

FACTORY AUTOMATION

Open Gigabit Enabled Motion Performance

Fully integrated, highest productivity open motion systems



CC-Link IE

Ethernet-based integrated network

MITSUBISHI SERVO AMPLIFIERS & MOTORS

**MELSERVO
SYSTEM**





Automating the World



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

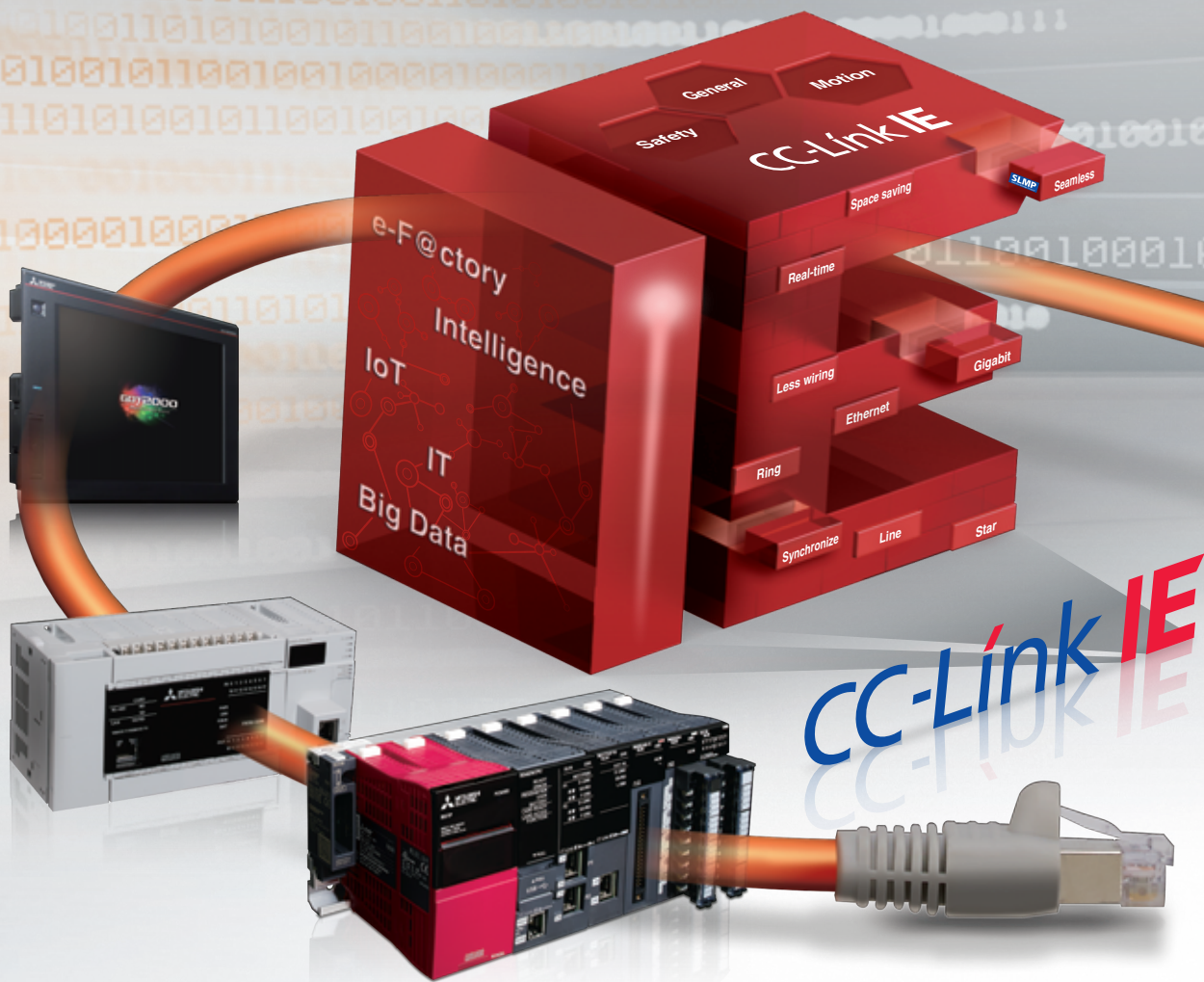
Maximizing productivity and efficiency with cutting-edge automation technology.



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.

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Extensive visualization with advanced data connectivity

Big Data analytics requires deterministic data collection, which can be realized by incorporating two key features: SLMP*1 that enables seamless connectivity between devices in the IT layer and on the shop floor; and a high-speed, large-capacity 1 Gbps communications network that enables the handling of large-data, such as production, quality and control data between different production processes.

*1. Seamless Message Protocol

*2. MELSEC iQ-R Series is supported by GX Works3. MELSEC-Q Series and MELSEC-L Series are supported by GX Works2.

General, motion and safety control integrated into one network

CC-Link IE incorporates generic distributed control, synchronous motion control, and safety control enabling safety communications across multiple safety devices, all on the same network. The topology is quite versatile, based on twisted-pair cables, which enables flexibility in system configuration while helping to keep installation cost low.

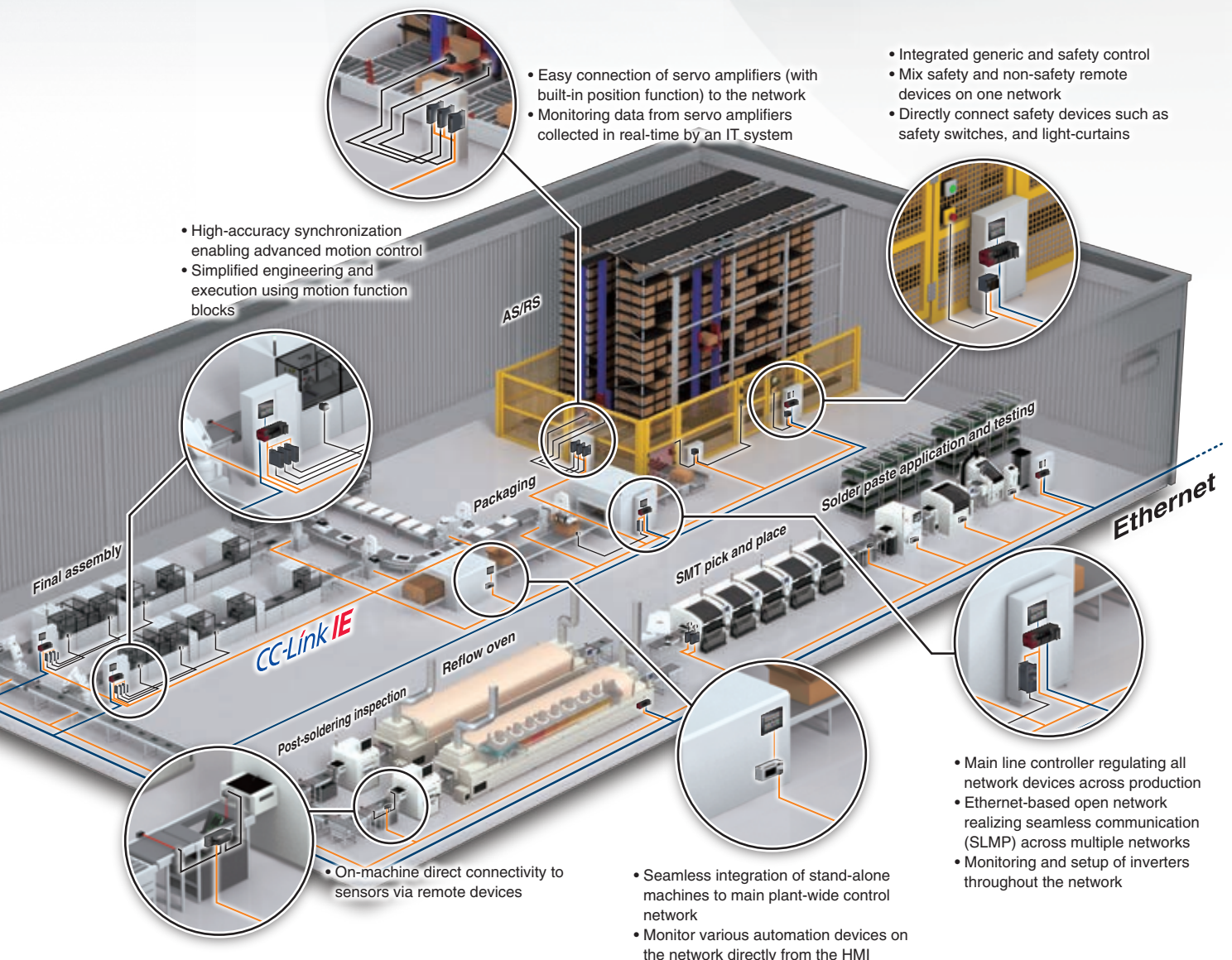
Comprehensive diagnosis realizing higher reliability

Disruptions to the control system are kept to a minimum via comprehensive diagnostics functions, high communications integrity owing to the noise-resistant characteristics of the optical cable, and communication re-routing capabilities made possible as the result of using a ring topology. Also, network errors can be rectified quickly by visualizing the network system image using the engineering software*2, and remotely from a GOT (HMI) directly on the machine or production line.

Seamless connectivity within all levels of automation

The backbone of e-F@ctory, leveraging connectivity between the shop floor and IT

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CONNEX





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Fully integrated, highest productivity open





LY

motion systems

Seamless integration of Mitsubishi Electric's servo system into CC-Link IE Field brings vast possibilities to the world of Industrial Automation.

- **Reduced wiring and high levels of significantly improved noise tolerance improve ease of use.**
- **Mitsubishi Electric CC-Link IE and partner products are designed with simple connectivity in mind.**
- **Access easily from anywhere is possible for maximum flexibility to perform engineering tasks from programming to diagnosis.**



IA Components

Full system integration on a single open gigabit network

Most machines incorporate a wide variety of automation components - I/O, motion, HMIs and others; all must be integrated into a single system. CC-Link IE offers the unique chance to build a single open system from a variety of vendors, all operating at unmatched gigabit speeds. Mitsubishi Electric's servo systems fit seamlessly into these systems, providing a new level of machine design possibilities. This leads to simplified configurations, reduced wiring, and significantly improved diagnostic efficiency.

All-in-One Network

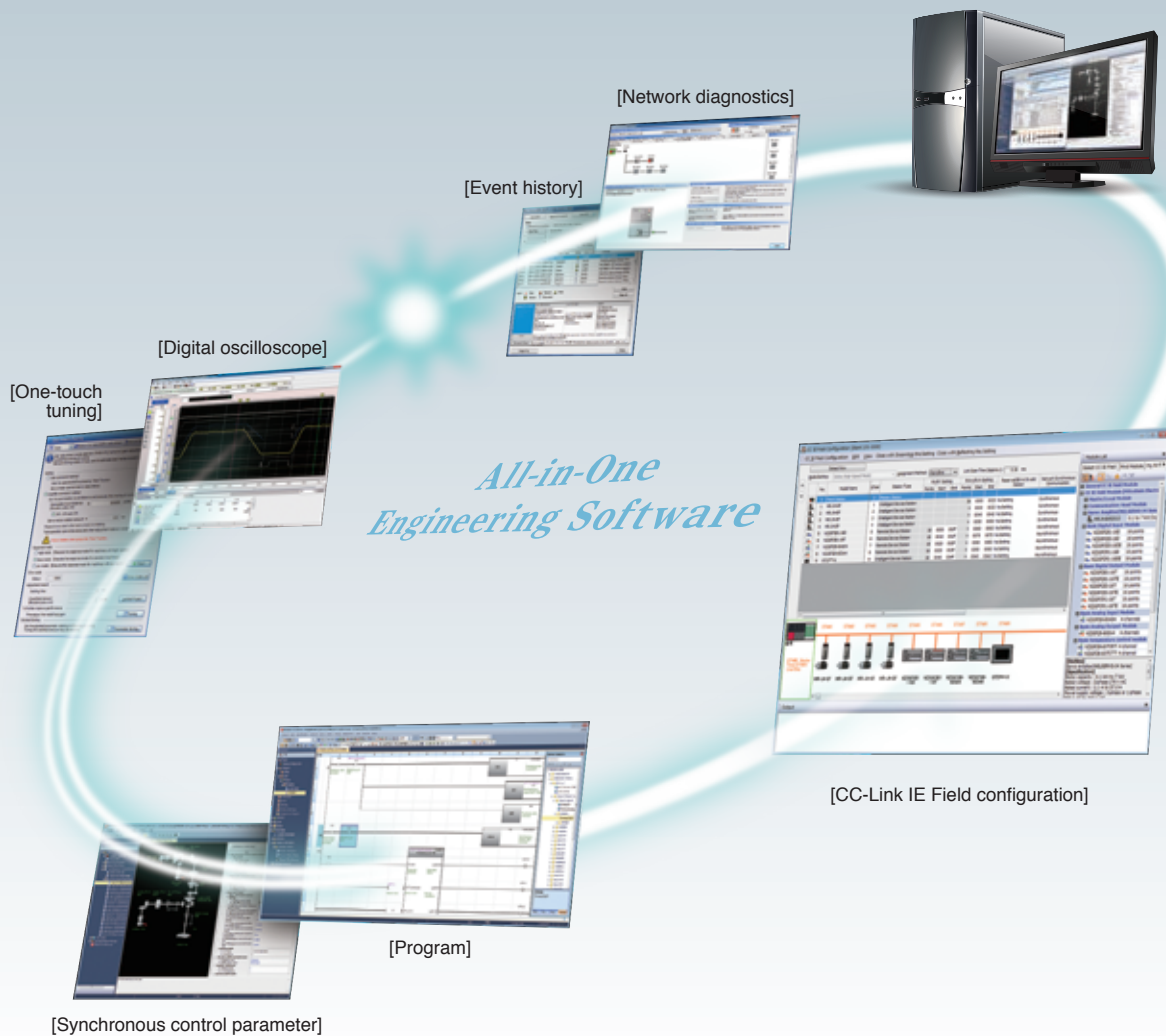


CC-Link IE Field Network - Integration of IA components on ONE single network

CC-Link IE Field Network is a single network which combines the versatility of Ethernet and highly accurate synchronous operation for Motion control. With the single network, various field devices, such as servo amplifiers, I/O modules, and high-speed counter modules, are connected flexibly.

CC-Link IE Field Network enables a further upgrade of your machine with the flexible servo system configuration.

All-in-One Engineering Software



Covering all aspects of the product development cycle - From easy settings to diagnosis with ONE engineering software

To meet customer needs, such as easy programming, easy startup, and easy maintenance, we offer the All-in-One engineering software as an easy manipulation tool with various new functions and technology.

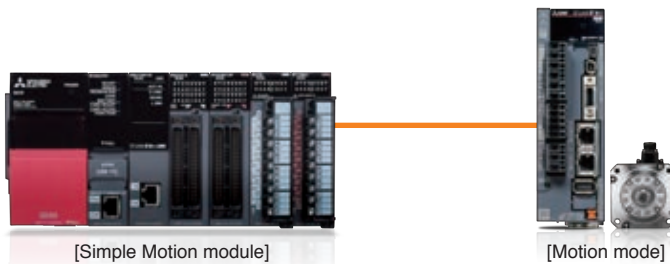
Various tasks, such as Simple Motion parameter settings, servo adjustment, and debugging as well as creating a sequence program, such as a function block (FB), are performed only with the All-in-One engineering software.

Flexible Servo System Configuration with CC-Link IE Field Network

Synchronous control up to μsec precision, suitable for high-accuracy positioning



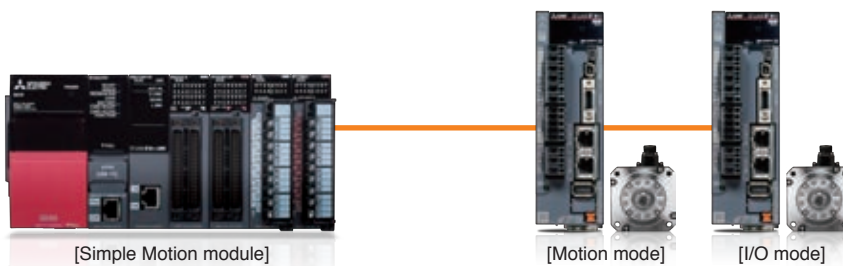
This system configuration is suited for a wide range of high-accuracy motion control, such as multi-axis interpolation, synchronous, and speed-torque control.



A high flexibility enabling versatile control with Motion and I/O modes



This system configuration allows a single axis for positioning to be flexibly added to a machine which requires a wide range of high-accuracy motion control, such as multi-axis interpolation, synchronous, and speed-torque control.



Covering a wide range of applications for positioning control



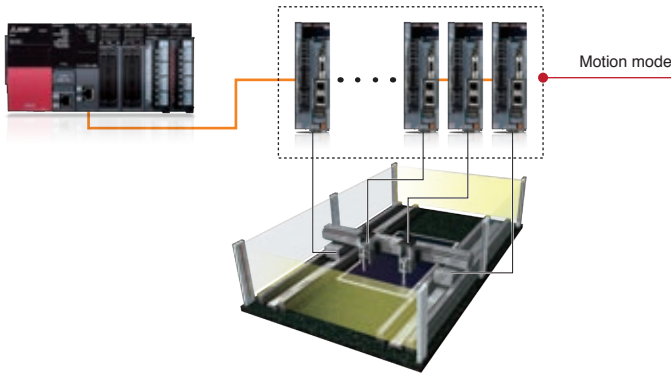
This system configuration allows a single axis for positioning to be flexibly connected to a master station, such as a CC-Link IE embedded CPU without the Simple Motion module.



Motion mode: This mode enables advanced motion control, such as positioning for multi-axis interpolation, synchronous, and speed-torque control in combination with the Simple Motion module.

I/O mode: This mode easily drives a belt conveyor, a rotary table, a ball screw mechanism, etc., by using the built-in positioning function in a servo amplifier.

Application example using Motion mode



■ Motion mode

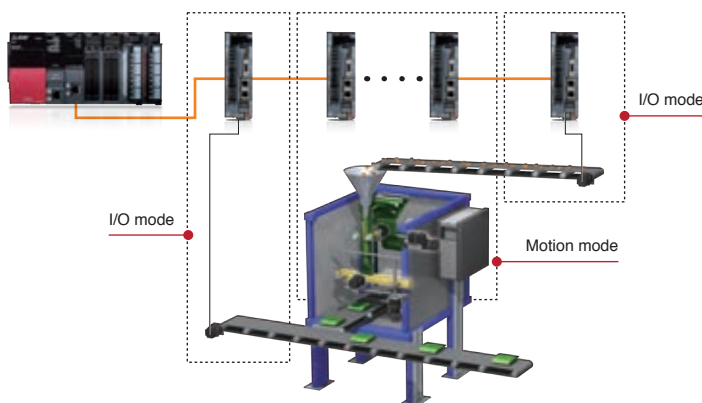
Application examples

Dispensing machines for FPD, Packaging machines, Pressing machines, X-Y tables, and Converting machines

Main functions

- Tandem control of a gantry application
- 2-axis continuous path control
- Advanced synchronous control

Application example using Motion and I/O modes



■ Motion mode

Application examples

Packaging machines, Filling machines, Material handling machines, and Converting machines

Main functions

- Advanced synchronous control
- Cam control
- Cam auto-generation
- Mark detection function

■ I/O mode

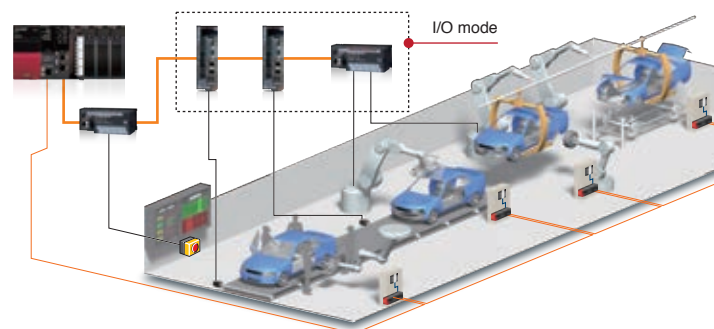
Application examples

Material feeding axes and Belt conveyor axes

Main functions

- Positioning control

Application example using I/O mode



■ I/O mode

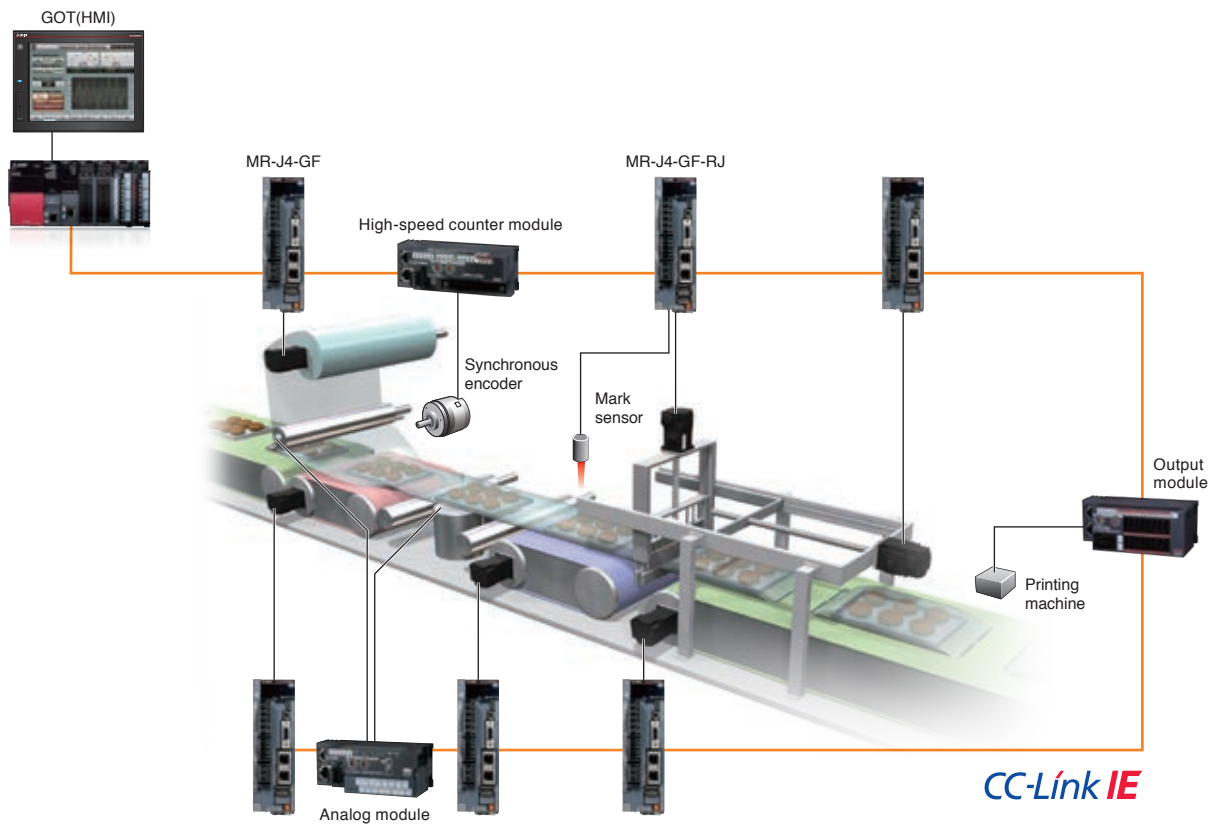
Application examples

Material handling axes and Belt conveyor axes

Main functions

- Positioning control

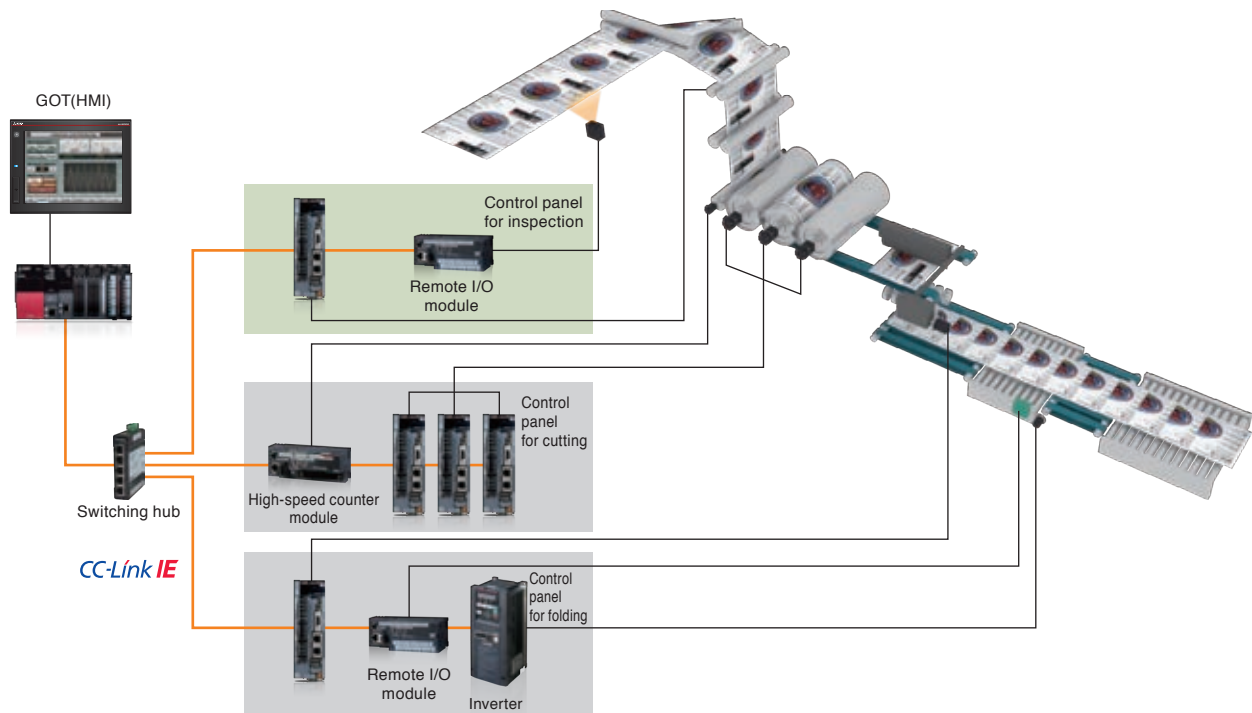
Synchronization of Inputs and Outputs with Servo Control



