MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

Mitsubishi Servo System Family Catalog

Leading the World with the industry's Top Class Technology

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

Servo Application Examples

Industry leading performance MELSERVO supports various system configurations.
Going beyond servo amplifiers and servo motors, Mitsubishi Electric offers system level solutions that include programmable controllers, Motion controllers, and networks to satisfy a broad scope of needs.

Automotive manufacturing

Improve productivity and realize flexibility in different automotive assembly lines with high-accuracy motion control, including linear/circular interpolation and electric cam profile.

Material handling

Realize advanced logistics coordination and eliminate errors in repetitive processes. Servo-based high-speed material handling and highly accurate positioning improve productivity and reduce energy consumption.

Food processing machines

Realize improvements in various packaging applications such as high-speed filling, which requires a highly accurate, continuous feed rate and precision.

Semiconductor manufacturing equipment
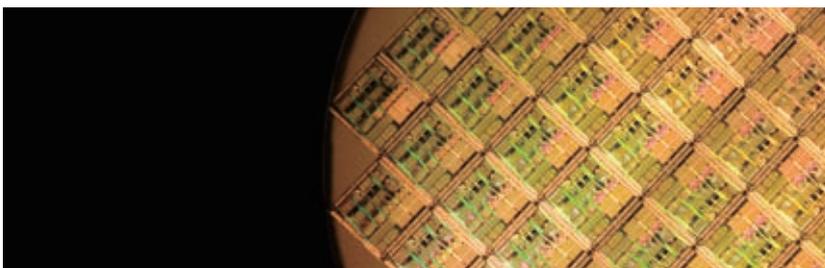
In today's semiconductor manufacturing process, wafer diameter is getting larger and components smaller. To meet the requirements of higher quality and productivity, Mitsubishi Electric's high-performance servos and high-resolution encoder achieve fast and accurate positioning at stable speeds.

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Servo Application Examples

Mounters

Flexible mounting of electronic components with high speed and density is demanded in printed circuit board applications. Mitsubishi Electric offers a high level of servo system solutions for rapid mounting of highly miniaturized components and for flexible mounting of irregular shapes.

LCD manufacturing systems

In addition to the high-speed and high-accuracy positioning control, linear servos and a broad array of other actuators play important roles in the manufacturing of constantly evolving flat panel displays.

Printing machines

Mitsubishi Electric provides high-accuracy synchronous system solutions for the paper feeding, printing, cutting, and assembly functions within the printing process, achieving high-speed and high-quality converting applications.

Injection molding machines

The integrated system with the advanced motion control supports high-accuracy molding in injection molding machines, which consist of various control sections.

Machine tools

High-performance servos enable fast and accurate positioning, and support high-speed handling of works. We promote the sophisticated machining capabilities that are a key part of the world's most advanced manufacturing.

Mitsubishi Servo System

Our Total Solution for Your Satisfaction

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 our exclusive engineering software and various networks including "CC-Link IE Field Network" and "SSCNET III/H", boasts a whole range of solutions specific to your needs.

HUMAN MACHINE I/F CONTROLLER

Graphic Operation Terminal

GOT2000 series

Personal computer

PC/AT compatible computer

Simple Motion module

MELSEC iQ-R series	MELSEC-Q series
RD77GF	QD77GF

Simple Motion module

MELSEC iQ-R series	MELSEC-Q series	MELSEC-L series	MELSEC iQ-F series
RD77MS	QD77MS	LD77MS	FX5-40SSC-S

CC-Link **IE** ꜰield

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

NETWORK

CC-Link IE Field Network	SSCNET III/H serial bus

SERVO AMPLIFIER

MR-J4-GF	MR-J4-B/MR-J4W2-B/MR-J4W3-B		
CC-Link IE Field Network compatible servo amplifier **MR-J4-GF(-RJ)**	SSCNET III/H compatible servo amplifier **MR-J4-B(-RJ)**	SSCNET III/H compatible 2-axis servo amplifier **MR-J4W2-B**	SSCNET III/H compatible 3-axis servo amplifier **MR-J4W3-B**

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 55 kW

Ultra-compact, ultra-small capacity
HG-AK series
Capacity: 10 to 30 W

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

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.

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	MELSEC-Q series	MELSEC-L series	MELSEC iQ-F series	MELSEC-F series

Personal computer

PC/AT compatible computer

Motion controller

MELSEC iQ-R series	MELSEC-Q series	MELSEC-Q series
RnMTCPU	Q17nDSCPU	Q170MSCPU

Positioning module

MELSEC iQ-R series	MELSEC-Q series	MELSEC-Q series	MELSEC-L series	MELSEC-F series
RD75P RD75D	QD75PN QD75DN	QD70P QD70D	LD75P LD75D	FX2N-10PG

Embedded type servo system controller

MELSEC-Q series	
Q173SCCF	MR-MC series

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

Pulse train input

MR-J4-A

General-purpose interface compatible servo amplifier
MR-J4-A(-RJ)

SSCNET III/H serial bus

MR-JE-B

SSCNET III/H compatible servo amplifier
MR-JE-B

Pulse train input

MR-JE-A

General-purpose interface compatible servo amplifier
MR-JE-A

LOW-VOLTAGE SWITCHGEAR

Molded-case circuit breaker

WS-V

Magnetic contactor

MS-T

*1

Linear servo motor

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

Core type (natural/liquid cooling)
LM-F series
Rating: 300 to 3000 N (natural cooling)
Rating: 600 to 6000 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

Rotary servo motor

Small capacity, low inertia
HG-KN series
Capacity: 100 to 750 W

Medium capacity, medium inertia
HG-SN series
Capacity: 0.5 to 3 kW

SOFTWARE

MELSOFT

Programmable Controller Engineering Software
MELSOFT GX Works2
MELSOFT GX Works3

Motion Controller Engineering Software
MELSOFT MT Works2

Servo Setup Software
MELSOFT MR Configurator2

Capacity Selection Software

*1. Not all the combinations of the servo amplifier and the servo motor are available. Refer to "MELSERVO-J4 catalog (L(NA)03058)" and "MELSERVO-JE catalog (L(NA)03086ENG)" for the available combinations.

Controllers

From simple positioning to multi-axis and high-speed systems

Our extensive product lines cover from Positioning modules, which enables positioning with simple programs, to Simple Motion modules and Motion controllers, which enable advanced control.

MELSEC iQ-R series

MELSEC iQ-R series

The MELSEC iQ-R series is equipped with the new, high-speed system bus, achieving a shorter cycle time.

Simple Motion module

CC-Link IE Field

RD77GF

NEW

The RD77GF is a Simple Motion module compatible with CC-Link IE Field Network which combines the versatility of Ethernet and highly accurate synchronous operation for Motion control.
The module easily performs various control such as synchronous, cam, and speed-torque control using only sequence programs.

	RD77GF4	RD77GF8	RD77GF16
Number of control axes	Up to 4 axes	Up to 8 axes	Up to 16 axes
Operation cycle	0.5 ms or longer		
Servo amplifier	MR-J4-GF(-RJ)		
Command interface	CC-Link IE Field Network		

Simple Motion module

SSCNET III/H SERVO SYSTEM CONTROLLER NETWORK

RD77MS

The RD77MS is an intelligent function module, easily performing various control such as positioning, synchronous, cam, and speed-torque (tightening & press-fit) control using only sequence programs.

	RD77MS2	RD77MS4	RD77MS8	RD77MS16
Number of control axes	Up to 2 axes	Up to 4 axes	Up to 8 axes	Up to 16 axes
Operation cycle	0.444 ms or longer			
Servo amplifier	MR-J4-B(-RJ) MR-JE-B			
Command interface	SSCNET III/H			

Motion controller

SSCNET III/H SERVO SYSTEM CONTROLLER NETWORK

RnMTCPU

The RnMTCPU is a CPU module performing control using the Motion SFC program, independently of a PLC CPU.
The controller performs various advanced Motion control such as positioning, speed, torque, tightening & press-fit, synchronous, and cam control.

	R16MTCPU	R32MTCPU	R64MTCPU NEW
Number of control axes	Up to 16 axes	Up to 32 axes	Up to 64 axes
Operation cycle	0.222 ms or longer		
Servo amplifier	MR-J4-B(-RJ)		
Command interface	SSCNET III/H		

Positioning module

RD75P/RD75D

The RD75P/RD75D are capable of controlling up to four axes with a high-speed pulse output (5 Mpulses/s[*1] at fastest). The RD75P and the RD75D are compatible with the transistor output and the differential driver output respectively.

*1. In the case of differential driver output

	RD75P2	RD75P4	RD75D2	RD75D4
Number of control axes	Up to 2 axes	Up to 4 axes	Up to 2 axes	Up to 4 axes
Startup time	0.3 ms or longer			
Servo amplifier	MR-J4-A(-RJ) MR-JE-A			
Command interface	Transistor output		Differential driver output	

MELSEC-Q series

MELSEC **Q** series

The wide-range of the MELSEC-Q series fully meets the control needs in each industry and field.

Simple Motion module

QD77GF CC-Link **IE** Field

The QD77GF is a Simple Motion module compatible with CC-Link IE Field Network which combines the versatility of Ethernet and highly accurate synchronous operation for Motion control.
QD77GF4:   4 axes NEW
QD77GF8:   8 axes NEW
QD77GF16: 16 axes

Simple Motion module

QD77MS SSCNETIII/H

The QD77MS is simple to use just like Positioning modules while capable of performing various control such as positioning, synchronous, cam, and speed-torque control (tightening & press-fit) using only sequence programs.
QD77MS2:   2 axes
QD77MS4:   4 axes
QD77MS16: 16 axes

Motion controller

Q17nDSCPU SSCNETIII/H

The Q17nDSCPU is a CPU module used with a PLC CPU for Motion control.
Q172DSCPU: 16 axes
Q173DSCPU: 32 axes

Stand-alone Motion controller

Q170MSCPU SSCNETIII/H

The Q170MSCPU is a module integrating a power supply, a PLC, and a Motion controller all in one.
Q170MSCPU: 16 axes
(Equivalent to Q03UDCPU)
Q170MSCPU-S1: 16 axes
(Equivalent to Q06UDHCPU)

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Controllers

Controllers

Positioning module

QD75PN/QD75DN

The QD75PN/QD75DN are pulse train output compatible modules. The QD75PN is for transistor output, and the QD75DN is for differential driver output.
QD75P1N/QD75D1N: 1 axis
QD75P2N/QD75D2N: 2 axes
QD75P4N/QD75D4N: 4 axes

Positioning module

QD70P/QD70D

The QD70P/QD70D are pulse train output compatible modules. These modules enable smooth acceleration/deceleration with frequent speed changes and are suitable for connecting to stepping motors.
QD70P4/QD70D4: 4 axes
QD70P8/QD70D8: 8 axes

MELSEC-L series

MELSEC *L* series

The MELSEC-L series is a baseless highly scalable controller ideal for applications having limited space.

Simple Motion module

LD77MS

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

The LD77MS is simple to use just like Positioning modules while capable of performing various control such as positioning, synchronous, cam, and speed-torque (tightening & press-fit) control.
LD77MS2:   2 axes
LD77MS4:   4 axes
LD77MS16: 16 axes

SSCNET III/H Head module

LJ72MS15

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

The SSCNET III/H head module is used to connect the MELSEC-L series I/O module and intelligent function module to SSCNET III/H.

Positioning module

LD75P/LD75D

The LD75P/LD75D are pulse train output compatible modules. The LD75P is for transistor output, and the LD75D is for differential driver output.
LD75P1/LD75D1: 1 axis
LD75P2/LD75D2: 2 axes
LD75P4/LD75D4: 4 axes

PLC CPU module (built-in positioning function)

LCPU

The positioning function, equipped as standard, outputs command pulses to a servo amplifier by using the built-in I/O function.
Control axes: 2 axes

Embedded Type Servo System Controllers

High-response servo control is achieved with a combination of the Position Board and a personal computer, or the C Controller Interface Module and the C Controller via PCI Express®.

Position Board

MR-MC240/MR-MC241

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

The MR-MC240/MR-MC241 are board type controllers used by being embedded in a personal computer for controlling MR-J4-B through a user program.
MR-MC240: 20 axes
MR-MC241: 32 axes

C Controller Interface module

Q173SCCF

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

The Q173SCCF is an intelligent module used by being connected directly to a C Controller via PCI Express® for controlling MR-J4-B through a user program.
Q173SCCF: 20 axes

MELSEC iQ-F series

MELSEC iQ-F series

From stand-alone use to networked system applications, the MELSEC iQ-F series brings your business to the next level of industry.

Simple Motion module

SSCNET III/H

FX5-40SSC-S

The FX5-40SSC-S is a next-generation, compact servo system controller with extensive built-in functions.
In cooperation with driving devices, the FX5-40SSC-S achieves advanced motion control.

	FX5-40SSC-S
Number of control axes	Up to 4 axes
Servo amplifier	MR-J4-B(-RJ) MR-JE-B
Command Interface	SSCNET III/H

PLC CPU module (built-in positioning function)

FX5U/FX5UC series

The FX5U/FX5UC series features positioning functionality with 4-axis pulse output.
In addition, Positioning operations including interrupt, variable speed, and simple interpolation are easily set up in tables and executed.

	FX5U/FX5UC series
Number of control axes	Up to 4 axes
Servo amplifier	MR-J4-A(-RJ) MR-JE-A
Command Interface	Pulse train

MELSEC-F series

MELSEC-F

Positioning module

FX3U-1PG/FX2N-10PG

This pulse train output block is used with the FX series programmable controller. The FX2N-10PG model is capable of high-speed and high-precision positioning at a maximum of 1 MHz high-speed pulses.
FX3U-1PG: 1 axis
FX2N-10PG: 1 axis

FX2N-10PG

Positioning module

FX2N-10GM/FX2N-20GM

This Positioning module is used independently or with the FX series programmable controller.
The FX2N-20GM model supports 2-axis interpolation control.
FX2N-10GM: 1 axis
FX2N-20GM: 2 axes

FX2N-20GM

3

Controllers

Servo Amplifiers

From the industry's top level high-speed, high-accuracy servos to one-touch servos and multi-axis models.
In addition to the high-end MELSERVO-J4 series, a variety of models to match various applications is available.
The Mitsubishi Electric's servo amplifiers support motors from rotary servo motors to linear servo motors and direct drive motors, and greatly enhance system performance.

~Man, Machine, and Environment in Perfect Harmony~

MELSERVO-J4 series

MELSERVO-J4 series is the newest member to the MELSERVO family, backed by Mitsubishi Electric's leadership in all-digital technology. With safety, Ethernet-based CC-Link IE Field Network, SSCNET III/H high-speed optical communication and energy-efficient design of the new MELSERVO-J4 series - man, machine, and environment can at last work together in perfect harmony.

MR-J4-GF(-RJ) [*1]
CC-Link IE Field Network compatible servo amplifier

CC-Link **IE** Field

NEW

This servo amplifier is compatible with CC-Link IE Field Network. Together with the Simple Motion module, advanced synchronous control and interpolation control by sequential commands are enabled. The servo amplifier has a built-in point table function, offering easy positioning with a combination with a master module.

