

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

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 rotational 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.

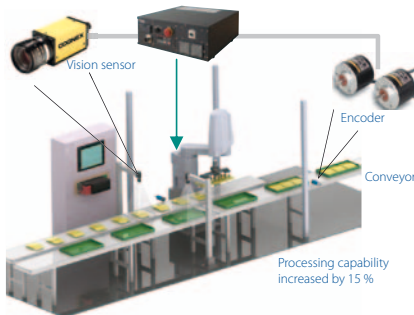
Internal routing of cables and air hoses is enabled through internal channels that lead up to the end of the robot arm. This increases the areas of the work envelope and prevents interferences with cables.

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.

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.



Tracking can be used with multiple conveyors at the same time

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

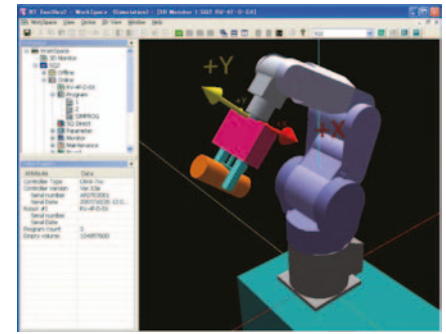
The robots of the RV-F series allow simple automatic operation from the teaching box or direct control via a Mitsubishi Electric GOT. This enables the robot controller status to be uploaded and operations to be controlled directly. Monitoring screens can be set up individually to match the needs of user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



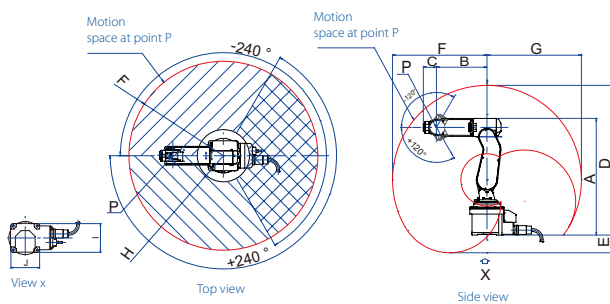
Attachment of a hand created in RT ToolBox2



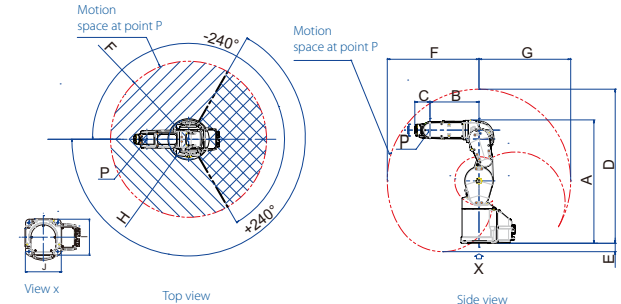
Controlling the robot

Movement range and dimensions

RV-2FB

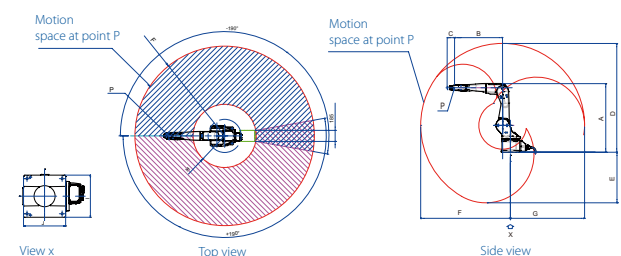


RV-4FLM/7FM/7FLM



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-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-7FLLM	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-7FLLM/13FM/13FLM/20FM



All dimensions in mm

Specifications

Robot		RV-2FB	RV-4FLM	RV-7FM	RV-7FLM	RV-7FLM	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	245 + 300	340 + 360	430 + 465	565 + 805	410 + 550	565 + 690	410 + 550	
Max. reach radius		mm	504	649	713	908	1503	1094	1388	1094
Maximum speed	J1-axis deg/s	300	420	360	288	234	290	234	110	
	J2-axis deg/s	150	336	401	321	164	234	164	110	
	J3-axis deg/s	300	250	450	360	219	312	219	110	
	J4-axis deg/s	450	540	337	337	374	375	375	124	
	J5-axis deg/s	450	623	450	450	450	375	375	125	
	J6-axis deg/s	750	720	720	720	720	720	720	360	
Maximum composite speed		mm/s	4955	9048	11064	10977	15308	10450	9700	4200
Cycle time (with 1 kg load)		s	0.6	0.36	0.32	0.35	0.63	0.53	0.68	0.70
Payload		kg	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	41	65	67	130	120	130	120
Tool wiring			4 E/A	8 E/A	8 E/A	8 E/A	8 E/A	8 E/A	8 E/A	8 E/A
Tool pneumatic pipes		Ø4x4	Primary: Ø6x2, secondary: Ø4x8, Ø4x4 (from base portion to forearm)				Primary: Ø6x2, secondary: Ø6x8			
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)	
	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 ^②	kVA	0.5-2.0
Ambient temperature		°C	0-40 (drive unit)/ 0-55 (robot CPU)
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.

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