[An example of inputs and outputs synchronized with the communication cycle of a servo amplifier]

Various data, such as synchronous encoder values, sheet tension values, and text data, are inputted and outputted in accordance with the servo communication cycle, enabling a wide range of Motion control applications.

Flexible network topology



1

Concept

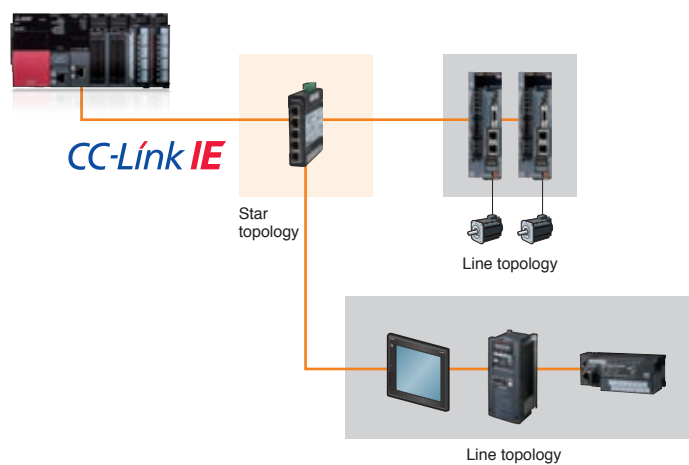
With a switching hub, multiple network topologies are supported including star, line, star and line combinations. This flexibility allows additional equipment to be simply connected to any available port, with little concern for restrictions.

Star topology

Each module is connected via a switching hub, allowing field devices to be added easily.

Line topology

Continuous connection of modules along the Ethernet line.



A wide range of product series and capacities for various system applications

MELSERVO-J4 series is the newest member to the MELSERVO family, backed by Mitsubishi Electric's leadership in all-digital technology.

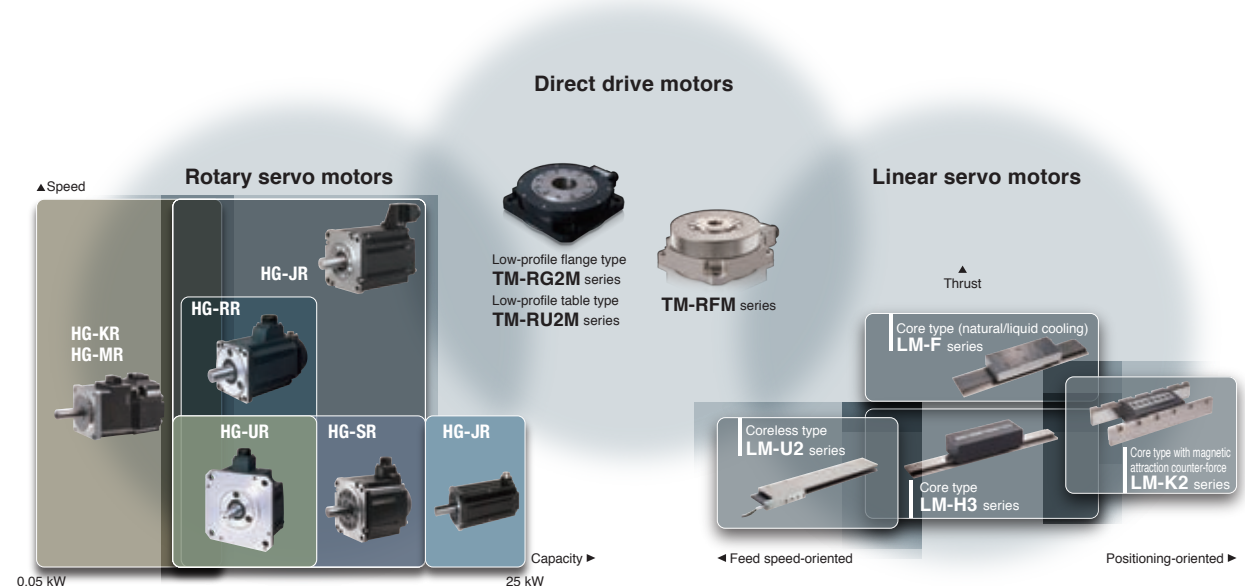
With the Ethernet-based "CC-Link IE Field Network", safety, and energy-efficient design of the MELSERVO-J4 series - man, machine, and environment can at last work together in perfect harmony.



From rotary to linear and direct drive motors, a wide range of servo motors is available.

Rotary servo motors are available in capacities from 50 W to 25 kW.

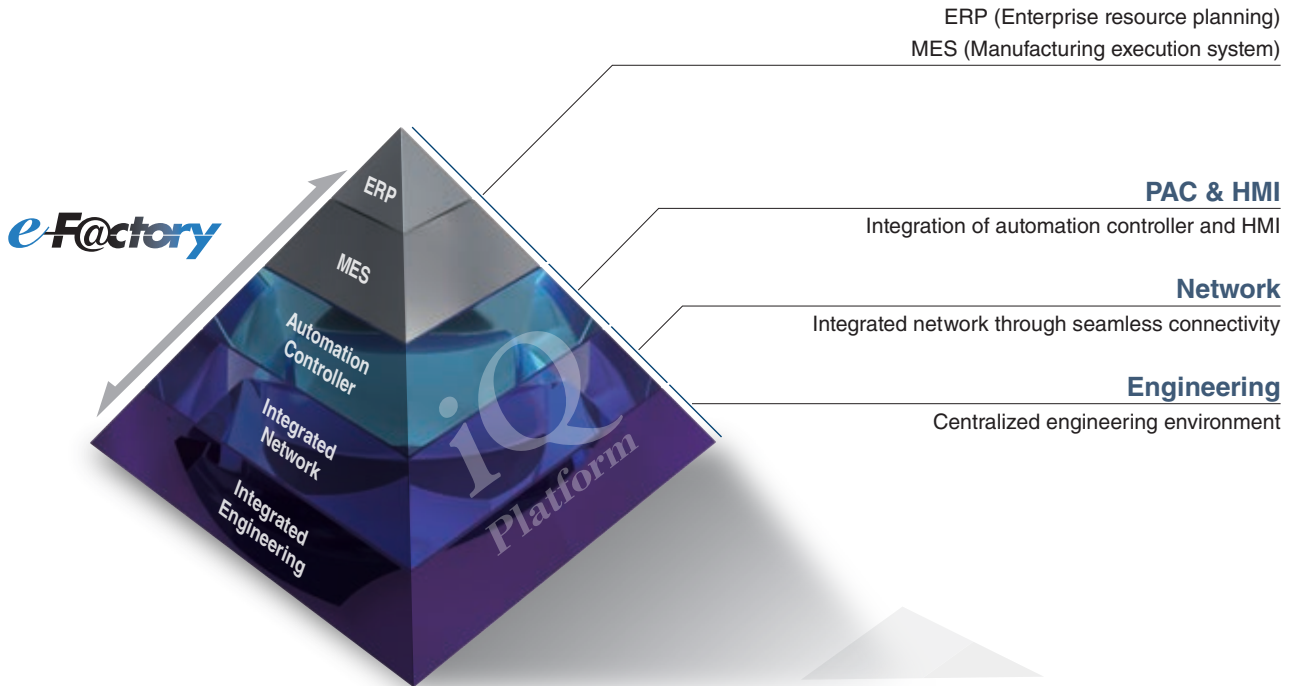
Linear servo motors and direct drive motors satisfy new needs in driving control by providing high rigidity, performance, and flexibility in system configurations unique to direct drive. These motors also offer easy maintenance and cleanliness.





iQ Platform for maximum return on investment

Minimize TCO, Seamless integration, Maximize productivity, Transparent communications: these are common items that highlight the benefits of the iQ Platform and e-F@ctory. The iQ Platform minimizes TCO at all phases of the automation life cycle by improving development times, enhancing productivity, reducing maintenance costs, and making information more easily accessible across the plant. Together with e-F@ctory, offering various best-in-class solutions through its e-F@ctory alliance program, the capabilities of the manufacturing enterprise is enhanced even further realizing the next level for future intelligent manufacturing plants.



Further reduce TCO while securing your manufacturing assets

Automation Controller

Improve productivity and product quality

1. High-speed system bus realizing improved system performance
2. On-screen multi-touch control enabling smooth GOT (HMI) operations

Integrated Network

Best-in-class integrated network optimizing production capabilities

1. CC-Link IE supporting 1 Gbps high-speed communication
2. Seamless connectivity within all levels of manufacturing with SLMP

Centralized Engineering


























Integrated engineering environment with system level features

1. Automatic generation of system configuration
2. Share parameters across multiple engineering software via MELSOFT Navigator
3. Changes to system labels are reflected between PAC and HMI



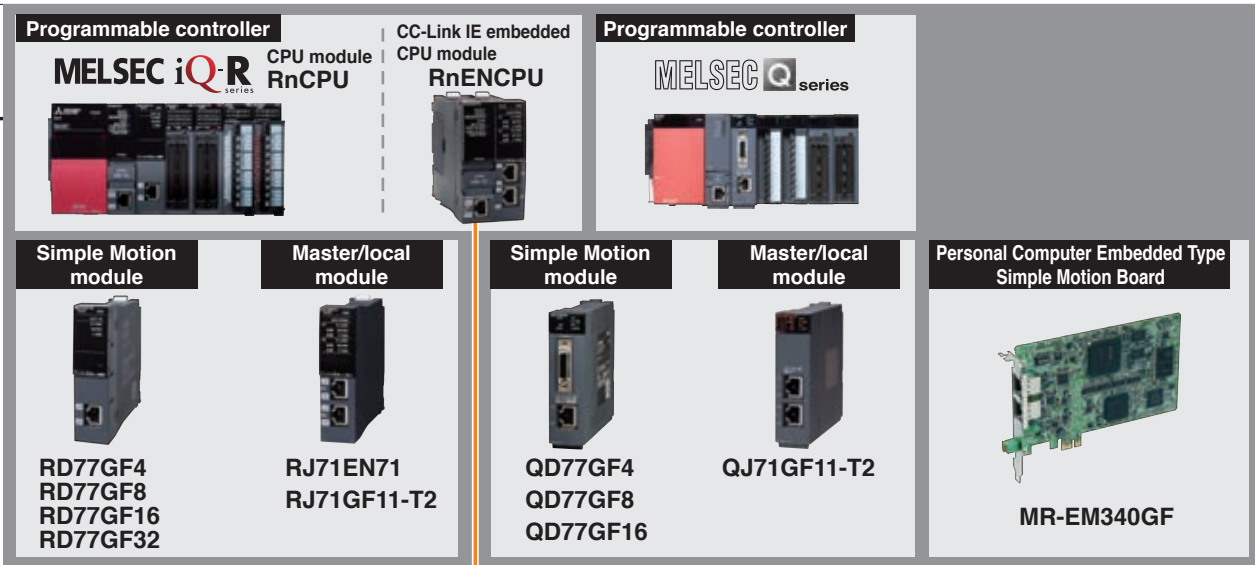
Mitsubishi Electric Servo System

As the leading supplier of automation products and solutions worldwide, Mitsubishi Electric, known for its high quality and diverse range of component products including servo system controllers, servo amplifiers, and servo motors, network, and engineering software, boasts a whole range of solutions specific to your needs.

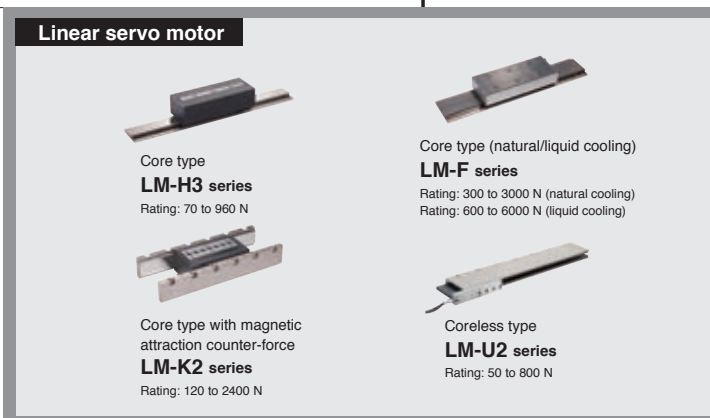
<p>SOLUTION</p>	 <p>Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, through collaboration with e-F@ctory Alliance Partners, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a "step ahead of the times".</p>						
<p>HUMAN MACHINE I/F CONTROLLER</p>	<table border="1"> <tr> <td data-bbox="598 582 917 801"> <p>Graphic Operation Terminal</p>  </td> <td data-bbox="917 582 1428 801"> <p>Personal computer</p>  </td> </tr> </table>	<p>Graphic Operation Terminal</p> 	<p>Personal computer</p> 				
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<p>SOFTWARE</p>	<table border="1"> <tr> <td data-bbox="598 840 917 940"> <p>Programmable Controller Engineering Software MELSOFT GX Works3 MELSOFT GX Works2</p> </td> <td data-bbox="917 840 1220 940"> <p>Software Development Kit MELSOFT EM Software Development Kit</p> </td> </tr> <tr> <td colspan="2" data-bbox="598 952 1220 1030"> <p>Servo Setup Software MELSOFT MR Configurator2</p> </td> </tr> <tr> <td colspan="2" data-bbox="598 1041 1220 1120"> <p>Drive System Sizing Software Motorizer</p> </td> </tr> </table>	<p>Programmable Controller Engineering Software MELSOFT GX Works3 MELSOFT GX Works2</p>	<p>Software Development Kit MELSOFT EM Software Development Kit</p>	<p>Servo Setup Software MELSOFT MR Configurator2</p>		<p>Drive System Sizing Software Motorizer</p>	
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<p>NETWORK</p>							
<p>SERVO AMPLIFIER LOW-VOLTAGE SWITCHGEAR</p>							
<p>SERVO MOTOR</p>	<p>Rotary servo motor</p> <table border="1"> <tr> <td data-bbox="598 1691 917 1870">  <p>Small capacity, low inertia HG-KR series Capacity: 50 to 750 W</p> </td> <td data-bbox="917 1691 1220 1870">  <p>Small capacity, ultra-low inertia HG-MR series Capacity: 50 to 750 W</p> </td> <td data-bbox="1220 1691 1428 1870">  <p>Medium capacity, medium inertia HG-SR series Capacity: 0.5 to 7 kW</p> </td> </tr> <tr> <td data-bbox="598 1870 917 2049">  <p>Medium/large capacity, low inertia HG-JR series Capacity: 0.5 to 25 kW</p> </td> <td data-bbox="917 1870 1220 2049">  <p>Medium capacity, ultra-low inertia HG-RR series Capacity: 1 to 5 kW</p> </td> <td data-bbox="1220 1870 1428 2049">  <p>Medium capacity, flat type HG-UR series Capacity: 0.75 to 5 kW</p> </td> </tr> </table>	 <p>Small capacity, low inertia HG-KR series Capacity: 50 to 750 W</p>	 <p>Small capacity, ultra-low inertia HG-MR series Capacity: 50 to 750 W</p>	 <p>Medium capacity, medium inertia HG-SR series Capacity: 0.5 to 7 kW</p>	 <p>Medium/large capacity, low inertia HG-JR series Capacity: 0.5 to 25 kW</p>	 <p>Medium capacity, ultra-low inertia HG-RR series Capacity: 1 to 5 kW</p>	 <p>Medium capacity, flat type HG-UR series Capacity: 0.75 to 5 kW</p>
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Mitsubishi Electric's integrated FA platform for achieving lateral integration of controllers & HMI, engineering environments and networks at production sites.



CC-Link IE Field Network





CC-Link IE Field Network Compatible Servo Amplifier

MR-J4-GF

MR-J4-GF-RJ

CC-Link IE Field Network compatible servo amplifier executes positioning of one or multiple axes, synchronous control, and speed-torque control by being connected to the various master modules compatible with CC-Link IE Field Network, including the Simple Motion module, and CC-Link IE embedded CPU module, etc.

CC-Link IE Field Network Compatible Servo Amplifier

Features

Two types of modes are available according to your needs:

- Motion mode for a wide range of motion control such as positioning of multiple axes, synchronous control, etc.
- I/O mode for positioning of one axis

●: Supported

Connectable module with MR-J4-GF	MR-J4-GF/MR-J4-GF-RJ	
	Motion mode	I/O mode
Simple Motion module	●	●
Simple Motion board	●	●
CC-Link IE embedded CPU module	—	●
Master/local module	—	●

Wide Range of Capacities and Series

The servo amplifiers support motors from rotary servo motors to linear servo motors and direct drive motors, and greatly enhance system performance.

Diagnosis

Reading information of the servo amplifier from the PLC CPU via a network helps the preventive maintenance such as the machine diagnosis.

Product Lines

●: Supported

Model	Power supply	Fully closed loop control <small>(Note-2)</small>	Servo motor			Capacity range [kW]
			Rotary	Linear <small>(Note-3)</small>	Direct drive	
MR-J4-GF MR-J4-GF-RJ <small>(Note-1)</small>	1-phase 100 VAC	●	●	●	●	0.1 kW ■ 0.4 kW
	3-phase 200 VAC	●	●	●	●	0.1 kW ■ 22 kW
	3-phase 400 VAC	●	●	●	—	0.6 kW ■ 22 kW

(Note-1): MR-J4-GF-RJ is compatible with two-wire type and four-wire type serial linear encoders, and pulse train interface (A/B/Z-phase differential output type) linear encoders. MR-J4-GF-RJ is compatible with DC power supply input. (200 V only)

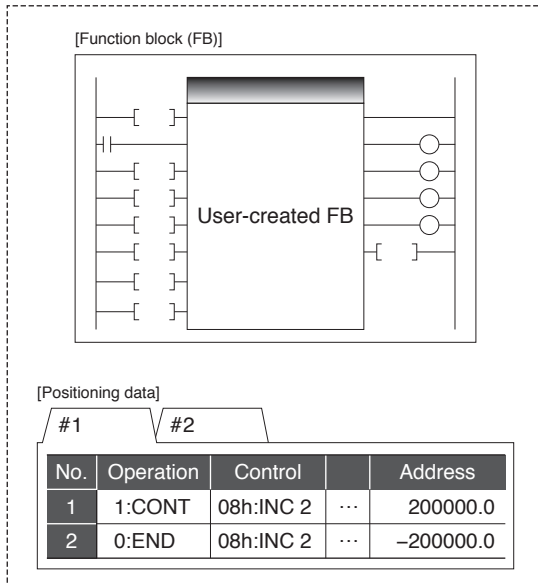
(Note-2): MR-J4-GF is compatible only with two-wire type serial linear encoders. For four-wire type serial linear encoders and pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ.

(Note-3): MR-J4-GF is compatible only with two-wire type and four-wire type serial linear encoders. For pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ.

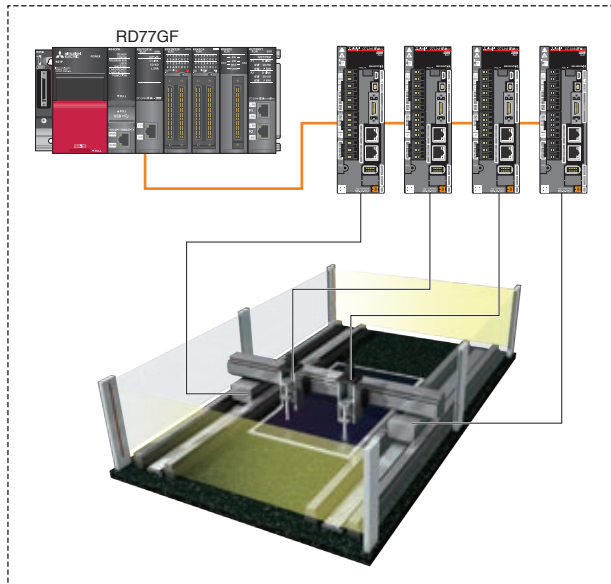
Control Mode

Motion mode

Combined with the Simple Motion module or the Simple Motion board, the servo amplifier can perform advanced motion control including multiple-axis interpolation, synchronous control, and speed-torque control.