Command interface	CC-Link IE Field Network	
Control mode	Position/Speed/Torque/Fully closed loop	
Power supply	200 V AC	400 V AC
Capacity range	0.1 kW to 7 kW	0.6 kW to 7 kW
Compatible servo motor	Rotary servo motor, linear servo motor, DD motor	

MR-J4-B(-RJ) [*1]
MR-J4W2-B/MR-J4W3-B
SSCNET III/H compatible servo amplifier

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

A complete synchronous system with SSCNET III/H can be configured using 0.222 ms cycle high-speed serial communication between the controller and the servo amplifier.
2-axis/3-axis servo amplifiers are also available, enabling energy-conservative, less-wiring, compact machine at lower cost.

Command interface	SSCNET III/H		
Control mode	Position/Speed/Torque/Fully closed loop		
Power supply	100 V AC	200 V AC	400 V AC
Capacity range	0.1 kW to 0.4 kW	0.1 kW to 37 kW	0.6 kW to 55 kW
Compatible servo motor	Rotary servo motor, linear servo motor, DD motor		

MR-J4-A(-RJ) [*1]
General-purpose interface compatible servo amplifier

Pulse train and analog input, etc., are provided as a standard for the command interface. The control mode can be switched accordingly for position, speed or torque control.
The MR-J4-A-RJ has a built-in positioning function, being compatible with MODBUS®, simple cam, and mark sensor input compensation.

Command interface	Pulse train/Analog voltage/RS-422/MODBUS® RTU		
Control mode	Position/Speed/Torque/Fully closed loop		
Power supply	100 V AC	200 V AC	400 V AC
Capacity range	0.1 kW to 0.4 kW	0.1 kW to 37 kW	0.6 kW to 55 kW
Compatible servo motor	Rotary servo motor, linear servo motor, DD motor		

MR-J4W2-0303B6
MR-J4-03A6(-RJ) [*1]
Ultra-small capacity servo amplifier

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

This servo amplifier is compatible with the ultra-compact HG-AK servo motor series (10 W to 30 W) and two types of main circuit power supply of 48 V DC and 24 V DC, being suitable for compact machines. 2-axis servo amplifiers are also available.

| Command interface	SSCNET III/H or Pulse train/Analog voltage/RS-422
Control mode	Position/Speed/Torque
Power supply	48 V DC/24 V DC
Capacity range	10 W to 30 W
Compatible servo motor	Rotary servo motor

*1. MR-J4-GF-RJ, MR-J4-B-RJ, MR-J4-A-RJ and MR-J4-03A6-RJ are servo amplifiers with special specification.

Harmony with Machine

The leading edge in drive control, with unrivaled accuracy and response for next-generation machine performance.

## Industry-leading Level of Servo Amplifier Basic Performance

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.

[Settling time comparison with the prior model]

[MR-J3]　Settling time reduced by 40%*　[MR-J4]

▶▶▶

Settling time　Settling time

— Command　— Torque　— Droop pulses　— In-position

* The result is based on our evaluation condition.

[Dedicated execution engine]

■ Servo amplifier control loop

Dedicated execution engine

Model-based control　← Command

Position control　Speed control　Current control

Servo motor

One-touch Tuning

Just turn on the one-touch tuning function to complete servo gain adjustment automatically, including machine resonance filter, advanced vibration suppression control II[*1], and robust filter for maximizing your machine performance. This function also sets responsivity automatically, while the real-time auto tuning requires manual setting. Moreover, a new method[*2] allows to create an optimum tuning command inside the servo amplifier.

— : Command　— : Actual operation

Before

Speed / Time — Operation is unstable.

Speed / Time — Operation is not following the command.　Settling time

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

▶▶▶

After

Exactly matched. High-speed positioning.

Speed / Time　Settling time
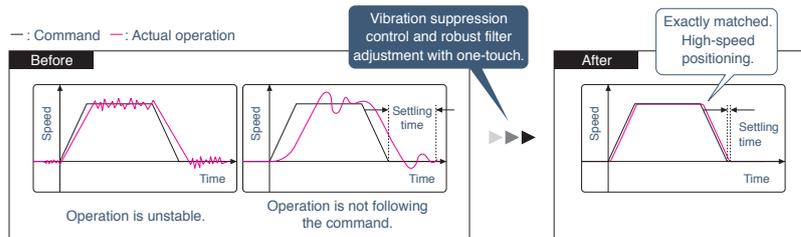
*1. The advanced vibration suppression control II automatically adjusts one frequency.
*2. This new method is available with MR-J4-B/MR-J4W_-B/MR-J4-A with software version of C1 or later.

Advanced Vibration Suppression Control II

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

Three-inertia system

Vibration at the end of an arm

Vibration in a machine

Two types of the vibrations are suppressed at the same time.

Without vibration suppression control

Advanced vibration suppression control II

Droop pulses
Torque
Speed command

Application examples
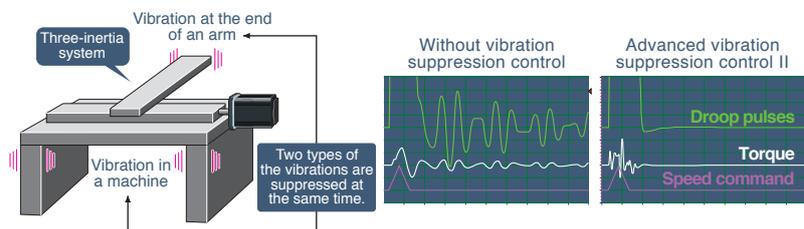
[Pick and place robots]　[Automatic assembly equipment]　[Material handling systems]
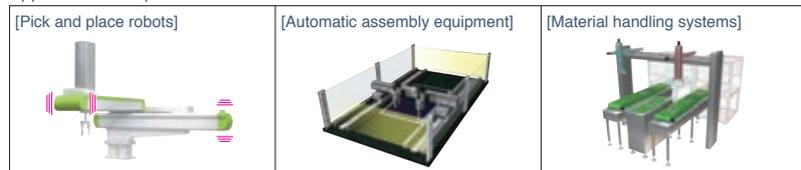
Lost Motion Compensation Function

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

* This function is not available with MR-J4W2-B and MR-J4W3-B.
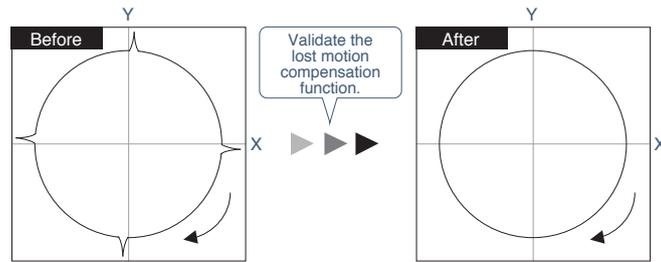
Suppression of quadrant protrusion of circular trajectory

Built-in Positioning Function

MR-J4-A-RJ has a built-in positioning function, enabling positioning operation with point table, program-based, and indexer (turret) methods. With this servo amplifier, a positioning system is configured without a Positioning module (command pulse). Positioning command is executed by input/output signals or RS-422/RS-485 communication (up to 32 axes).

* MR-J4-03A6-RJ is not compatible with RS-485 communication.

[Point table example]

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

[Program example]
256 programs max

Program No. 1
SPN (3000)
STC (20)
MOV (1000)
TIM (100)
FOR (3) ········· ①
MOVI (100) ····· ②
TIM (100) ······· ③
NEXT
STOP

[Indexer (turret) method]

Station No. 0–7
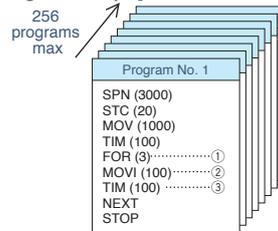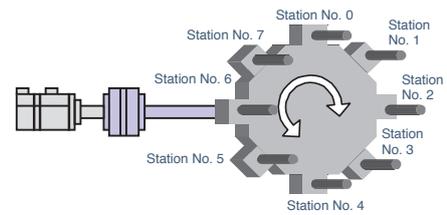
For Compact Machines

Ultra-compact servo motors combined with ultra-small capacity servo amplifiers compatible with the main circuit power supply of 48 V DC/24 V DC are best suited for compact machines. The following servo amplifiers are available: 2-axis with SSCNET III/H interface and general-purpose interface with the built-in positioning function.

HG-AK — 25 × 25

MR-J4-03A6(-RJ) — H100 × W30 × D90 for one axis

MR-J4W2-0303B6 — H168 × W30 × D100 for two axes

[Unit: mm]

Compatible with CC-Link IE Field Network

NEW

MR-J4-GF(-RJ) is compatible with CC-Link IE Field Network as standard.

The servo amplifier is connectable with Ethernet-based CC-Link IE Field Network, enabling high-speed, seamless communication.

MR-J4-GF

CC-Línk **IE** **F**ield

Easy Positioning with CC-Link IE Field Network

NEW

A combination of a master module and MR-J4-GF(-RJ) allows positioning operation with point table method, not requiring a Positioning module. Just set the point table No. and turn on the start signal, and then the positioning operation will be started.

Automatic continuous operation of the next point table is also possible without stopping.

[Point table example]

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

[Operation]

Speed
2000
1600

Point table No. 1   Point table No. 2

Position address   0   1000   2000

Start signal
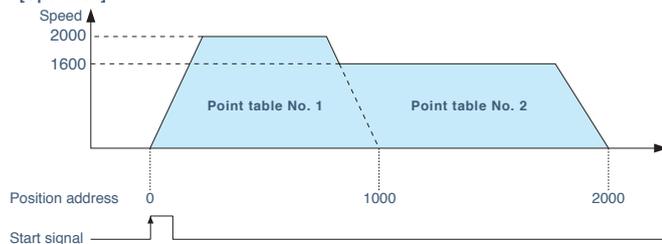
CC-Link IE Field Network Motion Control

NEW

A combination of a Simple Motion module and MR-J4-GF(-RJ) enables high-performance synchronous control and interpolation control with simple parameter setting and a start from a sequence program. Speed control and torque control are also possible, suitable for converting machines.

In addition, using remote inputs/outputs which are compatible with the synchronized communication function enables a system synchronized with the command cycle of the servo amplifier.

Pulse train command (asynchronous)

1st servo amplifier axis

2nd servo amplifier axis

3rd servo amplifier axis

Receives position command.

CC-Link IE Field Network command (synchronous)

CC-Línk **IE** **F**ield Motion

1st servo amplifier axis

2nd servo amplifier axis

3rd servo amplifier axis

Receives position command.

4

Servo Amplifiers
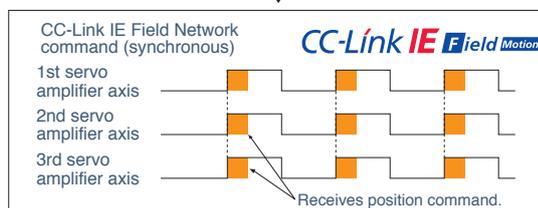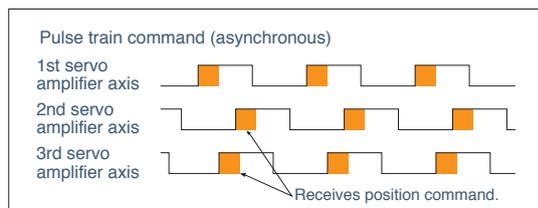
Harmony with Man

The leading edge in safety and convenience, designed to harmonize with the way you work.

Functions According to IEC/EN 61800-5-2

STO (Safe torque off) and SS1 [1] (Safe stop 1) are 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. [2]

● The safety level of STO is increased to SIL 3 from SIL 2. [3] NEW

[Shut-off by STO]

[Shut-off by STO and SS1]
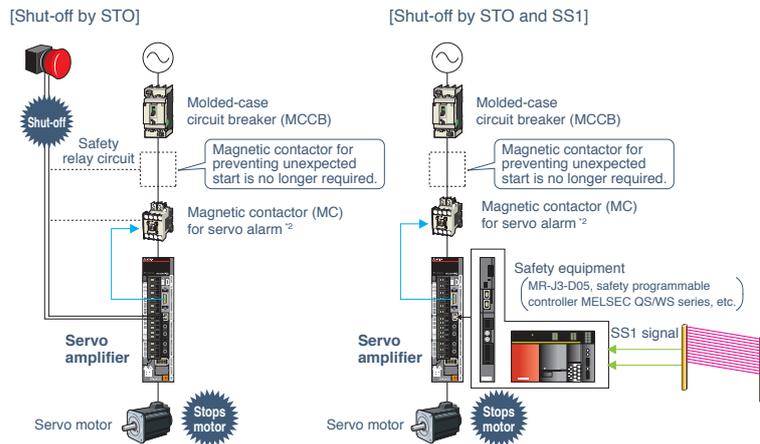
IEC/EN 61800-5-2:2007 function	Safety level
STO (Safe torque off)	Category 3, PL e, SIL 3 [3]
SS1 (Safe stop 1) [1]	

*1. Safety equipment (MR-J3-D05, safety programmable controller MELSEC QS/WS series, etc.) is required.
*2. 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.
*3. Category 3, PL e, SIL 3 is achievable with the servo amplifiers manufactured in Japan in June 2015 or later, and in China in December 2015 or later. Note that parameter setting is required.

Achieving Category 4, PL e, SIL 3 by wiring to functional safety unit

Category 4 PL e, SIL 3 is achieved when the safety signals are inputted directly to MR-D30 functional safety unit.
Because the safety observation function is operated on the MR-D30 side, expansion of the safety observation function is possible independent of controllers, offering a selection from a wide variety of controllers such as Simple Motion modules, Motion controllers, and Positioning modules. Moreover, the safety observation function is easily enabled by parameter setting.
Servo motors with functional safety are now available. (HG-KR_W0C/HG-SR_W0C/HG-JR_W0C)

[For general-purpose pulse train command (MR-J4-A-RJ + MR-D30)]

[For SSCNET III/H command (MR-J4-B-RJ + MR-D30)]
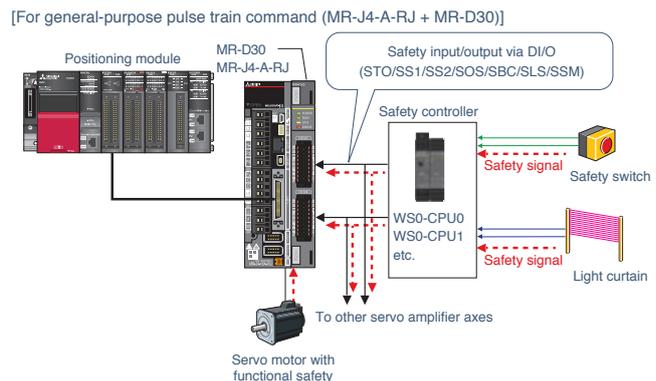
IEC/EN 61800-5-2:2007 function	Safety level
STO (Safe torque off)	Category 4 PL e, SIL 3
SS1 (Safe stop 1)	
SS2 (Safe stop 2) [1]	
SOS (Safe operating stop) [1]	
SLS (Safely-limited speed) [2]	
SBC (Safe brake control)	
SSM (Safe speed monitor) [2]	

*1. SS2 and SOS are achievable with the use of the servo motor with functional safety unit.
*2. The safety level would be Category 3 PL d, SIL 2 when the servo motor with functional safety is not used.
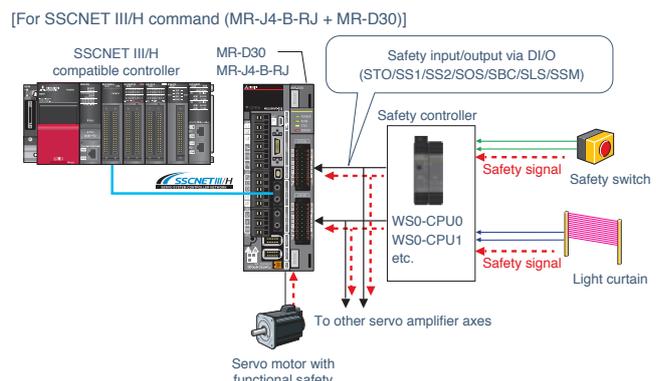
Tough Drive Function

Instantaneous power failure tough drive

When an instantaneous power failure is detected, this function allows the servo amplifier to use the electric energy charged in the main circuit capacitor in the servo amplifier to avoid an alarm occurrence, increasing the machine availability even with an unstable power supply.

