

Details of Option Connectors for LM Series Linear Servo Motors

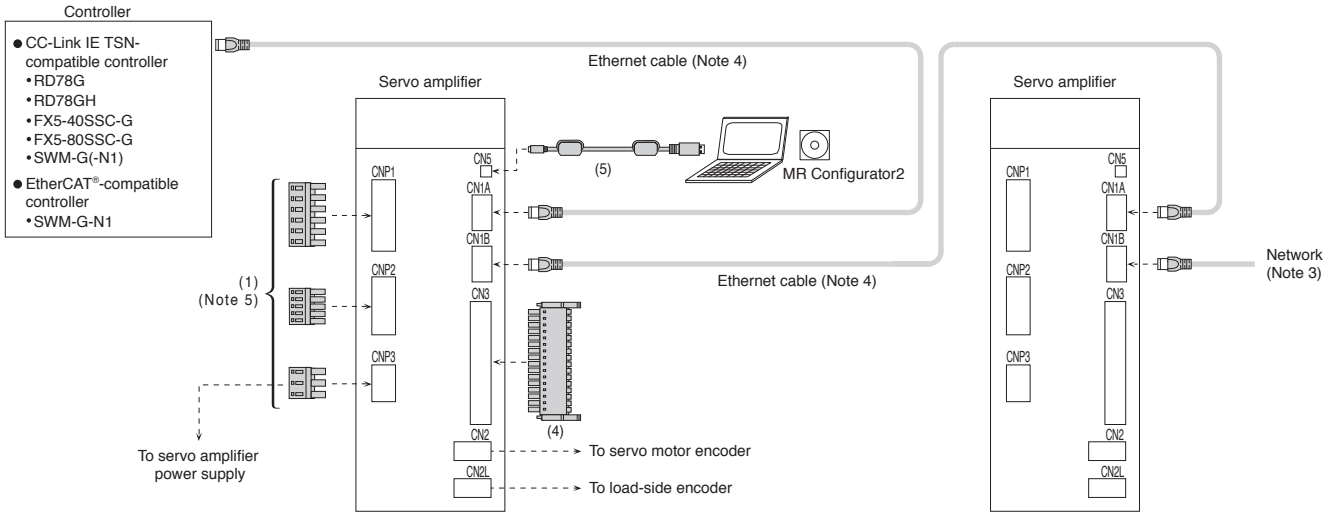
Model	Junction connector	Servo amplifier connector
MR-EKCBL_M-H MR-ECNM	 Housing: 1-172161-9 Connector pin: 170359-1 (TE Connectivity Ltd. Company) or an equivalent product Cable clamp: MTI-0002 (Toa Electric Industrial Co., Ltd.)	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M) or Connector set: 54599-1019 (Molex, LLC)

Model	Servo amplifier connector		
MR-J3CN2	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)	or	Connector set: 54599-1019 (Molex, LLC)

Configuration Example for MR-JET-G



Configuration Example for MR-JET-G4-HS



Notes: 1. Refer to "Junction Terminal Block" in this catalog.
2. When configuring an absolute position detection system with a rotary servo motor having a battery backup type absolute position encoder, whether a battery (MR-BAT6V1SET-B) is required depends on the system configuration. In addition, use the battery branch cable (MR-BT6V4CBL03M) when using the battery. Refer to "Battery" in this catalog for information on whether a battery is required, details, and connections of the battery.
3. When branching off CC-Link IE TSN (synchronous communication function) with a switching hub, use a switching hub (class B) recommended by CC-Link Partner Association. When a switching hub (class A) is used, there are restrictions on the topologies to be used. Refer to the controller manual for details.
4. Refer to "Ethernet Cable Specifications" in this catalog for specifications of the Ethernet cable.
5. The shape and position of the power connector are different from those of the indicated connector for some servo amplifier capacities. Refer to the dimensions for details.

Ethernet Cable Specifications

Item	CC-Link IE TSN (Note 1, 2)	EtherCAT®/CC-Link IE Field Network Basic
Cable type	Category 5e or higher, (double shielded/STP) straight cable	
Standard	IEEE802.3 (1000BASE-T) ANSI/TIA/EIA-568-B (Category 5e)	IEEE802.3 (100BASE-TX) ANSI/TIA/EIA-568-B (Category 5e)
Connector	RJ-45 connector with shield	

Notes: 1. Use wiring parts recommended by CC-Link Partner Association for wiring the CC-Link IE TSN.
2. Cables for CC-Link IE Controller Network cannot be used with CC-Link IE TSN.

[Products on the Market]

Ethernet Cable

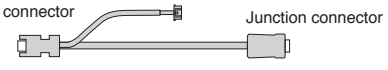
Item		Model	Specifications	
Ethernet Cable	For indoor	SC-E5EW-S_M	_: cable length (0.5 m, 1 to 100 m (unit of 1 m))	Double shielded cable (Category 5e)
	For indoor and moving part	SC-E5EW-S_M-MV	_: cable length (0.1, 0.2, 0.3, 0.5 m, 1 to 45 m (unit of 1 m))	
	For indoor/outdoor	SC-E5EW-S_M-L	_: cable length (1 to 100 m (unit of 1 m))	

For details, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)

* When using CC-Link IE TSN, refer to the website of CC-Link Partner Association for cables on the market other than above.
https://www.cc-link.org/en/

Cables and Connectors for Servo Amplifiers

Refer to "Details of Option Connectors for Servo Amplifiers" in this catalog for the detailed models.

No.		Item	Application	Cable length	Model	Description
For CNP1	(1)	Servo amplifier power connector set	MR-JET-100G or smaller	-	(Standard accessory)	CNP1 connector, Open tool  Applicable wire size (Note 1): AWG 18 to 14 Insulator OD: 3.9 mm or smaller
			MR-JET-200G/ MR-JET-300G			CNP1 connector, Open tool  Applicable wire size (Note 1): AWG 16 to 10 Insulator OD: 4.7 mm or smaller
			MR-JET-350G4-HS or smaller			CNP1 connector, CNP2 connector, CNP3 connector, Open tool  Applicable wire size (Note 1): AWG 18 to 14 Insulator OD: 3.9 mm or smaller
			MR-JET-500G4-HS/ MR-JET-700G4-HS			CNP1 connector, CNP3 connector  Applicable wire size (Note 1): AWG 20 to 8 Insulator OD: 6.6 mm or smaller
For CN3	(2)	Junction terminal block cable	Connecting MR-JET-_G and PS7DW-20V14B-F	0.5 m	MR-J2HBUS05M	Servo amplifier connector, Junction terminal block connector 
				1 m	MR-J2HBUS1M	
				5 m	MR-J2HBUS5M	
	(3)	Connector set	MR-JET-_G	-	MR-CCN1	 Servo amplifier connector
	(4)	Connector set	MR-JET-_G4-HS	-	(Standard accessory)	 Servo amplifier connector Applicable wire size: AWG 24 to 16
For CN5	(5)	Personal computer communication cable (USB cable)	MR-JET-_G/ MR-JET-_G4-HS	3 m	MR-J3USBCBL3M	Personal computer connector A connector, Servo amplifier connector mini-B connector (5-pin) 
For CN2	(6)	Battery branch cable	MR-JET-_G	0.3 m	MR-BT6V4CBL03M	Servo amplifier connector, Battery connector, Junction connector  Cable length Encoder side: 0.3 m Battery side: 0.1 m

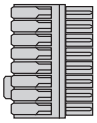
Notes: 1. The wire size shows wiring specifications of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for examples of wire size selection.

Details of Option Connectors for Servo Amplifiers

Model	CNP1 connector	Open tool
Servo amplifier power connector set For MR-JET-100G or smaller (standard accessory)	 1-2349815-2 (TE Connectivity Ltd. Company)	 1981045-1 (TE Connectivity Ltd. Company)

Model	CNP1 connector	Open tool
Servo amplifier power connector set For MR-JET-200G/ MR-JET-300G (standard accessory)	 1-2349825-8 (TE Connectivity Ltd. Company)	 2349891-1 (TE Connectivity Ltd. Company)

Model	CNP1 connector	CNP2 connector	CNP3 connector	Open tool
Servo amplifier power connector set For MR-JET-60G4-HS/ MR-JET-100G4-HS/ MR-JET-200G4-HS/ MR-JET-350G4-HS (standard accessory)	 06JFAT-SAXGDK-HT10.5 (LA) (J.S.T. Mfg. Co., Ltd.)	 05JFAT-SAXGDK-H5.0 (LA) (J.S.T. Mfg. Co., Ltd.)	 03JFAT-SAXGDK-HT10.5 (LA) (J.S.T. Mfg. Co., Ltd.)	 J-FAT-OT-XL (J.S.T. Mfg. Co., Ltd.)

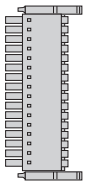
Model	CNP1 connector	CNP3 connector
Servo amplifier power connector set For MR-JET-500G4-HS/ MR-JET-700G4-HS (standard accessory)	 831-1108/MNC (WAGO)	 831-1103/MNA (WAGO)

Model	Servo amplifier connector	Junction terminal block connector
MR-J2HBUS_M	 Press bonding type (Note 1) Connector: 10120-6000EL Shell kit: 10320-3210-000 (3M) or an equivalent product	 Press bonding type (Note 1) Connector: 10120-6000EL Shell kit: 10320-3210-000 (3M) or an equivalent product

Notes: 1. The solder type (connector: 10120-3000PE and shell kit: 10320-52F0-008) (3M) is also usable. Contact the manufacturer directly.

Details of Option Connectors for Servo Amplifiers

Model	Servo amplifier connector	
MR-CCN1		Solder type (Note 1) Connector: 10120-3000PE Shell kit: 10320-52F0-008 (3M) or an equivalent product

Model	Connector set	
Servo amplifier connector set For MR-JET-_G4-HS (Standard accessory)		Connector: 15EDGKNHG-3.5-32P (Ningbo Degson Electrical Co., Ltd.) or an equivalent product

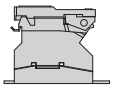
Model	Servo amplifier connector	Battery connector	Junction connector
MR-BT6V4CBL03M	 Receptacle: 36210-0100PL Shell kit: 36310-3200-008 (3M)	 Contact: SPHD-002GW-P0.5 Housing: PAP-05V-S (J.S.T. Mfg. Co., Ltd.)	 Plug: 36110-3000FD Shell kit: 36310-F200-008 (3M)

Notes: 1. The press bonding type (connector: 10120-6000EL and shell kit: 10320-3210-000) (3M) is also usable. Contact the manufacturer directly.

Products on the Market for Servo Amplifiers

Shield connection clamp

The shield connection clamp is used to ground the shield of a servo amplifier I/O signal cable on the top surface of the servo amplifier.

Application	Model	Description	
I/O cable shield connection for MR-JET-500G4-HS/ MR-JET-700G4-HS	SCC 15-F (Note 2)	Supported cable diameter: 8 mm to 15 mm	 Phoenix Contact (Note 1)

Notes: 1. For details, please contact the relevant manufacturers directly.
2. For installation of this clamp, two screws (M4 × 6 to 12) are required.

Regenerative Option

For 200 V (MR-RB_)

Servo amplifier model	Permissible regenerative power [W] (Note 2)						
	Built-in regenerative resistor	Regenerative option					
		MR-RB					
		032	12	14	30 (Note 3)	34 (Note 3)	50 (Note 1)
		40 Ω	40 Ω	26 Ω	13 Ω	26 Ω	13 Ω
MR-JET-10G	-	30	-	-	-	-	-
MR-JET-20G	-	30	100	-	-	-	-
MR-JET-40G	10	30	100	-	-	-	-
MR-JET-70G	30	-	-	100	-	300	-
MR-JET-100G	30	-	-	100	-	300	-
MR-JET-200G	100	-	-	-	300	-	500
MR-JET-300G	100	-	-	-	300	-	500

For 400 V (MR-RB_-4)

Servo amplifier model	Permissible regenerative power [W] (Note 2)									
	Built-in regenerative resistor	Regenerative option								
		MR-RB								
		1H-4	3M-4 (Note 1)	3G-4 (Note 1)	3Y-4 (Note 1)	34-4 (Note 1)	3U-4 (Note 1)	5G-4 (Note 1)	5Y-4 (Note 1)	54-4 (Note 1)	5U-4 (Note 1)
		82 Ω	120 Ω	47 Ω	36 Ω	26 Ω	22 Ω	47 Ω	36 Ω	26 Ω	22 Ω
MR-JET-60G4-HS	15	100	300	-	-	-	-	-	-	-	-
MR-JET-100G4-HS	15	100	300	-	-	-	-	-	-	-	-
MR-JET-200G4-HS	100	-	-	300	-	-	-	500	-	-	-
MR-JET-350G4-HS	120	-	-	-	300	-	-	-	500	-	-
MR-JET-500G4-HS	130	-	-	-	-	300	-	-	-	500	-
MR-JET-700G4-HS	170	-	-	-	-	-	300	-	-	-	500

Notes: 1. Cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m^3/min). The cooling fan must be prepared by users.
2. The power values in this table are resistor-generated powers, not rated powers.
3. It may be necessary to cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m^3/min), depending on the operating environment. Refer to "MR-JET User's Manual" for details. The cooling fan must be prepared by users.

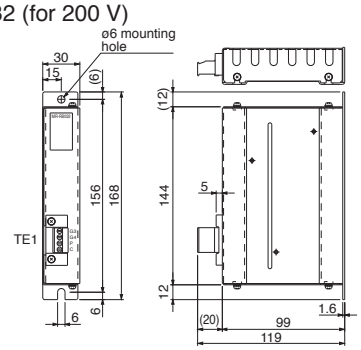
* Precautions when installing and connecting the regenerative option

1. The regenerative option causes a temperature rise of 100 °C or higher relative to the ambient temperature. Fully examine heat dissipation, installation position, wires used before installing the unit. Use flame-retardant wires or apply flame retardant on wires, and keep the wires clear of the unit.
2. Use twisted wires for connecting the regenerative option to the servo amplifier, and keep the wire length to a maximum of 5 m.
3. Use twisted wires for connecting a thermal sensor so that the sensor does not fail to work properly because of inducted noise.
4. There are restrictions on the mounting direction of the regenerative option. Refer to "MR-JET User's Manual" for details.

Regenerative Option

Dimensions [Unit: mm]	Connections

MR-RB032 (for 200 V)



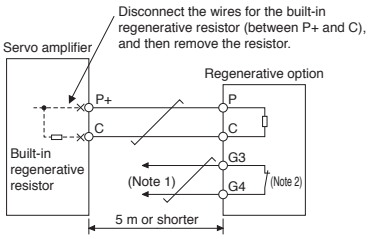
Terminal arrangement

TE1

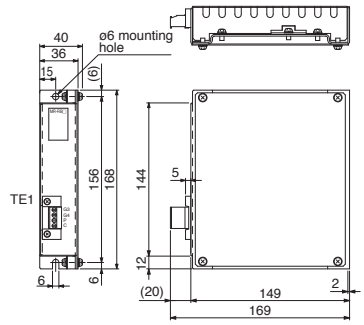
G3
G4
P
C

Applicable wire size (Note 3):
0.2 mm² to 2.5 mm² (AWG 24 to 12)
Mounting screw size: M5

Model	Mass [kg]
MR-RB032	0.5



MR-RB12, MR-RB14 (for 200 V)



Terminal arrangement

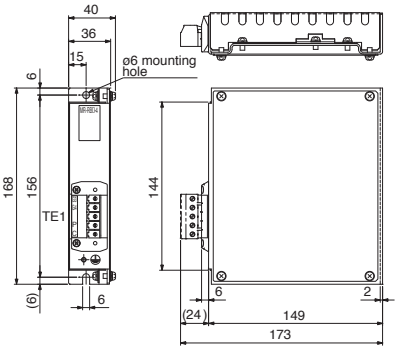
TE1

G3
G4
P
C

Applicable wire size (Note 3):
0.2 mm² to 2.5 mm² (AWG 24 to 12)
Mounting screw size: M5

Model	Mass [kg]
MR-RB12	1.1
MR-RB14	

MR-RB1H-4 (for 400 V)



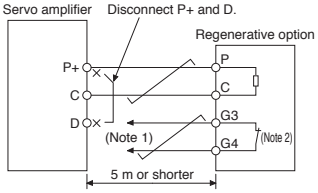
Terminal arrangement

TE1

G3
G4
P
C

Applicable wire size (Note 3):
0.2 mm² to 4.0 mm² (AWG 24 to 10)
Mounting screw size: M5

Model	Mass [kg]
MR-RB1H-4	1.1

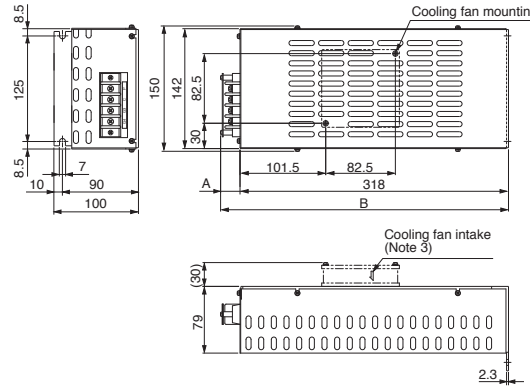


Notes: 1. Create a sequence circuit that turns off the magnetic contactor when abnormal overheating occurs.
2. G3 and G4 terminals are thermal sensor. G3-G4 opens when the regenerative option overheats abnormally.
3. The wire size shows wiring specifications of the connector. Refer to "Wires, Molded-Case Circuit Breakers, and Magnetic Contactors" in this catalog for examples of wire size selection.

