MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

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

Emancipation of IA components
from shackles of the conventional Network

CC-Link IE Field

MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO SYSTEM

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

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.

OVERVIEW

Concept

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.

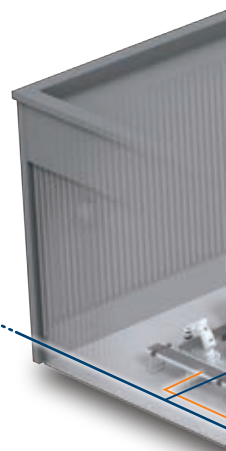## General, motion and safety control integrated into one network

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.
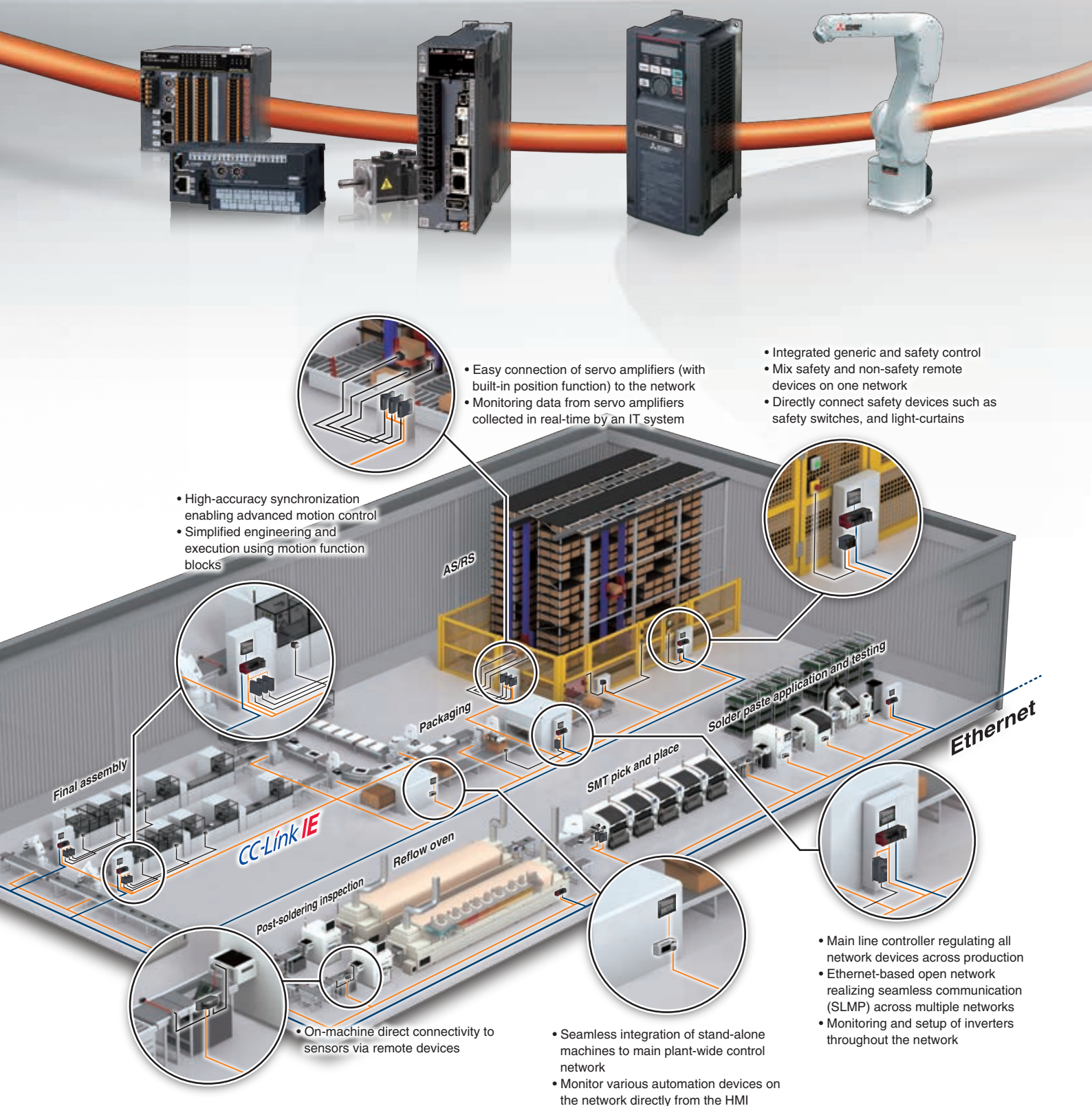
Comprehensive diagnosis realizing higher reliability

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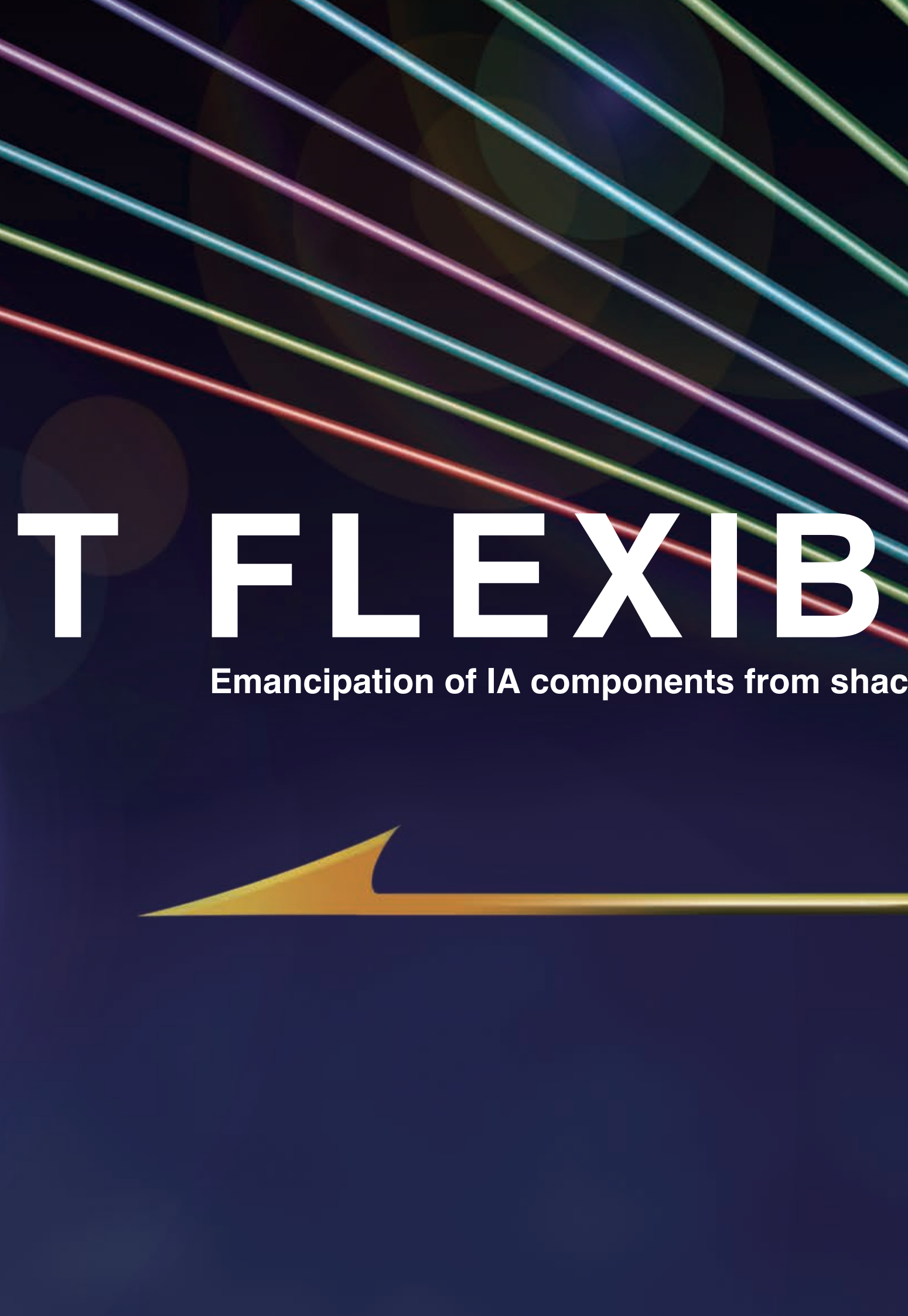
*1.   Seamless Message Protocol
*2.   MELSEC iQ-R Series is supported by GX Works3.
     MELSEC-Q Series and MELSEC-L Series are supported by GX Works2.

Seamless connectivity within all levels of automation

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

- Easy connection of servo amplifiers (with built-in position function) to the network
- Monitoring data from servo amplifiers collected in real-time by an IT system

- Integrated generic and safety control
- Mix safety and non-safety remote devices on one network
- Directly connect safety devices such as safety switches, and light-curtains

- High-accuracy synchronization enabling advanced motion control
- Simplified engineering and execution using motion function blocks

AS/RS

Packaging

Solder paste application and testing

Final assembly

CC-Link IE

SMT pick and place

Ethernet

Reflow oven

Post-soldering inspection

- Main line controller regulating all network devices across production
- Ethernet-based open network realizing seamless communication (SLMP) across multiple networks
- Monitoring and setup of inverters throughout the network

- On-machine direct connectivity to sensors via remote devices

- Seamless integration of stand-alone machines to main plant-wide control network
- Monitor various automation devices on the network directly from the HMI

4

CONNEC

T FLEXIB

Emancipation of IA components from shac

LY

kles of the conventional Network

A dramatic new update of the Mitsubishi Electric Servo System with CC-Link IE Field bringing vast possibilities to the world of Industrial Automation

- Reduced wiring, improved noise-immunity drastically 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

■ Integration of IA components on a single network of CC-Link IE

Optimizing conventional servo systems can be challenging and requires high cost and time commitments during start-up, operation, and maintenance. A key solution to this issue is the network.

What if we could connect all the components from servo amplifiers and inverters to high-speed counters, I/O modules, etc., over a single network?

CC-Link users have simplified system configurations, reduced wiring, and significantly improved diagnostic efficiency.

The Mitsubishi Servo System is the optimized CC-Link IE Field compatible system, solving common network issues by connecting all components over a single network.

All-in-One Network

Controller

HMI

Servo amplifier

Input module

Analog I/O module

Output module

All-in-One NETWORK

Extension module

Servo amplifier

Servo amplifier

Inverter

Temperature control module
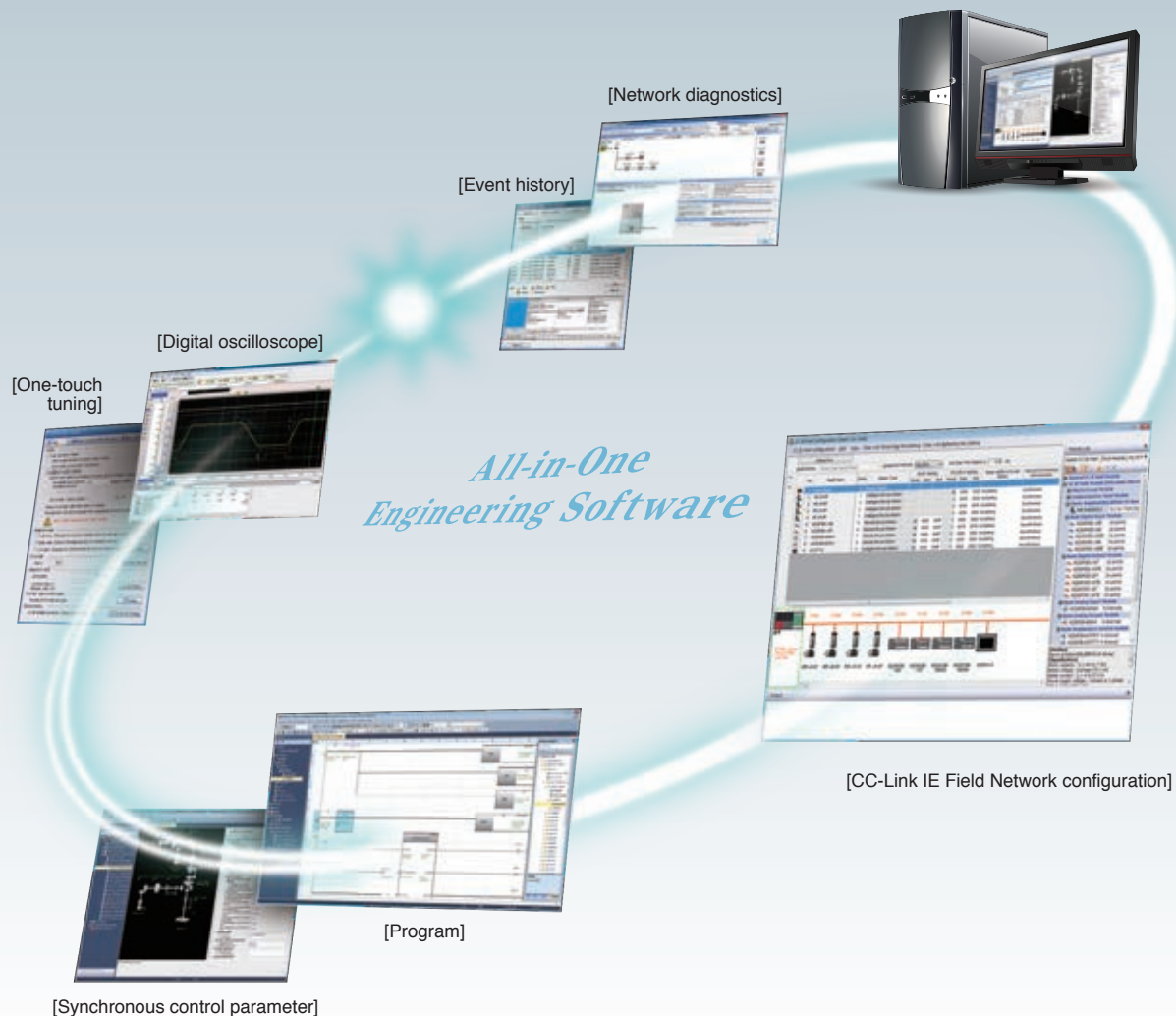
High-speed counter module

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 with no restriction.
CC-Link IE Field Network enables a further upgrade of your machine with the flexible servo system configuration.

