Mitsubishi Servo System Family Catalog

Leading the World with the industry's Top Class Technology
Global Player

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

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.

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.

Through Mitsubishi Electric’s vision, “Changes for the Better” are possible for a brighter future.
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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.
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.

Product Lines

Graphic Operation Terminal
Personal computer

HUMAN MACHINE I/F CONTROLLER

GOT2000 series
PC/AT compatible computer

Simple Motion module
MELSEC iQ-R series
RD77GF
RD77MS
FX5-40SSC-S

Simple Motion module
MELSEC-Q series
QD77GF
QD77MS
LD77MS

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

NETWORK

SERVO AMPLIFIER

MR-J4-GF
MR-J4-B/MR-J4W2-B/MR-J4W3-B

MR-J4-GF(-RJ)
MR-J4-B(-RJ)
MR-J4W2-B
MR-J4W3-B

SERVO MOTOR

Rotary servo motor

HG-KR series
Capacity: 50 to 750 W
HG-MR series
Capacity: 50 to 750 W
HG-SR series
Capacity: 0.5 to 7 kW
HG-JR series
Capacity: 0.5 to 52 kW
HG-AK series
Capacity: 10 to 30 W
HG-RR series
Capacity: 1 to 5 kW
HG-UR series
Capacity: 0.75 to 5 kW

Mitsubishi Electric’s integrated FA platform for achieving lateral integration of controllers & operation costs together with seamless information flow throughout the plant.

Manufacturing enterprise by enhancing productivity, and reducing the maintenance costs.
Mitsubishi Electric's integrated FA platform for achieving lateral integration of controllers & HMI, engineering environments and networks at production sites.

SOLUTION

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.

Programmable controller

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

Motion controller

- MELSEC iQ-R series
- MELSEC-Q series
- MELSEC-L series

Positioning module

- MELSEC iQ-R series
- MELSEC-Q series
- MELSEC-L series

Personal computer

PC/AT compatible computer

Embedded type servo system controller

- MELSEC-Q series

SOFTWARE

- MELSOFT GX Works2
- MELSOFT GX Works3
- MELSOFT MT Works2
- Servo Setup Software
- Capacity Selection Software

Programmable Controller Engineering Software

Molded-case circuit breaker

- WS-V

Magnetic contactor

- MS-T

LOW-VOLTAGE SWITCHGEAR

- TM-RFM series
- MR-JE-B
- MR-JE-A

Linear servo motor

- Core type (natural/liquid cooling)
- LM-H3 series
  Rating: 70 to 940 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-KZ series
  Rating: 120 to 2400 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

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

 ultra-small capacity
 HG-AK series
 ultra-compact
 HG-MR series
 ultra-low inertia
 HG-SR series

- Core type
  LM-H3 series
  Rating: 70 to 940 N

- Core type
  LM-H series
  Rating: 70 to 940 N

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

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

- Core type
  LM-KZ series
  Rating: 120 to 2400 N

**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

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

Simple Motion module

RD77GF

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.

<table>
<thead>
<tr>
<th></th>
<th>RD77GF4</th>
<th>RD77GF8</th>
<th>RD77GF16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of control axes</td>
<td>Up to 4 axes</td>
<td>Up to 8 axes</td>
<td>Up to 16 axes</td>
</tr>
<tr>
<td>Operation cycle</td>
<td>0.5 ms or longer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servo amplifier</td>
<td>MR-J4-GF(-RJ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command interface</td>
<td>CC-Link IE Field Network</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Simple Motion module

RD77MS

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

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

Motion controller

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.

<table>
<thead>
<tr>
<th></th>
<th>R16MTCPU</th>
<th>R32MTCPU</th>
<th>R64MTCPU NEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of control axes</td>
<td>Up to 16 axes</td>
<td>Up to 32 axes</td>
<td>Up to 64 axes</td>
</tr>
<tr>
<td>Operation cycle</td>
<td>0.222 ms or longer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servo amplifier</td>
<td>MR-J4-B(-RJ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command interface</td>
<td>SSCNET III/H</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Positioning module

**RD75P/RD75D**

The RD75P/RD75D are capable of controlling up to four axes with a high-speed pulse output (5 M pulses/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

