Product Information

EBG 233-EN

MITSUBISHI ELECTRIC
Changes for the Better

MR-J4

Servo and Motion Control

Innovative Servo Technology

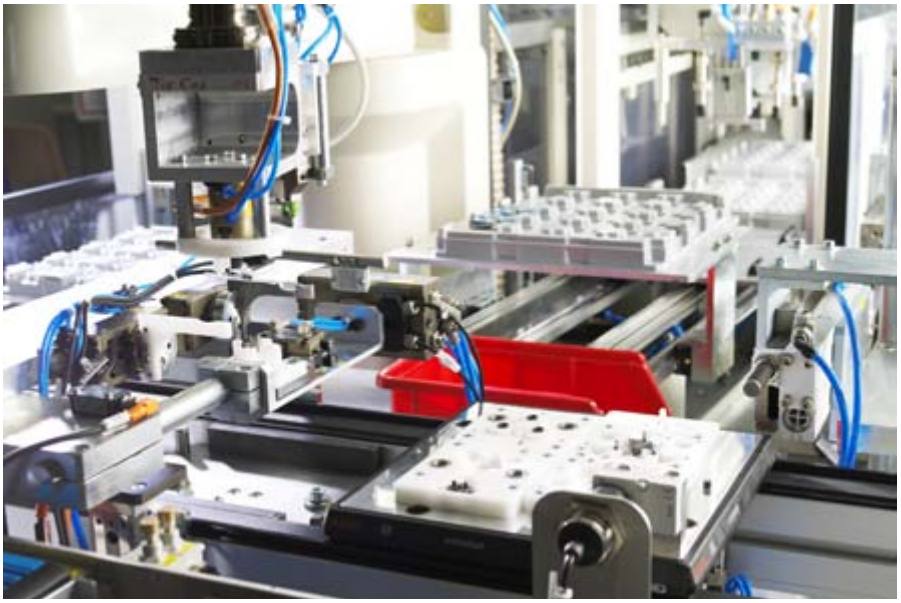
for improved safety, productivity and energy efficiency

IMPROVED PRODUCTIVITY — Single, dual and triple-axis amplifiers for improved economy, energy efficiency and cabinet space

FLEXIBLE DESIGN — Operation of rotary motors, linear motors and direct drive motors with a single unit

INCREASED SAFETY — Safety at all times – STO (Safe Torque Off) and SS1 (Safe Stop 1) in accordance with EN 61800-5-2. SLS/SBC and SSM options available

Safe, user-friendly and energy-efficient



Feed equipment is one of the servo's many applications.

The MELSERVO MR-J4 series of servo amplifiers and the associated positioning units, motion modules and high-end motion control systems from Mitsubishi Electric enable machine builders and end customers to increase production safety and improve productivity. The MR-J4 amplifier range with its high performance potential and wide-ranging functionality scores in all areas thanks to simple operation and commissioning. The MR-J4 is of particular interest for manufacturers of packaging machines, traversing tables and handling systems.

Innovative and powerful

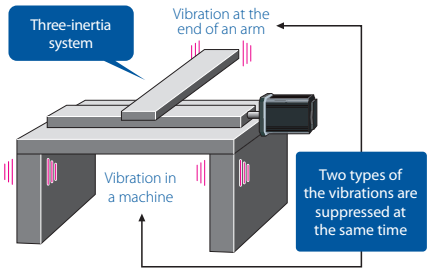
The MR-J4 amplifier series has been developed for the automation requirements of tomorrow. Mitsubishi Electric has incorporated numerous innovative and user-friendly functions to minimise the time-consuming and elaborate matching of mechanical and electronic systems.

The system tunes itself quickly and easily thanks to "Realtime Auto Tuning" and "Vibration suppression control". These functions are available both at start-up and during operation and thus reduce commissioning and parameterisation times.

The amplifiers also feature a "Life Diagnosis Function". This function checks the state and quality of the installed components, such as capacitors and relays, over the whole life cycle, and informs the user and operator of any abnormalities. This virtually eliminates failures and machine downtime.

Mechanical system characteristics are also monitored, and undesirable vibration and friction are checked and directly suppressed, thus preventing system resonance. This function not only damps drive train vibrations but also oscillations at the end of a tool arm.