Servo motor speed

Undervoltage

Tough drive enabled

Tough drive disabled

Operation continues even with instantaneous power failure.
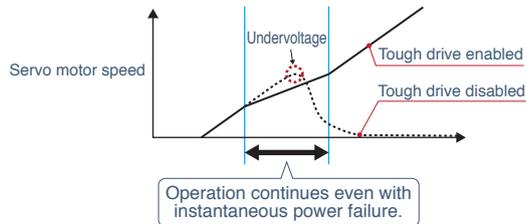
Vibration tough drive

Machine resonance suppression filter is automatically readjusted when a change in machine resonance frequency is detected by the servo amplifier. Losses from the machine stop due to age-related deterioration are reduced.

Suppresses vibration by readjusting the machine resonance suppression filter.

Vibration detected
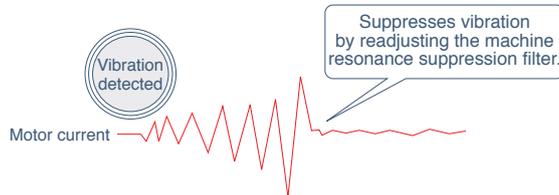
Motor current

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.

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

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

Waveform display

Monitor value display

Lowered bus voltage

It is revealed that the main circuit power is turned off.
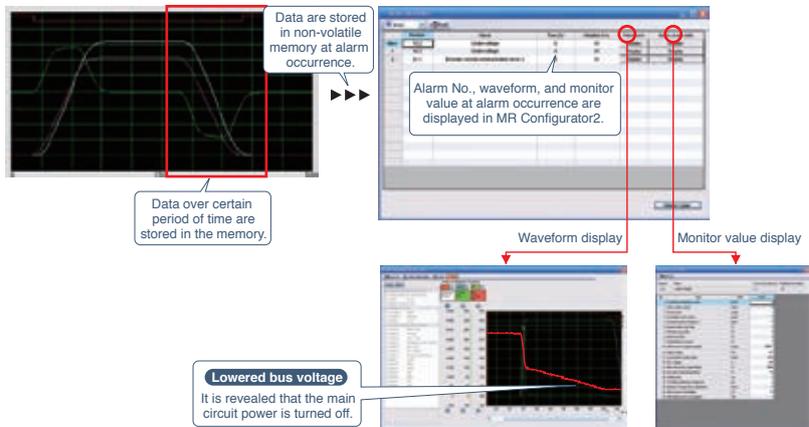
Machine Diagnosis Function

This 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. When MELSEC iQ-R Motion controller is used, the diagnosed data is monitored with the optional data monitor function, supporting timely maintenance of the driving parts.

[Machine diagnosis function window on MR Configurator2]

Estimated friction value is displayed

Estimated vibration value is displayed

Servo amplifier

Friction and vibration are estimated based on the data in a normal operation. Particular measurement is not required.

Encoder

Servo motor

Ball screw
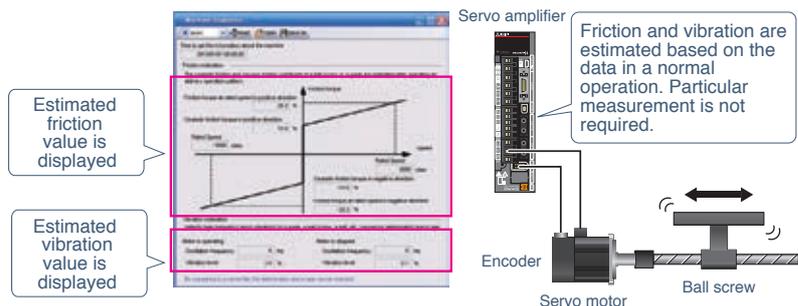
Harmony with the Environment

The new MR-J4 series: an evolution in eco-friendly design, and that's winning acclaim worldwide.

Expanded Environmental Conditions

**Capable of operating at an altitude of up to 2000 m.** NEW

Compatible with power supply voltage of 240 V AC for global use.

Complies with RoHS directive.

Servo amplifiers with special coating-specification are now available. This servo amplifier has an improved corrosion resistance in environments with corrosive gas concentrations, conforming to IEC 60721-3-3, Class 3C2. For details, contact your local office.

2-axis/3-axis Types for Energy-conservative, Miniaturized, and Low-cost Machine

2-axis and 3-axis servo amplifiers are available for operating two and three servo motors, respectively. These servo amplifiers enable energy-conservative, compact machine at lower cost. Different types of servo motors including rotary servo motors, linear servo motors, and direct drive motors are freely combined as long as the servo motors are compatible with the servo amplifier.

MR-J4W3-B

Operates any combination of rotary servo motors, linear servo motors, and direct drive motors with various series and capacities.

A-axis rotary servo motor (HG-KR/MR)

B-axis linear servo motor (LM-H3/K2/U2)

C-axis direct drive motor (TM-RFM)
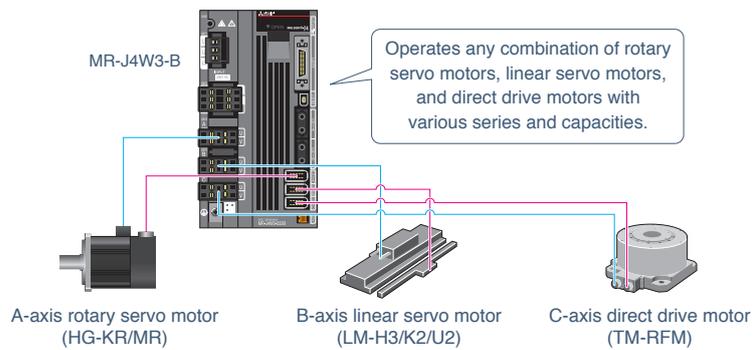
Supporting Energy-conservative Machine Using Regenerative Energy

In the multi-axis servo amplifier, the regenerative energy of an axis is used as driving power energy for the other axes, contributing to energy-conservation of machine.
Reusable regenerative energy stored in the capacitor is increased for MR-J4W2-B/MR-J4W3-B as compared to the prior model. Regenerative option is no longer required*.

* Regenerative option may be required depending on the conditions.

Regenerative energy
A-axis motor
Driving power energy
B-axis motor
Driving power energy
C-axis motor

Regenerative energy is temporarily stored and used as driving power energy.

■A-axis motor speed
Deceleration
Time

■B-axis motor speed
Acceleration
Time

■C-axis motor speed
Acceleration
Time

[Reusable energy]

	MR-J4W3	MR-J3
200 W	21 J	9 J
400 W	30 J	11 J
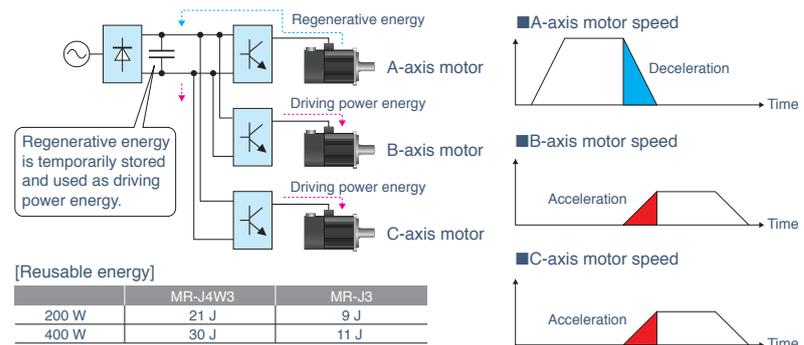
Space-saving with Industry's Smallest* 3-axis Type

2-axis servo amplifier MR-J4W2-B requires 26% less installation space than two units of MR-J4-B. 3-axis servo amplifier MR-J4W3-B requires 30% less installation space than three units of MR-J4-B.

* Based on Mitsubishi Electric research as of February, 2015.

[Example of installation space for two units of each 100 W, 200 W, 400 W, and 750 W]

MR-J4W3-B
(3-axis type)

(Depth 195 mm)

168 mm

85		
100 W × 2 200 W × 1	200 W × 1 400 W × 2	750 W × 2

Installation space reduced by **30**%

Industry's smallest*

255 mm = 85 mm (unit width) × 3

MR-J4W2-B
(3-axis type)

(Depth 195 mm)

168 mm

60			85
100 W × 2	200 W × 2	400 W × 2	750 W × 2

Installation space reduced by **26**%

265 mm = 60 mm (unit width) × 3 + 85 mm (unit width) × 1

MR-J4-B

(Depth 135 mm, 170 mm, 185 mm)

168 mm

40						60	
100 W	100 W	200 W	200 W	400 W	400 W	750 W	750 W

360 mm = 40 mm (unit width) × 6 + 60 mm (unit width) × 2
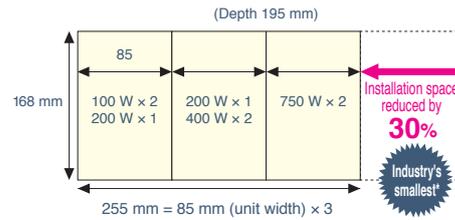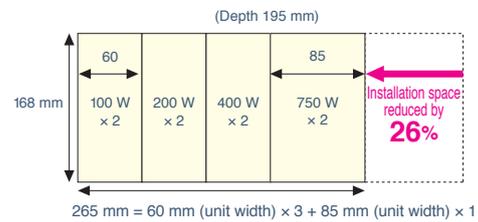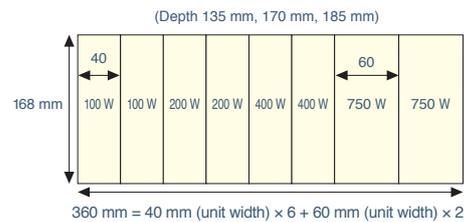
Reduced Wiring by Approx. 50% with 3-axis Type

The three axes of 3-axis servo amplifier MR-J4W3-B use the same connections for main and control circuit power, peripheral equipment, control signal wire, etc. Thus, the number of wirings and devices is greatly reduced.

[Comparison of the number of wirings]

MR-J4-B × 3 units

Controller

MR-J4W3-B (3-axis type) × 1 unit

Controller

Reduced wiring by **50**%

[Number of wirings]

SSCNET III/H	× 3	(number of units)
Main circuit power supply	× 3	(number of units)
Control circuit power supply	× 3	(number of units)
Magnetic contactor connection	× 3	(number of units)
Magnetic contactor control	× 3	(number of units)
Encoder	× 3	(number of axes)
Motor power input	× 3	(number of axes)
Total	21	

[Number of wirings]

SSCNET III/H	× 1
Main circuit power supply	× 1
Control circuit power supply	× 1
Magnetic contactor connection	× 1
Magnetic contactor control	× 1
Encoder	× 3
Motor power input	× 3
Total	11

4

Servo Amplifiers

Heritage

A heritage of trust and continuity — the hallmark of every MELSERVO product.

Easy Replacement of MR-J3 Series

MR-J4-B/MR-J4-A has the same mounting dimensions[1] with MR-J3-B/MR-J3-A. HG rotary servo motor series has the same mounting dimensions[2] and uses the same optional cables for the power, the encoder[3], and the electromagnetic brake as HF series or HC-RP/HC-UP series.

Same mounting dimensions with MR-J3

Same cables with MR-J3

Servo motor power cable

Encoder cable

Same mounting dimensions of servo motor

MR-J4-B
MR-J4-A

Servo motor
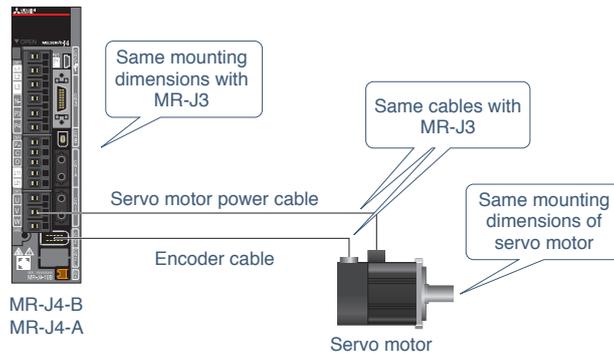
*1. Mounting dimensions are smaller for servo amplifiers rated 200 V 5 kW, 400 V 3.5 kW, 200 V/400 V 11 kW, and 200 V/400 V 15 kW.
*2. For replacing HA-LP series to HG-JR series, contact your local sales office for more detail.
*3. HG-JR series of 11 kW to 55 kW uses a different encoder cable from HF-JP series.

Supporting Replacement of MR-J2-Super Series

MELSERVO-J4 series product lines include general-purpose interface, positioning function, and SSCNET III/H interface. MELSERVO-J4 series is compatible with a wide variety of command interface and also replaceable from MELSERVO-J2S series.

MR-J2S-A	▶	MR-J4-A
MR-J2S-B	▶	MR-J4-B
MR-J2S-CP MR-J2S-CL	▶	MR-J4-A-RJ

We provide support for the renewal with the following materials from the catalog of renewal introduction, the handbook with detailed information to the instruction manual for the renewal tool to use the existing connections.

Transition from MELSERVO-J2-Super/J2M Series to J4 Series Handbook
L(NA)03093

This handbook explains how to replace your MR-J2S/J2M to MR-J4 series.
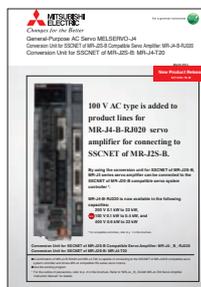
New Product Release of Conversion Unit for SSCNET of MR-J2S-B
SV1306-1

This brochure announces a new release of MR-J4-B-RJ020 and a conversion unit for connecting to SSCNET of MR-J2S-B. Specifications of the servo amplifier and the conversion unit are also listed.
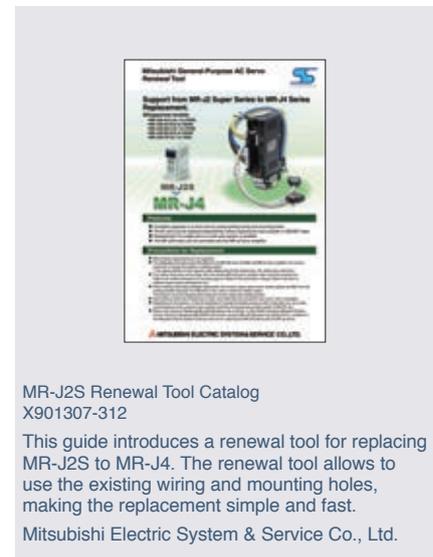
MR-J2S Renewal Tool Catalog
X901307-312

This guide introduces a renewal tool for replacing MR-J2S to MR-J4. The renewal tool allows to use the existing wiring and mounting holes, making the replacement simple and fast.

Mitsubishi Electric System & Service Co., Ltd.