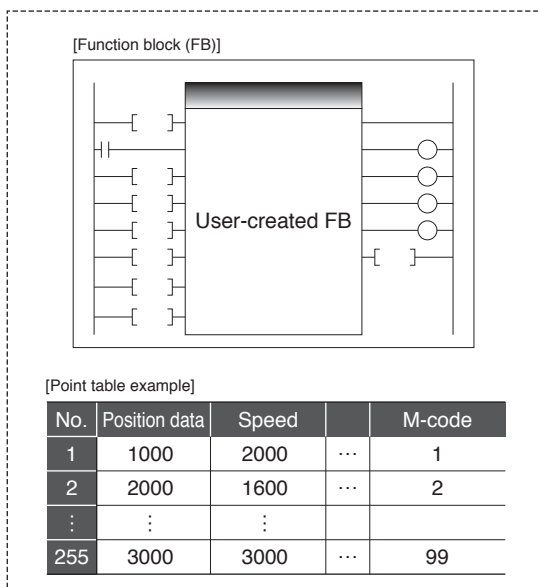
Positioning operation is executed easily from a function block (FB).



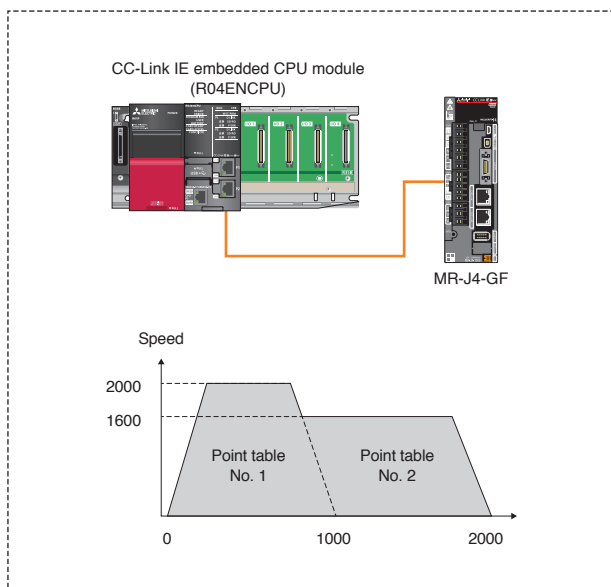
The motion mode enables motion control including tandem control, 2-axis (X-Y) continuous path control, and synchronous control for gantry applications.

I/O mode

Combined with the CC-Link IE embedded CPU or a master/local module, the servo amplifier can drive belt conveyors, rotary tables, ball screws, etc. Positioning operation is carried out easily in the same way as I/O operation because the built-in positioning function of the servo amplifier is used.



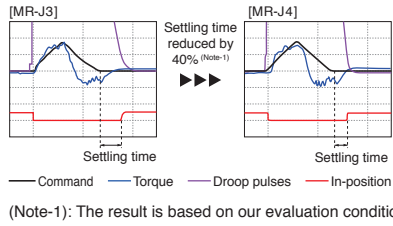
Setting position data (target position), servo motor speed, and acceleration/deceleration time constants in point table is as easy as setting a parameter.



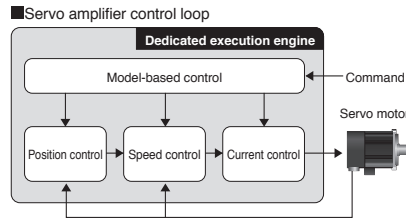
Positioning operation will be executed after the point table No. is selected and started from the sequence program.

Industry-leading Level of Servo Amplifier Basic Performance

[Settling time comparison]



[Dedicated execution engine]



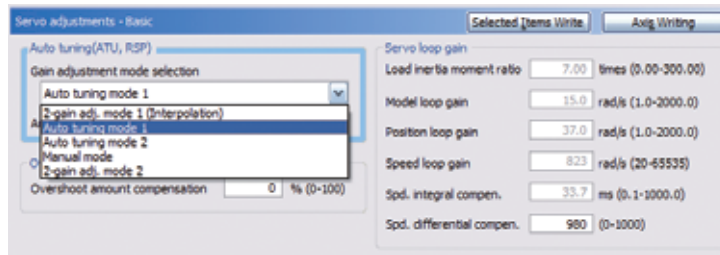
Speed frequency response of 2.5 kHz is achieved by applying our original high-speed servo control architecture evolved from the conventional two-degrees-of-freedom model adaptive control to the dedicated execution engine. Together with a high-resolution absolute position encoder of 4,194,304 pulses/rev, fast and accurate operation is enabled. The performance of the high-end machines is utilized to the fullest.

Servo Gain Adjustment

The following two functions are available for adjusting servo gain: auto tuning that eliminates a manual servo adjustment and one-touch tuning function that enables an advanced servo gain adjustment.

Auto tuning

Servo gain is automatically adjusted to an optimum value for a machine in real time when the servo amplifier is operated in auto tuning mode.

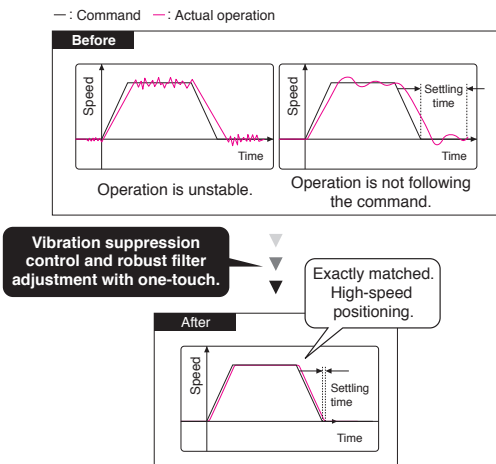


One-touch tuning function

Just turn on the one-touch tuning function to complete servo gain adjustment automatically, including machine resonance suppression filter, advanced vibration suppression control II (Note-1), and robust filter for maximizing your machine performance.

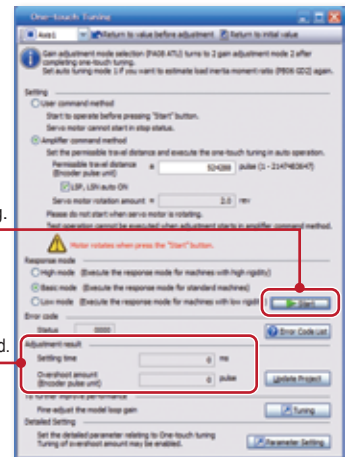
This function also sets responsiveness automatically, while the real-time auto tuning requires manual setting.

(Note-1): The advanced vibration suppression control II automatically adjusts one frequency.



Start tuning just by clicking.

Adjustment results are displayed.



Functional Safety

■ Achieving Category 4 PL e, SIL 3

■ By wiring to MR-D30 functional safety unit ^(Note-1)

Safety level is Category 4 PL e, SIL 3 when the safety signals are inputted directly to MR-D30 functional safety unit.

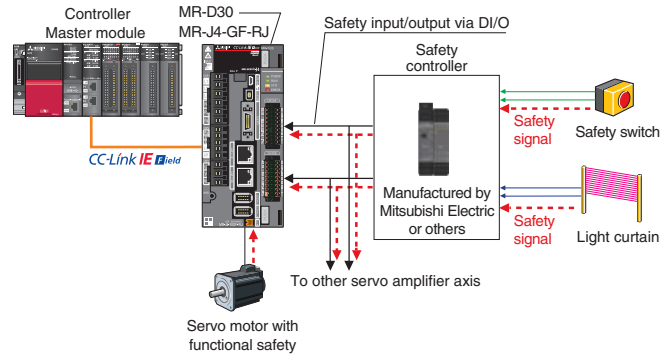
The safety observation function is operated on the MR-D30 by parameter setting, and therefore expansion of the safety observation function is possible independent of controllers.

IEC/EN 61800-5-2:2007 function	Safety level
STO (Safe torque off)	Category 4 PL e, SIL 3
SS1 (Safe stop 1)	
SS2 (Safe stop 2) ^(Note-2)	
SOS (Safe operating stop) ^(Note-2)	
SLS (Safely-limited speed) ^(Note-3)	
SBC (Safe brake control)	
SSM (Safe speed monitor) ^(Note-3)	

(Note-1): Requires modules which support the functional safety. Refer to relevant manuals or catalogs for details.

(Note-2): Requires the use of a servo motor with functional safety.

(Note-3): Safety level is Category 3 PL d, SIL 2 when the servo motor with functional safety is not used.



■ By CC-Link IE Field Network ^(Note-1)

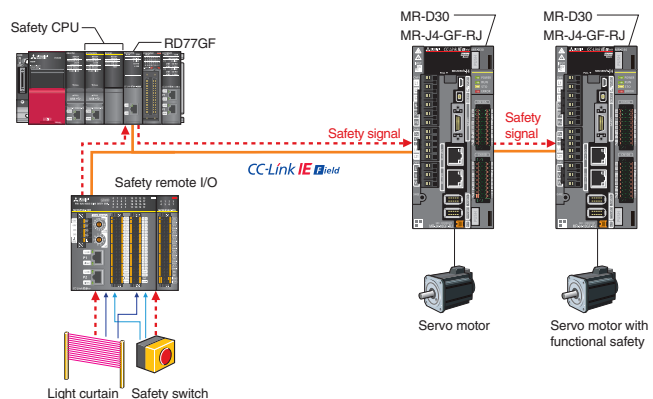
Safety signals are monitored by a combination of the safety CPU and RD77GF Simple Motion module. The safety CPU checks the safety signals received via the safety remote I/O module and outputs the safety signals (STO, etc.) to the servo amplifiers. Since the safety signals are outputted through CC-Link IE Field Network, wiring of the safety signals to each functional safety unit are not necessary.

IEC/EN 61800-5-2:2007 function	Safety level
STO (Safe torque off)	Category 4 PL e, SIL 3
SS1 (Safe stop 1)	
SS2 (Safe stop 2) ^(Note-2)	
SOS (Safe operating stop) ^(Note-2)	
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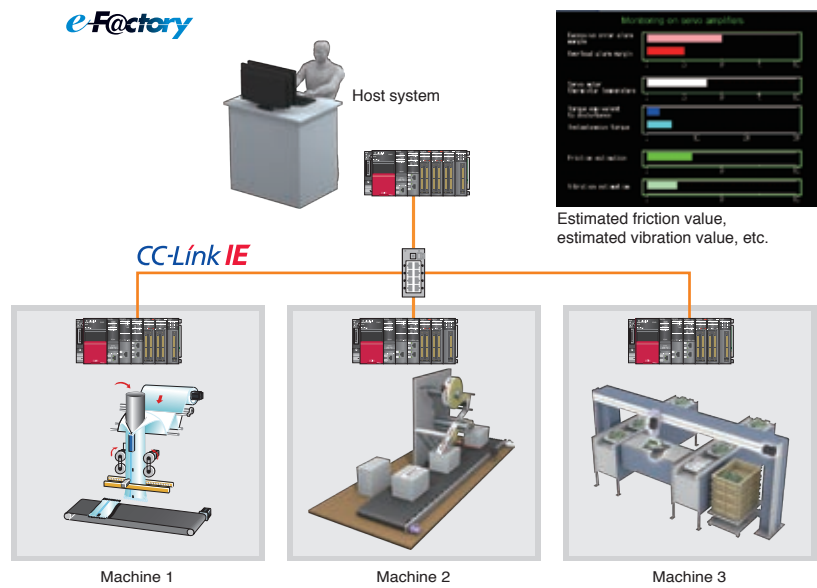
(Note-3): Safety level is Category 3 PL d, SIL 2 when the servo motor with functional safety is not used.



Direct Access to Host System

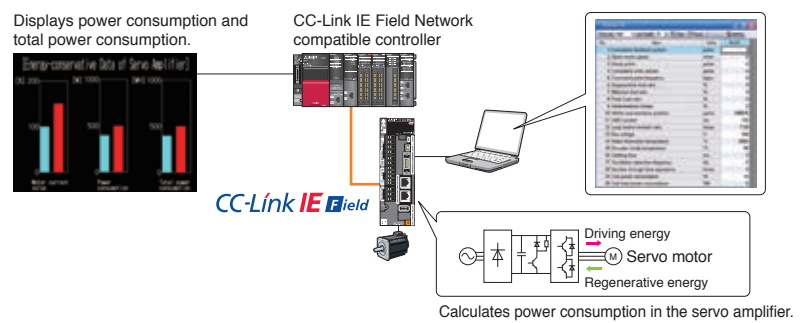
Data of servo amplifiers and servo motors for each machine can be collected via CC-Link IE Field Network. The status of the entire product line can be visualized by batch management of the collected data. A CC-Link IE Field Network servo system supports to build IoT^(Note-1) for your machine.

(Note-1): IoT (Internet of Things)



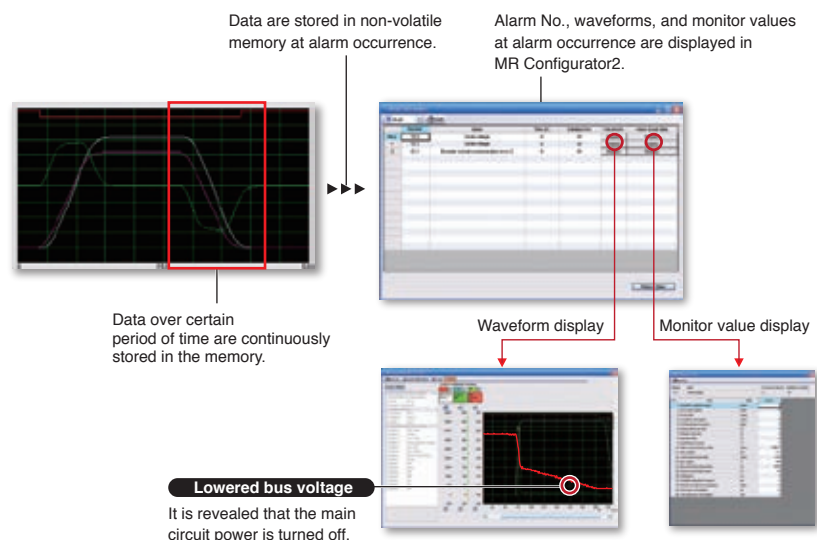
Power Monitoring Function

Driving/regenerative power is calculated from the data such as speed and current in the servo amplifier, and MR Configurator2 monitors the operation data including power consumption. The data are transmitted to a servo system controller, and the power consumption is analyzed and displayed.



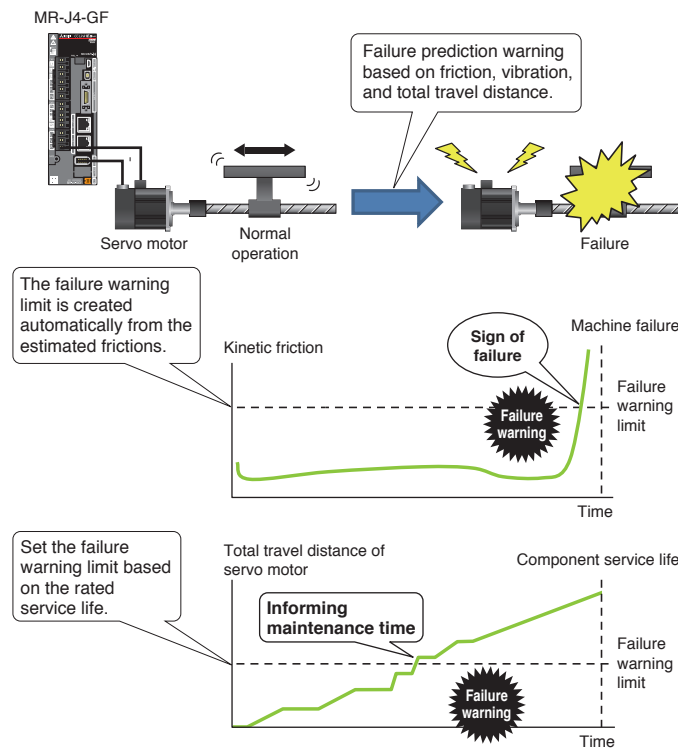
Large Capacity Drive Recorder

Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of the servo amplifier. Reading the servo data on MR Configurator2 helps you analyze the cause of the alarm.



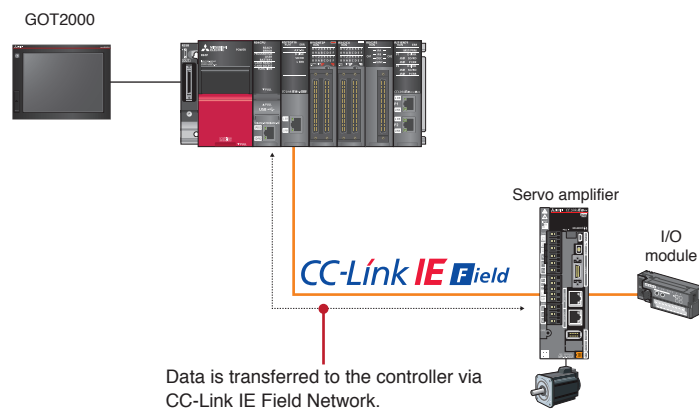
Failure Prediction Function

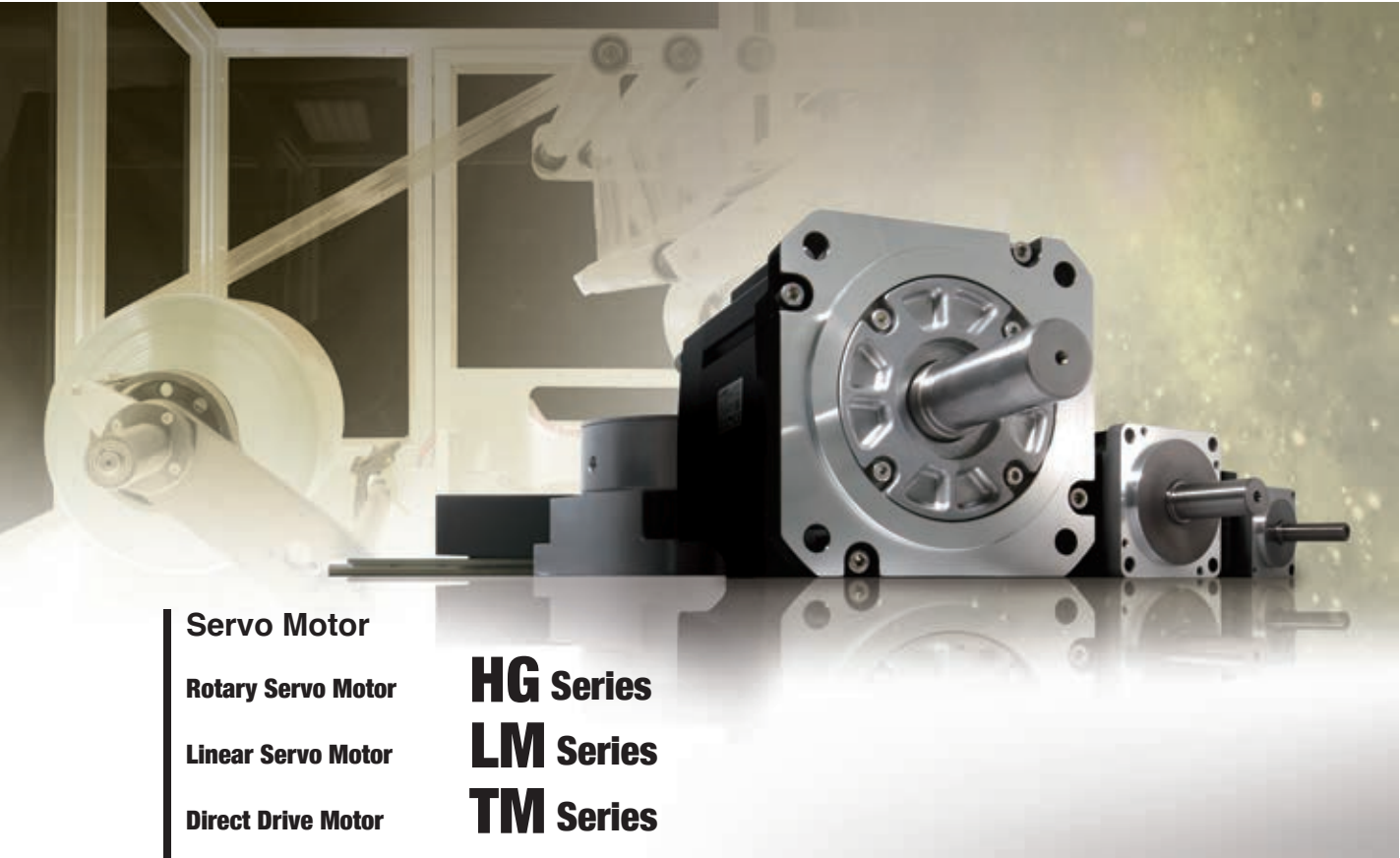
MR-J4-GF detects aging-related changes in a machine performance based on the frictions and vibrations monitored by the machine diagnosis function, and informs the maintenance time with a warning. MR-J4-GF also stores the total travel distance of the servo motor and informs the maintenance time with a warning when the total travel distance exceeds the warning limit set by you. When the limit is set to the rated service life of a ball screw or bearing, preventive maintenance can be executed according to the actual machine operation.



Backup/Restoration

Parameters of servo amplifiers and I/O modules which are connected to CC-Link IE Field Network are backed up and restored by GOT2000. Therefore, the efficiency of replacement and maintenance of the modules is improved.





Servo Motor

Rotary Servo Motor

HG Series

Linear Servo Motor

LM Series

Direct Drive Motor

TM Series

Rotary Servo Motor HG Series

High-speed, high-torque servo motors for fast, precise machine operation

High-Resolution Absolute Position Encoder

Servo motors are equipped with a high-resolution absolute position encoder of 4,194,304 pulses/rev (22-bit) as standard, increasing positioning accuracy.

Improved Environmental Resistance

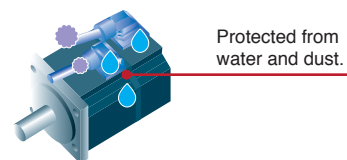
Ingress protection ^(Note-2) of servo motors:

HG-KR/HG-MR/HG-RR/HG-UR: IP65

HG-SR/HG-JR: IP67 ^(Note-1)

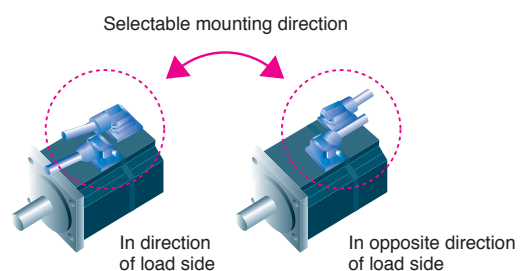
(Note-1): HG-JR 1000 r/min series 15 kW or larger and HG-JR 1500 r/min series 22 kW or larger are rated IP44.

(Note-2): The shaft-through portion is excluded.



