

INDUSTRIAL ROBOTS

Industrial Robot

The "robot" built with the latest technology for FA for future-oriented factories.

The combination of high-speed, high-precision basic performance and intelligent sensors is most ideal for the cell production field.

Its high affinity with programmable controllers and other FA products will bring an ultimate user-friendliness.

MELFA

Vertical, multiple-joint type

RV-F Series



A perfect choice for future-oriented assembly cells capable of multiproduct variable quantity production

Product specification
P.644

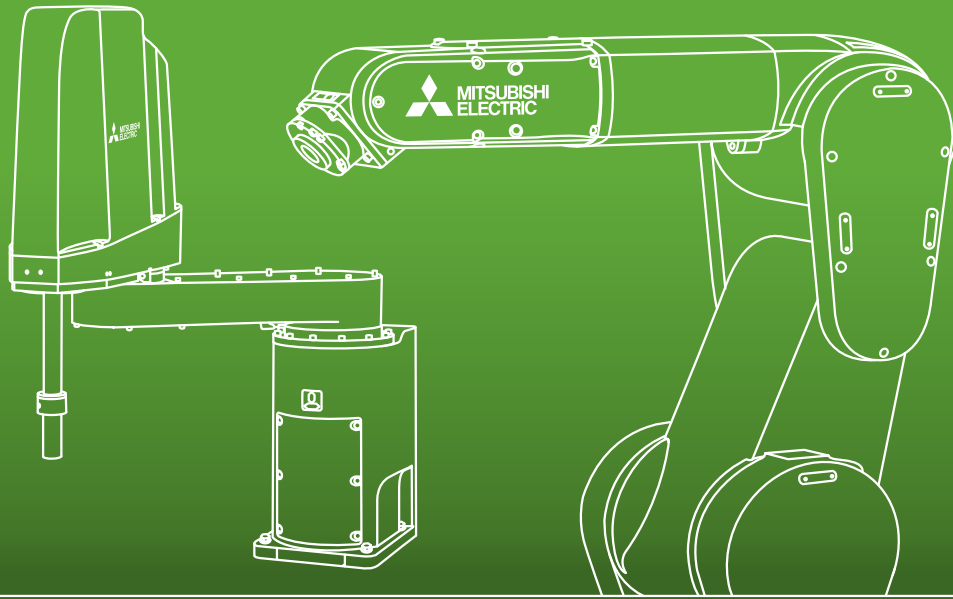
Horizontal, multiple-joint type

RH-F Series



Ideal for a wide variety of uses, from assembly of small parts to transporting heavy articles and box packing

Product specification
P.652



Ceiling

RH-3FHR



Small-footprint ceiling installation, high-speed, high-precision operation!

To learn product specifications, please refer to the separate catalog "Industrial Robot F Series".

Options



Force sensor set



MELFA-3D Vision



Multifunctional electric hand

Offers intelligent solutions to work with more advanced applications

Product specification
P.657

RV/RH-F Series Features & Line Up

Features

Contributes to improve productivity with high-frequency operations RV RH

Enhanced continuous operation performance by adopting the in-house motor and reviewing the overload detection system. Can be worked under high-frequency movement.



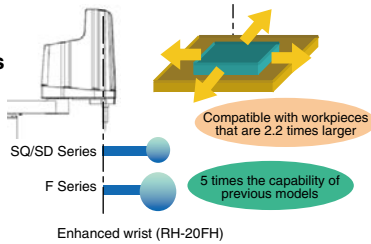
Changes in operating posture can be made even more quickly!! RV

Changes in operating posture, which occur frequently during assembly, can be completed at rapid speed, increasing the speed of the axis close at hand as well as that of the base axis. Enables changes to be made to the operating posture at high speed.



Enhanced wrist axis RH

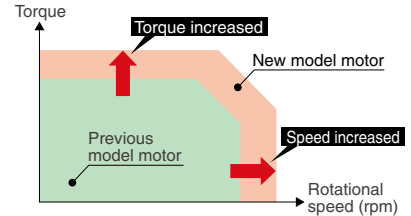
Tolerable J4 axis inertia dramatically increased. Applies easily to multiple hands, offset hands, etc.
[5 times that of previous models (RH-20FH)]



The fastest high-speed operation in its class RV RH

Its high-rotation and high-torque output thanks to the in-house developed motor and high-rigidity arm, combined with our unique drive control technology delivers best-in-class operating performance.

Continuous operation has also been improved, contributing to cycle time reduction and enhanced productivity.

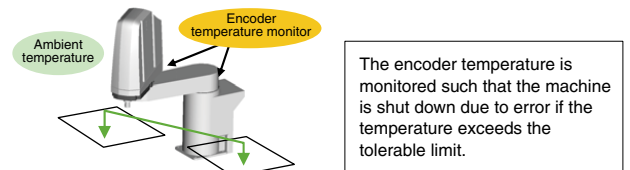


Improved speed for the vertical movements RH

Improved speed for the vertical movements that are so essential to horizontal multi-joint robot operation. 2400 mm/s, **[RH-6FH: Twice as fast as the conventional speed]**

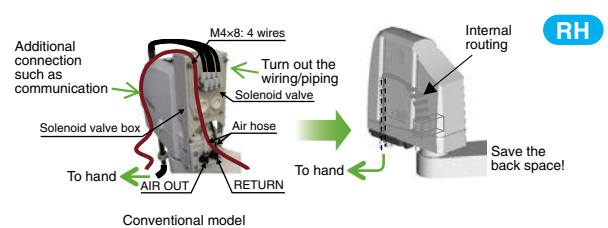
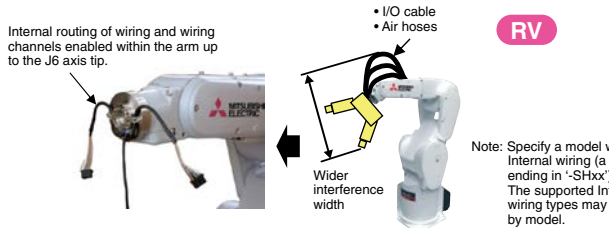
Improved continuous operatability RV RH

Overload detection levels optimized based on the ambient temperature settings for the robot (set in the parameters). This helps improve continuous operability using load levels calculated based on actual environmental conditions for the robot axes.



Internal routing of hand wiring and wiring channels

Internal routing of cables and air hoses is enabled through the internal channels that lead up to the end of the robot arm. Such internal routing increases the areas of the work envelope that the robot can reach without twisting and entangling cables and hoses. This prevents interference with cables around devices and reduces the risk of wiring disconnection.



Line Up

RV-F SERIES

A compact 6-axis jointed robot with an optimal arm length and wider range of movement suited for complex assembly and processing tasks. Compact body and slim arm design, allowing operating area to be expanded and load capacity increased. Layout accommodates a wide range of applications from transport of mechanical parts to assembly of electrical parts. Environmental resistance specifications enable application to a wide range of uses without needing to consider the installation environment.

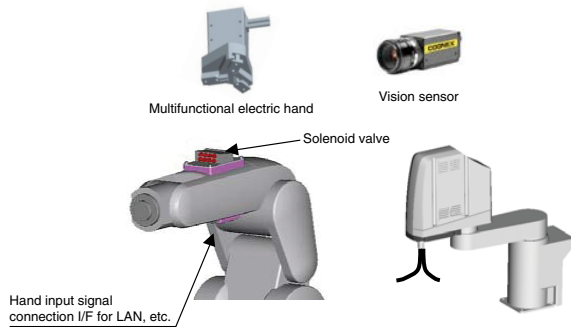
Type	RV-2F	RV-2FL	RV-4F	RV-4FL	RV-7F	RV-7FL	RV-7FLL	RV-13F	RV-13FL	RV-20F	RV-35F	RV-50F	RV-70F
Maximum load capacity	3 kg		4 kg		7 kg		7 kg	13 kg		20 kg	35 kg	50 kg	70 kg
Maximum reach radius	504 mm	649 mm	515 mm	649 mm	713 mm	908 mm	1503 mm	1094 mm	1388 mm	1094 mm	2050 mm		

Computability with internal Ethernet cable tools

RV RH

Internal installation of wiring and piping for connecting to vision sensors enabled.

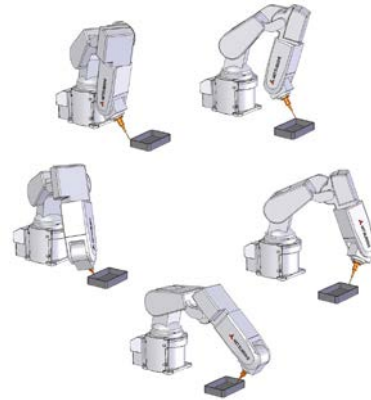
- Hand wiring
- Pipe
- Ethernet cable for the vision sensor
- Multifunctional electric hand



Expanded J4 axis operating range

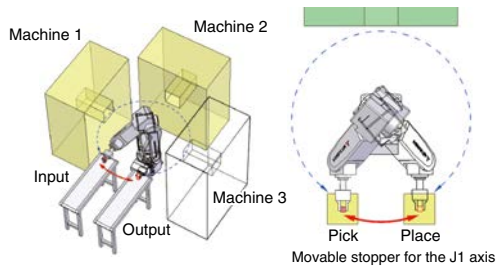
RV

Expanding the J4 axis operating range enables the posture to be changed continuously during assembly and transport operations. It also eliminates the need for the robot to move in the opposite direction partway through an operation.

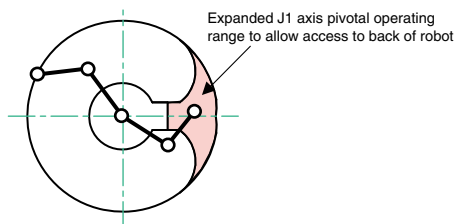


Expanded pivotal operating range

Improved flexibility for robot layout design considerations. Enabling more effective use of access space around the entire perimeter including to the rear. Shortened movement distances, enabling takt times to be shortened.



RV

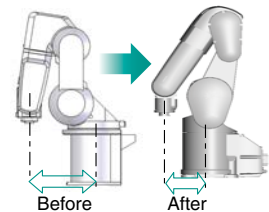


RH

Compact installation with operation performed near the robot base

RV

Use of a flap-style arm contributes to a slimming of customer equipment, enabling operations to be completed in even closer proximity to the robot.



RH-F SERIES

Matches perfectly to a variety of applications with a wide range of operating areas and variations. High speed and high accuracy achieved with the highly rigid arm and latest servo control technology. Suitable for a wide range of fields from mass production of food and pharmaceutical products requiring high-speed operation to assembly operations requiring high precision.

Type	RH-3FH			RH-6FH			RH-12FH		RH-20FH		RH-3FHR
Maximum load capacity	3 kg			6 kg			12 kg		20 kg		3 kg
Maximum reach radius	350 mm	450 mm	550 mm	350 mm	450 mm	550 mm	700 mm	850 mm	1000 mm	350 mm	
Z - axis stroke	150 mm ^{*1}			200 mm/340 mm			350 mm/450 mm				150 mm ^{*2}

*1: Clean specifications : 120 mm *2: Clean specifications, Waterproof specifications : 120 mm

Intelligent Solutions

To meet the demands of more advanced applications

By utilizing high-precision vision sensor and force sensor for controlling the robot's power level, works that could not be automated due to their high difficulty level can now be automated.

Examples of function utilization in robot control cell production system

Three-dimensional vision sensor

- Process work without use of parts feeder or positioning jig
- Kitting and sorting of works in a disorganized or overlapped status

Force control

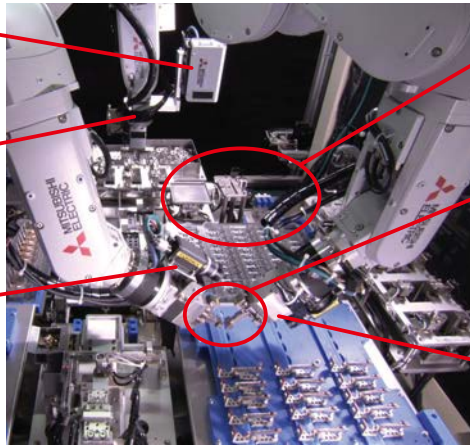
- Detects pressing force and force status at insertion timing for improved work quality
- Assembly of difficult fitting works
- Teaching support with force information

Two-dimensional vision sensor

- The robot and camera can be calibrated through a simple process using vision sensor setting tools
- Simple connection between the robot and camera using Ethernet
- Simple control using vision control commands in the robot programs

Safety solution

- High safety compliant with international standards
- Robot's automatic operation continues even with a safety fence opened
- Operators and robots share an operation area



Collision avoidance

iQ Platform

- Check interference of arm and hand between two robots for collision avoidance

Coordinated control

iQ Platform

- Two robots are in coordination to transport long objects and heavy articles
- Completes transport assembly while maintaining positional relationship of the parts not fixed

Multi-function hand

- Use of an Multifunctional electric hand enables handling of various parts in different sizes
- Reduction of setup changes
- Multi-hand function for simultaneous transport and cycle time reduction

iQ Platform compatible functions

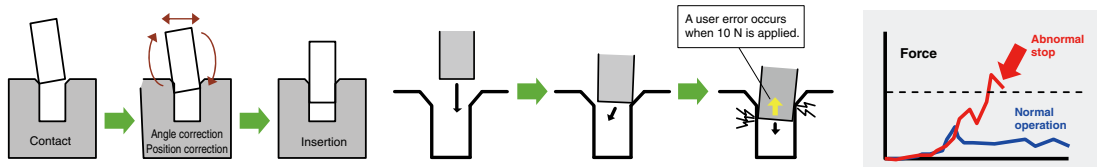
- Improved responsivity through high-speed communications
- Large amounts of data
- Batch management of multiple robots

Force control function

Highly-accurate mating operation, quality assurance, reliability improvement

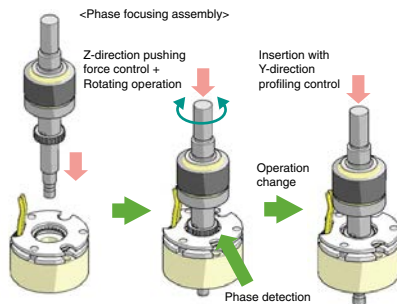
Flexible control + Error detection

The robot can be flexibly controlled and operated profiling the target workpiece. When a workpiece is inserted with an excessive force, an error is generated to stop the operation.