<table>
<thead>
<tr>
<th>Number of control axes</th>
<th>RD75P2</th>
<th>RD75P4</th>
<th>RD75D2</th>
<th>RD75D4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup time</td>
<td>0.3 ms or longer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servo amplifier</td>
<td>MR-J4-A(-RJ)</td>
<td>MR-JE-A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command interface</td>
<td>Transistor output</td>
<td>Differential driver output</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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**

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
- QD77GF8: 8 axes
- QD77GF16: 16 axes

**QD77MS**

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**

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**

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)
### 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

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

### Simple Motion module

**LD77MS**
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

### 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

### SSCNET III/H Head module

**LJ72MS15**
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.

### 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**
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**
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

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

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.

<table>
<thead>
<tr>
<th>Number of control axes</th>
<th>FX5-40SSC-S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 4 axes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servo amplifier</th>
<th>MR-J4-B(-RJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR-JE-B</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command Interface</th>
<th>SSCNET III/H</th>
</tr>
</thead>
</table>

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.

<table>
<thead>
<tr>
<th>Number of control axes</th>
<th>FX5U/FX5UC series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 4 axes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servo amplifier</th>
<th>MR-J4-A(-RJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR-JE-A</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command Interface</th>
<th>Pulse train</th>
</tr>
</thead>
</table>

MELSEC-F series

Positioning module

FX3U-1PG/FX2N-10PG

This pulse train output block is used with the FX series programmable controller. The FX3U-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

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
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

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

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

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.

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 II¹, 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 method² allows to create an optimum tuning command inside the servo amplifier.

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.

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](image)

**Before**

**After**

Validate the lost motion compensation function.

---

# 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

<table>
<thead>
<tr>
<th>Point table No.</th>
<th>Position data</th>
<th>Servo motor speed</th>
<th>Acceleration time constant</th>
<th>Deceleration time constant</th>
<th>Dwell</th>
<th>Sub function</th>
<th>M code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000</td>
<td>2000</td>
<td>200</td>
<td>200</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2000</td>
<td>1600</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>255</td>
<td>3000</td>
<td>3000</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>2</td>
<td>99</td>
</tr>
</tbody>
</table>

### Program example

<table>
<thead>
<tr>
<th>Program No. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPN (3000)</td>
</tr>
<tr>
<td>STC (30)</td>
</tr>
<tr>
<td>MOV (1500)</td>
</tr>
<tr>
<td>TIM (150)</td>
</tr>
<tr>
<td>FOR (3)</td>
</tr>
<tr>
<td>MOV (100)</td>
</tr>
<tr>
<td>TIM (100)</td>
</tr>
<tr>
<td>NEXT</td>
</tr>
</tbody>
</table>

### Indexer (turret) method

- Station No. 0
- Station No. 1
- Station No. 2
- Station No. 3
- Station No. 4
- Station No. 5
- Station No. 6
- Station No. 7
- Station No. 8
- Station No. 9
- Station No. 10

---

# 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
- MR-J4-03A6-RJ
- MR-J4W2-0303B6

[Unit: mm]
Compatible with CC-Link IE Field Network

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.

Easy Positioning with CC-Link IE Field Network

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.

CC-Link IE Field Network Motion Control

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.
**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.  

<table>
<thead>
<tr>
<th>IEC/EN 61800-5-2:2007 function</th>
<th>Safety level</th>
</tr>
</thead>
<tbody>
<tr>
<td>STO (Safe torque off)</td>
<td>Category 3, PL e, SIL 3 (^3)</td>
</tr>
<tr>
<td>SS1 (Safe stop 1) (^1)</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) 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_WOC/HG-SR_WOC/HG-JR_WOC)

<table>
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<th>Safety level</th>
</tr>
</thead>
<tbody>
<tr>
<td>STO (Safe torque off)</td>
<td>Category 4 PL e, SIL 3</td>
</tr>
<tr>
<td>SS1 (Safe stop 1) (^1)</td>
<td></td>
</tr>
<tr>
<td>SS2 (Safe stop 2) (^1)</td>
<td></td>
</tr>
<tr>
<td>SOS (Safe operating stop) (^1)</td>
<td></td>
</tr>
<tr>
<td>SLS (Safety-limited speed) (^2)</td>
<td></td>
</tr>
<tr>
<td>SBC (Safe brake control)</td>
<td></td>
</tr>
<tr>
<td>SSM (Safe speed monitor)</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) 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.

