

FACTORY AUTOMATION

# MELFA FAMILY

Industrial robots



- Collaborative robots
- Vertical/Horizontal articulated robots
- High-performance controllers
- Programming software
- Simulation

# Features in detail

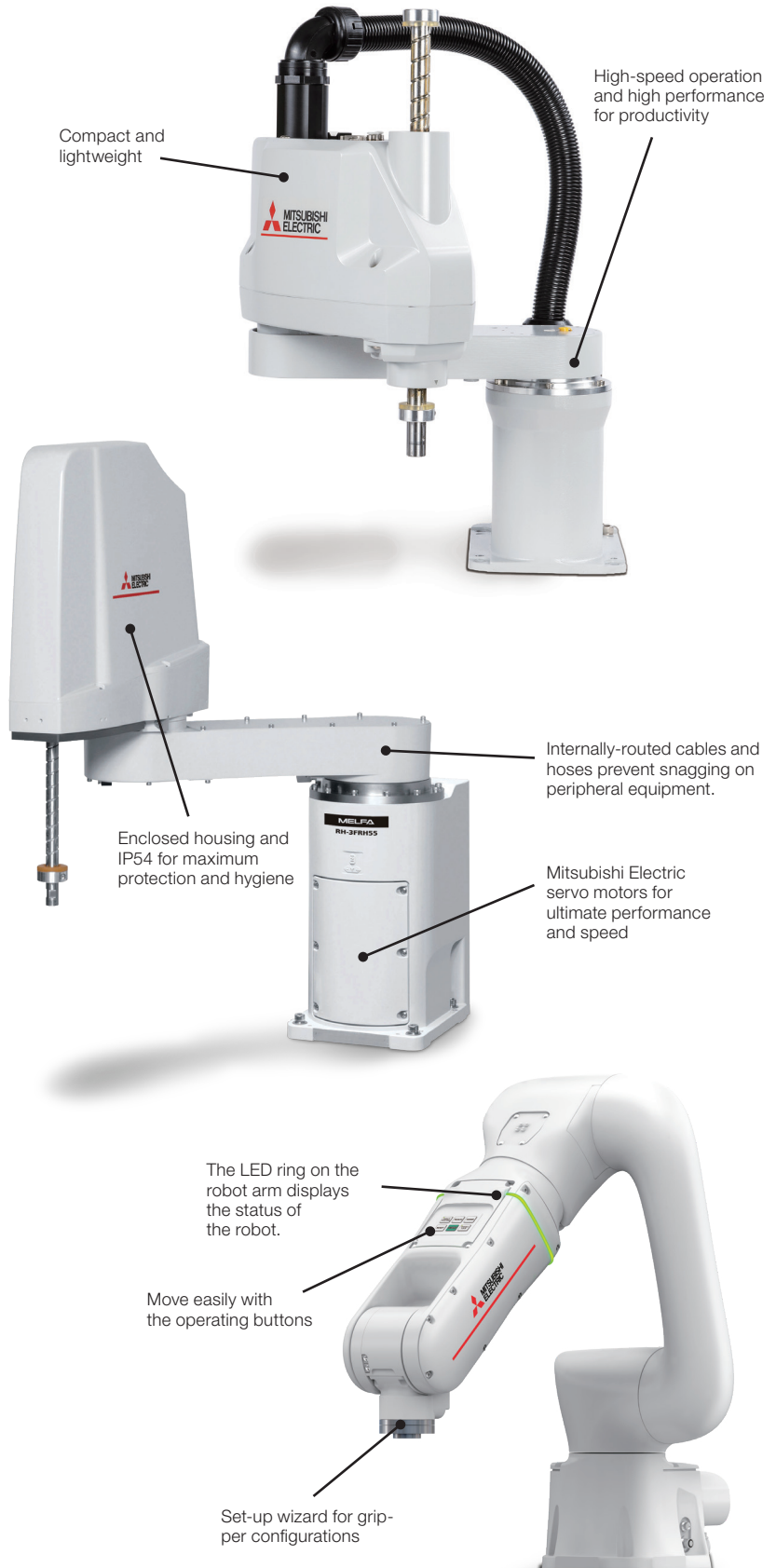
## Robots from € 1.65/hr

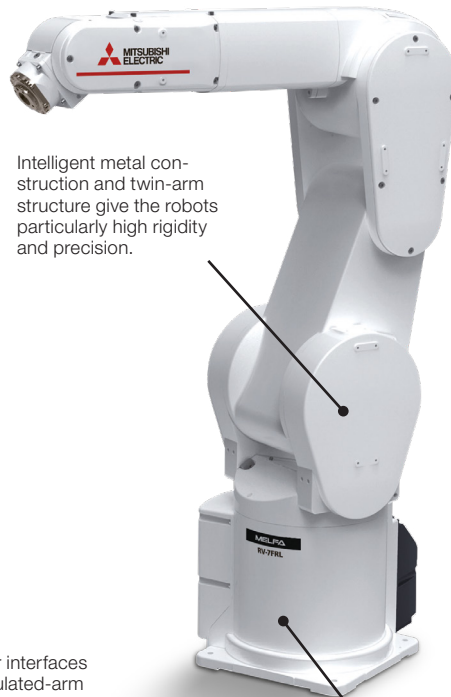
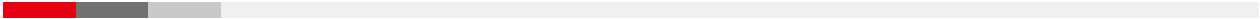
Calculated on the basis of their average service life, around 6–7 years in typical applications, Mitsubishi Electric robots have a surprisingly low total cost of ownership at around € 1.65 per hour for both purchasing and operation.



## Versatility

Small robots have been used in more than 100,000 applications in widely differing fields since 1978 – and what is more they work around the clock, 24 hours a day, 7 days a week.





Intelligent metal construction and twin-arm structure give the robots particularly high rigidity and precision.



The gripper interfaces of the articulated-arm robots conform to the ISO 9409-1 standard.

Mitsubishi Electric servo motors of the latest generation help to provide exceptional repeatability performance.

A very compact design takes up minimum space for applications in cramped quarters.

## Simple programming

A powerful range of robots needs an equally powerful and user-friendly programming interface. Mitsubishi Electric's RT ToolBox3 is a powerful programming and simulation software tool tailored precisely for the needs of your robots.