Regenerative Option

Dimensions [Unit: mm]

MR-RB30, MR-RB34 (for 200 V)
MR-RB3M-4, MR-RB3G-4, MR-RB3Y-4, MR-RB34-4, MR-RB3U-4 (for 400 V)



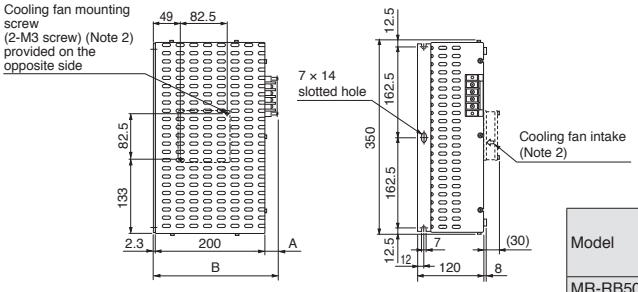
Terminal arrangement

P
C
G3
G4

Terminal screw size: M4
Mounting screw size: M6

Model	Variable dimensions		Mass [kg]
	A	B	
MR-RB30	17	335	2.9
MR-RB34			
MR-RB3M-4	23	341	
MR-RB3G-4			
MR-RB3Y-4			
MR-RB34-4			
MR-RB3U-4			

MR-RB50 (for 200 V)
MR-RB5G-4, MR-RB5Y-4, MR-RB54-4, MR-RB5U-4 (for 400 V)



Terminal arrangement

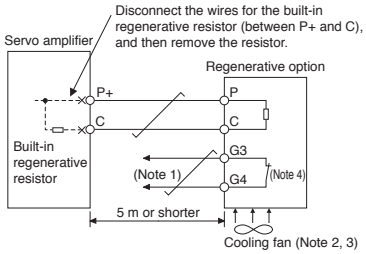
P
C
G3
G4

Terminal screw size: M4
Mounting screw size: M6

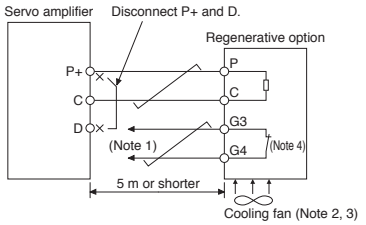
Model	Variable dimensions		Mass [kg]
	A	B	
MR-RB50	17	217	5.6
MR-RB5G-4	23	223	
MR-RB5Y-4			
MR-RB54-4			
MR-RB5U-4			

Connections

200 V servo amplifier



400 V servo amplifier



Notes: 1. Create a sequence circuit that turns off the magnetic contactor when abnormal overheating occurs.
2. When using MR-RB3M-4, MR-RB3G-4, MR-RB3Y-4, MR-RB34-4, MR-RB3U-4, MR-RB50, MR-RB5G-4, MR-RB5Y-4, MR-RB54-4, MR-RB5U-4, cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m^3/min). The cooling fan must be prepared by users.
3. When MR-RB30 or MR-RB34 is used, it may be necessary to cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m^3/min), depending on the operating environment. Refer to "MR-JET User's Manual" for details. The cooling fan must be prepared by users.
4. G3 and G4 terminals are thermal sensor. G3-G4 opens when the regenerative option overheats abnormally.

Replacement Fan Unit

The cooling fan of the 2 kW or larger servo amplifiers has a fan and a fan cover as a unit. Replace the fan unit when the fan needs to be replaced. Refer to "MR-JET User's Manual" for replacement of the cooling fan.

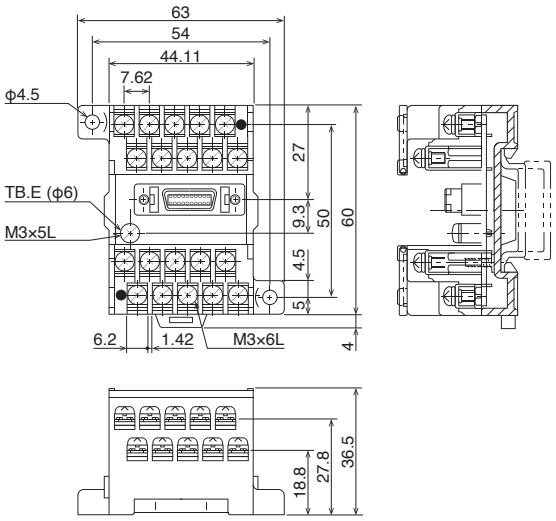
Servo amplifier model	Replacement fan unit model
MR-JET-200G MR-JET-300G	MR-JET-FAN1
MR-JET-200G4-HS MR-JET-350G4-HS	MR-J5-FAN6
MR-JET-500G4-HS MR-JET-700G4-HS	MR-J5-FAN7

[Products on the Market]

Junction Terminal Block (PS7DW-20V14B-F)

This terminal block is used for wiring signals.

Dimensions [Unit: mm]



Toho Technology Corp., (Note 1)
Kyoto Factory

Applicable wire: 1.25 mm² maximum

Notes: 1. For details, please contact the relevant manufacturers directly.

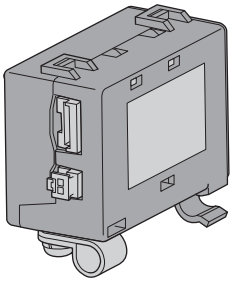
Battery (MR-BAT6V1SET-B)

When configuring an absolute position detection system, refer to the table below to check whether a battery is required.

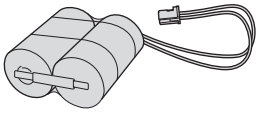
Motor side	Semi closed loop control system	Fully closed loop control system		
		Load-side		
		Batteryless absolute position encoder	Battery backup type absolute position encoder	Linear encoder
Rotary servo motor with batteryless absolute position encoder	Not required	Not required	Required	Not required
Rotary servo motor with battery backup type absolute position encoder	Required	Not required	Required	Not required
Linear servo motor	Not required	Not supported	Not supported	Not supported

MR-BAT6V1 is built in MR-BAT6V1SET-B. When the battery life runs out, please replace MR-BAT6V1. Refer to "MR-JET User's Manual" for installation of the battery.

External appearance	MR-BAT6V1



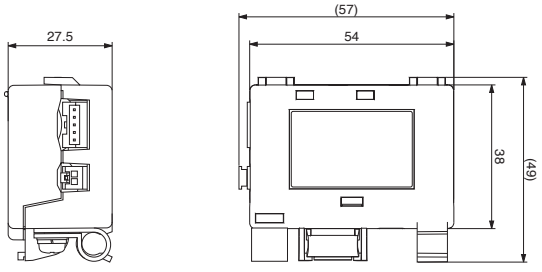
Mass: 62 g (including MR-BAT6V1 battery)

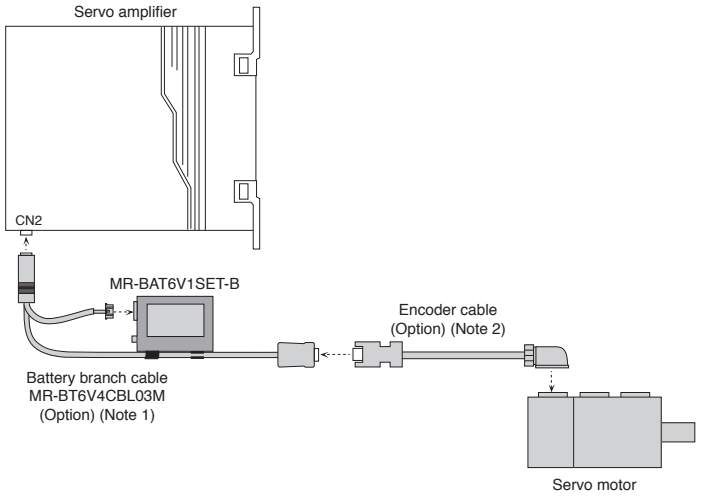


Model		MR-BAT6V1
Nominal voltage	[V]	6
Nominal capacity	[mAh]	1650
Lithium content	[g]	1.2
Primary battery		2CR17335A (CR17335A × 2 pcs. in series)
Mass	[g]	34

* MR-BAT6V1 is an assembled battery composed of lithium metal batteries of CR17335A. This battery is not subject to the dangerous goods (Class 9) of the UN Recommendations. To transport lithium metal batteries and lithium metal batteries contained in equipment, take actions to comply with the following regulations: the United Nations Recommendations on the Transport of Dangerous Goods, the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO), and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO). To transport the batteries, check the latest standards or the laws of the destination country and take actions. Contact your local sales office for more details.
* Please dispose of the battery according to your local laws and regulations.

Dimensions	Mounting



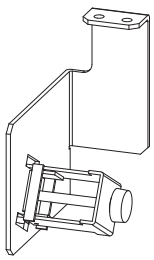
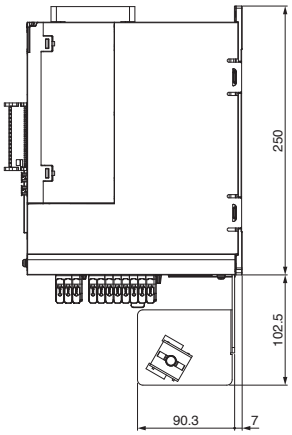


Notes: 1. Refer to "Cables and Connectors for Servo Amplifiers" for details.
2. Refer to "Cables and Connectors for Rotary Servo Motors" for details.

Shield Clamp Attachment (MR-ASCHP06)

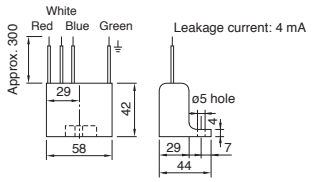
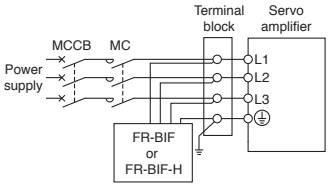
The shield clamp attachment clamps the shield of a servo motor power cable on the bottom surface of the servo amplifier.

Servo amplifier model	Shield clamp attachment model
MR-JET-500G4-HS/MR-JET-700G4-HS	MR-ASCHP06

Shield clamp attachment model	External appearance	Mounting [Unit: mm]
MR-ASCHP06	 Components Attachment Cable clamp Flat head screw (M4) × 2	

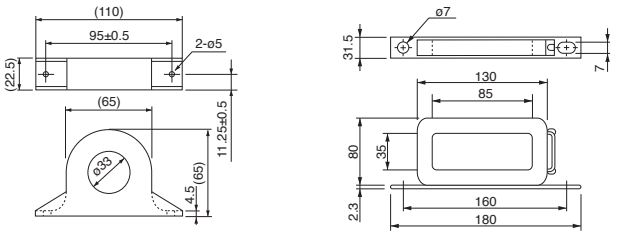
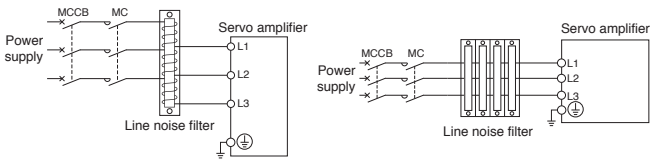
Radio Noise Filter (FR-BIF, FR-BIF-H)

This filter suppresses noise from the power supply side of the servo amplifier, especially effective for the radio frequency bands of 10 MHz or lower. The radio noise filter is designed to be installed on the input side.

Dimensions [Unit: mm]	Connections
	Do not use the radio noise filter on the output side of the servo amplifier. Wiring should be as short as possible. Grounding is required. Insulate the unused wire when using the radio noise filter with a 1-phase power supply.  200 V: FR-BIF 400 V: FR-BIF-H

Line Noise Filter (FR-BSF01, FR-BLF)

This filter is effective in suppressing noise emitted from the power supply side or the output side of the servo amplifier, and also in suppressing high-frequency leakage current (zero-phase current), especially within 0.5 MHz to 5 MHz band.

Dimensions [Unit: mm]	Connections
FR-BSF01 For wire size of 3.5 mm² (AWG 12) or smaller FR-BLF For wire size of 5.5 mm² (AWG 10) or larger 	The line noise filters can be mounted on lines of the power supply (L1/L2/L3) and of the servo motor power (U/V/W). Pass each of the wires through the line noise filter an equal number of times in the same direction. For wires of the power supply, the effect of the filter rises as the number of passes increases, but generally four passes would be appropriate. For the servo motor power lines, passes must be four times or less. Do not pass the grounding wire through the filter. Otherwise, the effect of the filter will drop. Wind the wires by passing through the filter to satisfy the required number of passes as shown in Example 1. If the wires are too thick to wind, use two or more filters to have the required number of passes as shown in Example 2. Place the line noise filters as close to the servo amplifier as possible for their best performance. Example 1 Example 2 

Data Line Filter

This filter is effective in preventing noise when attached to the motor encoder cable, etc.

Example) ESD-SR-250 (manufactured by TOKIN Corporation) (Note 1)
ZCAT3035-1330 (manufactured by TDK) (Note 1)
GRFC-13 (manufactured by Kitagawa Industries Co., Ltd.) (Note 1)
E04SRM563218 (manufactured by Seiwa Electric Mfg. Co., Ltd.) (Note 1)

Surge Killer

Attach surge killers to AC relays and AC valves around the servo amplifier. Attach diodes to DC relays and DC valves.

Example) Surge killer: CR-50500 (manufactured by Okaya Electric Industries Co., Ltd.) (Note 1)
Diode: A diode with breakdown voltage four or more times greater than the relay drive voltage, and with current capacity two or more times greater than the relay drive current.

Notes: 1. For details, please contact the relevant manufacturers directly.

EMC Filter

The following filters are recommended as a filter compliant with the EMC directive for the power supply of the servo amplifier.
A surge protector is separately required to use the filters. Refer to "MR-JET User's Manual" for details.
Fulfill the following requirements when connecting one or more units of servo amplifiers to one EMC filter.

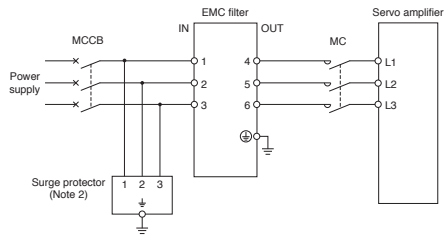
- Rated voltage [V] of EMC filter ≥ Rated input voltage [V] of servo amplifier
- Rated current [A] of EMC filter ≥ Total rated input current [A] of servo amplifiers connected to EMC filter

Operating environment	Total length of servo motor power cables	EMC Filter						
		Model	Rated current [A]	Rated voltage [V AC]	Operating temperature [°C]	Mass [kg]	Fig.	Manufacturer
IEC/EN 61800-3 Category C2/C3 (Note 1)	50 m or shorter	FSB-10-254-HU	10	250	-40 to 85	1.8	A	COSEL Co., Ltd.
		FSB-20-254-HU	20					
		FSB-30-254-HU	30					
		FSB-10-355 (Note 5)	10	500				
		FSB-20-355 (Note 5)	20					
		FN3288-16-44-C35-R65 (Note 3)	16	530	-40 to 50	1.0	C	Schaffner EMC K.K.
IEC/EN 61800-3 Category C3 (Note 1)	50 m or shorter (Note 4)	HF3010C-SZB	10	500	-20 to 50	0.9	B	Soshin Electric Co., Ltd.
		HF3020C-SZB	20			1.3		
		HF3030C-SZB	30					

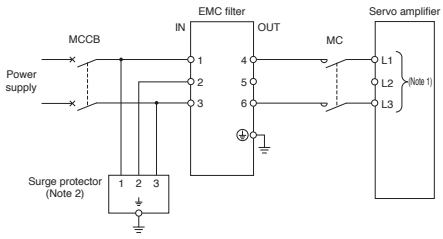
Notes: 1. Category C2: Intended to be installed in either the first environment (residential environment) by a professional or in the second environment (commercial, light industrial, and industrial environments).
Category C3: Intended to be installed in the second environment (commercial, light industrial, and industrial environments).
2. For details, please contact the relevant manufacturers directly.
3. FN3288-16-44-C17-R65, which features low leakage current from the EMC filter, can also be used for 200 V servo amplifiers.
4. If the length of the power cable exceeds 20 m, install the radio noise filter (FR-BIF) on the input side of the servo amplifier.
5. When a servo amplifier of MR-JET-60G4-HS to MR-JET-350G4-HS is used in category C2 environment, install a data line filter on the input and output sections of the servo amplifier.

