

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)

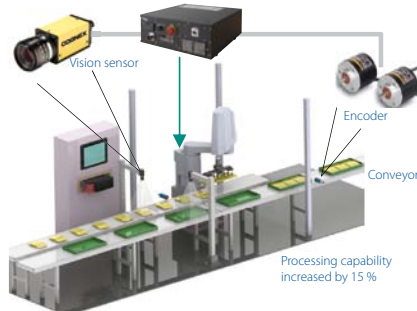


Ethernet, USB, tracking, camera connection, hand I/Os and additional axis connection as standard

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.

Safety features

With the help of the safety solution "MELFA SafePlus", F series industrial robots from Mitsubishi Electric and human operators can work side by side to save space and costs and boost productivity.

The technology limits the speed, range of movement and torque of the robot when safety sensors are activated, allowing operators to work in close proximity to a moving robot.

The functions are developed and certified to a full range of relevant safety standards, including EN ISO 10218-1 (Industrial robots), EN ISO 13849-1 (Safety of machinery), EN62061 / IEC 61508 (Functional safety) and EN61800-5-2 (safety function drive).

Intuitive programming and operation

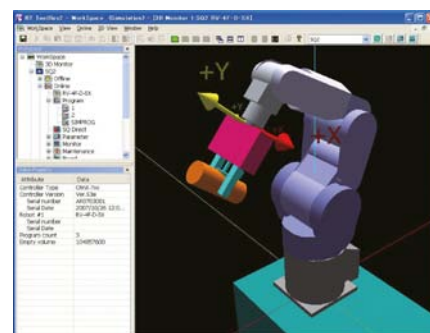
The robots of the RV-F series allow simple automatic operation from the teaching box or direct control via a Mitsubishi Electric GOT. This enables the robot controller status to be uploaded and operations to be controlled directly. Monitoring screens can be set up individually to match the needs of user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



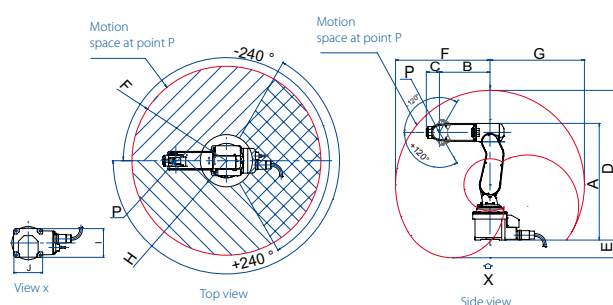
Attachment of a hand created in RT ToolBox2



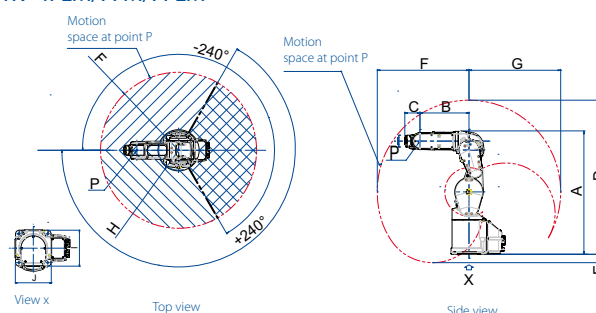
Controlling the robot

Movement range and dimensions

RV-2FB/RV-2FLB

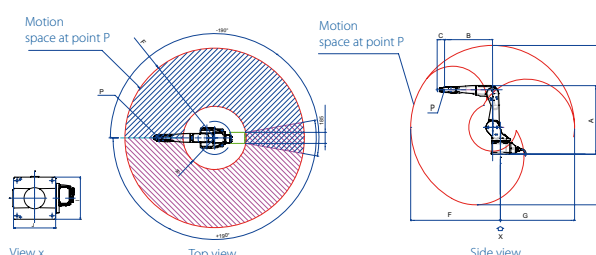


RV-4FLM/7FM/7FLM



Dimensions for type	A	B	C	D	E	F	G	H	I	J
RV-2FB	623	270	70	799.6	94.6	504.6	504.6	139.5	160	160
RV-2FLB	703	335	70	944	199	649	649	162	160	160
RV-4FLM	764.9	335	85	998.7	140	648.7	648.7	140.4	200	200
RV-7FM	844.4	370	85	1113.4	168.4	713.4	713.4	197.4	245	245.7
RV-7FLM	939.4	470	85	1307.7	352.3	907.7	907.7	192.8	245.7	245.7
RV-7FLM	1152	805	85	1821.5	846.9	1502.7	1242.6	529	300	300
RV-13FM	997	550	97	1413.8	458.9	1093.8	833.8	410.3	300	300
RV-13FLM	1152	690	97	1708.1	732.4	1387.9	1128.1	457.6	300	300
RV-20FM	997	550	97	1413.8	458.9	1093.8	833.8	410.3	300	300