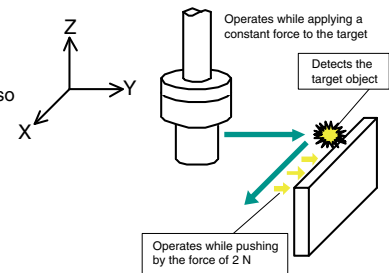
Performs complex assembly works such as phase focusing

Operation change with force detection
Contact detection switches operation directions or force controls.
This function realizes highly-flexible assembly works by changing the force control characteristics during interpolation operation.



Performs operations with a constant force

Pushing force control
A robot performs pushing operations in a specified direction with a constant force. This control can also be used for deburring works and tension applying works.

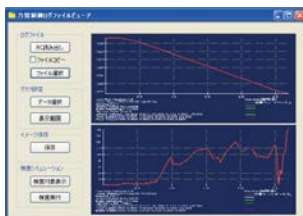


Teaching support

Force GUI has been installed.

● Because force GUI screens are utilized for the personal computer support software (RT ToolBox2) and teaching boxes (R56TB/R57TB, R32TB/R33TB) as standard, users can easily operate force sensors.

- The force data synchronized with position data can be saved as log data.
- RT ToolBox2 displays log data in a graph.
- Log data files can be transferred to a personal computer via FTP.



■ Force log (RT ToolBox2 log viewer)



R32TB/R33TB



R56TB/R57TB



Users can perform teaching while checking the force status on the force control-dedicated screen of the teaching boxes, realizing the optimal position teaching.

3D vision sensor

Realizes supply of discretely placed parts

The use of 3D vision sensors realizes supply of discretely placed parts without dedicated trays and part feeders, reducing part supply work.

Realizes high-speed bin picking using our unique technology

Eliminates the need to register the 3D model of a target workpiece, shortening the startup time.

3D modeling is no longer required - this sensor changed the common sense of vision sensors!

3D vision sensors changed the common sense of vision sensors and realized bin picking (picking of discretely placed parts), eliminating the need to register the shape of workpieces. With a bit of information required for gripping (hand jaw width, jaw dimensions, adsorption pad size etc.), this hand grips various workpieces, shortening the startup time.

* Some other devices such as 2D vision sensors are required for final positioning.
* When 3D and 2D vision sensors are used together, adjust 2D vision sensors.

Applicable to multiple recognition methods

Users can use different recognition methods, such as model-less recognition or model matching, for their applications.



MELFA-3D Vision



Picking of discretely placed parts



Model-less recognition



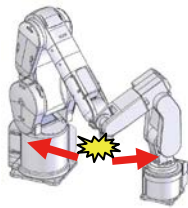
Model matching recognition

Collision avoidance

iQ Platform [Q type controllers only]

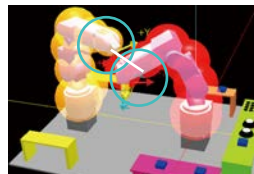
For automatic prevention of collisions between robots

The software constantly monitors robots motion, predicts collisions before they occur, and immediately stops the robots. This avoids damage to the robot during both the JOG operations and automatic mode operations.



Decreases downtime during startup operation

Reduces the number of recovery man-hours required after collisions due to teaching operation errors or failure to set interlocks.



Checking interference using the robot with a defined solid model

Coordinated control

iQ Platform [Q type controllers only]

Coordinated control between multiple robots

Enables coordinated control between multiple robots through CPU connection between the robots. Easy to operate and use under normal operation through individual robot operation.



Enables installation work to be completed while gripper positions between robots are maintained.

Coordinated transport

Enables transport of lengthy or heavy objects using multiple small-sized robots instead of larger ones.

Multifunctional electric hand

The highly-functional operation control that cannot be performed with air cylinders

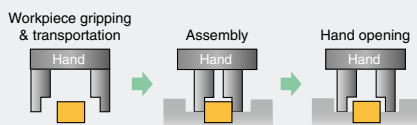
Users can set the grip force and gripping speed depending on a target workpiece, such as a soft one and heavy one. When users need to handle workpieces with different sizes, they can set the optimal stroke in the operating position setting. Position feedback of hands can be utilized for the judgments of success/failure in gripping and OK/NG products with the measurement of workpiece dimensions and product inspections.



● Multifunctional electric hand (manufactured by TAIYO)



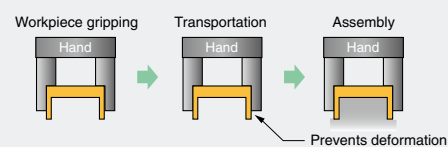
Prevents interference using the opening/closing stroke control



<Benefits of electric hands>

- ◎ Multipoint position control (applicable to a wide variety of products, opening/closing stroke adjustment)

Prevents deformation of resin moldings



<Benefits of electric hands>

- ◎ Speed control (workpiece shape retention, impact cushioning)
- ◎ Grip force control (prevention of workpiece deformation)

Easy control

With a robot program, users can easily set the operation stroke and grip force according to the dimensions of workpieces.

Easy operation

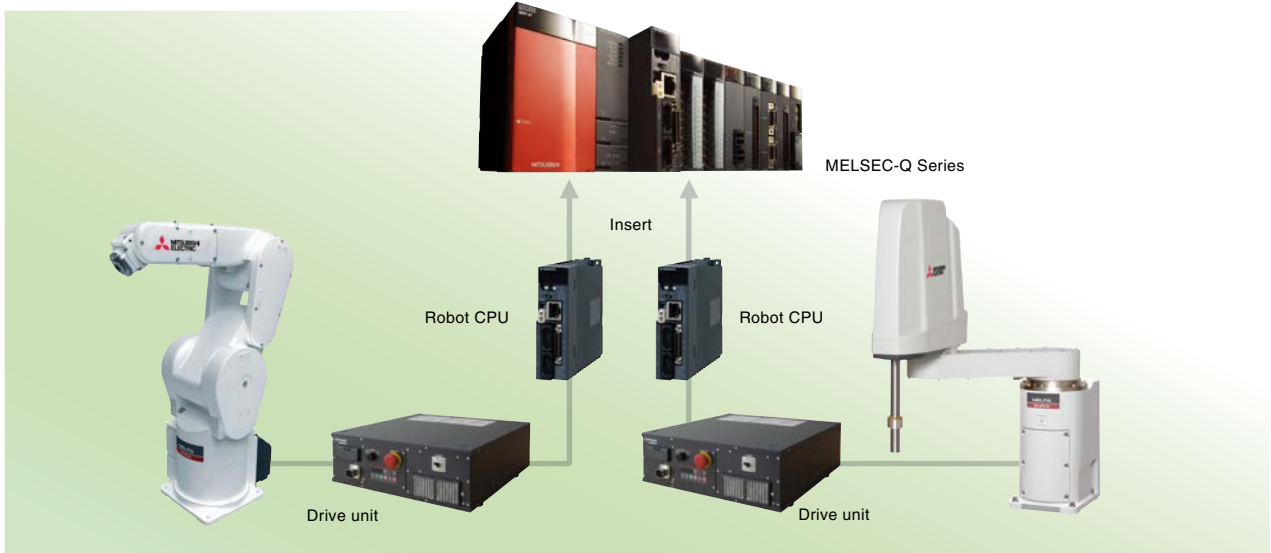
Users can flexibly operate electric hands on the hand-dedicated screen of the teaching box.

Controller Type Line Up

QTYPE Controller

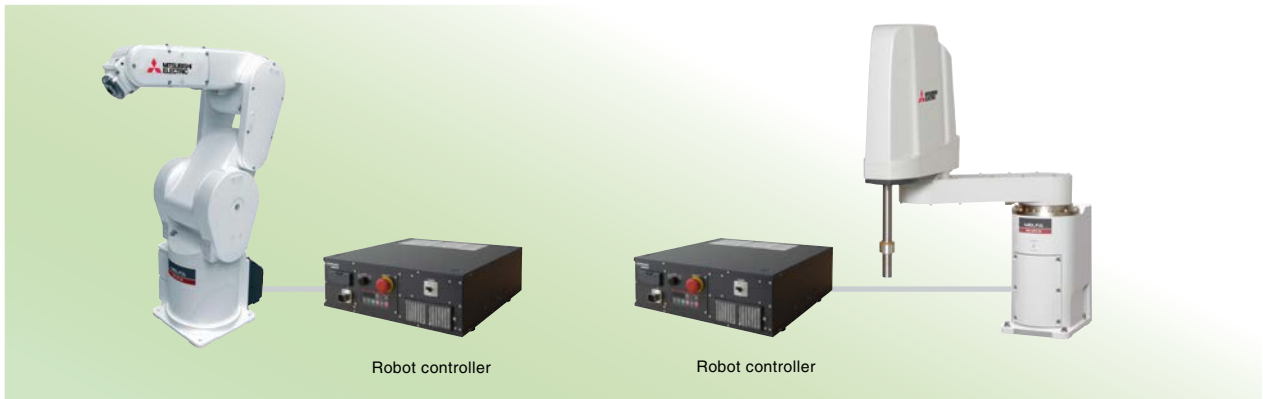
Compatible with the "iQ Platform," this controller makes seamless integration of various controllers at production site, HMI, engineering environment, and network.

The multi-CPU configuration dramatically improved an affinity with FA devices, offering fast and easy execution of delicate control and information management.



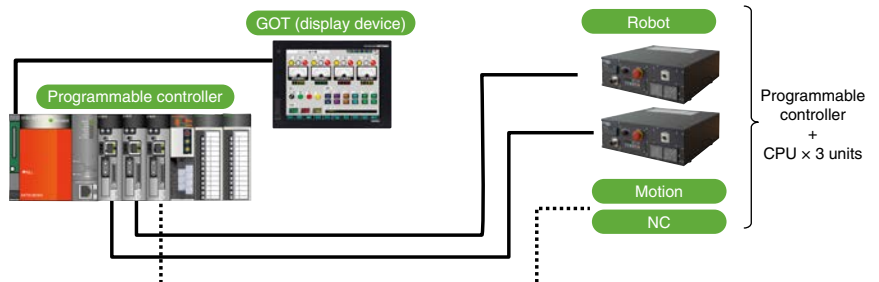
DTYPE Controller

This is a stand-alone controller, similar to the conventional type. The robot controller can be used as centralized control for cell construction. Various interfaces come as a standard feature to construct a system most suited to customers' application.



Multiple CPU environment

The multi-CPU configuration with the programmable controller CPU and robot, Motion, and NC will dramatically improve an affinity with FA devices, offering fast and easy execution of delicate control and information management.



Features of iQ Platform Controllers

QType Controller



iQ Platform function

Improved responsiveness through high-speed communications

Increases the speed of data communications between CPUs and dramatically reduces I/O processing times using a high-speed standard base between multiple CPUs.

High-speed communications



Measurement example: Transfer of 16-word data (With data matching check)
CC-Link: 262 ms
Between multiple CPUs: 63 ms (Approx. 4x)

Large amounts of data

The number of device points between the programmable controller and robot was increased to 8192 input points and 8192 output points. This allows the system to handle larger programs, more complicated control, and other objects that require a lot of I/O points.



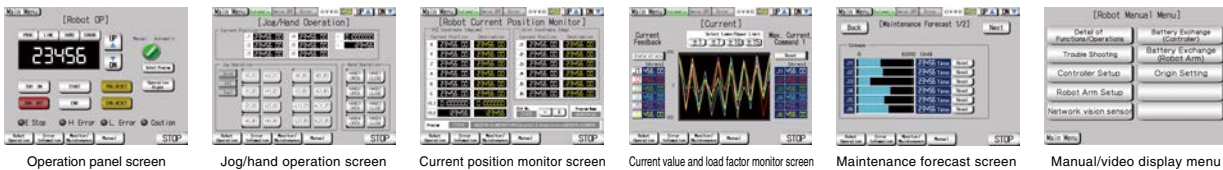
Number of I/O points: 8192/8192
Remote I/O: 256/256
CC-Link (4 stations, 1x): 126/126
CC-Link (4 stations, 8x): 894/894

Shared memory

Shared memory expansion

Enhanced efficiency of monitoring and maintenance operations onsite using a single GOT (display device) as the Human Machine Interface (HMI).

<GOT screen shots>



- Enables the robot to be controlled from the GOT even without a teaching box. Current robot position data, error information, and other items can be displayed easily on the GOT.
- Internal robot information
 - Error, variable, and program information
 - Maintenance information (Remaining battery capacity, grease life, etc.)
- Robot status (Current speed, current position, etc.)
- Servo data (Load factor, current values, etc.)

GOT connection (transparent function)

Programs and parameters can be edited from the USB interface on the front of the GOT using a transparent function for improved operability. (For GOT1000 Series + 2000 Series)

Engineering tool operations performed from the USB interface on the front of the GOT



Engineering environment



The personal computer and the GOT are connected with a USB cable or RS232 cable

GOT backup/restore functions (Supported on GT14, GT15 and GT16)

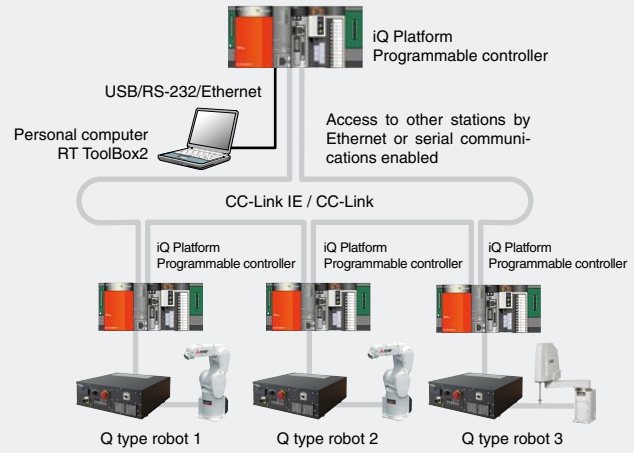
Robot data on the GOT can be backed up to and restored from a CF card or USB memory stick. With no need for a PC. This helps prevent data from being lost due to the empty battery / battery or robot malfunction. Data can be saved after periodic maintenance tasks are performed or when unexpected errors occur. Dramatically improves serviceability.



Batch management of multiple robots

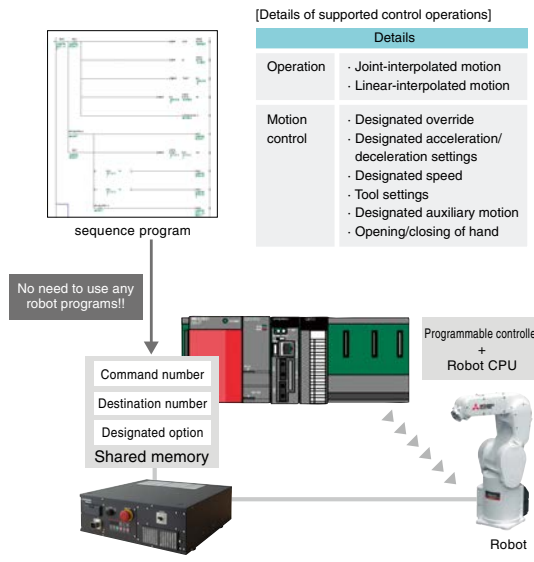
Enables access to robots in the programmable controller network from a PC connected to the main CPU. Leads to a shortening of rise times and improved maintainability for robots on the production line.