Cable Leading Direction

Cables for power, encoder, and electromagnetic brake are capable of connecting either in direction or in opposite direction of the load side, depending on the cable selection. (HG-KR, HG-MR series)



Product lines

Series	Rated speed [r/min]	Maximum speed [r/min]	Capacity range [kW]				IP rating ^(Note-1)
HG-KR	3000	6000	0.05 kW	0.75 kW			IP65
HG-MR	3000	6000	0.05 kW	0.75 kW			IP65
HG-SR	1000	1500	0.5 kW		4.2 kW		IP67
	2000	3000	0.5 kW		7 kW		IP67
HG-JR	3000	6000/5000	0.5 kW		9 kW		IP67
	1500	3000/2500	7 kW		22 kW		IP67/IP44
	1000	2000/1500	6 kW		25 kW		IP67/IP44
HG-RR	3000	4500	1 kW		5 kW		IP65
HG-UR	2000	3000/2500	0.75 kW		5 kW		IP65

0.01 kW 0.1 kW 1 kW 10 kW 100 kW

(Note-1): The shaft-through portion is excluded.

▶ HG-KR/HG-MR



HG-KR: Small capacity, low inertia. Perfect for general-purpose industrial machines.
 HG-MR: Small capacity, ultra-low inertia. Perfect for high-throughput operations.
 Capacity: 50 W to 750 W Rated speed: 3000 r/min Maximum speed: 6000 r/min
 [Application examples]
 ●Inserters, mounters and bonders ●PCB drilling machines
 ●In-circuit testers and label printers ●Knitting and embroidery machines
 ●Compact robots and robot hand sections

▶ HG-SR



Medium capacity, medium inertia. Suitable for machines having large load inertia.
 Capacity: 0.5 kW to 7 kW Rated speed: 1000 r/min and 2000 r/min
 [Application examples]
 ●Material handling systems ●Dedicated machines ●Robots
 ●Loaders and unloaders ●Winders and tension units ●Turrets ●X-Y tables

▶ HG-JR



Medium to large capacity, low inertia. Perfect for high-throughput positioning or high acceleration/deceleration operations.
 Capacity: 0.5 kW to 25 kW Rated speed: 1000 r/min, 1500 r/min, and 3000 r/min
 [Application examples]
 ●Food packaging machines ●Printers ●Injection molding machines ●Press machines

▶ HG-RR



Medium capacity, ultra-low inertia. Perfect for high-throughput operation.
 Capacity: 1 kW to 5 kW Rated speed: 3000 r/min
 [Application examples]
 ●Roll feeders ●Loaders and unloaders
 ●Ultra high-throughput material handling systems ●Vibration testing machines

▶ HG-UR



Medium capacity, flat type. Perfect for applications with limited mounting space.
 Capacity: 0.75 kW to 5 kW Rated speed: 2000 r/min
 [Application examples]
 ●Robots ●Conveyors ●Winders and tension machines
 ●Food processing machines

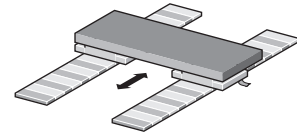
Linear Servo Motor

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

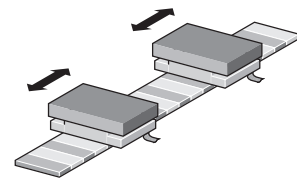
Basic Performance

- Supporting maximum speed of 3 m/s (LM-H3 series)
- Supporting maximum thrust of 150 N to 18000 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.
- Available in four types: core, liquid-cooling core, magnetic attraction counter-force core, and coreless types
- Supporting A/B/Z-phase differential output type linear encoders (MR-J4-GF-RJ)
- Configuring a high-performance system including high-accuracy tandem synchronous control with a combination of the servo amplifiers and the CC-Link IE Field Network compatible servo system controller

Tandem configuration



Multi-head configuration

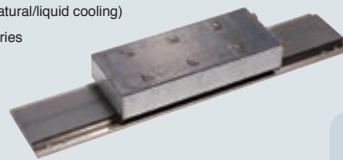


Product lines

Series	Maximum speed [m/s]	Magnetic attraction force [N]	Thrust [N]		IP rating	
			Continuous thrust [N]	Maximum thrust [N]		
LM-H3	3	630 to 8800	70 N 175 N	960 N 2400 N	IP00	
LM-F	2	4500 to 45000	(Natural cooling)	300 N 1800 N	3000 N 18000 N	IP00
			(Liquid cooling)	600 N 1800 N	6000 N 18000 N	
LM-K2	2	0	120 N 300 N	2400 N 6000 N	IP00	
LM-U2	2	0	50 N 150 N	800 N 3200 N	IP00	

▲ Thrust

Core type (natural/liquid cooling)
LM-F series



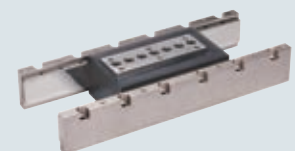
Coreless type
LM-U2 series



Core type
LM-H3 series



Core type with magnetic attraction counter-force
LM-K2 series



► Positioning-oriented

◀ Feed speed-oriented

Direct Drive Motor

Compact and robust direct drive motors for high-accuracy applications

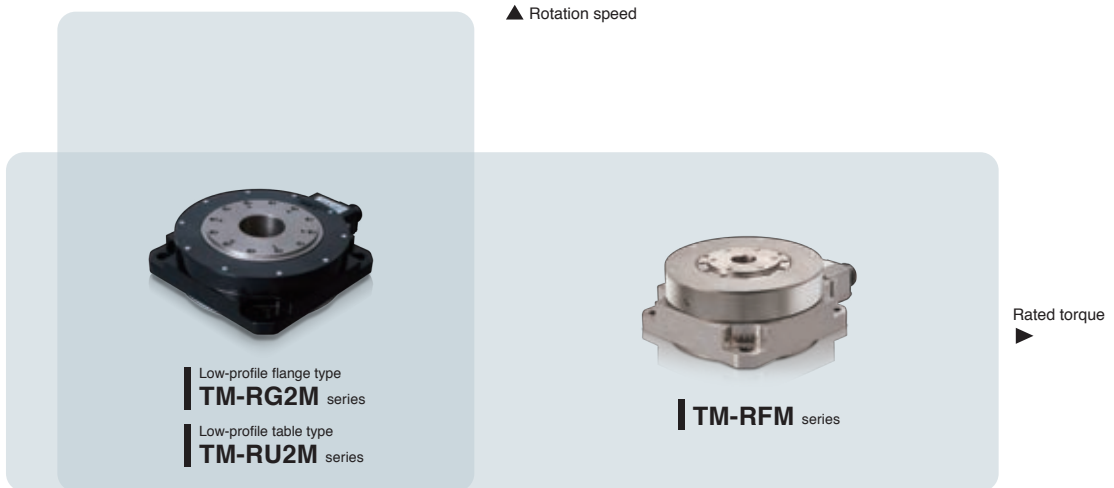
Basic Performance

- High performance with the latest technologies
Our latest magnetic design and winding technologies enable high torque density. In addition, extremely smooth rotation is achieved by the minimized torque ripple.
- Compact and low-profile design
Due to high level of structural design technology, compact and low-profile design is achieved. This design enables a small mounting space and a low center of gravity.
- High-resolution absolute position encoder
The direct drive motor is equipped with a high-resolution absolute position encoder (1,000,000 to 4,000,000 pulses/rev) as standard, increasing positioning accuracy.
- Hollow shaft diameter range: $\varnothing 20$ mm to 104 mm
The motor is equipped with a large hollow shaft resulting from using bearing and encoder with large diameter. It allows cables and air tubing to pass through.

Product lines

Series	Rated speed [r/min]	Maximum speed [r/min]	Motor outer diameter [mm]	Rated torque [N·m]	Maximum torque [N·m]	IP rating (Note-1)
TM-RG2M TM-RU2M	300	600	130	2.2 N·m	8.8 N·m	IP40
	300	600	180	4.5 N·m	13.5 N·m	IP40
	300	600	230	9 N·m	27 N·m	IP40
TM-RFM	200	500	130	2 N·m	6 N·m	IP42
	200	500	180	6 N·m	18 N·m	IP42
	200	500	230	12 N·m	36 N·m	IP42
	100	200	330	40 N·m	120 N·m	IP42


(Note-1): Connectors and a gap along the rotor (output shaft) are excluded.



Product lines





■ Servo amplifier

● : Supported — : Not supported

Servo amplifier (*4)	Number of control axes	Power supply specifications	Rated output [kW] (*1)	Control mode				Compatible servo motor series													
				Position	Speed	Torque	Positioning function	Fully closed loop control (*2)	HG-KR	HG-MR	HG-SR	HG-JR	HG-AK	HG+RR	HG+UR	LM-H3	LM-F	LM-K2	LM-U2	TM-RG2M/TM-RU2M	TM-RFM
CC-Link IE Field Network 	1 axis	1-phase 100 VAC	0.1, 0.2, 0.4	●	●	●	●	●	●	—	—	—	—	—	●	—	●	●	●	●	
		3-phase 200 VAC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7, 11, 15, 22	●	●	●	●	●	●	●	—	●	●	●	●	●	●	●	●	●	●
		3-phase 400 VAC	0.6, 1, 2, 3.5, 5, 7, 11, 15, 22	●	●	●	●	●	—	—	●	●	—	—	—	—	●	—	—	—	—



*1. The values listed are the rated output of the servo amplifier. For the compatible servo motor capacities, refer to "MELSERVO-J4 catalog (L(NA)03058)."
 *2. MR-J4-GF is compatible with two-wire type serial linear encoders. For four-wire type serial linear encoders and pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ.
 *3. MR-J4-GF is compatible with two-wire type and four-wire type serial linear encoders. For pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ.
 *4. The functions listed are supported by the servo amplifiers with the latest software version. (As of November 2018) Refer to relevant servo amplifier instruction manuals for the supporting software versions.

■ Linear servo motor

Linear servo motor series	Maximum speed [m/s]	Continuous thrust [N] (*1)	Maximum thrust [N] (*1)	Cooling method	Features	Application examples
LM-H3 series 	3.0	70, 120, 240, 360, 480, 720, 960	175, 300, 600, 900, 1200, 1800, 2400	Natural cooling	Suitable for space-saving. Compact size and high thrust. Maximum speed: 3 m/s.	<ul style="list-style-type: none"> •Mounters •Wafer cleaning systems •FPD assembly machines •Material handlings
LM-F series 	2.0	300, 600, 900, 1200, 1800, 2400, <u>3000</u>	1800, 3600, 5400, 7200, 10800, 14400, <u>18000</u>	Natural cooling	Compact size. The integrated liquid-cooling system doubles the continuous thrust.	<ul style="list-style-type: none"> •Press feeders •NC machine tools •Material handlings
		600, 1200, 1800, 2400, 3600, 4800, <u>6000</u>	1800, 3600, 5400, 7200, 10800, 14400, <u>18000</u>	Liquid cooling		
LM-K2 series 	2.0	120, 240, 360, 720, 1200, 1440, 2400	300, 600, 900, 1800, 3000, 3600, 6000	Natural cooling	High thrust density. Magnetic attraction counter-force structure enables longer service life of the linear guides and lower audible noise.	<ul style="list-style-type: none"> •Mounters •Wafer cleaning systems •FPD assembly machines
LM-U2 series 	2.0	50, 75, 100, 150, 225, 400, 600, 800	150, 225, 300, 450, 675, 1600, 2400, 3200	Natural cooling	No cogging and small speed fluctuation. No magnetic attraction force structure extends service life of the linear guides.	<ul style="list-style-type: none"> •Screen printing systems •Scanning exposure systems •Inspection systems •Material handlings

*1.  : For 400 V.







■ Direct drive motor

Direct drive motor series	Motor outer diameter [mm]	Hollow shaft diameter [mm]	Rated speed [r/min]	Maximum speed [r/min]	Rated torque [N·m]	Maximum torque [N·m]	IP rating (*1)	Features	Application examples
Low-profile 	TM-RG2M series TM-RU2M series	φ130	300	600	2.2	8.8	IP40	<ul style="list-style-type: none"> •Suitable for low-speed and high-torque operations. •Smooth operation with less audible noise. •The motor's low profile design contributes to compact construction and a low center of gravity for enhanced machine stability. •Clean room compatible. 	<ul style="list-style-type: none"> •Semiconductor manufacturing devices •Liquid crystal manufacturing devices •Machine tools
		φ180	300	600	4.5	13.5	IP40		
		φ230	300	600	9	27	IP40		
High-rigidity 	TM-RFM series	φ130	200	500	2, 4, 6	6, 12, 18	IP42		
		φ180	200	500	6, 12, 18	18, 36, 54	IP42		
		φ230	200	500	12, 48, 72	36, 144, 216	IP42		
		φ330	100	200	40, 120, 240	120, 360, 720	IP42		

*1. Connectors and a gap along the rotor (output shaft) are excluded.

Rotary servo motor

●: Available —: Not available

Rotary servo motor series	Rated speed (maximum speed) [r/min]	Rated output [kW] (*1)	Servo motor type (*2)			IP rating (*3)	Features	Application examples
			With electro-magnetic brake (B)	With reducer (G1)	With reducer (G5, G7)			
Small capacity 	HG-KR series 3000 (6000)	0.05, 0.1, 0.2, 0.4, 0.75	●	●	●	IP65	Low inertia Perfect for general industrial machines.	<ul style="list-style-type: none"> •Belt drives •Robots •Mounters •Food processing machines •Semiconductor manufacturing equipment
	HG-MR series 	3000 (6000)	0.05, 0.1, 0.2, 0.4, 0.75	●	—	—	IP65	Ultra-low inertia Well suited for high-throughput operations.
Medium capacity 	HG-SR series 1000 (1500)	0.5, 0.85, 1.2, 2.0, 3.0, 4.2	●	—	—	IP67	Medium inertia This series is available with two rated speeds.	<ul style="list-style-type: none"> •Material handling systems •Robots
	2000 (3000)	0.5, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0 0.5, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0	●	●	●	IP67		
Medium/large capacity 	HG-JR series 3000 (6000: 0.5 to 5 kW 5000: 7, 9 kW)	0.5, 0.75, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0, 9.0 0.5, 0.75, 1.0, 1.5, 2.0, 3.5, 5.0, 7.0, 9.0	●	—	—	IP67	Low inertia Well suited for high-throughput and high-acceleration/ deceleration operations.	<ul style="list-style-type: none"> •Food packaging machines •Printing machines
	1500 (3000: 7 to 15 kW 2500: 22 kW)	7.0, 11, 15, 22 7.0, 11, 15, 22	● (*5)	—	—	IP67/ IP44 (*4)		<ul style="list-style-type: none"> •Injection molding machines •Press machines
	1000 (2000: 6 to 12 kW 1500: 15 to 25 kW)	6.0, 8.0, 12, 15, 20, 25 6.0, 8.0, 12, 15, 20, 25	● (*5)	—	—	IP67/ IP44 (*4)		
Medium capacity 	HG-RR series 3000 (4500)	1.0, 1.5, 2.0, 3.5, 5.0	●	—	—	IP65	Ultra-low inertia Well suited for high-throughput operations.	<ul style="list-style-type: none"> •Ultra-high-throughput material handling systems •Vibration testing machines
Medium capacity, flat type 	HG-UR series 2000 (3000: 0.75 to 2 kW 2500: 3.5, 5 kW)	0.75, 1.5, 2.0, 3.5, 5.0	●	—	—	IP65	Flat type The flat design makes this unit well suited for situations where the installation space is limited.	<ul style="list-style-type: none"> •Robots •Food processing machines

*1. : For 400 V.

*2. G1 for general industrial machines. G5 and G7 for high precision applications.

*3. The shaft-through portion is excluded. Refer to "MELSERVO-J4 catalog (L(NA)03058)" for the shaft-through portion.

For geared servo motor, IP rating of the reducer portion is equivalent to IP44.

*4. For HG-JR 1500 r/min series, 15 kW or smaller is rated IP67, and 22 kW is rated IP44. For HG-JR 1000 r/min series, 12 kW or smaller is rated IP67, and 15 kW or larger is rated IP44.

*5. The servo motor with an electromagnetic brake is not available for HG-JR 1500 r/min series 22 kW, and 1000 r/min series 15 kW or larger.



CC-Link IE Field Network Compatible Simple Motion Module

RD77GF4/RD77GF8/RD77GF16/RD77GF32 QD77GF4/QD77GF8/QD77GF16

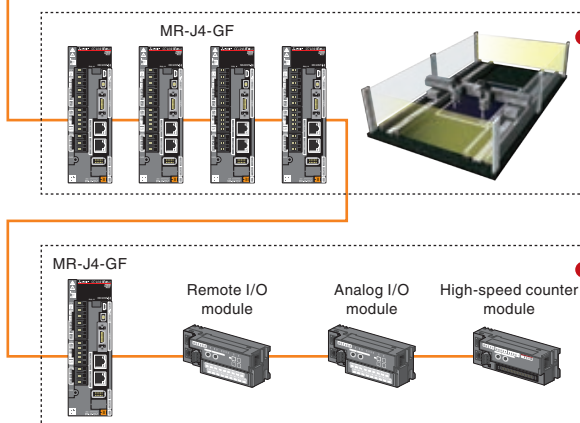
The Simple Motion module enables various motion control, such as positioning including interpolation and path control, synchronous, cam, and speed-torque control.

Advanced motion control is easily performed with parameter settings and a sequence program, such as a function block (FB).

The 4, 8, 16 and 32-axis models are available to best suit your control needs.

Servo System MR Configuration

The CC-Link IE Field Network compatible Simple Motion module, not only performs Motion control, but can also function as a CC-Link IE Field Network master station. Up to 120 stations including servo amplifiers are connectable.

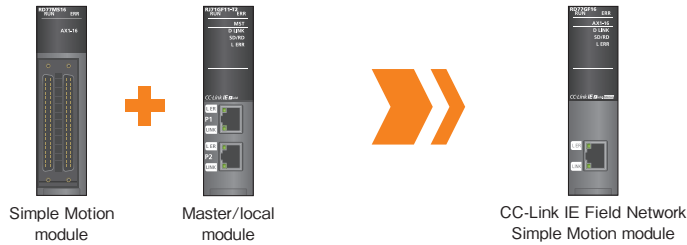


Motion mode
This mode enables advanced Motion control, such as positioning for multi-axis interpolation, synchronous, and speed-torque control in combination with the Simple Motion module.
Maximum number of control axes: 32 axes

I/O mode
With CC-Link IE Field Network, various field devices, such as servo amplifiers, I/O modules, and high-speed counter modules, can be connected flexibly.
Maximum number of control stations: 120 stations

RD77GF: Including the number of servo amplifiers in motion mode
QD77GF: 16 servo amplifiers in motion mode + 104 I/O devices

CC-Link IE Field Network Master Station



The CC-Link IE Field Network Simple Motion module covers the functionality that a CC-Link IE Field Network master/local module provides^(Note-1). The Simple Motion module can function as a master module, and is also equipped with link devices equivalent to a master/local module. This leads to reduced cost on system because it includes functions of both Simple Motion module and a master module.

(Note-1): Excludes the function of a sub-master station.

Maximum link points per network

Item	RD77GF	QD77GF	Master module
Remote input (RX)/Remote output (RY)	16k points each (16384 points, 2k bytes)	8k points each (8192 points, 1k byte)	16k points each (16384 points, 2k bytes)
Remote register (RWw, RWr)	8k points each (8192 points, 16k bytes)	1k points each (1024 points, 2k bytes)	8k points each (8192 points, 16k bytes)

Diagnosis and Parameter Settings for CC-Link IE Field Network

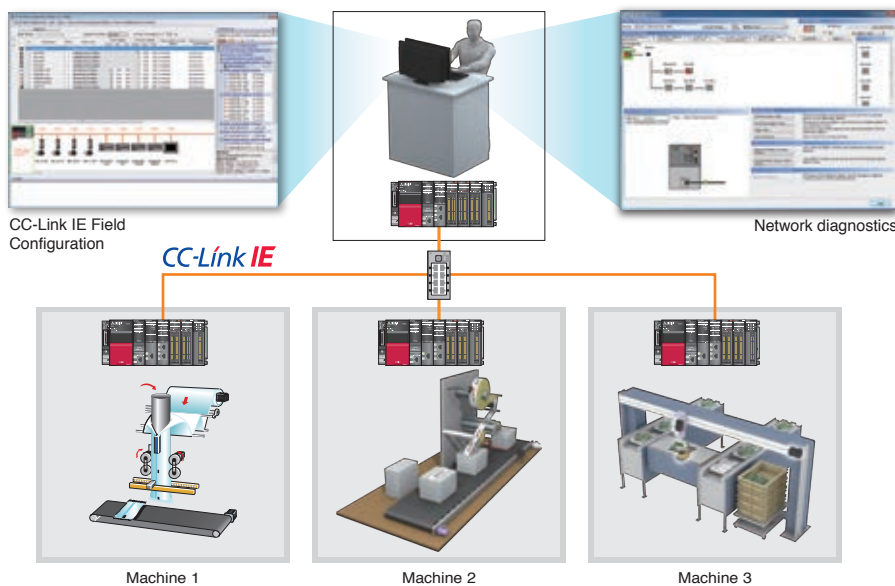
Setting parameters and collecting information of field devices are possible from any-network connected point including a computer or shop floor device.

Easy parameter settings

Selecting each field device on the screen of CC-Link IE Field configuration via drag & drop enables easy parameter settings.

Easy diagnosis of network

Engineering software enables users to identify network errors at a glance. The users can instantly identify the cause of trouble when it occurs thus downtime will be shortened.



Programming

Control, such as positioning control, is easily executed by a sequence program, such as a function block (FB) being started.

■ PLCopen® Motion Control FB

Simple Motion modules and servo amplifiers with built-in positioning are used to execute Motion control. Each device uses specific programming, thus the time and cost involved in understanding how each device works is a burden.

PLCopen® Motion Control FB is a standardized interface, which provides the following benefits:

- Reduced workload for programming, saving time and reducing costs.
- People other than the program designer can understand the programming, leading to reduced maintenance time.



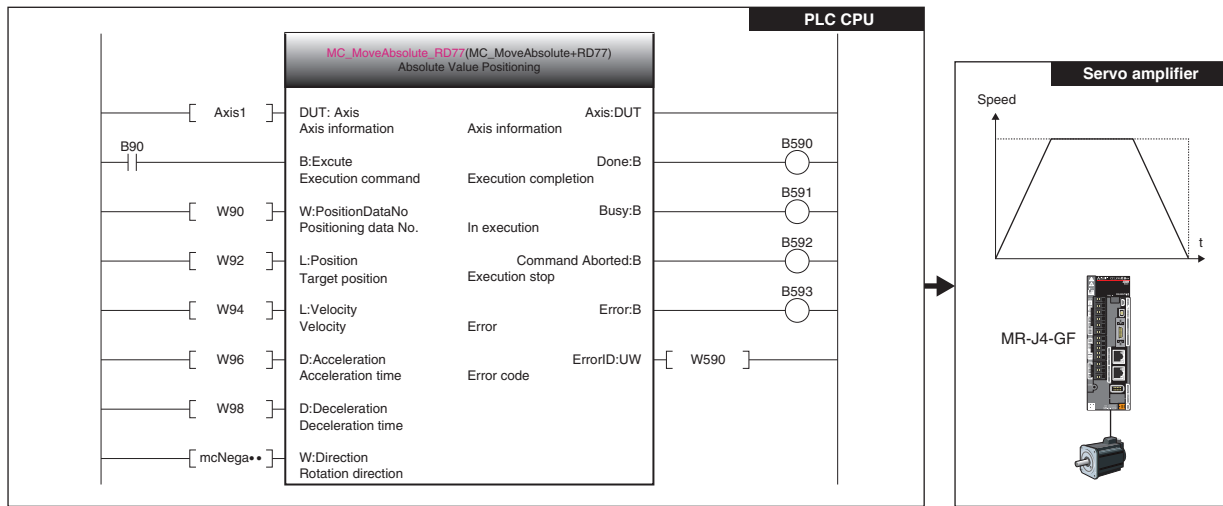
Conforms to IEC 61131-3

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

The sequence program using FBs is created with the same interface regardless of whether the motion mode or the I/O mode is used.