## Network capabilities

Network connections like Ethernet, Profibus, PROFINET, EtherCAT, DeviceNet® and CC-Link make it easy to integrate Mitsubishi Electric robot controllers in to larger systems, providing users with access to every step of the process. Also you can connect the robot via OPC UA standard.



# The technology in detail



## More safety

The DIN ISO-10218 safety standard is common to all robots and therefore guarantees safe operation in all applications. Mitsubishi Electric's supplementary product range including safety controllers enables the robots to be integrated into a common safety concept. Ready-made example projects make it possible for anyone to put together even complex systems quickly and effectively.

The optional "MELFA SafePlus" safety technology for the FR series robot controllers has functions available like reduced safe speed control, safe limited control range and safe torque monitoring, which can be activated via safety inputs. Logic for each safe I/O can be edited and in combination with the position monitoring function a safe system can be constructed without using a Safety PLC.

Based on these functions, saving of safety equipment and a reduction of safeguarded space is possible which leads to a reduction of cost and space while meeting all safety requirements at the same time.

## Sensor-controlled robots with image processing

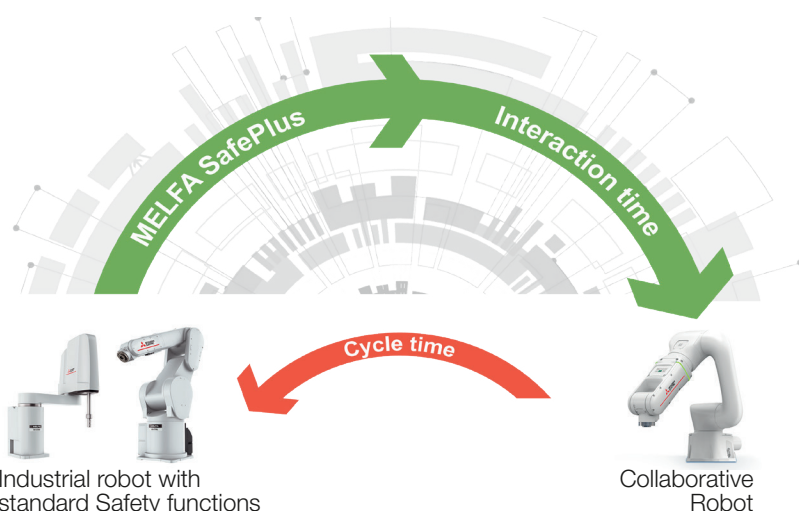
Mitsubishi Electric's industrial robots can be connected to any object rec-

ognition camera system via the Gigabit Ethernet interface of the robot controller. This enables static and moving parts to be detected with the correct positional information.