Connections

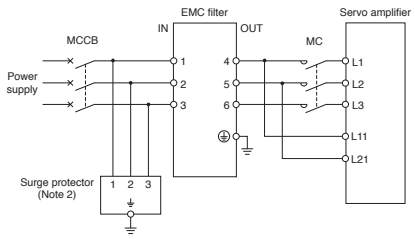
3-phase 200 V AC



1-phase 200 V AC



3-phase 400 V AC



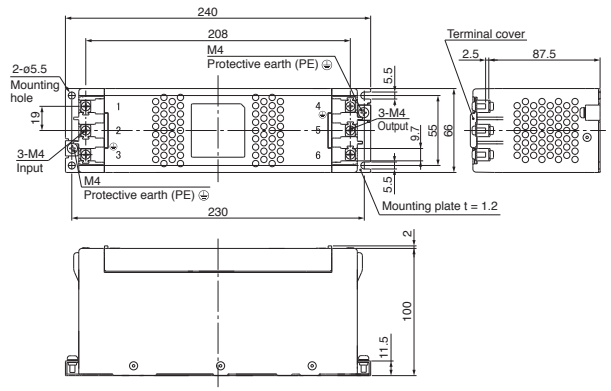
Notes: 1. Connect the power supply to L1 and L3 terminals. Do not connect anything to L2.
2. This is for when a surge protector is connected.

EMC Filter

Dimensions [Unit: mm]

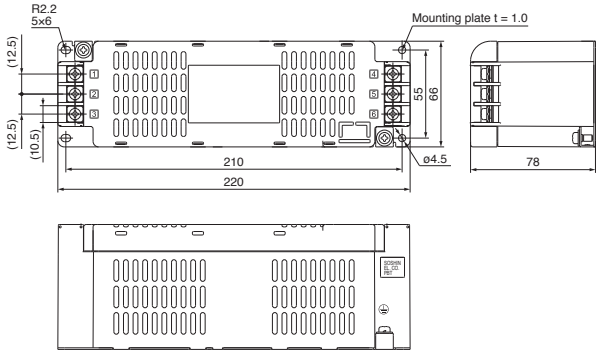
A

FSB-10-254-HU/FSB-20-254-HU/FSB-30-254-HU



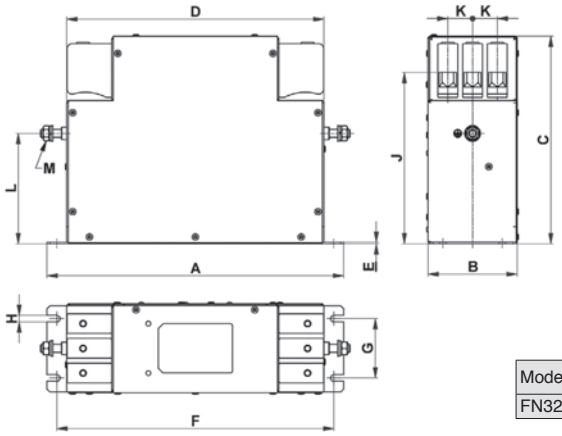
B

HF3010C-SZB/HF3020C-SZB/HF3030C-SZB



C

FN3288-16-44-C35-R65



Model	A	B	C	D	E	F	G	H	J	K	L	M
FN3288-16-44-C35-R65	195	45	140	164	0.8	180	25	5.4	122	11	93	M5

Surge Protector

Attach surge protectors of RSPD series (manufactured by Okaya Electric Industries Co., Ltd.) (Note 1) or LT-CS-WS series (manufactured by Soshin Electric Co., Ltd.) (Note 1) to the servo amplifiers.

Notes: 1. For details, please contact the relevant manufacturers directly.

Power Factor Improving AC Reactor (FR-HAL, FR-HAL-H)

This boosts the power factor of servo amplifier and reduces the power supply capacity.

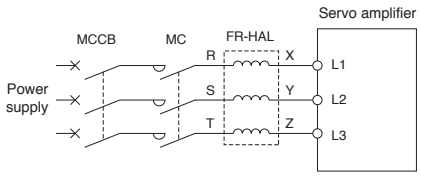
Servo amplifier model	Power factor improving AC reactor model (Note 1)	Fig.
MR-JET-10G	FR-HAL-0.4K	A
MR-JET-20G		
MR-JET-40G	FR-HAL-0.75K	
MR-JET-70G	FR-HAL-1.5K	
MR-JET-100G (3-phase power input)	FR-HAL-2.2K	
MR-JET-100G (1-phase power input)	FR-HAL-3.7K	B
MR-JET-200G (3-phase power input)		
MR-JET-200G (1-phase power input)	FR-HAL-5.5K	
MR-JET-300G		

Servo amplifier model	Power factor improving AC reactor model (Note 1)	Fig.
MR-JET-60G4-HS	FR-HAL-H1.5K	C
MR-JET-100G4-HS	FR-HAL-H2.2K	
MR-JET-200G4-HS	FR-HAL-H3.7K	
MR-JET-350G4-HS	FR-HAL-H7.5K	D
MR-JET-500G4-HS	FR-HAL-H11K	E
MR-JET-700G4-HS	FR-HAL-H15K	

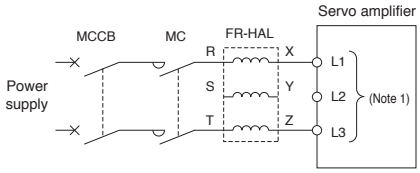
Notes: 1. When using the power factor improving AC reactor, install one reactor for each servo amplifier.

Connections

3-phase 200 V AC
3-phase 400 V AC



1-phase 200 V AC

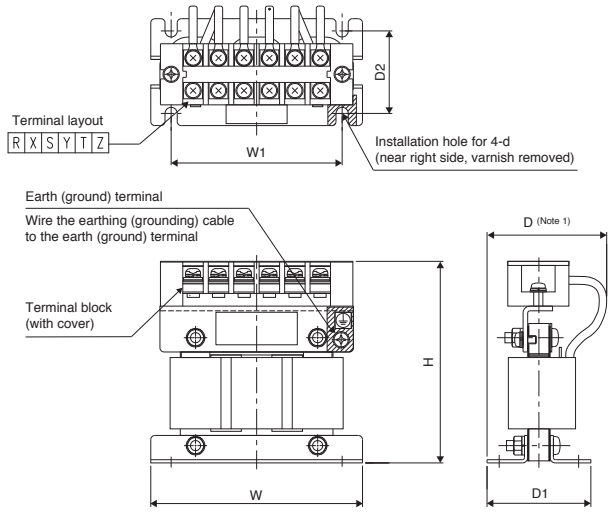


Notes: 1. Connect the power supply to L1 and L3 terminals. Do not connect anything to L2.

Power Factor Improving AC Reactor (FR-HAL, FR-HAL-H)

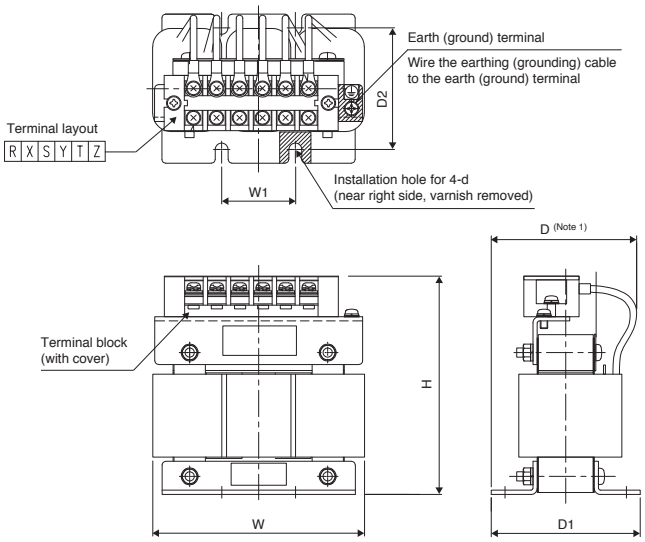
Dimensions

A



Model	Variable dimensions [mm]							Mass [kg]	Terminal size
	W	W1	H	D (Note 1)	D1	D2	d		
FR-HAL-0.4K	104	84	99	72	51	40	M5	0.6	M4
FR-HAL-0.75K	104	84	99	74	56	44	M5	0.8	M4
FR-HAL-1.5K	104	84	99	77	61	50	M5	1.1	M4

B



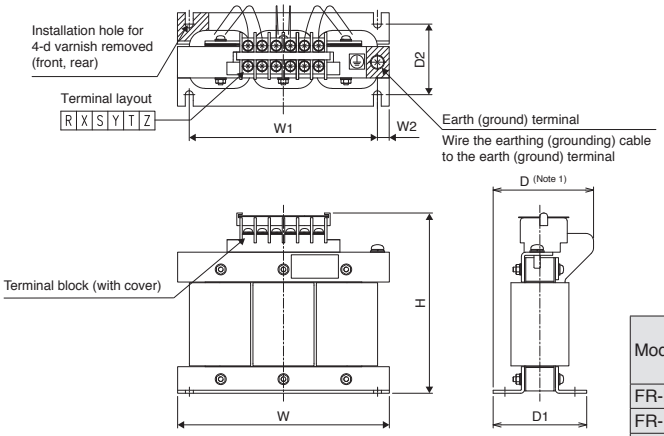
Model	Variable dimensions [mm]							Mass [kg]	Terminal size
	W	W1	H	D (Note 1)	D1	D2	d		
FR-HAL-2.2K	115	40	115	77	71	57	M6	1.5	M4
FR-HAL-3.7K	115	40	115	83	81	67	M6	2.2	M4
FR-HAL-5.5K	115	40	115	83	81	67	M6	2.3	M4

Notes: 1. This indicates the maximum dimension. The dimension varies depending on the bending degree of the input/output lines.

Power Factor Improving AC Reactor (FR-HAL, FR-HAL-H)

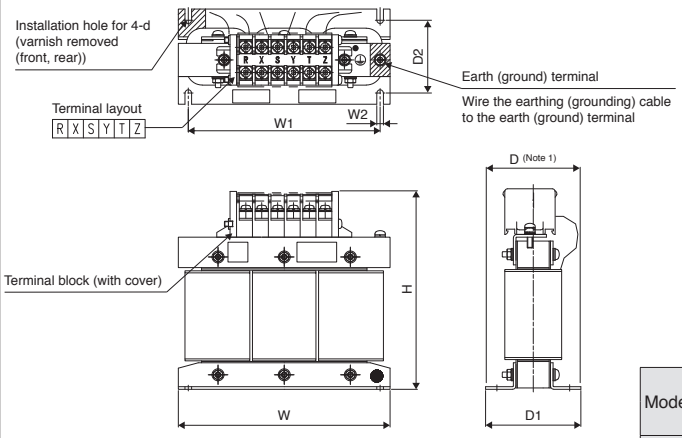
Dimensions

C



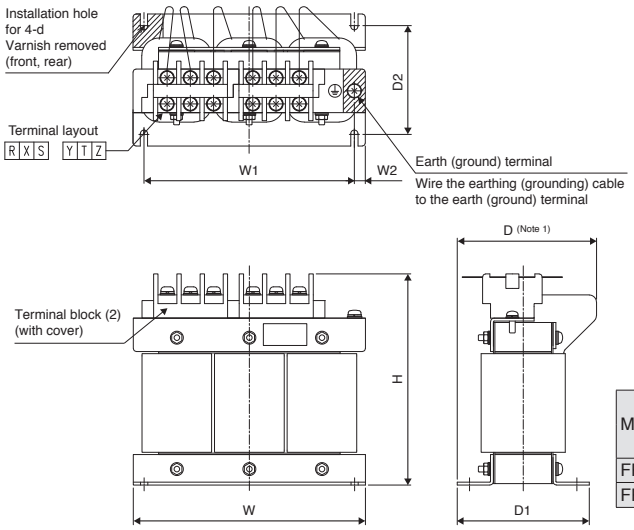
Model	Variable dimensions [mm]								Mass [kg]	Terminal size
	W	W1	W2	H	D (Note 1)	D1	D2	d		
FR-HAL-H1.5K	135	120	8	115	59	59.6	45	M4	1.5	M3.5
FR-HAL-H2.2K	135	120	8	115	59	59.6	45	M4	1.5	M3.5
FR-HAL-H3.7K	135	120	8	115	69	70.6	57	M4	2.5	M3.5

D



Model	Variable dimensions [mm]								Mass [kg]	Terminal size
	W	W1	W2	H	D (Note 1)	D1	D2	d		
FR-HAL-H7.5K	160	145	8	150	91	91	75	M4	5.0	M4

E



Model	Variable dimensions [mm]								Mass [kg]	Terminal size
	W	W1	W2	H	D (Note 1)	D1	D2	d		
FR-HAL-H11K	160	145	8	146	91	91	75	M4	6.0	M5
FR-HAL-H15K	220	200	10	195	105	90	70	M5	9.0	M5

Notes: 1. This indicates the maximum dimension. The dimension varies depending on the bending degree of the input/output lines.

Drive System Sizing Software MELSOFT Motorizer

MELSOFT

Specifications

Item	Description
Types of motor/drive	Servo, Inverter, Sensorless servo
Types of load mechanism	Ball screw, Rack and pinion, Roll feed, Rotary table, Cart, Elevator/Hoist, Conveyor, Fan, Pump, Crank, Winding/Unwinding, Generic (Rotary), Generic (Linear), Linear servo
Types of transmission mechanism	Coupling, External gear reducer, V belt and pulley, Toothed belt/roller chain
Operation pattern	Constant speed/Pause, Acceleration/Deceleration, Trapezoid, Triangle, Speed CSV File, MELSOFT GX LogViewer file
Types of input support of moment of inertia calculation function	Solid cylinder, Hollow cylinder, Disk, Rectangular solid, Truncated cone, Sphere, Generic
Sizing results	Result, Motor type, Power supply voltage, Motor, Motor capacity, Drive, Drive capacity, Effective torque, Torque effective load rate, Peak torque, Peak load rate, Effective torque at stop, Effective load rate at stop, Motor output, Motor output rate, Maximum speed, Maximum speed rate, Maximum load inertia moment, Inertia moment ratio, Regenerative power, Regenerative load ratio, Regenerative option, Maximally increased torque, Rated speed, Brake, Oil seal, Structure specification, Graph of Motor side speed/Motor side torque/Motor output
Printing of output of results	Prints load mechanism, transmission mechanism, operation pattern, and sizing results.
Data saving	Load mechanism, transmission mechanism, operation pattern, motor selection, drive selection, and sizing results are saved with a file name.

Operating environment (Note 1, 2)

Item		Description
OS		Microsoft® Windows® 11 Microsoft® Windows® 10 (64-bit/32-bit)
.NET Framework		.NET Framework 4.6 or later
CPU	Windows® 11	2 or more cores on a compatible 64-bit processor or System on a Chip (SoC)
	Windows® 10	Desktop PC: Intel® Celeron® processor 2.4 GHz or more recommended Laptop PC: Intel® Pentium® processor 1.9 GHz or more recommended
Memory	Windows® 11	4 GB or more recommended
	Windows® 10	For 64-bit OS: 2 GB or more recommended, For 32-bit OS:1 GB or more recommended
Required hard disk space		For installation: 1 GB or more free hard disk space For operation: 512 MB or more free virtual memory space
Monitor		Resolution 1024 × 768 or more (XGA) Compatible with above personal computers

Notes: 1. This software may not run correctly on some personal computers.
2. Surrogate pair characters and environment dependent characters are not available.

Servo Engineering Software MELSOFT MR Configurator2 (SW1DND-MRC2-EC) (Note 1)

MELSOFT

MR Configurator2 can be obtained by either of the following:
- Purchase MR Configurator2 alone.
- Purchase GX Works3 or MT Works2: MR Configurator2 is included in GX Works3 and MT Works2 with software version 1.34L or later.

Specification (Note 2)

Item	Description
Project	New/Open/Save/Save As/Delete Project, Read Other Format, Write Other Format, System Setting, Print
Parameter	Parameter Setting, Network Parameter, Axis Name Setting, Parameter Converter
Safety	Safety parameter setting, Change password, Initialize password
Positioning-data	Point Table, Program, Indirect Addressing, Cam Data
Monitor	Display All, I/O Monitor, Graph, ABS Data Display, Object Monitor
Diagnosis	Alarm Display, Alarm Onset Data, Drive recorder, No Motor Rotation, System Configuration, Life Diagnosis, Machine Diagnosis, Linear Diagnosis, Fully Closed Loop Diagnosis, Gear Failure Diagnosis, Encoder Communication Diagnosis
Test Operation	JOG Operation, Positioning Operation, Motor-Less Operation, DO Forced Output, Program Operation, Single-Step Feed, Test Operation Information
Adjustment	One-Touch Tuning, Tuning, Multi-Axis Tuning, Machine Analyzer, Advanced Gain Search
Others	Servo Assistant, Update Parameter Setting Range, Machine Unit Conversion Setting, Switch Display Language, Axis Label Name Settings, Add-ons, Help

Notes: 1. MELSERVO-JET series is supported by MR Configurator2 with software version 1.105K or later.
2. Supported items vary depending on the servo amplifiers. Refer to "MR Configurator2 SW1DND-MRC2-EC Installation Guide" for details.