The absolute encoder which is fitted as standard has a resolution of 22 bits. This corresponds to more than 4 million pulses/revolution. The result is excellent true-running characteristics and a maximum positioning accuracy and processing speed which more than satisfy the performance requirements of modern high-end machines.



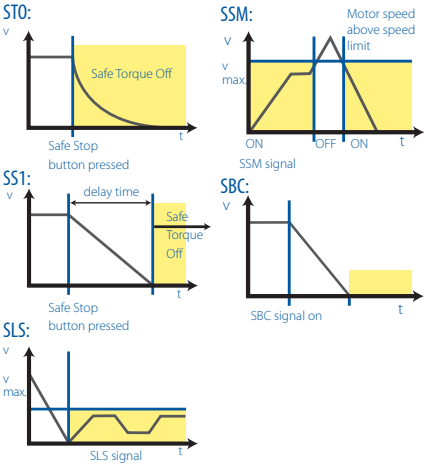
Automatic vibration suppression

Economic

Alongside the standard MR-J4-A version (analogue/digital/pulse train) and the MR-J4-B version (SSCNETIII/H Motion network), with the MR-J4 series, Mitsubishi Electric is for the first time offering two additional versions for the operation of two or three servo motors. The dual and triple-axis amplifiers (MR-J4W2B and MR-J4W3B) are accordingly more compact and more efficient than three single amplifiers. As a result, the machine builder not only saves space in the electrical cabinet, but also valuable energy and at the same time reduces CO2 emissions.

Safety is top priority

The designers of the MR-J4 series also had the user and the future in their sights when it came to safety and safety functions. As standard, the amplifiers feature STO (Safe Torque Off) safety functions in accordance with EN 61800-5-2. This achieves safety level SIL according to EN 62061 and PLd according to EN 13849-1. In conjunction with a Mitsubishi Electric MR-D30 safety unit, the MR-J4 series can be expanded by the addition of other EN 61800-5-2 safety functions such as SS1, SLS, SBC and SSM.



Maintain safe control of motor behaviour even in emergency situations

Flexible motor selection

Another highlight of functionality and flexibility is the possibility of connecting different motors to the MR-J4 amplifier. The servo amplifier can be conveniently and easily used with rotary motors, linear motors and also direct drive motors.

Five series of rotary motors are available, covering the range from small to medium power and speeds from 2000–6000 rpm. Individual series are distinguished by particularly small moments of inertia or a particularly low-profile design. All motors have protection class IP65 or IP67 (protected against dust and spray water) and are therefore suitable even for the toughest industrial environments. Output powers range from 50–750 W for the HG-KR/MR series, 1–5 kW for the HG-RR series, 0.5–7 kW for the HG-SR series and 0.5–22 kW for the HG-JR series.

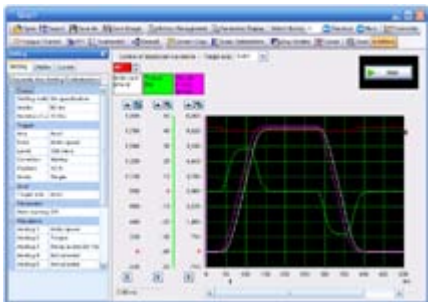
Large choice of different servo motors

Linear motors are available in four ranges: with core (LM-H3 series), without core (LM-U2 series), core with liquid or self-cooling (LM-F series), and core with magnetic counter-force (LM-K2 series). A number of serial interfaces for linear encoders including the A/B/Z phase encoder with differential output are supported. The maximum speed is up to 3 m/s and the thrust between 50–6000 N depending on the model range.

Special features of the direct drive motors of the TM-RFM series include high torque density and extremely uniform rotation for direct connection to the mechanical equipment, thus obviating the need for a gearbox. The standard design with high-resolution 20-bit encoder (1,048,576 pulses/rev) enables the utmost machine precision to be achieved. The motors are available with four outside diameters and cover a torque range from 2–240 Nm.

User-friendly software

The MR Configurator2 programming tool allows convenient commissioning and diagnostics. Calibration, monitoring, diagnostics, reading and writing of parameters and test operation can be carried out easily on a standard PC. MR Configurator2 ensures a stable machine system, optimum control and short set-up times. Even less experienced users can set up an MR-J4 servo system quickly and precisely thanks to the wide range of automatic adjustment aids.