Enables Robot 1, Robot 2, and Robot 3 to be monitored from a single location.



Direct execution function for programmable controllers

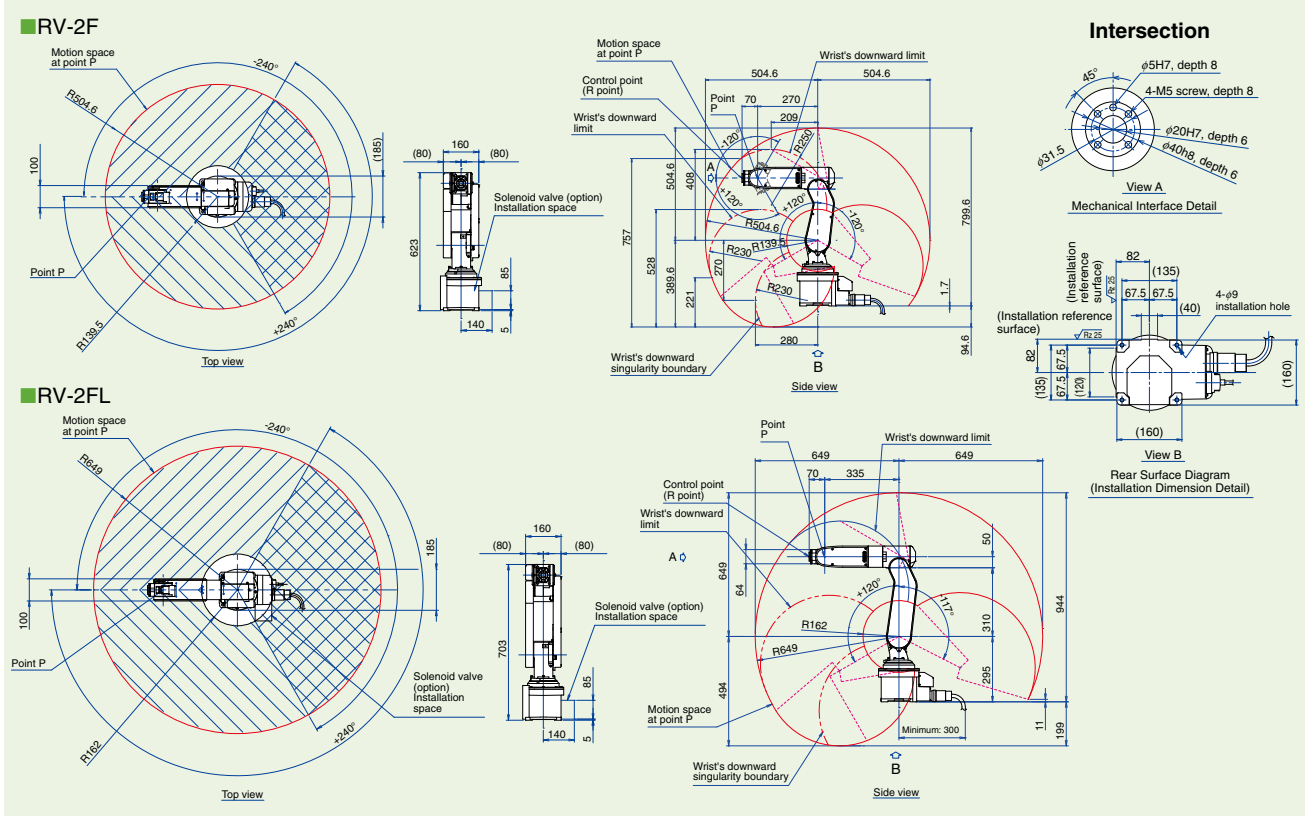
Robots can be controlled easily using programmable controller language. System operation can be controlled using a single programmable controller. This enables the operation of the programmable controller to handle making changes to system specifications and troubleshooting directly.



[Details of supported control operations]	
Details	
Operation	<ul style="list-style-type: none"> - Joint-interpolated motion - Linear-interpolated motion
Motion control	<ul style="list-style-type: none"> - Designated override - Designated acceleration/ deceleration settings - Designated speed - Tool settings - Designated auxiliary motion - Opening/closing of hand

RV-2F/4F Specifications/Operating Range

External Dimensions/Operating Range Diagram

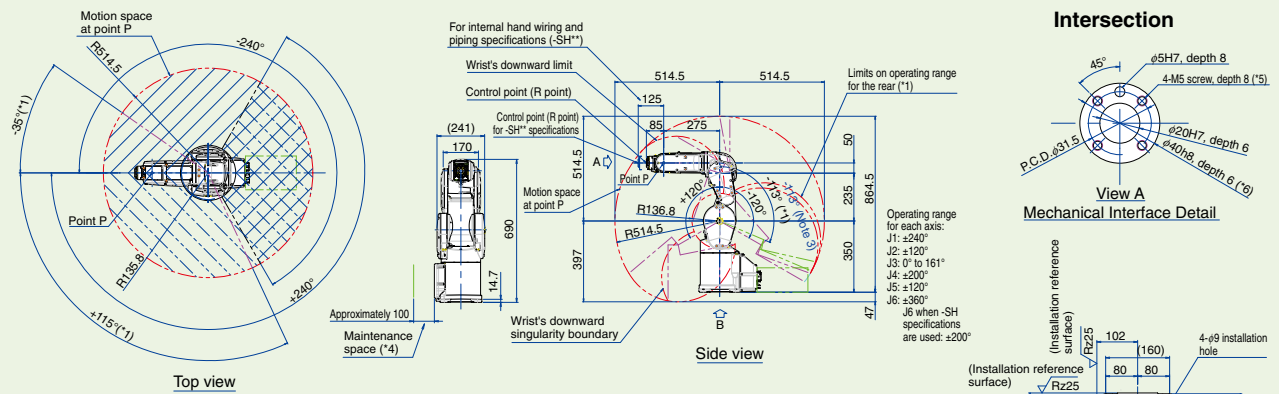


Specifications

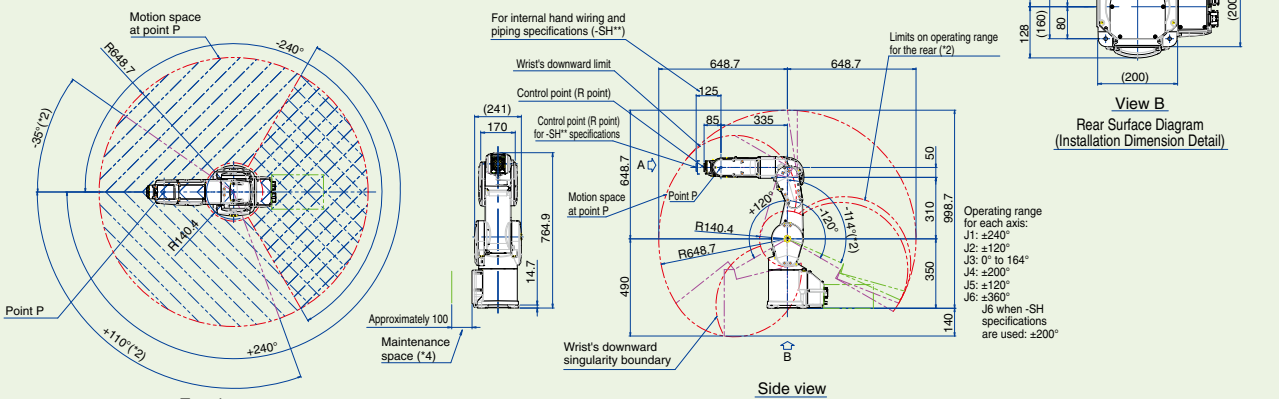
Type	Unit	RV-2F(B)	RV-2FL(B)	RV-4F(M)(C)	RV-4FL(M)(C)
Environmental specifications		Standard		Standard/ Oil mist/ Clean	
Protection degree		IP30		IP40 (standard)/ IP67 (oil mist) *1/ ISOclass3 *7	
Installation		Floor type, ceiling type, (wall-mounted type *2)			
Structure		Vertical, multiple-joint type			
Degrees of freedom		6			
Drive system *9		AC servo motor (J2, J3 and J5: with brake)		AC servo motor	
Position detection method		Absolute encoder			
Maximum load capacity	kg	Maximum 3 (Rated 2) *8		Maximum 4 (Rated 4) *8	
Arm length	mm	230 + 270	310 + 335	240 + 270	245 + 300
Maximum reach radius	mm	504	649	515	649
Operating range	deg	480 (±240)			
		240 (-120 to +120)		240 (-120 to +120)	
		160 (-0 to +160)		161 (-0 to +161)	
		400 (±200)			
		240 (-120 to +120)			
		720 (-360 to +360)			
Maximum speed	deg/sec	300	225	450	420
		150	105	450	336
		300	165	300	250
		450	412	540	540
		450		623	623
		720		720	720
Maximum composite speed *3	mm/sec	4955	4200	9027	9048
Cycle time *4	sec	0.6	0.7	0.36	0.36
Position repeatability	mm	±0.02			
Ambient temperature	°C	0 to 40			
Mass	kg	19	21	39	41
Tolerable moment	Nm	4.17		6.66	
		4.17		6.66	
		2.45		3.96	
Tolerable amount of inertia	kgm ²	0.18		0.2	
		0.18		0.2	
		0.04		0.1	
Tool wiring		Hand: 4 input points/4 output points Signal cable for the multi-function hand		Hand: 8 input points/8 output points Signal cable for the multi-function hand and sensors LAN X 1 <100 BASE-TX> (8-pin) *5	
Tool pneumatic pipes		φ4 x 4		Primary: φ6 x 2 Secondary: φ4 x 8, φ4 x 4 (from base portion to forearm)	
Machine cable		5 m (connector on both ends)			
Connected controller		CR750, CR751			

RV-2F/4F Specifications/Operating Range

RV-4F



RV-4FL



[NOTE]

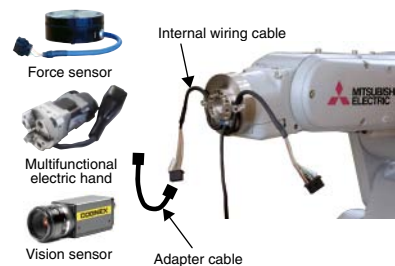
- *1. The operating range for the J2 axis when $-35^\circ \leq J1 \leq +115^\circ$ is limited to $-113^\circ \leq J2 \leq +120^\circ$.
- *2. The operating range for the J2 axis when $-35^\circ \leq J1 \leq +110^\circ$ is limited to $-114^\circ \leq J2 \leq +120^\circ$.
- *3. Make sure to leave enough space open for cable connections between devices.
- *4. Make sure to leave enough space open for removing and attaching covers during maintenance work.
- *5. Specify a thread engagement length of 7.5 to 8 mm.
- *6. The depth of the $\phi 40$ -mm section is 3.5 mm for Clean/Mist models and 6 mm for Standard.

Internal wiring specifications (excludes RV-2F) (*1)

Internal piping ready apparatus	Type (Special device No.)					
	-SH01	-SH02	-SH03	-SH04	-SH05	-SH06
Tool pneumatic pipes $\phi 4$ (x4/x2)	○ (x4)	—	—	○ (x2)	○ (x2)	—
Hand: 8 input points	○	○	—	○	○	—
Vision sensor (*2)	—	○	○	—	○	—
Force sensor	—	○	○	○	—	—
Electrical hand	—	—	○	—	—	—

*1) Operating range of the J6 axis is ± 200 deg; protection grade: IP40

*2) Confirmation is made with the connection and operation of internal vision sensor cable with the In-Sight EZ by COGNEX.



RV-4FLC-1D-SH01

Robot structure

RV: Vertical, multiple-joint type

Load capacity

2: 2 kg

4: 4 kg

Series

F: F Series

Arm length

Blank: Standard arm

L: Long arm

Special device No.

SHxx: Internal wiring specifications

Controller type

D: CR750-D 1D: CR751-D

Q: CR750-Q 1Q: CR751-Q

Environment specification

Blank: Standard specifications

M: Oil mist specifications

C: Clean specifications

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use. Air will need to be purged from the lines. For details, refer to the specifications sheet.

*2: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.

*3: This is the value at the surface of the mechanical interface when all axes are composited.

*4: The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm when the load is 1 kg.

*5: Can also be used as a spare line (0.2 sq. mm, 4-pair cable) for conventional models.

*6: Select either controller according to your application. CR751-D: Standalone type, CR751-Q: iQ Platform compatible type.

*7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A $\phi 8$ -mm coupler for suctioning is provided at the back of the base.

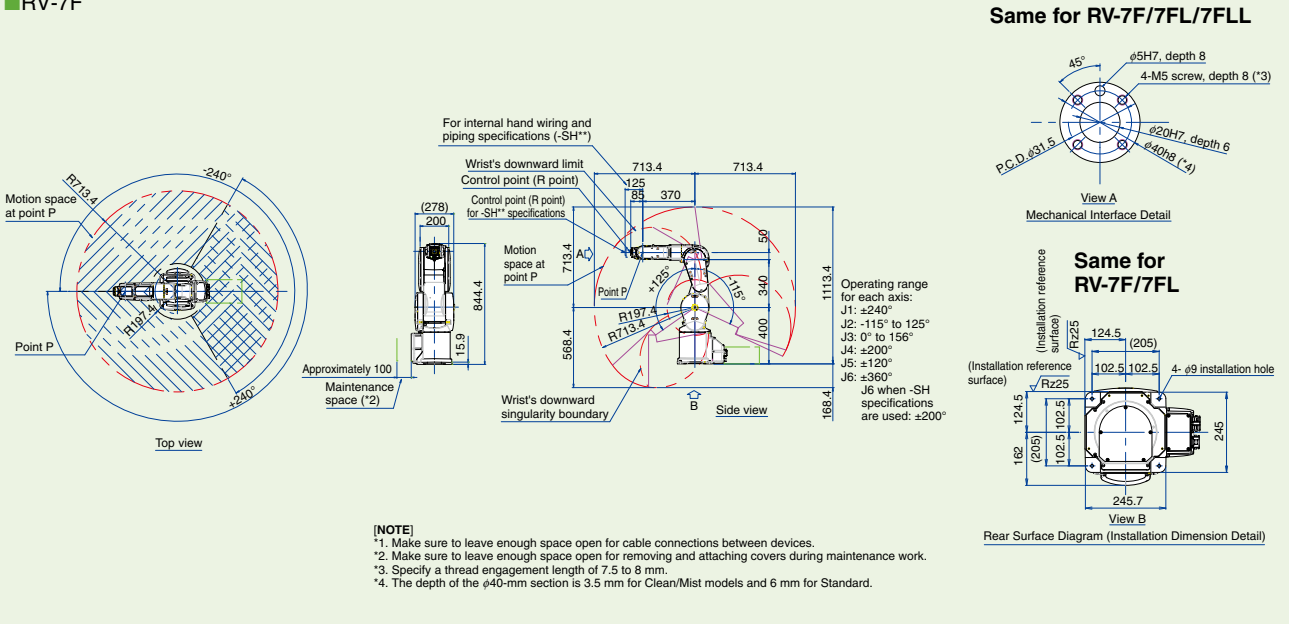
*8: The maximum load capacity indicates the maximum payload when the mechanical interface is facing downward ($\pm 10^\circ$ to the perpendicular).

