

RV-F Series

Industrial robots

Compact and powerful
for flexible automation and high reliability



Highly dynamic 6 axis robots for fastest Pick&Place cycles in their class (0.32 s for 12" cycle)



Increased load capacity and extended operating range thanks to compact body and slim arm design

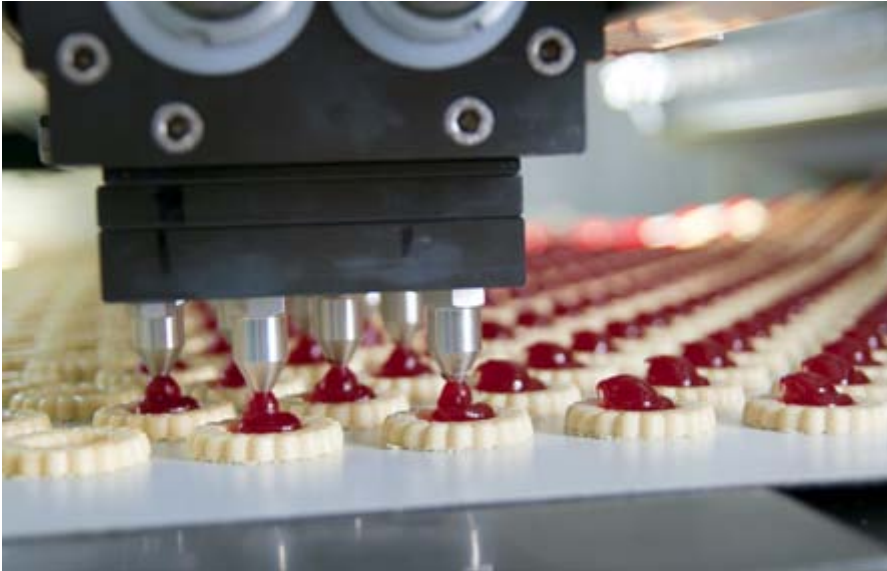


Outstanding IP67 protection for full integration possibilities (Food & Beverage, packaging)

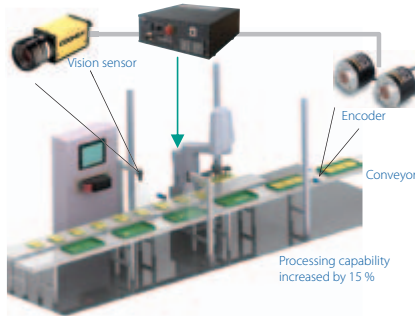


Ethernet, USB, tracking, camera connection, hand I/Os and additional axis connection as standard

Advanced technology for flexible automation



The F series – designed for flexible automation



Tracking can be used with multiple conveyors at the same time

Setting new benchmark standards

With the RV-F series of the MELFA robots, Mitsubishi Electric is setting new benchmark standards for speed, flexibility, ease of integration and simplicity of programming. Combining a wide area of coverage with the industry's fastest cycle times, the F series provides a cost-effective means to boost productivity on critical production lines. In addition, with the inclusion of an entry-level model - the RV-2F - Mitsubishi Electric is making it possible for many users to reap the benefits of robotic lifting, positioning and assembling, perhaps for the first time. The robots of the F series are suitable for a wide range of industrial applications and can be deployed in many industries.

Short cycle times

The robots of the RV-F series achieve the highest speeds in their class thanks to the high-performance Mitsubishi Electric servo motors and unique driver control technology developed by Mitsubishi Electric. The resulting reduced cycle time of only 0.32 seconds for a 12" cycle makes for significantly increased productivity and improved continuous operation. This enables high torque output at high rational speed with shortened acceleration/deceleration time.

The extended movement range ensures more flexibility and thus simplifies system planning. Effective access to the entire, almost circular working range has many advantages: it reduces cycle times by avoiding unnecessary movements and increases the tasks which the robot can perform in its working range.

Performance combined with accuracy

The RV-F series offers many features as standard, which are usually available as optional extras. Every model has connections for pneumatic grippers, Ethernet, USB, tracking functions, camera interface, hand I/O, additional axis controller and an interface for up to 8 additional axes.

Internal routing of cables and air hoses is enabled through internal channels that lead up to the end of the robot arm. This increases the areas of the work envelope and prevents interferences with cables.