**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.

---

**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.

---

**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.
Harmony with the Environment


**Expanded Environmental Conditions**

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

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.

-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.

<table>
<thead>
<tr>
<th>[Reusable energy]</th>
<th>MR-J4W3</th>
<th>MR-J3</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 W</td>
<td>21 J</td>
<td>9 J</td>
</tr>
<tr>
<td>400 W</td>
<td>23 J</td>
<td>11 J</td>
</tr>
</tbody>
</table>

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

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.
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.

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.

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.
~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.

<table>
<thead>
<tr>
<th>Command interface</th>
<th>SSCNET III/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control mode</td>
<td>Position/Speed/Torque</td>
</tr>
<tr>
<td>Power supply</td>
<td>200 V AC</td>
</tr>
<tr>
<td>Capacity range</td>
<td>0.1 kW to 3 kW</td>
</tr>
<tr>
<td>Compatible servo motor</td>
<td>Rotary servo motor</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Command interface</th>
<th>Pulse train/Analog/RS-422/MODBUS® RTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control mode</td>
<td>Position/Speed/Torque</td>
</tr>
<tr>
<td>Power supply</td>
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</tbody>
</table>
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**
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
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.

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)

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.

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**

- [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]
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 repetitious 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**

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

**Module configuration**

Each parameter is set from the module configuration screen.

**Servo data setting**

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.

**Copying servo data**

Copy & paste the data between axes easily.

Right-click on the axis No.
## Programming

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

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

### Programming
User-friendly functions make Motion controller program development easier.

### Synchronous control parameter
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
Various cam patterns are created more freely and flexibly.

### Cam data list
The created cam data are easily viewed as thumbnails.

## Startup and Adjustment

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

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

### Multi-axis adjustment
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

#### Servo assistant function
Complete setting up the servo amplifier just by following guidance displays.

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

#### 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.

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

#### Alarm display
MRJ4 series displays the alarm No. in three digits to show the servo alarm in more details, making troubleshooting easy.

---

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.
Networks

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: DT13STX (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.
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

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

Smooth control of machine is possible using high-speed serial communication with a cycle time of 0.22 ms.

Deterministic and Synchronized Communication

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

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.
Dramatically Reduced Wiring

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.

**Specifications**
- Maximum number of stations: 4 stations
- Maximum I/O points per system
  - Input points: 256 bytes
  - Output points: 256 bytes
- The control panel on controller side
- The control panel on servo amplifier side

Central Control with Network

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

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 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.
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

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.

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

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

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.

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.
Model Selection by Control Method

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

<table>
<thead>
<tr>
<th>Programmable controller</th>
<th>Model</th>
<th>Engineering software</th>
<th>Command interface</th>
<th>MELSERVO-J4</th>
<th>MELSERVO-JE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MELSEC iQ-R series</td>
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*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

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<th>Number of control axes</th>
<th>Operation cycle</th>
<th>Positioning program</th>
<th>Electronic gear</th>
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*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.
### Controller Selection Guide

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- Position control
- Speed control
- Torque control
- Tightening & press-fit control
- Advanced synchronous control
- Cam control
- Linear interpolation
- Circular interpolation
- Continuous trajectory control
- Speed/position switching control
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- Unlimited length feed
- Optional data monitor
- Mark detect
- Event history
- 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 User’s manual for details.
*4. Available only with QD70D.
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.

SSCNET Partner Association

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

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.
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.

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>2,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site area</td>
<td>306,000 m²</td>
</tr>
<tr>
<td>Gross floor space</td>
<td>Approx. 252,000 m² (Excluding satellite factories)</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site area</td>
<td>137,000 m²</td>
</tr>
<tr>
<td>Gross floor space</td>
<td>40,000 m²</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site area</td>
<td>33,150 m²</td>
</tr>
<tr>
<td>Gross floor space</td>
<td>24,000 m²</td>
</tr>
</tbody>
</table>
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)
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.