*9: The standard model does not have a brake on the J1, J4, or J6 axis. There are models available with brakes included for all axes. (RV-2FB)

RV-7F Specifications/Operating Range

External Dimensions/Operating Range Diagram

RV-7F



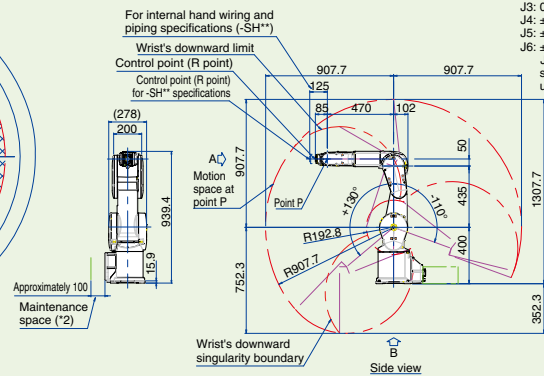
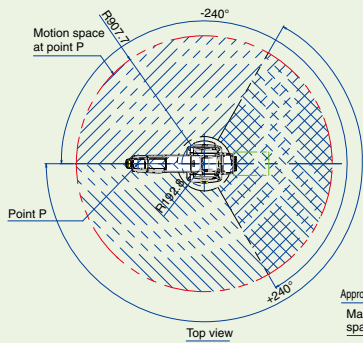
Specifications

Type	Unit	RV-7F(M)(C)	RV-7FL(M)(C)	RV-7FLL(M)(C)	
Machine class		Standard/ Oil mist/ Clean			
Protection degree		IP40 (standard)/ IP67 (oil mist) *1/ ISOclass3 *7			
Installation		Floor type, ceiling type, (wall-mounted type *2)			
Structure		Vertical, multiple-joint type			
Degrees of freedom		6			
Drive system		AC servo motor			
Position detection method		Absolute encoder			
Maximum load capacity	kg	Maximum: 7 (Rated: 7)			
Arm length	NO1 arm	mm	340 + 370	435 + 470	
Maximum reach radius		mm	713	908	
Operating range	J1	deg	480 (±240)		380 (±190)
	J2		240 (-115 to +125)	240 (-110 to +130)	240 (-90 to +150)
	J3		156 (-0 to +156)	162 (-0 to +162)	167.5 (-10 to +157.5)
	J4		400 (±200)		
	J5		240 (-120 to +120)		
	J6		720 (±360)		
Maximum speed	J1	deg/sec	360	288	234
	J2		401	321	164
	J3		450	360	219
	J4		337		
	J5		450		
	J6		720		
Maximum composite speed *3	mm/sec	11064	10977	15300	
Cycle time *4	sec	0.32	0.35	0.63	
Position repeatability	mm	±0.02			
Ambient temperature	°C	0 to 40			
Mass	kg	65	67	130	
Tolerable moment	J4	Nm			16.2
	J5				16.2
	J6				6.86
Tolerable amount of inertia	J4	kgm ²			0.45
	J5				0.45
	J6				0.10
Tool wiring		Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *5			
Tool pneumatic pipes		Primary: ø6 x 2 Secondary: ø4 x 8, ø4 x 4 (from base portion to forearm)		Primary: ø6 x 2 Secondary: ø4 x 8, ø4 x 4 (With wrist attached)	
Machine cable		5 m (connector on both ends)		7 m (connector on both ends)	
Connected controller		CR750, CR751			

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use.
 *2: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.
 *3: This is the value at the surface of the mechanical interface when all axes are composited.
 *4: The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm when the load is 1 kg.
 *5: Can also be used as a spare line (0.13 sq. mm, 4-pair cable) for conventional models. Provided up to the inside of the forearm.
 *6: Select either controller according to your application.
 *7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A ø8-mm coupler for suctioning is provided at the back of the base.

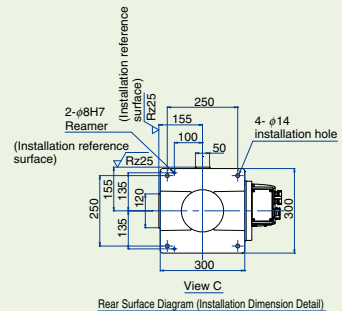
RV-7F Specifications/Operating Range

RV-7FL

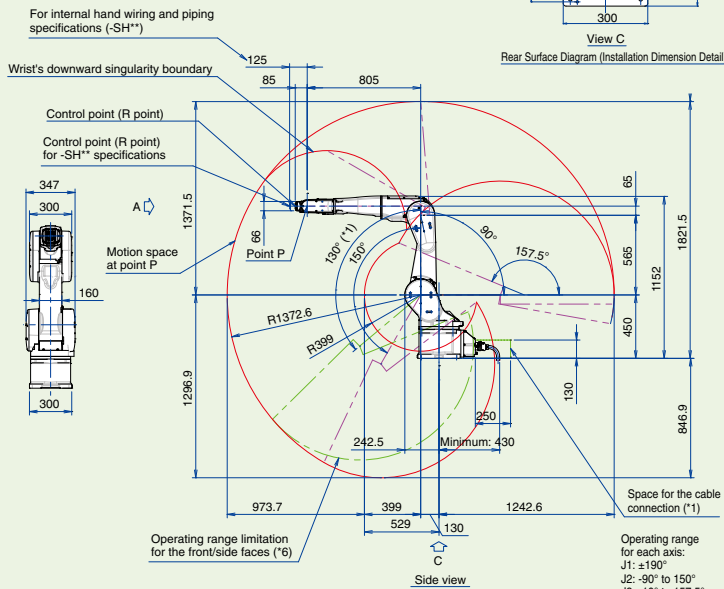
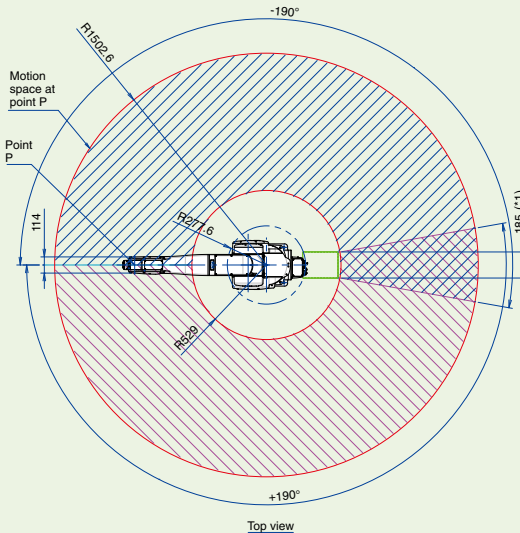


Operating range for each axis:
J1: ±240°
J2: -110° to 130°
J3: 0° to 162°
J4: ±200°
J5: ±120°
J6: ±360°
J6 when -SH specifications are used: ±200°

Dedicated for RV-7FLL



RV-7FLL



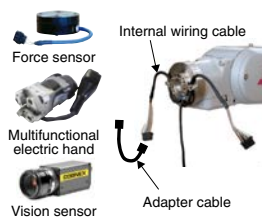
[NOTE]

- Make sure to leave enough space open for cable connections between devices.
- Make sure to leave enough space open for removing and attaching covers during maintenance work.
- Specify a thread engagement length of 7.5 to 8 mm.
- The depth for the φ40 part is 3.5 mm (Oil mist/clean), 6 mm (Standard), or 6.5 mm (-SH** models).
- Limits on the operating range for the front part: When the J1-axis angle is inside the range of +145° ≤ J1 ≤ +215° or -145° ≤ J1 ≤ -215°, the operating range of the J2-axis is limited to -110° ≤ J2 ≤ +120°.
- Limits on the operating range for the front part: When the J1-axis angle is inside the range of J1 ≥ +120° or J1 ≤ -120°, the operating range of the J2-axis is limited to -90° ≤ J2 ≤ +130°.

Internal wiring specifications (*1)

Internal piping ready apparatus	Type (Special device No.)					
	-SH01	-SH02	-SH03	-SH04	-SH05	-SH06
Tool pneumatic pipes φ4	○ (x4)	—	—	○ (x2)	○ (x2)	—
Hand: 8 input points	○	○	—	○	○	—
Vision sensor (*2)	—	○	○	○	○	—
Force sensor	—	○	○	○	—	—
Electrical hand	—	(Either apparatus only)		○	—	—

*1) Operating range of the J6 axis is ±200deg; protection grade: IP40
*2) Confirmation is made with the connection and operation of internal vision sensor cable with the In-Sight EZ by COGNEX.



RV-7FLLC-1D-SH01

Robot structure

RV: Vertical, multiple-joint type

Maximum load capacity

7: 7 kg

Series

F: F Series

Arm length

Blank: Standard arm
L : Long arm
LL: Super long arm

Special device No.

SHxx: Internal wiring specifications

Controller type

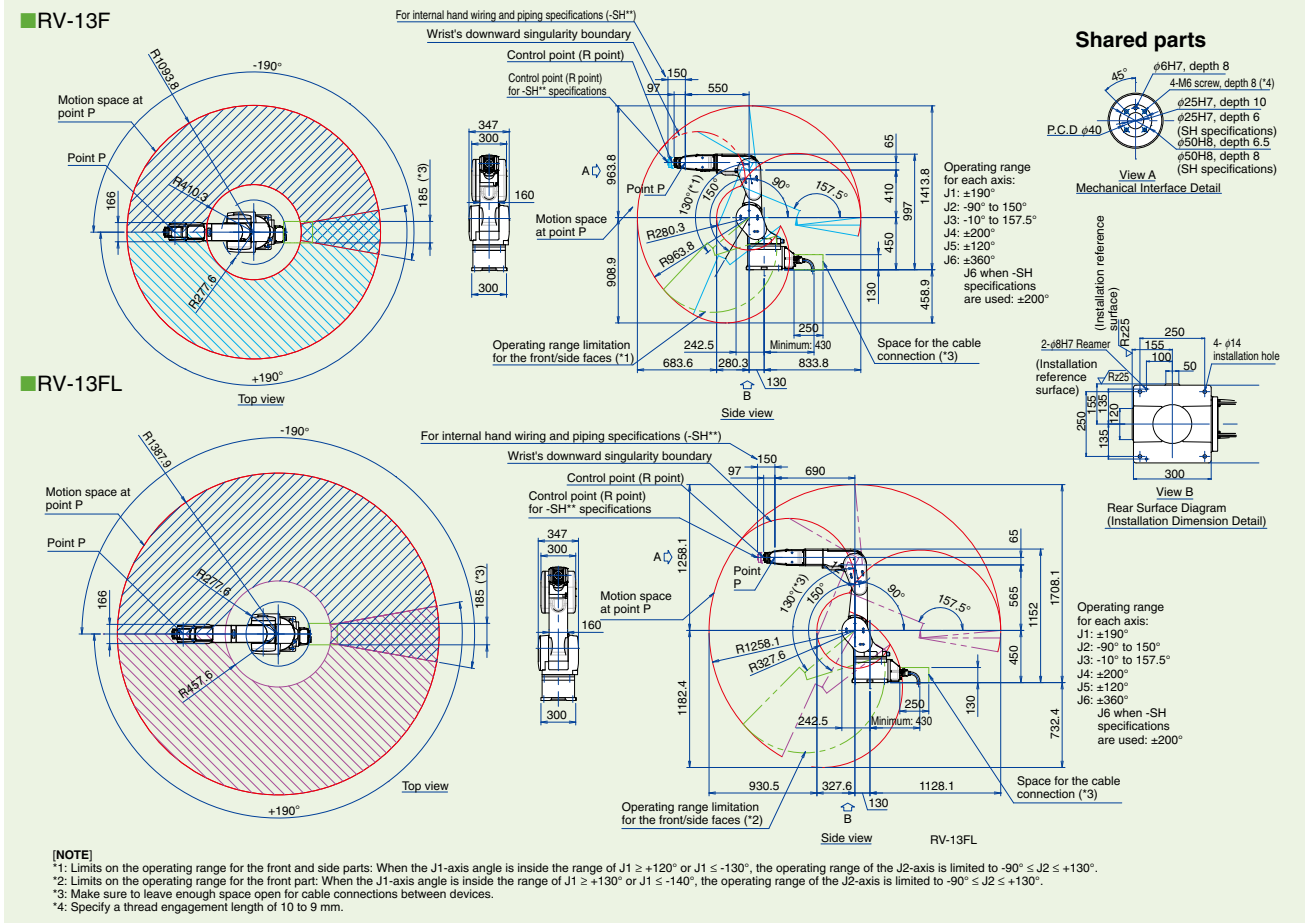
D: CR750-D
Q: CR750-Q
1D: CR751-D
1Q: CR752-Q

Environment specification

Blank: Standard specifications
M: Oil mist specifications
C: Clean specifications