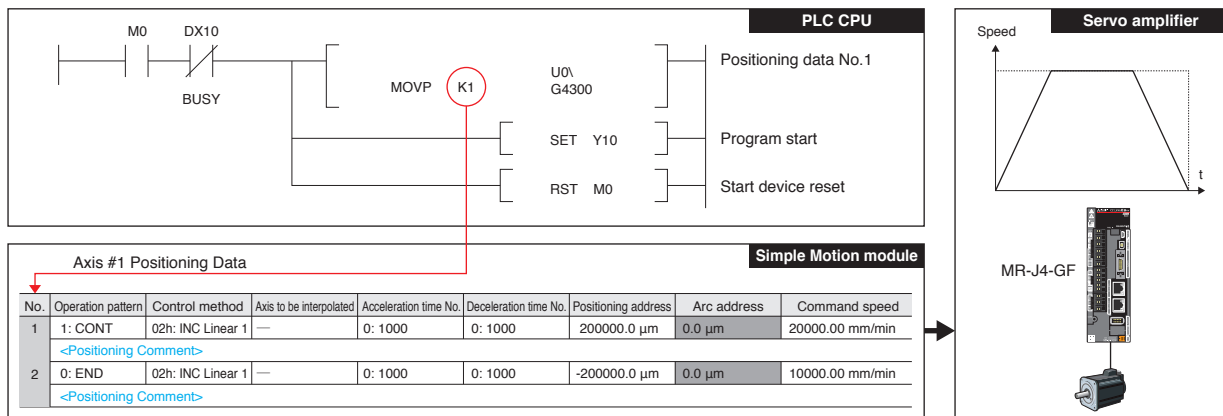
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Simple Motion Modules



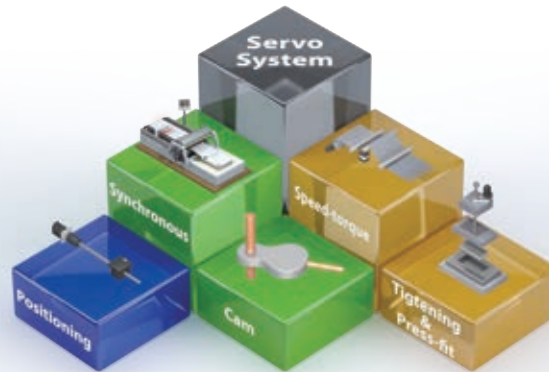
■ Sequence Program

The operation starts from the designated positioning data No. in the sequence program.



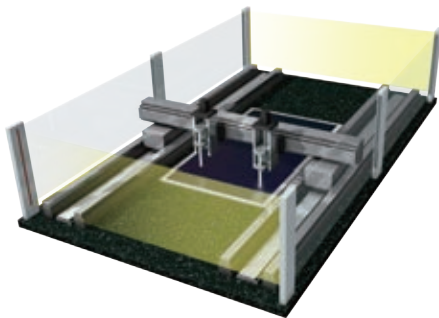
Extensive Motion control

A wide range of control, such as positioning, speed-torque, cam, and synchronous control, is applicable to various machines, such as X-Y tables, packaging machines, and converting machines. Selecting the best suitable control methods and functions for your machine achieves an optimal solution.



Positioning control (Interpolation Function and Path Control)

Positioning control is easily performed with a Motion profile table from the sequence program.

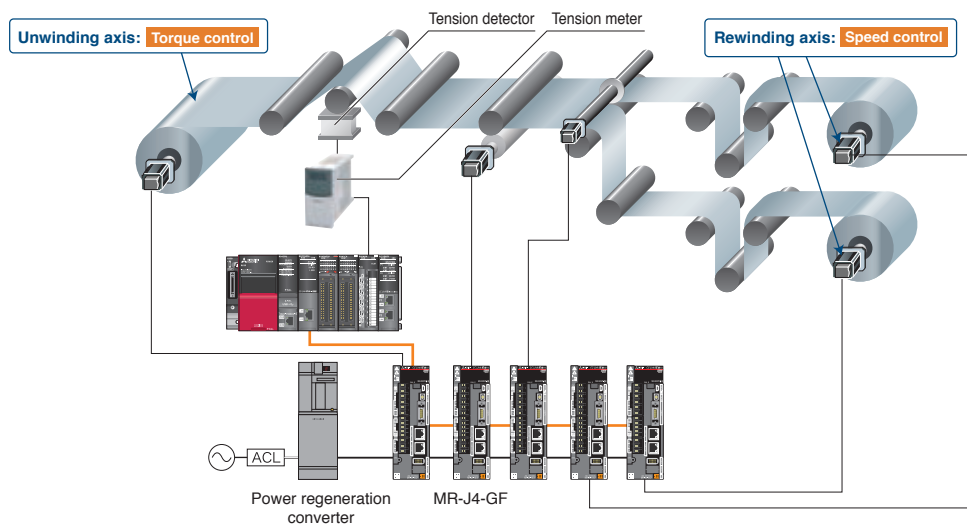


- To respond to various application needs, the Simple Motion module offers various control methods, such as linear interpolation, 2-axis circular interpolation, fixed-pitch feed, and continuous path control.
- Automatic operation can be executed easily by setting positioning addresses, speeds, and other setting items in a sequence program.
- Powerful sub-functions, such as M-code output, skip, speed change, and target position change functions, are available.

Speed-torque Control

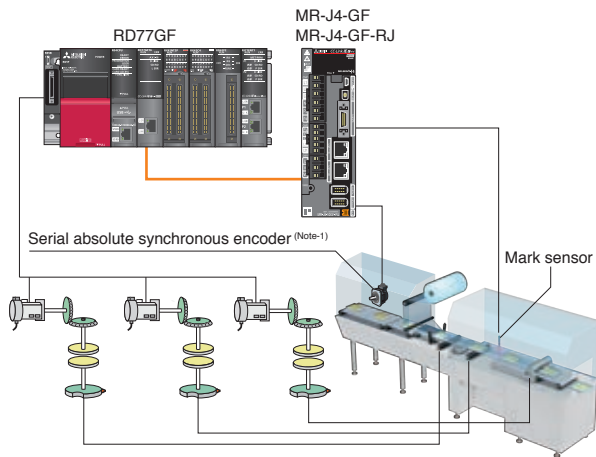
The Simple Motion module can be used for tension control, such as unwinding or rewinding.

Positioning using absolute position coordinates can be smoothly performed even after switching back to position control because the current position is controlled during the speed-torque control.



Simple Motion Modules

Advanced Synchronous Control



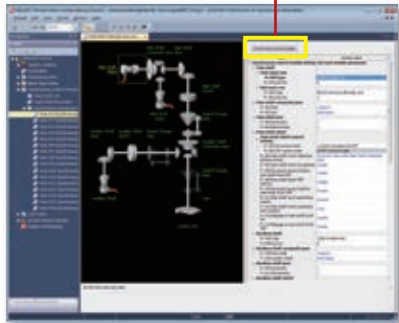
The advanced synchronous control is software-based synchronous control as an alternative to mechanical control, such as gear, shaft, clutch, speed change gear, and cam. In addition, cam control becomes even easier with cam auto-generation function.

The synchronous control can be flexibly started/ended for each axis, allowing the synchronous control axis and positioning control axis to be used within the same program.

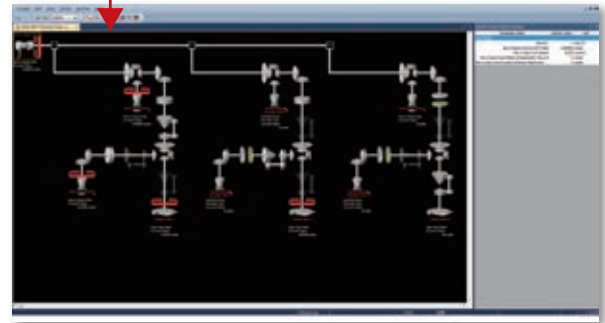
(Note-1): MR-J4-GF-RJ is required when the serial absolute synchronous encoder is used.

Module configuration of synchronous control

The whole module configuration of the advanced synchronous control is displayed in one screen, and monitoring of the target modules is also viewed, which enables more efficient debugging.



Synchronous control parameters



Module configuration

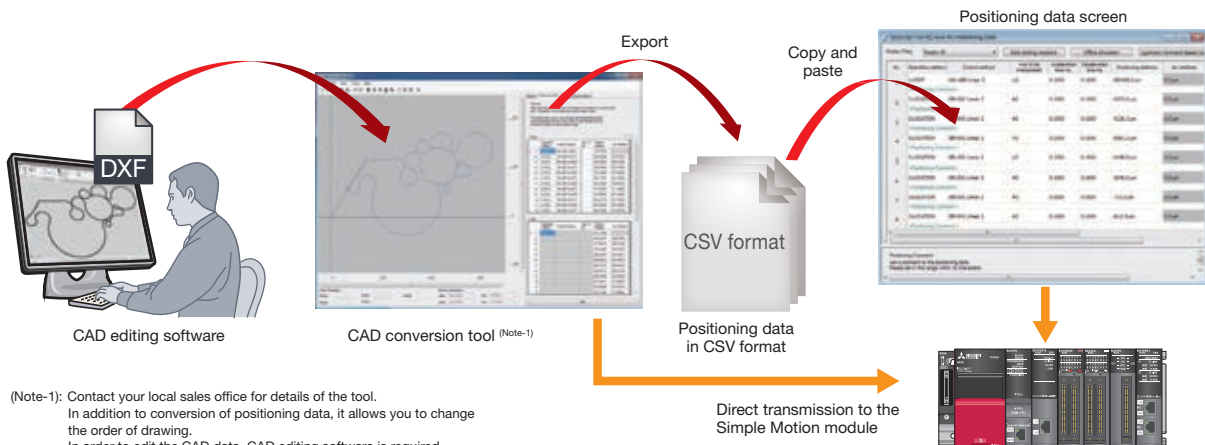
- Synchronous control is easily performed only with parameter settings.

- All the output axes that are connected to the main shaft main input axes modules are displayed in the monitoring screen.
- Monitoring of each module and parameter settings are possible.

Conversion from CAD Data into Positioning Data

CAD data in DXF format is converted into positioning data, and then the data is exported as text data in CSV format or directly transmitted to the Simple Motion module.

The exported data can be copied and pasted to MELSOFT GX Works3.



(Note-1): Contact your local sales office for details of the tool.
In addition to conversion of positioning data, it allows you to change the order of drawing.
In order to edit the CAD data, CAD editing software is required.

Various Functions

JOG operation

While the JOG start signal is ON, the workpiece moves in the designated direction.

JOG operation can be executed without completing home position return.

Motion profile table operation

The operation is executed by the motion profile table method, in which position data and feed speed are set. Once the start signal is turned ON, the set commands are executed sequentially from the start point to the end point.

Stroke limit functions

This function is used to establish the physical movable range for a machine. The hardware stroke limit function and the software stroke limit function are available.

Absolute position system

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

Step function

This function temporarily stops the operation to confirm the positioning operation during debugging, etc.
The operation is stopped at each of "automatic deceleration" or "positioning data".

M-code output function

This function issues commands for sub works corresponding to the M-code No. 0 to 65535 that is set for each positioning data. The commands are used for clamp or drill stop, tool change, etc.

External input signal setting function

This function allows you to set the input type, the input terminal, and the input filter for each external input signal (the upper/lower limit signal, the proximity dog signal, and the stop signal).

Phase compensation

In synchronous control with a synchronous encoder, the phase compensation function is used to compensate the delay time caused by a communication delay in the synchronous encoder data, etc.

Home position return methods

Various types of home position return methods, the retry function and the shift function are available to establish a home position used as the machine reference point. Select any of these home position return methods that suits your machine type.

Stop operation functions

Forced stop, axis stop, and forced stop for servo amplifiers are available. Utilize these stop operation functions based on your application.

Unlimited length feed

Unlimited length feed is performed by disabling the stroke limit function. This function is used for a rotary table, a belt conveyor, etc.

Amplifier-less operation

This function executes the positioning control by the Simple Motion module without connecting to servo amplifiers, thus enabling debugging of a user program and simulation of positioning operation on a personal computer.

Skip function

This function stops the positioning being executed when the skip signal is inputted, and executes the next positioning. It is used for measurement with a sensor.

Execution data backup function

This function stores the "setting data", currently being executed, into the flash ROM/internal memory without a battery. The command for this function is executed on MELSOFT GX Works3 or a sequence program.

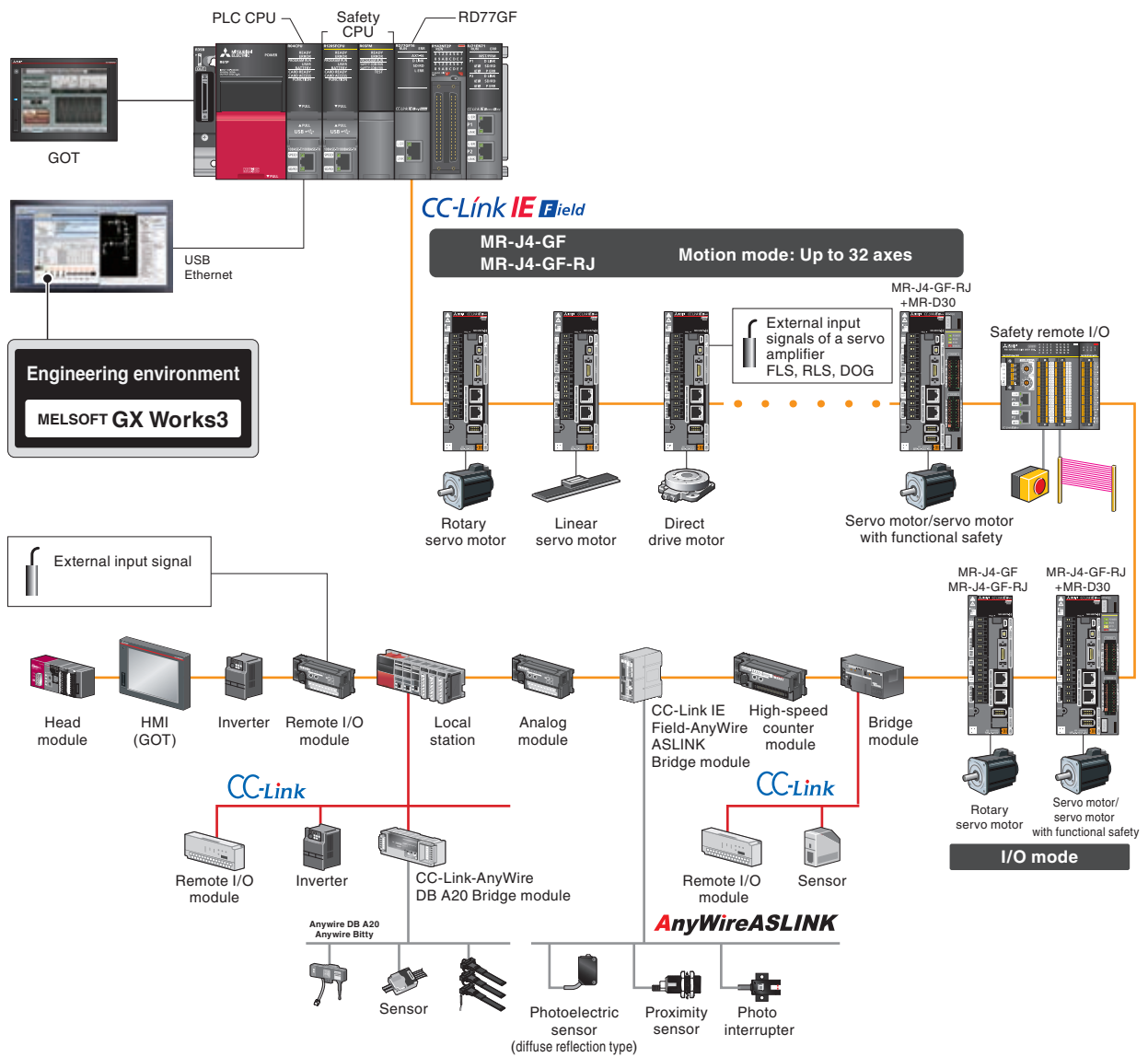
External I/O signal logic switching function

This function switches I/O signal logic according to devices connected to the Simple Motion module, etc.

CC-Link IE Field
MELSEC iQ-R
series

CC-Link IE Field Network
MELSEC iQ-R series Simple Motion module

RD77GF4/RD77GF8/RD77GF16/RD77GF32



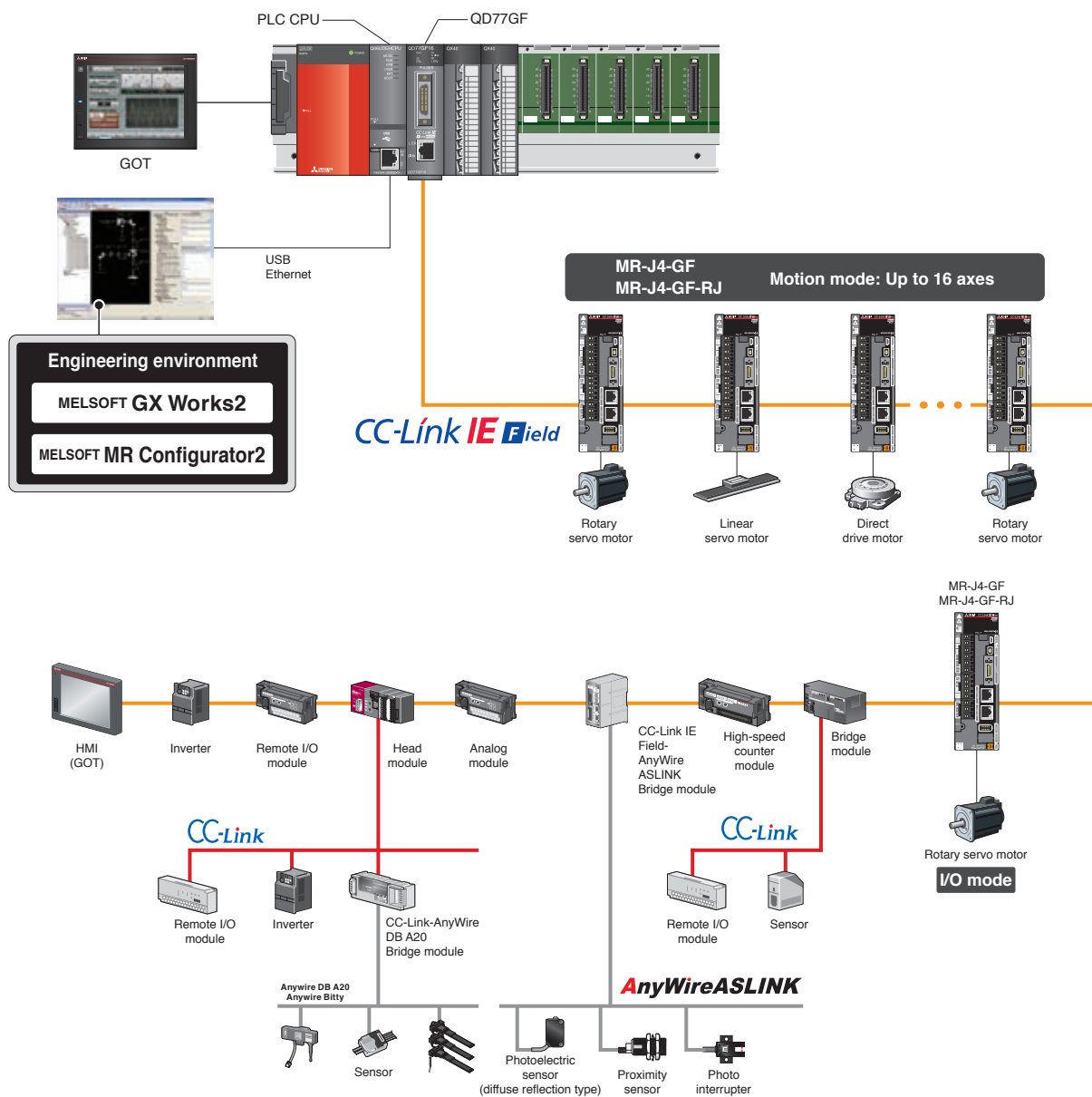
Device station: Up to 120 stations (including the number of servo amplifiers in motion mode)

(Note): A switching hub is required for star topology.

CC-Link IE Field
MELSEC Q series

CC-Link IE Field Network
MELSEC-Q series Simple Motion module

QD77GF4/QD77GF8/QD77GF16



Device station: Up to 120 stations (16 servo amplifiers in motion mode + 104 I/O devices)

(Note): A switching hub is required for star topology.

Simple Motion Modules

■ Module specifications

Simple Motion module RD77GF4/RD77GF8/RD77GF16/RD77GF32

Item	Specifications			
	RD77GF4	RD77GF8	RD77GF16	RD77GF32
Maximum number of control axes (Virtual servo amplifier axis included)	4 axes	8 axes	16 axes	32 axes
Servo amplifier connection system	CC-Link IE Field Network			
Maximum distance between stations [m(ft.)]	100(328.08)			
Peripheral I/F	Via CPU module (USB, Ethernet)			
Manual pulse generator operation function	Possible to connect 1 module (via link device)			
Synchronous encoder operation	4 modules	8 modules	16 modules	32 modules
	A total of link devices, interfaces via CPU, and interfaces via servo amplifier			
Number of I/O occupying points	32 points (I/O allocation: Intelligent function module, 32 points)			64 points (I/O allocation: intelligent function module, 64 points)
Number of module occupied slots	1			
5VDC internal current consumption [A]	1.1			
Mass [kg]	0.23			
Exterior dimensions [mm(inch)]	106.0(4.17) (H) × 27.8(1.09) (W) × 110.0(4.33) (D)			

Applicable CPU

PLC CPU module	R00CPU, R01CPU, R02CPU, R04CPU, R08CPU, R16CPU, R32CPU, R120CPU, R04ENCPU, R08ENCPU, R16ENCPU, R32ENCPU, R120PCPU, R08PCPU, R16PCPU, R32PCPU, R120PCPU, R08SFPCPU-SET, R16SFPCPU-SET, R32SFPCPU-SET, R120SFPCPU-SET
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Depending on the combination of the modules, there are restrictions on the firmware version of the PLC CPU module. Refer to "MELSEC iQ-R Module Configuration Manual" for details.