~Reliable Basic Performance and Advanced Ease-of-use~

MELSERVO-JE series

[Easy To Use]

● Advanced one-touch tuning adjusts servo gains with one-touch ease.

● Instantaneous power failure tough drive function and a large capacity capacitor reduce machine downtime.

[High Performance]

● The dedicated engine enables speed frequency response of 2.0 kHz, shortening the cycle time.

● The large capacity main circuit capacitor allows the regenerative energy to be used effectively.

[Global Standard]

● Global servo, MR-JE series, complies with global standards as standard.

● Command pulse input and digital input/output are compatible with both sink and source type connections.

MR-JE-B
SSCNET III/H compatible
servo amplifier

MR-JE-B is compatible with SSCNET III/H, optical servo system controller network that enables a high-response and multi-axis system with high synchronous performance and less wiring. In addition, absolute position detection system can be configured easily with the MR-JE-B servo amplifiers.

Command interface	SSCNET III/H
Control mode	Position/Speed/Torque
Power supply	200 V AC
Capacity range	0.1 kW to 3 kW
Compatible servo motor	Rotary servo motor

MR-JE-A
General-purpose interface compatible
servo amplifier

Pulse train and analog input, etc., are provided as a standard for the command interface. The control mode can be switched accordingly for position, speed or torque control. The MR-JE-A has a built-in positioning function, being compatible with MODBUS®, simple cam, and mark sensor input compensation.

Command interface	Pulse train/Analog/RS-422/MODBUS® RTU
Control mode	Position/Speed/Torque
Power supply	200 V AC
Capacity range	0.1 kW to 3 kW
Compatible servo motor	Rotary servo motor

4

Servo Amplifiers

Servo Motors

From rotary to linear and direct drive motors

Rotary servo motors are available in capacities from 10 W to 55 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 a direct drive.

Rotary servo motor: A wide range of capacities and series for various system applications

HG series for MELSERVO-J4 series

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 55 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-AK

Ultra-compact, ultra-small capacity with flange size of 25 mm. Suitable for small machines.
Capacity: 10 W to 30 W   Rated speed: 3000 r/min   Maximum speed: 6000 r/min
[Application example]
●Mounters and bonders ●Semiconductor manufacturing equipment ●Compact robots
●Electric component manufacturing machines ●Compact X-Y table

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

5

Servo Motors

Equipped with 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. Positioning accuracy is increased.

* 262,144 pulses/rev (18-bit) for HG-AK series.

Improved Environmental Resistance

HG-KR/HG-MR/HG-RR/HG-UR, HG-SR/HG-JR, and HG-AK are rated IP65, IP67[*1], and IP55, respectively.[*2]

*1. HG-JR1000 r/min series 15 kW or larger, and HG-JR1500 r/min series 22 kW or larger are rated IP44.
*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 and HG-MR series)

Selectable mounting direction

In direction of load side

In opposite direction of load side
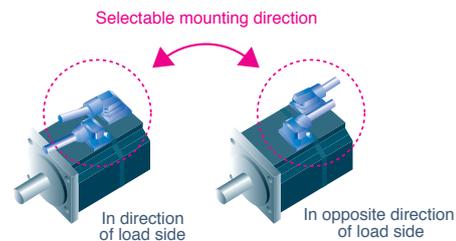
Reduced Torque Ripple during Conduction

The torque ripple is reduced owing to the optimized combination of the numbers of the motor poles and the slots. Thereby, smooth rotation is achieved even during a low-speed operation which is more likely affected by the torque ripple, improving the operation stability.

Torque ripple

[Prior model (HF-KP series)]

[New model (HG-KR series)]

1/4 As compared to the prior series.

* For 400 W
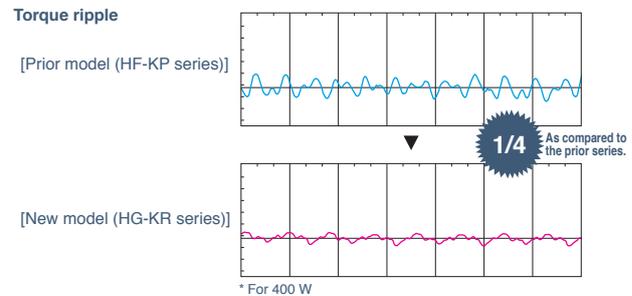
HG series for MELSERVO-JE series

HG-KN

Small capacity, low inertia. Perfect for general-purpose industrial machines.
Capacity: 0.1 kW to 0.75 kW   Rated speed: 3000 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-SN

Medium capacity, medium inertia. Suitable for machines having large load inertia.
Capacity: 0.5 kW to 3 kW   Rated speed: 2000 r/min
[Application example]
●Material handling systems ●Dedicated machines ●Robots
●Loaders and unloaders ●Winders, tension units ●Turrets ●X-Y tables

Linear servo motor: Suitable for linear motion systems requiring high speed and accuracy

LM series for MELSERVO-J4 series

LM-H3 series

Maximum speed: 3 m/s Rated thrust: 70 N to 960 N
Core type suitable for space-saving.
The magnetic attraction force contributes to high rigidity.

LM-F series

Maximum speed: 2 m/s Rated thrust: 300 N to 3000 N (natural cooling), 600 N to 6000 N
(liquid cooling)
Core type compact linear servo motor.
The integrated liquid-cooling system doubles the continuous thrust.
The magnetic attraction force contributes to high rigidity.

LM-K2 series

Maximum speed: 2 m/s Rated thrust: 120 N to 2400 N
Core type with magnetic attraction counter-force.
The magnetic attraction counter-force structure extends life of the linear guides and
contributes to lowering audible noise.

LM-U2 series

Maximum speed: 2 m/s Rated thrust: 50 N to 800 N
Coreless type without cogging resulting in small speed fluctuation.
The structure with no magnetic attraction force extends life of the linear guides.

Sophisticated Performance

Supporting maximum speed of 3 m/s (LM-H3 series) and 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.
Diverse product lines include core, liquid-cooling core, magnetic attraction
counter-force core, and coreless types.

A/B/Z-phase differential output type linear encoders are also supported by
MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ servo amplifiers.

A combination of the MR-J4 series servo amplifier and CC-Link IE Field Network
or SSCNET III/H compatible controller achieves advanced system including
high-accuracy tandem synchronous control.

[Application example]

Tandem configuration
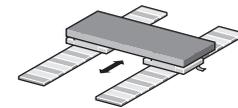
Multi-head configuration
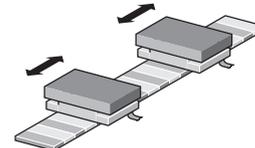
Application Example

[Machine tools XYZ stage]
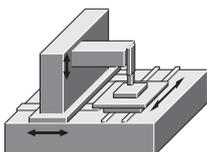
[Semiconductor/LCD manufacturing systems]
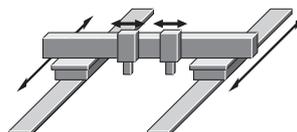
[Screen printing systems]
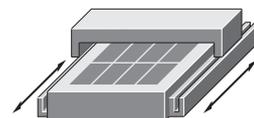
Direct drive motor: For compact and simplified machine driving part with high-accuracy control

TM-RFM series for MELSERVO-J4 series

Motor outer diameter: φ130 mm, φ180 mm, φ230 mm, φ330 mm
Rated torque: 2 N·m to 240 N·m (12 models)
[Application example]
●Material handling systems ●LCD manufacturing systems
●Machine tools

Sophisticated Performance

[High performance due to 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. High-accuracy machine is achieved.

[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.

Application Example

Suitable for low speed and high torque applications.

[Index table for machine tools]   [Rotary axis for material handling robots]   [Painting and vapor deposition systems]
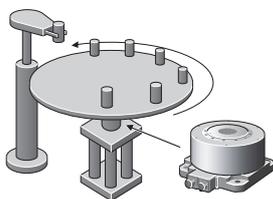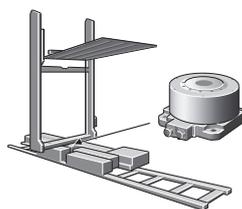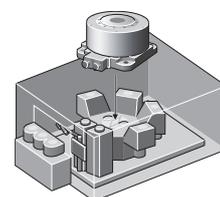
[Spin-type cleaning systems for LCD/semiconductor]   [LCD/semiconductor testing systems (XYθ tables)]   [Rotary axis for polishing systems]
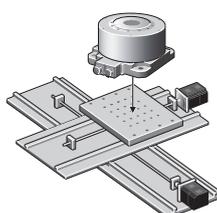
Material handling/
loader part

Polish part
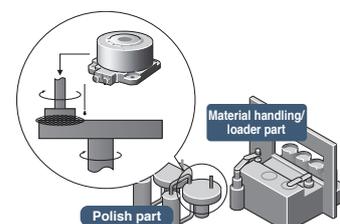
Engineering Software

FA Integrated Engineering Software MELSOFT iQ Works

MELSOFT iQ Works is an integrated software suite consisting of GX Works3, MT Works2, GT Works3, RT ToolBox2 mini and FR Configurator2, which are programming software for each respective product. Integration is further enhanced with MELSOFT Navigator as the central system configuration incorporating an easy-to-use, graphical user interface with additional project-sharing features such as system labels and parameters. The advantages of this powerful integrated software suite are that system design is made much easier with a substantial reduction in repetitive tasks, cutting down on errors while helping to reduce the overall TCO.
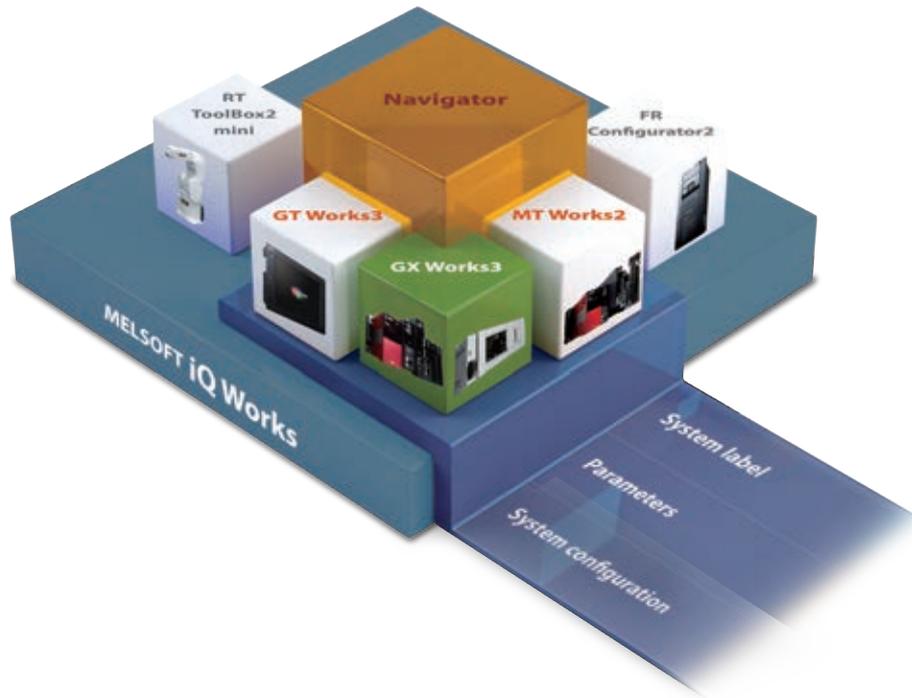
System management software
MELSOFT Navigator

System level graphic-based configuration tool that simplifies the system design by providing a visual representation of the system. System management features such as system-wide parameterization, labels and block reading of project data are also included.

Programmable controller engineering software
MELSOFT GX Works3

GX Works3 is the latest generation of programming and maintenance software offered by Mitsubishi Electric specifically designed for the MELSEC iQ-R Series control system. It includes many new features such as graphic-based system configuration, integrated motion control setup, multiple language support, providing an intuitive engineering environment solution.

HMI/GOT screen design software
MELSOFT GT Works3

This graphic operation terminal (GOT) screen creation software is designed with three main features—simplicity, graphics design and operation ease—that help to create graphic screens in fewer steps.

Motion controller engineering software
MELSOFT MT Works2

This motion control design and maintenance software includes intuitive graphic-based programming together with a digital oscilloscope simulator.

Robot engineering software
MELSOFT RT ToolBox2 mini

This robot setup software supports various steps from programming, to commissioning, evaluation, and maintenance. In addition, improved preventative maintenance is realized through the use of an integrated 3D robot simulator.

Inverter setup software
MELSOFT FR Configurator2

This software simplifies the setup and maintenance of AC Inverters. Parameters can be registered easily and distributed to multiple inverters when replacing, and activation of the PLC function all from one setup screen.

Mitsubishi Electric offers diverse software to fully support all phases of the product development cycle- from sizing, system design, startup, to maintenance.

MELSOFT is the FA integrated engineering software that demonstrates their abilities in various FA scenes including designing, debugging and startup, and operation and maintenance to facilitate all aspects from specification review to daily data collection.

| Programmable Controller Engineering Software **MELSOFT GX Works3**	Motion Controller Engineering Software **MELSOFT MT Works2**	Servo Setup Software **MELSOFT MR Configurator2**
All-in-one Tool for Quick and Easy Startup This all integrated software offers a wide range of features - sequence program and function block creation, parameter settings for Simple Motion modules, servo adjustment, and debugging.	**Harness the Full Potential of Motion Performance through MELSOFT MT Works2** MELSOFT MT Works2 supports the entire product development cycle - parameter settings, Motion SFC programming, servo adjustment to debugging for Motion controller.	**User-friendly Software for Easy Setup, Tuning and Operation** By being connected to a servo amplifier, tuning, monitoring, diagnosis, reading/writing parameters, and test operations are easily performed.

System Design

System configuration

`GX Works3` `MT Works2`

Servo amplifiers and modules are set easily with the graphical system setting screen.

Amplifier setting

Module configuration

`GX Works3`
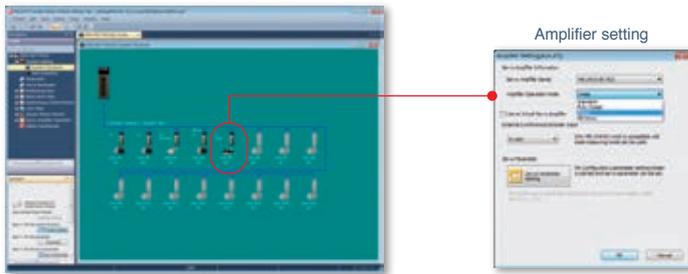
Each parameter is set from the module configuration screen.
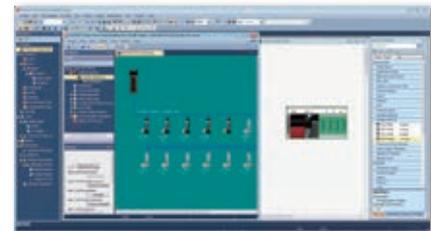
Servo data setting

`GX Works3` `MT Works2`

One-point help allows you to set parameters without manuals.

Entering just the machine specifications (reduction ratio, ball screw pitch, etc.) sets the electric gear.

Electronic gear setting   Reduction ratio setting
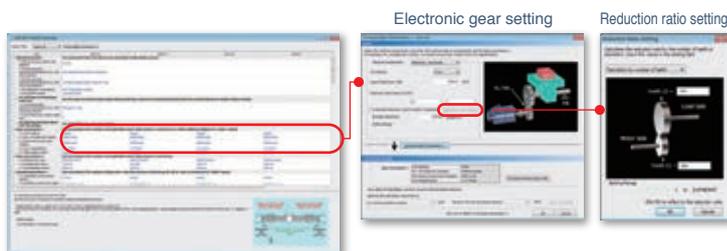
Copying servo data

`GX Works3` `MT Works2`

Copy & paste the data between axes easily.