RV-13F/20F Specifications/Operating Range

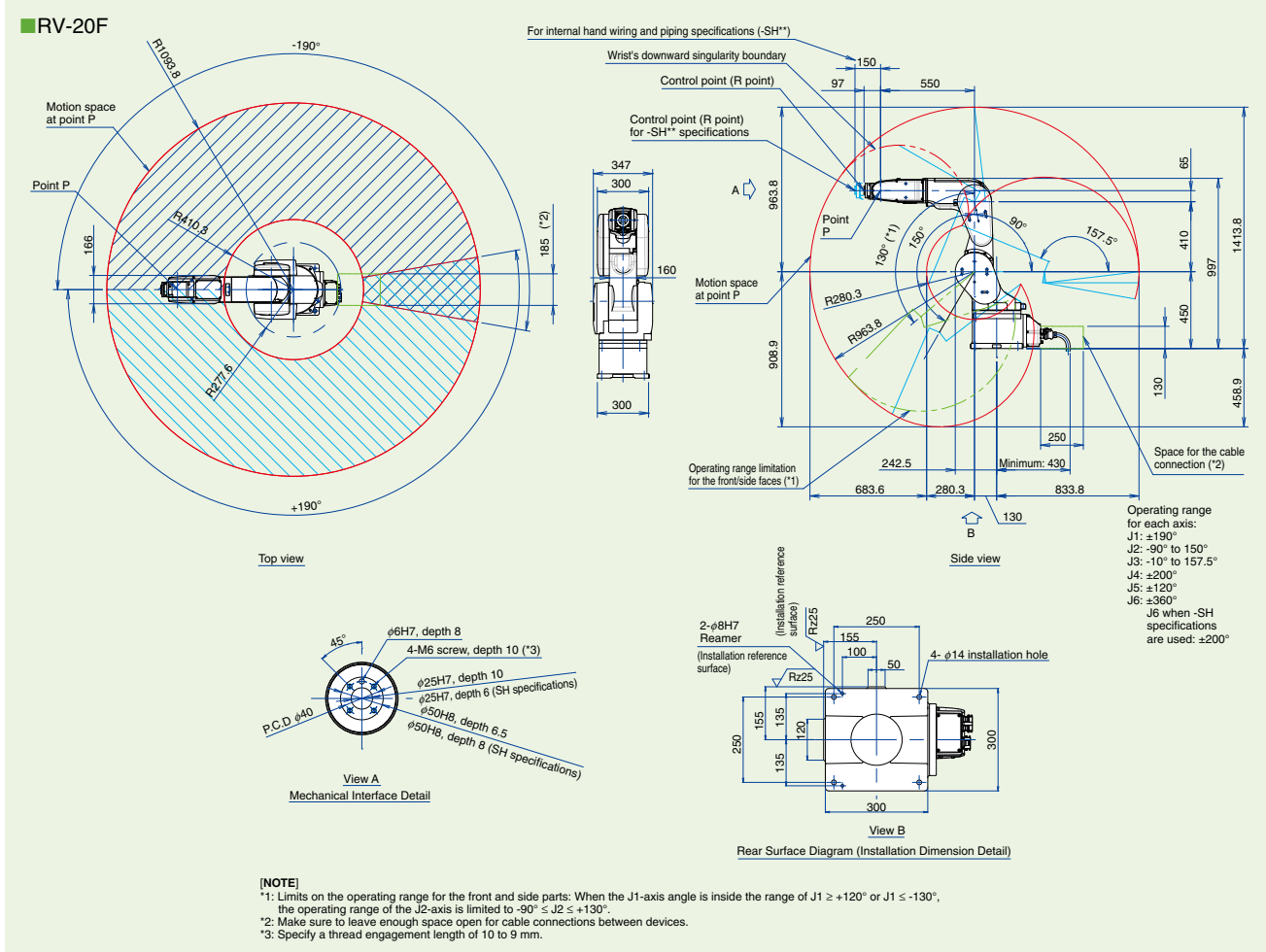
External Dimensions/Operating Range Diagram



Specifications

Type	Unit	RV-13F(M)(C)	RV-13FL(M)(C)	RV-20F(M)(C)
Machine class		Standard/ Oil mist/ Clean		
Protection degree		IP40 (standard)/ IP67 (oil mist) *1/ ISOclass3 *7		
Installation		Floor type, ceiling type, (wall-mounted type *2)		
Structure		Vertical, multiple-joint type		
Degrees of freedom		6		
Drive system		AC servo motor		
Position detection method		Absolute encoder		
Maximum load capacity	kg	Maximum: 13 (Rated: 12) *8		Maximum: 20 (Rated: 15) *8
Arm length	mm	410 + 550	565 + 690	410 + 550
Maximum reach radius	mm	1094	1388	1094
Operating range	J1	380(±190)		
	J2	240 (-90 to +150)		
	J3	167.5 (-10 to +157.5)		
	J4	400 (±200)		
	J5	240 (-120 to +120)		
	J6	720 (±360)		
Maximum speed	J1	290	234	110
	J2	234	164	110
	J3	312	219	110
	J4	375	375	124
	J5	375	375	125
	J6	720	720	360
Maximum composite speed *3	mm/sec	10450	9700	4200
Cycle time *4	sec	0.53	0.68	0.70
Position repeatability	mm	±0.05		
Ambient temperature	°C	0 to 40		
Mass	kg	120	130	120
Tolerable moment	J4	19.3	19.3	49.0
	J5	19.3	19.3	49.0
	J6	11	11	11
Tolerable amount of inertia	J4	0.47	0.47	1.40
	J5	0.47	0.47	1.40
	J6	0.14	0.14	0.14
Tool wiring		Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *5		Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *5
Tool pneumatic pipes		Primary: φ6 x 2 Secondary: φ4 x 8, φ4 x 4 (With wrist attached)		
Machine cable		7 m (connector on both ends)		
Connected controller *6		CR750, CR751		

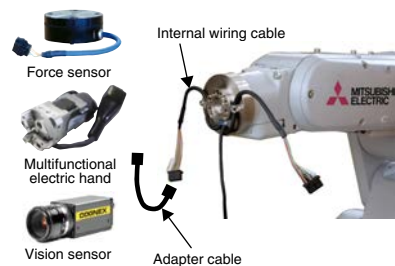
RV-13F/20F Specifications/Operating Range



Internal wiring specifications (*1)

Internal piping ready apparatus	Type (Special device No.)				
	-SH01	-SH02	-SH03	-SH04	-SH05
Tool pneumatic pipes φ4	○ (x4)	—	—	○ (x2)	○ (x2)
Hand: 8 input points	○	○	—	○	○
Vision sensor (*2)	—	○	○	—	○
Force sensor	—	○	○	○	—
Electrical hand	—	(Either apparatus only)	○	—	—

*1) Operating range of the J6 axis is ±200deg; protection grade: IP40
 *2) Confirmation is made with the connection and operation of internal vision sensor cable with the In-Sight EZ by COGNEX.



RV-20FLC-1D-SH01

Robot structure

RV: Vertical, multiple-joint type

Maximum load capacity

13: 13 kg

20: 20 kg

Series

F: F Series

Arm length

Blank: Standard arm

L: Long arm

Special device No.

SHxx: Internal wiring specifications

Controller type

D: CR750-D 1D: CR751-D

Q: CR750-Q 1Q: CR751-Q

Environment specification

Blank: Standard specifications

M: Oil mist specifications

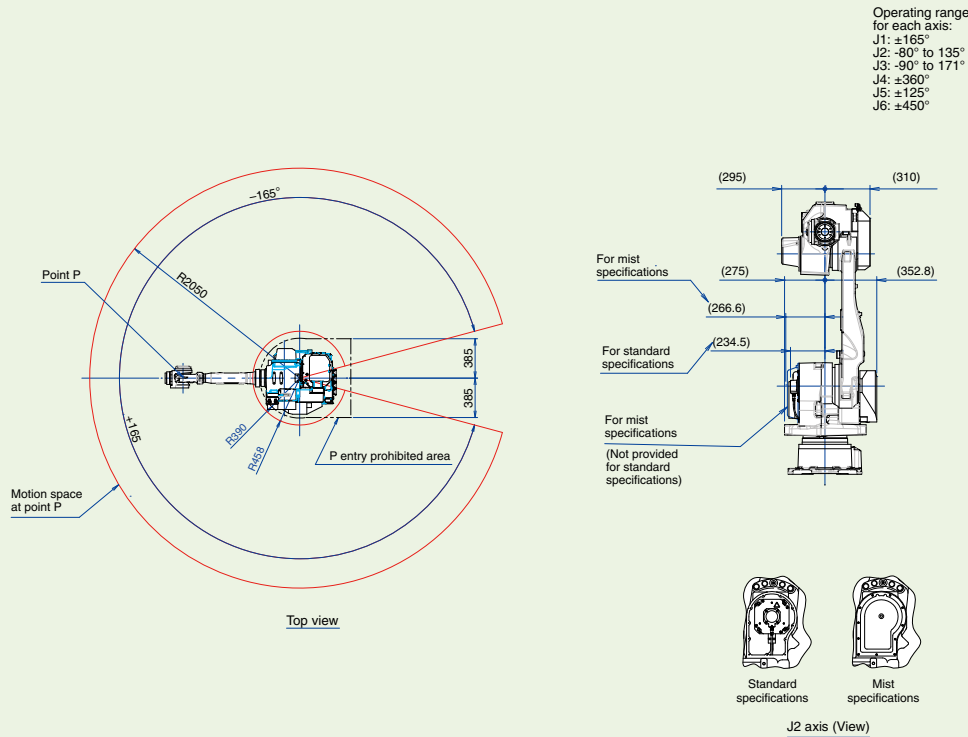
C: Clean specifications

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use.
 *2: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.
 *3: This is the value at the surface of the mechanical interface when all axes are composited.
 *4: The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm when the load is 5 kg.
 *5: Can also be used as a spare line (0.13 sq. mm, 4-pair cable) for conventional models. Provided up to the inside of the forearm.
 *6: Select either controller according to your application.
 *7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A φ8-mm coupler for suctioning is provided at the back of the base.
 *8: The maximum load capacity indicates the maximum payload when the mechanical interface is facing downward (±10° to the perpendicular).

RV-35F/50F/70F Specifications/Operating Range

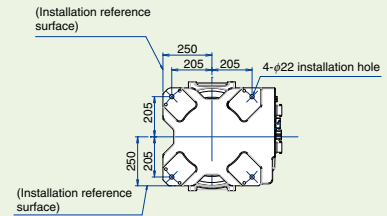
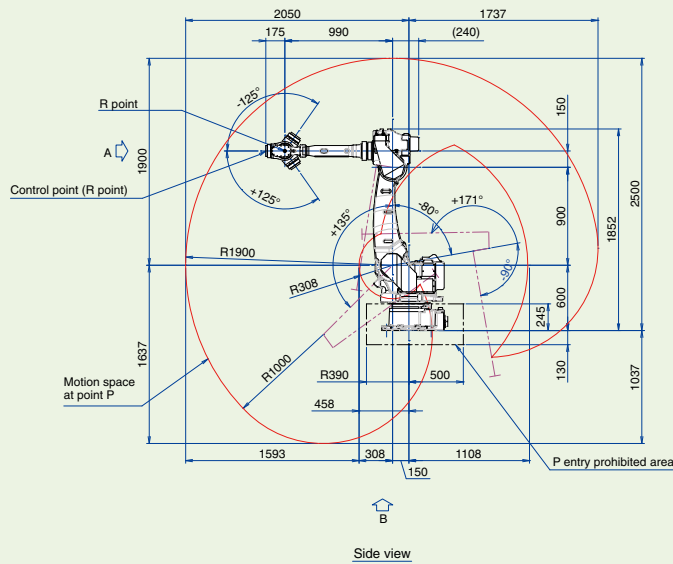
External Dimensions/Operating Range Diagram

RV-35F/50F/70F

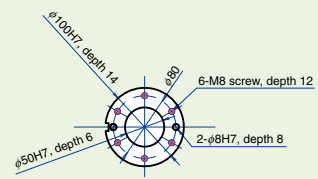


Specifications

Type	Unit	RV-35F(M)	RV-50F(M)	RV-70F(M)
Machine class			Standard/ Oil mist	
Protection degree		J1 to J4:IP40, J5 to J6:IP67 (standard)/ IP67 (oil mist) *1		
Installation		Floor type		
Structure		Vertical, multiple-joint type		
Degrees of freedom		6		
Drive system		AC servo motor		
Position detection method		Absolute encoder		
Maximum load capacity	kg	35	50	75
Arm length	NO1 arm	mm		
Maximum reach radius		mm		
Operating range	J1	330 (± 165)		
	J2	215 (-80 to $+135$)		
	J3	261 (-90 to $+171$)		
	J4	720 (± 360)		
	J5	250 (± 125)		
	J6	900 (± 450)		
Maximum speed	J1	185	180	175
	J2	180		145
	J3	190	180	165
	J4	305	255	235
	J5	305	255	235
	J6	420	370	350
Maximum composite speed *2	mm/sec	13450	13000	11500
Position repeatability	mm	± 0.07		
Ambient temperature	$^\circ\text{C}$	0 to 40		
Mass	kg	640		
Tolerable moment	J4	160	210	300
	J5	160	210	300
	J6	90	130	150
Tolerable amount of inertia	J4	16	30	
	J5	16	30	
	J6	5	12	
Tool wiring		Hand: 16 input points/16 output points LAN X 1		
Tool pneumatic pipes		$\phi 10 \times 2$		
Connected controller *3		CR760-D/Q		



View B
Rear Surface Diagram (Installation Dimension Detail)



View A
Mechanical Interface Detail

- <Operable range>
 (1) For $11^\circ \leq J2 < 56^\circ$, $J3 \leq [170.5 - ((1/6) * (J2 - 8))]$
 (2) For $J2 \geq 56^\circ$, the point P shall not enter the operable range limit area.
 (3) For $J3 \geq 162.5^\circ$, $J2 \leq 1031 - 6 * J3^\circ$
 (4) For $J2 \geq 130^\circ$, $J1 \leq 110^\circ$, or for $J1 > 110^\circ$, $J2 \leq 130^\circ$

RV - ●● **F(M)** - □ - **S****

Maximum load capacity
(one of 35, 50 or 70)

Environment specification
Blank: Standard specifications
M: Robot oil mist specifications

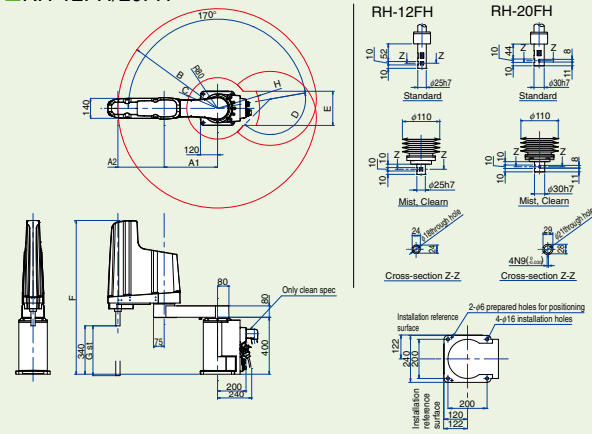
Special device No.
S**: Special specification No.