All-in-One Engineering Software

[Network diagnostics]

[Event history]

[Digital oscilloscope]

[One-touch tuning]

All-in-One Engineering Software

[CC-Link IE Field Network configuration]

[Program]

[Synchronous control parameter]

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 this 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

Simple Motion module	+	Motion mode

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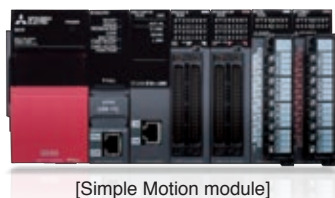
[Simple Motion module]　　　　　[Motion mode]

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

Simple Motion module	+	Motion mode + I/O mode

This system configuration enables an easy addition of an axis for single-axis positioning to a machine which requires a wide range of high-accuracy motion control, such as multi-axis interpolation, synchronous, and speed-torque control.
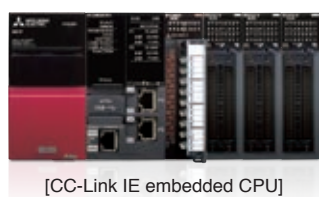
[Simple Motion module]　　　　　[Motion mode]　　　[I/O mode]

Compatible with a wide range of applications for positioning control

| CC-Link IE embedded CPU	+	I/O mode

This system configuration enables an easy connection of the axis for single-axis positioning to a master station, such as a CC-Link IE embedded CPU without the Simple Motion module.

[CC-Link IE embedded CPU]　　　　　[I/O mode]

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.

## [Dispensing Machine for FPD] Using Motion mode
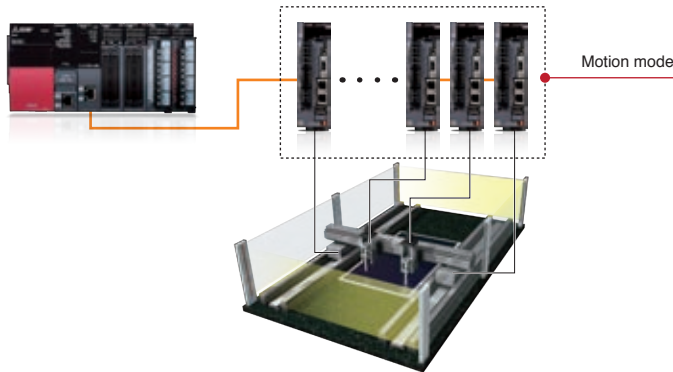
■ **Motion mode**

Application examples

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

Main functions

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

Motion mode

[Packing and Liquid Filling Machines] Using Motion mode and I/O mode

I/O mode

I/O mode
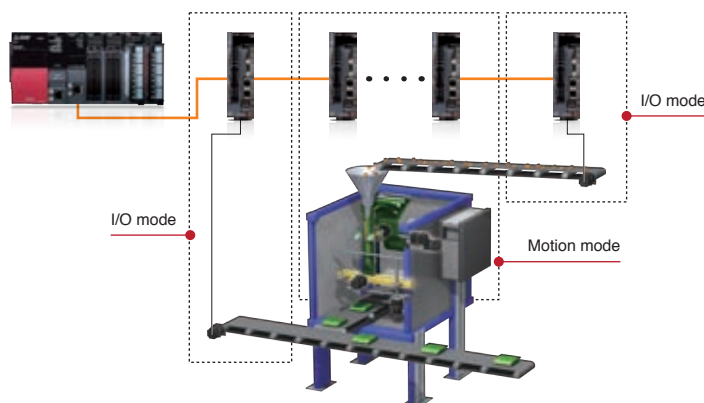
Motion mode

■ **Motion mode**

Application examples

Packing machines, Liquid filling machines, Material handling machines, and Converting machines

Main functions

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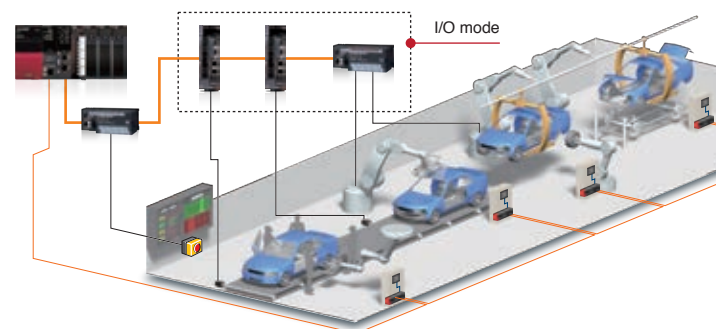・Cam auto-generation　・Mark detection function

■ **I/O mode**

Application examples

Material handling axes and Belt conveyor axes

Main functions

・Speed control　・Positioning control

[Belt Conveyor Axis] Using I/O mode

I/O mode
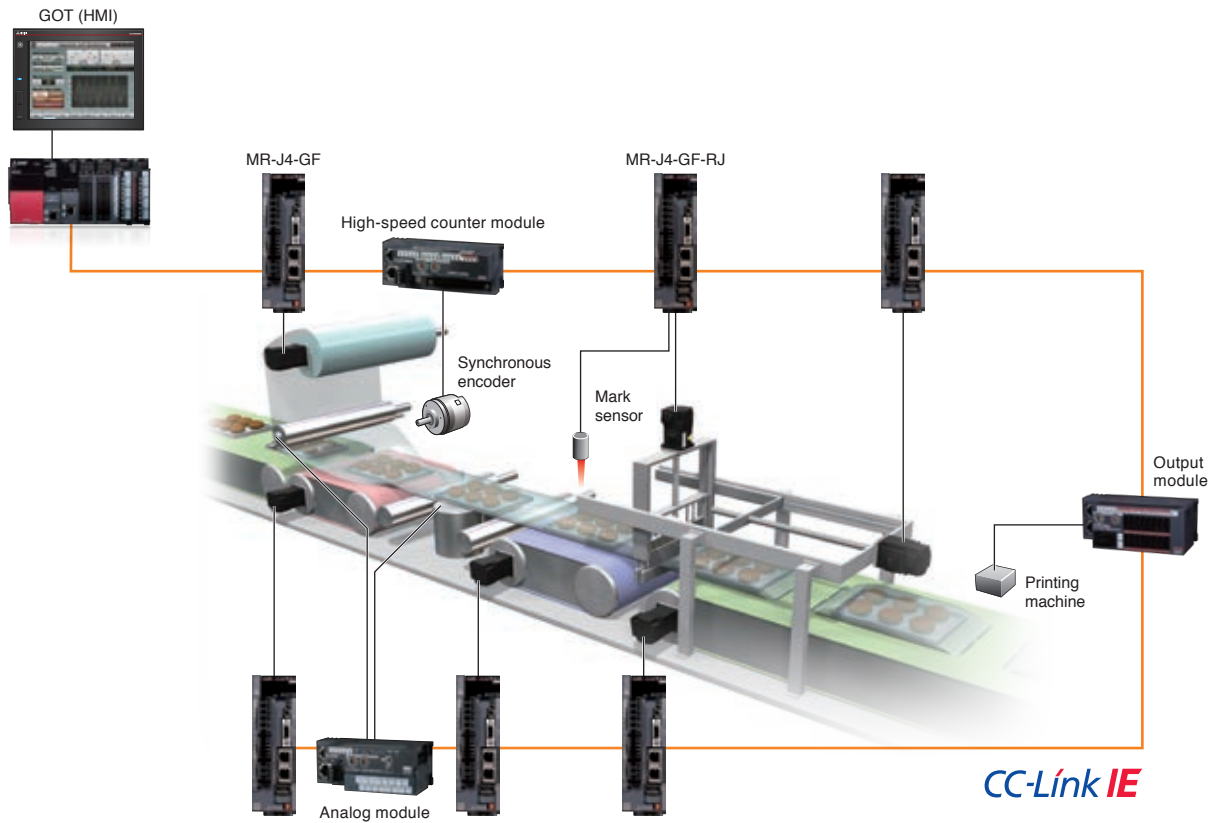
■ **I/O mode**

Application examples

Material handling axes and Belt conveyor axes

Main functions

・Speed control　・Positioning control

Synchronization of Inputs and Outputs with Servo Control

GOT (HMI)

MR-J4-GF

High-speed counter module

MR-J4-GF-RJ

Synchronous encoder

Mark sensor
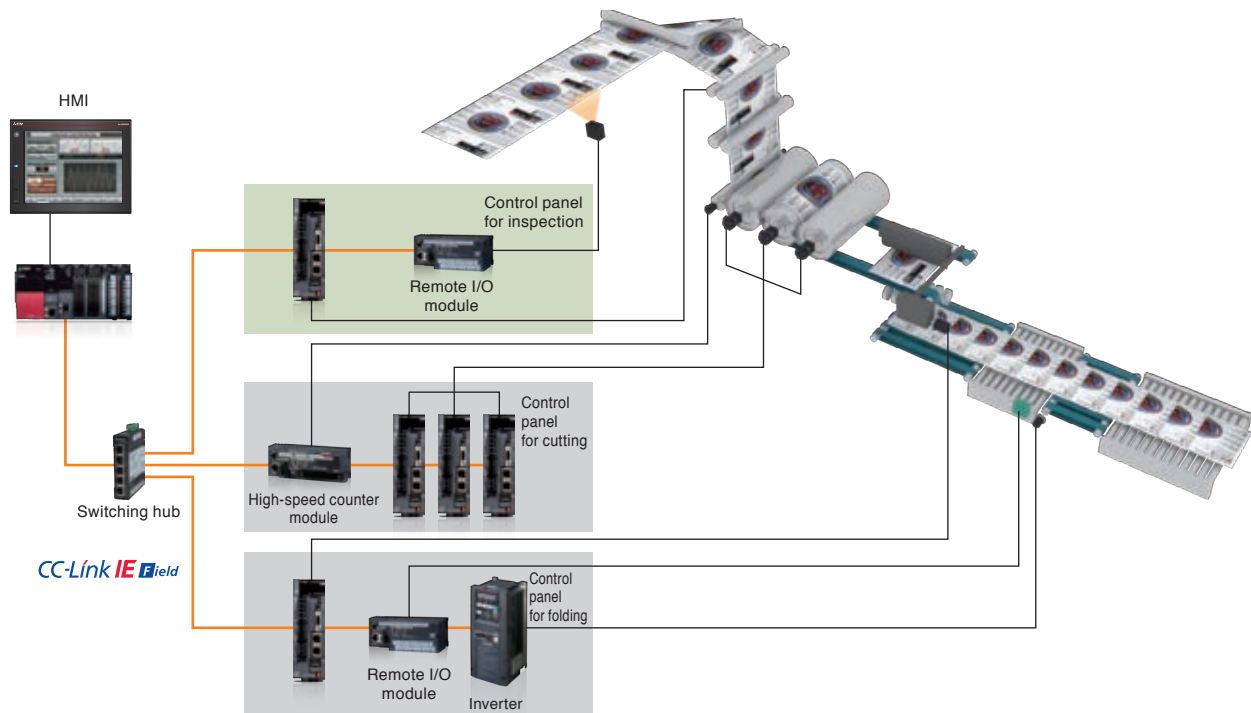
Output module

Printing machine

Analog module

CC-Link IE

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

In a single network, inputs/outputs are synchronized with the command communication cycle of the servo amplifier. For example, an input from a synchronous encoder and an output to a printing machine are synchronized in the same network.
CC-Link IE Field Network enables a wide range of Motion control applications.

Flexible network topology

HMI

Control panel
for inspection

Remote I/O
module

Switching hub

High-speed counter
module

Control
panel
for cutting

Control
panel
for folding

Remote I/O
module

Inverter

CC-Link IE Field

Using the switching hub enables the network configuration with a combination of star, line, and star/line mixed topologies to be easily modified without any settings. An easy topology created only by a cable being connected to a free port of the switching hub allows field devices to be added to the system more flexibly.

Star topology
Each module is connected via the switching hub allowing field devices to be added easily.

Line topology
Continuous connection of modules along the Ethernet line.

CC-Link IE Field

Star
topology

Line topology

Line topology
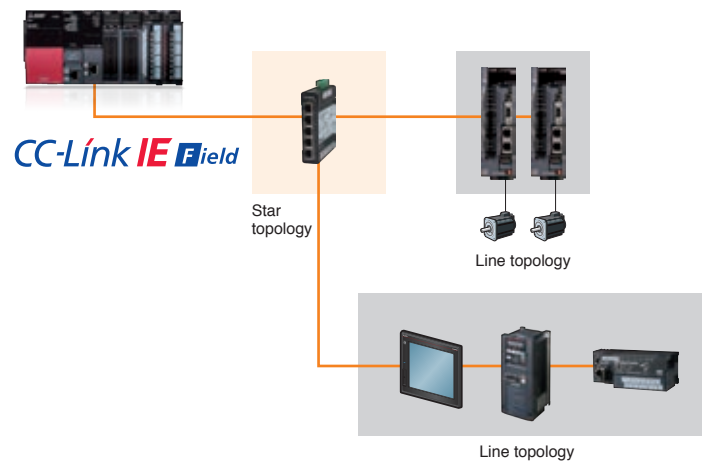
A wide range of product series and capacities for various system applications
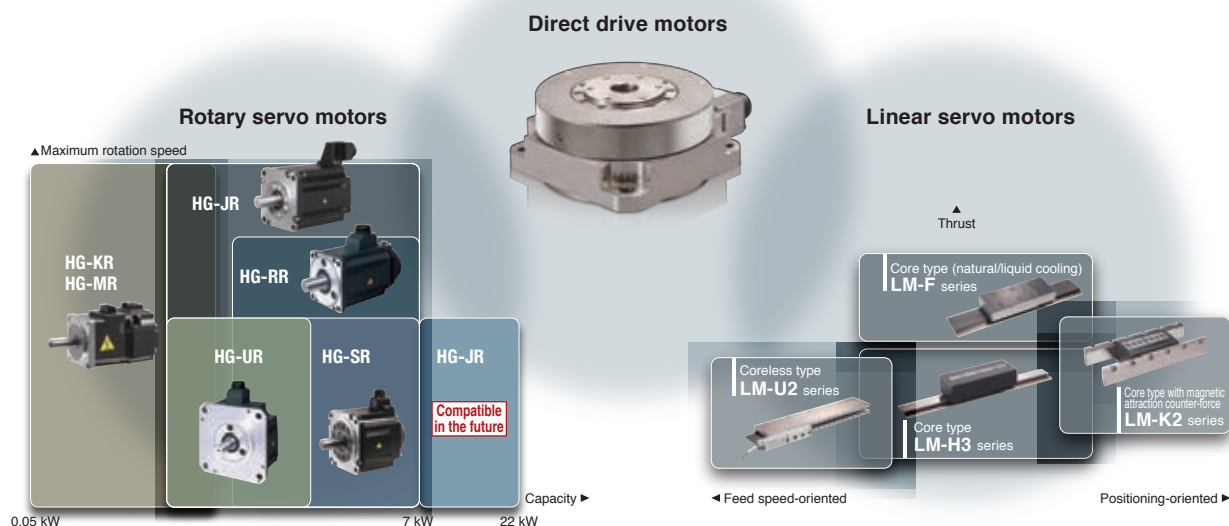
MELSERVO-J4 series is the newest member to the MELSERVO family, backed by Mitsubishi leadership in all-digital technology. With the Ethernet-based "CC-Link IE Field Network", safety, and energy-efficient design of the new MELSERVO-J4 series - man, machine, and environment can at last work together in perfect harmony.