Improved trajectory accuracy and optimal motor control tuning is achieved by an operation mode setting function which matches all customer system requirements. This is effective for standard operations and tooling work requiring high accuracy.

The F series naturally fulfils the requirements of the latest safety standards ISO 10218-1 (2011) for robots. UL versions and Korean safety certification are also available.

Safety features

Many safety features are added to protect staff, hardware and programs.

The accuracy of the robot trajectory can be maintained even when the machine is shut down using an emergency stop. This enables the risk of collisions with peripheral devices and other components to be reduced or even completely avoided.

Intuitive programming and operation

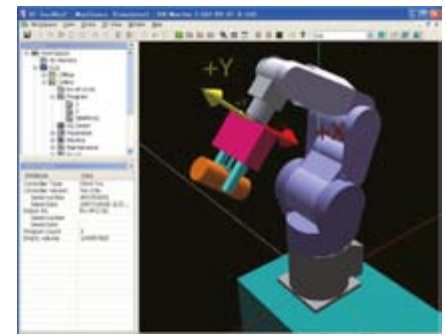
The robots of the RV-F series allow simple automatic operation from the teaching box or direct control via a Mitsubishi GOT. This enables the robot controller status to be uploaded and operations to be controlled directly. Monitoring screens can be set up individually to match the needs of user debugging conditions.

Versatile connection possibilities

The RV-F series includes a number of user interfaces straight from the factory. These enable image processing systems to be connected directly to the controller and initiated via the standard programming language. Simple parameter structures even enable known systems to be set up in advance with a single mouse click.

Two encoder interfaces enable the robot to track two conveyors freely in space and move with them in absolute synchronism. This saves additional costs for positioning units and, above all, time, as the robot is able to fetch, position and machine workpieces while the process is running.

In addition, up to 8 additional axes can be connected directly to the controller. Two of these can be used as additional interpolating axes of the robot. The special feature compared with other systems is that all additionally connected axes can be programmed in exactly the same way as the robot, using the same Teach-Box or the standard RT ToolBox2 software. This avoids the additional expense of software, training and programming.



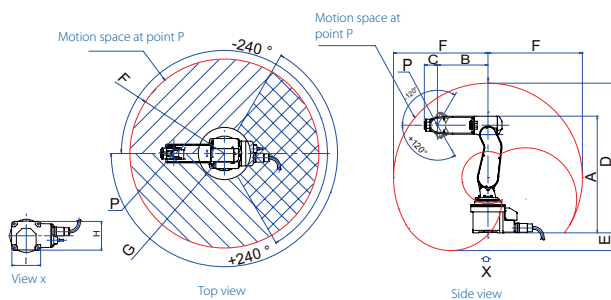
Attachment of a hand created in RT ToolBox2



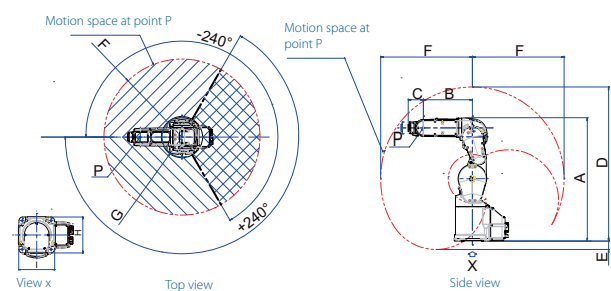
Controlling the robot

Movement range and dimensions

RV-2FB



RV-4FLM/7FM/7FLM



Dimensions for type	A	B	C	D	E	F	G	H	I
RV-2FB	623	270	70	799.6	94.6	504.6	139.5	160	160
RV-4FLM	764.9	335	85	998.7	140	648.7	140.4	200	200
RV-7FM	844.4	370	85	1113.4	168.4	713.4	197.4	245	245.7
RV-7FLM	939.4	470	85	1307.7	352.3	907.7	192.8	245.7	245.7