Connected robot controller type
D: Standalone type robot controller
Q: iQ Platform compatible robot controller

*1: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use.
 *2: This is the value at the surface of the mechanical interface when all axes are composited.
 *3: Select either of the controllers according to your application. CR760-D: Standalone type, CR760-Q: iQ Platform compatible type.

RH-3F/6F/12F/20F Specifications/Operating Range

RH-12FH/20FH



Variable dimensions

Robot series	A1	A2	B	C	D	E	F	G	H
RH-12FH55xx	225	325	R550	R191	145°	240	1080/1180	350/450	R295
RH-12FH55xxM/C	225	325	R550	R191	145°	320	1080/1180	350/450	R382
RH-12FH70xx	375	325	R700	R216	145°	240	1080/1180	350/450	R295
RH-12FH70xxM/C	375	325	R700	R216	145°	320	1080/1180	350/450	R382
RH-12FH/20FH85xx	525	325	R850	R278	153°	-	1080/1180	350/450	-
RH-12FH/20FH85xxM/C	525	325	R850	R278	153°	240	1080/1180	350/450	R367
RH-20FH100xx	525	475	R1000	R238	153°	240	1080/1180	350/450	R295
RH-20FH100xxM/C	525	475	R1000	R238	153°	320	1080/1180	350/450	R382

RH-20FH10045M-1D-S**

Robot structure

RH: Horizontal, multiple-joint type

Maximum load capacity

3: 3 kg 12: 12 kg
6: 6 kg 20: 20 kg

Series

FH: F Series

Arm length

35: 350 mm 70: 700 mm
45: 450 mm 85: 850 mm
55: 550 mm 100: 1000 mm

Special device No.

S**: Special specification No.

Controller type

D: CR750-D 1D: CR751-D
Q: CR750-Q 1Q: CR751-Q

Environment specification

Blank: Standard specifications
M: Oil mist specifications
C: Clean specifications

Vertical stroke

12: 120 mm 34: 340 mm
15: 150 mm 35: 350 mm
20: 200 mm 45: 450 mm

Specifications

Type	Unit	RH-12FH55XX/M/C	RH-12FH70XX/M/C	RH-12FH85XX/M/C	RH-20FH85XX/M/C	RH-20FH100XX/M/C
Machine class		Standard/ oil mist/ Clean			Standard/ oil mist/ Clean	
Protection degree *1		IP20/ IP65 *6/ ISO3 *7			IP20/ IP65 *6/ ISO3 *7	
Installation		Floor type			Floor type	
Structure		Horizontal, multiple-joint type				
Degrees of freedom		4				
Drive system		AC servo motor				
Position detection method		Absolute encoder				
Maximum load capacity	kg	Maximum 12 (rating 3)			Maximum 20 (rating 5)	
Arm length	NO1 arm	225	375	525	525	525
	NO2 arm		325		325	475
Maximum reach radius	mm	550	700	850	850	1000
Operating range	J1	340 (±170)			306 (±153)	
	J2	290 (±145)				
	J3 (Z)	xx = 35 : 350/ xx = 45 : 450				
	J4 (θ)	720 (±360)				
Maximum speed	J1	420			280	
	J2	450				
	J3 (Z)	2800			2400	
	J4 (θ)	2400				
Maximum composite speed *2	mm/sec	11435	12535	11350	11372	13283
Cycle time *3		0.30	0.30	0.30	0.30	0.36
	Y-X composite	mm	±0.012	±0.015	±0.015	±0.015
Position repeatability	J3 (Z)	±0.01				
	J4 (θ)	±0.005				
Ambient temperature	°C	0 to 40				
Mass	kg	65	67	69	75	77
Tolerable amount of inertia	Rating	0.025			0.065	
	Maximum	0.3			1.05	
Tool wiring		Hand: 8 input points/8 output points (20 pins total) Serial signal cable for parallel I/O (2-pin + 2-pin power line) LAN X 1 <100 BASE-TX> (8-pin) *4				
Tool pneumatic pipes		Primary: φ6 x 2 Secondary: φ6 x 8				
Machine cable		5 m (connector on both ends)				
Connected controller *5		CR750, CR751				

*1: The environment-resistant specifications (C: Clean specification, M: Mist specification) are factory-set custom specifications.

*2: The value assumes composition of J1, J2, and J4.

*3: Value for a maximum load capacity of 2 kg. The cycle time may increase if specific requirements apply such as high work positioning accuracy, or depending on the operating position. (The cycle time is based on back-and-forth movement over a vertical distance of 25 mm and horizontal distance of 300 mm.)

*4: Can also be used as a spare line (0.2 sq. mm, 4-pair cable) for conventional models.

*5: Select either controller according to your application. Note that controllers with oil mist specifications come equipped with a controller protection box (CR750-MB) and "SM" is appended at the end of the robot model name. If you require it, consult with the Mitsubishi Electric dealer.

*6: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil you use. Direct jet to the bellows is excluded.

*7: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. A φ8-mm coupler for suctioning is provided at the back of the base.

Controller Q type/D type Specifications/System Configuration

Controller Specifications

Type	Unit	CR750-Q	CR751-Q
Robot CPU		Q172DRCPU	
Path control method		PTP control and CP control	
Number of axes controlled		Maximum 6 axes	
Robot language		MELFA-BASIC IV/V	
Position teaching method		Teaching method, MDI method	
Memory capacity	Number of teaching points	points	13,000
	Number of steps	step	26,000
	Number of programs	Unit	256
External input/output *4	General-purpose I/O	points	8192 input points/8192 output points with the multiple CPU common device
	Dedicated I/O	points	Assigned to multiple CPU common device.
	Hand open/close	points	8 input / 8 output
	Emergency stop input	points	1 (redundant)
	Door switch input	points	1 (redundant)
	Enabling device input	points	1 (redundant)
	Emergency stop output	points	1 (redundant)
	Mode output	points	1 (redundant)
	Robot error output	points	1 (redundant)
	Synchronization of additional axes	points	1 (redundant)
Interface	RS-422	ports	1 (Teaching pendant: dedicated T/B)
	Ethernet	ports	1 (dedicated teaching pendant port) 10BASE-T
	USB *5	ports	1 (USB port of programmable controller CPU unit can be used.)
	Additional-axis interface	channels	1 (SSCNET III)
	Encoder input	channels	Q173DPX (Sold separately)
Ambient temperature	°C	0 to 40 (drive unit)/0 to 55 (Robot CPU)	
Relative humidity	%RH	45 to 85	
Power supply *4	Input voltage range *1	V	RV-2F/4F, RH-3FH/6FH: Single-phase 180 to 253 V AC RV-7, 7FLL/13F/20F, RH-12FH/20FH: Three-phase 180 to 253 V AC or Single-phase 207 to 253 V AC
	Power capacity *2	KVA	RV-2F series, RH-3FH series: 0.5 RV-4F series, RH-6FH series: 1.0 RH-12FH/20FH series: 1.5 RV-7F series (excluding RV-7FLL): 2.0 RV-7FLL, RV-13F series, RV-20F series: 3.0
External dimensions (including legs)	mm	430 (W) x 425 (D) x 174 (H)	430 (W) x 425 (D) x 98 (H) / 430 (W) x 425 (D) x 174 (H) *6
Weight	kg	Approx. 18	Approx. 12 / Approx. 18 *6
Structure [protective specification]		Self-contained floor type/open structure (Vertical and horizontal position can be placed) [IP20]	
Grounding *3	Ω	100 or less (class D grounding)	

*1: The rate of power-supply voltage fluctuation is within 10%.
 *2: The power capacity indicates the rating for normal operation. Take note that the power capacity does not include the current being input when the power is turned on. The power capacity is only a rough guide and whether or not operation can be guaranteed depends on the input power-supply voltage.
 *3: Grounding works are the customer's responsibility.
 *4: For CR751, crimp or solder wiring for connection to user wiring connectors for emergency stop input/output, door switch input, etc. and power supply connectors. The optional terminal block replacement tool available separately can also be used to connect wiring.
 *5: For RV-7FLL / 13F / 20F

Controller Specifications

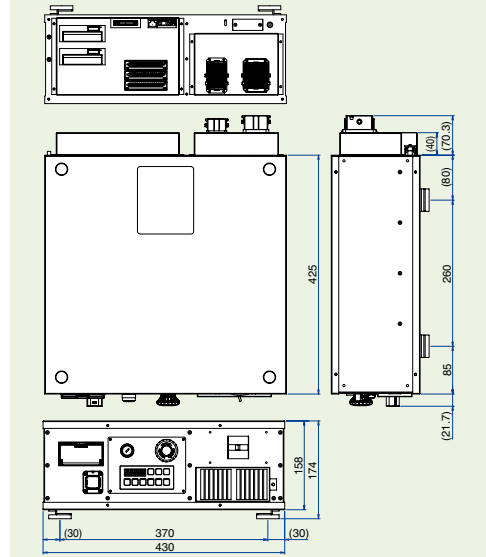
Type	Unit	CR750-D	CR751-D
Path control method		PTP control and CP control	
Number of axes controlled		Maximum 6 axes	
Robot language		MELFA-BASIC IV/V	
Position teaching method		Teaching method, MDI method	
Memory capacity	Number of teaching points	points	39,000
	Number of steps	step	78,000
	Number of programs	Unit	512
External input/output *5	General-purpose I/O	points	0 input/0 output (Up to 256/256 when options are used)
	Dedicated I/O	points	Assigned to general-purpose I/O.
	Hand open/close	points	8 input / 8 output
	Emergency stop input	points	1 (redundant)
	Door switch input	points	1 (redundant)
	Enabling device input	points	1 (redundant)
	Emergency stop output	points	1 (redundant)
	Mode output	points	1 (redundant)
	Robot error output	points	1 (redundant)
	Synchronization of additional axes	points	1 (redundant)
Interface	RS-422	ports	1 (Teaching pendant: dedicated T/B)
	Ethernet	ports	1 (dedicated teaching pendant port), 1 (for customer) 10BASE-T/100BASE-TX
	USB *6	ports	1 (Ver. 2.0 device functions only, mini B terminal)
	Additional-axis interface	channels	1 (SSCNET III)
	Extension slot *1	slots	2
Encoder input	channels	2	
Ambient temperature	°C	0 to 40	
Relative humidity	%RH	45 to 85	
Power supply *5	Input voltage range *2	V	RV-2F/4F, RH-3FH/6FH: Single-phase 180 to 253 V AC RV-7, 7FLL/13F/20F, RH-12FH/20FH: Three-phase 180 to 253 V AC or Single-phase 207 to 253 V AC
	Power capacity *3	KVA	RV-2F series, RH-3FH series: 0.5 RV-4F series, RH-6FH series: 1.0 RH-12FH/20FH series: 1.5 RV-7F series (excluding RV-7FLL): 2.0 RV-7FLL, RV-13F series, RV-20F series: 3.0
External dimensions (including legs)	mm	430 (W) x 425 (D) x 174 (H)	430 (W) x 425 (D) x 98 (H) / 430 (W) x 425 (D) x 174 (H) *6
Weight	kg	Approx. 18	Approx. 12 / Approx. 18 *6
Structure [protective specification]		Self-contained floor type/open structure (Vertical and horizontal position can be placed) [IP20]	
Grounding *4	Ω	100 or less (class D grounding)	

*1: For installing option interface.
 *2: The rate of power-supply voltage fluctuation is within 10%.
 *3: The power capacity indicates the rating for normal operation. Take note that the power capacity does not include the current being input when the power is turned on. The power capacity is only a rough guide and whether or not operation can be guaranteed depends on the input power-supply voltage.
 *4: Grounding works are the customer's responsibility.
 *5: For CR751, crimp or solder wiring for connection to user wiring connectors for emergency stop input/output, door switch input, etc. and power supply connectors. The optional terminal block replacement tool available separately can also be used to connect wiring.
 *6: For RV-7FLL / 13F / 20F

CR750-Q / D



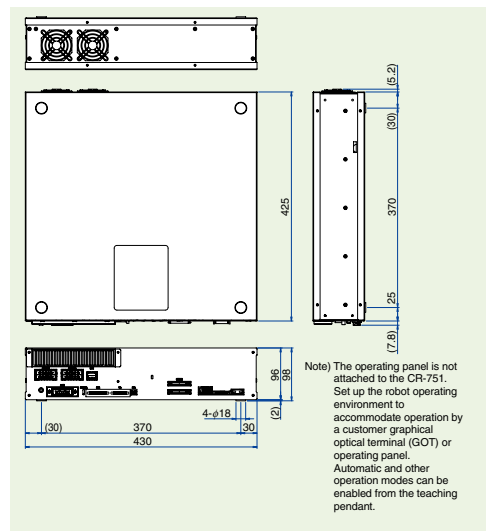
External Dimensions



CR751-Q / D



External Dimensions



Note) The operating panel is not attached to the CR-751. Set up the robot operating environment to accommodate operation by a customer graphical optical terminal (GOT) or operating panel. Automatic and other operation modes can be enabled from the teaching pendant.

Multiple CPU environment

Unit	Type
Base	High-speed standard base between multiple CPU
	• Q35DB: 5 slots
	• Q38DB: 8 slots
Power supply	• Q312DB: 12 slots
	• Q61P • Q62P • Q63P
	• Q64PN
Programmable controller CPU	Universal model
	• Q03UD (E/V) CPU
	• Q04UD (H/EH/V) CPU
	• Q06UD (H/EH/V) CPU
	• Q10UD (H/EH) CPU
	• Q13UD (H/EH/V) CPU
	• Q20UD (H/EH) CPU
	• Q26UD (H/EH/V) CPU
	• Q50UDEHCPU
	• Q100UDEHCPU

Note) To learn more about individual units of programmable controllers, please refer to the Mitsubishi Electric FA website.