RV-7FLM/13FM/13FLM/20FM



All dimensions in mm

Specifications

Robot			RV-2FB	RV-2FLB	RV-4FLM	RV-7FM	RV-7FLM	RV-7FLLM	RV-13FM	RV-13FLM	RV-20FM
Installation			Floor, wall, ceiling								
Degrees of freedom			6								
Design			Vertical, mutiple-joint type								
Drive system			AC servo motor								
Position detection method			Absolute encoder								
Arm length	N01	mm	230 + 270	310 + 335	245 + 300	340 + 360	430 + 465	565 + 805	410 + 550	565 + 690	410 + 550
Max. reach radius		mm	504	649	649	713	908	1503	1094	1388	1094
Maximum speed	J1-axis	deg/s	300	225	420	360	288	234	290	234	110
	J2-axis	deg/s	150	105	336	401	321	164	234	164	110
	J3-axis	deg/s	300	165	250	450	360	219	312	219	110
	J4-axis	deg/s	450	412	540	337	337	374	375	375	124
	J5-axis	deg/s	450	450	623	450	450	450	375	375	125
	J6-axis	deg/s	750	720	720	720	720	720	720	720	360
Maximum composite speed		mm/s	4955	4206	9048	11064	10977	15308	10450	9700	4200
Cycle time (with 1 kg load)		s	0.6	0.7	0.36	0.32	0.35	0.63	0.53	0.68	0.70
Payload		kg	2	2	4	7	7	7	13	13	20
Position repeatability		mm	±0.02					±0.06	±0.05		
Operating temperature		°C	0–40								
Weight		kg	19	21	41	65	67	130	120	130	120
Tool wiring			4 I/O	4 I/O	8 I/O	8 I/O	8 I/O	8 I/O	8 I/O	8 I/O	8 I/O
Tool pneumatic pipes			Ø 4x4		Primary: Ø 6x2, secondary: Ø 4x8, Ø 4x4 (from base portion to forearm)				Primary: Ø 6x2, secondary: Ø 6x8		
Protection class			IP30		IP67 (Optional cleanroom model available)						
Compatible robot controller *			CR750-D/CR750-Q + Q172DRCPU								

* 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
	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)	
	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)
Interfaces	Additional axis	up to 8 (SSCNETIII)	
	Conveyor belt tracking encoder	Q173DPX (optional)	2
	Expansion slot	—	2
	Input voltage	Single phase 180 V to 253 V AC ^①	
	Power consumption ^② kVA	0.5–2.0	
Ambient temperature		°C	°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 Offices

Mitsubishi Electric Europe B.V. Gothaer Straße 8 D-40880 Ratingen Phone: +49 (0)2102 / 486-0	Germany	Mitsubishi Electric (Russia) LLC 52, bld. 1 Kosmodamianskaya emb. RU-115054 Moscow Phone: +7 495 / 721 2070	Russia
Mitsubishi Electric Europe B.V. Radlická 751/113e Avenir Business Park CZ-158 00 Praha 5 Phone: +420 251 551 470	Czech Rep.	Mitsubishi Electric Europe B.V. Carretera de Rubí 78-80 Apdo. 420 E-08190 Sant Cugat del Valles (Barcelona) Phone: +34 (0) 93 / 5653131	Spain
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. (Scandinavia) Sweden Fjellvägen 8 SE-22736 Lund Phone: +46 (0) 8 625 10 00	Sweden
Mitsubishi Electric Europe B.V. Viale Collezioni 7 Palazzo Sirio I-20864 Agrate Brianza (MB) Phone: +39 039 / 60 53 1	Italy	Mitsubishi Electric Turkey Elektrik Ürünleri A.Ş. Turkey Şerifali Mahallesi Nutuk Sokak No:5 TR-34775 Ümraniye-İSTANBUL Phone: +90 (0)216 / 526 39 90	Turkey
Mitsubishi Electric Europe B.V. Westgate Business Park, Ballymount IRL-Dublin 24 Phone: +353 (0) 1 4198800	Ireland	Mitsubishi Electric Europe B.V. Travellers Lane UK-Hatfield, Herts. AL10 8XB Phone: +44 (0)1707 / 28 87 80	UK
Mitsubishi Electric Europe B.V. Nijverheidsweg 23a NL-3641RP Mijdrecht Phone: +31 (0) 297250350	Netherlands	Mitsubishi Electric Europe B.V. Dubai Silicon Oasis United Arab Emirates - Dubai Phone: +971 4 3724716	UAE
Mitsubishi Electric Europe B.V. ul. Krakowska 50 PL-32-083 Balice Phone: +48 (0) 12 347 65 00	Poland		