Simple Motion module QD77GF4/QD77GF8/QD77GF16

Item	Specifications		
	QD77GF4	QD77GF8	QD77GF16
Maximum number of control axes (Virtual servo amplifier axis included)	4 axes	8 axes	16 axes
Servo amplifier connection system	CC-Link IE Field Network		
Maximum distance between stations [m(ft.)]	100(328.08)		
Peripheral I/F	Via CPU module (USB, RS-232, Ethernet)		
Manual pulse generator operation function	Possible to connect 1 module		
External command signal	Number of input points	4 points	
	Input method	Positive common/Negative common shared (Photocoupler isolation)	
	Rated input voltage/current	24 VDC/ Approx. 5 mA	
	Operating voltage range	21.6 to 26.4 VDC (24 VDC ±10%, ripple ratio 5% or less)	
	ON voltage/current	17.5 VDC or more/3.5 mA or more	
	OFF voltage/current	5 VDC or less/0.9 mA or less	
	Input resistance	Approx. 5.6 kΩ	
	Response time	1 ms or less (OFF → ON, ON → OFF)	
Forced stop input signal (EMI)	Recommended wire size	AWG24 (0.2 mm ²)	
	Number of input points	1 point	
	Input method	Positive common/Negative common shared (Photocoupler isolation)	
	Rated input voltage/current	24 VDC/Approx. 2.4 mA	
	Operating voltage range	20.4 to 26.4 VDC (24 VDC +10%/-15%, ripple ratio 5% or less)	
	ON voltage/current	17.5 VDC or more/2 mA or more	
	OFF voltage/current	1.8 VDC or less/0.18 mA or less	
	Input resistance	Approx. 10 kΩ	
Manual pulse generator/Incremental synchronous encoder signal	Response time	1 ms or less (OFF → ON, ON → OFF)	
	Recommended wire size	AWG24 (0.2 mm ²)	
	Signal input form	Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN	
Manual pulse generator/Incremental synchronous encoder signal	Input frequency	1 Mpps (After magnification by 4, up to 4 Mpps) (Differential output type) 200 kpps (After magnification by 4, up to 800 kpps) (Voltage-output/Open-collector type)	
	Cable length	Up to 30 m (98.43ft.) (Differential output type) Up to 10 m (32.81ft.) (Voltage-output/Open-collector type)	
Number of occupied I/O points	32 points (I/O allocation: Intelligent function module, 32 points)		
Number of module occupied slots	1		
5 VDC internal current consumption [A]	0.8		
Mass [kg]	0.26		
Exterior dimensions [mm(inch)]	98.0(3.86) (H) × 27.4(1.08) (W) × 115(4.53) (D)		

Applicable CPU

Universal model QCPU (Upper five digit of Serial No. is "12012" or later)	Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU
High-speed universal model QCPU	Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, Q26UDVCPU

■ Performance specifications of CC-Link IE Field Network

Item		MELSEC IQ-R series				MELSEC-Q series			
		RD77GF4	RD77GF8	RD77GF16	RD77GF32	QD77GF4	QD77GF8	QD77GF16	
Maximum link points per network	RX	16k points (16384 points, 2k bytes)				8k points (8192 points, 1k byte)			
	RY	16k points (16384 points, 2k bytes)				8k points (8192 points, 1k byte)			
	RWr	8k points (8192 points, 16k bytes)				1k points (1024 points, 2k bytes)			
	RWw	8k points (8192 points, 16k bytes)				1k points (1024 points, 2k bytes)			
Maximum link points per station	Master station	RX	16k points (16384 points, 2k bytes)				8k points (8192 points, 1k byte)		
		RY	16k points (16384 points, 2k bytes)				8k points (8192 points, 1k byte)		
		RWr	8k points (8192 points, 16k bytes)				1k points (1024 points, 2k bytes)		
		RWw	8k points (8192 points, 16k bytes)				1k points (1024 points, 2k bytes)		
	Local station	RX	2k points (2048 points, 256 bytes)				-		
		RY	2k points (2048 points, 256 bytes)				-		
		RWr	1k points (1024 points, 2k bytes)				-		
		RWw	1k points (1024 points, 2k bytes)				-		
	Intelligent device station	RX	2k points (2048 points, 256 bytes)				2k points (2048 points, 256 bytes)		
		RY	2k points (2048 points, 256 bytes)				2k points (2048 points, 256 bytes)		
		RWr	1k points (1024 points, 2048 bytes)				1k points (1024 points, 2048 bytes)		
		RWw	1k points (1024 points, 2048 bytes)				1k points (1024 points, 2048 bytes)		
Remote device station	RX	128 points, 16 bytes				128 points, 16 bytes			
	RY	128 points, 16 bytes				128 points, 16 bytes			
	RWr	64 points, 128 bytes				64 points, 128 bytes			
	RWw	64 points, 128 bytes				64 points, 128 bytes			
Ethernet	Communication speed	1 Gbps							
	Connection cable	1000BASE-T Ethernet cable ^(Note-1) (Category 5e or higher), (Double shielded/STP) Straight cable							
	Maximum distance between stations [m(ft.)]	100(328.08) (conforms to ANSI/TIA/EIA-568-B(Category 5e))							
	Topology	Line, star, line/star mixed							
Overall cable distance	Line topology [m(ft.)]	12000(39370.08) (When 1 master station and 120 device stations are connected)							
	Star topology ^(Note-2)	Depends on system configuration							
Maximum stations per network	121 stations (1 master station and 120 device stations)				121 stations (1 master station and 120 device stations) (4, 8, or 16 servo amplifiers + 104 I/O devices)				
Maximum number of networks	239								

(Note-1): Use the cables recommended by CC-Link Partner Association for CC-Link IE Field Network.

CC-Link IE Controller Network cables are not compatible with CC-Link IE Field Network.

(Note-2): A switching hub is required for star topology.

■ Ethernet Cable Specifications

Item		Description
Ethernet cable		Category 5e or higher, (double shielded/STP) straight cable
	Standard	The cable must meet the following standards: • IEEE802.3 (1000BASE-T) • ANSI/TIA/EIA-568-B (Category 5e)
	Connector	RJ-45 connector with shield

■ Recommended products

Switching hub

Mitsubishi Electric has confirmed the operation of the following CC-Link IE Field Network compatible switching hubs. Contact the manufacturers for details.

Item	Model	Synchronous communications (Motion mode)	Asynchronous communications (I/O mode)	Manufacturer
Industrial managed switch	NZ2MHG-T8F2	○ (Up to 4 levels)	○	Mitsubishi Electric Corporation
Industrial switching hub	DT135TX	○ (Up to 4 levels)	○	Mitsubishi Electric System & Service Co., Ltd. ^(Note)
	NZ2EHG-T8N	—	○	Mitsubishi Electric Corporation

Ethernet Cable

Item	Specification	Manufacturer
Ethernet cable	For indoor	Double shielded cable (Category 5e) Mitsubishi Electric System & Service Co., Ltd. ^(Note)
	For moving part, indoor	
	For indoor/outdoor	

(Note): For details, contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION (Email:osb.webmaster@melsc.jp)

Manual pulse generator

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

Product	Model	Description	Manufacturer
Manual pulse generator	UFO-M2-0025-2Z1-B00E	Number of pulses per revolution: 25 pulse/rev (100 pulse/rev after magnification by 4), Permitted speed: 200 r/min (Normal rotation)	Nemicon Corporation

Control specifications

Item	Specifications							
	MELSEC iQ-R series				MELSEC-Q series			
	RD77GF4	RD77GF8	RD77GF16	RD77GF32	QD77GF4	QD77GF8	QD77GF16	
Maximum number of control axes (Virtual servo amplifier axis included)	4 axes	8 axes	16 axes	32 axes	4 axes	8 axes	16 axes	
Operation cycle (Operation cycle settings) [ms]	0.5, 1.0, 2.0, 4.0				1.0, 2.0, 4.0			
Interpolation function	Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes) ^(Note-1)							
Control modes	Positioning, Path control (Linear, arc, and helical), Speed control, Speed-torque control							
Acceleration/deceleration process	Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration							
Compensation function	Backlash compensation, Electronic gear, Near pass function							
Synchronous control	Synchronous encoder input, Cam, Phase compensation, Cam auto-generation							
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 (battery-less backup)							
Home position return	Home position return method	Driver home position return method ^(Note-2)						
	Fast home position return control	Provided						
Positioning control	Linear control	Linear interpolation (Up to 4 axes) ^(Note-3) (Vector speed, Reference axis speed)						
	Fixed-pitch feed	Fixed-pitch feed control (Up to 4 axes)						
	2-axis circular interpolation	Auxiliary point-specified circular interpolation, Central point-specified circular interpolation						
	Speed control	Speed control (Up to 4 axes)						
	Speed-position switching	INC mode, ABS mode						
	Position-speed switching	INC mode						
	Current value change	Positioning data, Start No. for current value change						
	NOP instruction	Provided						
	JUMP instruction	Unconditional JUMP, Conditional JUMP						
	LOOP, LEND	Provided						
High-level positioning	Block start, Condition start, Wait start, Simultaneous start, Repeated start							
Manual control	JOG operation	Provided						
	Inching operation	Provided						
	Manual pulse generator	Possible to connect 1 module (Incremental), Unit magnification (1 to 10000 times)						
Expansion control	Speed-torque control	Link device			Via internal interface			
		Speed control without positioning loops, Torque control						
Absolute position system	Made compatible by setting a battery to a servo amplifier							
Synchronous encoder interface		4CH	8CH	16CH	32CH	4CH		
	Internal interface	-				1CH (Incremental)		
	Via CPU (buffer memory)	Provided (Incremental)						
	Link device	Provided (Incremental)						
	Via servo amplifier	4CH	8CH	16CH	32CH	4CH		
Functions that limit control	Speed limit	Speed limit value, JOG speed limit value						
	Torque limit	Torque limit value same setting, torque limit value individual setting						
	Forced stop	Valid/Invalid setting						
	Software stroke limit	Movable range check with current feed value, movable range check with machine feed value						
	Hardware stroke limit	Provided						
Functions that change control details	Speed change	Provided						
	Override	0 to 300 [%]						
	Acceleration/deceleration time change	Provided						
	Torque change	Provided						
	Target position change	Target position address and speed are changeable						
Other functions	M-code output	WITH mode/AFTER mode						
	Step function	Deceleration unit step, Data No. unit step						
	Skip function	Via PLC CPU, Via external command signal						
	Teaching function	Provided						
Parameter initialization function	Provided							
External input signal setting function	Internal interface	-				Provided		
	Via CPU (buffer memory)	Provided						
	Link device	Provided				-		
	Via servo amplifier	Provided						
Event history function	Provided							
Amplifier-less operation function	Provided							
Mark detection function		Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode						
	Mark detection signal	Up to 16 points ^(Note-4)			Up to 32 points ^(Note-4)	Up to 4 points		
	Mark detection setting	Up to 16 settings			Up to 32 settings	Up to 16 settings		
Functions that monitor servo data	Optional data monitor	-						
	Servo cyclic transmission	4 settings/axis						
	Servo transient transmission	4 settings/axis						
Digital oscilloscope function ^(Note-5)	Bit data	16CH						
	Word data	16CH						

(Note-1): Available with RD77GF.

(Note-2): The home position return method set in a driver (a servo amplifier) is used.

(Note-3): 4-axis linear interpolation control is enabled only at the reference axis speed.

(Note-4): The Mitsubishi Electric remote I/O module is required.

(Note-5): 8CH word data and 8CH bit data are displayed in real time.

■ Synchronous control specifications

Item	Number of settable axes						
	MELSEC iQ-R series				MELSEC-Q series		
	RD77GF4	RD77GF8	RD77GF16	RD77GF32	QD77GF4	QD77GF8	QD77GF16
Servo input axis	4 axes/module	8 axes/module	16 axes/module	32 axes/module	4 axes/module	8 axes/module	16 axes/module
Synchronous encoder input axis	4 axes/module	8 axes/module	16 axes/module	32 axes/module	4 axes/module		
Composite main shaft gear	1 module/output axis						
Main shaft main input axis	1 module/output axis						
Main shaft sub input axis	1 module/output axis						
Main shaft gear	1 module/output axis						
Main shaft clutch	1 module/output axis						
Auxiliary shaft	1 module/output axis						
Auxiliary shaft gear	1 module/output axis						
Auxiliary shaft clutch	1 module/output axis						
Composite auxiliary shaft gear	1 module/output axis						
Speed change gear	1 module/output axis						
Output axis (Cam axis)	4 axes/module	8 axes/module	16 axes/module	32 axes/module	4 axes/module	8 axes/module	16 axes/module

■ Cam control

Item			Specifications								
			MELSEC iQ-R series				MELSEC-Q series				
			RD77GF4	RD77GF8	RD77GF16	RD77GF32	QD77GF4	QD77GF8	QD77GF16		
Memory capacity	Cam storage area	Up to 3 MB				256k bytes					
	Cam working area	Up to 16 MB				1024k bytes					
Number of registration		Up to 1024				Up to 256					
Comment			Up to 32 characters for each cam data								
Cam data	Stroke ratio data type	Maximum number of cam registration	RD77GF								
			Cam resolution	256	512	1024	2048	4096	8192	16384	32768
		Number of cam registration	1024	1024	1024	1024	1024	512	256	128	
		QD77GF									
	Cam resolution	256	512	1024	2048	4096	8192	16384	32768		
	Number of cam registration	256	128	64	32	16	8	4	2		
Coordinate data type	Maximum number of cam registration	RD77GF									
		Number of coordinates	128	256	512	1024	2048	4096	8192	16384	32768
	Number of cam registration	1024	1024	1024	1024	1024	512	256	128	64	32
	QD77GF										
Number of coordinates	128	256	512	1024	2048	4096	8192	16384			
Number of cam registration	256	128	64	32	16	8	4	2			
Coordinate data		Input value: 0 to 2147483647, Output value: -2147483648 to 2147483647									
Cam auto-generation	Cam for rotary knife	Available				Available					
	Easy stroke ratio cam	Available				-					
	Advanced stroke ratio cam	Available				-					

■ Compatibility with servo amplifier

Item	MELSEC iQ-R series				MELSEC-Q series		
	RD77GF4	RD77GF8	RD77GF16	RD77GF32	QD77GF4	QD77GF8	QD77GF16
MR-J4-GF(-RJ)	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible (Note-1)

(Note-1): Only QD77GF16 with the first 5 digits of serial No. on and after 17102 is compatible with MR-J4-GF(-RJ).

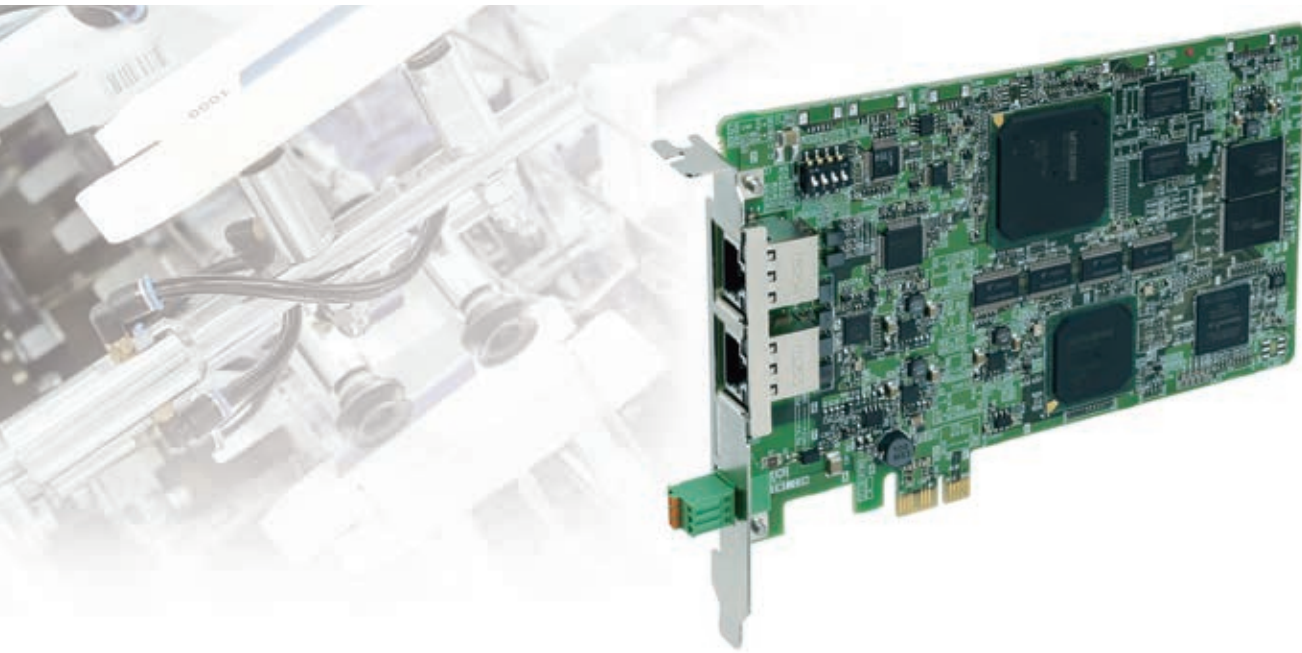
■ Components

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.

Part	Model	Description	Standards	
Simple Motion modules	MELSEC iQ-R series	RD77GF4	Up to 4 axes	CE, UL, KC
		RD77GF8	Up to 8 axes	CE, UL, KC
		RD77GF16	Up to 16 axes	CE, UL, KC
		RD77GF32	Up to 32 axes	CE, UL, KC
	MELSEC-Q series	QD77GF4	Up to 4 axes	CE, UL, KC
		QD77GF8	Up to 8 axes	CE, UL, KC
	QD77GF16	Up to 16 axes	CE, UL, KC	
Internal I/F connector set (Note-1)	LD77MHIOCON	Incremental synchronous encoder/Mark detection signal interface connector set	-	

(Note-1): Use this connector set for QD77GF.

Simple Motion Board



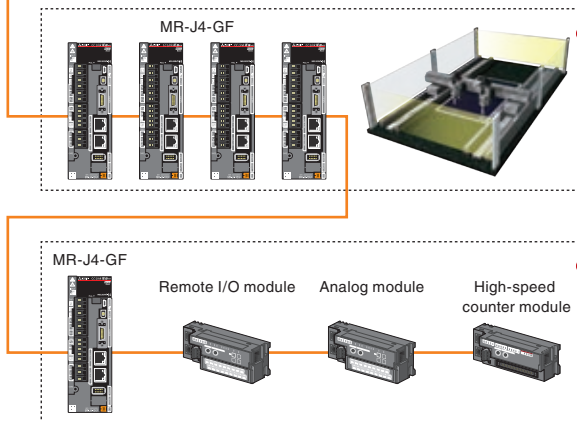
CC-Link IE Field Network Compatible
Simple Motion Board

MR-EM340GF

Numerous motion control functions, such as positioning, synchronous control, and speed-torque control are performed by the Simple Motion board being embedded in a PC which supports PCI Express®.

Servo System Configuration

The Simple Motion board, not only performs Motion control, but can also function as a CC-Link IE Field Network master station. Up to 120 stations including servo amplifiers are connectable.



Motion mode:

This mode enables advanced motion control functions, such as positioning for multi-axis interpolation, synchronous control, and speed-torque control in combination with the Simple Motion board.

Maximum number of control axes: 16 axes

I/O mode:

With CC-Link IE Field Network, various field devices, such as servo amplifiers, I/O modules, and high-speed counter modules, can be connected flexibly.

Maximum number of control stations: 120 stations (including the number of servo amplifiers for motion mode)

Software Development Kit MELSOFT EM Software Development Kit

MELSOFT EM Software Development Kit is a development software package supporting the engineering process from system design and programming to debug and maintenance for the Simple Motion board.

(Note): Contact your local sales office for the latest version of Software Development Kit.



MELSOFT EM Configurator

Every step in the engineering process from system design and programming to debug and maintenance is supported by this software.



MELSOFT MR Configurator2

Primarily, tuning, monitoring, and diagnosis are easily performed with this software by being connected to a servo amplifier.



API library

The API library is an add-on library which uses functions (method) and labels (member) of controller and axis classes, and enables easy programming with Visual C++®.



PCI Express® device driver

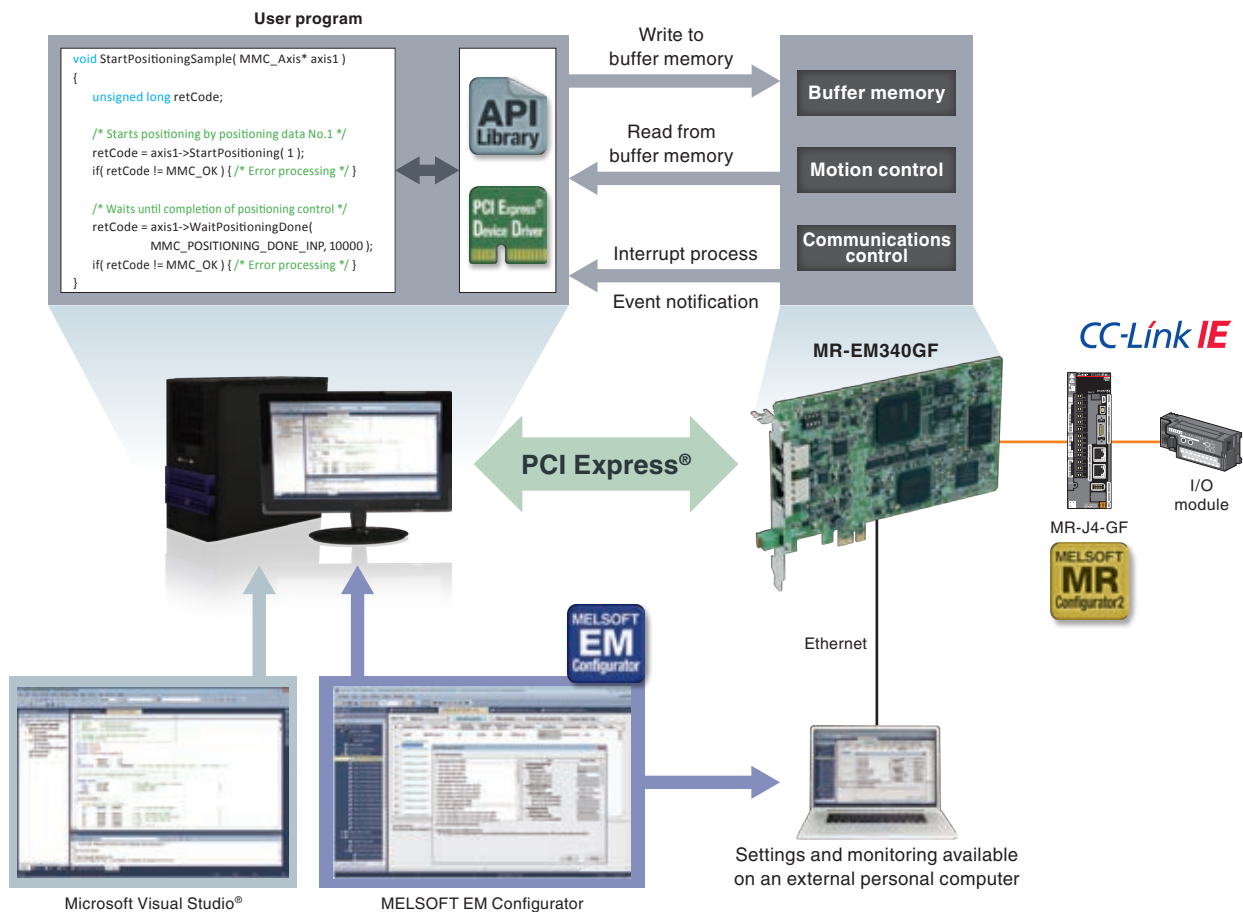
The PCI Express® device driver is software for a user program to gain access to the Simple Motion board via PCI Express®.