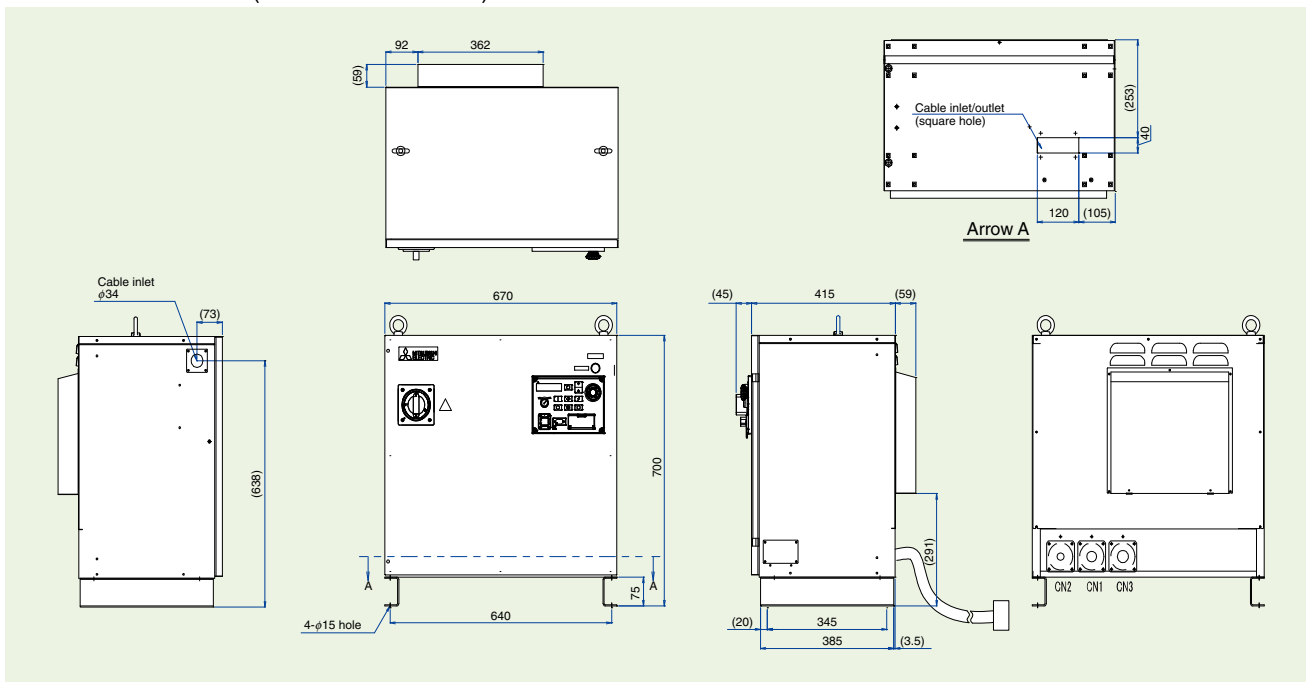
■ Controller Specifications

Type	Unit	CR760-Q iQ Platform compatible functions Q172DRCPU	CR760-D Stand alone Built-in	
Robot CPU		Q172DRCPU		
Path control method		PTP control and CP control		
Number of axes controlled		6 axes + additional 8 axes available		
Robot language		MELFA-BASIC IV/V		
Position teaching method		Teaching method, MDI method		
Memory capacity	Number of teaching points	points	13,000	
	Number of steps	step	26,000	
	Number of programs	Unit	256	
External input/output	General-purpose I/O	points	0 input/0 output	
	Dedicated I/O	points	Assigned to general-purpose I/O.	
	Hand open/close	points	16 input / 16 output	
	Emergency stop input	points	1 (redundant)	
	Door switch input	points	1 (redundant)	
	Enabling device input	points	1 (redundant)	
	Emergency stop output	points	1 (redundant)	
	Mode output	points	1 (redundant)	
	Robot error output	points	1 (redundant)	
Synchronization of additional axes	points	1 (redundant)		
Interface	RS-232	ports	1	Use the function of the programmable controller.
	RS-422	ports	1 (Teaching pendant: dedicated T/B)	
	Ethernet	ports	1 (dedicated teaching pendant port) 10BASE-T	1 (dedicated teaching pendant port), 1 (for customer) 10BASE-T/100BASE-TX
	USB	ports	Use the function of the programmable controller.	
	Additional-axis interface	channels	1 (SSCNET III)	
	Extension slot	slots	Use the option of the programmable controller.	
	Encoder input	channels	Use the option of the programmable controller.	
	Memory extension slot	slots	-	
Ambient temperature	°C	0 to 40		
Relative humidity	%RH	45 to 85		
Power supply	Input voltage range	V	RV-35F/50F/70F: Three-phase AC 180 V to 253 V	
	Power capacity	KVA	RV-35F/50F/70F: Maximum : 20	
External dimensions (including legs)	mm	670 (W) x 415 (D) x 700 (H)		
Weight	kg	Approx. 120		
Structure [protective specification]		Self-contained floor type/sealed structure [IP54]		
Grounding	Ω	100 or less (class D grounding)		

■ CR760

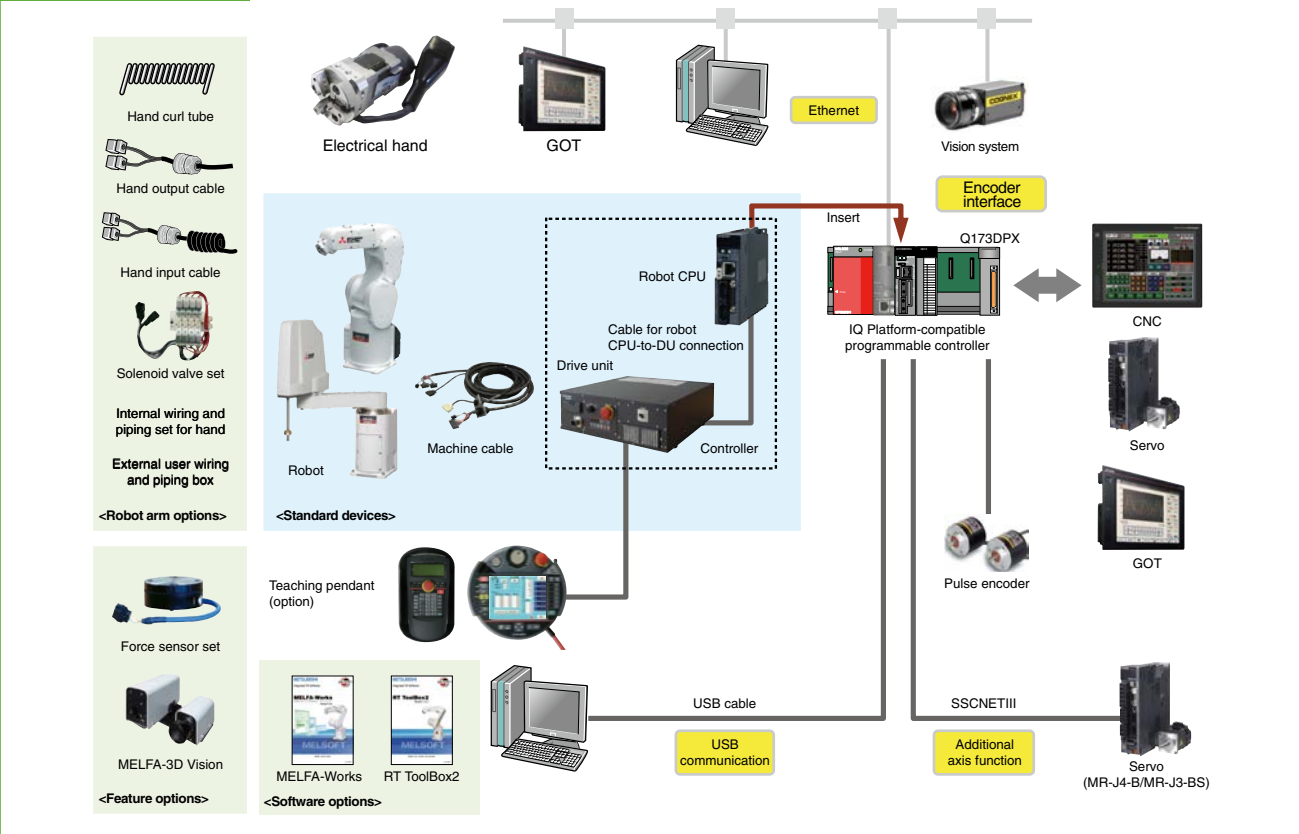


■ External Dimensions (For RV-35F/50F/70F)