All dimensions in mm

Specifications

Robot		RV-2FB	RV-4FLM	RV-7FM	RV-7FLM	
Installation		Floor, wall, ceiling				
Degrees of freedom		6				
Design		Vertical, multiple-joint type				
Drive system		AC servo motor				
Position detection method		Absolute encoder				
Arm length	N01	mm	230 + 270	245 + 300	340 + 360	430 + 465
Max. reach radius		mm	504	649	713	908
Maximum speed	J1-axis	deg/s	300	420	360	288
	J2-axis	deg/s	150	336	401	321
	J3-axis	deg/s	300	250	450	360
	J4-axis	deg/s	450	540	337	337
	J5-axis	deg/s	450	623	450	450
	J6-axis	deg/s	750	720	720	720
Maximum composite speed		mm/s	4955	9048	11064	10977
Cycle time (with 1 kg load)		s	0.6	0.36	0.32	0.35
Payload		kg	2	4	7	
Position repeatability		mm	±0.02			
Operating temperature		°C	0–40			
Weight		kg	19	36	46	48
Tool wiring			Hand: 4 I/O points Signal cable for the multi-function hand	Hand: 8 inputs/8 outputs (20 pins total) Serial signal cable for parallel I/O (2-pin and 2 pins for power supply) LAN 100BASE-TX (RJ45)		
Tool pneumatic pipes			Ø4x4	Primary: Ø6x2, Secondary: Ø4x8, Ø4x4 (from base portion to forearm)		
Protection class			IP30	IP67 (oil mist), ISO class 3		
Compatible robot controller *			CR750-F-D/Q			

* Select the control unit suitable for your application.

Robot controller		CR750-Q	CR750-D
Programming language		MELFA-BASIC V	
Position determination		Teaching, manual data input (MDI)	
External I/O	General-purpose I/O	up to 8192	up to 256
	Dedicated I/O	Common I/O for multiple CPU	User-defined
External I/O	Gripper status signal inputs	8 inputs	
	External emergency stop	1 (redundant)	
	Door closed contact	1 (redundant)	
	Enabling switch	1 (redundant)	
	Emergency stop additional axes	1 (redundant)	
RS422		1 (Teaching Box)	
Interfaces	Ethernet	1 (Teaching Box)	1 (Teaching Box) 1 (spare) 10BASE-T/100BASE-TX
	USB	1 (USB port for PLC CPU)	1 (Mini-B connector, Ver. 2.0)
	Additional axis	up to 8 (SSCNETIII)	
	Conveyor belt tracking encoder	Q173DPX (optional)	2
	Expansion slot	—	2
Power supply	Input voltage	Single phase 180 V to 253 V AC ①	
	Power consumption kVA ②	0.5 – 2.0	
Ambient temperature	°C	0–40 (drive unit)/ 0–55 (robot CPU)	0–40
Dimensions (WxHxD)	mm	430x425x174	
Weight	kg	approx. 16	
Housing/protection class		Floor mounting/IP20	

① The supply voltage should not vary by more than 10%.

② Without switch-on current. The power consumption depends on the robot arm model.

European Branches

Mitsubishi Electric Europe B.V. Gothaer Straße 8 D-40880 Ratingen Phone: +49 (0)2102 / 486-0	Germany
Mitsubishi Electric Europe B.V.-org.sl Radlická 714/113a CZ-158 00 Praha 5 Phone: +420 - 251 551 470	Czech Rep.
Mitsubishi Electric Europe B.V. 25, Boulevard des Bouvets F-92741 Nanterre Cedex Phone: +33 (0)1 / 55 68 55 68	France
Mitsubishi Electric Europe B.V. Viale Colonnari 7 I-20041 Agrate Brianza (MB) Phone: +39 039 / 60 53 1	Italy
Mitsubishi Electric Europe B.V. Kokowska 50 PL-32-083 Balice Phone: +48 (0)12 / 630 47 00	Poland
Mitsubishi Electric Europe B.V. S2, bld. 3 Kosmodamianskaya nab 8 floor RU-115054 Moscow Phone: +7 495 721-2070	Russia
Mitsubishi Electric Europe B.V. Carretera de Rubí 76-80 E-08190 Sant Cugat del Valles (Barcelona) Phone: 902 131121 // +34 935653131	Spain
Mitsubishi Electric Europe B.V. Travellers Lane UK-Hatfield, Herts. AL10 8XB Phone: +44 (0)1707 / 27 61 00	UK

