



for a greener tomorrow



**MITSUBISHI
ELECTRIC**

Changes for the Better

FACTORY AUTOMATION

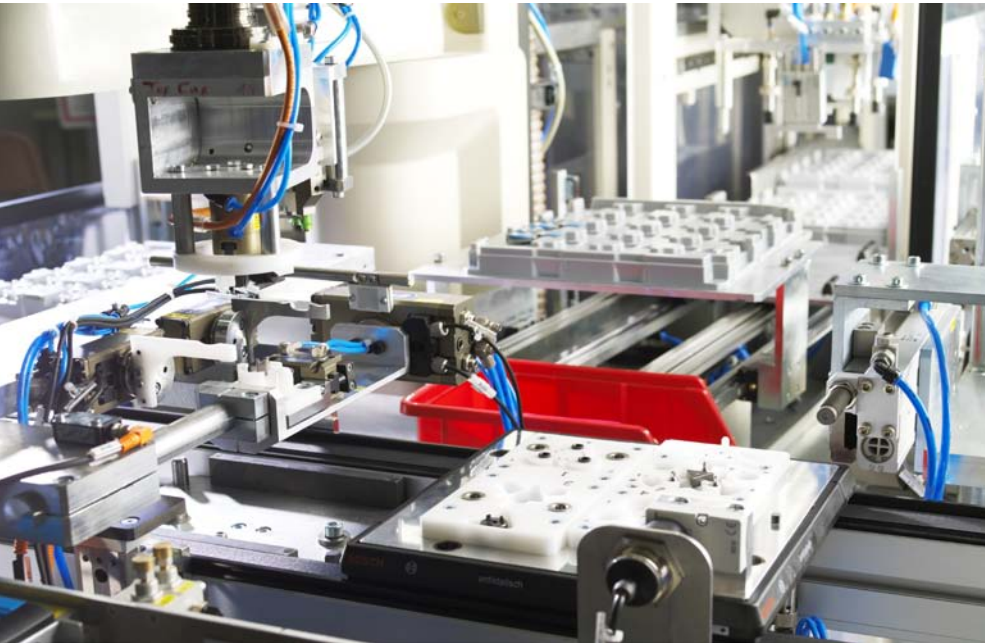
MR-J4-TM

Multi-Network servo with EtherCAT



- Standard IEC61158 type 12 CAN application control over EtherCAT
- Short communication cycle times
- Dual 100Base-TX Ethernet ports
- Higher efficiency and more space in the cabinet

Real-Time Performance with EtherCAT



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



EtherCAT

With the MR-J4-TM-ECT servo amplifier the industry leading performance, features and reliability of the MR-J4 series servo system is combined with an EtherCAT open network interface. Even if the control system is specified by end-customer, system manufacturers can use Mitsubishi Electric servo technology and benefit of the highly compact and powerful technology of the MR-J4 series.

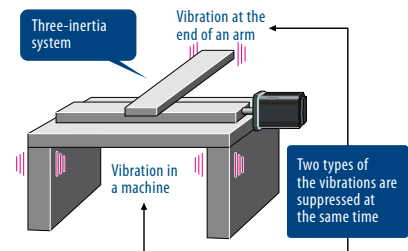
Interface to the Ethernet fieldbus

EtherCAT (Ethernet for Control Automation Technology) is a real-time Industrial Ethernet technology organized by the user organization EtherCAT Technology Group. The EtherCAT protocol which is disclosed in the IEC standard IEC61158 is suitable for real-time requirements in industrial automation technology and in many other applications. The MR-J4-TM-ECT servo amplifier provides the the interface to EtherCAT and supports the IEC 61158 type 12 CAN application protocol and the IEC 61800-7 CiA402 drive profile for excellent compatibility.

The dual 100BASE-TX Ethernet ports of the MR-J4-TM-ECT support line, tree, star, and ring topologies for maximum flexibility in wiring layout. The communication cycle times are 250 μ s, 500 μ s, 1 ms and 2 ms.

Outstanding performance

Mitsubishi Electric has incorporated numerous innovative and user-friendly functions to the MR-J4-TM to minimise the time-consuming and elaborate matching of mechanical and electronic systems.