1980
- Launch of Mitsubishi's first servo amplifier MR-A/S0

1985
- First to introduce a completely digital servo
- Improvement of productivity

1990
- Industry's smallest servo (at the time)

1995
- Most advanced servo (at the time)
- Launched the MR-J2-Super series - the industry's fastest servo (at the time)
- Compliant with standards
- High-speed processing (150 Mbps × 2)

2000
- Networking
- Multi-axis synchronous
- Widened environmental conditions

2005
- Continuous thrust 250 to 4000 N
- High-reliability (optical communication)
- High-speed processing (50 Mbps × 2)

History 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)
- High-speed processing (50 Mbps × 2)

Linear
- Core type
- Coreless type
- Medium/large capacity
- Medium capacity
- Small capacity

Rotary
- Direct drive motor

Controller
- Motion controller
- Multi-axis Controller
- A173UHCPUA172SHCPU/Q173/Q172CPUN

Simple Motion module
- Positioning module
- A173UHCPUA172SHCPU/Q173/Q172CPUN

Field network
- CC-Link
- High-speed (5.6 Mbps + 2)
- Centralized parameter management
- ABS standard
- Multi-axis synchronous

Network
- SSCNET
- Continuous thrust 120 to 2400 N
- Ease of startup
- High-reliability
- Simplified maintenance function
- Simplified diagnosis functions
- Energy-saving
- Vibration suppression
- Maintenance-free
- Built-in PLC

HMIs
- Q series
- iQ Platform
- A173UHCPUA172SHCPU/Q173/Q172CPUN
- Continuous thrust 70 to 960 N
- Rated torque 2 to 240 N·m

1980
- MR-J
- HA-SAL

1985
- MR-J2
- HA-SA

1990
- MR-J2 Super/J2M
- HA-SA

1995
- MR-J3
- HA-LP

2000
- MR-E
- HC-KF/KFS

2005
- MR-J3W
- HA-LH

A series
- QD74MH

Q series
- QD77MS

RnMTCPU
- FX5-40SSC-S

LD77MS
- CC-Link IE Field

MR-JM
- AD75M

G7D75M
- SSCNET III/H

MR-MQ100
- SSCNET III

Multi-axis (16 axes)

Rated torque 2 to 240 N·m

1 Gbps

50 to 400 W

10 Mbps

10 to 22 kW

80 to 600 W

600 to 6000 N
### History of Mitsubishi Servo System

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.

<table>
<thead>
<tr>
<th>Year</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>2-axis type MR-J3W</td>
</tr>
<tr>
<td>2010</td>
<td>Speed frequency response of 2.5 kHz MR-J4/MR-J4W2/MR-J4W3</td>
</tr>
</tbody>
</table>

#### MR-E Super

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

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 7 kW</td>
<td>HF-SP</td>
</tr>
<tr>
<td>1 to 5 kW</td>
<td>HC-RP</td>
</tr>
<tr>
<td>0.75 to 5 kW</td>
<td>HC-UP</td>
</tr>
<tr>
<td>5 to 750 W</td>
<td>HF-KP/MP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 15 kW</td>
<td>HF-JP</td>
</tr>
<tr>
<td>0.5 to 55 kW</td>
<td>HG-JR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
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</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 7 kW</td>
<td>HG-SR</td>
</tr>
<tr>
<td>1 to 5 kW</td>
<td>HG-RR</td>
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<tr>
<td>0.75 to 5 kW</td>
<td>HG-UR</td>
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<td>HG-KM/MP</td>
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<tr>
<td>0.5 to 15 kW</td>
<td>HG-KM</td>
</tr>
<tr>
<td>0.5 to 55 kW</td>
<td>HG-AK</td>
</tr>
</tbody>
</table>

#### MR-JE

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

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous thrust 600 to 6000 N</td>
<td>LM-F</td>
</tr>
<tr>
<td>Continuous thrust 60 to 960 N</td>
<td>LM-H2</td>
</tr>
<tr>
<td>Continuous thrust 70 to 960 N</td>
<td>LM-H3</td>
</tr>
<tr>
<td>Continuous thrust 120 to 2400 N</td>
<td>LM-K2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous thrust 50 to 800 N</td>
<td>LM-U2</td>
</tr>
<tr>
<td>0.5 to 55 kW</td>
<td>HA-LP</td>
</tr>
<tr>
<td>0.5 to 7 kW</td>
<td>HF-SP</td>
</tr>
<tr>
<td>1 to 5 kW</td>
<td>HC-RP</td>
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<td>HG-AK</td>
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</tbody>
</table>