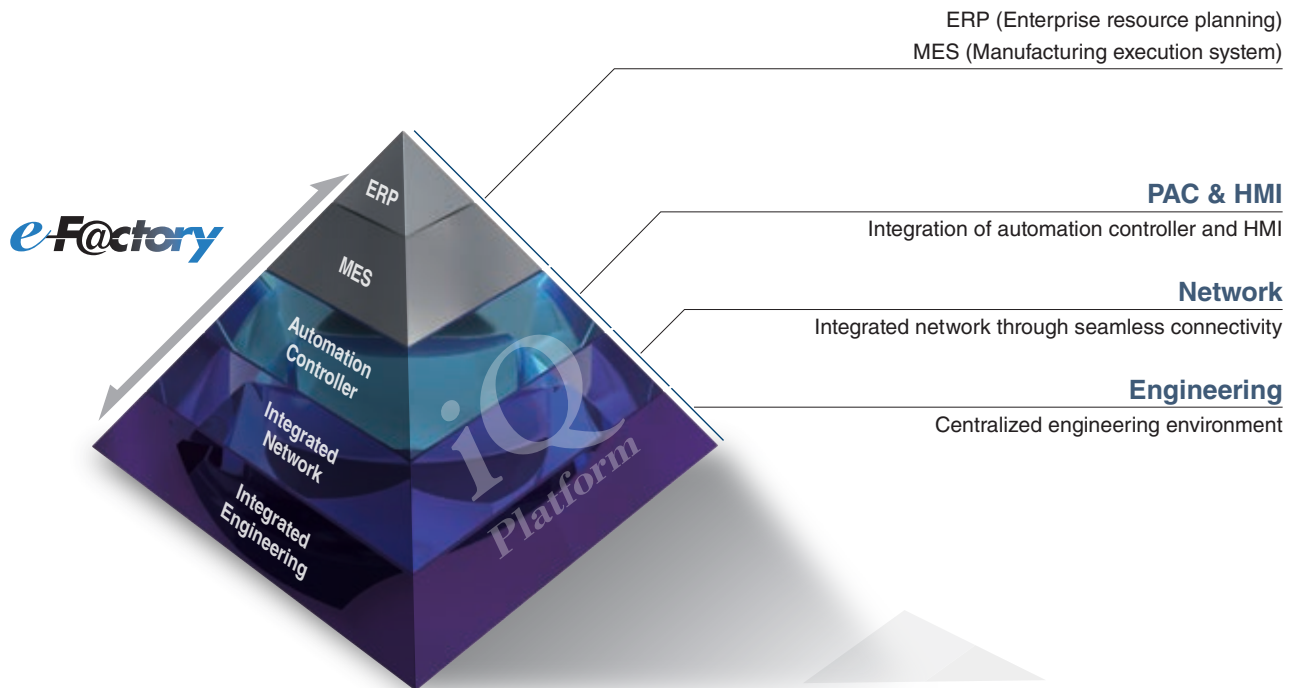## From rotary to linear and direct drive motors, a wide range of servo motors is available.

Rotary servo motors are available in capacities from 50 W to 7 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.

Direct drive motors

Rotary servo motors

▲ Maximum rotation speed

HG-JR

HG-KR
HG-MR

HG-RR

HG-UR

HG-SR

HG-JR

Compatible in the future

Capacity ▶

0.05 kW   7 kW   22 kW

Linear servo motors

▲ 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

◀ Feed speed-oriented   Positioning-oriented ▶

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.

ERP (Enterprise resource planning)
MES (Manufacturing execution system)

PAC & HMI
Integration of automation controller and HMI

Network
Integrated network through seamless connectivity

Engineering
Centralized engineering environment

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 Servo System

As the leading supplier of automation products and solutions worldwide, Mitsubishi Electric, known for its high quality and diverse range of automation products including servo system controllers, servo amplifiers, and servo motors, together with "CC-Link IE Field Network" and our exclusive engineering software, boasts a whole range of solutions specific to your needs.

SOLUTION

e-F@ctory

e-F@ctory is the Mitsubishi Electric solution for improving the performance of any manufacturing enterprise by enhancing productivity, and reducing the maintenance and operation costs together with seamless information flow throughout the plant.

HUMAN MACHINE I/F CONTROLLER

Graphic Operation Terminal

Personal computer

SOFTWARE

Programmable Controller Engineering Software
MELSOFT GX Works3

Programmable Controller Engineering Software
MELSOFT GX Works2

Servo Setup Software
MELSOFT MR Configurator2

Capacity Selection Software

NETWORK

SERVO AMPLIFIER LOW-VOLTAGE SWITCHGEAR

SERVO MOTOR

Rotary servo motor

Small capacity, low inertia
HG-KR series
Capacity: 50 to 750 W

Small capacity, ultra-low inertia
HG-MR series
Capacity: 50 to 750 W

Medium capacity, medium inertia
HG-SR series
Capacity: 0.5 to 7 kW

Medium/large capacity, low inertia
HG-JR series
Capacity: 0.5 to 7 kW

Medium capacity, ultra-low inertia
HG-RR series
Capacity: 1 to 5 kW

Medium capacity, flat type
HG-UR series
Capacity: 0.75 to 5 kW

iQ Platform Mitsubishi Electric's integrated FA platform for achieving lateral integration of controllers & HMI, engineering environments and networks at production sites.

Programmable controller

MELSEC iQ-R series

CPU module
RnCPU

CC-Link IE embedded CPU module
RnENCPU

Programmable controller

MELSEC Q series

Simple Motion module

RD77GF4
RD77GF8
RD77GF16

NEW

Master/local module

RJ71EN71
RJ71GF11-T2

Simple Motion module

QD77GF4 NEW
QD77GF8 NEW
QD77GF16

Master/local module

QJ71GF11-T2

CC-Link IE Field

CC-Link IE Field Network

Servo amplifier

MELSERVO-J4

MR-J4-GF NEW
MR-J4-GF-RJ NEW

Magnetic contactor

MS-T

Molded-case circuit breaker

WS-V

Linear servo motor

Core type
LM-H3 series
Rating: 70 to 960 N

Core type (natural/liquid cooling)
LM-F series
Rating: 300 to 1200 N (natural cooling)
Rating: 600 to 2400 N (liquid cooling)

Core type with magnetic attraction counter-force
LM-K2 series
Rating: 120 to 2400 N

Coreless type
LM-U2 series
Rating: 50 to 800 N

Direct drive motor

TM-RFM series
Rating: 2 to 240 N·m

Servo Amplifiers

CC-Link IE Field Network Compatible Servo Amplifier

MR-J4-GF NEW
MR-J4-GF-RJ NEW

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

●: Compatible

Connectable module with MR-J4-GF	MR-J4-GF	
	Motion mode	I/O mode
Simple Motion module	●	●
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

●: Compatible ▨ : Available in the future

Model	Power supply	Fully closed loop control (Note-2)	Servo motor			Capacity range [kW]		
			Rotary	Linear (Note-3)	Direct drive			
MR-J4-GF	200 V	●	●	●	●	0.1 kW — 7 kW		11 kW to 22 kW
MR-J4-GF-RJ (Note-1)	400 V	●	●	● (Note-4)	–	0.6 kW — 7 kW		11 kW to 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.
(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.
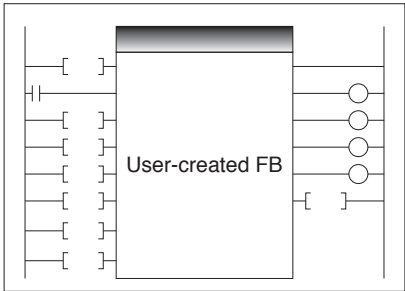(Note-4): Linear servo motor (400 V) will be compatible in the future.

Control Mode

■ Motion mode

Combined with the Simple Motion module, the servo amplifier can perform advanced motion control including multiple-axis positioning and synchronous control, in addition to speed and torque control.
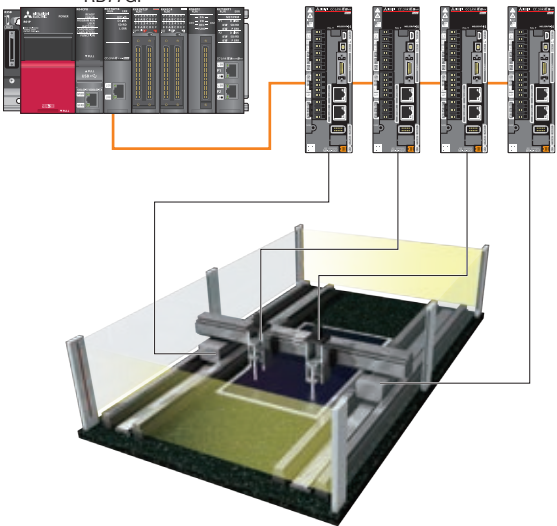
[Function block (FB)]

User-created FB

[Positioning data]

#1   #2

No.	Operation	Control		Address
1	1:CONT	08h:INC 2	···	200000.0
2	0:END	08h:INC 2	···	−200000.0

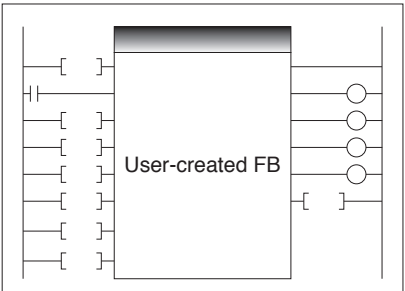Positioning operation is executed easily from a function block (FB).

RD77GF

The motion mode enables motion control including tandem control, 2-axis (X-Y) continuous trajectory 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 perform positioning operations just as easy as I/O operations, suitable for belt conveyers, rotary tables, ball screws, etc.

[Function block (FB)]

User-created FB
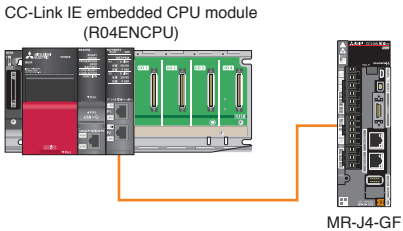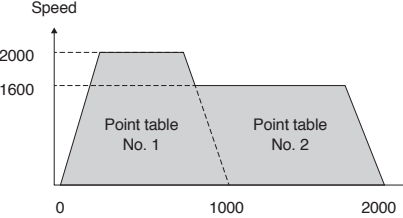
[Point table example]

No.	Position data	Speed		M-code
1	1000	2000	···	1
2	2000	1600	···	2
⋮	⋮	⋮		
255	3000	3000	···	99

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

CC-Link IE embedded CPU module
(R04ENCPU)

MR-J4-GF

Speed

2000
1600

Point table No. 1   Point table No. 2

0   1000   2000

Positioning operation will be executed after the point table No. is selected and started from the function block (FB).

3

Servo Amplifiers

Servo Amplifiers

3

Industry-leading Level of Servo Amplifier Basic Performance

[Settling time comparison]

[MR-J3]   [MR-J4]

Settling time reduced by 40% (Note-1)

▶▶▶

Settling time

Settling time

— Command — Torque — Droop pulses — In-position

(Note-1): The result is based on our evaluation condition.

[Dedicated execution engine]

■Servo amplifier control loop

Dedicated execution engine

Model-based control ← Command

Servo motor

Position control — Speed control — Current control
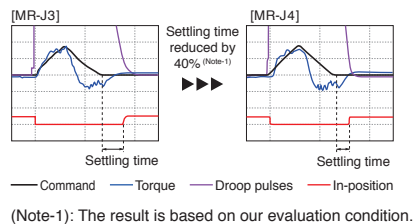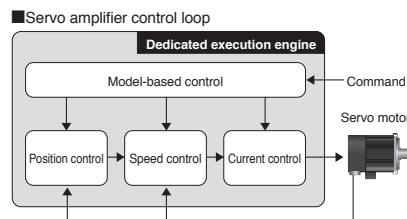
Speed frequency response of 2.5 kHz is achieved by applying our original high-speed servo control architecture evolved from the conventional two-degrees-of-freedom model adaptive control to the dedicated execution engine. Together with a high-resolution absolute position encoder of 4,194,304 pulses/rev, 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.
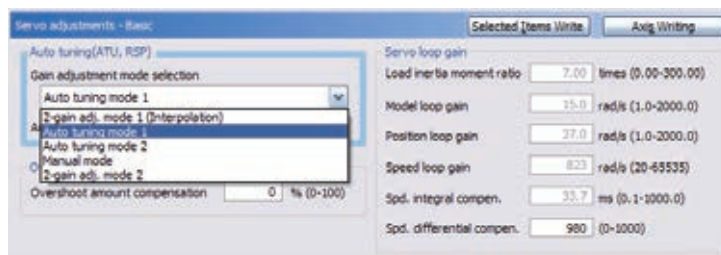
■ One-touch tuning function

Just turn on the one-touch tuning function to complete servo gain adjustment automatically, including machine resonance filter, advanced vibration suppression control II (Note-1), and robust filter for maximizing your machine performance. This function also sets responsivity automatically, while the real-time auto tuning requires manual setting.

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

— : Command — : Actual operation

Before

Speed / Time

Operation is unstable.

Speed / Time

Settling time

Operation is not following the command.

▼ Vibration suppression
▼ control and robust filter
▼ adjustment with one-touch.