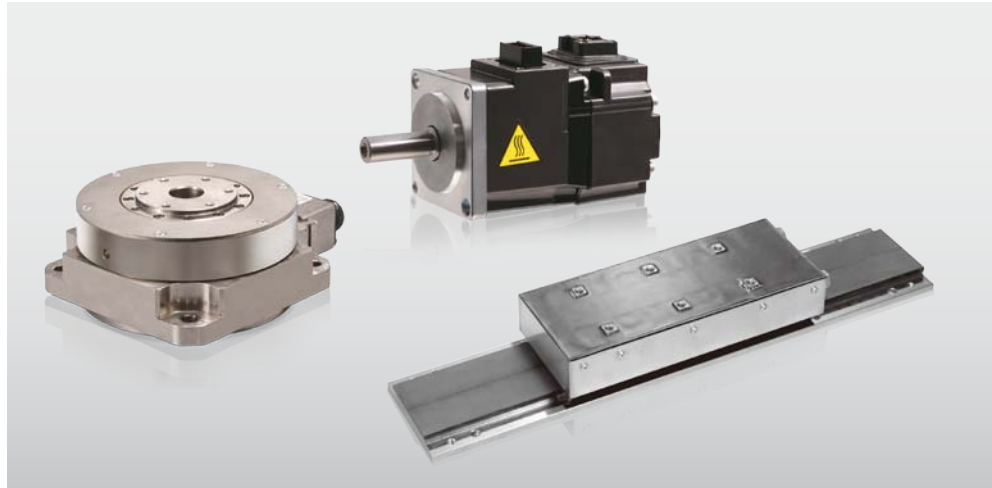
Automatic vibration suppression

The MR-J4-TM has an industry-leading performance with 2.5 kHz speed frequency response for shortest settlingtime. The absolute encoder which is fitted as standard has a resolution of 22 bits. This corresponds to 4,194,304 pulses/revolution. The result is excellent true-running characteristics, smooth rotation and a maximum positioning accuracy and processing speed which more than satisfy the performance requirements of modern high-end machines.

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. No tuning experience is necessary and no additional motion controllers or protocol converters are required for a clean installation with a minimum amount of hardware and software.

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.



Large choice of different servo motors

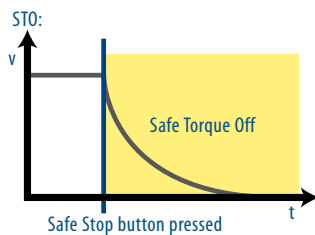
Target applications

The MR-J4-TM is especially suitable for applications like:

- Packaging
- Life Sciences and medical devices
- Electronic and semiconductor equipment
- Pharmaceutical industry

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.



Maintain safe control of motor behaviour even in emergency situations

* Extended Safety functions (SS1/SS2/SOS/SBC/SLS/SSM) available from Summer 2016

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.

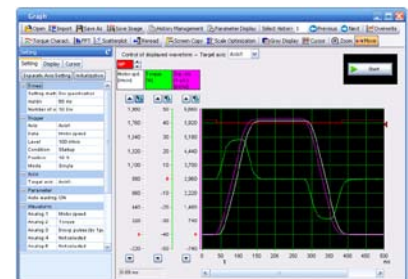
Linear motors are available in four ranges: with core (LM-H3 series), without core (LM-U2 series), core with liquid or self-cooling (LM-F series), and core with magnetic counter-force (LM-K2 series). A number of serial interfaces for linear encoders including the A/B/Z phase encoder with differential 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



Monitoring and testing with the online diagnostics

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.

MR-J4-TM / Multi-Network servo with EtherCAT

Specifications

SERVO AMPLIFIER MR-J4-□ (200 V TYPE)		10TM	20TM	40TM	60TM	70TM	100TM	200TM	350TM	500TM	700TM
Capacity range	[kW]	0.1	0.2	0.4	0.6	0.75	1	2	3.5	5	7
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

SERVO AMPLIFIER MR-J4-□ * (400 V TYPE)		60TM4	100TM4	200TM4	350TM4	500TM4	700TM4	11KTM4	15KTM4	22KTM4
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

* MR-J4-11KTM(4) to MR-J4-22KTM(4) are available from March 2016

GENERAL DATA	
Control system	Sinusoidal PWM control/current control system
Control functions	Cyclic synchronous position mode (csp), Cyclic synchronous velocity mode (csv), Cyclic synchronous torque mode (cst), Profile position mode (pp), Profile velocity mode (pv), Profile torque mode (tq), Homing mode (hm)
Latch function	Hardware and Software latch method, 2 channels (1 ch. 55 μs + 1 ch. 2 μs)
Interfaces	USB, 2 ports RJ45 100 BASE-TX
Function Safety	STO (IEC/EN 61800-5-2)
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: 2000 m or less above sea level; Oscillation: 5.9 m/s ² (0.6 G) max.