Representatives

GEVA Wiener Straße 89 AT-2500 Baden Phone: +43 (0)2252 / 85 55 20	Austria	UTECO S. Mavrogenou Str. GR-18542 Piraeus Phone: +30 211 / 1206 900	Greece	Fonseca S.A. R. João Francisco do Casal 87/89 PT - 3801-997 Aveiro, Esqueira Phone: +351 (0)234 / 303 900	Portugal	PROCONTI, spol. s r.o. Prešov Kúpeľná 1/A SK-080 01 Prešov Phone: +421 (0)51 7580 611	Slovakia	Robotronic AG Schlachthofstrasse 8 CH-8406 Winterthur Phone: +41 (052) / 267 02 00	Switzerland	I.C. SYSTEMS LTD. 23 Al-Saad-Al-Alee St. EG - Sarayat, Maadi, Cairo Phone: +20 (0) 2 / 235 98 548	Egypt
Koning & Hartman b.v. BE-1800 Wilvoorde Phone: +32 (0)2 / 257 02 40	Belgium	AXICONT AUTOMATIKA Kft. (ROBOT CENTER) Retter E. U. 132 HU-1131 Budapest Phone: +36 1 / 412-0882	Hungary	SIRIUS T & S SRL Aleea Lacul Morii Nr. 3 RO-060841 Bucuresti, Sector 6 Phone: +40 (0)21 / 430 04 06	Romania	INEAR RBT d.o.o. Stepne 11 SI-1000 Ljubljana Phone: +386 (0)1 / 513 8116	Slovenia	GTS Bayraktar Bulvarı Nutuk Sok. No:5 TR-34775 Yukan ISTANBUL Phone: +90 (0)216 526 39 90	Turkey	ILAN & GAVISH Ltd. 24 Shenkar St., Kiryat Arie IL-49001 Petah-Tiqva Phone: +972 (0)3 / 922 18 24	Israel
INEAR RBT d.o.o. Aloja Lipa 56 BA-71000 Sarajevo Phone: +387 (0)33 / 921 164	Bosnia and Herzeg.	ALFATRADE Ltd. 99, Paola Hill Malta-Paola PLA 1702 Phone: +356 (0)21 / 697 816	Malta	INEAR RBT d.o.o. Izletnicka 10 SER-113000 Smederevo Phone: +381 (0)26 / 615 401	Serbia	Bejeer Electronics AB Box 426 SE-20124 Malmö Phone: +46 (0)40 / 35 86 00	Sweden	CSC Automation Ltd. 4-B, M. Raskovoyi St. UA-02660 Kiev Phone: +380 (0)44 / 494 33 55	Ukraine	CBI Ltd. Private Bag 2016 ZA-1600 Isando Phone: 27 (0)11 / 977 0770	South Africa
AKHNATON 4, Andrei I. Iapchev Blvd., PO Box 21 BG-1756 Sofia Phone: +359 (0)2 / 817 6000	Bulgaria	HIFLEX AUTOM. B.V. Wohvenstraat 22 NL-2984 CD Ridderkerk Phone: +31 (0)180 - 46 60 04	Netherlands	SIMAP s.r.o. Jána Derku 1671 SK-911 01 Trenčín Phone: +421 (0)32 743 04 72	Slovakia						
AutoCont C.S. s.r.o. Technologická 374/6 CZ-708 00 Ostrava-Pustkovec Phone: +420 595 691 150	Czech Republic	Koning & Hartman b.v. Haarlerbergweg 21-23 NL-1101 CH Amsterdam Phone: +31 (0)20 / 587 76 00	Netherlands								
Bejeer Electronics A/S Lykkegårdsvej 17 DK-4000 Roskilde Phone: +45 (0)46 / 75 76 66	Denmark	Bejeer Electronics AS Postboks 487 NO-3002 Drammen Phone: +47 (0)32 / 24 30 00	Norway								
Bejeer Electronics OY Peltoie 37 FIN-28400 Uvila Phone: +358 (0)207 / 463 540	Finland										



Mitsubishi Electric Europe B.V. / FA - European Business Group / Gothaer Straße 8 / D-40880 Ratingen / Germany / Tel.: +49(0)2102-4860 / Fax: +49(0)2102-4861 120 / info@mitsubishi-automation.com / www.mitsubishi-automation.com

Art. no. 260575-A / 02.2013 / Specifications subject to change / All trademarks and copyrights acknowledged.