After

Speed / Time

Settling time

Exactly matched.
High-speed positioning.
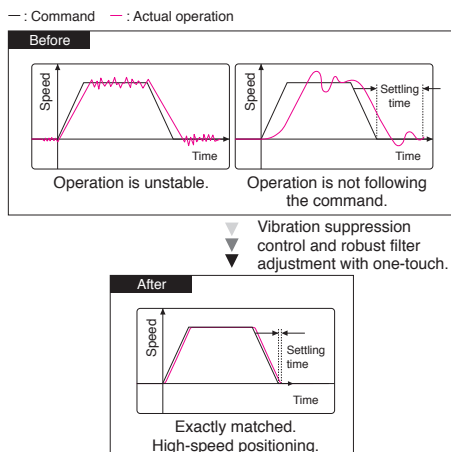
Start tuning just by clicking.

Adjustment results are displayed.
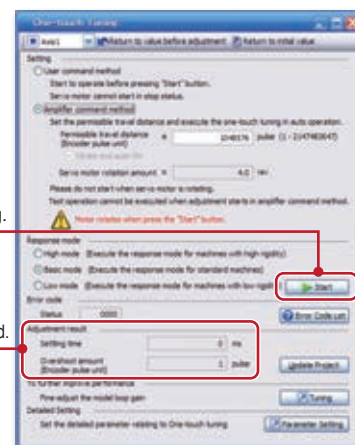
Machine, Man, Environment in perfect harmony

Functions According to IEC/EN 61800-5-2

[Shut-off by STO]

Shut-off

Safety relay circuit

Molded-case circuit breaker (MCCB)

Magnetic contactor for preventing unexpected start is no longer required.

Magnetic contactor (MC) for servo alarm (Note-1)

Servo amplifier

Servo motor

Stops motor

STO (Safe torque off) is integrated as standard, enabling the safety system to be configured easily in the machine.

● By using STO, it is not necessary to turn off the control power of the servo amplifier, resulting in shorter restart time. In addition, home position return is not also necessary.
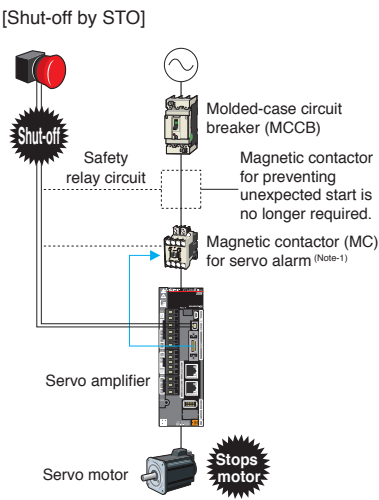
● Magnetic contactor for preventing unexpected motor start is not needed. (Note-1)

(Note-1): For MR-J4 series servo amplifier, magnetic contactors are not required to meet the STO requirements. However, this figure has a magnetic contactor installed to prevent servo alarms and electric shock.

IEC/EN 61800-5-2:2007 function	Safety level
STO (Safe torque off)	Category 3, PL e, SIL 3 (Note-2)

(Note-2): Parameter setting is required to meet Category 3, PL e, SIL 3.

Touch Probe Function

CC-Link **IE** Field

Mark sensor
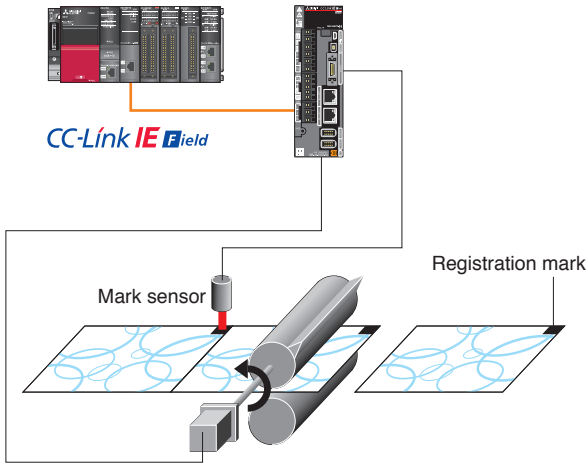
Registration mark

The touch probe function latches a current position when the registration mark signal is turned ON.
The current position is transmitted to the Simple Motion module via CC-Link IE Field Network and used for compensating the servo amplifier axis.

Servo Amplifiers

Direct Access to IT System

Information of the servo amplifiers and the servo motors is collected via CC-Link IE Field Network.
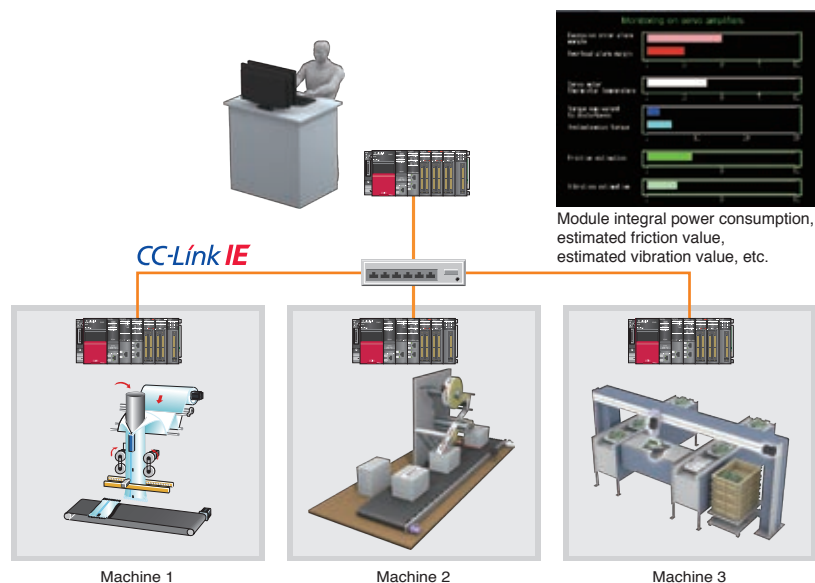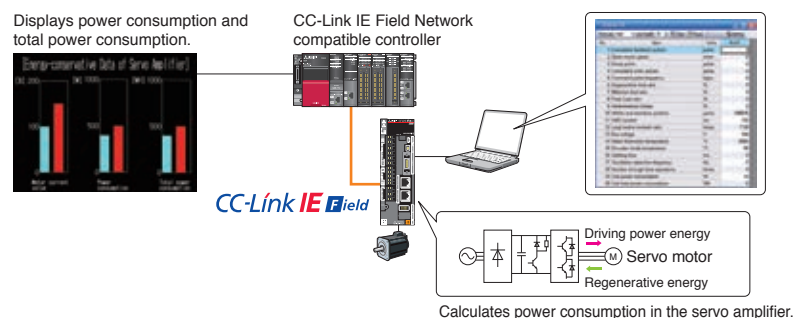The information is centralized by a host system and can be used for managing the status of the entire line.
The CC-Link IE Field Network compatible servo system helps IoT [Note-1] of the machine.

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

CC-Link IE

Machine 1　　　　　Machine 2　　　　　Machine 3

Module integral power consumption, estimated friction value, estimated vibration value, etc.

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.

Displays power consumption and total power consumption.

CC-Link IE Field Network compatible controller

CC-Link IE Field

Driving power energy
Servo motor
Regenerative energy

Calculates power consumption in the servo amplifier.

Preventive Maintenance

Machine diagnosis function detects changes of machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier, supporting timely maintenance of the driving parts.
In addition, the data are transferred to the host system and used to monitor the entire line.

[Machine diagnosis function window]

Host system
CC-Link IE Ethernet

CC-Link IE Field
Servo amplifier

Estimated vibration value is displayed.

Estimated friction value is displayed.

Data is transferred to the controller via CC-Link IE Field Network.
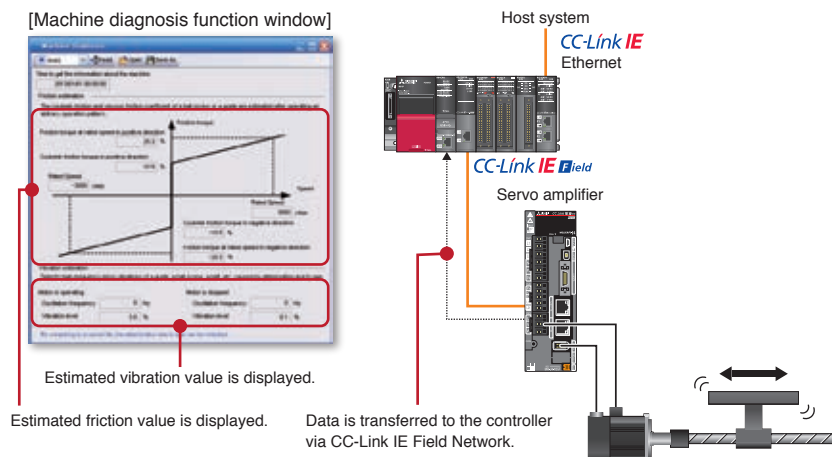
Backup/Restoration

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

GOT2000

Servo amplifier

I/O module   Inverter

CC-Línk IE Field

Data is transferred to the controller via CC-Link IE Field Network.
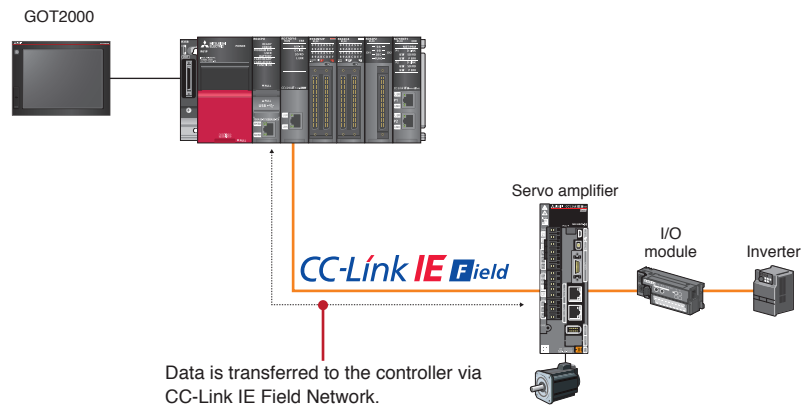
Large Capacity Drive Recorder

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 MELSOFT MR Configurator2 helps you analyze the cause of the alarm.
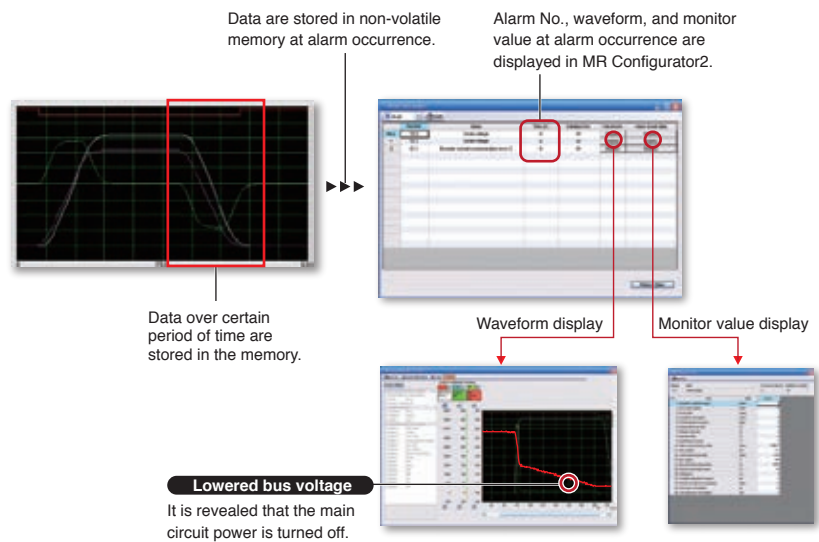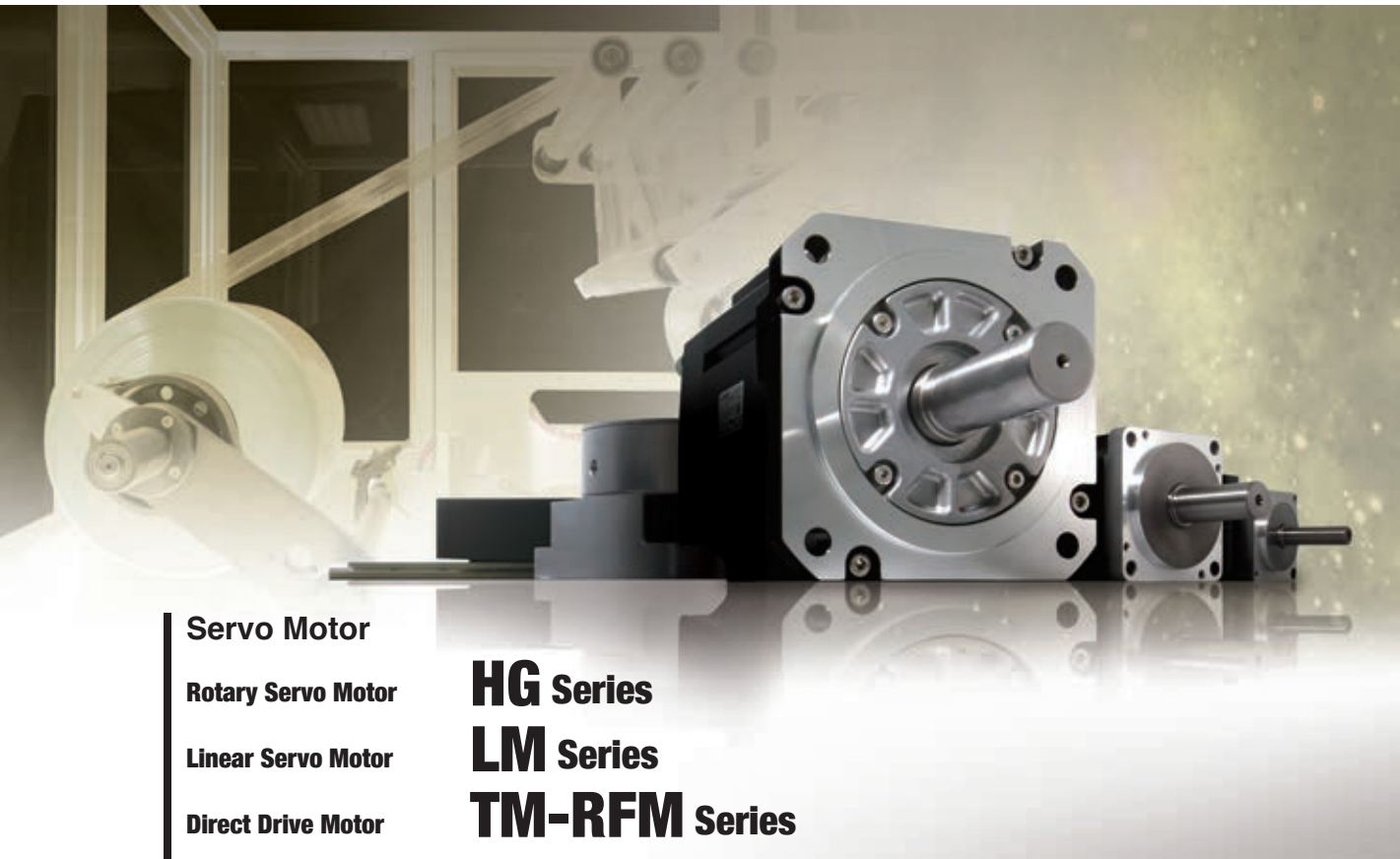
Data are stored in non-volatile memory at alarm occurrence.