European Offices

Germany Mitsubishi Electric Europe B.V. Mitsubishi-Electric-Platz 1 D-40882 Ratingen Phone: +49 (0)2102 / 486-0	Russia Mitsubishi Electric (Russia) LLC 52, bld. 1 Kosmodamianskaya emb. RU-15054 Moscow Phone: +495 721 2070
Czech Rep. Mitsubishi Electric Europe B.V. Radlická 751/113e, Avenii Business Park CZ-158 00 Praha 5 Phone: +420 251 551 470	Spain Mitsubishi Electric Europe B.V. Carretera de Rubí 76-80 Ajpós. 420 E-08190 Sant Cugat del Valles (Barcelona) Phone: +34 (0) 93 / 5663131
France Mitsubishi Electric Europe B.V. 25, Boulevard des Bouvets F-92741 Nanterre Cedex Phone: +33 (0)1 / 55 68 55 68	Sweden Mitsubishi Electric Europe B.V. (Scandinavia) Fjellvägen 8 SE-22736 Lund Phone: +46 (0) 8 625 10 00
Italy Mitsubishi Electric Europe B.V. Viale Collesani 7 Palazzo Sirio I-20864 Agrate Brianza (MB) Phone: +39 039 / 60 53 1	Turkey Mitsubishi Electric Turkey Elektrik Ürünleri A.Ş. Serifali Mahallesi Nutuk Sokak No:5 TR-34775 Ümraniye-İSTANBUL Phone: +90 (0)216 / 526 39 90
Ireland Mitsubishi Electric Europe B.V. Vespugan Business Park, Ballymount IRL-Dublin 24 Phone: +353 (0)1 4198800	UK Mitsubishi Electric Europe B.V. Tzavellas Lane UK-Hatfield, Herts. AL10 8XB Phone: +44 (0)1707 / 28 87 80
Netherlands Mitsubishi Electric Europe B.V. Nijverheidsweg 23a NL-3641RP Mijdrecht Phone: +31 (0) 297250350	UAE Mitsubishi Electric Europe B.V. Dubai Silicon Oasis United Arab Emirates - Dubai Phone: +971 4 3724716
Poland Mitsubishi Electric Europe B.V. ul. Krakowska 50 PL-32-083 Balice Phone: +48 (0) 12 347 65 00	

Representatives

Austria GEVA Wiener Straße 89 A-2500 Baden Phone: +43 (0)2252 / 85 55 20	Czech Republic AutoCont C.S. S.R.O. Kačkova 1833/3 CZ-702 00 Ostrava 2 Phone: +420 599 691 150	Moldova SIMAP SK Jana Derku 1671 SK-911 01 Trenčín Phone: +421 (0)32 743 04 72	Slovakia SHERP Motion Techn. Ltd. Rehov Hamerikava 19 IL-58851 Holon Phone: +972 (0)3 / 559 54 62
Belarus OOO TECHNION Prospect Nezavisimosti 177-9 BY-220125 Minsk Phone: +375 (0)17 / 393 1177	Denmark HANS FØLSGAARD A/S Thielgårds Tor 1 DK-4600 Køge Phone: +45 4320 8600	Netherlands HIFLEX AUTOM. B.V. Wolvensteestraat 22 NL-2984 CD Ridderkerk Phone: +31 (0)180 / 46 60 04	Slovenia CEG LIBAN Cebocor Center/Block A, Autostrada DURA Lebanon-Beirut Phone: +961 (0)1 / 240 445
Belgium ESCO DRIVES Culliganlaan 3 BE-1831 Diegem Phone: +32 (0)2 / 717 64 60	Finland PROVENDOR OY Teljänkatu 8 A3 FIN-28130 Pori Phone: +358 (0) 2 / 522 3300	Netherlands KONING & HARTMAN B.V. Energieweg 1 NL-2627 AP Delft Phone: +31 (0)15 260 99 06	Switzerland OMNI RAY AG Im Schürli 5 CH-8600 Dübendorf Phone: +41 (0)44 / 802 28 80
Belgium KONING & HARTMAN B.V. Wolvenlaan 31 BE-1800 Vilvoorde Phone: +32 (0)2 / 257 02 40	Greece UTEKO A.B.E.E. 5, Mavrogenous Str. GR-18542 Piraeus Phone: +30 (0)211 / 1206-900	Portugal Fonseca S.A. R. João Francisco do Casal 87/89 PT-3801-997 Aveiro, Esigueira Phone: +351 (0)234 / 363 900	Ukraine OOO "CSC-AUTOMATION" 4-B, M. Raskovoyi St. UA-02660 Kiev Phone: +380 (0)44 / 494 33 44
Bosnia and Herzegovina INEA RBT d.o.o. Štepcu 11 SI-1000 Ljubljana Phone: +386 (0)1 / 513 8116	Hungary MELTRADE Kft. Fényi utca 14. HU-1107 Budapest Phone: +36 (0)1 / 431-9726	Romania Sirius Trading & Services Alieșii Locali Moșii Nr. 3 RO-060841 București, Sector 6 Phone: +40 (0)21 / 430 40 06	
Bulgaria AKHIMATON 4, Andrei Ljapchev Blvd., PO Box 21 BG-1756 Sofia Phone: +359 (0)2 / 817 6000	Kazakhstan TOO Kazpromavtomatika Ul. Zhambila 28 KAZ-100017 Karaganda Phone: +7 7272 / 50 10 00	Serbia INEA SR d.o.o. Ul. Karadjojevića 12/217 SER-11300 Smederevo Phone: +386 (026) 461 54 01	
Croatia INEA CR Losijska 4 a HR-10000 Zagreb Phone: +385 (0)1 / 36 940- 01 / 02 / 03	Malta ALFATRADE Ltd. 99, Paola Hill Malta-Paola PLA 1702 Phone: +356 (0)21 / 697 816		

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Mitsubishi Electric Europe B.V.

FA - European Business Group
Mitsubishi-Electric-Platz 1
D-40882 Ratingen Germany
Tel.: +49(0)2102-4860 Fax: +49(0)2102-4861120
info@mitsubishi-automation.com
https://eu3a.mitsubisielectric.com

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