Right-click on the axis No.
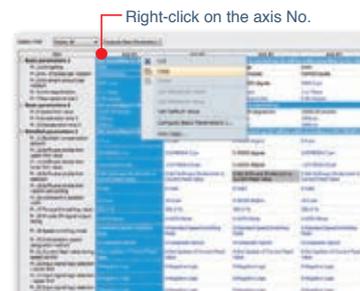
Programming

Positioning data setting

`GX Works3`

Functions such as Data setting assistant and Automatic calculation of auxiliary arc simplify the setting input process of positioning data.

Simulation

`GX Works3` `MT Works2`

The MELSOFT GX Works3 simulates the program on a personal computer without an actual machine during the debugging process.

Programming

`MT Works2`

User-friendly functions make Motion controller program development easier.

Synchronous control parameter

`GX Works3` `MT Works2`
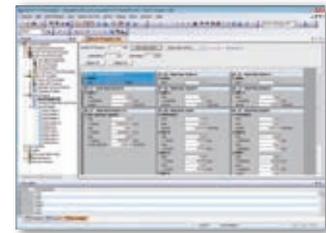
The synchronous control parameter is easily set using software instead of controlling mechanically with physical gears, shafts, speed change gears or cams.

Cam data creation

`GX Works3` `MT Works2`
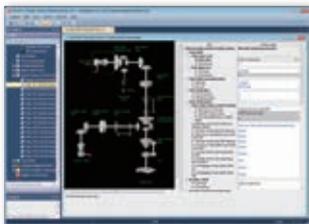
Various cam patterns are created more freely and flexibly.

Cam data list

`GX Works3` `MT Works2`
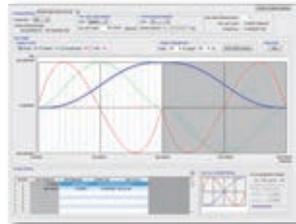
The created cam data are easily viewed as thumbnails.
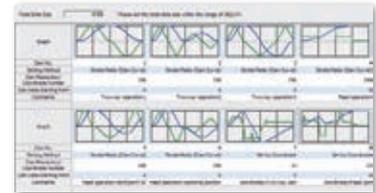
Startup and Adjustment

Monitor

`GX Works3` `MT Works2`

The required items and axes are selected from various monitoring information.

Digital oscilloscope

`GX Works3` `MT Works2`

Data collection and waveform display which are synchronized with the Motion operation cycle greatly help you check operation and perform troubleshooting.


Multi-axis adjustment

`GX Works3` `MT Works2`
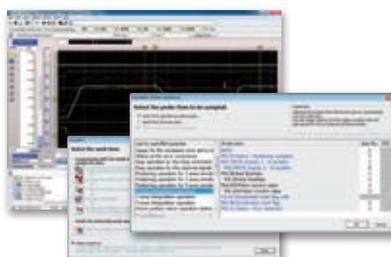
The multi-axis adjustment function enables easy servo adjustment and quick startup for machines executing multi-axis simultaneous operation, such as a tandem configuration.
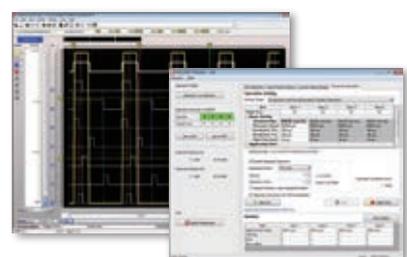
Startup and Adjustment of Servo Amplifier

| GX Works3 | MT Works2 | MR Configurator2 |

Servo setting adjustment via network

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

CC-Link IE Field

Servo amplifier

Servo motor

Graph
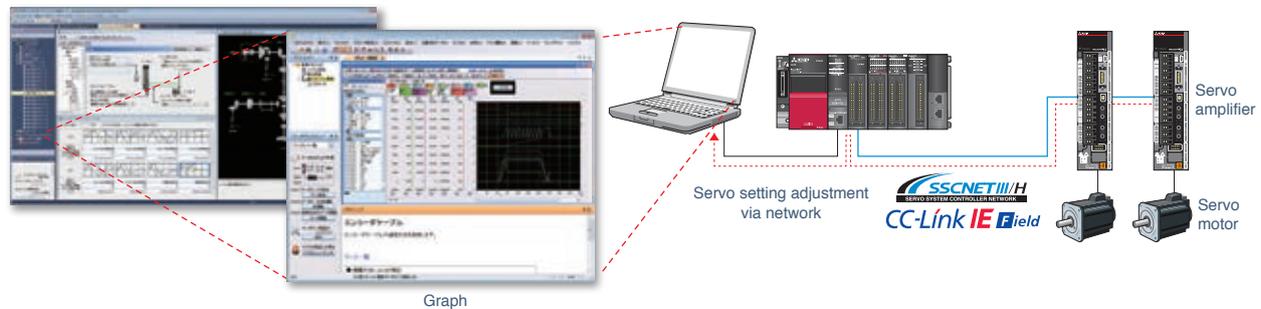
Servo assistant function

Complete setting up the servo amplifier just by following guidance displays.

Easy use

Parameter setting function

Display parameter setting in list or visual formats, and set parameters by selecting from the drop down list.

Set without manuals.
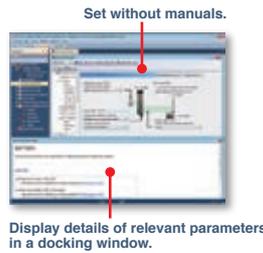
Display details of relevant parameters in a docking window.

Monitor function

Monitor an operation status on the [Display all] window. No measurement equipment is necessary to monitor power consumption since the power consumption is monitored and displayed on the window.
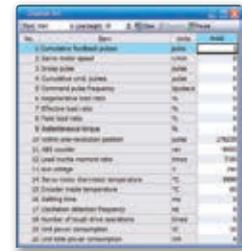
One-touch tuning function

With the ease of clicking the start button, adjustments such as estimating load to motor inertia ratio, adjusting gain, and suppressing machine resonance are automatically performed for the maximum servo performance.

Click
Adjustment completed

Display adjustment results.

Tuning function

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

Adjust gains finely.
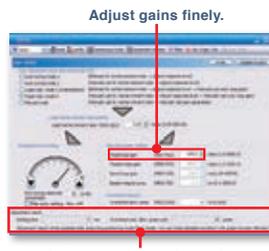
Display adjustment results.

Alarm display

MR-J4 series displays the alarm No. in three digits to show the servo alarm in more details, making troubleshooting easy.

10.1 ▶
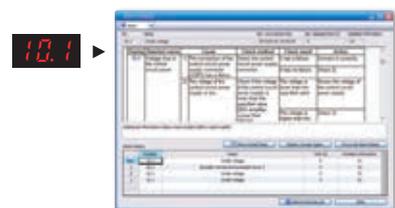
Select the most suitable motor for your machine
Capacity selection software **MRZJW3-MOTSZ111E**

Select the most suitable servo amplifier, servo motor, and regenerative option for your machine just by setting machine specifications and operation pattern.
Select the operation pattern from either position control mode or speed control mode. The capacity selection software is available for free download. Contact your local sales office for more details.

6

Engineering Software
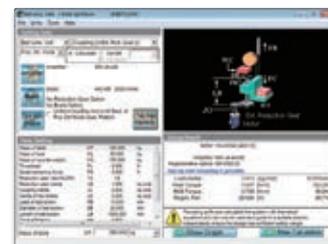
CC-Link IE Field Network

Ethernet-based open network, CC-Link IE Field Network —
All-rounder network opens up new areas of control

This Ethernet-based open network is designed to simultaneously handle distributed control, I/O control, safety control, and Motion control.

Two Times Faster Operation Cycle
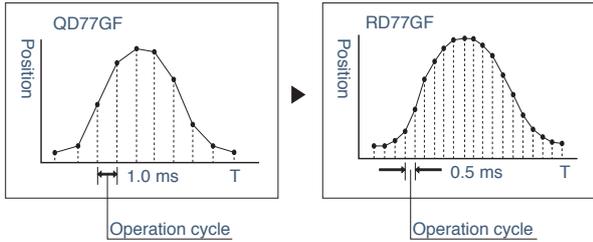
The operation cycle of 0.5 ms, two times faster than the previous model, enables smoother machine control.
Smooth control of synchronization, cam control, and S-curve acceleration/deceleration improves the product quality with a shorter cycle time.

Motion Control Achieved
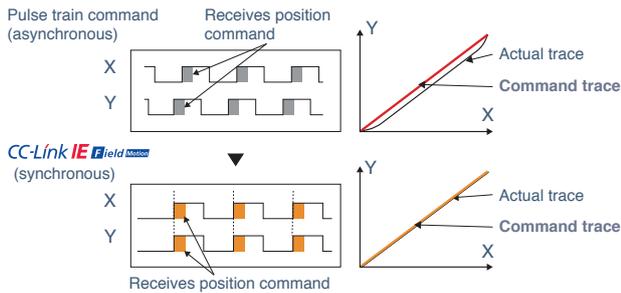
The CC-Link IE Field Network is newly equipped with Motion function in the cyclic communication band. The complete, deterministic, and synchronized communication with the servo amplifiers enables advanced and high-accuracy positioning, synchronization, and cam control.

Easy Startup
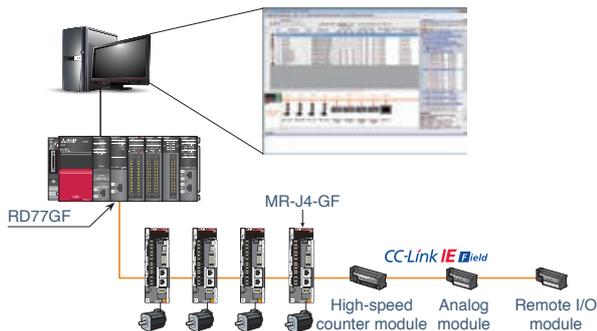
Selecting each field device on the screen of CC-Link IE Field configuration via drag & drop enables easy parameter settings.
The addition or the change of field devices are also easily applied by resetting the parameters.

All-rounder Network
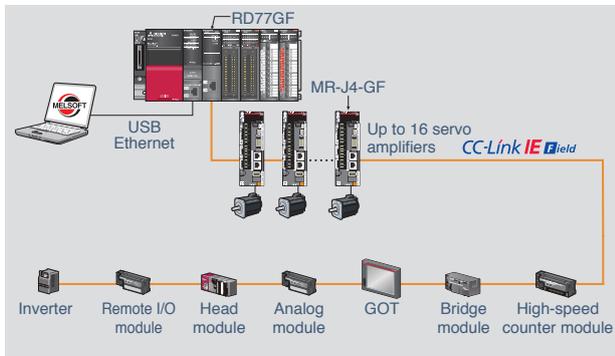
CC-Link IE Field Network is an Ethernet-based open network. The highly flexible wiring of CC-Link IE Field enables versatile control from I/O control to Motion control over the single network. Because CC-Link IE Field Network is based on the Ethernet, cables and connectors are highly available in the world.

* Up to 16 servo amplifiers (motion mode) are connectable.

   Slave stations:
      RD77GF: 120 stations
               (Including the number of motion mode compatible servo amplifiers)
      QD77GF: 120 stations
               (16 motion mode compatible servo amplifiers + 104 I/O devices)

Flexible Network Topology
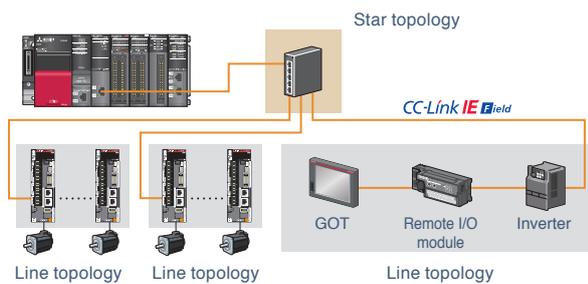
Star, line, and star/line mixed topologies are available.
Star topology is available using an industrial switching HUB.
Applicable HUB: DT135TX (manufactured by Mitsubishi Electric System & Service Co., Ltd.)

Synchronized Communication Function
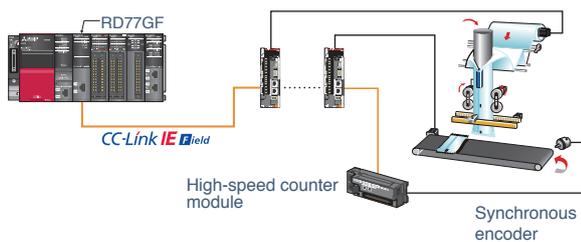
The operation timing between multiple slave units is aligned since the synchronous communication compatible slave devices operate simultaneously with the operation cycle of the Simple Motion module.
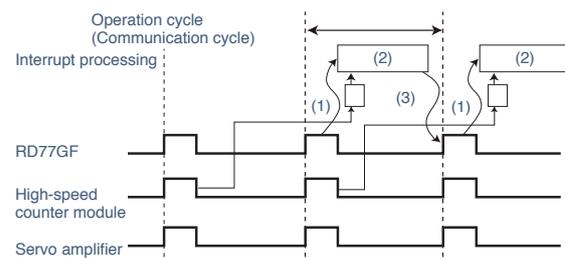
(1) Interrupts   (2) Operation processing   (3) Setting of command value

7

Networks

SSCNET III/H

The blazingly fast speed and response of 150 Mbps full-duplex baud rate
SSCNET III/H optical networking

SSCNET III/H is a high-speed servo system controller network employing fiber optic cables, enabling high precision synchronization. The communication cycle as fast as 0.222 ms increases responsivity and reduces cycle time of machine. The dedicated fiber optic cable reduces the wiring and makes the setting up so simple.

Three Times Faster Communication Speed

Industry-leading levels

■Network communication speed

| SSCNET III/H MR-J4 | |
| SSCNET III MR-J3 | |

50   100   150[Mbps]
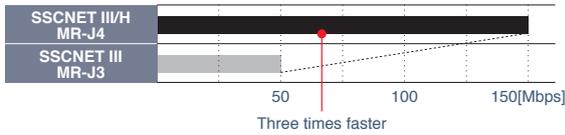
Three times faster

Communication speed is increased to 150 Mbps full duplex (equivalent to 300 Mbps half duplex), three times faster than the conventional speed. System response is dramatically improved.

Cycle Time as Fast as 0.222 ms

Industry-leading levels

■ SSCNET III
Position
0.444 ms   T
Communication cycle

▶

■ SSCNET III/H
Position
0.222 ms   T
Communication cycle
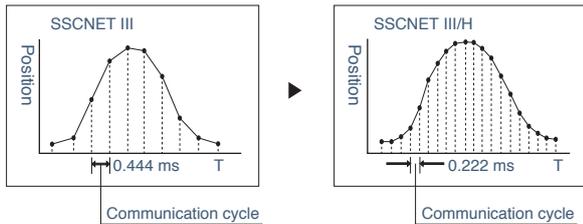
Smooth control of machine is possible using high-speed serial communication with a cycle time of 0.22 ms.