The possible uses of sensor-controlled robots in factory automation are manifold. They range from component assembly via quality control and the reworking of workpieces to the location and removal of objects from a conveyor belt.

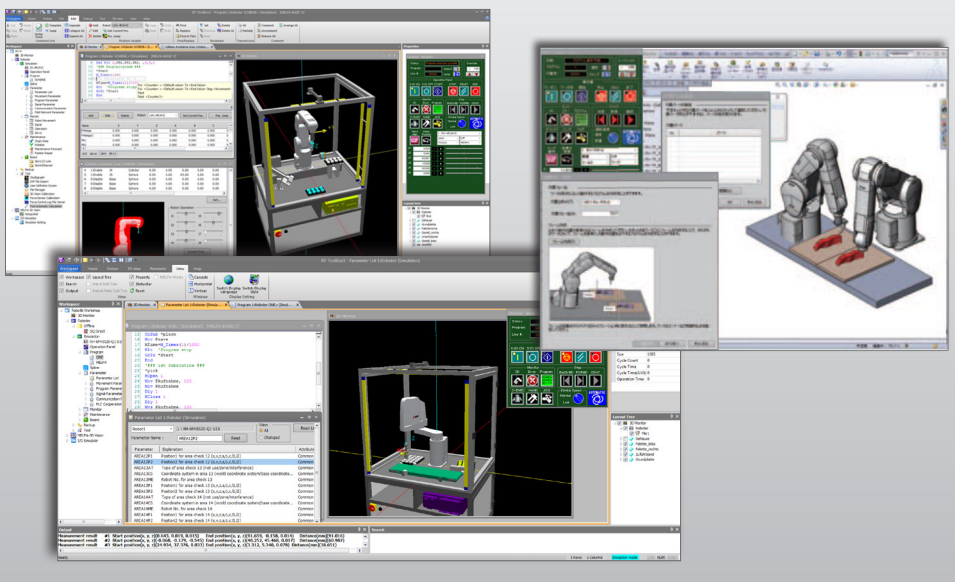
## FR-R series – full PLC functionality in the robot

As robots are never installed on a stand-alone basis, the system must be easy to integrate into its working environment to enable it to communicate with PLC and motion systems as well as operating panels and other systems. Together with the modular robot CPU, the Mitsubishi Electric iQ Platform provides the ideal basis for integrating the full functionality of a PLC into the robot controller – once again demonstrating the company's role as a pioneer in automation technology.





# Programming and simulation



Simulation of a Mitsubishi Electric industrial robot directly in an application

High-performance industrial robots also require high-performance software. For this reason, more and more automation engineers are opting for the versatile and convenient Mitsubishi Electric software. All tasks, such as the creation of projects, programming and simulation, are implemented intuitively and mesh perfectly with one another. This results in optimum movement sequences in the shortest possible installation and commissioning time.

## Programming

Offline and online programming with simulation.

## Simulation

3D-CAD import and up to 16 robots can be simulated in one project; additional axes can be connected and positions taught directly in the simulation.

## Parameters

Parameter structure for the simple parameterisation of functions; complete overview of all parameters with display of modified values only.

## Maintenance

Full backup and restore function and monitoring of service intervals, production runtimes and product cycles.

## Monitoring

Display of load currents, position values, variables and variable positions. Monitoring of switching signals, program execution and fault history.

## Documentation

Full project documentation with output of modified parameters, program code and positions.

## 3D-simulation with RT ToolBox3 Pro

The RT ToolBox3 Pro add-in tool for SolidWorks enables MELFA robots to be simulated in the CAD environment on a PC, and converts the workpiece paths into robot position data.