#### MR-J3W

- Ease of startup
- Widened environmental conditions

<table>
<thead>
<tr>
<th>Capacity</th>
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</thead>
<tbody>
<tr>
<td>0.75 to 7 kW</td>
<td>HG-KR/MR</td>
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<tr>
<td>1 to 5 kW</td>
<td>HG-JP</td>
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<td>HG-KM/MP</td>
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</tbody>
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<td>HG-JP</td>
</tr>
<tr>
<td>0.5 to 7 kW</td>
<td>HG-SR</td>
</tr>
<tr>
<td>1 to 5 kW</td>
<td>HG-RR</td>
</tr>
<tr>
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<td>HG-UR</td>
</tr>
<tr>
<td>50 to 750 W</td>
<td>HG-KM/MP</td>
</tr>
</tbody>
</table>


- Maintenance function
- Energy-saving

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
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<tbody>
<tr>
<td>0.75 to 7 kW</td>
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</tbody>
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<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 15 kW</td>
<td>HG-KM</td>
</tr>
<tr>
<td>0.5 to 55 kW</td>
<td>HG-AK</td>
</tr>
</tbody>
</table>

#### MR-J4-GF

- High-speed processing (150 Mbps × 2)
- Open network
- High-speed processing (10 Mbps × 2)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75 to 7 kW</td>
<td>HG-KR/MR</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 15 kW</td>
<td>HG-KM</td>
</tr>
<tr>
<td>0.5 to 55 kW</td>
<td>HG-AK</td>
</tr>
</tbody>
</table>

#### MR-J4-GF2

- Maintenance function
- Energy-saving

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75 to 7 kW</td>
<td>HG-KR/MR</td>
</tr>
<tr>
<td>1 to 5 kW</td>
<td>HG-JP</td>
</tr>
<tr>
<td>0.75 to 5 kW</td>
<td>HG-UR</td>
</tr>
<tr>
<td>50 to 750 W</td>
<td>HG-KM/MP</td>
</tr>
</tbody>
</table>

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<td>50 to 750 W</td>
<td>HG-KM/MP</td>
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</tbody>
</table>

<table>
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<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 15 kW</td>
<td>HG-KM</td>
</tr>
<tr>
<td>0.5 to 55 kW</td>
<td>HG-AK</td>
</tr>
</tbody>
</table>

#### MR-J4-GF3

- High-speed processing (150 Mbps × 2)
- Open network
- High-speed processing (10 Mbps × 2)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75 to 7 kW</td>
<td>HG-KR/MR</td>
</tr>
<tr>
<td>1 to 5 kW</td>
<td>HG-JP</td>
</tr>
<tr>
<td>0.75 to 5 kW</td>
<td>HG-JR</td>
</tr>
<tr>
<td>50 to 750 W</td>
<td>HG-KM/MP</td>
</tr>
</tbody>
</table>

<table>
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<tbody>
<tr>
<td>0.5 to 55 kW</td>
<td>HG-JR</td>
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<td>HG-KM/MP</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 15 kW</td>
<td>HG-KM</td>
</tr>
<tr>
<td>0.5 to 55 kW</td>
<td>HG-AK</td>
</tr>
</tbody>
</table>

#### MR-J4-GF4

- Maintenance function
- Energy-saving

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Features</th>
</tr>
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<tbody>
<tr>
<td>0.75 to 7 kW</td>
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<td>HG-UR</td>
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<td>50 to 750 W</td>
<td>HG-KM/MP</td>
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<td>HG-JR</td>
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<td>0.5 to 15 kW</td>
<td>HG-JP</td>
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<td>HG-KM</td>
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<tr>
<td>0.5 to 55 kW</td>
<td>HG-AK</td>
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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.

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

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

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

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

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

As one of the world’s leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.
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<thead>
<tr>
<th>Country/Region</th>
<th>Sales office</th>
<th>Tel/Fax</th>
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</thead>
<tbody>
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<td>Tel: +52-55-3067-7500, Fax: --</td>
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<tr>
<td>Brazil</td>
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<tr>
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<tr>
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MITSUBISHI ELECTRIC CORPORATION
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ISO 14001 Certification

ISO 9001 BUREAU VERITAS