Operating environment (Note 1, 3, 4)

Components		Description
OS		Microsoft® Windows® 11 Education Microsoft® Windows® 11 Enterprise Microsoft® Windows® 11 Pro Microsoft® Windows® 11 Home Microsoft® Windows® 10 Education Microsoft® Windows® 10 Enterprise Microsoft® Windows® 10 Pro Microsoft® Windows® 10 Home Microsoft® Windows® 10 IoT Enterprise 2016 LTSB (Note 2) Microsoft® Windows® 10 IoT Enterprise 2019 LTSC (Note 2)
CPU	Windows® 11	2 or more cores on a compatible 64-bit processor or System on a Chip (SoC)
	Windows® 10	Desktop PC: Intel® Celeron® processor 2.8 GHz or more recommended Laptop PC: Intel® Pentium® M processor 1.7 GHz or more recommended
Memory	Windows® 11	4 GB or more recommended
	Windows® 10	For 64-bit OS: 2 GB or more recommended, For 32-bit OS: 1 GB or more recommended
Required hard disk space		1.5 GB or more
Monitor		Resolution 1024 × 768 or more, 16-bit high color,
		Compatible with above personal computers
USB cable		MR-J3USBCBL3M
Ethernet cable		Cable type: Category 5e or higher, (double shielded/STP) straight cable Standard: IEEE802.3 (1000BASE-T) or ANSI/TIA/EIA-568-B (Category 5e) Connector: RJ-45 connector with shield

Notes: 1. This software may not run correctly on some personal computers.
2. This software is supported by 64-bit OS only.
3. Surrogate pair characters and environment dependent characters are not available.
4. When .NET Framework 3.5 (including .NET 2.0 and 3.0) is disabled, enable the .NET Framework.

Unit Conversion Table

Quantity	SI (metric) unit	U.S. customary unit
Mass	1 [kg]	2.2046 [lb]
Length	1 [mm]	0.03937 [in]
Torque	1 [N•m]	141.6 [oz•in]
Moment of inertia	1 [(× 10^{-4} kg•m^2)]	5.4675 [oz•in^2]
Load (thrust load/axial load)	1 [N]	0.2248 [lbf]
Temperature	n [°C]	n × 9/5 + 32 [°F]

7 Low-Voltage Switchgear/ Wires

* Low-voltage switchgears/wires for servo amplifiers are the same regardless of the network. Refer to the servo amplifiers with the same rated output.
* Refer to p. 6-54 in this catalog for conversion of units.

Wires, Molded-Case Circuit Breakers, and Magnetic Contactors

The following are examples of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) are used. The wire size for U/V/W/E varies depending on the servo motor. Refer to "Selection Example in HIV Wires for Servo Motors" in this catalog for details on wires for each servo motor.

Wires, molded-case circuit breakers, and magnetic contactors (MR-JET-G)

Servo amplifier model	Molded-case circuit breaker (Note 4, 5, 6)	Magnetic contactor (Note 2, 5)	Wire size [mm²] (Note 4)		
			L1/L2/L3/⏚	P+/C (Note 1)	U/V/W/E
MR-JET-10G	30 A frame 5 A (30 A frame 5 A)	S-T10	2 (AWG 14)	2 (AWG 14)	0.75 to 2 (AWG 18 to 14) (Note 3)
MR-JET-20G	30 A frame 5 A (30 A frame 5 A)				
MR-JET-40G	30 A frame 10 A (30 A frame 5 A)				
MR-JET-70G	30 A frame 15 A (30 A frame 10 A)				
MR-JET-100G (3-phase power input)	30 A frame 15 A (30 A frame 10 A)				
MR-JET-100G (1-phase power input)	30 A frame 15 A (30 A frame 15 A)				
MR-JET-200G (3-phase power input)	30 A frame 20 A (30 A frame 20 A)	S-T21			
MR-JET-200G (1-phase power input)	30 A frame 20 A (30 A frame 20 A)		3.5 (AWG 12)		1.25 to 5.5 (AWG 16 to 10) (Note 3)
MR-JET-300G	30 A frame 30 A (30 A frame 30 A)				

Wires and molded-case circuit breakers (MR-JET-G4-HS)

Servo amplifier model	Molded-case circuit breaker (Note 4, 5, 6)	Wire size [mm²] (Note 4)			
		L1/L2/L3/⏚	L11/L21	P+/C (Note 1)	U/V/W/E
MR-JET-60G4-HS	30 A frame 5 A (30 A frame 5 A)	2 (AWG 14)	1.25 to 2 (AWG 16 to 14)	2 (AWG 14)	0.75 to 2 (AWG 18 to 14) (Note 3)
MR-JET-100G4-HS	30 A frame 10 A (30 A frame 5 A)				
MR-JET-200G4-HS	30 A frame 15 A (30 A frame 10 A)				
MR-JET-350G4-HS	30 A frame 20 A (30 A frame 15 A)				
MR-JET-500G4-HS	30 A frame 20 A (30 A frame 20 A)				0.5 to 10 (AWG 20 to 8)
MR-JET-700G4-HS	30 A frame 30 A (30 A frame 30 A)	3.5 (AWG 12)			

Magnetic contactors (MR-JET-G4-HS)

Servo amplifier model	Magnetic contactor (Note 5, 7)	
	On/off of main circuit power supply	
	AC power supply	DC power supply
MR-JET-60G4-HS	S-T10	SD-T12
MR-JET-100G4-HS		
MR-JET-200G4-HS		
MR-JET-350G4-HS	S-T21	SD-T21
MR-JET-500G4-HS		
MR-JET-700G4-HS		

Notes: 1. Keep the wire length to the regenerative option within 5 m.
2. Use a magnetic contactor with an operation delay time of 80 ms or less. The operation delay time is the time interval from current being applied to the coil until closure of contacts.
3. The wire size shows applicable size for the servo amplifier connector.
4. When complying with IEC/EN/UL/CSA standard, refer to "Selection Example According to IEC/EN/UL 61800-5-1 and CSA C22.2 No. 274" in this catalog.
5. Install one molded-case circuit breaker and one magnetic contactor for each servo amplifier.
6. When using a power factor improving AC reactor, use a molded-case circuit breaker listed in the brackets.
7. Use a magnetic contactor with an operation delay time of 80 ms or less. (When driving on/off of main circuit power supply with DC power supply, use it of 90 ms or less.) The operation delay time is the time interval from current being applied to the coil until closure of contacts.

Selection Example According to IEC/EN/UL 61800-5-1 and CSA C22.2 No. 274

The molded-case circuit breakers, semiconductor fuses, and recommended wire sizes in the table are examples based on the rated inputs/outputs of the servo amplifiers.

Molded-case circuit breakers/semiconductor fuses

Servo amplifier model	Molded-case circuit breaker (240 V AC) SCCR 50 kA (Mitsubishi Electric)	Semiconductor fuse (700 V) SCCR 100 kA (Bussmann)
MR-JET-10G	NF125-SVU-15A (125 A frame 15 A) (Note 1)	170M1408 (10 A)
MR-JET-20G		
MR-JET-40G		
MR-JET-70G		
MR-JET-100G (3-phase power input)	NF125-SVU-15A (125 A frame 15 A) (Note 1)	170M1409 (16 A)
MR-JET-100G (1-phase power input)	NF125-SVU-15A (125 A frame 15 A) (Note 1)	170M1412 (32 A)
MR-JET-200G (3-phase power input)		
MR-JET-200G (1-phase power input)	NF125-SVU-20A (125 A frame 20 A) (Note 1)	170M1413 (40 A)
MR-JET-300G		
MR-JET-60G4-HS	NF125-SVU-15A (125 A frame 15 A) (Note 1)	170M1408 (10 A)
MR-JET-100G4-HS		
MR-JET-200G4-HS		170M1409 (16 A)
MR-JET-350G4-HS		170M1412 (32 A)
MR-JET-500G4-HS	NF125-SVU-20A (125 A frame 20 A) (Note 1)	170M1413 (40 A)
MR-JET-700G4-HS	NF125-SVU-30A (125 A frame 30 A) (Note 1)	170M1414 (50 A)

Notes: 1. For the use under the conditions of UL Listed, select a semiconductor fuse.

Recommended wires (MR-JET-G)

Servo amplifier model	75 °C stranded wire [AWG]		
	L1/L2/L3/⏚	P+/C	U/V/W/E
MR-JET-10G	14	14	14
MR-JET-20G			
MR-JET-40G			
MR-JET-70G			
MR-JET-100G			
MR-JET-200G (3-phase power input)			
MR-JET-200G (1-phase power input)	12		
MR-JET-300G			

Recommended wires (MR-JET-G4-HS)

Servo amplifier model	75 °C stranded wire [AWG]			
	L1/L2/L3/⏚	L11/L21	P+/C	U/V/W/E
MR-JET-60G4-HS	14	14	14	14
MR-JET-100G4-HS				
MR-JET-200G4-HS				
MR-JET-350G4-HS				
MR-JET-500G4-HS				12
MR-JET-700G4-HS	12			10

Type E Combination Motor Controller

The Type E Combination Motor Controller is comprised of the Manual Motor Starter, Short-circuit Display Unit "UT-TU", and Power Side Terminal Cover Kit "UT-CV3".

Servo amplifier model	Rated input voltage AC [V]	Input phase (Note 2)	Manual Motor Starter (Note 3, 4)			SCCR [kA] (Note 1)
			Model (Mitsubishi Electric)	Rated voltage AC [V]	Rated current [A] (Heater design)	
MR-JET-10G	200 to 240	3-phase	MMP-T32	240	1.6	50
MR-JET-20G					2.5	
MR-JET-40G					4	
MR-JET-70G					6.3	
MR-JET-100G					8	
MR-JET-200G					18	
MR-JET-300G					25	25

Notes: 1. The value is applicable when the Type E Combination Motor Controller is combined with the servo amplifier.
2. 1-phase power input is not supported.
3. Use the MMP-T series products that bear the UL mark.
4. For the use under the conditions of UL Listed, select a semiconductor fuse.

Selection Example in HIV Wires for Servo Motors

The following are examples of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) with a length of 30 m are used. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when using cab-tire cables for supplying power (U/V//W) to HK-FN (1.0 kW to 3.0 kW) series and HK-SN series.

Rotary servo motor model		Wire size [mm²] (Note 6)	
		For power and grounding (U/V/W/E)	For electromagnetic brake (B1/B2)
HK-KN	HK-KN053	0.75 (AWG 18) (Note 1, 2, 3)	0.2 (AWG 24) (Note 4, 5)
	HK-KN13		
	HK-KN1M3		
	HK-KN23		
	HK-KN43		
	HK-KN63		
	HK-KN7M3		
	HK-KN103		
	HK-KN153		
	HK-KN203	0.75 (AWG 18) (Note 1, 3, 7)	
	HK-KN202	0.75 (AWG 18) (Note 1, 2, 3)	
HK-KN_4	HK-KN134		
	HK-KN234		
	HK-KN434		
	HK-KN634		
	HK-KN7M34		
	HK-KN1034		
	HK-KN1534		
	HK-KN2034		
HK-FN	HK-FN13		
	HK-FN23		
	HK-FN43		
	HK-FN7M3		
	HK-FN102	2 (AWG 14)	1.25 (AWG 16)
	HK-FN152		
	HK-FN202		
	HK-FN301M		
HK-SN_4	HK-SN3534		
	HK-SN5034		
	HK-SN7034	3.5 (AWG 12)	

Notes:
1. Use fluorine resin wires of 0.75 mm² (AWG 18) for wiring to the servo motor power supply.
2. This size is applicable for wiring length of 10 m or shorter. For over 10 m, use MR-AEPB2J10CBL03M-_-L, MR-AEP2J10CBL03M-_-L, MR-AEPB2J20CBL03M-_-L, or MR-AEP2J20CBL03M-_-L, and extend it with HIV wires of 1.25 mm² (AWG 16).
3. Use a cable provided by Mitsubishi Electric or Mitsubishi Electric System & Service Co., Ltd. When fabricating a cable, select wires applicable for the usage. The National Electrical Code recommends that the wire size should be a minimum of AWG 14 (2 mm²).
4. Use fluorine resin wires of 0.2 mm² (AWG 24) for wiring to the electromagnetic brake.
5. This size is applicable for wiring length of 10 m or shorter. For over 10 m, extend the wires with HIV wires of 1.25 mm² (AWG 16).
6. The same wire size is applicable when the torques are increased.
7. This size is applicable for wiring length of 10 m or shorter. For over 10 m, use MR-AEPB2J10CBL03M-_-L, MR-AEP2J10CBL03M-_-L, MR-AEPB2J20CBL03M-_-L, or MR-AEP2J20CBL03M-_-L, and extend it with HIV wires of 2 mm² (AWG 14).

Selection Example in HIV Wires for Servo Motors

The following are examples of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) with a length of 30 m are used. Refer to "Rotary Servo Motor User's Manual (For MR-JET)" when using cab-tire cables for supplying power (U/V/W) to HG-SNS series.

Rotary servo motor model	Wire size [mm²]	
	For power and grounding (U/V/W/E)	For electromagnetic brake (B1/B2)
HG-KNS13J, 23J, 43J, 73J	0.75 (AWG 18) (Note 1, 2, 3)	0.5 (AWG 20) (Note 4, 6)
HG-SNS52J, 102J	1.25 (AWG 16) (Note 5)	1.25 (AWG 16)
HG-SNS152J, 202J	2 (AWG 14)	
HG-SNS302J	3.5 (AWG 12)	

Linear servo motor model Primary side	Wire size [mm²]	
	For power and grounding (U/V/W/E)	For thermistor (G1/G2)
LM-H3P2A-07P-BSS0	1.25 (AWG 16) (Note 5)	0.2 (AWG 24)
LM-H3P3A-12P-CSS0		
LM-H3P3B-24P-CSS0		
LM-H3P3C-36P-CSS0		
LM-H3P3D-48P-CSS0	2 (AWG 14)	
LM-H3P7A-24P-ASS0	1.25 (AWG 16) (Note 5)	
LM-H3P7B-48P-ASS0	2 (AWG 14)	
LM-H3P7C-72P-ASS0		

Linear servo motor model Primary side	Wire size [mm²]	
	For power and grounding (U/V/W/E)	For thermal protector
LM-AJP1B-07K-JSS0	1.25 (AWG 16) (Note 5)	0.2 (AWG 24)
LM-AJP1D-14K-JSS0		
LM-AJP2B-12S-JSS0		
LM-AJP2D-23T-JSS0		
LM-AJP3B-17N-JSS0		
LM-AJP3D-35R-JSS0		
LM-AJP4B-22M-JSS0		
LM-AJP4D-45N-JSS0		
LM-AUP3A-03V-JSS0		
LM-AUP3B-06V-JSS0		
LM-AUP3C-09V-JSS0		
LM-AUP3D-11R-JSS0		
LM-AUP4A-04R-JSS0		
LM-AUP4B-09R-JSS0		
LM-AUP4C-13P-JSS0		
LM-AUP4D-18M-JSS0		
LM-AUP4F-26P-JSS0		
LM-AUP4H-35M-JSS0		

Notes: 1. Use fluorine resin wires of 0.75 mm² (AWG 18) for wiring to the servo motor power supply.
2. This size is applicable for wiring length of 10 m or shorter. For over 10 m, use MR-PWS2CBL03M-A_-L and extend it with HIV wires of 1.25 mm² (AWG 16).
3. Use a cable provided by Mitsubishi Electric or Mitsubishi Electric System & Service Co., Ltd. When fabricating a cable, select wires applicable for the usage. The National Electrical Code recommends that the wire size should be a minimum of AWG 14 (2 mm²).
4. Use fluorine resin wires of 0.5 mm² (AWG 20) for wiring to the electromagnetic brake.
5. The National Electrical Code recommends that the wire size should be a minimum of AWG 14 (2 mm²). Refer to the servo motor User's Manual for details.
6. This size is applicable for wiring length of 10 m or shorter. For over 10 m, extend the wires with HIV wires of 1.25 mm² (AWG 16).