Supplementing the SolidWorks platform by the addition of RT ToolBox3 Pro extends the simulation functions and opens up new simulation possibilities.

- The CAD data of the system can be directly imported
- Grippers can be connected directly to the robot
- Handling of workpieces
- Offline teaching in a 3D environment
- Creation of robot programs
- Collision-checking between robot and system environment

## RT VisualBox

The RT VisualBox programming tool is an intuitive engineering software for MELFA ASSISTA for quick, easy system deployment. It enables operating sequences to be created intuitively by linking block diagrams in a chain of events, including connection with other devices such as robot hands and cameras.

## The convenient operating terminal for mobile teaching

The R86TB is a powerful operating panel for carrying out all tasks directly at the robot, from controlling the robot and displaying the loads by means of the input/output display to complete program creation and parameterisation. The comprehensive functions ensure optimum utilisation of the robot system and thus reduce setup times.

The integral USB port enables data to be exchanged conveniently, and complete controller backups can be uploaded and downloaded through a memory stick.



# A complete lineup

## Large range of robot models makes selection easy

Mitsubishi Electric produces a comprehensive range of robot models to cater to the full spectrum of modern needs. All Mitsubishi Electric robots are powerful, fast and compact – that goes almost without saying.

The product range includes the almost universal articulated-arm robots with 6 degrees of freedom and payloads of 2 kg to 80 kg and SCARA robots with 4 degrees of freedom and payloads of 3 kg to 20 kg for assembly and palletising tasks.

Three special models are available, the unique collaborative robot MELFA ASSISTA with a payload of 5 kg, which can share a workspace with humans, the cost effective models RV-8CRL and RV-12CRL as well as the flexible high-speed SCARA robots for ceiling mounting.

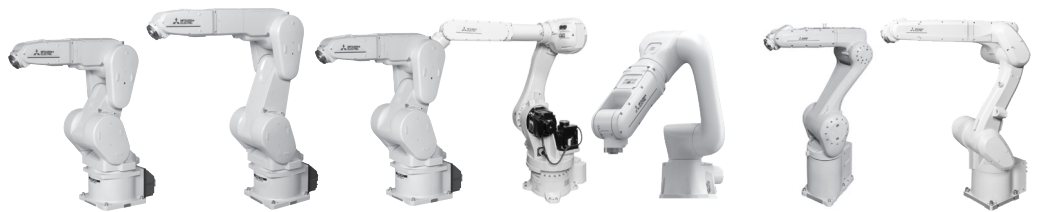
### Vertical, multiple-joint type (RV)



Model	RV-2FR(B)	RV-2FRL(B)	RV-4FRL	RV-7FR	RV-7FRL	RV-7FRL
R. accuracy (mm)	± 0.02	± 0.02	± 0.02	± 0.02	± 0.02	± 0.06
Load capacity (kg)	2	2	4	7	7	7
Reach (mm)	504	648	649	713	908	1503
IP class	IP30	IP30	IP40/(M)IP67	IP40/(M)IP67	IP40/(M)IP67	IP40/(M)IP67
ISO 14644-1 (full load)	8	—	7	7	5	5
Clean Room Design	—	—	ISO class 3	ISO class 3	ISO class 3	ISO class 3
Special Version	—	—	ESD/ATEX	ESD/ATEX	ESD/ATEX	ESD/ATEX



Controller	CR800-D/CR800-R + R16RTCPU					
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Model	RV-13FR	RV-13FRL	RV-20FR	RV-35/50/80FR	RV-5AS	RV-8CRL	RV-12CRL
R. accuracy (mm)	± 0.05	± 0.05	± 0.05	± 0.06	± 0.03	± 0.02	± 0.04
Load capacity (kg)	13	13	20	35/50/80	5	8	12
Reach (mm)	1094	1388	1094	2100	916	931	1504
IP class	IP40/(M)IP67	IP40/(M)IP67	IP40/(M)IP67	IP65/(M)IP67	IP54	IP65	IP65
ISO 14644-1 (full load)	7	7	5	—	5	6	—
Clean Room Design	ISO class 3	ISO class 3	ISO class 3	—	ISO class 5	—	—
Special Version	ESD/ATEX	ESD/ATEX	ESD/ATEX	—	ESD/Food grade H1 grease	—	—



	CR800-D/CR800-R + R16RTCPU	CR860-D/CR860-R + R16RTCPU	CR800-D
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## Advanced intelligence, safety and integration

The concept of FR robots offers a simple approach to advanced and flexible production to handle all automation needs. This concept is based on 3 key features.