Deterministic and Synchronized Communication

■Timing of servo amplifier processing

SSCNETⅢ/H
SERVO SYSTEM CONTROLLER NETWORK

Pulse train command (asynchronous)

SSCNET III/H command (synchronous)

1st servo amplifier axis
2nd servo amplifier axis
3rd servo amplifier axis

Receives position command.
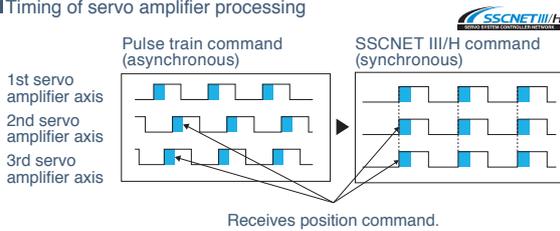
Complete deterministic and synchronized communication is achieved with SSCNET III/H, offering technical advantages in machines such as printing and food processing machines that require synchronous accuracy.

No Transmission Collision

SSCNETⅢ/H
SERVO SYSTEM CONTROLLER NETWORK
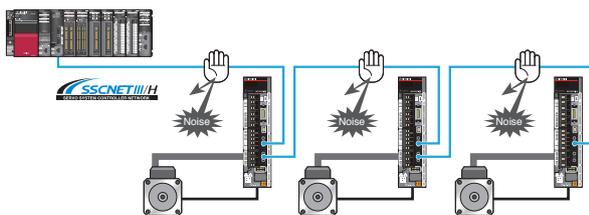
Noise   Noise   Noise

The fiber-optic cables thoroughly shut out noise that enters from the power cable or external devices. Noise tolerance is dramatically improved as compared to metal cables.

🖐 Guards against noise.

Dramatically Reduced Wiring

The control panel on controller side   The control panel on servo amplifier side

SSCNET III/H Head module
LJ72MS15

[Specifications]
• Maximum number of stations: 4 stations
• Maximum I/O points per system   • Maximum I/O points per station
  Input points   256 bytes   Input points   64 bytes
  Output points   256 bytes   Output points   64 bytes
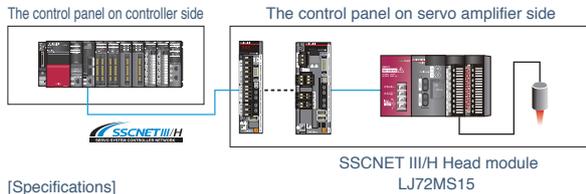
The SSCNET III/H Head module allows the controller to connect remotely with various modules (I/O, analog, high-speed counter, etc.) via SSCNET III/H. This results in reduced wiring since the Motion controller receives the I/O and analog I/O signals directly from the servo amplifier side.

Central Control with Network

→ Data write
--→ Data read

SSCNET III/H compatible controller
*1

MR Configurator2

SSCNET III/H

MR-J4_-B

*1. Reconnecting cable is not required.
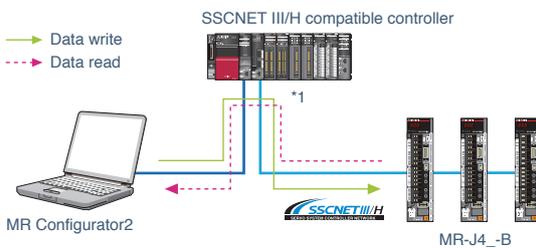
Large amounts of servo data are exchanged in real-time between the controller and the servo amplifier. Using MR Configurator2 on a personal computer that is connected to the Motion controller or the Simple Motion module helps consolidate information such as parameter settings and monitoring for the multiple servo amplifiers.

Long Distance Wiring up to 3200 m

Enhanced performance

32 axes maximum

SSCNET III/H

Standard code/standard cable: Max. 20 m between stations
Long distance cable: Max. 100 m between stations
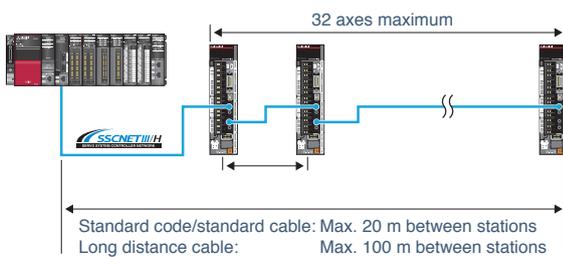
Long distance wiring is possible up to 3200 m per system (maximum of 100 m between stations × 32 axes).
Thus, it is suitable for large-scale systems.
* This is when all axes are connected via SSCNET III/H.

Maximum overall distance per system
  Standard code/standard cable: 640 m (20 m × 32 axes)
  Long distance cable: 3200 m (100 m × 32 axes)

SSCNET III/H Compatible and SSCNET III Compatible Products Connected in a Same System

■SSCNET III/H compatible controller + MR-J4-B/MR-J4W2-B/MR-J4W3-B
MR-J4-B MR-J4-B MR-J4-B MR-J4-B
SSCNET III/H compatible controller

■SSCNET III/H compatible controller or SSCNET III compatible controller, together with a combination of MR-J3-B/MR-J4-B in a system
MR-J3-B MR-J4-B* MR-J3-B MR-J4-B*
SSCNET III/H compatible controller
SSCNET III compatible controller

SSCNET III/H and SSCNET III compatible controllers support the use of SSCNET III/H and SSCNET III compatible servo amplifiers together in a same system.

* When the SSCNET III compatible products are in the system, the communication speed is 50 Mbps, and the function and the performance are equivalent to those of MR-J3.

7

Networks

33

Selection of Servo System Controller

Select the type of servo system controller roughly on the basis of control method after selecting a PLC CPU. Next, select the optimal servo system controller that suits your application on the basis of connecting devices, performance/program types, and functions.
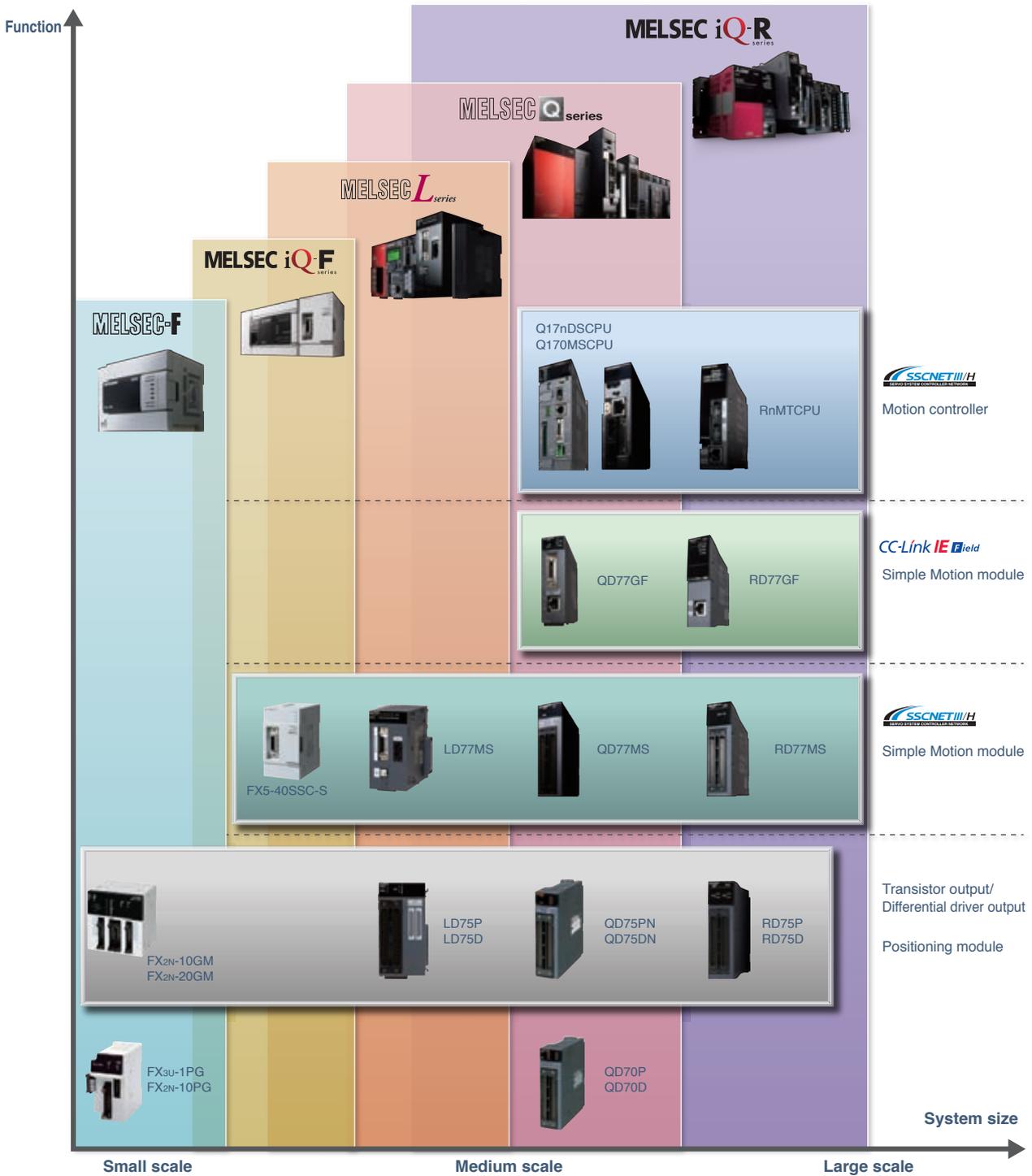
Model Selection of PLC CPU and Controller

Medium- to large-scale control

MELSEC iQ-R series

A next-generation programmable automation controller (PAC), the MELSEC iQ-R series resolves your tasks as the core of the automation system by integrating high-performance capabilities based on the high-end iQ-R system bus, inter-module synchronization, and high precision processing achieved by synchronization between high-speed networks.

MELSEC Q series
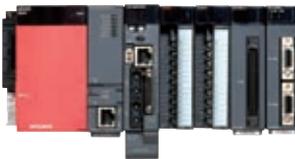
The first to incorporate the multiple CPU architecture, the MELSECQ series wide-range of CPUs enables control of multiple operations, improving the performance and scalability of the overall production system.

Small- to medium-scale control

MELSEC L series

The MELSEC-L series is a baseless highly scalable controller ideal for applications having limited space. With various I/O functionality embedded into the CPU module, high performance is achieved in a compact body.

Small-scale and stand-alone

MELSEC iQ-F series

Designed to provide outstanding performance and superior drive control, the MELSEC iQ-F series is a high-performance compact-class controller with a rich assortment of integrated functions.

MELSEC-F

Incorporating abundant features with a flexible system configuration, the MELSEC-F series has a power supply, CPU, and I/Os into a single compact body.

Motion control by C Language based programming

High-response servo control can be performed with a combination of the Position Board and a personal computer, or the C Controller Interface Module and the C Controller.

8 Controller Selection Guide

Model Selection by Control Method

Select the controller on the basis of control method, program, and command interface.

Control method

| Positioning control only | Synchronous control, Speed-torque control, Mark detection, etc. | Special control such as pressure control |

| X-Y tables, Material handling, Mounters, etc. | Packaging, Printing, Pressing, Converting, Semiconductor manufacturing, etc. | Injection molding, etc. |

①

R16MTCPU
R32MTCPU
R64MTCPU

Program

| Motion SFC | Sequence program (FB included) | C language |

Command interface

CC-Link IE Field Network

SSCNET III/H

Transistor output or Differential driver output

| R16MTCPU R32MTCPU R64MTCPU Q172DSCPU Q173DSCPU Q170MSCPU | RD77MS QD77MS LD77MS FX5-40SSC-S | RD77GF QD77GF | RD75P, RD75D QD75PN, QD75DN LD75P, LD75D | MR-MC240 MR-MC241 Q173SCCF |

① Synchronous control,
Speed-torque control,
Mark detection, etc.

Program

Motion SFC

Sequence program

Command interface

SSCNET III/H

CC-Link IE Field Network

R16MTCPU
R32MTCPU
R64MTCPU
Q172DSCPU
Q173DSCPU
Q170MSCPU

RD77MS
QD77MS
LD77MS
FX5-40SSC-S

RD77GF
QD77GF

8

Controller Selection Guide

Model Selection of PLC CPU

Select the PLC CPU in consideration of the size and expandability of the equipment.

For small system and stand-alone

For small- to medium-scale system

For medium- to large-scale system

MELSEC iQ-F series

MELSEC L series

MELSEC iQ-R series

MELSEC-F

MELSEC Q series
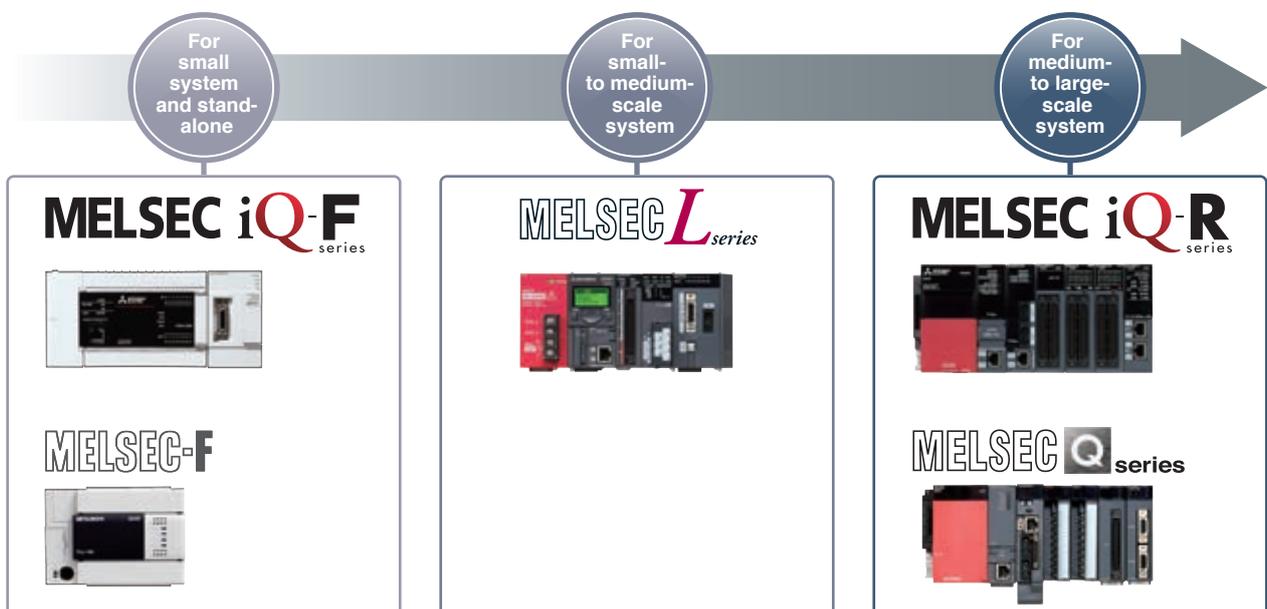
Product Lines

Programmable controller	Model		Engineering software	Command interface	MELSERVO-J4		MELSERVO-JE	
					Servo amplifier	Servo motor	Servo amplifier	Servo motor
MELSEC iQ-R series	Simple Motion module	RD77GF	GX Works3	CC-Link IE Field	MR-J4-GF		–	–
		RD77MS	GX Works3	SSCNETIII/H	MR-J4(W)-B		MR-JE-B	
	Motion controller	RnMTCPU	GX Works3 MT Works2				–	–
	Positioning module	RD75P RD75D	GX Works3	Transistor output Differential driver output	MR-J4-A		MR-JE-A	
MELSEC Q series	Simple Motion module	QD77GF	GX Works2	CC-Link IE Field	MR-J4-GF		–	–
		QD77MS	GX Works2	SSCNETIII/H	MR-J4(W)-B		MR-JE-B	
	Motion controller	Q17nDSCPU Q170MSCPU	GX Works2 MT Works2				–	–
	Positioning module	QD75PN QD75DN	GX Works2	Transistor output Differential driver output	MR-J4-A		MR-JE-A	
		QD70P QD70D	GX Works2	Transistor output Differential driver output				
MELSEC L series	CPU module	LCPU	GX Works2	Transistor output	MR-J4-A		MR-JE-A	
	Simple Motion module	LD77MS	GX Works2	SSCNETIII/H	MR-J4(W)-B		MR-JE-B	
	Positioning module	LD75P LD75D	GX Works2	Transistor output Differential driver output	MR-J4-A		MR-JE-A	
MELSEC iQ-F series	CPU module	FX5U FX5UC	GX Works3	Transistor output	MR-J4-A		MR-JE-A	
	Simple Motion module	FX5-40SSC-S	GX Works3	SSCNETIII/H	MR-J4(W)-B	– –	MR-JE-B	
MELSEC F series	CPU module	FX3U FX3UC	GX Works2	Transistor output	MR-J4-A		MR-JE-A	
	Positioning module	FX3U-1PG FX2N-10PG	GX Works2	Transistor output Differential driver output				
		FX2N-10GM FX2N-20GM	GX Works2 FX-PCS-VPS/WIN	Transistor output				
Personal computer	C Language compatible module	MR-MC240 MR-MC241	*1	SSCNETIII/H	MR-J4(W)-B		MR-JE-B	
		Q173SCCF	*2					