Alarm No., waveform, and monitor value at alarm occurrence are displayed in MR Configurator2.

▶▶▶

Data over certain period of time are stored in the memory.

Waveform display   Monitor value display

Lowered bus voltage
It is revealed that the main circuit power is turned off.

3

Servo Amplifiers

Servo Motor

Rotary Servo Motor **HG** Series

Linear Servo Motor **LM** Series

Direct Drive Motor **TM-RFM** 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

HG-KR/HG-MR/HG-RR/HG-UR and HG-SR/HG-JR are rated IP65 and

IP67 [Note-1], respectively. [Note-2]

(Note-1): HG-JR1000 r/min series 15 kW or larger, and HG-JR1500 r/min series 22 kW or larger are rated IP44. HG-JR series servo motors of 8 kW or larger will be compatible in the future.
(Note-2): The shaft-through portion is excluded.

Protected from
water and dust.
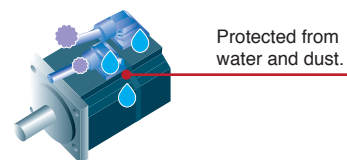
■ Cable Leading Direction

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)

Selectable mounting direction

In direction
of load side

In opposite direction
of load side
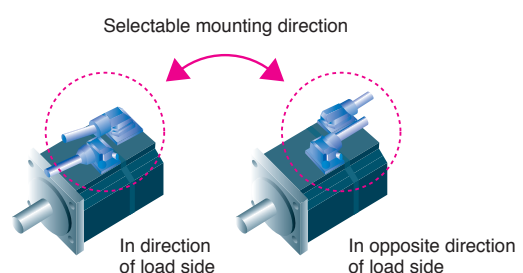
Product lines

: Compatible in the future

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
HG-SR	2000	3000	0.5 kW — 7 kW	IP67
HG-JR	3000	6000/5000	0.5 kW — 9 kW	IP67
HG-JR	1500	3000/2500	7 kW — 22 kW	IP67/IP44
HG-JR	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 example]
●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 example]
●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 7 kW Rated speed: 1000 r/min, 1500 r/min, and 3000 r/min
[Application example]
●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 example]
●Roll feeders ●Loaders and unloaders
●Ultra high-throughput material handling systems

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 example]
●Robots ●Conveyors ●Winders and tension machines
●Food processing machines

Linear Servo Motor

Suitable for linear motion systems requiring high speed and accuracy

■ 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)
- Enabling an advanced 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
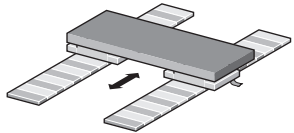
Multi-head configuration
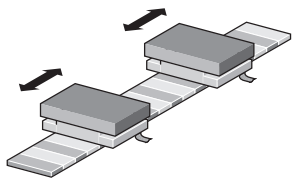
■ Product lines

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

10   100   1000   10000   100000

▲ Thrust

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

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

Coreless type
LM-U2 series

Core type
LM-H3 series

Positioning-oriented ▶

◀ Feed speed-oriented
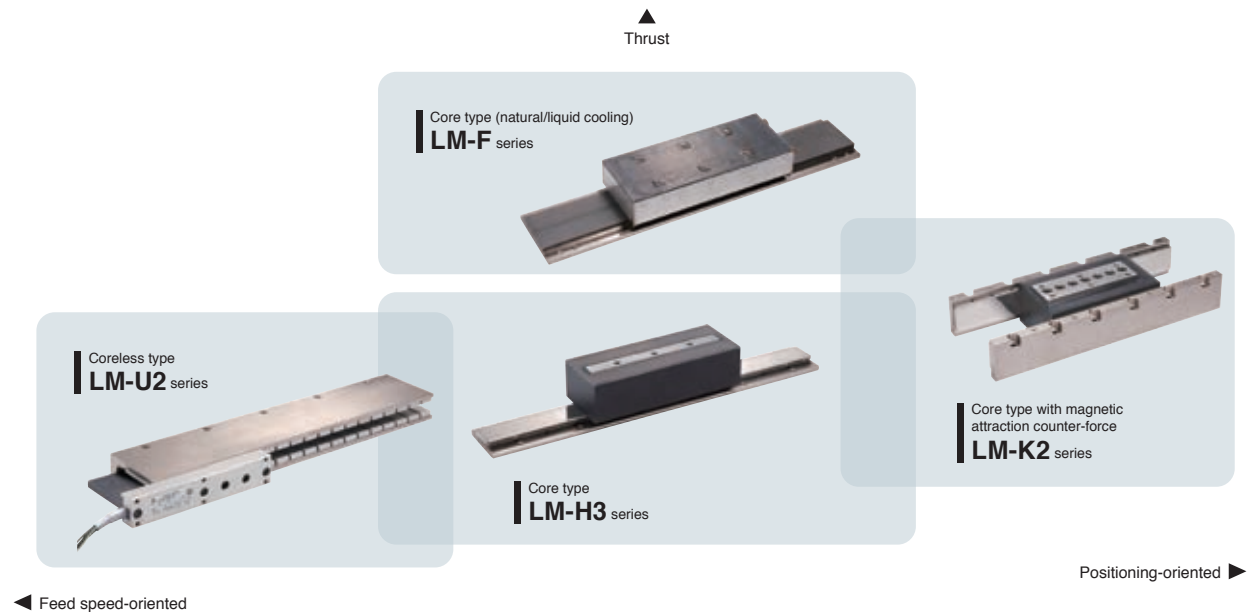
Direct Drive Motor

For compact and simplified machine driving part with high-accuracy control

■ 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.
● 20-bit high-resolution absolute position encoder
  The direct drive motor is equipped with 20-bit high-resolution absolute position encoder (1,048,576 pulses/rev) as standard, increasing positioning accuracy.
● Hollow shaft diameter range: ø20 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.

4

Servo Motors

■ Product lines

Series	Rated speed [r/min]	Maximum speed [r/min]	Rated torque [N·m]　　Maximum torque [N·m]	IP rating [Note-1]
TM-RFM	200	500	2 N·m – 6 N·m (rated); 6 N·m – 18 N·m (max)	IP42
	200	500	6 N·m – 18 N·m (rated); 18 N·m – 54 N·m (max)	IP42
	200	500	12 N·m – 72 N·m (rated); 36 N·m – 216 N·m (max)	IP42
	100	200	40 N·m – 240 N·m (rated); 120 N·m – 720 N·m (max)	IP42

1　　10　　100　　1000

(Note-1): Connectors and gap between rotor and stator are excluded.

Smooth rotation makes it suitable for a rotary axis of polishing systems.

The hollow shaft allows cables and air tubing to pass through.

The high-resolution encoder enables more accurate machines.

Compact and low-profile design contributes to smaller machines.

TM-RFM series
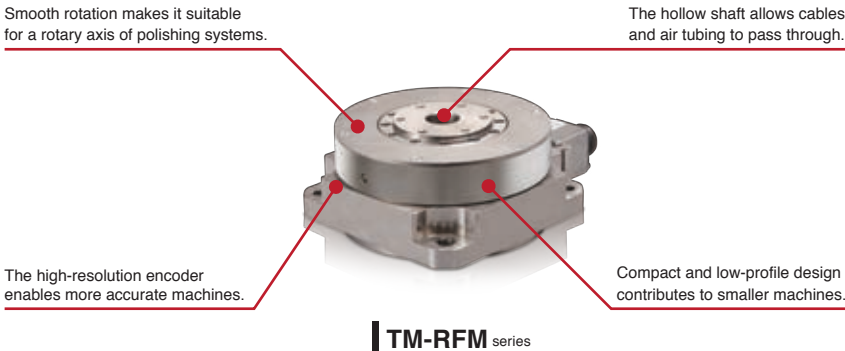
MR-J4-GF Product lines

■**Servo amplifier**

●: Compatible   —: Not compatible

Servo amplifier (*5)		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-RFM
																	(*3)				
CC-Link IE Field Network	MR-J4-GF(-RJ) (*4) NEW	1 axis	3-phase 200 VAC	0.1, 0.2, 0.4, 0.6, 0.75, 1, 2, 3.5, 5, 7	●	●	●	●	●	●	●	●	●	—	●	●	●	●	●	●	●
			3-phase 400 VAC	0.6, 1, 2, 3.5, 5, 7	●	●	●	●	●	—	—	●	●	—	—	—	—	—	—	—	—

*1. The listed are the rated output of the servo amplifier. For the compatible servo motor capacities, refer to "MELSERVO-J4 catalog (L(NA)03058)."
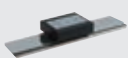*2. MR-J4-GF is compatible with two-wire type serial linear encoders. For four-wire type serial linear encoders and pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ.
*3. MR-J4-GF is compatible with two-wire type and four-wire type serial linear encoders. For pulse train interface (A/B/Z-phase differential output type) linear encoders, use MR-J4-GF-RJ.
*4. MR-J4-GF(-RJ) of 11 kW or larger will be available in the future.
*5. Some functions are available only with the servo amplifier with specific versions. Refer to relevant Servo Amplifier Instruction Manual for details.

■**Linear servo motor**

Linear servo motor series		Maximum speed [m/s]	Continuous thrust [N] (*1, 2)	Maximum thrust [N] (*1, 2)	Cooling method	Features	Application examples
Core type	LM-H3 series	3.0	9 types 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.	•Mounters •Wafer cleaning systems •LCD assembly machines •Material handlings
	LM-F series	2.0	8 types 300, 600, 900, 1200, 1800, 2400, 3000	1800, 3600, 5400, 7200, 10800, 14400, 18000	Natural cooling	Compact size. The integrated liquid-cooling system doubles the continuous thrust.	•Press feeders •NC machine tools •Material handlings
		2.0	8 types 600, 1200, 1800, 2400, 3600, 4800, 6000	1800, 3600, 5400, 7200, 10800, 14400, 18000	Liquid cooling		
	LM-K2 series	2.0	7 types 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 life of the linear guides and lower audible noise.	•Mounters •Wafer cleaning systems •LCD assembly machines
Coreless type	LM-U2 series	2.0	9 types 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 life of the linear guides.	•Screen printing systems •Scanning exposure systems •Inspection systems •Material handlings

*1. ▢ will be compatible in the future with 400 V.
*2. ▢ will be compatible in the future.

■Rotary servo motor

●: Available　—: Not available

Rotary servo motor series		Rated speed (maximum speed) [r/min]	Rated output [kW] (*1)	Servo motor type			IP rating (*3)	Features	Application examples
				With electro-magnetic brake (B)	With reducer (G1) (*2)	With reducer (G5, G7) (*2)			
Small capacity	**HG-KR series**	3000 (6000)	5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	●	●	IP65	Low inertia Perfect for general industrial machines.	•Belt drives •Robots •Mounters •Sewing machines •Food processing machines •Semiconductor manufacturing equipment •Knitting and embroidery machines
	HG-MR series	3000 (6000)	5 types 0.05, 0.1, 0.2, 0.4, 0.75	●	—	—	IP65	Ultra-low inertia Well suited for high-throughput operations.	•Inserters •Mounters
Medium capacity	**HG-SR series**	1000 (1500)	6 types 0.5, 0.85, 1.2, 2.0, 3.0, 4.2	●	—	—	IP67	Medium inertia This series is available with two rated speeds.	•Material handling systems •Robots
		2000 (3000)	14 types 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** (*6)	3000 (6000: 0.5 to 5 kW) (5000: 7, 9 kW)	18 types 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.	•Food packaging machines •Printing machines
		1500 (3000: 7 to 15 kW) (2500: 22 kW)	14 types 7.0, 11, 15, 22 7.0, 11, 15, 22	● (*5)	—	—	IP67/ IP44 (*4)		•Injection molding machines •Press machines
		1000 (2000: 6 to 12 kW) (1500: 15 to 25 kW)	16 types 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)	5 types 1.0, 1.5, 2.0, 3.5, 5.0	●	—	—	IP65	Ultra-low inertia Well suited for high-throughput operations.	•Ultra-high-throughput material handling systems
Medium capacity, flat type	**HG-UR series**	2000 (3000: 0.75 to 2 kW) (2500: 3.5, 5 kW)	5 types 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.	•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-JR1500 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 electromagnetic brake is not available for HG-JR 1500 r/min series 22 kW, and 1000 r/min series 15 kW or larger.
*6. HG-JR series servo motors of 8 kW or larger will be compatible in the future.

■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
TM-RFM series	ø130	ø20	200	500	3 types 2, 4, 6	6, 12, 18	IP42	•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.	•Semiconductor manufacturing devices •Liquid crystal manufacturing devices •Machine tools
	ø180	ø47	200	500	3 types 6, 12, 18	18, 36, 54	IP42		
	ø230	ø62	200	500	3 types 12, 48, 72	36, 144, 216	IP42		
	ø330	ø104	100	200	3 types 40, 120, 240	120, 360, 720	IP42		

*1. Connectors and gap between rotor and stator are excluded.