Development and Debugging Environments

A user program is created by adding the API library (for motion control) to a project of Microsoft Visual Studio®.

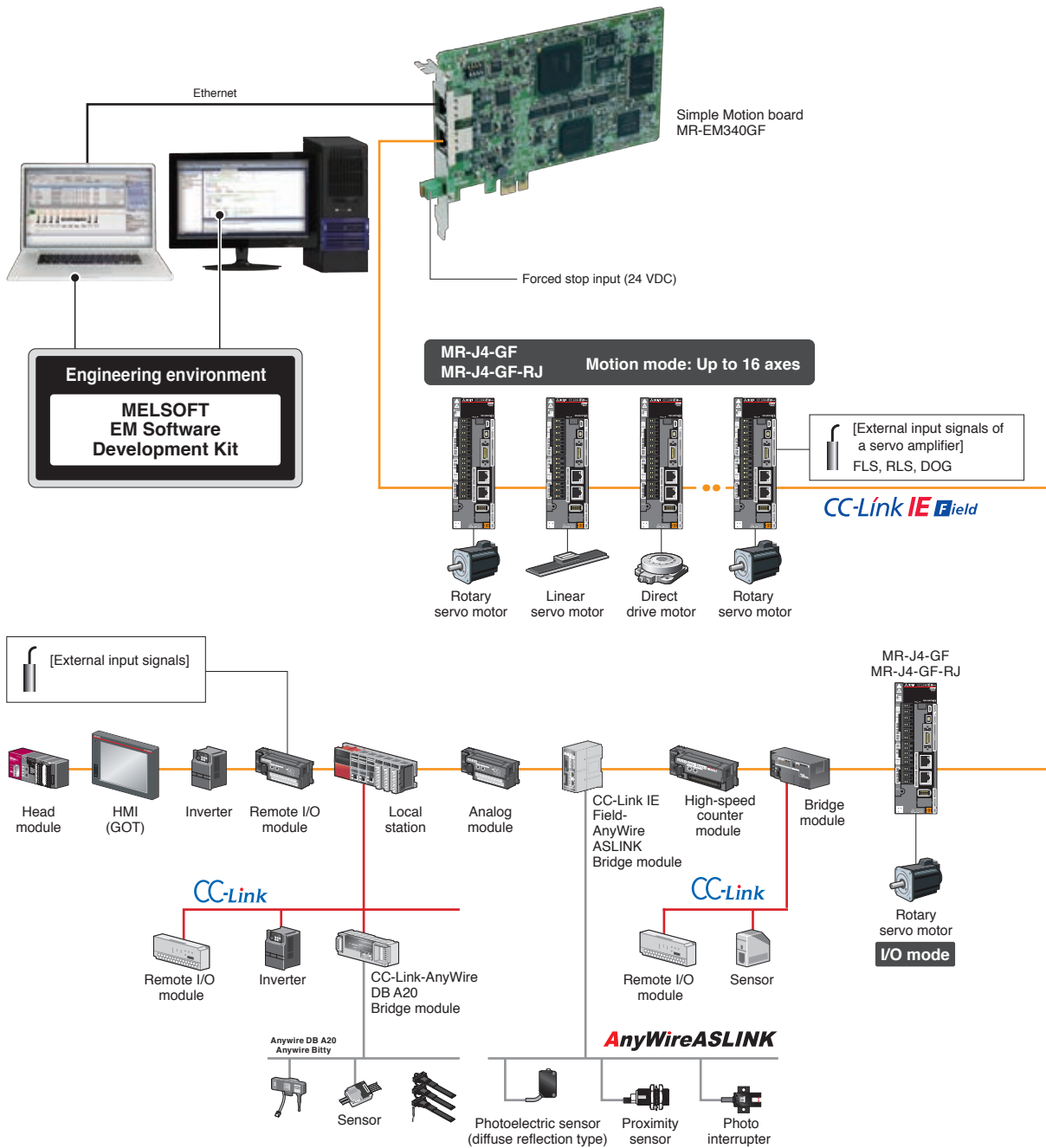
INtime and RTX (real-time operating system) are supported.

(Note): Contact your local Mitsubishi Electric office for more details.



(Note): OS and the development environment are not included.

System configuration



Device station: Up to 120 stations (including the number of servo amplifiers in motion mode)

(Note): A switching hub is required for star topology.

Control specifications

Item		Specification		
		MR-EM340GF		
Maximum number of control axes (virtual servo amplifier axis included)		16 axes		
Operation cycle (operation cycle settings)		0.5 ms, 1.0 ms, 2.0 ms, 4.0 ms		
Interpolation function		Linear interpolation (up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)		
Control modes		Positioning, Path control (linear, arc, and helical), Speed control, Speed-torque control		
Acceleration/deceleration process		Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration		
Compensation function		Backlash compensation, Electronic gear, Near pass function		
Synchronous control		Synchronous encoder input, Cam, Phase compensation, Cam auto-generation		
Control unit		mm, inch, degree, pulse		
Number of positioning data		600 data/axis		
Backup		Parameters, positioning data, and block start data can be saved on flash ROM (battery-less backup)		
Home position return	Home position return method		Driver home position return method	
	Fast home position return control		Provided	
	Sub-function		Provided (the sub-function of a servo amplifier)	
Positioning control	Linear control		Linear interpolation control (up to 4 axes) ^(Note-1) (vector speed, reference axis speed)	
	Fixed-pitch feed		Fixed-pitch feed control	
	2-axis circular interpolation		Auxiliary point-specified circular interpolation, Central point-specified circular interpolation	
	Speed control		Speed control	
	Speed-position switching		INC mode, ABS mode	
	Position-speed switching		INC mode	
	Current value change		Positioning data, Start No. for a current value changing	
	NOP instruction		Provided	
	JUMP instruction		Conditional JUMP, Unconditional JUMP	
	LOOP, LEND		Provided	
High-level positioning		Block start, Condition start, Wait start, Simultaneous start, Repeated start		
Manual control	JOG operation		Provided	
	Inching operation		Provided	
	Manual pulse generator		Possible to connect 1 module (incremental), Unit magnification (1 to 10000 times) Via link device	
Expansion control	Speed-torque control		Speed control without positioning loops, Torque control	
	Direct control		Provided	
Absolute position system		Made compatible by setting a battery to a servo amplifier		
Synchronous encoder interface		16CH		
	Via buffer memory		Provided (incremental)	
	Link device		Provided (incremental)	
	Via servo amplifier		16CH	
Functions that limit control	Speed limit		Speed limit value, JOG speed limit value	
	Torque limit		Torque limit value same setting, torque limit value individual setting	
	Forced stop	Internal interface		Provided
		Buffer memory		Provided
		Link device		Provided
	Software stroke limit		Movable range check with current feed value, movable range check with machine feed value	
Hardware stroke limit		Provided		
Functions that change control details	Speed change		Provided	
	Override		0 to 300 [%]	
	Acceleration/deceleration time change		Provided	
	Torque change		Provided	
	Target position change		Target position address and speed are changeable	
Other functions	M-code output		WITH mode/AFTER mode	
	Step function		Deceleration unit step, Data No. unit step	
	Skip function		Via buffer memory, Via external command signal	
	Teaching function		Provided	
Parameter initialization function		Provided		
External input signal setting function	Via buffer memory		Provided	
	Link device		Provided	
	Via servo amplifier		Provided	
Amplifier-less operation function (virtual servo amplifier function)		Provided		
Mark detection function			Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode	
	Mark detection signal		Up to 16 points ^(Note-3)	
	Mark detection setting		16 settings	
Digital oscilloscope function ^(Note-2)	Bit data		16CH	
	Word data		16CH	

(Note-1): 4-axis linear interpolation control is enabled only at the reference axis speed.

(Note-2): 8CH word data and 8CH bit data are displayed in real time.

(Note-3): The Mitsubishi Electric remote input module is required.

Simple Motion Board

Simple Motion board specifications

Item		Specification
		MR-EM340GF
Servo amplifier connection system		CC-Link IE Field Network
Maximum distance between stations [m(ft.)]		100 (328.08)
Peripheral I/F		Ethernet (100BASE)
Forced stop input signal (EM)	Number of input points	1 point
	Input method	Positive Common/ Negative Common Shared Type (Photocoupler isolation)
	Rated input voltage/current	24 VDC/approx. 2.4 mA
	Operating voltage range	20.4 to 26.4 VDC (24 VDC +10 %/-15 %, ripple ratio 5 % or less)
	ON voltage/current	17.5 VDC or more/2.0 mA or more
	OFF voltage/current	1.8 VDC or less/0.18 mA or less
	Input resistance	Approx. 10 kΩ
	Response time	1 ms or less (OFF to ON, ON to OFF)
Recommended wire size [mm ²]		0.08 to 0.5 (AWG 20 to AWG 28)
Number of Simple Motion boards for one computer		4
Bus specification		PCI Express® 2.0 × 1
Size [mm(inch)]		Half-length (167.65(6.60) × 111.15(4.38))
Power supply voltage		12 VDC/3.3 VDC
Current consumption [A]	12 VDC	0.4
	3.3 VDC	0.6
Mass [kg]		0.13

Operation environment for MELSOFT EM Software Development Kit

Item		Description
Personal computer	Personal computer	Microsoft® Windows® supported personal computer
	OS	Microsoft® Windows® 10 (Pro, Enterprise) English version (64-bit/32-bit)
	CPU	Desktop: Intel® Celeron® Processor 2.8 GHz or more recommended Laptop: Intel® Pentium® M Processor 1.7 GHz or more recommended
	Required memory	1 GB or more recommended (For 32-bit edition) 2 GB or more recommended (For 64-bit edition)
Required hard disk space		When installing the test tool: 3 GB or more free hard disk space When operating the test tool: 512 MB or more free hard disk space
Monitor		Resolution 1024 × 768 or more
Communications interface		PCI Express® BUS Ethernet port

Development environment

Item	Description
OS for user program operation	The same operation environment as MELSOFT EM Software Development Kit
Software development environment	Microsoft® Visual C++® 2015/2013/2012/2010 Microsoft® Visual C#® 2015/2013/2012/2010
API library	Class library (Compiled into C++/C#)

Performance specifications of CC-Link IE Field Network

Item		Specification		
		MR-EM340GF		
Maximum link points per network	RX	16k points (16384 points, 2 kbytes)		
	RY	16k points (16384 points, 2 kbytes)		
	RWr	8k points (8192 points, 16 kbytes)		
	RWw	8k points (8192 points, 16 kbytes)		
Maximum link points per station	Master station	RX	16k points (16384 points, 2 kbytes)	
		RY	16k points (16384 points, 2 kbytes)	
		RWr	8k points (8192 points, 16 kbytes)	
		RWw	8k points (8192 points, 16 kbytes)	
	Local station	RX	2k points (2048 points, 256 bytes)	
		RY	2k points (2048 points, 256 bytes)	
		RWr	256 points, 512 bytes	
	Intelligent device station	RWw	256 points, 512 bytes	
		RX	2k points (2048 points, 256 bytes)	
		RY	2k points (2048 points, 256 bytes)	
	Remote device station	RWr	256 points, 512 bytes	
		RWw	256 points, 512 bytes	
RX		128 points, 16 bytes		
RY		128 points, 16 bytes		
Ethernet	RWr	64 points, 128 bytes		
	RWw	64 points, 128 bytes		
	Communication speed		1 Gbps	
	Connection cable		1000BASE-T Ethernet cable ^(Note-1) ; category 5e or higher (double shielded/STP) straight cable	
Overall cable distance	Maximum distance between stations [m(ft.)]		100(328.08) (conforms to ANSI/TIA/EIA-568-B (category 5e))	
	Topology		Line, star, line/star mixed	
	Line topology [m(ft.)]		12000(39370.08) (When 1 master station and 120 device stations are connected)	
Maximum connectable stations per network	Star topology ^(Note-2)		Depends on system configuration	
	Maximum number of networks		239	

(Note-1): Use the cables recommended by CC-Link Partner Association for CC-Link IE Field Network.

CC-Link IE Controller Network cables are not compatible with CC-Link IE Field Network.

(Note-2): A switching hub is required for star topology.

Ethernet Cable Specifications

Item		Specification
Ethernet cable	Category 5e or higher (double shielded/STP) straight cable	
	Standard	The cable must meet the following standards: <ul style="list-style-type: none"> • IEEE802.3 (1000BASE-T) • ANSI/TIA/EIA-568-B (category 5e)
	Connector	RJ-45 connector with shield

Recommended products

Switching hub

Mitsubishi Electric has confirmed the operation of the following CC-Link IE Field Network compatible switching hubs. Contact the manufacturers for details.

Item	Model	Synchronous communications (Motion mode)	Asynchronous communications (I/O mode)	Manufacturer
Industrial managed switch	NZ2MHG-T8F2	○ (Up to 4 levels)	○	Mitsubishi Electric Corporation
Industrial switching hub	DT135TX	○ (Up to 4 levels)	○	Mitsubishi Electric System & Service Co., Ltd. ^(Note)
	NZ2EHG-T8N	—	○	Mitsubishi Electric Corporation

Ethernet Cable

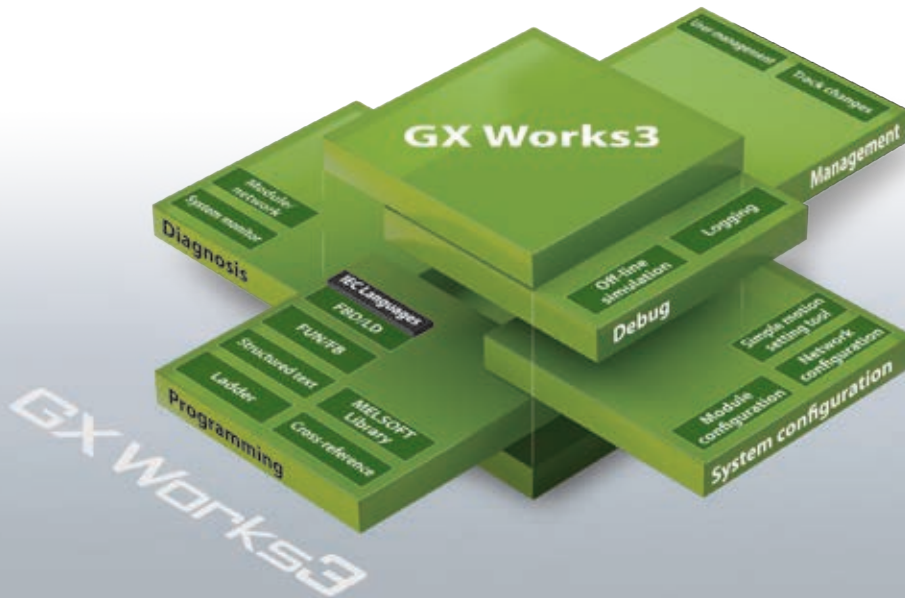
Item	Specification	Manufacturer
Ethernet cable	For indoor	Double shielded cable (Category 5e) Mitsubishi Electric System & Service Co., Ltd. ^(Note)
	For moving part, indoor	
	For indoor/outdoor	

(Note): For details, contact Mitsubishi Electric System & Service Co., Ltd.
OVERSEAS SERVICE SECTION (Email:osb.webmaster@mesc.jp)

GX Works3

One Software, Many Possibilities

GX Works3 consists of various different components that help to simplify project creation and maintenance tasks.



All-in-One Tool for Quick and Easy Startup

This all integrated software offers a wide range of features - creation of a sequence program such as a function block (FB), parameter settings for Simple Motion modules, servo adjustment and debugging.

■ Easy-to-use features

- Various intuitive features, such as graphics-based system configuration and an extensive module library (module label/FB), are provided as standard.
- MELSOFT GX Works3 conforms to an international standard, IEC 61131-3, supporting structured programming.

■ Powerful security features protecting intellectual property

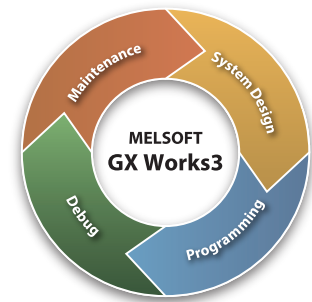
- Security key authentication function protects your project data.

■ Global realization by multi-language support

- Multiple languages (Japanese, English, and Chinese) are supported at various levels (Menu display, etc.).

■ Easy settings and diagnostic functions

- Network is set up easily only with parameter settings.
- Troubleshooting is performed even with little experience.



All-in-One Engineering Software


This all-in-one software covers all aspects of the product development cycle - from system design, programming, to debugging and maintenance - maximizing efficiency while minimizing your effort.

Easy system design


No need of manuals in system and parameter settings

- MELSOFT GX Works3 includes everything needed from system configuration to servo parameter settings.
- Parameters for CC-Link IE Field Network are easy to be set.

[Servo parameter]



[CC-Link IE Field configuration]



System Design

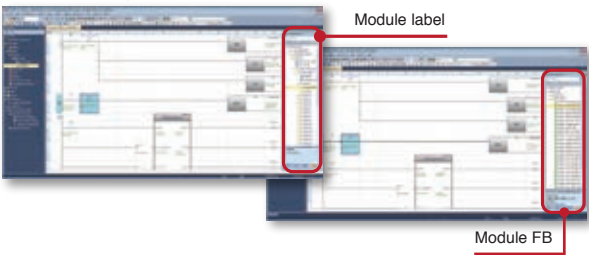
Programming

Easy programming

Simple point-and-click programming

- A sequence program is created effortlessly via drag & drop of module labels/FBs.

[Sequence program]

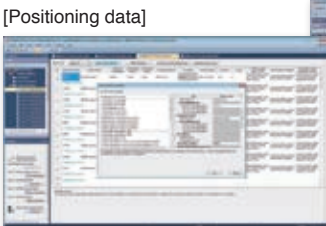


Debug


Maintenance

Easy motion control

[Positioning data]




[Synchronous control parameter]




Easy startup

[One-touch tuning]



[Network diagnostics]



Increased usability in synchronous/positioning control settings

- An array of sub functions helps you create positioning data.
- Synchronous control is performed easily just by parameter settings.
- Creation of a rough cam waveform on a graph via drag & drop, or direct numerical value input to the graph enables easy creation of cam data.

Increased efficiency in debugging and maintenance

- Servo adjustment is automatically completed using the one-touch tuning function.
- Debugging of a program without an actual machine is possible by simulation.
- The network errors are displayed by network diagnostics.

■ Operating environment

MELSOFT GX Works3

Item		Description
OS		Microsoft® Windows®11 (Home, Pro, Enterprise, Education) Microsoft® Windows®10 (Home, Pro, Enterprise, Education, IoT Enterprise 2016 LTSC ^{*1} , IoT Enterprise 2019 LTSC ^{*1}) ^{*1} : 64-bit version only
CPU	Windows®11	Two 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 x 768 or more

(Note) Refer to Installation Instructions for precautions and restrictions regarding the operating environment.

MELSOFT GX Works2

Item		Description
OS		Microsoft® Windows®11 (Home, Pro, Enterprise, Education) Microsoft® Windows®10 (Home, Pro, Enterprise, Education, IoT Enterprise 2016 LTSC ^{*1}) ^{*1} : 64-bit edition supported
CPU	Windows®11	Two 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: 3 GB or more free hard disk space For operation: 512 MB or more free virtual memory space
Monitor		Resolution 1024 x 768 or more

(Note) Refer to Installation Instructions for precautions and restrictions regarding the operating environment.

■ Engineering software list

Product	Model	Description	
MELSOFT GX Works3	SW1DND-GXW3-E	<ul style="list-style-type: none"> Programmable Controller Engineering Software (GX Works2, GX Developer, and PX Developer ^(Note-2)) mitsubishi electric fa library 	DVD
MELSOFT GX Works2	SW1DND-GXW2-E	<ul style="list-style-type: none"> Programmable controller engineering software (including GX Developer) 	DVD
MELSOFT iQ Works	SW2DND-IQWK-E	<ul style="list-style-type: none"> FA engineering software ^(Note-1) System management software: MELSOFT Navigator Programmable controller engineering software: MELSOFT GX Works3 (including GX Works2, GX Developer, PX Developer ^(Note-2)) Motion controller engineering software: MELSOFT MT Works2 HMI/GOT screen design software: MELSOFT GT Works3 Robot engineering software: MELSOFT RT ToolBox3 ^(Note-3) Inverter setup software: MELSOFT FR Configurator2 Servo setup software: MELSOFT MR Configurator2 C Controller setting and monitoring tool: MELSOFT CW Configurator mitsubishi electric fa library 	DVD

(Note-1) For detailed information about supported modules, refer to the manuals of the relevant software package.

(Note-2) Includes both programming tool and monitor tool for process control.

(Note-3) 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.

MEMO



**Realize cyclic communication
with software implementation only**

CC-Link IE Field Network Basic

With recent trends of IoT^{*1}, network connection of devices and equipment for small-scale systems are becoming more mainstream. CC-Link IE Field Network Basic realizes easier network integration, as its cyclic communications stack is software-based, without requiring a dedicated ASIC helping to reduce implementation costs for device partners.

Mitsubishi Electric is launching CC-Link IE Field Network Basic compatible products to further leverage networking on the production floor.

Plant-wide seamless communication

Utilizing standard Ethernet technology, TCP/IP protocol stack for communications (such as HTTP, FTP) is supported. Based on SLMP^{*2}, data flows transparently between the sensor level and the enterprise level across multiple industry-standard automation networks.

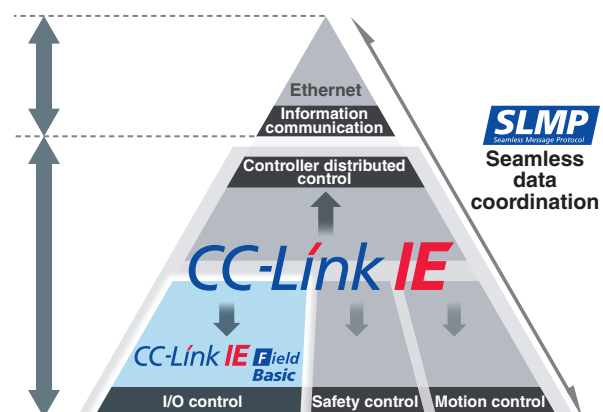
Seamless communication can be easily realized with CC-Link IE Field Network Basic, further improving performance of the manufacturing enterprise.