- Intelligence: “MELFA Smart Plus” offers greater accuracy and shorter startup times, making installation simpler and more advanced tasks possible.
- Safety: A comprehensive range of safety functions, including position and speed monitoring, allow work to be conducted in cooperation with people.
- Integration: MELSEC iQ-R compatible robot controller and the e-F@ctory integrated FA solution offers seamless integration of robots and IT systems.

## Horizontal articulated robots (RH)



Model	RH-1FRHR	RH-3FRHR	RH-3FRH5515N	RH-6FRH5520N	RH-12FRH8535N	RH-20FRH10035N
R. accuracy (mm)	± 0.02	± 0.02	± 0.02	± 0.02	± 0.02	± 0.02
Load capacity (kg)	1	3	3	6	12	20
Reach (mm)	550	700	550	550	850	1000
IP class	IP20/(IP65)	IP20/(IP65)	IP20	IP54/(IP65)	IP54/(IP65)	IP54/(IP65)
ISO 14644-1 (With/without bellows)	—	—	—	5/7	5/-	5/7
Clean Room Design	ISO class 5	ISO class 5	ISO class 3	ISO class 3	ISO class 3	ISO class 3
Special version	—	ESD	ESD	ESD	ESD	ESD



<b>Controller</b>	<b>CR800-D/CR800-R + R16RTCPU</b>					
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Model	RH-3CRH	RH-6CRH	RH-10CRH	RH-20CRH
R. accuracy (mm)	± 0.01	± 0.02		
Load capacity (kg)	3	6	10	20
Reach (mm)	400	600/700	600/700/800	850/1000
IP class	IP20	IP20	IP20	IP20
ISO 14644-1 (full load)	—	—	—	—
Clean Room Design	—	—	—	—
Special version	—	—	—	—



<b>Controller</b>	<b>CR800-D</b>			
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## European Offices

<b>Germany</b> <b>Mitsubishi Electric Europe B.V.</b> Mitsubishi-Electric-Platz 1 D-40882 Ratingen Phone: +49 (0)2102 / 486-2048	<b>Czech Republic</b> <b>Mitsubishi Electric Europe B.V.</b> Pekafská 621/7 CZ-155 00 Praha 5 Phone: +420 734 402 587	<b>France</b> <b>Mitsubishi Electric Europe B.V.</b> 2, rue de l'Union F-92565 Rueil Malmaison cedex Phone: +33 1 41 02 83 00	<b>Greece</b> <b>Mitsubishi Electric Europe B.V.</b> 3 Konitsis street & 90 Kiffisias Ave Maroussi 15125, Greece Phone: +30 2106140050	<b>Hungary</b> <b>Mitsubishi Electric Europe B.V.</b> Budaörs Office Park, Building A, 3rd Floor, Szabadság street 117 HU-2040 Budapest Phone: +36 70 3322 372
<b>Ireland</b> <b>Mitsubishi Electric Europe B.V.</b> Plunkett House, Grange Castle Business Park, Nangor Road, Dublin 22 Phone: +353 (0)1 4198800	<b>Italy</b> <b>Mitsubishi Electric Europe B.V.</b> Campus Energy Park Via Energy Park 14 - 20871 Vimercate (MB) Phone: +39 039 / 60 53 1	<b>Netherlands</b> <b>Mitsubishi Electric Europe B.V.</b> Beechavenue 111 NL-1119 NS Schiphol-Rijk Phone: +31 (0) 297 250 350	<b>Poland</b> <b>Mitsubishi Electric Europe B.V.</b> ul. Krakowska 48 PL-32-083 Balice Phone: +48 (0) 12 347 65 00	<b>Romania</b> <b>Mitsubishi Electric Europe B.V.</b> 22, Tudor Vladimirescu Street, Floor 6, Office 4.2, District 5 – Bucharest Phone: +40 31 229 0840
<b>Slovakia</b> <b>Mitsubishi Electric Europe B.V.</b> Levická 7 SK-949 01 Nitra Phone: +421 917 624036	<b>Spain</b> <b>Mitsubishi Electric Europe B.V.</b> Carretera de Rubí 76-80 Apdo. 420 E-08190 Sant Cugat del Vallés (Barcelona) Phone: +34 (0) 93 / 5653131	<b>Sweden</b> <b>Mitsubishi Electric Europe B.V. (Scandinavia)</b> Hedvig Möllers gata 6 SE-223 55 Lund Phone: +46 (0) 8 625 10 00	<b>Turkey</b> <b>Mitsubishi Electric Turkey Elektrik Ürünleri A.Ş.</b> Serifali Mahallesi Kale Sokak No:41 TR-34775 Ümraniye-İSTANBUL Phone: +90 (216) 969 25 00	<b>UK</b> <b>Mitsubishi Electric Europe B.V.</b> Travellers Lane UK-Hatfield, Herts. AL10 8XB Phone: +44 (0)1707 / 28 87 80