MEMO

Product List

Servo system controllers

Item		Model	Application	
Motion module		RD78G4	Maximum number of control axes: 4 axes	CC-Link IE TSN master station
		RD78G8	Maximum number of control axes: 8 axes	CC-Link IE TSN master station
		RD78G16	Maximum number of control axes: 16 axes	CC-Link IE TSN master station
		RD78G32	Maximum number of control axes: 32 axes	CC-Link IE TSN master station
		RD78G64	Maximum number of control axes: 64 axes	CC-Link IE TSN master station
		RD78GHV	Maximum number of control axes: 128 axes (Note 1)	CC-Link IE TSN master station
		RD78GHW	Maximum number of control axes: 256 axes (Note 1)	CC-Link IE TSN master station
		FX5-40SSC-G	Maximum number of control axes: 4 axes	CC-Link IE TSN master station
		FX5-80SSC-G	Maximum number of control axes: 8 axes	CC-Link IE TSN master station
Motion Control Software (Note 2)	SWM-G	SW1DNN-SWMG-M	• SWM-G Engine • SWM-G Operating Station • Network API • SWM-G API • Real Time OS (RTX64)	CC-Link IE TSN compatible
	SWM-G-N1	SW1DNN-SWMGN1-M	• SWM-G Engine • SWM-G Operating Station • Network API • SWM-G API • EcConfigurator • Real Time OS (RTX64)	CC-Link IE TSN/ EtherCAT® compatible
USB key for Motion Control Software	SWM-G	MR-SWMG16-U	Maximum number of control axes: 16 axes	USB key (license)
		MR-SWMG32-U	Maximum number of control axes: 32 axes	USB key (license)
		MR-SWMG64-U	Maximum number of control axes: 64 axes	USB key (license)
		MR-SWMG128-U	Maximum number of control axes: 128 axes	USB key (license)
	SWM-G-N1	MR-SWMG16N1-U	Maximum number of control axes: 16 axes	USB key (license)
		MR-SWMG32N1-U	Maximum number of control axes: 32 axes	USB key (license)
		MR-SWMG64N1-U	Maximum number of control axes: 64 axes	USB key (license)
		MR-SWMG128N1-U	Maximum number of control axes: 128 axes	USB key (license)

Notes:

1. When MR-JET servo amplifiers are used for all axes, RD78GH controls a maximum of 120 axes.
2. Download and install Motion Control Software from Mitsubishi Electric FA global website.

Servo amplifiers (200 V)

Item	Model	Rated output	Power supply input
MR-JET-G	MR-JET-10G	0.1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-20G	0.2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-40G	0.4 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-70G	0.75 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-100G	1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-200G	2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-300G	3 kW	3-phase 200 V AC to 240 V AC
MR-JET-G-N1	MR-JET-10G-N1	0.1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-20G-N1	0.2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-40G-N1	0.4 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-70G-N1	0.75 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-100G-N1	1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-200G-N1	2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JET-300G-N1	3 kW	3-phase 200 V AC to 240 V AC

Servo amplifiers (400 V)

Item	Model	Rated output	Power supply input
MR-JET-G4-HS	MR-JET-60G4-HS	0.6 kW	3-phase 380 V AC to 480 V AC
	MR-JET-100G4-HS	1 kW	3-phase 380 V AC to 480 V AC
	MR-JET-200G4-HS	2 kW	3-phase 380 V AC to 480 V AC
	MR-JET-350G4-HS	3.5 kW	3-phase 380 V AC to 480 V AC
	MR-JET-500G4-HS	5 kW	3-phase 380 V AC to 480 V AC
	MR-JET-700G4-HS	7 kW	3-phase 380 V AC to 480 V AC
MR-JET-G4-HSN1	MR-JET-60G4-HSN1	0.6 kW	3-phase 380 V AC to 480 V AC
	MR-JET-100G4-HSN1	1 kW	3-phase 380 V AC to 480 V AC
	MR-JET-200G4-HSN1	2 kW	3-phase 380 V AC to 480 V AC
	MR-JET-350G4-HSN1	3.5 kW	3-phase 380 V AC to 480 V AC
	MR-JET-500G4-HSN1	5 kW	3-phase 380 V AC to 480 V AC
	MR-JET-700G4-HSN1	7 kW	3-phase 380 V AC to 480 V AC

Product List

HK series rotary servo motors (200 V)

Item	Flange size [mm]	Model	Rated output	Rated speed
HK-KN series B: With an electromagnetic brake	40 x 40	HK-KN053(B)	0.05 kW	3000 r/min
		HK-KN13(B)	0.1 kW	3000 r/min
		HK-KN1M3(B)	0.15 kW	3000 r/min
	60 x 60	HK-KN23(B)	0.2 kW	3000 r/min
		HK-KN43(B)	0.4 kW	3000 r/min
		HK-KN63(B)	0.6 kW	3000 r/min
	80 x 80	HK-KN7M3(B)	0.75 kW	3000 r/min
		HK-KN103(B)	1.0 kW	3000 r/min
	90 x 90	HK-KN153(B)	1.5 kW	3000 r/min
		HK-KN203(B)	2.0 kW	3000 r/min
		HK-KN202(B)	2.0 kW	2000 r/min
HK-FN series B: With an electromagnetic brake	40 x 40	HK-FN13(B)	0.1 kW	3000 r/min
	60 x 60	HK-FN23(B)	0.2 kW	3000 r/min
		HK-FN43(B)	0.4 kW	3000 r/min
	80 x 80	HK-FN7M3(B)	0.75 kW	3000 r/min
	130 x 130	HK-FN102(B)	1.0 kW	2000 r/min
		HK-FN152(B)	1.5 kW	2000 r/min
	176 x 176	HK-FN202(B)	2.0 kW	2000 r/min
		HK-FN301M(B)	3.0 kW	1500 r/min

HK series rotary servo motors (400 V)

Item	Flange size [mm]	Model	Rated output	Rated speed
HK-KN series B: With an electromagnetic brake	40 x 40	HK-KN134(B)	0.1 kW	3000 r/min
	60 x 60	HK-KN234(B)	0.2 kW	3000 r/min
		HK-KN434(B)	0.4 kW	3000 r/min
		HK-KN634(B)	0.6 kW	3000 r/min
	80 x 80	HK-KN7M34(B)	0.75 kW	3000 r/min
		HK-KN1034(B)	1.0 kW	3000 r/min
	90 x 90	HK-KN1534(B)	1.5 kW	3000 r/min
		HK-KN2034(B)	2.0 kW	3000 r/min
HK-SN series B: With an electromagnetic brake	130 x 130	HK-SN3534(B)	3.5 kW	3000 r/min
		HK-SN5034(B)	5.0 kW	3000 r/min
	176 x 176	HK-SN7034(B)	7.0 kW	3000 r/min

HG series rotary servo motors (200 V)

Item	Flange size [mm]	Model	Rated output	Rated speed
HG-KNS series With an oil seal B: With an electromagnetic brake	40 x 40	HG-KNS13(B)J	0.1 kW	3000 r/min
	60 x 60	HG-KNS23(B)J	0.2 kW	3000 r/min
		HG-KNS43(B)J	0.4 kW	3000 r/min
	80 x 80	HG-KNS73(B)J	0.75 kW	3000 r/min
HG-KNS series Without an oil seal B: With an electromagnetic brake	40 x 40	HG-KNS13(B)	0.1 kW	3000 r/min
	60 x 60	HG-KNS23(B)	0.2 kW	3000 r/min
		HG-KNS43(B)	0.4 kW	3000 r/min
	80 x 80	HG-KNS73(B)	0.75 kW	3000 r/min
HG-SNS series With an oil seal B: With an electromagnetic brake	130 x 130	HG-SNS52(B)J	0.5 kW	2000 r/min
		HG-SNS102(B)J	1.0 kW	2000 r/min
		HG-SNS152(B)J	1.5 kW	2000 r/min
	176 x 176	HG-SNS202(B)J	2.0 kW	2000 r/min
		HG-SNS302(B)J	3.0 kW	2000 r/min
HG-SNS series Without an oil seal B: With an electromagnetic brake	130 x 130	HG-SNS52(B)	0.5 kW	2000 r/min
		HG-SNS102(B)	1.0 kW	2000 r/min
		HG-SNS152(B)	1.5 kW	2000 r/min
	176 x 176	HG-SNS202(B)	2.0 kW	2000 r/min
		HG-SNS302(B)	3.0 kW	2000 r/min

Linear servo motors

Item	Model	Continuous thrust	Maximum thrust	Maximum speed	Length
LM-H3 series primary side (coil)	LM-H3P2A-07P-BSS0	70 N	175 N	3.0 m/s	—
	LM-H3P3A-12P-CSS0	120 N	300 N	3.0 m/s	—
	LM-H3P3B-24P-CSS0	240 N	600 N	3.0 m/s	—
	LM-H3P3C-36P-CSS0	360 N	900 N	3.0 m/s	—
	LM-H3P3D-48P-CSS0	480 N	1200 N	3.0 m/s	—
	LM-H3P7A-24P-ASS0	240 N	600 N	3.0 m/s	—
	LM-H3P7B-48P-ASS0	480 N	1200 N	3.0 m/s	—
	LM-H3P7C-72P-ASS0	720 N	1800 N	3.0 m/s	—
LM-H3 series secondary side (magnet)	LM-H3S20-288-BSS0	—	—	—	288 mm
	LM-H3S20-384-BSS0	—	—	—	384 mm
	LM-H3S20-480-BSS0	—	—	—	480 mm
	LM-H3S20-768-BSS0	—	—	—	768 mm
	LM-H3S30-288-CSS0	—	—	—	288 mm
	LM-H3S30-384-CSS0	—	—	—	384 mm
	LM-H3S30-480-CSS0	—	—	—	480 mm
	LM-H3S30-768-CSS0	—	—	—	768 mm
	LM-H3S70-288-ASS0	—	—	—	288 mm
	LM-H3S70-384-ASS0	—	—	—	384 mm
	LM-H3S70-480-ASS0	—	—	—	480 mm
	LM-H3S70-768-ASS0	—	—	—	768 mm
LM-AJ series primary side (coil)	LM-AJP1B-07K-JSS0	68.1 N	214.7 N	6.5 m/s	—
	LM-AJP1D-14K-JSS0	136.2 N	429.4 N	6.5 m/s	—
	LM-AJP2B-12S-JSS0	117.0 N	369.0 N	4.0 m/s	—
	LM-AJP2D-23T-JSS0	234.0 N	738.1 N	5.0 m/s	—
	LM-AJP3B-17N-JSS0	174.5 N	550.2 N	2.5 m/s	—
	LM-AJP3D-35R-JSS0	348.9 N	1100.4 N	3.5 m/s	—
	LM-AJP4B-22M-JSS0	223.4 N	704.5 N	2.0 m/s	—
	LM-AJP4D-45N-JSS0	446.8 N	1409.1 N	2.5 m/s	—
LM-AJ series secondary side (magnet)	LM-AJS10-080-JSS0	—	—	—	80 mm
	LM-AJS10-200-JSS0	—	—	—	200 mm
	LM-AJS10-400-JSS0	—	—	—	400 mm
	LM-AJS20-080-JSS0	—	—	—	80 mm
	LM-AJS20-200-JSS0	—	—	—	200 mm
	LM-AJS20-400-JSS0	—	—	—	400 mm
	LM-AJS30-080-JSS0	—	—	—	80 mm
	LM-AJS30-200-JSS0	—	—	—	200 mm
	LM-AJS30-400-JSS0	—	—	—	400 mm
	LM-AJS40-080-JSS0	—	—	—	80 mm
	LM-AJS40-200-JSS0	—	—	—	200 mm
	LM-AJS40-400-JSS0	—	—	—	400 mm
LM-AU series primary side (coil)	LM-AUP3A-03V-JSS0	28 N	122 N	4.5 m/s	—
	LM-AUP3B-06V-JSS0	57 N	274 N	4.5 m/s	—
	LM-AUP3C-09V-JSS0	85 N	411 N	4.5 m/s	—
	LM-AUP3D-11R-JSS0	113 N	549 N	3.5 m/s	—
	LM-AUP4A-04R-JSS0	44 N	280 N	3.5 m/s	—
	LM-AUP4B-09R-JSS0	88 N	561 N	3.5 m/s	—
	LM-AUP4C-13P-JSS0	132 N	842 N	3.0 m/s	—
	LM-AUP4D-18M-JSS0	176 N	970 N	2.0 m/s	—
	LM-AUP4F-26P-JSS0	264 N	1684 N	3.0 m/s	—
	LM-AUP4H-35M-JSS0	350 N	1764 N	2.0 m/s	—
LM-AU series secondary side (magnet)	LM-AUS30-120-JSS0	—	—	—	120 mm
	LM-AUS30-180-JSS0	—	—	—	180 mm
	LM-AUS30-240-JSS0	—	—	—	240 mm
	LM-AUS30-300-JSS0	—	—	—	300 mm
	LM-AUS30-600-JSS0	—	—	—	600 mm
	LM-AUS40-120-JSS0	—	—	—	120 mm
	LM-AUS40-180-JSS0	—	—	—	180 mm
	LM-AUS40-240-JSS0	—	—	—	240 mm
	LM-AUS40-300-JSS0	—	—	—	300 mm
	LM-AUS40-600-JSS0	—	—	—	600 mm

Cables for HK series rotary servo motors

Item	Model	Length	Bending life	IP rating	Application
Motor cable (dual cable type/ direct connection type for 10 m or shorter)	MR-AEPB2CBL2M-A1-H	2 m	Long bending life	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires
	MR-AEPB2CBL5M-A1-H	5 m	Long bending life	IP65	
	MR-AEPB2CBL10M-A1-H	10 m	Long bending life	IP65	
	MR-AEPB2CBL2M-A1-L	2 m	Standard	IP65	
	MR-AEPB2CBL5M-A1-L	5 m	Standard	IP65	
	MR-AEPB2CBL10M-A1-L	10 m	Standard	IP65	
	MR-AEPB2CBL2M-A2-H	2 m	Long bending life	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires
	MR-AEPB2CBL5M-A2-H	5 m	Long bending life	IP65	
	MR-AEPB2CBL10M-A2-H	10 m	Long bending life	IP65	
	MR-AEPB2CBL2M-A2-L	2 m	Standard	IP65	
	MR-AEPB2CBL5M-A2-L	5 m	Standard	IP65	
	MR-AEPB2CBL10M-A2-L	10 m	Standard	IP65	
	MR-AEPB2CBL2M-A5-H	2 m	Long bending life	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead With electromagnetic brake wires
	MR-AEPB2CBL5M-A5-H	5 m	Long bending life	IP65	
	MR-AEPB2CBL10M-A5-H	10 m	Long bending life	IP65	
	MR-AEPB2CBL2M-A5-L	2 m	Standard	IP65	
	MR-AEPB2CBL5M-A5-L	5 m	Standard	IP65	
	MR-AEPB2CBL10M-A5-L	10 m	Standard	IP65	
	MR-AEP2CBL2M-A1-H	2 m	Long bending life	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires
	MR-AEP2CBL5M-A1-H	5 m	Long bending life	IP65	
	MR-AEP2CBL10M-A1-H	10 m	Long bending life	IP65	
	MR-AEP2CBL2M-A1-L	2 m	Standard	IP65	
	MR-AEP2CBL5M-A1-L	5 m	Standard	IP65	
	MR-AEP2CBL10M-A1-L	10 m	Standard	IP65	
	MR-AEP2CBL2M-A2-H	2 m	Long bending life	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires
	MR-AEP2CBL5M-A2-H	5 m	Long bending life	IP65	
	MR-AEP2CBL10M-A2-H	10 m	Long bending life	IP65	
	MR-AEP2CBL2M-A2-L	2 m	Standard	IP65	
	MR-AEP2CBL5M-A2-L	5 m	Standard	IP65	
	MR-AEP2CBL10M-A2-L	10 m	Standard	IP65	
	MR-AEP2CBL2M-A5-H	2 m	Long bending life	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead Without electromagnetic brake wires
	MR-AEP2CBL5M-A5-H	5 m	Long bending life	IP65	
	MR-AEP2CBL10M-A5-H	10 m	Long bending life	IP65	
	MR-AEP2CBL2M-A5-L	2 m	Standard	IP65	
	MR-AEP2CBL5M-A5-L	5 m	Standard	IP65	
	MR-AEP2CBL10M-A5-L	10 m	Standard	IP65	

Cables for HK series rotary servo motors

Item	Model	Length	Bending life	IP rating	Application
Motor cable (Note 1) (dual cable type/ junction type for over 10 m)	MR-AEPB2J10CBL03M-A1-L	0.3 m	Standard	IP20	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires
	MR-AEPB2J10CBL03M-A2-L	0.3 m	Standard	IP20	HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires
	MR-AEPB2J10CBL03M-A5-L	0.3 m	Standard	IP20	HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead With electromagnetic brake wires
	MR-AEP2J10CBL03M-A1-L	0.3 m	Standard	IP20	HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires
	MR-AEP2J10CBL03M-A2-L	0.3 m	Standard	IP20	HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires
	MR-AEP2J10CBL03M-A5-L	0.3 m	Standard	IP20	HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead Without electromagnetic brake wires
Encoder cable (Note 2)	MR-AEKCBL20M-H	20 m	Long bending life	IP20	HK-KN series HK-FN13, 23, 43, 7M3
	MR-AEKCBL30M-H	30 m	Long bending life	IP20	
	MR-AEKCBL40M-H	40 m	Long bending life	IP20	
	MR-AEKCBL50M-H	50 m	Long bending life	IP20	
	MR-AEKCBL20M-L	20 m	Standard	IP20	
	MR-AEKCBL30M-L	30 m	Standard	IP20	

Notes:

1. Use this cable in combination with MR-AEKCBL_M-H, MR-AEKCBL_M-L, or MR-ECNM.
2. Use this cable in combination with MR-AEPB2J10CBL03M-_-L or MR-AEP2J10CBL03M-_-L.