* MR-J4(W)-B : Servo amplifiers of MR-J4-B, MR-J4-B-RJ, MR-J4W2-B, and MR-J4W3-B.
*1. Be sure to prepare the development environment that Microsoft Visual Studio® can be used.
*2. CW Workbench/Wind River Workbench, and Setting/monitoring tool for the C Language Controllers

Performance/Program

Programmable controller	Model		Number of control axes	Operation cycle	Positioning program							Electronic gear
					Motion profile table	Synchronous control parameter	Motion SFC	Mechanical support language	Positioning dedicated language	Ladder	C language	
MELSEC iQ-R series	Simple Motion module	RD77GF	1 to 16	0.5 ms or longer	●	●	–	–	–	●	–	●
		RD77MS	1 to 16	0.444 ms or longer	●	●	–	–	–	●	–	●
	Motion controller	RnMTCPU	1 to 64	0.222 ms or longer	–	●	●	–	–	●	–	●
	Positioning module	RD75P RD75D	1 to 4	–	●	–	–	–	–	●	–	●
MELSEC Q series	Simple Motion module	QD77GF	1 to 16	1 ms or longer	●	●	–	–	–	●	–	●
		QD77MS	1 to 16	0.888 ms or longer	●	●	–	–	–	●	–	●
	Motion controller	Q17nDSCPU Q170MSCPU	1 to 32 1 to 16	0.222 ms or longer	–	●	●	●	–	●	–	●
	Positioning module	QD75PN QD75DN	1 to 4	–	●	–	–	–	–	●	–	●
		QD70P QD70D	1 to 8	–	●	–	–	–	–	●	–	–
MELSEC L series	CPU module	LCPU	1 to 2	–	●	–	–	–	–	●	–	–
	Simple Motion module	LD77MS	1 to 16	0.888 ms or longer	●	●	–	–	–	●	–	●
	Positioning module	LD75P LD75D	1 to 4	–	●	–	–	–	–	●	–	●
MELSEC iQ-F series	CPU module	FX5U FX5UC	1 to 4	–	–	–	–	–	–	●	–	–
	Simple Motion module	FX5-40SSC-S	1 to 4	1.777 ms	●	●	–	–	–	●	–	●
MELSEC F series	CPU module	FX3U FX3UC	1 to 3	–	–	–	–	–	–	●	–	–
	Positioning module	FX3U-1PG FX2N-10PG	1	–	–	–	–	–	–	●	–	–
		FX2N-10GM FX2N-20GM	1 1 to 2	–	–	–	–	–	●	–	–	–
Personal computer	C Language compatible module	MR-MC240 MR-MC241	1 to 20 1 to 32	0.222 ms or longer	●	–	–	–	–	–	●	●
		Q173SCCF	1 to 20	0.222 ms or longer	●	–	–	–	–	–	●	●

Function comparison

	MELSEC iQ-R				MELSEC-Q		
	RD77GF4 RD77GF8 RD77GF16	RD77MS2 RD77MS4 RD77MS8 RD77MS16	R16MTCPU R32MTCPU R64MTCPU	RD75P2 RD75D2 RD75P4 RD75D4	QD77GF4 QD77GF8 QD77GF16	QD77MS2 QD77MS4 QD77MS8 QD77MS16	Q172DSCPU Q173DSCPU Q170MSCPU Q170MSCPU-S1
Position control	●	●	●	●	●	●	●
Speed control	●	●	●	●*1	●	●	●
Torque control	●	●	●	—	●	●	●
Tightening & press-fit control	—	●	●	—	—	●	●
Advanced synchronous control	●	●	●	—	●	●	●
Cam control	●	●	●	—	●	●	●
Linear interpolation	●	●	●	●	●	●	●
Circular interpolation	●	●	●	●	●	●	●
Continuous trajectory control	●	●	●	●	●	●	●
Speed/position switching control	●	●	●	●	●	●	●
Position follow-up control	—	—	●	—	—	—	●
Helical interpolation	●	●	●	●	—	—	●
Trapezoidal acceleration/deceleration	●	●	●	●	●	●	●
S-curve acceleration/deceleration	●	●	●	●	●	●	●
Advanced S-curve acceleration/deceleration	—	—	●	—	—	—	●
JOG operation	●	●	●	●	●	●	●
Manual pulse generator operation	●	●	●	●	●	●	●
Current value change	●	●	●	●	●	●	●
Target position change	●	●	●	●	●	●	●
Speed change	●	●	●	●	●	●	●
Override	●	●	●	●	●	●	—
Acceleration/deceleration time change	●	●	●	●	●	●	●
Home position return	●	●	●	●	●	●	●
Absolute position system	●	●	●	Simple ver.	●	●	●
Unlimited length feed	●	●	●	—	●	●	●
Optional data monitor	●	●	●	—	●	●	●
Mark detect	●	●	●	—	●	●	●
Event history	●	●	●	●*1	—	—	—
Cam auto-generation	●	●	●	—	●	●	●
Driver communication	—	●	●	—	—	●	●
Digital oscilloscope	●	●	●	—	●	●	●
Vision system	—	—	●	—	—	—	●
Security key	—	—	●	—	—	—	●

*1. Speed control including position loop.
*2. Available only with FX2N-20GM.
*3. Refer to the Users manual for details.
*4. Available only with QD70D.

|		MELSEC-L		MELSEC iQ-F		MELSEC-F		MELSEC-Q	PC
QD75P1N QD75D1N QD75P2N QD75D2N QD75P4N QD75D4N	QD70P4 QD70D4 QD70P8 QD70D8	LD77MS4 LD77MS16	LD75P1 LD75D1 LD75P2 LD75D2 LD75P4 LD75D4	FX5-40SSC-S	FX5U FX5UC	FX2N-10GM FX2N-20GM	FX3U-1PG FX2N-10PG	Q173SCCF	MR-MC240 MR-MC241
●	●	●	●	●	●	●	●	●	●
●*1	—	●	●*1	●	—	—	●*1	●*3	●*3
—	—	●	—	●	—	—	—	●*3	●*3
—	—	●	—	●	—	—	—	●*3	●*3
—	—	●	—	●	—	—	—	—	—
—	—	●	—	●	—	—	—	—	—
●	—	●	●	●	●	●*2	—	●	●
●	—	●	●	●	—	●*2	—	—	—
●	●	●	●	●	—	*3	*3	●	●
●	●	●	●	●	—	*3	*3	—	—
—	—	—	—	—	—	—	—	—	—
●	—	—	●	—	—	—	—	—	—
●	●	●	●	●	●	●	●	●	●
●	*4	●	●	●	—	—	●	●	●
—	—	—	—	—	—	—	—	—	—
●	●	●	●	●	—	●	●	●	●
●	—	●	●	●	—	●	*3	—	—
●	●	●	●	●	—	—	—	—	—
●	*4	●	●	●	—	—	—	●	●
●	●	●	●	●	—	—	—	●	●
●	—	●	●	●	—	—	—	—	—
●	—	●	●	●	—	—	—	●	●
●	●	●	●	●	●	●	●	●	●
Simple ver.	—	●	Simple ver.	●	●	●	Simple ver.	●	●
—	—	●	—	●	—	—	—	—	—
—	—	●	—	●	—	—	—	●	●
—	—	●	—	●	—	—	—	●	●
—	—	—	—	—	—	—	—	●	●
—	—	●	—	●	—	—	—	—	—
—	—	●	—	●	—	—	—	—	—
—	—	●	—	●	—	—	—	●	●
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—

8

Controller Selection Guide

Solutions

Mitsubishi Electric's e-F@ctory concept will offer a solution for your "challenges" and "concerns" by making your plant truly "visible."

e-F@ctory Solutions

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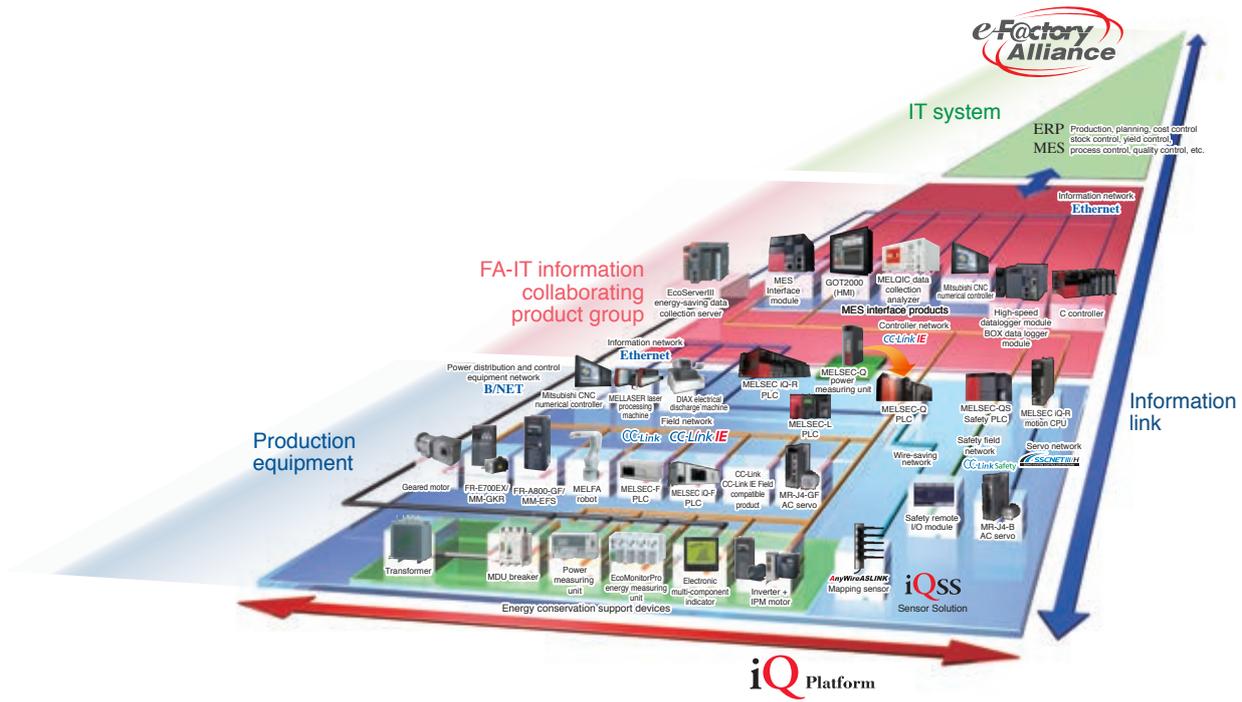

MELSERVO Solutions

Vertical Form, Fill & Seal
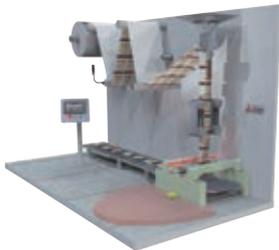
For food/beverage bag filling and packing

Issues:
Stabilizing the packing quality
Shorter cycle time without increasing shock to a machine
Creating a safety system

Motion Alignment (X-Y- θ)
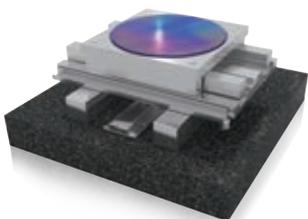
For equipment requiring more accurate positioning

Issues:
More accurate positioning
More precise drive operation
Shorter cycle time

Exceptional Solutions for All of Your Production Needs
Refer to "MELSERVO SOLUTIONS catalog (L(NA)03094)" for details.
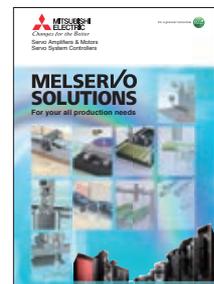
Mitsubishi Servo System Partners

Servo system includes controllers, servo drivers, actuators, sensors, etc. The servo system takes a step further to accelerate the equipment revolution by collaborating with our partner companies. Now that a wide variety of partner products are available such as stepping motors, direct drive motors, vision systems, and software, your system will be configured flexibly.

Software

Vision

Device

Servo System Partner Product

Controller

Encoder

Amplifier

Motor

SSCNET Partner Association

The SSCNET Partner Association (SNP) acting to spread SSCNET throughout the world.

SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

The SSCNET Partner Association (SNP) carries activities to introduce the advanced servo system controller network "SSCNET" and compatible products to many users. In cooperation with partner corporations, SNP widely promotes the performance attainable with SSCNET. In recent years, SNP holds partner meetings in Japan and other countries such as Taiwan and India. SNP and aims to make "SSCNET" a more global servo system controller network.

9

Solutions

Production System

Homes of MELSERVO where the advanced FA technologies are incorporated.
To guarantee the high quality and performance of MELSERVO, Mitsubishi Electric has built a cooperative system of three facilities - Shinshiro Factory, a branch factory of Nagoya Works; MEAMC (Mitsubishi Electric Automation Manufacturing (Changshu) Co., Ltd.) a manufacturing base; and Nagoya Works at the core. Mitsubishi Electric responds to customer needs throughout the world by uniting technologies and know-hows of these facilities.

Nagoya Works

Integrated manufacturing of servo amplifiers, servo motors, and other Mitsubishi Electric's servo system products.

Nagoya Works was established in 1924 as the first electric-motor mass-production factory of Mitsubishi Electric Corporation and has been gradually expanding the lineup of factory-automation and mechatronics products since the advent of high economic growth in Japan. On the basis of its rich achievements, Nagoya Works is active in developing solutions for improvement of productivity and quality.

Number of employees	2,500
Site area	306,000 m^2
Gross floor space	Approx. 252,000 m^2 (Excluding satellite factories)

Shinshiro Factory

Mitsubishi Electric's servo motor manufacturing facility.