Positioning within CC-Link IE Network

The Ethernet-based open network CC-Link IE is a high-speed and large-capacity network integrating distributed control, I/O control, safety control, and motion control.

CC-Link IE Field Network Basic, which is a part of CC-Link IE Network, realizes easier network connection of Ethernet devices.

Transparent communications are achieved by utilizing SLMP^{*2} that enables seamless connectivity within all levels of manufacturing.



*1. Internet of Things

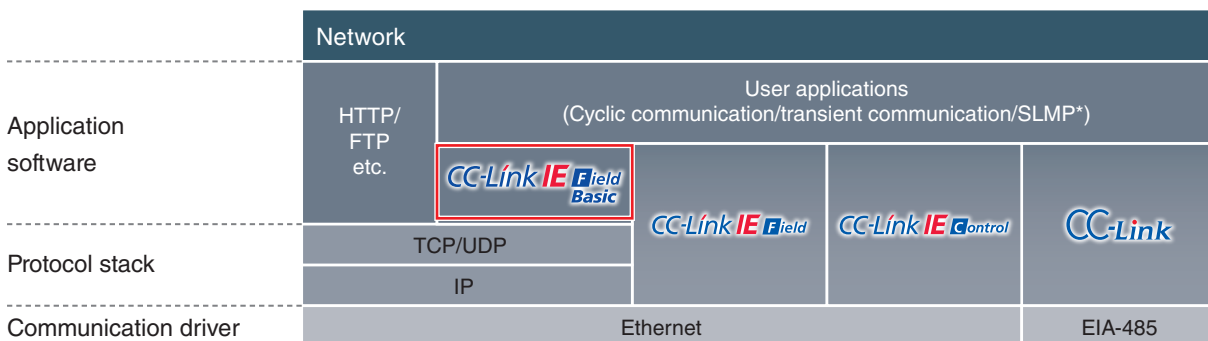
*2. Seamless Message Protocol

Combining with TCP/IP communications

- Configure more flexible system
- Setup/monitor from enterprise level computer or tablet computer

Highly flexible system can be configured combining with TCP/IP communications

The network operates on the standard Ethernet protocol stack, which can be used together with TCP/IP communications. This feature allows CC-Link IE Field Network Basic compatible products and Ethernet compatible products to be connected on the same Ethernet communications line, enabling a highly-flexible and low cost system. By enabling cyclic communication control on standard Ethernet, parameter setting and status monitoring can be done with peripheral devices (such as an enterprise level or tablet computer) connected via TCP/IP communications.



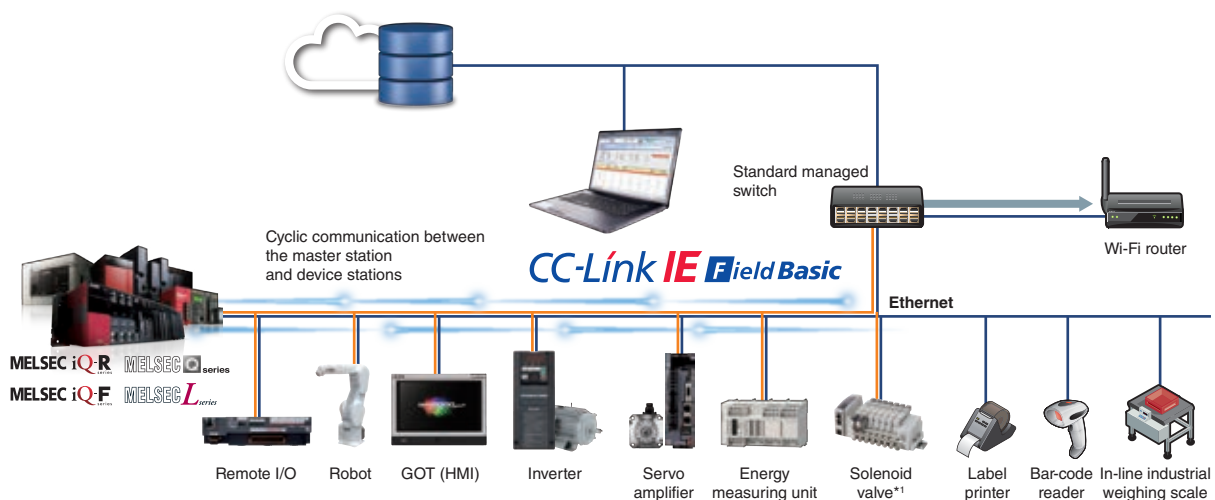
* SLMP: Seamless Message Protocol

Wider range of connectable products

- Connect third-party partner products on the same network

A wider range of CC-Link IE Field Network Basic-supported devices

CC-Link IE Field Network Basic realizes cyclic communication with software implementation only. System can be easily configured using a standard managed switch and cables at a lower cost. Supported-products can be easily developed and a wider range of CC-Link IE Field Network Basic-supported devices can be readily available.



*1. For further details regarding this product, please directly contact 'CKD Corporation', details can be found on their website at <http://www.ckd.co.jp/english/glbinfo/global/>
 Note: Some images are for illustrative purposes only.

CC-Link IE Field Network Basic compatible
servo amplifier

MR-JE-C

Servo motor

HG-KN

HG-SN

CC-Link IE Field Network compatible servo amplifier
(CC-Link IE Field Network Basic supported)

MR-J4-GF



CC-Link IE Field Network Basic realizes easier network integration, as its cyclic communications stack is software-based, without requiring a dedicated ASIC. The servo amplifiers connect to a personal computer and a controller via Ethernet without any network dedicated module, realizing a simple system.

Supporting CC-Link IE Field Network Basic

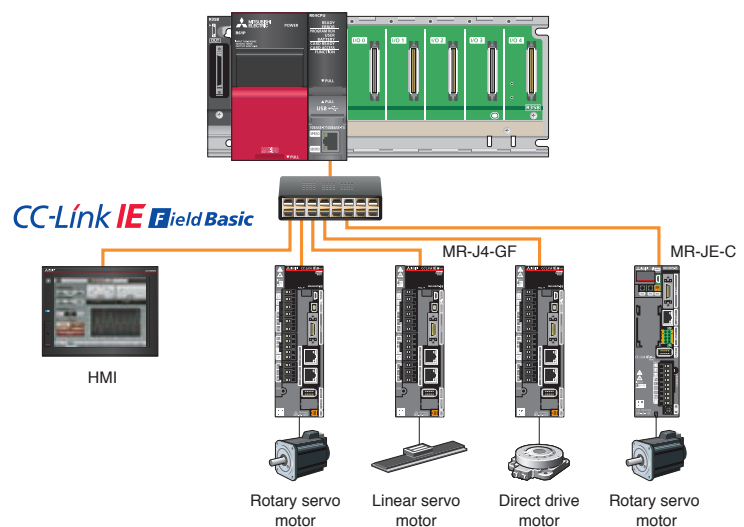
Configuration

Mitsubishi Electric offers two models of servo amplifiers which support CC-Link IE Field Network Basic:

MR-J4-GF ^(Note-1) and MR-JE-C. They can be configured together in the same system.

Additionally, MR-J4-GF supports a broad range of servo motors from rotary servo motors, linear servo motors, to direct drive motors, allowing you to flexibly configure a system that meets your application needs.

(Note-1): MR-J4-GF with software version of A4 or later supports CC-Link IE Field Network Basic.

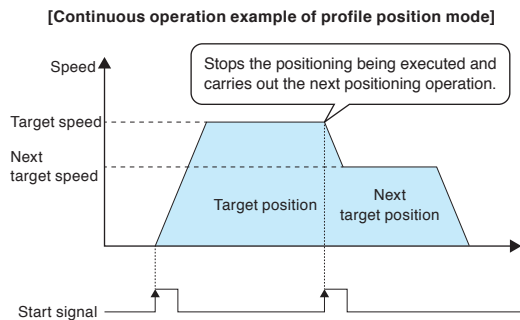


Features

MR-JE-C

MR-JE-C servo amplifier supports CiA 402 drive profile. A positioning system is easily configured without a Positioning module.

- Drive methods supported by CiA 402 drive profile
 - Profile position mode: pp
 - Profile velocity mode: pv
 - Profile torque mode: tq
 - Homing mode: hm



MR-J4-GF

MR-J4-GF(-RJ) allows positioning operation with point table method or indexer method.

- Point table method

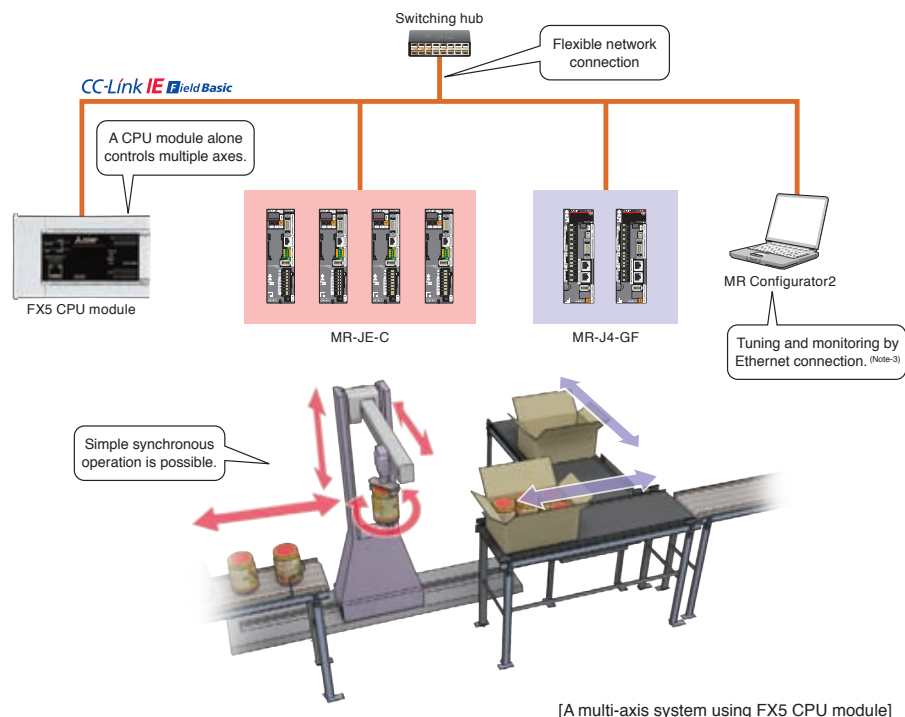
With the point table method, just set the point table No. and turn on the start signal, and then the positioning operation will be started. A continuous operation of the next point table is also possible without stopping.
- Indexer method

In the indexer method, the travel amount is automatically calculated based on the number of stations set in the parameter.

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

Multi-axis system

- Flexible network connection is configured easily using a switching hub. (Network topology: Star topology, Maximum station-to-station distance: 100 m ^(Note-1))
- A CC-Link IE Field Network Basic embedded CPU ^(Note-2) alone controls multiple axes.
- Simple synchronous operations including horizontal, vertical, and rotational movements are possible with a start signal to all axes via cyclic transmission.
- Tuning, monitoring, diagnosing, reading/writing parameters, and test operations are enabled with a personal computer (MR Configurator2) connected via Ethernet. ^(Note-3)



(Note-1): For the maximum station-to-station distance, contact manufacturers of the switching hub to be used.

(Note-2): Refer to "Ethernet-based Open Network CC-Link IE Product Catalog" (L(NA)08111E) for CPU modules supporting CC-Link IE Field Network Basic.

(Note-3): MR Configurator2 which supports CC-Link IE Field Network Basic is required. Refer to relevant manuals or catalogs for details.

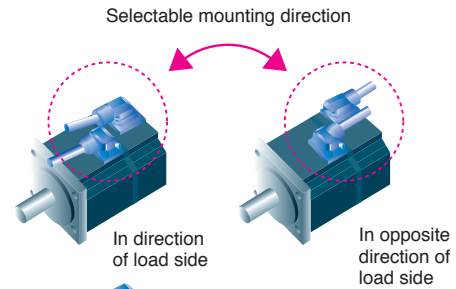
HG Series Rotary Servo Motors for MR-JE-C

Features

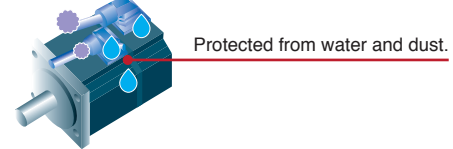
- High-resolution encoder
Servo motors are equipped with a high-resolution encoder of 131072 pulses/rev (17-bit) as standard, achieving high-accuracy positioning and smooth rotation.



- Flexible cable leading direction
Cables for power, encoder, and electromagnetic brake are capable of connecting either in direction or in opposite direction of the load side, depending on the cable selection. (HG-KN series)



- Improved environmental resistance
Ingress protection ^(Note) of servo motors:
HG-KN: IP65
HG-SN: IP67



(Note): The shaft-through portion is excluded.

Product lines

▶ HG-KN series



Small capacity, low inertia. Perfect for general industrial machines.

Capacity: 100 to 750 W

Rated speed: 3000 r/min

Maximum speed: 5000 (6000) r/min ^(Note-1)

Rated torque: 0.32 to 2.4 N·m

(Note-1): The value in the parenthesis is applicable according to the parameter setting of the servo amplifier. Refer to "MR-JE- _C Servo Amplifier Instruction Manual" for details.

Application examples

- Insetters, mounters and bonders
- PCB drilling machines
- In-circuit testers and label printers
- Knitting and embroidery machines
- Compact robots and robot hand sections

▶ HG-SN series



Medium capacity, medium inertia. Applicable to machines with high inertia.

Capacity: 0.5 to 3 kW

Rated speed: 2000 r/min

Maximum speed: 2500 r/min ^(Note-2), 3000 r/min

Rated torque: 2.39 to 14.3 N·m

(Note-2): The maximum speed of HG-SN302(B)J is 2500 r/min.

Application examples

- Material handling systems
- Dedicated machines
- Robots
- Loaders and unloaders
- Winders and tension units
- Turrets
- X-Y tables

Product lines of MR-JE-C servo amplifier and servo motors

● Servo amplifier

●: Supported

Model	Power supply specifications ^(Note-1)	Rated output [kW] ^(Note-1)	Command interface	Control mode				Compatible servo motor series	
			CC-Link IE Field Network Basic	Profile position mode	Profile velocity mode	Profile torque mode	Positioning function	HG-KN	HG-SN
MR-JE-C	3-phase 200 VAC 1-phase 200 VAC	0.1, 0.2, 0.4, 0.75, 1, 2, 3	●	●	●	●	●	●	●

(Note-1): Servo amplifiers with rated output of 3 kW support only 3-phase power supply.

● Servo motor

●: Supported

Series	Rated speed [r/min]	Maximum speed [r/min]	Rated output [kW]	With electromagnetic brake (B)	Oil seal (J)	IP rating ^(Note-3)
HG-KN series	3000	5000 (6000) ^(Note-1)	0.1, 0.2, 0.4, 0.75	●	●	IP65
HG-SN series	2000	3000/2500 ^(Note-2)	0.5, 1, 1.5, 2, 3	●	●	IP67

(Note-1): The default speed is 5000 r/min. The speed can be set to 6000 r/min with the parameter of servo amplifiers. Refer to "MR-JE_C Servo Amplifier Instruction Manual" for details.

(Note-2): The maximum speed of HG-SN302(B)J is 2500 r/min.

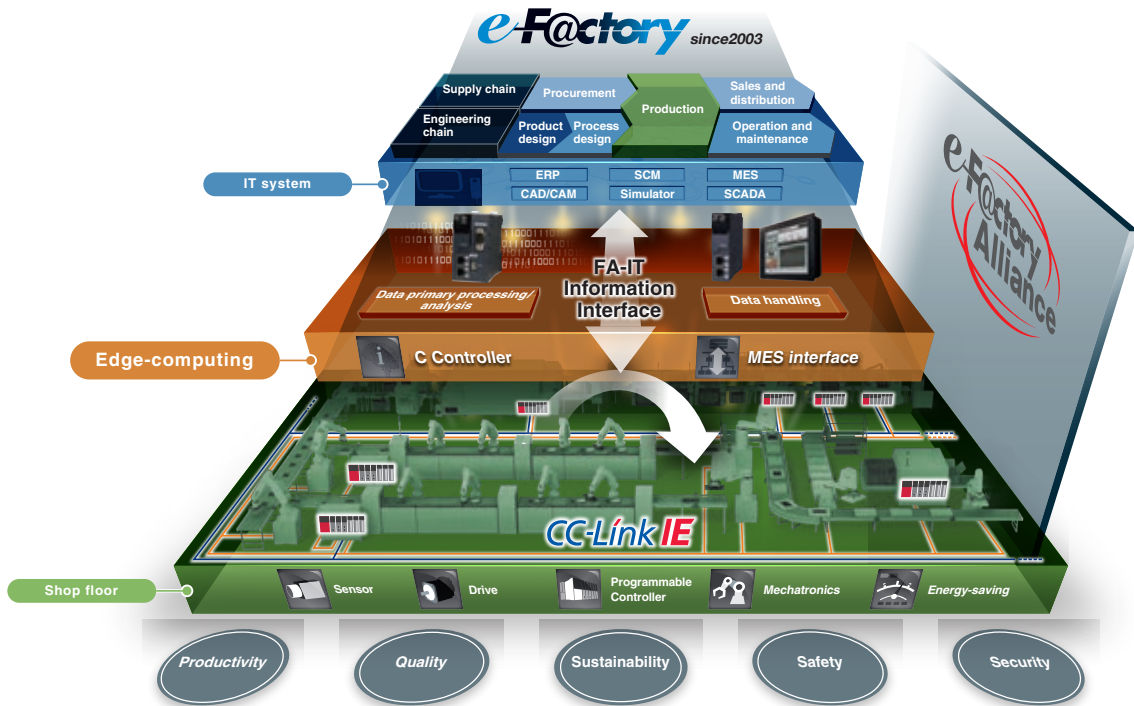
(Note-3): The shaft-through portion is excluded.

Product lines of MR-J4-GF servo amplifier and servo motors

Refer to "Product lines" in page 29 in this catalog.

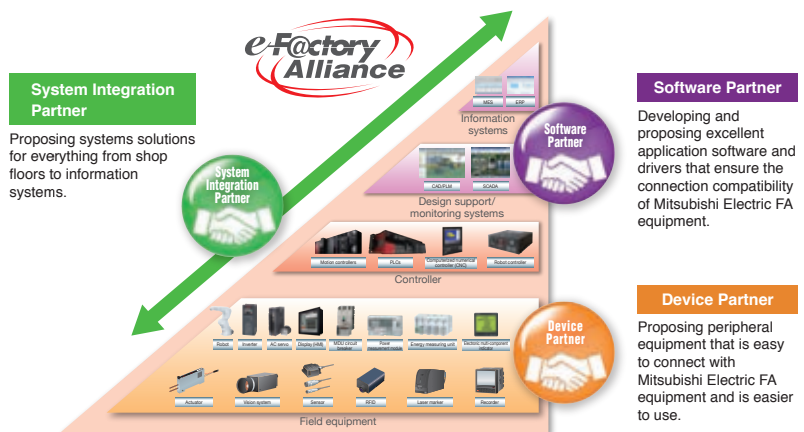
e-F@ctory Solution

e-F@ctory is Mitsubishi Electric's integrated concept to build reliable and flexible manufacturing systems that enable users to achieve many of their high speed, information driven manufacturing aspirations. Through its partner solution activity, the e-F@ctory Alliance, and its work with open network associations such as The CC-Link Partners Association (CLPA), users can build comprehensive solutions based on a wide ranging "best in class" principle.



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.



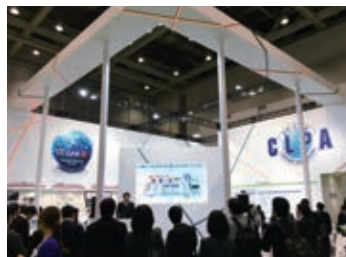
CC-Link Partner Association (CLPA) - Actively promoting worldwide adoption of CC-Link networks

Proactively supporting CC-Link, from promotion to specification development

The CC-Link Partner Association (CLPA) was established to promote the worldwide adoption of the CC-Link open-field network. By conducting promotional activities such as organizing trade shows and seminars, conducting conformance tests, and providing catalogs, brochures and website information, CLPA activities are successfully increasing the number of CC-Link partner manufacturers and CC-Link-compatible products. As such, CLPA is playing a major role in the globalization of CC-Link.



Seminar



Trade show



Conformance testing lab

■ Visit the CLPA website for the latest CC-Link information.



CLPA website
www.cc-link.org/en



CLPA
Headquarters

6F Ozone Front Bldg. 3-15-58 Ozone
Kita-ku, Nagoya 462-0825, JAPAN
TEL: +81-52-919-1588 FAX: +81-52-916-8655
e-mail: info@cc-link.org

Global influence of CC-Link continues to spread

CC-Link is supported globally by CLPA. With offices throughout the world, support for partner companies can be found locally. Each regional CLPA office undertakes various support and promotional activities to further the influence of CC-Link/CC-Link IE in that part of the world. For companies looking to increase their presence in their local area, CLPA is well placed to assist these efforts through offices in all major regions.

Americas

- CLPA-Americas (Mexico office)
- CLPA-Americas (USA office)

Asia-Pacific

- CLPA-China CT
- CLPA-Headquarter(Japan) CT
- CLPA-India
- CLPA-Korea CT
- CLPA-Taiwan
- CC-Link Promotion Center ASEAN (Singapore) CT
- CC-Link Promotion Center Thailand

Europe, the Middle East and Africa

- CLPA-Europe(Germany) CT
- CLPA-Turkey

CT : Conformance Testing Lab

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

SETSUYO ENTERPRISE 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

General-purpose AC servo

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 General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.
- (2) Our General-Purpose 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.

Simple Motion module/Simple Motion board

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.
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- (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 Simple Motion module/Simple Motion board, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the Simple Motion module/Simple Motion board, and a backup or fail-safe function should operate on an external system to the Simple Motion module/Simple Motion board when any failure or malfunction occurs.
- (2) Our Simple Motion module/Simple Motion board 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.

Conformity with Global Standards and Regulations

Mitsubishi Electric servo system conforms to global standards.

- Our servo system products are not subject to China Compulsory Certification (CCC).
- Refer to relevant manuals and "EMC Installation Guidelines" when your system needs to meet the EMC directive.
- Refer to "MELSERVO-J4 Series Catalog" for details of MR-J4 series conformity with global standards and regulations.
- For corresponding standards and models, contact your local sales office.

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All other company names and product names used in this document are trademarks or registered trademarks of their respective companies.

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!

Ethernet-based Open Network CC-Link IE Compatible Servo System

Country/Region	Sales office	Tel
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-Adpo. 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	SETSUYO ENTERPRISE CO., LTD. 5F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 24889, 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



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.



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