Cables for HK series rotary servo motors

Item	Model	Length	Bending life	IP rating	Application
Motor cable (Note 1) (dual cable type/ junction type for over 10 m)	MR-AEPB2J20CBL03M-A1-L	0.3 m	Standard	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires
	MR-AEPB2J20CBL03M-A2-L	0.3 m	Standard	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires
	MR-AEPB2J20CBL03M-A5-L	0.3 m	Standard	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead With electromagnetic brake wires
	MR-AEP2J20CBL03M-A1-L	0.3 m	Standard	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires
	MR-AEP2J20CBL03M-A2-L	0.3 m	Standard	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires
	MR-AEP2J20CBL03M-A5-L	0.3 m	Standard	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead Without electromagnetic brake wires
Encoder cable	MR-J3ENSCBL2M-H	2 m	Long bending life	IP67	HK-FN102, 152, 202, 301M HK-SN series
	MR-J3ENSCBL5M-H	5 m	Long bending life	IP67	
	MR-J3ENSCBL10M-H	10 m	Long bending life	IP67	
	MR-AENSCBL20M-H (Note 2)	20 m	Long bending life	IP67	HK-KN series HK-FN series HK-SN series
	MR-AENSCBL30M-H (Note 2)	30 m	Long bending life	IP67	
	MR-AENSCBL40M-H (Note 2)	40 m	Long bending life	IP67	
	MR-AENSCBL50M-H (Note 2)	50 m	Long bending life	IP67	
	MR-J3ENSCBL2M-L	2 m	Standard	IP67	HK-FN102, 152, 202, 301M HK-SN series
	MR-J3ENSCBL5M-L	5 m	Standard	IP67	
	MR-J3ENSCBL10M-L	10 m	Standard	IP67	
	MR-AENSCBL20M-L (Note 2)	20 m	Standard	IP67	HK-KN series HK-FN series HK-SN series
	MR-AENSCBL30M-L (Note 2)	30 m	Standard	IP67	

Notes:

1. Use this cable in combination with MR-AENSCBL_M-H, MR-AENSCBL_M-L, or MR-J3SCNS.
2. When using this cable for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series, use it in combination with MR-AEPB2J20CBL03M-_-L or MR-AEP2J20CBL03M-_-L.

Cables for HK series rotary servo motors

Item	Model	Length	Bending life	IP rating	Application
Motor cable (single cable type/ direct connection type for 10 m or shorter)	MR-AEPB1CBL2M-A1-H	2 m	Long bending life	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Load-side lead With electromagnetic brake wires
	MR-AEPB1CBL5M-A1-H	5 m	Long bending life	IP65	
	MR-AEPB1CBL10M-A1-H	10 m	Long bending life	IP65	
	MR-AEPB1CBL2M-A1-L	2 m	Standard	IP65	
	MR-AEPB1CBL5M-A1-L	5 m	Standard	IP65	
	MR-AEPB1CBL10M-A1-L	10 m	Standard	IP65	
	MR-AEPB1CBL2M-A2-H	2 m	Long bending life	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Opposite to load-side lead With electromagnetic brake wires
	MR-AEPB1CBL5M-A2-H	5 m	Long bending life	IP65	
	MR-AEPB1CBL10M-A2-H	10 m	Long bending life	IP65	
	MR-AEPB1CBL2M-A2-L	2 m	Standard	IP65	
	MR-AEPB1CBL5M-A2-L	5 m	Standard	IP65	
	MR-AEPB1CBL10M-A2-L	10 m	Standard	IP65	
	MR-AEPB1CBL2M-A5-H	2 m	Long bending life	IP65	HK-KN series HK-FN13B, 23B, 43B, 7M3B Vertical lead With electromagnetic brake wires
	MR-AEPB1CBL5M-A5-H	5 m	Long bending life	IP65	
	MR-AEPB1CBL10M-A5-H	10 m	Long bending life	IP65	
	MR-AEPB1CBL2M-A5-L	2 m	Standard	IP65	
	MR-AEPB1CBL5M-A5-L	5 m	Standard	IP65	
	MR-AEPB1CBL10M-A5-L	10 m	Standard	IP65	
	MR-AEP1CBL2M-A1-H	2 m	Long bending life	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Load-side lead Without electromagnetic brake wires
	MR-AEP1CBL5M-A1-H	5 m	Long bending life	IP65	
	MR-AEP1CBL10M-A1-H	10 m	Long bending life	IP65	
	MR-AEP1CBL2M-A1-L	2 m	Standard	IP65	
	MR-AEP1CBL5M-A1-L	5 m	Standard	IP65	
	MR-AEP1CBL10M-A1-L	10 m	Standard	IP65	
	MR-AEP1CBL2M-A2-H	2 m	Long bending life	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Opposite to load-side lead Without electromagnetic brake wires
	MR-AEP1CBL5M-A2-H	5 m	Long bending life	IP65	
	MR-AEP1CBL10M-A2-H	10 m	Long bending life	IP65	
	MR-AEP1CBL2M-A2-L	2 m	Standard	IP65	
	MR-AEP1CBL5M-A2-L	5 m	Standard	IP65	
	MR-AEP1CBL10M-A2-L	10 m	Standard	IP65	
	MR-AEP1CBL2M-A5-H	2 m	Long bending life	IP65	HK-KN series HK-FN13, 23, 43, 7M3 Vertical lead Without electromagnetic brake wires
	MR-AEP1CBL5M-A5-H	5 m	Long bending life	IP65	
	MR-AEP1CBL10M-A5-H	10 m	Long bending life	IP65	
	MR-AEP1CBL2M-A5-L	2 m	Standard	IP65	
	MR-AEP1CBL5M-A5-L	5 m	Standard	IP65	
	MR-AEP1CBL10M-A5-L	10 m	Standard	IP65	

Connector sets for HK series rotary servo motors

Item	Model	Description	IP rating	Application
Encoder connector set	MR-ECNM (Note 1)	Junction connector × 1 Servo amplifier connector × 1	IP20	HK-KN series HK-FN13, 23, 43, 7M3
	MR-J3SCNS (Note 2)	Junction connector or encoder connector × 1 Servo amplifier connector × 1	IP67	HK-KN series HK-FN series HK-SN series (one-touch connection type)
	MR-ENCNS2	Encoder connector × 1 Servo amplifier connector × 1	IP67	HK-FN102, 152, 202, 301M HK-SN series (straight type) (screw type)
	MR-J3SCNSA	Encoder connector × 1 Servo amplifier connector × 1	IP67	HK-FN102, 152, 202, 301M HK-SN series (angle type) (one-touch connection type)
	MR-ENCNS2A	Encoder connector × 1 Servo amplifier connector × 1	IP67	HK-FN102, 152, 202, 301M HK-SN series (angle type) (screw type)

Notes:

1. Use this connector set in combination with MR-AEPB2J10CBL03M-_-L or MR-AEP2J10CBL03M-_-L.
2. When using this connector set for HK-KN series/HK-FN (0.1 kW to 0.75 kW) series, use it in combination with MR-AEPB2J20CBL03M-_-L or MR-AEP2J20CBL03M-_-L.

Connector sets for HK series rotary servo motors

Item	Model	Description	IP rating	Application
Power connector set	MR-APWCNS4	Power connector × 1	IP67	HK-FN102, 152 HK-SN3534, 5034 (one-touch connection type)
	MR-APWCNS5	Power connector × 1	IP67	HK-FN202, 301M HK-SN7034 (one-touch connection type)
Electromagnetic brake connector set	MR-BKCNS1	Electromagnetic brake connector × 1	IP67	HK-FN102B, 152B, 202B, 301MB HK-SN series (straight type) (one-touch connection type)
	MR-BKCNS2	Electromagnetic brake connector × 1	IP67	HK-FN102B, 152B, 202B, 301MB HK-SN series (straight type) (screw type)
	MR-BKCNS1A	Electromagnetic brake connector × 1	IP67	HK-FN102B, 152B, 202B, 301MB HK-SN series (angle type) (one-touch connection type)
	MR-BKCNS2A	Electromagnetic brake connector × 1	IP67	HK-FN102B, 152B, 202B, 301MB HK-SN series (angle type) (screw type)

Cables and connector sets for fully closed loop control with HK series rotary servo motors

Item	Model	Length	Bending life/Description	IP rating	Application
Encoder cable	MR-EKCBL2M-H	2 m	Long bending life	IP20	Connecting a load-side encoder
	MR-EKCBL5M-H	5 m	Long bending life	IP20	
Junction cable for fully closed loop control	MR-J4FCCBL03M	0.3 m	Standard	-	Branching a load-side encoder
Encoder connector set	MR-ECNM	-	Junction connector × 1 Servo amplifier connector × 1	IP20	Connecting a load-side encoder
	MR-J3CN2	-	Servo amplifier connector × 1	-	Connecting a load-side encoder
Connector set	MR-J3THMCN2	-	Junction connector × 2 Servo amplifier connector × 1	-	Branching a load-side encoder

Encoder cables/Junction cables for HG series rotary servo motors

Item	Model	Length	Bending life	IP rating	Application
Encoder cable	MR-J3ENCBL2M-A1-H	2 m	Long bending life	IP65	HG-KNS series (direct connection type) (Load-side lead)
	MR-J3ENCBL5M-A1-H	5 m	Long bending life	IP65	
	MR-J3ENCBL10M-A1-H	10 m	Long bending life	IP65	
	MR-J3ENCBL2M-A1-L	2 m	Standard	IP65	
	MR-J3ENCBL5M-A1-L	5 m	Standard	IP65	
	MR-J3ENCBL10M-A1-L	10 m	Standard	IP65	
	MR-J3ENCBL2M-A2-H	2 m	Long bending life	IP65	HG-KNS series (direct connection type) (Opposite to load-side lead)
	MR-J3ENCBL5M-A2-H	5 m	Long bending life	IP65	
	MR-J3ENCBL10M-A2-H	10 m	Long bending life	IP65	
	MR-J3ENCBL2M-A2-L	2 m	Standard	IP65	
	MR-J3ENCBL5M-A2-L	5 m	Standard	IP65	
	MR-J3ENCBL10M-A2-L	10 m	Standard	IP65	
	MR-J3JCBL03M-A1-L (Note 1)	0.3 m	Standard	IP20	HG-KNS series (junction type) (Load-side lead)
	MR-J3JCBL03M-A2-L (Note 1)	0.3 m	Standard	IP20	HG-KNS series (junction type) (Opposite to load-side lead)
	MR-EKCBL20M-H (Note 2)	20 m	Long bending life	IP20	HG-KNS series (junction type)
	MR-EKCBL30M-H (Note 2)	30 m	Long bending life	IP20	
	MR-EKCBL40M-H (Note 2)	40 m	Long bending life	IP20	
	MR-EKCBL50M-H (Note 2)	50 m	Long bending life	IP20	
	MR-EKCBL20M-L (Note 2)	20 m	Standard	IP20	
	MR-EKCBL30M-L (Note 2)	30 m	Standard	IP20	
	MR-J3JSCBL03M-A1-L (Note 3)	0.3 m	Standard	IP65	HG-KNS series (junction type) (Load-side lead)
	MR-J3JSCBL03M-A2-L (Note 3)	0.3 m	Standard	IP65	HG-KNS series (junction type) (Opposite to load-side lead)
	MR-J3ENSCBL2M-H (Note 4)	2 m	Long bending life	IP67	HG-KNS series (junction type) HG-SNS series (direct connection type)
	MR-J3ENSCBL5M-H (Note 4)	5 m	Long bending life	IP67	
	MR-J3ENSCBL10M-H (Note 4)	10 m	Long bending life	IP67	
	MR-J3ENSCBL20M-H (Note 4)	20 m	Long bending life	IP67	
	MR-J3ENSCBL30M-H (Note 4)	30 m	Long bending life	IP67	
	MR-J3ENSCBL40M-H (Note 4)	40 m	Long bending life	IP67	
	MR-J3ENSCBL50M-H (Note 4)	50 m	Long bending life	IP67	
	MR-J3ENSCBL2M-L (Note 4)	2 m	Standard	IP67	
	MR-J3ENSCBL5M-L (Note 4)	5 m	Standard	IP67	
	MR-J3ENSCBL10M-L (Note 4)	10 m	Standard	IP67	
	MR-J3ENSCBL20M-L (Note 4)	20 m	Standard	IP67	
	MR-J3ENSCBL30M-L (Note 4)	30 m	Standard	IP67	

Notes:

1. Use this cable in combination with MR-EKCBL_M-H, MR-EKCBL_M-L, or MR-ECNM.
2. Use this cable in combination with MR-J3JCBL03M-A1-L or MR-J3JCBL03M-A2-L.
3. Use this cable in combination with MR-J3ENSCBL_M-H, MR-J3ENSCBL_M-L, or MR-J3SCNS.
4. When using this cable for HG-KNS series, use it in combination with MR-J3JSCBL03M-A1-L or MR-J3JSCBL03M-A2-L.

Product List

Encoder connector sets for HG series rotary servo motors

Item	Model	Description	IP rating	Application
Encoder connector set	MR-ECNM (Note 1)	Junction connector × 1 Servo amplifier connector × 1	IP20	HG-KNS series (junction type)
	MR-J3SCNS (Note 2)	Junction connector or encoder connector × 1 Servo amplifier connector × 1	IP67	HG-KNS series (junction type) HG-SNS series (direct connection type) (straight type) (one-touch connection type)
	MR-ENCNS2 (Note 2)	Junction connector or encoder connector × 1 Servo amplifier connector × 1	IP67	HG-KNS series (junction type) HG-SNS series (direct connection type) (straight type) (screw type)
	MR-J3SCNSA	Encoder connector × 1 Servo amplifier connector × 1	IP67	HG-SNS series (angle type) (one-touch connection type)
	MR-ENCNS2A	Encoder connector × 1 Servo amplifier connector × 1	IP67	HG-SNS series (angle type) (screw type)

Power cables for HG series rotary servo motors

Item	Model	Length	Bending life	IP rating	Application
Power cable	MR-PWS1CBL2M-A1-H	2 m	Long bending life	IP65	HG-KNS series (direct connection type) (load-side lead, lead-out)
	MR-PWS1CBL5M-A1-H	5 m	Long bending life	IP65	
	MR-PWS1CBL10M-A1-H	10 m	Long bending life	IP65	
	MR-PWS1CBL2M-A1-L	2 m	Standard	IP65	
	MR-PWS1CBL5M-A1-L	5 m	Standard	IP65	
	MR-PWS1CBL10M-A1-L	10 m	Standard	IP65	
	MR-PWS1CBL2M-A2-H	2 m	Long bending life	IP65	HG-KNS series (direct connection type) (opposite to load-side lead, lead-out)
	MR-PWS1CBL5M-A2-H	5 m	Long bending life	IP65	
	MR-PWS1CBL10M-A2-H	10 m	Long bending life	IP65	
	MR-PWS1CBL2M-A2-L	2 m	Standard	IP65	
	MR-PWS1CBL5M-A2-L	5 m	Standard	IP65	
	MR-PWS1CBL10M-A2-L	10 m	Standard	IP65	
	MR-PWS2CBL03M-A1-L	0.3 m	Standard	IP55	HG-KNS series (junction type) (load-side lead, lead-out)
	MR-PWS2CBL03M-A2-L	0.3 m	Standard	IP55	HG-KNS series (junction type) (opposite to load-side lead, lead-out)

Power connector sets for HG series rotary servo motors

Item	Model	Description	IP rating	Application
Power connector set	MR-PWCNS4	Power connector × 1	IP67	HG-SNS52J, 102J, 152J
	MR-PWCNS5	Power connector × 1	IP67	HG-SNS202J, 302J

Notes:

1. Use this connector set in combination with MR-J3JCBL03M-A1-L or MR-J3JCBL03M-A2-L.
2. When using this connector set for HG-KNS series, use it in combination with MR-J3JSCBL03M-A1-L or MR-J3JSCBL03M-A2-L.