Shinshiro Factory was established in 1974 as a satellite factory of Nagoya Works. From its establishment, the factory has been supplying various types of three-phase motors, in which the newest mechatronics technologies and system technologies are integrated. Moreover, Shinshiro Factory has introduced e-F@ctory, the FA integrated solution, to the processing line for motor shafts, which include a lot of special components. Thus, the productivity of the production line has been improved, and the factory is now able to handle a variety of and a small lot of products in a short cycle time.

Number of employees	100
Site area	137,000 m^2
Gross floor space	40,000 m^2

MEAMC
(Mitsubishi Electric Automation Manufacturing (Changshu) Co., Ltd.)

AC servo manufacturing facility in China

Established in June 2011 in Changshu, China, MEAMC started operations in December 2012. Local production for local consumption of AC servos and NC units, etc., is being promoted to respond to increasing demands for drive control units in China. Our latest FA integration solution "e-F@ctory" has been implemented in the manufacturing line to improve productivity and conserve energy.

Number of employees	100
Site area	33,150 m^2
Gross floor space	24,000 m^2

Key parts of own manufacturing on unique technology

In the advanced production system integrating the production management system and the FA system based on IT, key components such as power modules and servo-motor encoders for drive control devices and oscillators and lenses for laser machining equipment are manufactured in our company by making the best use of unique technologies. This strategic facility is indispensable for Nagoya Works to enhance competitiveness of its products and to add values to the products.

e-F@ctory/iQ Platform factories

e-F@ctory optimizes the whole operation of the factory. iQ Platform reduces TCO by seamless linkage in the production site. Nagoya Works has introduced these solutions of its own development to the production facilities to make productive use of them, gaining considerable effect on enhancement of its productivity.

Painstaking quality assurance through the application of cutting-edge testing equipment.

Ultrasonic Probing Devices

LSI testers

X-ray scanners

EMC center (large electromagnetic environment experiment room)

Equipment for highly accelerated life tests (HALT)

10

Production System/R&D

R&D

World-class R&D capabilities to offer a unique set of servo systems.
To bring cutting-edge servo systems to worldwide market, Mitsubishi Electric has established FA-related development centers in its Nagoya Works, Europe, the U.S., and India.
Together with our Advanced Technology R&D Center, and Information and Technology R&D Center, we are moving forward with the development of new products to correspond to technology trends and the voices of our customers.

Japan (Nagoya Works)

FA Development Center

Integrating product-development ability as a comprehensive FA supplier.

One thousand engineers of controllers and drives, including people from our affiliated companies work here. We are advancing the synergy of Mitsubishi's FA products, enhancing the compatibility among the products by sharing the development technologies each other. Moreover, engineers share and use technological data and development knowledge with overseas bases and partners, as well through high-speed network communication environments accessible twenty-four hours a day. In addition, planning, development, and prototyping stages are virtualized by information technology to reduce development period and to enhance development quality.

Mechatronics Development Center

The advanced base for advantage of technology and development of industrial mechatronics products.

As well as factory automation equipment, industrial mechatronics products are among the major products of Nagoya Works. The Mechatronics Development Center is the development base of these products. This development center has established advanced machining technology to achieve ultra-fine machining at the accuracy level as high as nanometer, improving development efficiency and reducing development time by seamlessly linking itself with relevant technological organizations. The Mechatronics Development Center is also utilized for joint development projects with our customers, leading creation of products corresponding to new ways of usage and new markets.

Japan (Mitsubishi Electric R&D)

Advanced Technology R&D Center

This is the base for the most advanced technology in relation to the whole business of Mitsubishi Electric Corporation, advancing development of common basic technologies and new products and forwarding research and development projects to initiate future business.

Information and Technology R&D Center

Here, research and development of basic technology is advanced in the fields of information, communication, multimedia, and light and radio wave to activate creation of new business. Moreover, the Information and Technology R&D Center is playing a role in finding a technology for a future top-runner business and in refreshing existing business with achievements of research and development in the field of information technology.

Global Development Centers

Lead the world in production development cooperating with overseas Mitsubishi development centers and domestic Mitsubishi laboratories.

European Development Center (EDC)

North American Development Center (NADC)

India Development Center (INDC)
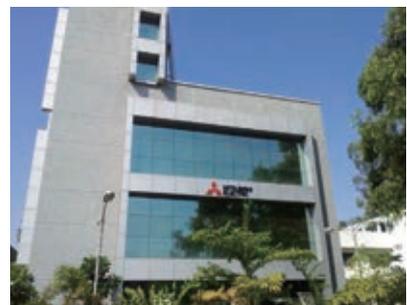
History of Mitsubishi Servo System

Passing our technologies and experiences from one generation to the next, Mitsubishi Electric continuously strives for cutting-edge technology.

Timeline markers: 1980 | 1985 | 1990 | 1995 | 2000 | 2005

Servo amplifier

- ●Launch of Mitsubishi's first servo amplifier
  MR-A/S0
- ●First to introduce a completely digital servo
- **MR-SA/SB/SC/SD**
- ●Industry's smallest servo (at the time)
  MR-J
- ●Most advanced servo (at the time)
  MR-H
- ●Launched super-miniaturized series
  MR-C
- **MR-J2**
- ●Launched the MR-J2-Super series – the industry's fastest servos (at the time)
  MR-J2-Super/J2M
- **MR-E**
- **MR-J3**

Industry Needs

- ●Improvement of productivity ●FMS
- ●Maintenance-free ●High-speed response ●Low-cost
- ●Miniaturized ●Low-noise ●Reduced wiring
- ●Compliant with standards ●Environment resistance ●High-speed and High-performance
- ●Networking ●Improvement of productivity (Per unit time, per unit area)

Servo motor

Linear

Core type
- ●Continuous thrust 250 to 4000 N
  LM-N
- **LM-H**

Coreless type
- **LM-T/LM-U**

Rotary

Medium/large capacity
- ●0.5 to 22 kW **HA-SAL**
- ●0.5 to 22 kW **HA-LH**
- ●5 to 55 kW **HA-LF/LFS**

Medium capacity
- ●0.2 to 7 kW **HA-A**
- ●0.2 to 7 kW **HA-SA**
- ●0.5 to 7 kW **HA-SH**
- ●0.5 to 7 kW **HC-SF/SFS**
- ●1 to 5 kW **HC-RF/RFS**
- ●0.1 to 5 kW **HC-UF/UFS**

Small capacity
- ●50 to 600 W **HA-S0/SC**
- ●50 to 600 W **HA-FE/FH**
- ●50 to 600 W **HA-FF**
- ●50 to 750 W **HC-KF/KFS**

Direct drive motor

Servo system controller

Motion controller
- ●Motion Controller **MR-P20/P40**
- ●Multi-axis Controller **A373CPU**
- ●A series **A173UHCPU/A172SHCPUN**
- ●Q series **Q173/Q172CPUN**

Simple Motion module / Positioning module
- ●A series **AD75M**
- ●Q series **QD75M**

Network

Field network
- ●10 Mbps **CC-Link**

Servo system controller network (SSCNET)
- ●High-speed (5.6 Mbps × 2) ●Centralized parameter management ●ABS standard ●Multi-axis synchronous
  SSCNET

In 1987, Mitsubishi Electric announced MELSERVO-SA, the first completely digital hardware logic product at a time when analog products were at their zenith. Since then, we have pioneered servo technology in Japan. Carrying that heritage forward, we will continuously offer you globally-acknowledged servo systems that completely satisfy your needs.

2005

2010

●2-axis type
MR-J3W

●Speed frequency response of 2.5 kHz
MR-J4/MR-J4W2/MR-J4W3

●CC-Link IE Field
MR-J4-GF

MR-E Super

MR-JE

●Diagnosis functions ●Ease of startup
●Widened scope of servo application

●High-performance ●Safety standard ●Energy-saving ●Widened environmental conditions
●Easy to use ●Vibration suppression ●Maintenance function ●Open network

●Continuous thrust 600 to 6000 N
LM-F

●Continuous thrust 60 to 960 N
LM-H2

●Continuous thrust 70 to 960 N
LM-H3

●Continuous thrust 120 to 2400 N
LM-K2

●Continuous thrust 50 to 800 N
LM-U2

●5 to 55 kW
HA-LP

●0.5 to 15 kW
HF-JP

●0.5 to 55 kW
HG-JR

●0.5 to 7 kW
HF-SP

●0.5 to 7 kW
HG-SR

●1 to 5 kW
HC-RP

●1 to 5 kW
HG-RR

●0.75 to 5 kW
HC-UP

●0.75 to 5 kW
HG-UR

●50 to 750 W
HF-KP/MP

●50 to 750 W
HG-KR/MR

●10 to 30 W
HG-AK

●50 to 400 W
HF-KN

Rated torque 2 to 240 N·m
TM-RFM

●SSCNET III
●Built-in PLC
Q170MCPU

●SSCNET III/H
●Built-in PLC
Q170MSCPU

●Single axis Motion controller
MR-MQ100

●iQ Platform
●SSCNET III/H
Q173DS/Q172DSCPU

RnMTCPU

●Q series
●SSCNET III
Q173H/Q172HCPU

●iQ Platform
Q173D/Q172DCPU

●CC-Link IE Field
QD77GF

RD77GF

●SSCNET III/H
●L series
LD77MS

●SSCNET III
LD77MH

●SSCNET III
QD75MH

●Multi-axis (16 axes)
QD74MH

●SSCNET III/H
QD77MS

RD77MS

FX5-40SSC-S

●1 Gbps
CC-Link IE Field

●High-speed processing (50 Mbps × 2) ●High-reliability (optical communication)
SSCNET III

●High-speed processing (150 Mbps × 2)
SSCNET III/H

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History of Mitsubishi Servo System

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
Tel: 86-22-2813-1015 Fax: 86-22-2813-1017

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

Korea FA Center
Mitsubishi Electric Automation
Korea Co., Ltd.
7F-9F, Gangseo Hangang Xi-tower A, 401,
Yangcheon-ro, Gangseo-Gu, Seoul 07528, Korea
Tel: 82-2-3660-9605 Fax: 82-2-3664-0475

Thailand

Thailand FA Center
Mitsubishi Electric Factory Automation
(Thailand) Co., Ltd.
12th Floor, SV.City Building, Office Tower 1,
No. 896/19 and 20 Rama 3 Road,
Kwaeng Bangpongpang, Khet Yannawa, Bangkok
10120, Thailand
Tel: 66-2682-6522 to 6531 Fax: 66-2682-6020

ASEAN

ASEAN FA Center
Mitsubishi Electric Asia Pte. Ltd.
307 Alexandra Road, Mitsubishi Electric Building,
Singapore 159943
Tel: 65-6470-2475 Fax: 65-6476-7439

Indonesia

Indonesia FA Center
PT. Mitsubishi Electric Indonesia
Cikarang Office
Jl. Kenari Raya Blok G2-07A Delta Silicon 5,
Lippo Cikarang - Bekasi 17550, Indonesia
Tel: 62-21-2961-7797 Fax: 62-21-2961-7794

Vietnam

Hanoi FA Center
Mitsubishi Electric Vietnam Company
Limited Hanoi Branch Office
6th Floor, Detech Tower, 8 Ton That Thuyet Street,
My Dinh2 Ward, Nam Tu Liem District, Hanoi,
Vietnam
Tel: 84-4-3937-8075 Fax: 84-4-3937-8076

Ho Chi Minh FA Center
Mitsubishi Electric Vietnam Company Limited
Unit 01-04, 10th Floor, Vincom Center, 72 Le
Thanh Ton Street, District 1, Ho Chi Minh City,
Vietnam
Tel: 84-8-3910-5945 Fax: 84-8-3910-5947

India

India Pune FA Center
Mitsubishi Electric India Pvt. Ltd.
Pune Branch
Emerald House, EL-3, J Block, M.I.D.C., Bhosari,
Pune - 411026, Maharashtra, India
Tel: 91-20-2710-2000 Fax: 91-20-2710-2100

India Gurgaon FA Center
Mitsubishi Electric India Pvt. Ltd.
Gurgaon Head Office
2nd Floor, Tower A & B, Cyber Greens, DLF
Cyber City, DLF Phase - III, Gurgaon - 122002,
Haryana, India
Tel: 91-124-463-0300 Fax: 91-124-463-0399

India Bangalore FA Center
Mitsubishi Electric India Pvt. Ltd.
Bangalore Branch
Prestige Emerald, 6th Floor, Municipal No.2,
Madras Bank Road, Bangalore - 560001,
Karnataka, India
Tel: 91-80-4020-1600 Fax: 91-80-4020-1699

India Chennai FA Center
Mitsubishi Electric India Pvt. Ltd.
Chennai Branch
Citilights Corporate Centre No. 1,
Vivekananda Road, Srinivasa Nagar, Chetpet,
Chennai – 600031, Tamil Nadu, India
Tel: 91-4445548772 Fax: 91-4445548773

India Ahmedabad FA Center
Mitsubishi Electric India Pvt. Ltd.
Ahmedabad Branch
B/4, 3rd Floor, SAFAL Profitaire, Corporate Road,
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,
IL 60061, U.S.A.
Tel: 1-847-478-2110 Fax: 1-847-478-2253

Mexico

Mexico FA Center
Mitsubishi Electric Automation, Inc.
Mexico Branch
Mariano Escobedo #69, Col.Zona Industrial,
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German Branch
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Umraniye Branch
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Tel: 90-216-526-3990 Fax: 90-216-526-3995

MEMO

Warranty

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.

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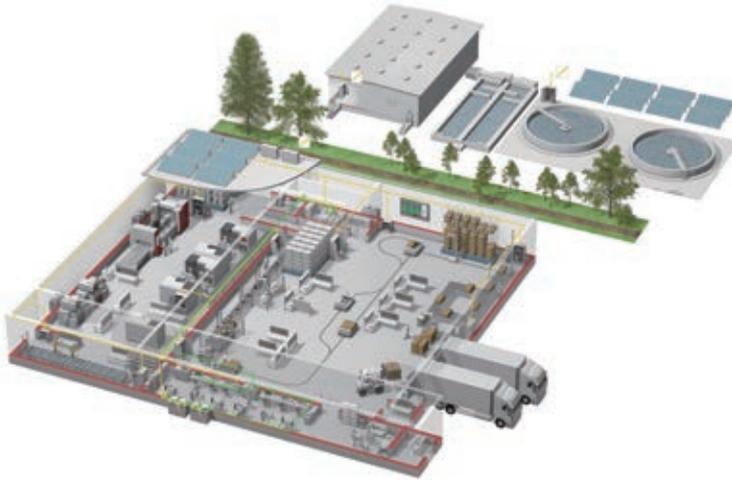
Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

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

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.

Mitsubishi Servo System Family Catalog

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ISO 9001
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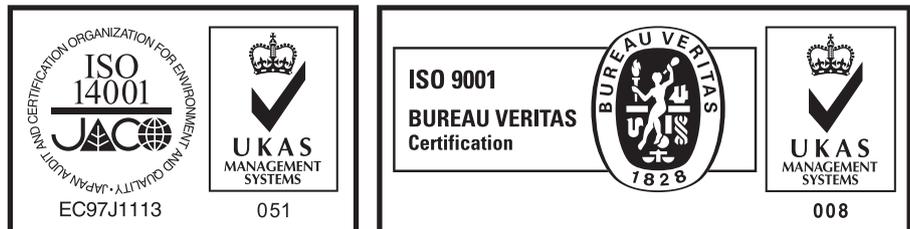
MITSUBISHI ELECTRIC CORPORATION

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