## Representatives

<b>Algeria</b> <b>MEC Casa ALGERIA</b> Cité Alghazel n.1 02000 Chlef – Algérie Phone: 021 327 798 069	<b>Austria</b> <b>GEVA</b> Wiener Straße 89 A-2500 Baden Phone: +43 (0)2252 / 85 55 20	<b>Bosnia and Herzegovina</b> <b>AM Pneumatik d.o.o.</b> Krecanska 15A/PP-1, SI-75000 Tuzla Phone: +387 35 364 430 Mobile: +387 61 101 582	<b>Bosnia and Herzegovina</b> <b>INEA RBT d.o.o.</b> Stegne 11 SI-1000 Ljubljana Phone: +386 (0)1/ 513 8116	<b>Bulgaria</b> <b>AKHNATON</b> 4, Andrei Ljapchev Blvd., PO Box 21, BG-1756 Sofia Phone: +359 (0)2/817 6000 Phone: +359 88 800 0061
<b>Bulgaria</b> <b>PM Electrical Ltd.</b> ulitsa Poruchik Nedelcho Bonchev 10, BG-1528 Sofia Phone: +359 87 827 6715	<b>Croatia</b> <b>INEA CR</b> Losinjska 4 a HR-10000 Zagreb Phone: +385 (0)1 / 36 940 - 01/-02/-03	<b>Czech Republic</b> <b>SIMAP CZ s.r.o.</b> Nové sady 988/2 CZ-602 00 Brno Phone: +420 777 731 900	<b>Denmark</b> <b>HANS FØLSGAARD A/S</b> Theilgaardstrø 1 DK-4600 Køge Phone: +45 4320 8600	<b>Egypt</b> <b>TECHNYCON FOR SMART SOLUTION</b> 36 Sherif Basha Str, 1st floor, Flat 1, Abdeen, 11613 -Cairo, Egypt K.A. Mr. Hossam Sakr Mob: +20 122 23 17 541
<b>Estonia</b> <b>Electrobit OÜ</b> Suur-Sõjamäe 13a 11415, Tallinn Phone: +372 6518 140	<b>Finland</b> <b>UTU Automation Oy</b> Peltotie 37 FIN-28400 Ulvila Phone: +358 (0)207 / 463 500	<b>Greece</b> <b>UTECO A.B.E.E.</b> 5, Mavrogenou Str. GR-18542 Piraeus Phone: +30 (0)211 / 1206-900	<b>Hungary</b> <b>MELTRADE Kft.</b> Fertő utca 14. HU-1107 Budapest Phone: +36 (0)1 / 431-9726	<b>Israel</b> <b>ILAN &amp; GAVISH Ltd.</b> 24 Shenkar St., Kiryat Arie IL-49001 Petah-Tikva Phone: +972 (0)3 / 922 18 24
<b>Israel</b> <b>SHERF MOTION TECHNOLOGIES LTD</b> Haprat Street 2, Entrance A 2 floor 8122702 Yavne-Israel	<b>Latvia</b> <b>SIA OAK Integrator Products</b> Mežkalna iela 5, Riga LV-1058	<b>Lithuania</b> <b>Automatikos centras</b> Pramonės pr. 17H, 51327 Kaunas, Lithuania tel:+37037262707	<b>Macedonia</b> <b>RADE KONCAR-TEP</b> 3rd Macedonian Brigade Blvd, MK-1000 Skopje Phone: +389 2 2402 481	<b>Malta</b> <b>ALFATRADE Ltd.</b> 99, Paola Hill Malta-Paola PLA 1702 Phone: +356 (0)21 / 697 816