Electromagnetic brake cables for HG series rotary servo motors

Item	Model	Length	Bending life	IP rating	Application
Electromagnetic brake cable	MR-BKS1CBL2M-A1-H	2 m	Long bending life	IP65	HG-KNS series (direct connection type) (load-side lead, lead-out)
	MR-BKS1CBL5M-A1-H	5 m	Long bending life	IP65	
	MR-BKS1CBL10M-A1-H	10 m	Long bending life	IP65	
	MR-BKS1CBL2M-A1-L	2 m	Standard	IP65	
	MR-BKS1CBL5M-A1-L	5 m	Standard	IP65	
	MR-BKS1CBL10M-A1-L	10 m	Standard	IP65	
	MR-BKS1CBL2M-A2-H	2 m	Long bending life	IP65	HG-KNS series (direct connection type) (opposite to load-side lead, lead-out)
	MR-BKS1CBL5M-A2-H	5 m	Long bending life	IP65	
	MR-BKS1CBL10M-A2-H	10 m	Long bending life	IP65	
	MR-BKS1CBL2M-A2-L	2 m	Standard	IP65	
	MR-BKS1CBL5M-A2-L	5 m	Standard	IP65	
	MR-BKS1CBL10M-A2-L	10 m	Standard	IP65	
	MR-BKS2CBL03M-A1-L	0.3 m	Standard	IP55	HG-KNS series (junction type) (load-side lead, lead-out)
	MR-BKS2CBL03M-A2-L	0.3 m	Standard	IP55	HG-KNS series (junction type) (opposite to load-side lead, lead-out)

Electromagnetic brake connector sets for HG series rotary servo motors

Item	Model	Description	IP rating	Application
Electromagnetic brake connector set	MR-BKCNS1	Electromagnetic brake connector × 1	IP67	HG-SNS series (straight type) (one-touch connection type)
	MR-BKCNS2	Electromagnetic brake connector × 1	IP67	HG-SNS series (straight type) (screw type)
	MR-BKCNS1A	Electromagnetic brake connector × 1	IP67	HG-SNS series (angle type) (one-touch connection type)
	MR-BKCNS2A	Electromagnetic brake connector × 1	IP67	HG-SNS series (angle type) (screw type)

Cables and connector sets for fully closed loop control with HG series rotary servo motors

Item	Model	Length	Bending life/Description	IP rating	Application
Junction cable for fully closed loop control	MR-J4FCCBL03M	0.3 m	Standard	-	Branching a load-side encoder
Encoder connector set	MR-ECNM	-	Junction connector × 1 Servo amplifier connector × 1	IP20	Connecting a load-side encoder
	MR-J3CN2	-	Servo amplifier connector × 1	-	Connecting a load-side encoder
Connector set	MR-J3THMCN2	-	Junction connector × 2 Servo amplifier connector × 1	-	Branching a load-side encoder

Cables and connector sets for LM series linear servo motors

Item	Model	Length	Bending life/Description	IP rating	Application
Encoder cable	MR-EKCBL2M-H	2 m	Long bending life	IP20	Connecting a linear encoder
	MR-EKCBL5M-H	5 m	Long bending life	IP20	
Encoder connector set	MR-ECNM	-	Junction connector × 1 Servo amplifier connector × 1	IP20	Connecting a linear encoder
	MR-J3CN2	-	Servo amplifier connector × 1	–	Connecting a linear encoder

Product List

Junction terminal block cables/Connector sets

Item	Model	Length	Application (Note 1)
Junction terminal block cable (For PS7DW-20V14B-F)	MR-J2HBUS05M	0.5 m	Connecting MR-JET-_G_ and PS7DW-20V14B-F (Toho Technology Corp.)
	MR-J2HBUS1M	1 m	
	MR-J2HBUS5M	5 m	
Connector set	MR-CCN1	-	Connecting MR-JET-_G_ and PS7DW-20V14B-F (Toho Technology Corp.)

Battery/Battery branch cable

Item	Model	Length	Application (Note 1)
Battery	MR-BAT6V1SET-B	-	MR-JET-_G_
	MR-BAT6V1	-	MR-BAT6V1SET-B
Battery branch cable	MR-BT6V4CBL03M	0.3 m	Connecting MR-JET-_G_ and MR-BAT6V1SET-B

Regenerative options

Item	Model	Permissible regenerative power	Resistance value	Application (Note 1)
Regenerative option (200 V)	MR-RB032	30 W	40 Ω	MR-JET-10G_ to MR-JET-40G_
	MR-RB12	100 W	40 Ω	MR-JET-20G_ and MR-JET-40G_
	MR-RB14	100 W	26 Ω	MR-JET-70G_ and MR-JET-100G_
	MR-RB30	300 W	13 Ω	MR-JET-200G_ and MR-JET-300G_
	MR-RB34	300 W	26 Ω	MR-JET-70G_ and MR-JET-100G_
	MR-RB50	500 W	13 Ω	MR-JET-200G_ and MR-JET-300G_
Regenerative option (400 V)	MR-RB1H-4	100 W	82 Ω	MR-JET-60G4-HS_ and MR-JET-100G4-HS_
	MR-RB3M-4	300 W	120 Ω	MR-JET-60G4-HS_ and MR-JET-100G4-HS_
	MR-RB3G-4	300 W	47 Ω	MR-JET-200G4-HS_
	MR-RB3Y-4	300 W	36 Ω	MR-JET-350G4-HS_
	MR-RB34-4	300 W	26 Ω	MR-JET-500G4-HS_
	MR-RB3U-4	300 W	22 Ω	MR-JET-700G4-HS_
	MR-RB5G-4	500 W	47 Ω	MR-JET-200G4-HS_
	MR-RB5Y-4	500 W	36 Ω	MR-JET-350G4-HS_
	MR-RB54-4	500 W	26 Ω	MR-JET-500G4-HS_
	MR-RB5U-4	500 W	22 Ω	MR-JET-700G4-HS_

Peripheral units

Item	Model	Application (Note 1)
Replacement fan unit	MR-JET-FAN1	MR-JET-200G_ and MR-JET-300G_
	MR-J5-FAN6	MR-JET-200G4-HS_ and MR-JET-350G4-HS_
	MR-J5-FAN7	MR-JET-500G4-HS_ and MR-JET-700G4-HS_

Peripheral cables

Item	Model	Length	Application (Note 1)
Personal computer communication cable (USB cable)	MR-J3USBCBL3M	3 m	MR-JET-_G_/MR-JET-_G4-HS_

Peripheral attachments

Item	Model	Description	Application (Note 1)
Shield clamp attachment	MR-ASCHP06	Attachment × 1 Cable clamp × 2 Flat head screw (M4) × 2	MR-JET-500G4-HS_ and MR-JET-700G4-HS_

Notes:

1. Note that options/peripheral equipment necessary for servo amplifiers with special specifications are the same as those for standard servo amplifiers. Refer to the servo amplifiers with the same rated output.

Engineering software

Item	Model	Description
MELSOFT iQ Works	SW2DND-IQWK-EC	FA engineering software (site license (Note 2))
MELSOFT GX Works3	SW1DND-GXW3-EC	Programmable controller engineering software (including motion control setting) (site license (Note 2))
MELSOFT MR Configurator2 (Note 1)	SW1DND-MRC2-EC	Servo engineering software (site license (Note 2))

Notes:

1. MR Configurator2 can be obtained by either of the following:
   - Purchase MR Configurator2 alone.
   - Purchase GX Works3 or MT Works2: MR Configurator2 is included in GX Works3 and MT Works2 with software version 1.34L or later.
2. Anyone can use the product as long as that person belongs to the business office (including overseas offices) of the corporation that purchased the product, or to the same public vocational training facility or other educational institution as the corporation.

For your safety

- To use the products given in this catalog safely, read the User's Manuals and the appended document prior to use.
- In this catalog, the safety instruction levels are classified into "WARNING" and "CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight injury.

Note that the CAUTION level may lead to a serious consequence depending on conditions.
Please follow the instructions of both levels because they are important to personnel safety.

Safety instructions

⚠WARNING

[Wiring]

- To prevent an electric shock, turn off the servo amplifier power and wait for 15 minutes or more before starting wiring and/or inspection.
- To prevent an electric shock, ground the servo amplifier.
- To prevent an electric shock, any person who is involved in wiring should be fully competent to do the work.
- To prevent an electric shock, mount the servo amplifier and the servo motor before wiring.
- To prevent an electric shock, connect the grounding wire to the cabinet protective earth (PE) terminal via the servo amplifier protective earth (PE) terminal.
- To prevent an electric shock, do not touch the conductive parts.
- To prevent an electric shock and burn injury, do not operate the servo amplifier and the servo motor with wet hands.

[Operation]

- To prevent an electric shock and burn injury, do not operate the servo amplifier and the servo motor with wet hands.

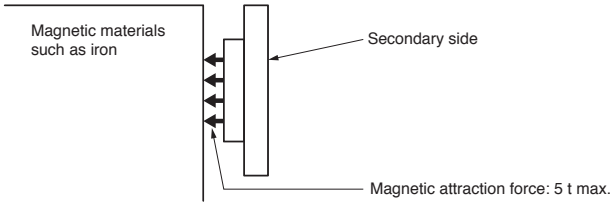
[Maintenance]

- To prevent an electric shock, any person who is involved in wiring should be fully competent to do the work.
- To prevent an electric shock and burn injury, do not operate the servo amplifier and the servo motor with wet hands.

⚠CAUTION

[Transportation/installation]

- To prevent injury, transport the products correctly according to their mass.
- To prevent injury, do not touch the sharp edges of the servo motor, shaft keyway, or others with bare hands when handling the servo motor.
- For the linear servo motor, attraction force is generated between the permanent magnet on the secondary side and the magnetic materials. To prevent injury to fingers and other body parts due to the attraction force between the secondary side and the magnetic material side, take special care in handling the linear servo motor.



[Operation]

- To prevent injury, do not touch the rotor of the servo motor during operation.

[Disposal of linear servo motors]

- To prevent burn injury, do not touch the secondary side after the demagnetization of the secondary side by heating over 300 ˚C until it becomes cool enough.

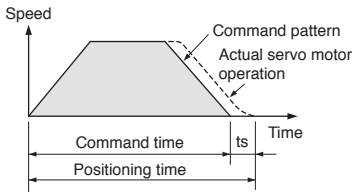
For proper use

- To use the products given in this catalog properly, read the User's Manuals and the appended document prior to use.
- In this catalog, instructions for incorrect handling which may cause physical damage, instructions for other functions, and so on are classified into "NOTICES".

ⓘ NOTICES

[Model selection]

- Select a rotary servo motor which has the rated torque equal to or higher than the continuous effective torque.
- Select a linear servo motor which has the continuous thrust equal to or higher than the continuous effective load thrust.
- When the linear servo motor is used for vertical axis, it is necessary to have an anti-drop mechanism using springs and counter balances in the machine side.
- For the system where the unbalanced torque occurs, such as a vertical axis, the unbalanced torque of the machine should be kept at 70 % or lower of the rated torque.
- Create operation patterns by considering the settling time (ts) to complete positioning.
- Load to motor inertia ratio or load to mass ratio must be below the recommended ratio. If the ratio is too large, the expected performance may not be achieved, and the dynamic brake may be damaged.



- Use the servo motor with the specified servo amplifier.

[Transportation/installation]

- To prevent a malfunction, do not drop or strike the servo amplifier and servo motor.
- When fumigants that contain halogen materials, such as fluorine, chlorine, bromine, and iodine, are used for disinfecting and protecting wooden packaging from insects, they cause a malfunction when entering our products. Please take necessary precautions to ensure that any residual materials from fumigant do not enter our products, or perform disinfection and pest control using methods other than fumigation, such as heat treatment. Perform disinfection and pest control at timbering stage before packing the products.
- Do not get on or place heavy objects on the servo amplifier or the servo motor.
- The system must withstand high speeds and high acceleration/deceleration.
- To enable high-accuracy positioning, ensure the machine rigidity, and keep the machine resonance point at a high level.
- Install the servo amplifier and the servo motor on incombustible material. Installing them directly or close to combustibles will lead to smoke or a fire. In addition, the servo amplifier must be installed in a metal cabinet.
- The regenerative option becomes hot (the temperature rise of 100 °C or higher) with frequent use. Do not install within combustibles or objects subject to thermal deformation. Make sure that wires do not come into contact with the unit.
- Securely fix the servo motor onto the machine. If attached insecurely, the motor may come off during operation.
- Install electrical and mechanical stoppers at the stroke end.
- Mount the servo amplifier on a perpendicular wall in the correct vertical direction.
- To prevent a malfunction, do not block the intake and exhaust areas of the servo amplifier.
- When installing multiple servo amplifiers in a row in a sealed cabinet, leave space around the servo amplifiers as described in User's Manuals. To ensure the service life and reliability of the servo amplifiers, prevent heat accumulation by keeping space as open as possible toward the top plate.
- Do not disassemble, repair, or modify the product.

[Environment]

- Use the servo amplifier and the servo motor in the designated environment.
- Avoid installing the servo amplifier and the servo motor in areas with oil mist or dust. When installing in such areas, enclose the servo amplifier in a sealed cabinet, and protect the servo motor by furnishing a cover or by taking similar measures.
- In the condition where cutting fluid or lubricating oil are constantly applied, and condensation occurs due to excessive humidity, continuous operation of the servo motor for a long period of time may result in the deterioration on the insulation of the servo motor. Provide measures such as oil proof, dust proof cover, and dew condensation prevention to protect the servo motor.
- To prevent a malfunction or a failure, do not use the servo system products under a strong electric field, magnetic field, or radiation environment.

[Wiring]

- To prevent a fire, use a molded-case circuit breaker or a fuse for the power supply (L1/L2/L3) of the servo amplifier.
- Connect a magnetic contactor between the power supply and the power supply (L1/L2/L3) of the servo amplifier so that the power supply can be shut off when a malfunction or an alarm occurs in the servo amplifier.
- The grounding must be connected to prevent faults such as a position mismatch.
- Do not supply power to the output terminals (U/V/W) of the servo amplifier or the input terminals (U/V/W) of the servo motor. Doing so damages the servo amplifier and the servo motor.
- To prevent abnormal operation and malfunction, connect the servo amplifier power outputs (U/V/W) to the servo motor power inputs (U/V/W) directly. Do not connect a magnetic contactor and others between them.
- The phases (U/V/W) of the servo amplifier power outputs and the phases (U/V/W) of the servo motor power inputs should match with each other.
- Check the wiring and sequence program thoroughly before switching the power on.
- Carefully select the cable clamping method, and make sure that bending stress and the stress of the cable's own weight are not applied on the cable connection section.
- In an application where the servo motor moves, determine the cable bending radius based on the cable bending life and wire type.
- To prevent malfunction, avoid bundling the servo amplifier's power lines (input/output) and signal cables together or running them in parallel to each other. Separate the power lines from the signal cables.
- To prevent heat generation and ignition of wires, use the wires given in this catalog or equivalent products.

[Initial settings]

- Set the control mode by the controller.
- When using the regenerative option, change [Pr. PA02.0-1]. The regenerative option is disabled as default.

[Operation]

- Do not use a product which is damaged or has missing parts. In that case, replace the product.
- Turn on the stroke limit signals (FLS/RLS), or the stroke end signals (LSP/LSN) in position or speed control mode. The servo motor will not start if the signals are off.
- When a magnetic contactor is installed on the primary side of the servo amplifier, do not perform frequent starts and stops with the magnetic contactor. Doing so may damage the servo amplifier.
- Do not use the dynamic brake to stop in a normal operation as it is the function to stop in emergency.
- Note that the number of operation times of the dynamic brake is limited. For example, when a machine operates at the recommended load to motor inertia ratio or less and decelerates from the rated speed to a stop once in 10 minutes, the estimated number of operation times is 1000.
- If the protective functions of the servo amplifier activate, turn the power off immediately. Remove the cause before turning the power on again.
- The servo amplifier, the regenerative resistor, and the servo motor can be very hot. Take safety measures such as covering them.
  In addition, do not directly touch the servo amplifier, the regenerative resistor, and the servo motor during or right after operation.

[Maintenance]

- When an error occurs, ensure safety by turning the power off, etc., before dealing with the error. Otherwise, it may cause an accident.
- Before wiring or inspection, turn off the power, wait for 15 minutes or more until the charge light turns off.
- In a maintenance inspection, make sure that the emergency stop circuit operates properly such that an operation can be stopped immediately and a power can be shut off by the emergency stop switch.

[Use of rotary servo motors]

- To prevent a malfunction on the encoder, do not apply shocks, e.g. hit with a hammer, when coupling the shaft end of the rotary drive motor.
- When mounting a pulley to the rotary servo motor with a keyed shaft, use the screw hole in the shaft end.
- When removing the pulley, use a pulley remover to protect the shaft from excessive load and impact.
- Do not apply a load exceeding the tolerable load onto the rotary servo motor shaft. The shaft or the rotor may break.
- When the rotary servo motor is mounted with the shaft vertical (shaft up), provide measures so that the servo motor is not exposed to oil and water entering from the machine side, gear box, etc.
- Mount the rotary servo motor in the specified direction.
- Do not use the 24 V DC interface power supply for the electromagnetic brake. To prevent malfunction, use the power supply designed exclusively for the electromagnetic brake.
- Do not apply the electromagnetic brake when the servo is on. Doing so may cause the servo amplifier overload or shorten the brake life. Apply the electromagnetic brake when the servo is off.
- Torque may drop due to temperature increase of the rotary servo motor. Use the motor within the specified ambient temperature.
- The temperature rise of the rotary servo motors varies depending on the installation environment and the operation conditions. Conduct a test run on the servo motors before an actual operation to make sure that no alarm occurs.