4

Servo Motors

Simple Motion Modules

CC-Link IE Field Network Compatible
Simple Motion Module

RD77GF4/RD77GF8/RD77GF16 NEW
QD77GF4 NEW /QD77GF8 NEW /QD77GF16

The Simple Motion module is the module that enables various motion control, such as positioning including interpolation and trajectory control, synchronous, cam, and speed-torque control.
Advanced motion control is easily performed by parameter settings and a sequence program, such as a function block (FB).
The 4, 8, and 16-axis models are available to best suit your control needs.

CC-Link IE Field Network Compatible Simple Motion Module

This CC-Link IE Field Network compatible Simple Motion module has not only a function for Motion control, but also a function as a master station of CC-Link IE Field Network.
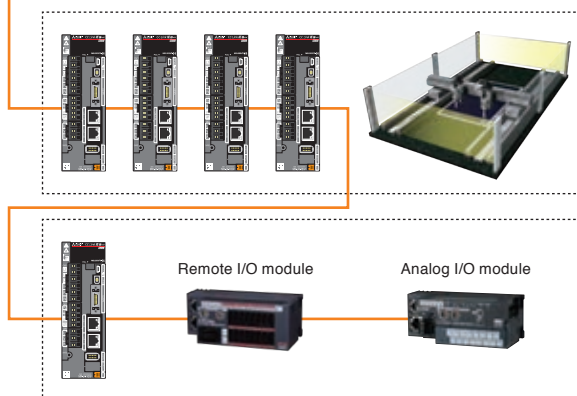
Motion mode
This mode enables advanced Motion control, such as positioning for multi-axis interpolation, synchronous, and speed-torque control in combination with the Simple Motion module.
Maximum number of control axes: 16 axes

Remote I/O module   Analog I/O 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.
Number of control stations: 120 stations
RD77GF: Including the number of motion mode compatible servo amplifiers
QD77GF: 16 motion mode compatible servo amplifiers + 104 I/O devices

CC-Link IE Field Network Master Station

Simple Motion module

Master/local module

CC-Link IE Field Network Simple Motion module
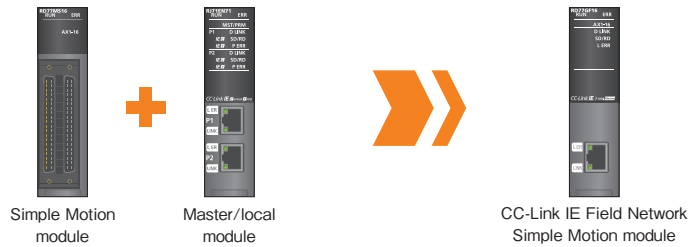
The CC-Link IE Field Network compatible Simple Motion module is equipped with functions as a link device and a master station equivalent to a CC-Link IE field Network master/local module. [Note-1] Suppressing the cost of a system configuration is possible since this module is used not only for Motion control, but also as a master station of the network.

(Note-1): The sub-master and safety communication functions are not supported.

■Maximum link points per network

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

Diagnosis and Setting Functions by CC-Link IE Field Network

Setting parameters and collecting information of field devices are possible from anywhere via CC Link IE Field Network.

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.

CC-Link IE Field Configuration

Network diagnostics

CC-Link IE

Machine 1

Machine 2

Machine 3

Simple Motion Modules
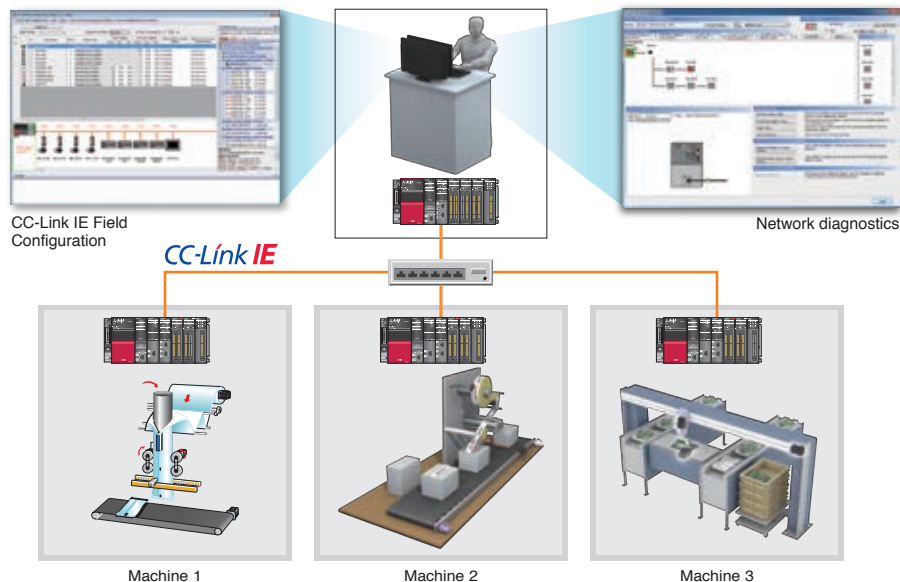
Programming

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

■ Function Block `Compatible in the future`

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

	PLC CPU
MC_MoveAbsolute_RD77(MC_MoveAbsolute+RD77)	

Input	Output
Axis1 — DUT: Axis	Axls:DUT
B90 — B:Excute	Done:B — B590
W90 — W:PositionDataNo	Busy:B — B591
W92 — E:Position	Command A borted:B — B592
W94 — E:Velocity	Error:B — B593
W96 — D:Acceleration	Error ID:W — W590
W98 — D:Deceleration	
mcNega•• — W:Direction	

Servo amplifier

MR-J4-GF
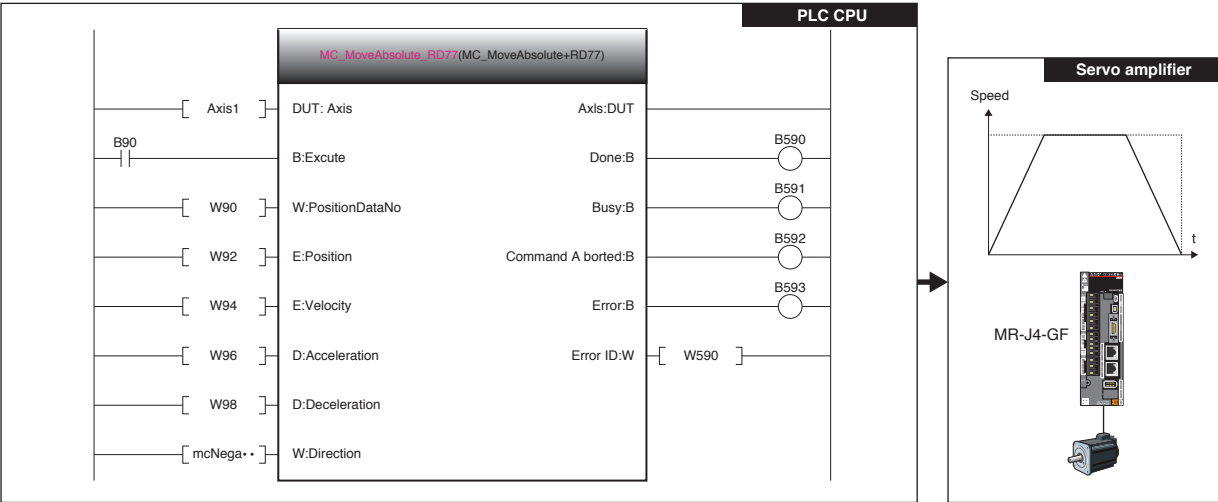
■ Sequence Program

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

	PLC CPU
M0 DX10	
BUSY	
MOVP K1 U0\ G4300	Positioning data No.1
SET Y10	Program start
RST M0	Start device reset

Servo amplifier

MR-J4-GF

Axis #1 Positioning Data — Simple Motion module

No.	Operation pattern	Control system	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed
1	1: CONT	02h: INC Linear 1	—	0: 1000	0: 1000	200000.0 μm	0.0 μm	20000.00 mm/min
	<Positioning Comment>							
2	0: END	02h: INC Linear 1	—	0: 1000	0: 1000	-200000.0 μm	0.0 μm	10000.00 mm/min
	<Positioning Comment>							

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 application achieves optimal solutions.
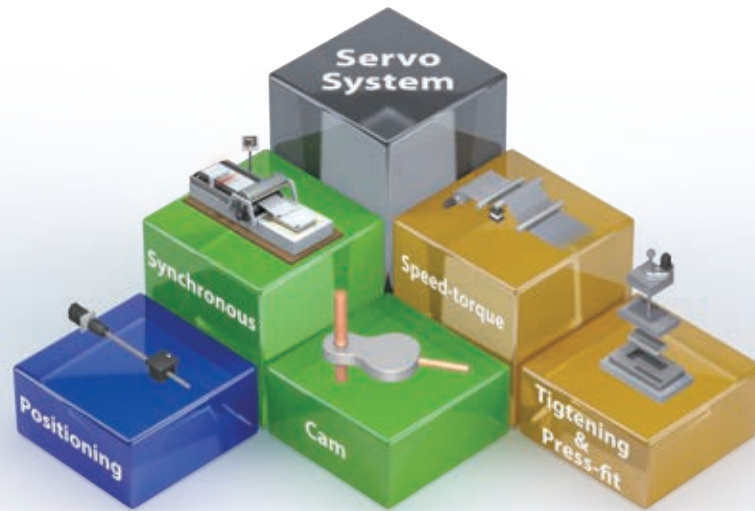
■ Positioning control (Interpolation Function and Trajectory Control)

Positioning control is easily performed with a Motion profile table in the sequence program.
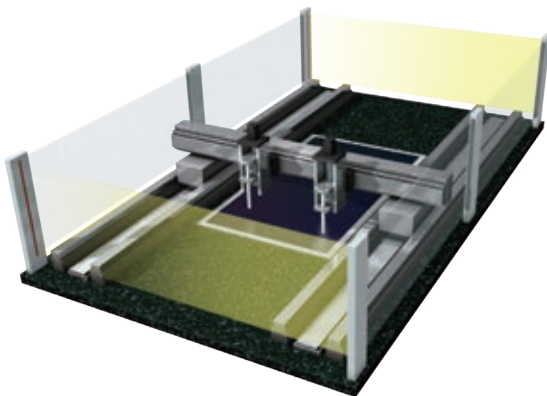
- ● To respond to various application needs, the Simple Motion module offers various control methods, such as linear interpolation, 2-axis circular interpolation, fixed-pitch feed, and continuous trajectory control.
- ● Setting positioning addresses and speeds, etc. in the sequence program enables automatic operation.
- ● Powerful auxiliary functions, such as M-code output, skip, speed change, and target position change functions, are available.

Simple Motion Modules

■ Advanced Synchronous Control

RD77GF

MR-J4-GF
MR-J4-GF-RJ

Serial absolute synchronous encoder (Note-1)

Mark sensor
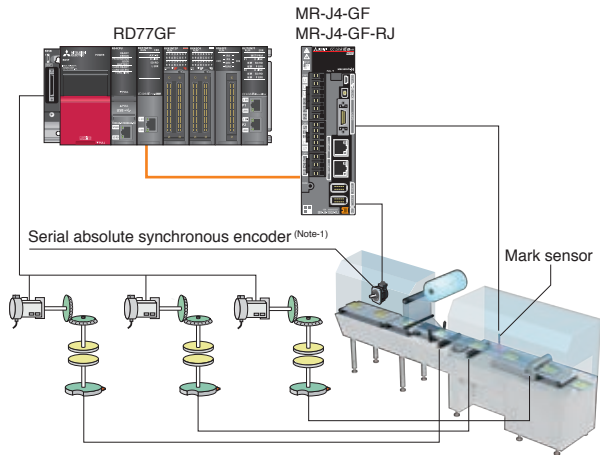
The advanced synchronous control can be achieved using software instead of controlling mechanically with physical gears, shafts, clutches, speed change gears or cams etc. Additionally, a cam is easily created with the cam auto-generation function. The synchronous control is started/ended on an axis-by-axis basis, thus enabling mixed axes of synchronous control and positioning control in one project.

(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
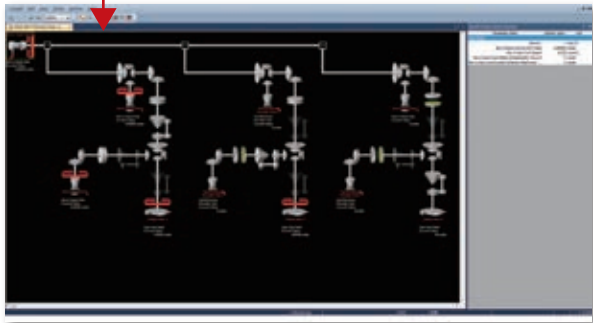
Module configuration

● 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 on each module and parameter settings are possible.

■ Speed-torque Control

The Simple Motion module is used for tension control, such as unwinding or rewinding applications. Since the current position is controlled even during the speed-torque control, the positioning operation based on the absolute position coordinates is performed after switching from the speed-torque control back to the position control.

Unwinding axis: Torque control

Tension detector   Tension meter

Rewinding axis: Speed control

ACL

FR-CV series
Power regeneration
common converter

MR-J4-GF
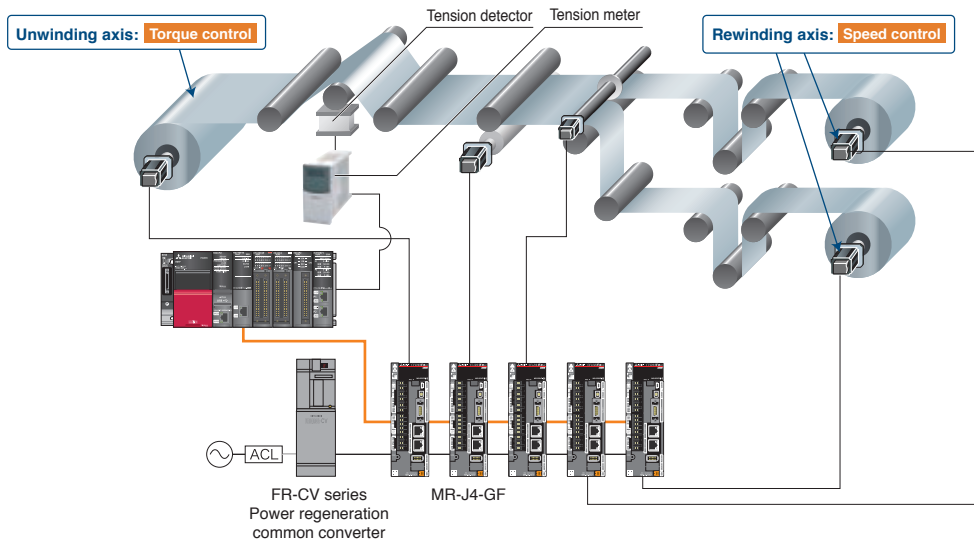
Various Functions

JOG operation

While the JOG start signal is ON, the workpiece is being moved in the designated direction.
JOG operation can be used without completing home position return.