Representatives

GEVA Wiener Straße 89 A-2500 Baden Phone: +43 (0)2252 / 85 55 20	Austria	Beijer Electronics A/S Lykkegardsvej 17 DK-4000 Roskilde Phone: +45 (0)46 / 75 76 66	Denmark	KONING & HARTMAN B.V. Energieplein 1 NL-2627 AP Delft Phone: +31 (0)15 260 99 06	Netherlands	INEA RBT d.o.o. Stegne 11 SI-1000 Ljubljana Phone: +386 (0)1 / 513 8116	Slovenia	ILAN & GAVISH Ltd. 24 Shenkar St., Kiryat Ariz IL-49001 Petah-Tikva Phone: +972 (0)3 / 922 18 24	Israel
000 TECHNIKON Prospect Nezavisimosti 177-9 BY-220125 Minsk Phone: +375 (0)17 / 393 1177	Belarus	HANS FOLSGAARD A/S Thellgaards Torv 1 DK-4600 Køge Phone: +45 4320 8600	Denmark	Beijer Electronics AS Postboks 487 NO-3002 Drammen Phone: +47 (0)32 / 24 30 00	Norway	Beijer Electronics Automation AB Box 426 SE-20124 Malmö Phone: +46 (0)40 / 35 86 00	Sweden	ADROIT TECHNOLOGIES 20 Waterford Office Park 189 Wokkopen Road ZA-Fourways Phone: +27 (0)11 / 658 8100	South Africa
ESCO DRIVES Culliganlaan 3 BE-1831 Diegem Phone: +32 (0)2 / 717 64 60	Belgium	Beijer Electronics OY Vanha Nurmijärventie 62 FIN-01670 Vantaa Phone: +358 (0)207 / 463 500	Finland	Fonseca S.A. R. João Francisco do Casal 87/89 PT-3801-997 Aveiro, Esqueira Phone: +351 (0)234 / 303 900	Portugal	OOO "CSC-AUTOMATION" 4-B, M. Raskovoy St. UA-02660 Kiev Phone: +380 (0)44 / 494 33 44	Ukraine		
KONING & HARTMAN B.V. Woluweelaan 31 BE-1800 Vilvoorde Phone: +32 (0)2 / 257 02 40	Belgium	PROVENDOR OY Teljänkatu 8 A3 FIN-28130 Pori Phone: +358 (0) 2 / 522 3300	Finland	Sirius Trading & Services Alexa Lacul Morii Nr. 3 RO-060841 Bucuresti, Sector 6 Phone: +40 (0)21 / 430 40 06	Romania				
INEA RBT d.o.o. Stegne 11 SI-1000 Ljubljana Phone: +386 (0)1 / 513 8116	Bosnia and Herzegovina	UTEKO A.B.E.E. S. Mavrogenous Str. GR-18542 Piraeus Phone: +30 (0)211 / 1206-900	Greece	INEA SR d.o.o. Ul. Karadjordjeva 12/217 SER-11300 Smederevo Phone: +386 (026) 461 54 01	Serbia				
AKHNATON 4, Andrei Lipachev Blvd., PO Box 21 BG-1756 Sofia Phone: +359 (0)2 / 817 6000	Bulgaria	AxiCont Automatica Kft. (Robot Center) Rókolva utca 1-13 HU-1131 Budapest Phone: +36 (0)1 / 412-0882	Hungary	SIMAP SK Jána Derku 1671 SK-911 01 Trenčín Phone: +421 (0)32 743 04 72	Slovakia				
INEA CR Losinjka 4 a HR-10000 Zagreb Phone: +385 (0)1 / 36 940 - 01/-02/-03	Croatia	ALFATRADE Ltd. 99, Paola Hill Malta-Paola PLA 1702 Phone: +356 (0)21 / 697 816	Malta						
AutoCont C.S. S.R.O. Kafkova 1853/3 CZ-702 00 Ostrava 2 Phone: +420 595 691 150	Czech Republic	HIFLEX AUTOM. B.V. Wolveverstraat 22 NL-2984 CD Ridderkerk Phone: +31 (0)180 / 46 60 04	Netherlands						



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Mitsubishi Electric Europe B.V. / FA - European Business Group / Gothaer Straße 8 / D-40880 Ratingen / Germany / Tel.: +49(0)2102-4860 / Fax: +49(0)2102-4861120 / info@mitsubishi-automation.com / https://eu3a.mitsubishielectric.com

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