[Use of linear encoders]

- When the linear encoder is incorrectly installed, an alarm or a position mismatch may occur. In this case, refer to the following checking points for the linear encoder to check the mounting condition.
- Checking points for the linear encoder
  (a) Check that the gap between the head and scale is proper.
  (b) Check the scale head for rolling and yawing (decrease in rigidity of scale head section).
  (c) Check the scale surface for dust and scratches.
  (d) Check that the vibration and temperature are within the specified range.
  (e) Check that the speed is within the permissible range without overshooting.

[Use of linear servo motors]

- The linear servo system uses powerful magnets on the secondary side. Magnetic force is inversely proportional to the square of the distance from the magnetic material. Therefore, the magnetic force will be significantly stronger as closer to the magnetic material. When mounting the secondary side of linear servo motor, ensure the sufficient distance from the magnetic bodies around it and securely fix those magnetic bodies.
- One who uses a medical device like a pacemaker must keep away from the product and equipment.
- Do not wear metals such as watches, pierced earrings, necklaces, etc.
- Do not put magnetic cards, watches, portable phones, etc. close to the motor.
- Place a caution sign such as "CAUTION! POWERFUL MAGNET" to give warning against the machine.
- Use non-magnetic tools, when installing or working near the linear servo motor.
  e.g., explosion-proof beryllium copper alloy safety tools
  (BEALON manufactured by NGK Insulators, Ltd.)
- If the linear servo motor is used in such an environment where there is magnetic powder, the powder may adhere to the permanent magnets of the secondary side and cause a damage. In that case, take measures to prevent the magnetic powder or pieces from being attracted to the permanent magnets of the secondary side or from going into the gap between primary side and secondary side.
- The linear servo motor is rated IP00. Provide protection measures to prevent dust and oil, etc., as necessary.
- Install the linear servo motor so that the thrust is applied to the center of gravity of the moving part. Failing to do so will cause a moment to occur.
- The cables such as the power cable deriving from the primary side cannot withstand the long-term bending action. Avoid the bending action by fixing the cables to the moving part or others. Also, use the cable that can withstand the long-term bending action for the wiring to the servo amplifier.
- Increase in the temperature of the linear servo motor causes a thrust drop. Use the motor within the specified ambient temperature.

[Disposal of linear servo motors]

- Dispose the primary side as industrial waste.
- Demagnetize the secondary side with a heat of 300 °C or higher, and dispose as industrial waste.
- Do not leave the product unattended.

For safety enhancement

When the MELSERVO-JET series servo amplifiers, servo motors, options, and peripheral equipment are installed in machines/systems, make sure the machines/systems conform to relevant standards and regulations. The entire system shall observe the following:

(1) For safety circuits, use parts and/or devices whose safety are confirmed or which comply with safety standards for the application.
(2) For details regarding the use of the servo amplifiers and other cautionary information, refer to relevant User's Manuals.
(3) Perform risk assessment on the entire machine/system. Using Certification Body for final safety certification is recommended.

Servo system controller

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is repaired or replaced.

[Term]

For terms of warranty, please contact your original place of purchase.

[Limitations]

(1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule.
It can also be carried out by us or our service company upon your request and the actual cost will be charged.
However, it will not be charged if we are responsible for the cause of the failure.

(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
  (i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
  (ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
  (iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
  (iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
  (v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
  (vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
  (vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
  (viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA Center for details.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

(1) For the use of our servo system controller, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the servo system controller, and a backup or fail-safe function should operate on an external system to the servo system controller when any failure or malfunction occurs.

(2) Our servo system controller is designed and manufactured as general purpose product for use at general industries.
Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

AC servo

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is repaired or replaced.

[Term]

For terms of warranty, please contact your original place of purchase.

[Limitations]

(1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.

(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;

(i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem

(ii) a failure caused by any alteration, etc. to the Product made on your side without our approval

(iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry

(iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced

(v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)

(vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters

(vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company

(viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA Center for details.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

(1) For the use of our AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in AC Servo, and a backup or fail-safe function should operate on an external system to AC Servo when any failure or malfunction occurs.

(2) Our AC Servo is designed and manufactured as a general purpose product for use at general industries. Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

Extensive global support coverage providing expert help whenever needed

■ Global FA centers

EMEA

Europe FA Center
MITSUBISHI ELECTRIC EUROPE B.V. Polish Branch
Tel: +48-12-347-65-00

Germany FA Center
MITSUBISHI ELECTRIC EUROPE B.V. German Branch
Tel: +49-2102-486-0

UK FA Center
MITSUBISHI ELECTRIC EUROPE B.V. UK Branch
Tel: +44-1707-27-8780

Czech Republic FA Center
MITSUBISHI ELECTRIC EUROPE B.V. Czech Branch
Tel: +420-734-402-587

Italy FA Center
MITSUBISHI ELECTRIC EUROPE B.V. Italian Branch
Tel: +39-039-60531

Turkey FA Center
MITSUBISHI ELECTRIC TURKEY Elektrik Urunleri A.S.
Tel: +90-216-969-2500

Asia-Pacific

China

Beijing FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
Beijing FA Center
Tel: +86-10-6518-8830

Guangzhou FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
Guangzhou FA Center
Tel: +86-20-8923-6730

Shanghai FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
Shanghai FA Center
Tel: +86-21-2322-3030

Tianjin FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
Tianjin FA Center
Tel: +86-22-2813-1015

Taiwan

Taipei FA Center
MITSUBISHI ELECTRIC AUTOMATION (TAIWAN) CO., LTD.
Tel: +886-2-2299-9917

Korea

Korea FA Center
MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD.
Tel: +82-2-3660-9630

Thailand

Thailand FA Center
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.
Tel: +66-2682-6522 to 31

ASEAN

ASEAN FA Center
MITSUBISHI ELECTRIC ASIA PTE. LTD.
Tel: +65-6470-2475

Malaysia

Malaysia FA Center
Malaysia FA Center
Tel: +60-3-7626-5080

Indonesia

Indonesia FA Center
PT. MITSUBISHI ELECTRIC INDONESIA
Cikarang Office
Tel: +62-21-2961-7797

Vietnam

Hanoi FA Center
MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED
Hanoi Branch Office
Tel: +84-24-3937-8075

Ho Chi Minh FA Center
MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED
Tel: +84-28-3910-5945

Philippines

Philippines FA Center
MELCO Factory Automation Philippines Inc.
Tel: +63-(0)2-8256-8042

India

India Ahmedabad FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
Ahmedabad Branch
Tel: +91-7965120063

India Bangalore FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
Bangalore Branch
Tel: +91-80-4020-1600

India Chennai FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
Chennai Branch
Tel: +91-4445548772

India Coimbatore FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
Coimbatore Branch
Tel: +91-422-438-5606

India Gurgaon FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
Gurgaon Head Office
Tel: +91-124-463-0300

India Pune FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
Pune Branch
Tel: +91-20-2710-2000

Americas

USA

North America FA Center
MITSUBISHI ELECTRIC AUTOMATION, INC.
Tel: +1-847-478-2100

Mexico

Mexico City FA Center
MITSUBISHI ELECTRIC AUTOMATION, INC.
Mexico Branch
Tel: +52-55-3067-7500

Mexico FA Center
MITSUBISHI ELECTRIC AUTOMATION, INC.
Queretaro Office
Tel: +52-442-153-6014

Mexico Monterrey FA Center
MITSUBISHI ELECTRIC AUTOMATION, INC.
Monterrey Office
Tel: +52-55-3067-7599

Brazil

Brazil FA Center
MITSUBISHI ELECTRIC DO BRASIL COMERCIO E SERVICOS LTDA.
Tel: +55-11-4689-3000

MEMO

List of Instruction Manuals

Relevant manuals are listed below:

Servo System Controller

Manual name	Manual No.
MELSEC iQ-R Motion Module User's Manual (Application for Simple Motion Mode)	IB-0300572ENG
MELSEC iQ-R Motion Module (Simple Motion Mode) Function Block Reference	BCN-B62005-1040ENG
MELSEC iQ-R Motion Module User's Manual (Advanced Synchronous Control for Simple Motion Mode)	IB-0300575ENG
MELSEC iQ-R Motion Module User's Manual (Startup)	IB-0300406ENG
MELSEC iQ-R Motion Module User's Manual (Application)	IB-0300411ENG
MELSEC iQ-R Motion Module User's Manual (Network)	IB-0300426ENG
MELSEC iQ-R Programming Manual (Motion Module Instructions, Standard Functions/Function Blocks)	IB-0300431ENG
MELSEC iQ-R Programming Manual (Motion Control Function Blocks)	IB-0300533ENG
MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Startup)	IB-0300251ENG
MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Application)	IB-0300253ENG
MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Advanced Synchronous Control)	IB-0300255ENG
MELSEC iQ-F FX5 Motion Module User's Manual (CC-Link IE TSN)	IB-0300568ENG
MELSEC iQ-F FX5 Motion Module/Simple Motion Module Function Block Reference	BCN-B62005-719
Motion Control Software SWM-G User's Manual (Startup)	IB-0300562ENG
Motion Control Software SWM-G Operating Manual (SWMOS)	IB-0300563ENG
Motion Control Software SWM-G Operating Manual (EcConfigurator)	IB-0300617ENG

Servo Amplifier

Manual name	Manual No.
MR-JET User's Manual (Hardware)	IB-0300453ENG
MR-JET User's Manual (Function)	IB-0300458ENG
MR-JET User's Manual (Adjustment)	IB-0300473ENG
MR-JET User's Manual (Troubleshooting)	IB-0300483ENG
MR-JET-G User's Manual (Introduction)	IB-0300448ENG
MR-JET-G User's Manual (Communication Function)	IB-0300463ENG
MR-JET-G User's Manual (Object Dictionary)	IB-0300468ENG
MR-JET-G User's Manual (Parameters)	IB-0300478ENG
MR-JET-G-N1 User's Manual (Introduction)	IB-0300495ENG
MR-JET-G-N1 User's Manual (Communication Function)	IB-0300500ENG
MR-JET-G-N1 User's Manual (Object Dictionary)	IB-0300505ENG

Servo Motor

Manual name	Manual No.
Rotary Servo Motor User's Manual (For MR-JET)	IB-0300488ENG
Linear Servo Motor User's Manual (LM-H3/LM-U2/LM-F/LM-K2)	SH-030316ENG
Linear Servo Motor User's Manual (LM-AJ/LM-AU)	IB-0300518ENG

Others

Manual name	Manual No.
EMC Installation Guidelines	IB-67310
MR-JET Partner's Encoder User's Manual	IB-0300523ENG

Precautions before use

This publication explains the typical features and functions of the products herein and does not provide restrictions or other information related to usage and module combinations. Before using the products, always read the product user manuals. Mitsubishi Electric will not be held liable for damage caused by factors found not to be the cause of Mitsubishi Electric; opportunity loss or lost profits caused by faults in Mitsubishi Electric products; damage, secondary damage, or accident compensation, whether foreseeable or not, caused by special factors; damage to products other than Mitsubishi Electric products; or any other duties.

⚠ For safe use

- To use the products given in this publication properly, always read the relevant manuals before beginning operation.
- The products have been manufactured as general-purpose parts for general industries, and are not designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.

Creating Solutions Together.

Low-voltage Power Distribution Products

Transformers, Med-voltage Distribution Products

Power Monitoring and Energy Saving Products

Power (UPS) and Environmental Products

Compact and Modular Controllers

Servos, Motors and Inverters

Visualization: HMIs

Edge Computing Products

Numerical Control (NC)

Collaborative and Industrial Robots

Processing machines: EDM, Lasers

SCADA, analytics and simulation software

Mitsubishi Electric's product lineup, from various controllers and drives to energy-saving devices and processing machines, all help you to automate your world. They are underpinned by software, innovative data monitoring, and modelling systems supported by advanced industrial networking and Edgecross IT/OT connectivity. Together with a worldwide partner ecosystem, Mitsubishi Electric factory automation (FA) has everything to make IoT and Digital Manufacturing a reality.

With a complete portfolio and comprehensive capabilities that combine synergies with diverse business units, Mitsubishi Electric provides a one-stop approach to how companies can tackle the shift to clean energy and energy conservation, carbon neutrality and sustainability, which are now a universal requirement of factories, buildings, and social infrastructure.

We at Mitsubishi Electric FA are your solution partners waiting to work with you as you take a step toward the realization of sustainable manufacturing and society through the application of automation.
Let's automate the world together!

Note: not all products are available in all countries

Mitsubishi Electric AC Servo System MELSERVO-JET

Country/Region	Sales office	
USA	Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100
Mexico	Mitsubishi Electric Automation, Inc. Mexico Branch Boulevard Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Int. 502, Ampliacion Granada, Miguel Hidalgo, Ciudad de Mexico, Mexico, C.P.11520	Tel : +52-55-3067-7500
Brazil	Mitsubishi Electric do Brasil Comercio e Servicos Ltda. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil	Tel : +55-11-4689-3000
Germany	Mitsubishi Electric Europe B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel : +49-2102-486-0
UK	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, UK-Hatfield, Hertfordshire, AL10 8XB, U.K.	Tel : +44-1707-28-8780
Italy	Mitsubishi Electric Europe B.V. Italian Branch Campus, Energy Park Via Energy Park 14, Vimercate 20871 (MB) Italy	Tel : +39-039-60531
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi, 76-80-Apdo. 420, E-08174 Sant Cugat del Valles (Barcelona), Spain	Tel : +34-935-65-3131
France	Mitsubishi Electric Europe B.V. French Branch 2, rue de l'Union-92565 Rueil-Malmaison Cedex-France	Tel : +33-1-55-68-55-68
Czech Republic	Mitsubishi Electric Europe B.V. Czech Branch, Prague Office Pekarska 621/7, 155 00 Praha 5, Czech Republic	Tel : +420-734-402-587
Poland	Mitsubishi Electric Europe B.V. Polish Branch ul. Krakowska 48, 32-083 Balice, Poland	Tel : +48-12-347-65-00
Sweden	Mitsubishi Electric Europe B.V. (Scandinavia) Hedvig Mollersgata 6, 223 55 Lund, Sweden	Tel : +46-8-625-10-00
Turkey	Mitsubishi Electric Turkey Elektrik Urunleri A.S. Serifali Mah. Kale Sok. No:41 Umraniye / Istanbul, Turkey	Tel : +90-216-969-2500
UAE	Mitsubishi Electric Europe B.V. Dubai Branch Dubai Silicon Oasis, P.O.BOX 341241, Dubai, U.A.E.	Tel : +971-4-3724716
South Africa	Adroit Technologies 20 Waterford Office Park, 189 Witkoppen Road, Fourways, South Africa	Tel : +27-11-658-8100
China	Mitsubishi Electric Automation (China) Ltd. Mitsubishi Electric Automation Center, No.1386 Hongqiao Road, Shanghai, China	Tel : +86-21-2322-3030
Taiwan	Mitsubishi Electric Automation (TAIWAN) Co., Ltd. 6F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 248019, Taiwan	Tel : +886-2-2299-2499
Korea	Mitsubishi Electric Automation Korea Co., Ltd. 7F to 9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul, Korea	Tel : +82-2-6103-9474
Singapore	Mitsubishi Electric Asia Pte. Ltd. 307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943	Tel : +65-6473-2486
Thailand	Mitsubishi Electric Factory Automation (Thailand) Co., Ltd. 101, True Digital Park Office, 5th Floor, Sukhumvit Road, Bang Chak, Prakanong, Bangkok, Thailand	Tel : +66-2092-8600
Indonesia	PT. Mitsubishi Electric Indonesia Gedung Jaya 8th Floor, JL. MH. Thamrin No.12, Jakarta Pusat 10340, Indonesia	Tel : +62-21-3192-6461
Vietnam	Mitsubishi Electric Vietnam Company Limited 11th & 12th Floor, Viettel Tower B, 285 Cach Mang Thang Tam Street, Ward 12, District 10, Ho Chi Minh City, Vietnam.	Tel : +84-28-3910-5945
India	Mitsubishi Electric India Pvt. Ltd. Pune Branch ICC-Devi Gaurav Technology Park, Unit no. 402, Fourth Floor, Survey no. 191-192 (P), Opp. Vallabh Nagar Bus Depot, Pune - 411018, Maharashtra, India	Tel : +91-20-4624-2100
Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, P.O. Box 11, Rydalmere, N.S.W 2116, Australia	Tel : +61-2-9684-7777

e-F@ctory

Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a "step ahead of the times". It is supported by the e-F@ctory Alliance Partners covering software, devices, and system integration, creating the optimal e-F@ctory architecture to meet the end users needs and investment plans.

e-F@ctory Alliance

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN

L(NA)03187ENG-G 2411 (IP)

New publication, effective November 2024