Motion profile table

A motion profile table, where position data and feed speed are set, is used in this automatic operation. Once the start operation signal is turned ON, instructions are executed sequentially from the set start point to the set 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. If the home position return is executed at the start of system, after that, it is unnecessary to carry out the home position return again when the power is turned ON.

Step function

This function temporarily stops the operation to confirm the positioning operation during debugging, etc.
The operation can be 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 can be 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 make up 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 can be performed by disabling the stroke limit function. This function can be 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. So, you can execute 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 carries out the next positioning. It can be 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 can be 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.

Simple Motion Modules

CC-Link IE Field
MELSEC iQ-R series

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

RD77GF4/RD77GF8/RD77GF16

PLC CPU

RD77GF

GOT

USB
Ethernet

Engineering environment

Programmable Controller Engineering Software
MELSOFT GX Works3

CC-Link IE Field

MR-J4-GF
MR-J4-GF-RJ **Motion mode: Up to 16 axes**

Rotary
servo motor

Linear
servo motor

Direct
drive motor

Head
module

HMI
(GOT)

Inverter

Remote I/O
module

Local station

Analog
module

CC-Link IE
Field-
AnyWire
ASLINK
Bridge module

High-speed
counter
module

Bridge
module

MR-J4-GF
MR-J4-GF-RJ

I/O mode

CC-Link

CC-Link

CC-Link
CC-Link/LT
Bridge module

Remote I/O
module

Inverter

CC-Link-AnyWire
DB A20
Bridge module

Remote I/O
module

Sensor

CC-Link/LT

Anywire DB A20
Anywire Bitty

AnyWireASLINK

I/O module

Sensor

Photoelectric
sensor
(diffuse reflection type)

Proximity
sensor

Photo
interrupter

Slave station: 120 stations (Including the number of motion mode compatible servo amplifiers)

(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

PLC CPU — QD77GF

GOT

USB
Ethernet

Engineering environment

Programmable Controller Engineering Software
MELSOFT GX Works2

Servo Setup Software
MELSOFT MR Configurator2

**MR-J4-GF
MR-J4-GF-RJ**　　**Motion mode: Up to 16 axes**

CC-Link IE Field

Rotary
servo motor

Linear
servo motor

Direct
drive motor

HMI
(GOT)

Inverter

Remote I/O
module

Head
module

Analog
module

CC-Link IE
Field-
AnyWire
ASLINK
Bridge module

High-speed
counter
module

Bridge
module

MR-J4-GF
MR-J4-GF-RJ

I/O mode

CC-Link

CC-Link
CC-Link/LT
Bridge module

Remote I/O
module

Inverter

CC-Link-AnyWire
DB A20
Bridge module

CC-Link

Remote I/O
module

Sensor

CC-Link/LT

Anywire DB A20
Anywire Bitty

AnyWireASLINK

I/O module

Sensor

Photoelectric
sensor
(diffuse reflection type)

Proximity
sensor

Photo
interrupter

Slave station: 120 stations (16 motion mode compatible servo amplifiers + 104 I/O devices)

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

Simple Motion Modules

■Module specifications

Simple Motion module RD77GF4/RD77GF8/RD77GF16

Item	Specifications		
	RD77GF4	RD77GF8	RD77GF16
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, Ethernet)		
Manual pulse generator operation function	Possible to connect 1 module (via link device)		
Synchronous encoder operation	4 modules	8 modules	16 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)		
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	R04CPU, R08CPU, R16CPU, R32CPU, R120CPU, R04ENCPU, R08ENCPU, R16ENCPU, R32ENCPU, R120ENCPU

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)		
	Recommended wire size	AWG24 (0.2 mm^2)		
Forced stop input signal (EMI)	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		
	Response time	1 ms or less (OFF→ON, ON→OFF)		
	Recommended wire size	AWG24 (0.2 mm^2)		
Manual pulse generator/Incremental synchronous encoder signal	Signal input form	Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN		
	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	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)		
	Master station — RY	16k points (16384 points, 2k bytes)			8k points (8192 points, 1k byte)		
	Master station — RWr	8k points (8192 points, 16k bytes)			1k points (1024 points, 2k bytes)		
	Master station — RWw	8k points (8192 points, 16k bytes)			1k points (1024 points, 2k bytes)		
	Local station — RX	2k points (2048 points, 256 bytes)			—		
	Local station — RY	2k points (2048 points, 256 bytes)			—		
	Local station — RWr	1k points (1024 points, 2k bytes)			—		
	Local station — RWw	1k points (1024 points, 2k bytes)			—		
	Intelligent device station — RX	2k points (2048 points, 256 bytes)			2k points (2048 points, 256 bytes)		
	Intelligent device station — RY	2k points (2048 points, 256 bytes)			2k points (2048 points, 256 bytes)		
	Intelligent device station — RWr	1k points (1024 points, 2048 bytes)			1k points (1024 points, 2048 bytes)		
	Intelligent device station — 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		
	Remote device station — RY	128 points, 16 bytes			128 points, 16 bytes		
	Remote device station — RWr	64 points, 128 bytes			64 points, 128 bytes		
	Remote device station — 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-(Category 5e))					
	Topology	Line type, star type, line/star mixed type					
Overall cable distance	Line type [m(ft.)]	12000(39370.08) (When 1 master station and 120 slave stations are connected)					
	Star type	Depends on system configuration					
Maximum stations per network		121 stations (1 master station. 120 slave stations)			121 stations (1 master station. 120 slave 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.

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

■Products on the Market

Ethernet Cable

Item		Model		Note
Ethernet cable	For indoor	SC-E5EW-S_M	_: cable length (100 m max., unit of 1 m)	Double shielded cable (Category 5e)
	For moving part, indoor	SC-E5EW-S_M-MV	_: cable length (45 m max., unit of 1 m)	
	For indoor/outdoor	SC-E5EW-S_M-L	_: cable length (100 m max., unit of 1 m)	

Manual pulse generator

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

Product	Model	Description	Manufacturer
Manual pulse generator	RE45BA2R5C	Number of pulses per revolution: 25 pulse/rev (100 pulse/rev after magnification by 4), Permitted speed: 200 r/min (Normal rotation)	Tokyo Sokuteikizai Co., Ltd.
	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	QD77GF4	QD77GF8	QD77GF16
Maximum number of control axes (Virtual servo amplifier axis included)		4 axes	8 axes	16 axes	4 axes	8 axes	16 axes
Operation cycle (Operation cycle settings)		0.5 ms, 1.0 ms, 2.0 ms, 4.0 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) (Note-1)					
Control modes		PTP (Point To Point) control, Trajectory control (Linear, arc, and helical), Speed control, Speed-position switching control, Position-speed switching 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					
	Fast home position return control	Provided					
Positioning control	Linear control	Linear interpolation control (Up to 4 axes) (Note-2) (Vector speed, Reference axis speed)					
	Fixed-pitch feed control	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 control	INC mode, ABS mode					
	Position-speed switching control	INC mode					
	Current value change	Positioning data, Start No. for a current value changing					
	NOP instruction	Provided					
	JUMP instruction	Unconditional JUMP, Conditional JUMP					
	LOOP, LEND	Provided					
	High-level positioning control	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			Via internal interface		
Expansion control	Speed-torque control	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	4CH		
	Internal interface	—			1CH (Incremental)		
	Via CPU	Provided (Incremental)					
	Via link device	Provided (Incremental)					
	Via servo amplifier	4CH	8CH	16CH	4CH		
Functions that limit control	Speed limit function	Speed limit value, JOG speed limit value					
	Torque limit function	Torque limit value same setting, torque limit value individual setting					
	Forced stop	Valid/Invalid setting					
	Software stroke limit function	Movable range check with current feed value, movable range check with machine feed value					
	Hardware stroke limit function	Provided					
Functions that change control details	Speed change function	Provided					
	Override function	0 to 300 [%]					
	Acceleration/deceleration time change function	Provided					
	Torque change function	Provided					
	Target position change function	Target position address and speed are changeable					
Other functions	M-code output function	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 link device	Provided			—		
	Via servo amplifier	Provided			Provided		
Event history function		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-4)			Up to 4 points		
	Mark detection setting	16 settings					
Optional data monitor function		4 points/axis					
Digital oscilloscope function (Note-3)	Bit data	16CH					
	Word data	16CH					

(Note-1): Available with RD77MS.
(Note-2): 4-axis linear interpolation control is enabled only at the reference axis speed.
(Note-3): 8CH word data and 8CH bit data are displayed in real time.
(Note-4): The synchronous input timing acquisition function of a remote input module is used.

■Synchronous control specifications

Item		Number of settable axes					
		MELSEC iQ-R series			MELSEC-Q series		
		RD77GF4	RD77GF8	RD77GF16	QD77GF4	QD77GF8	QD77GF16
Input axis module	Servo input axis	4 axes/module	8 axes/module	16 axes/module	4 axes/module	8 axes/module	16 axes/module
	Synchronous encoder axis	4 axes/module	8 axes/module	16 axes/module	4 axes/module		
Main shaft 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 module	Auxiliary shaft	1 module/output axis					
	Auxiliary shaft gear	1 module/output axis					
	Auxiliary shaft clutch	1 module/output axis					
	Auxiliary shaft composite gear	1 module/output axis					
Speed change gear module	Speed change gear	2 modules/output axis					
Output axis module	Output axis (Cam axis)	4 axes/module	8 axes/module	16 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	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 [Note-1]			Up to 256 [Note-1]					
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
		Stroke ratio	-214.7483648 to 214.7483647 [%]								
	Coordinate data type	Maximum number of cam registration	RD77GF								
			Number of coordinates	128	256	512	1024	2048	4096	8192	16384	32768	65535
			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	32768
			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 cutter		Available			Available					
	Easy stroke ratio cam		Available			—					
	Advanced stroke ratio cam		Available			—					

(Note-1): The number of registration varies depending on memory capacity, cam resolution, and the number of coordinates.

■Compatibility with servo amplifier

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

(Note-1): Only QD77GF16 with the first 5 digits of product information on and after 17102 is compatible with MR-J4-GF(-RJ).

■Component

Part		Model	Description	Standards
Simple Motion modules	MELSEC iQ-R series	RD77GF4 NEW	Up to 4 axes	CE, UL, KC
		RD77GF8 NEW	Up to 8 axes	CE, UL, KC
		RD77GF16 NEW	Up to 16 axes	CE, UL, KC
	MELSEC-Q series	QD77GF4 NEW	Up to 4 axes	CE, UL, KC
		QD77GF8 NEW	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.

5

Simple Motion Modules

GX Works3

One Software, Many Possibilities

GX Works3 consists of various different components that help to simplify project creation and maintenance tasks.
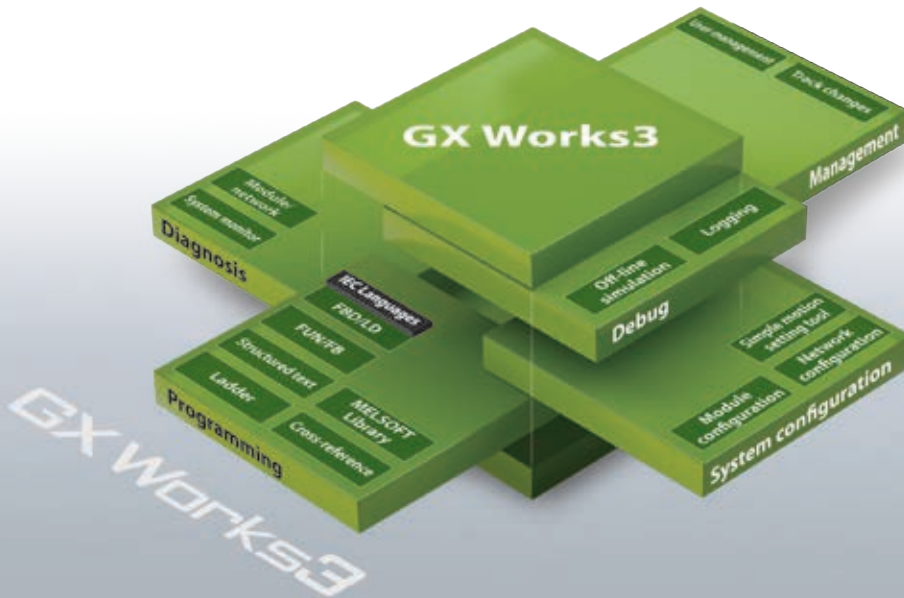
All-in-one Tool for Quick and Easy Startup

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.

MELSOFT
GX Works3
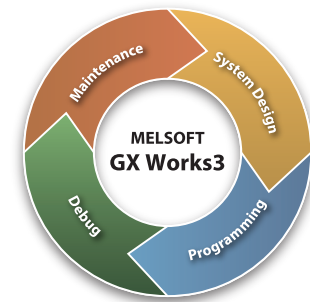
All-in-One Engineering Software

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 configuration]

Easy programming

Simple point-and-click programming

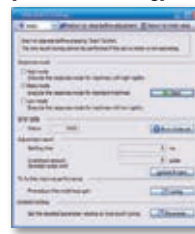● A sequence program is created effortlessly via drag & drop of module labels/FBs.

[Sequence program]

Module label

Module FB

System Design	Programming

Debug	Maintenance

Easy motion control

[Synchronous control parameter]

[Positioning data]
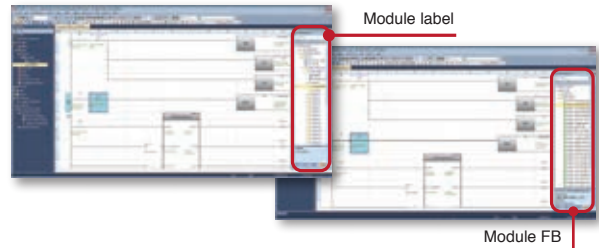
Easy startup

[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. Compatible in the future
● The network errors are displayed by Network diagnostics.