<b>Morocco</b> <b>SCHIELE MAROC SA</b> Nouvelle Route Rabat KM 7.2 20600 Ain Sebaa Casablanca	<b>Norway</b> <b>MITSUBISHI ELECTRIC EUROPE B.V. (SCANDINAVIA)</b> Factory Automation Dronninggata 15, 3019 Drammen Phone: +47 915 02 650	<b>Poland</b> <b>Enel – Dystrybucja Sp. z o.o.</b> Józefa Sowiańskiego 3, 44-101 Gliwice Phone: (+48) 32 237 61 80	<b>Poland</b> <b>MECON Sp. z o.o.</b> Xenon Business Park Śląska 53, 81-304 Gdynia Phone: +48 58 620 85 40 Mobile: +48 609 394 959	<b>Poland</b> <b>PG SYSTEMS Sp. z o.o.</b> Macieja Rataja 12, 05-070 Sulejów Phone: +48 (22) 499 57 26 Mobile: +48 501 380 073
<b>Portugal</b> <b>Fonseca S.A.</b> R. João Francisco do Casal 87/89 PT-3801-997 Aveiro, Esqueira Phone: +351 (0)234 / 303 900	<b>Romania</b> <b>Sirius Trading &amp; Services SRL</b> Aleea Lacul Morii Nr. 3 RO-060841 Bucuresti, Sector 6 Phone: +40 (0)21 / 430 40 06	<b>Serbia</b> <b>INEA SR d.o.o.</b> Batajnički drum 10. deo 1b 11080 Zemun, Beograd Republika Srbija info@inea.rs	<b>Serbia</b> <b>Venting d.o.o.</b> Beblerjev trg 3, RS-1000 Ljubljana Phone: +386 (059) 017 465 Mobile: +386 (0)51 415 116	<b>Serbia</b> <b>VitaELKO d.o.o.</b> Vojvodanska 165, RS-22304 Novi Banovci Phone: +381 22/343-197; +381 22/343-198 Phone: +381 22/341-452; +381 22/342-790;
<b>Slovakia</b> <b>SIMAP SK</b> Dolné Pažite 603/97 SK-911 06 Trenčín Phone: +421 (0)32 743 04 72	<b>Slovenia</b> <b>INEA RBT d.o.o.</b> Stegne 11 SI-1000 Ljubljana Phone: +386 (0)1 / 513 8116	<b>South Africa</b> <b>ADROIT TECHNOLOGIES</b> Four Ways 20 Waterford Office Park 189 Witkoppen Road Gauteng 2001 ZA Phone: + 27 (0)11/658 8100	<b>South Africa</b> <b>MEGADRIVE AUTOMATION CC</b> Mega Park, 26 Fourie Street Brackenfell, Cape Town 7560 ZA	<b>Switzerland</b> <b>Robotronic AG</b> Schlachthofstrasse 8 CH-8406 Winterthur Telefon: +41 (0)52/267 02 00
<b>Tunisia</b> <b>MOTRA ELECTRIC</b> 3, Residence Imen Avenue Des Martyrs El Mourouj III 2074	<b>Ukraine</b> <b>CSC- AUTOMATION Ltd.</b> 4 B, Yevhena Sverstyuka Str. UA-02002 Kiev Phone: +380 (0)44 / 494 33 44			



Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a „step ahead of the times“. It is supported by the e-F@ctory Alliance Partners covering software, devices, and system integration, creating the optimal e-F@ctory architecture to meet the end users needs and investment plans.



Version check:



**Mitsubishi Electric Europe B.V.**  
Factory Automation EMEA, Mitsubishi-Electric-Platz 1, D-40882 Ratingen Germany