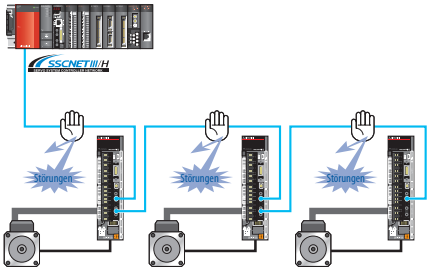
Monitoring and testing with the online diagnostics

High-speed motion on the network

As well as conventional positioning by means of pulse trains, the MR-J4 series also features the SSCNETIII/H high-speed motion network. SSCNETIII/H enables a data transfer rate of 150 Mbit/s and a bus cycle time of only 0.22 ms. The purely optical network uses optical cables which prevent electromagnetic interference and thus ensure maximum performance, precision, reliability and immunity to interference.

There is no complicated wiring thanks to a simple connection system. The system is “Plug & Play” and therefore reduces the amount of wiring and possible wiring errors.

The SSCNETIII/H achieves fully synchronised communication. Most notably, this has technical advantages in printing machines and food-processing machines which require synchronous accuracy.



Reduction of interference by the SSCNETIII/H optical network

Specifications

Servo amplifier MR-J4-A/B (200 V type)		10A/B (-RJ)	20A/B (-RJ)	40A/B (-RJ)	60A/B (-RJ)	70A/B (-RJ)	100A/B (-RJ)	200A/B (-RJ)	350A/B (-RJ)	500A/B (-RJ)	700A/B (-RJ)	11KA/B (-RJ)	15KA/B (-RJ)	22KA/B (-RJ)
Capacity range	[kW]	0.1	0.2	0.4	0.6	0.75	1	2	3.5	5	7	11	15	22
Power supply	voltage/frequency	3-phase or 1-phase 200–240 V AC, 50 Hz/60 Hz					3-phase 200–240 V AC, 50 Hz/60 Hz							
	rated current [A]	0.9	1.5	2.6	3.2	3.8	5.0	10.5	16.0	21.7	28.9	46.0	64.0	95.0

Servo amplifier MR-J4-A/B (400 V type)		60A4/B4 (-RJ)	100A4/B4 (-RJ)	200A4/B4 (-RJ)	350A4/B4 (-RJ)	500A4/B4 (-RJ)	700A4/B4 (-RJ)	11KA4/B4 (-RJ)	15KA4/B4 (-RJ)	22KA4/B4 (-RJ)
Capacity range	[kW]	0.6	1	2	3.5	5	7	11	15	22
Power supply	voltage/frequency	3-phase 380–480 V AC, 50 Hz/60 Hz								
	rated current [A]	1.4	2.5	5.1	7.9	10.8	14.4	23.1	31.8	47.6

Servo amplifier MR-J4-W2-B/W3-B		W2-22B	W2-44B	W2-77B	W2-1010B	W3-222B	W3-444B
Capacity range	[kW]	0.2	0.4	0.75	1	0.2	0.4
Number of axes		2 axes				3 axes	
Power supply	voltage/frequency	1-phase or 3-phase 200–240 V AC, 50 Hz/60 Hz			3-phase 200–240 V AC, 50 Hz/60 Hz	1-phase or 3-phase 200–240 V AC, 50 Hz/60 Hz	
	rated current per axis [A]	1.5	2.8	5.8	6.0	1.5	2.8

General data	
Control system	Sinusoidal PWM control/current control system
Control functions	Positioning/Speed/Torque
Control connections	(A) Analogue/Pulse train/9 digital inputs/6 digital outputs, (B) SSCNETIII/H/3 digital inputs, 3 digital outputs
Interfaces	USB, RS485, RS422
Protective functions	Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servomotor overheat protection, encoder fault protection, regeneration fault protection, undervoltage / sudden power outage protection, excess error protection
Protection	Self-cooling, open (IP20); Fan cooling, open (IP20)
Ambient temperature	Operation: 0–55 °C (no freezing); Storage: -20–65 °C (no freezing)
Ambient humidity	Operation, storage: 90 % RH max. (no condensation)
Others	Elevation: 1000 m or less above sea level; Oscillation: 5.9 m/s² (0.6 G) max.

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