6

Engineering Software

Engineering Software

■Operating environment

MELSOFT GX Works3

Item	Description
OS	Microsoft® Windows® 8.1 (64bit/32bit), Microsoft® Windows® 8.1 (Enterprise, Pro) (64bit/32bit) Microsoft® Windows® 8 (64bit/32bit), Microsoft® Windows® 8 (Enterprise, Pro) (64bit/32bit) Microsoft® Windows®7 (Enterprise, Ultimate, Professional, Home Premium, Starter) (64bit/32bit) Microsoft® Windows Vista® (Enterprise, Ultimate, Business, Home Premium, Home Basic) (32bit) Microsoft® Windows®XP Service Pack3 (Professional, Home Edition) (32bit)
CPU	Intel® Core™2 Duo Processor 2 GHz or more recommended
Required memory	For 32-bit edition: 1GB or more recommended For 64-bit edition: 2GB or more recommended
Available hard disk capacity	When installing MELSOFT GX Works3: HDD available capacity is 5GB or more.
Optical drive	DVD-ROM supported disk drive
Monitor	Resolution 1024 × 768 dots or higher

MELSOFT GX Works2

Item	Description
OS	Microsoft® Windows® 8.1 (64bit/32bit), Microsoft® Windows® 8.1 (Enterprise, Pro) (64bit/32bit) Microsoft® Windows® 8 (64bit/32bit), Microsoft® Windows® 8 (Enterprise, Pro) (64bit/32bit) Microsoft® Windows® 7 (Enterprise, Ultimate, Professional, Home Premium, Starter) (64bit/32bit) Microsoft® Windows Vista® (Enterprise, Ultimate, Business, Home Premium, Home Basic) (32bit) Microsoft® Windows® XP Service Pack2 or later (Professional, Home Edition) (32bit)
CPU	Recommended Intel® Core™2 Duo Processor 2GHz or more
Required memory	Recommended 1GB or more
Available hard disk capacity	When installing GX Works2: HDD available capacity is 2.5GB or more. When operating GX Works2: Virtual memory available capacity is 512MB or more.
Optical drive	CD-ROM supported disk drive
Monitor	Resolution 1024 × 768 dots or higher

■Engineering software list

Product	Model	Description	
MELSOFT GX Works3	SW1DND-GXW3-E	• Programmable Controller Engineering Software [MELSOFT GX Works3, GX Works2, GX Developer] • MITSUBISHI ELECTRIC FA Library	DVD-ROM
MELSOFT GX Works2	SW1DNC-GXW2-E	• Programmable Controller Engineering Software [MELSOFT GX Works2, GX Developer]	CD-ROM
MELSOFT iQ Works	SW2DND-IQWK-E	FA Engineering Software (Note-1) • System Management Software [MELSOFT Navigator] • Programmable Controller Engineering Software [MELSOFT GX Works3, GX Works2, GX Developer] • Motion Controller Engineering Software [MELSOFT MT Works2] • Screen Design Software [MELSOFT GT Works3] • Robot Total Engineering Support Software [MELSOFT RT ToolBox2 mini] • Inverter Setup Software [MELSOFT FR Configurator2]	DVD-ROM

(Note-1): Refer to each product manual for software needed for the model.

MEMO

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
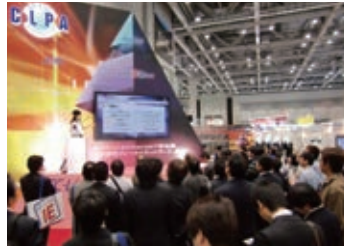
Trade show

Conformance testing lab

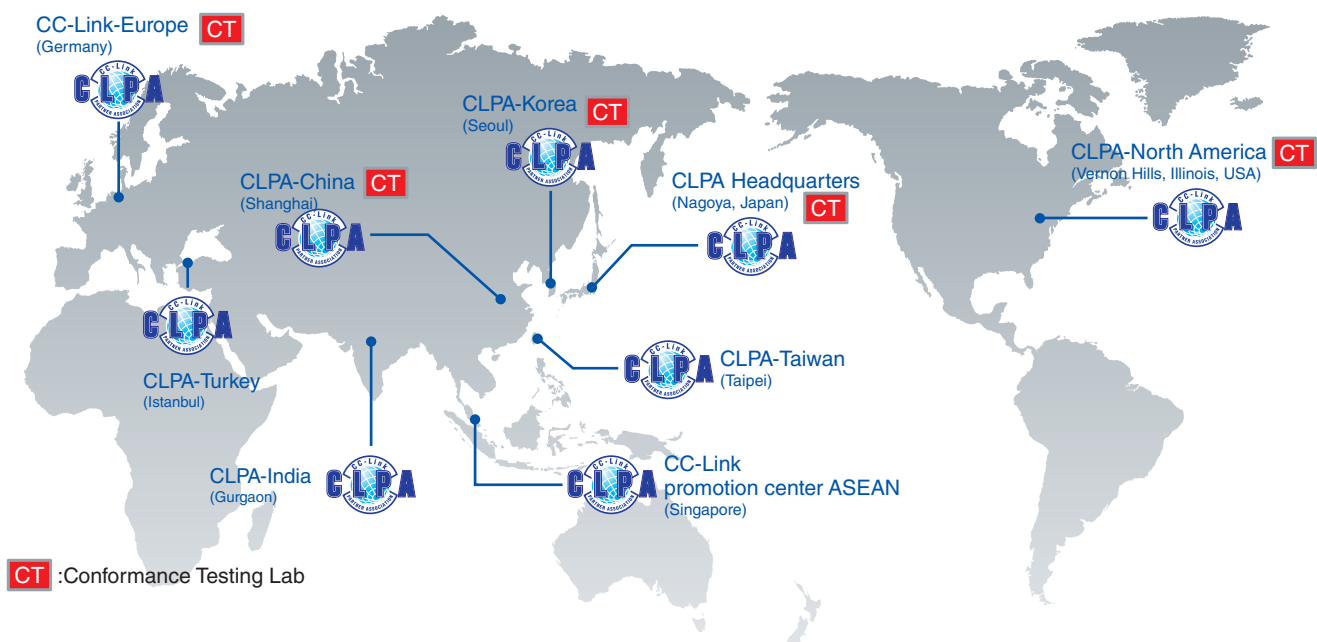## Visit the CLPA website for the latest CC-Link information.

URL:http://www.cc-link.org

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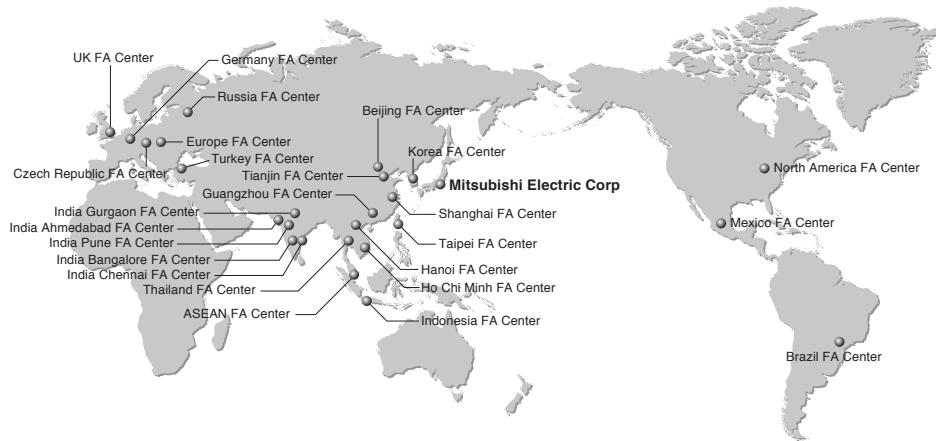E-mail:info@cc-link.org

CC-Link
Partner Association

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 the network in that part of the world. For companies looking to increase their presence in Asia, CLPA is well placed to assist these efforts through offices in all major Asian regions.

CC-Link-Europe CT
(Germany)

CLPA-Korea CT
(Seoul)

CLPA-North America CT
(Vernon Hills, Illinois, USA)

CLPA-China CT
(Shanghai)

CLPA Headquarters
(Nagoya, Japan) CT

CLPA-Turkey
(Istanbul)

CLPA-Taiwan
(Taipei)

CLPA-India
(Gurgaon)

CC-Link
promotion center ASEAN
(Singapore)

CT :Conformance Testing Lab

Global FA Centers

China

Shanghai FA Center
Mitsubishi Electric Automation
(China) Ltd. Shanghai FA Center
Mitsubishi Electric Automation Center,
No.1386 Hongqiao Road, Shanghai, China
Tel: 86-21-2322-3030 Fax: 86-21-2322-3000 (9611#)

Beijing FA Center
Mitsubishi Electric Automation
(China) Ltd. Beijing FA Center
Unit 901, Office Tower 1, Henderson Centre,
18 Jianguomennei Avenue, Dongcheng District,
Beijing, China
Tel: 86-10-6518-8830 Fax: 86-10-6518-2938

Tianjin FA Center
Mitsubishi Electric Automation
(China) Ltd. Tianjin FA Center
Room 2003 City Tower, No.35, Youyi Road,
Hexi District, Tianjin, China
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Guangzhou FA Center
Mitsubishi Electric Automation
(China) Ltd. Guangzhou FA Center
Room 1609, North Tower, The Hub Center,
No.1068, Xingang East Road, Haizhu District,
Guangzhou, China
Tel: 86-20-8923-6730 Fax: 86-20-8923-6715

Taiwan

Taipei FA Center
SETSUYO ENTERPRISE CO., LTD.
3F, No.105, Wugong 3rd Road, Wugu District,
New Taipei City 24889, Taiwan
Tel: 886-2-2299-9917 Fax: 886-2-2299-9963

Korea

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Mitsubishi Electric Automation
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Thailand

Thailand FA Center
Mitsubishi Electric Factory Automation
(Thailand) Co., Ltd.
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Kwaeng Bangpongpang, Khet Yannawa, Bangkok
10120, Thailand
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ASEAN

ASEAN FA Center
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Indonesia

Indonesia FA Center
PT. Mitsubishi Electric Indonesia
Cikarang Office
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India Ahmedabad FA Center
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Ahmedabad Branch
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Prahaladnagar, Satellite, Ahmedabad - 380015,
Gujarat, India
Tel: 91-7965120063 Fax: -

America

North America FA Center
Mitsubishi Electric Automation, Inc.
500 Corporate Woods Parkway, Vernon Hills,
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Mexico

Mexico FA Center
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Mexico Branch
Mariano Escobedo #69, Col.Zona Industrial,
Tlalnepantla Edo. Mexico, C.P.54030
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Brazil

Brazil FA Center
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Comercio e Servicos Ltda.
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Bethaville, Barueri SP, Brazil
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ul. Krakowska 50, 32-083 Balice, Poland
Tel: 48-12-347-65-00 Fax: 48-12-630-47-01

Germany FA Center
Mitsubishi Electric Europe B.V.
German Branch
Gothaer Strasse 8, D-40880 Ratingen, Germany
Tel: 49-2102-486-0 Fax: 49-2102-486-1120

UK FA Center
Mitsubishi Electric Europe B.V.
UK Branch
Travellers Lane, Hatfield, Hertfordshire, AL10
8XB, U.K.
Tel: 44-1707-27-8780 Fax: 44-1707-27-8695

Czech Republic FA Center
Mitsubishi Electric Europe B.V.
Czech Branch
Avenir Business Park, Radlicka 751/113e,
158 00 Praha5, Czech Republic
Tel: 420-251-551-470 Fax: 420-251-551-471

Russia FA Center
Mitsubishi Electric (Russia) LLC
St. Petersburg Branch
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office 720; 195027, St. Petersburg, Russia
Tel: 7-812-633-3497 Fax: 7-812-633-3499

Turkey FA Center
Mitsubishi Electric Turkey A.S.
Umraniye Branch
Serifali Mahallesi Nutuk Sokak No:5,
TR-34775 Umraniye / Istanbul, Turkey
Tel: 90-216-526-3990 Fax: 90-216-526-3995

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]

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[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.

Servo system controller

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]

The term of warranty for Product is thirty six (36) months after your purchase or delivery of the Product to a place designated by you or forty two (42) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[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, etc.)

(vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters

(vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company

(viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA Center for details.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

(1) For the use of our Servo System Controller, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in Servo System Controller, and a backup or fail-safe function should operate on an external system to Servo System Controller when any failure or malfunction occurs.

(2) Our Servo System Controller 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.

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.

YOUR SOLUTION PARTNER
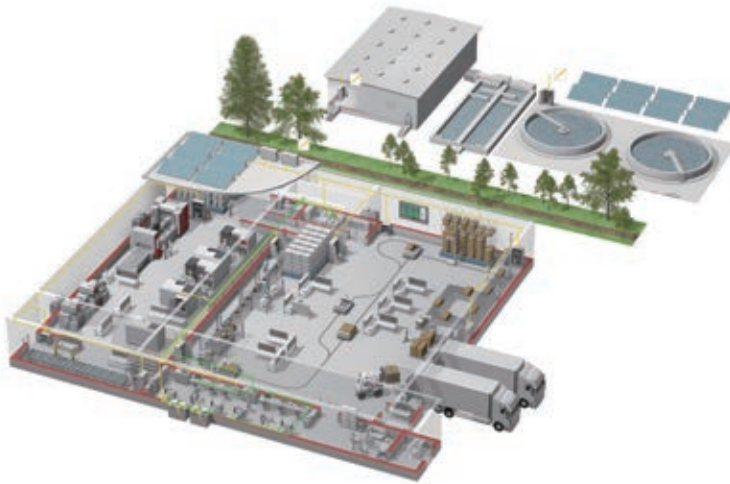
Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

A NAME TO TRUST

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

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

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

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

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

Compact and Modular Controllers

Inverters, Servos and Motors

Visualization: HMIs, Software, MES connectivity

Numerical Control (NC)

Robots: SCARA, Articulated arm

Processing machines: EDM, Lasers, IDS

Air-conditioning, Photovoltaic, EDS

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

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Brazil	Mitsubishi Electric do Brasil Comercio e Servicos Ltda. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil	Tel : +55-11-4689-3000 Fax : +55-11-4689-3016
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UAE	Mitsubishi Electric Europe B.V. Dubai Branch Dubai Silicon Oasis, P.O.BOX 341241, Dubai, U.A.E.	Tel : +971-4-3724716 Fax : +971-4-3724721
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