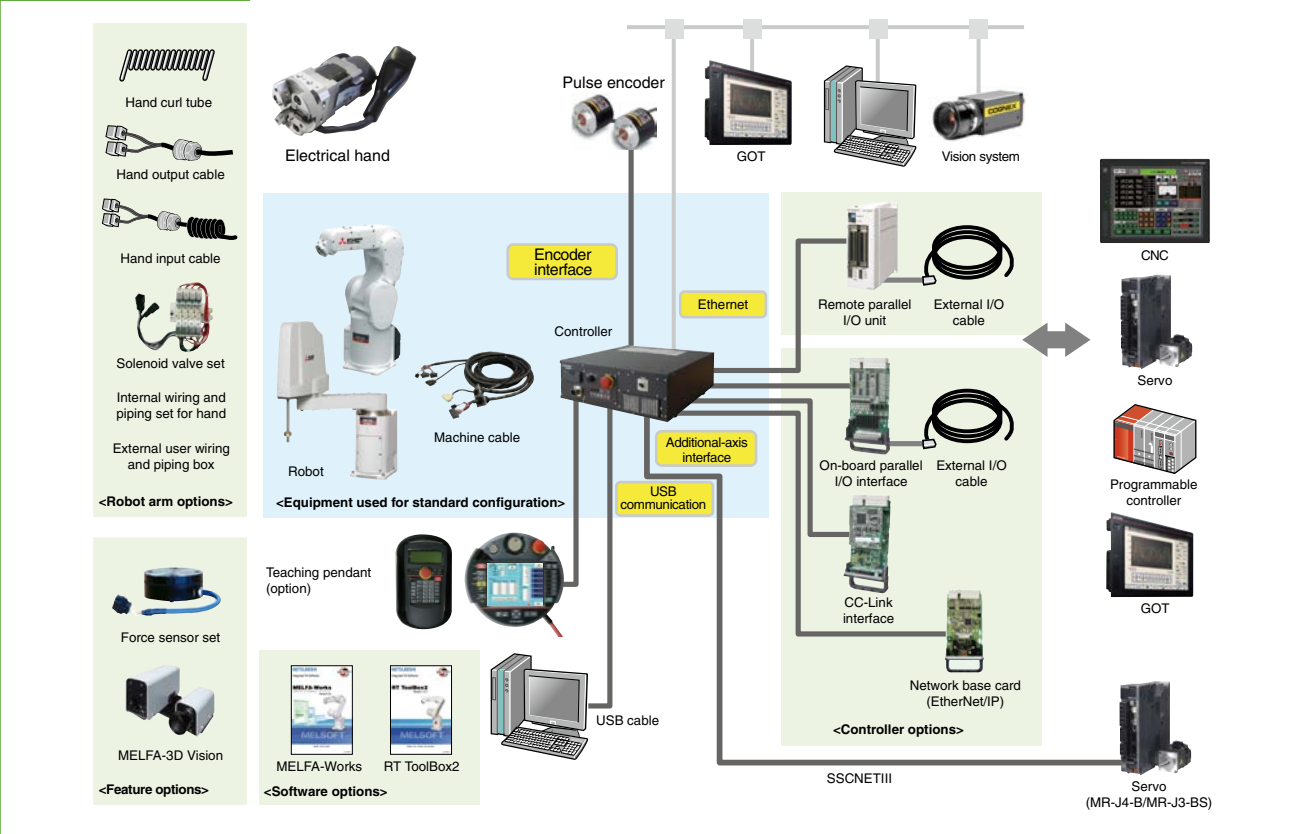
F-Q SERIES

System Configuration



F-D SERIES

System Configuration



Options

Configurations options

Classification	Name	Type	RV					RH				Functional specifications	
			2F 2FL	4F 4FL	7F 7FL	7FLL	13F 13FL 20F	3FH	6FH	12FH 20FH	3FHR		
Solenoid valve set	1E-VD0□ (Sink) 1E-VD0□E (Source)	○	-	-	-	-	-	-	-	-	-	1 to 2 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1 or 2 valves) Output: φ4	
	1F-VD0□-02 (Sink) 1F-VD0□E-02 (Source)	-	○	○	○	-	-	-	-	-	-	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: φ4	
	1F-VD0□-03 (Sink) 1F-VD0□E-03 (Source)	-	-	-	-	○	-	-	-	-	-	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: φ6	
	1F-VD0□-01 (Sink) 1F-VD0□E-01 (Source)	-	-	-	-	-	○	○	-	-	-	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: φ4	
	1S-VD0□-01 (Sink) 1S-VD0□E-01 (Source)	-	-	-	-	-	-	-	○	-	-	1 to 4 valves, with solenoid valve output cable. □ indicates the number of solenoid valves (1, 2, 3, or 4 valves) Output: φ6	
	1S-VD04-05 (Sink) 1S-VD04E-05 (Source)	-	-	-	-	-	-	-	-	-	○	4 valves, with solenoid valve output cable. Output: φ4 (Standard)	
	1S-VD04W-05 (Sink) 1S-VD04WE-05 (Source)	-	-	-	-	-	-	-	-	-	○	4 valves, with solenoid valve output cable. Output: φ4 (water proof/clean)	
	Hand output cable	1E-GR35S	○	-	-	-	-	-	-	-	-	-	Straight cable for 2-solenoid valve systems, total length of 300 mm, with a robot connector on one side and unterminated on the other side
		1F-GR35S-02	-	○	○	○	○	-	-	-	-	-	Straight cable for 4-solenoid valve systems, total length of 300 mm, with a robot connector on one side and unterminated on the other side
		1F-GR60S-01	-	-	-	-	-	○	○	○	-	-	Straight cable for 4-solenoid valve systems, total length of 1050 mm, with a robot connector on one side and unterminated on the other side, equipped with a splash-proof grommet
1S-GR35S-02		-	-	-	-	-	-	-	-	-	○	Straight cable for 4-solenoid valve systems, total length of 450 mm, with a robot connector on one side and unterminated on the other side	
Hand input cable	1S-HC30C-11	○	-	-	-	-	-	-	-	-	-	4-point type, with a robot connector on one side and unterminated on the other side	
	1F-HC35S-02	-	○	○	○	○	-	-	-	-	-	8-point type, total length of 1000 mm, with a robot connector on one side and unterminated on the other side	
	1F-HC35C-01	-	-	-	-	-	-	○	○	-	-	8-point type, total length of 1650 mm (includes a 350-mm-long curled section), with a robot connector on one side and unterminated on the other side, equipped with a splash-proof grommet	
	1F-HC35C-02	-	-	-	-	-	-	-	-	○	-	8-point type, total length of 1800 mm (includes a 350-mm-long curled section), with a robot connector on one side and unterminated on the other side, equipped with a splash-proof grommet	
	1S-HC00S-01	-	-	-	-	-	-	-	-	-	○	4-point type, total length of 1210 mm, with a robot connector on one side and unterminated on the other side	
Hand (curl) tube	1E-ST040□C	○	○	○	○	-	-	-	-	-	-	φ4: 1 to 4 valves (L = 300 mm) □ indicates the number of solenoid valves (2, 4, 6, 8). 2 or 4 valves for RV-2F.	
	1E-ST0408C-300	-	-	-	-	-	○	○	-	-	-	Compatibility with φ4-4 solenoid valve systems (L = 300 mm)	
	1N-ST060□C	-	-	-	-	-	○	-	○	-	-	φ6: 1 to 4 valves (L = 600 mm) □ indicates the number of solenoid valves (2, 4, 6, 8).	
	1N-ST0608C-01	-	-	-	-	-	-	-	-	○	-	For 1- to 4-φ6-valve systems, total length of 1300 mm (including curl part 250 mm)	
Hand tube	1S-ST0304S	-	-	-	-	-	-	-	-	○	φ3: 2 valves (Maximum usable length: 400 mm)		
Robot arm	External wiring set 1 for the forearm	1F-HB01S-01	-	○	○	○	○	○	-	-	-	-	Used for the forearm. External wiring box used for connecting the hand input cable, the Ethernet cable, and the electrical hand and force sensor cable.
	External wiring set 2 for the forearm	1F-HB02S-01	-	○	○	○	○	○	-	-	-	-	Used for the forearm. External wiring box used for connecting the force sensor, the electrical hand, and the Ethernet cable.
	External wiring set 1 for the base	1F-HA01S-01	-	○	○	○	○	○	-	-	-	-	Used for the base. External wiring box used for connecting the communications output for the electrical hand, the electrical hand and force sensor cable, and the Ethernet cable. There are hand input connection available.
	External wiring set 2 for the base	1F-HA02S-01	-	○	○	○	○	○	-	-	-	-	Used for the base. External wiring box used for connecting the communications output for the electrical hand, the electrical hand, the force sensor cable, and the Ethernet cable. No hand input connection available.
	Internal wiring and piping set for hand	1F-HS604S-01	-	-	-	-	-	-	-	-	○	-	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + φ6-2 solenoid valve systems) For 350 mm Z-axis stroke
		1F-HS604S-02	-	-	-	-	-	-	-	-	-	○	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + φ6-2 solenoid valve systems) For 450 mm Z-axis stroke
		1F-HS408S-01	-	-	-	-	-	-	-	○	-	-	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + φ4-4 solenoid valve systems) For 200 mm Z-axis stroke
		1F-HS408S-02	-	-	-	-	-	-	-	-	○	-	Wiring and piping set for internal mounting in the tip axis (Compatible with 8 input points for hand systems + φ4-4 solenoid valve systems) For 340 mm Z-axis stroke
		1F-HS304S-01	-	-	-	-	-	-	-	-	○	-	Wiring and piping set for internal mounting in the tip axis (Compatible with 4 input points for hand systems + φ3-2solenoid valve systems)
	External user wiring and piping box	1F-UT-BOX	-	-	-	-	-	-	○	○	-	-	Box for external wiring of user wiring (hand I/O, hand tube)
		1F-UT-BOX-01	-	-	-	-	-	-	-	-	○	-	Box for external wiring of user wiring (hand I/O, hand tube)
	Machine cable (replacement for shorter 2 m type) (*1)	1S-02UCBL-01	-	○	○	○	○	○	○	○	○	○	2 m long cables for securement purposes (2-wire set with power supply and signal)
		1F-02UCBL-02	-	-	-	-	-	-	○	-	-	-	2 m long cables for securement purposes (2-wire set with power supply and signal)
	Machine cable, for extension/fixed CR-750	1S-□□CBL-11	○	-	-	-	-	-	-	-	-	-	Exchange type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
		1S-□□CBL-01	-	○	○	○	○	○	○	○	○	○	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)
1S-□□CBL-03		-	-	-	-	-	-	○	-	-	-	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)	
Machine cable, for extension/fixed CR-751	1F-□□UCBL-11	○	-	-	-	-	-	-	-	-	-	Exchange type, extended length 5 m, 10m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)	
	1F-□□UCBL-02	-	○	○	○	○	○	○	○	○	○	Exchange type, extended length 10 m, 15 m, 20 m (2wires set with power and signal wires) □□ indicates the length of cables (10, 15, 20 m)	
Machine cable, for extension/flexible CR-750	1S-□□LCBL-11	○	-	-	-	-	-	-	-	-	-	Exchange type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)	
	1S-□□LCBL-01	-	○	○	○	○	○	○	○	○	○	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)	
	1S-□□LCBL-03	-	-	-	-	-	-	○	-	-	-	Extention type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)	
Machine cable, for extension/flexible CR-751	1F-□□LUCBL-11	○	-	-	-	-	-	-	-	-	-	Exchange type, extended length 5 m, 10 m, 15 m (2wires set with power and signal wires) □□ indicates the length of cables (5, 10, 15 m)	
	1F-□□LUCBL-02	-	○	○	○	○	○	○	○	○	○	Exchange type, extended length 10 m, 15 m, 20 m (2wires set with power and signal wires) □□ indicates the length of cables (10, 15, 20 m)	
Stopper for changing the J1-axis operating range	1S-DH-11J1	○	-	-	-	-	-	-	-	-	-	Stopper for making changes, installed by customer	
	1F-DH-05J1	-	-	-	○	○	-	-	-	-	-	Stopper for making changes, installed by customer (Compatible with the RV-7FLL)	
	1F-DH-04	-	-	○	-	-	-	-	-	-	-	Stopper for making changes, installed by customer	
	1F-DH-03	-	○	-	-	-	-	-	-	-	-	Stopper for making changes, installed by customer	
	1F-DH-02	-	-	-	-	-	-	-	-	○	-	Stopper for making changes, installed by customer	
	1S-DH-01	-	-	-	-	-	-	○	○	-	-	Stopper for making changes, installed by customer	
	1S-DH-05J1	-	-	-	-	-	-	-	-	-	○	Stopper for making changes, installed by customer	
Stopper for changing the J2-axis operating range	1S-DH-11J2	○	-	-	-	-	-	-	-	-	-	Stopper for making changes, installed by customer	
	1S-DH-05J2	-	-	-	-	-	-	-	-	-	○	Stopper for making changes, installed by customer	
Stopper for changing the J3-axis operating range	1S-DH-11J3	○	-	-	-	-	-	-	-	-	-	Stopper for making changes, installed by customer	

Note 1) This is a special specification for shipping. Inquire for delivery and prices.

Options

Classification	Name	Type	CR750		CR751		CR760		Functional specifications
			Q type	D type	Q type	D type	Q type	D type	
Controller	Standard teaching pendant (7 m, 15 m)	R32TB(-**)	○	○	-	-	○	○	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-750-*
	High-function teaching pendant (7 m, 15 m)	R56TB(-**)	○	○	-	-	○	○	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-750-*
	Standard teaching pendant (7 m, 15 m)	R33TB(-**)	-	-	○	○	-	-	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-751-*
	High-function teaching pendant (7 m, 15 m)	R57TB(-**)	-	-	○	○	-	-	7 m: Standard, 15 m: Custom (*-15* is included in the model name) For controller CR-751-*
	Conversion cable for the teaching box	2F-32CON03M	-	-	○	○	-	-	Conversion cable used to connect the R32TB to the CR-751 controller. Cable length: 3 m.
	On-board Parallel I/O interface (Sink type) (Source type)	2A-RZ361 2A-RZ371	-	○	-	○	-	○	32 output points/ 32 input points
	Remote Parallel I/O cable (5 m, 15 m)	2A-CBL**	-	○	-	○	-	○	CBL05: 5 m, CBL15: 15 m, not terminated at one end. For 2A-RZ361/371.
	On-board Parallel I/O interface (Installed internally) (Sink type) (Source type)	2D-TZ368 2D-TZ378	-	○	-	○	-	○	32 output points/ 32 input points
	Remote Parallel I/O cable (5 m, 15 m)	2D-CBL**	-	○	-	○	-	○	CBL05: 5 m, CBL15: 15 m, not terminated at one end. For 2D-TZ368/378.
	CC-Link interface	2D-TZ576	-	○	-	○	-	○	CC-Link Intelligent device station, Ver. 2.0, 1 to 4 stations
	Network base card	2D-TZ535	-	○	-	○	-	-	Communications interface for attaching to Anybus-CompactCom modules An HMS EtherNet/IP module (AB6314) and a PROFINET IO module (AB6489-B) must be separately prepared by customers. (*1)
	Force sensor set	4F-FS001-W200	○	○	○	○	-	-	Set of devices required for the force control function including a force sensor and interface unit
	MELFA- 3D Vision	4F-3DVS2-PKG1	○	○	○	○	-	-	Set of devices required for the 3D vision sensor function, including a 3D camera head and control unit (applicable model: RV-F series)
	Terminal block replacement tool for the user wiring	2F-CNUSR01M	-	-	○	○	-	-	Terminal block replacement tool for the wiring for the external input/output, such as emergency input/output, door switch input, and enabling device input
	Encoder distribution unit	2F-YZ581	○	○	○	○	-	-	Unit for connecting one rotary encoder to multiple robot controllers (up to four controllers) when the tracking function is used
	Controller protection box	CR750-MB	○	○	-	-	-	-	With a built-in CR750-D/Q for improved dust-proofing to IP54 (dedicated CR750)
	Controller protection box	CR751-MB	-	-	○	○	-	-	With a built-in CR751-D/Q for improved dust-proofing to IP54 (dedicated CR751)
Personal computer support software	3D-11C-WINJ	○	○	○	○	○	○	With simulation function (CD-ROM)	
Personal computer support software -mini	3D-12C-WINJ	○	○	○	○	○	○	Simple version (CD-ROM)	
Simulator (MELFA-Works)	3F-21D-WINJ	○	○	○	○	○	○	Layout study/Takt time study/Program debug. Add-in software for Solidworks® (*2)	
Extension memory	2D-TZ454	-	-	-	-	-	○	Extended user program area of 2 MB	

*1: Ethernet is a registered trademark of Fuji Xerox Co., Ltd.

*2: SolidWorks® is a registered trademark of SolidWorks Corporation (USA).

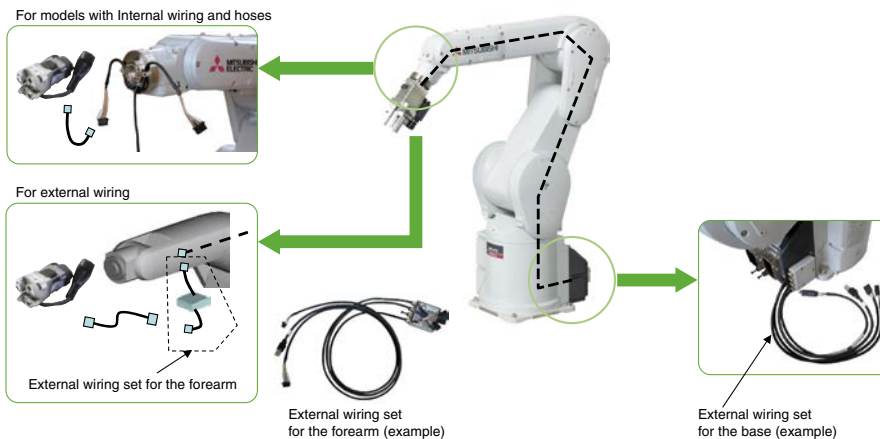
RV-4F/7F/13F/20F Series Tooling device configuration

Hand configuration	Wiring format	Robot specifications	Required device		Comments
			External wiring set for the forearm	External wiring set for the base (*3)	
• Air-hand + Hand input signal	Interior equipment	-SH01	- (*1)	-	Air hoses: Up to 2 systems (4 mm diameter x 4); 8 input signals
	Exterior equipment	Standard	- (*2)	-	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Air-hand + Hand input signal • Vision sensor	Interior equipment	-SH05	- (*1)	(1F-HA01S-01)	Air hoses: Up to 1 systems (4 mm diameter x 2); 8 input signals
	Exterior equipment	Standard	1F-HB01S-01 (*2)	1F-HA01S-01	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Air-hand + Hand input signal • Force sensor	Interior equipment	-SH04	- (*1)	(1F-HA01S-01)	Air hoses: Up to 1 systems (4 mm diameter x 2); 8 input signals
	Exterior equipment	Standard	1F-HB01S-01 (*2)	1F-HA01S-01	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Air-hand + Hand input signal • Vision sensor • Force sensor	Interior equipment (Air hoses are part of exterior equipment)	-SH02	- (*1)	(1F-HA01S-01)	Air hoses are exterior equipment: 4 systems (4 mm diameter x 8)
	Exterior equipment	Standard	1F-HB01S-01	1F-HA01S-01	Air hoses: Up to 4 systems (4 mm diameter x 8) are possible.
• Electrical hand + Hand input signal • Vision sensor	Interior equipment	-SH02	-	(1F-HA01S-01)	
	Exterior equipment	Standard	1F-HB01S-01	1F-HA01S-01	
• Electrical hand • Vision sensor • Force sensor	Interior equipment	-SH03	-	(1F-HA02S-01)	
	Exterior equipment	Standard	1F-HB02S-01	1F-HA02S-01	

*1: Users must provide the solenoid valves for Internal wiring model air-hands.

*2: Users must provide solenoid valves and hoses/input cables as needed for External wiring model air-hands.

*3: The external wiring set for the base is provided for models with Internal wiring and hoses.



Options Description

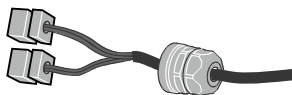
Solenoid valve set



For RH-3F and 6FH
For RH-12FH and 20FH

This optional solenoid valve is designed for tooling control, for example, when attaching a hand at the tip of a robot arm. Assembled with a manifold, fittings, and connectors for easy attachment to the robot unit. Mounting shape of the solenoid valve is different depending on the robot. Please check details before use.

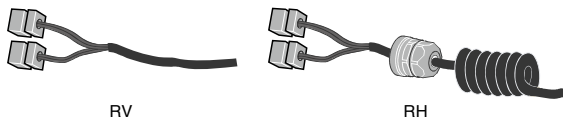
Hand output cable



Wire size x no. of core wires	AWG#24(0.2mm ²) x 12 cores
Full length	300mm (RV), 1050mm (RH)

Useful when using a solenoid valve other than the optional solenoid valve set. One side can be connected to a hand signal output connector in the robot machine. The other side is designed for cable bridging.

Hand input cable



Wire size x no. of core wires	AWG#24(0.2mm ²) x 12 cores
Full length	1000mm (RV), 1650/1800mm (RH: inc. curled part of 350mm)

These are for air-hands designed by customers to capture hand opening/closing signals and grip confirmation signal for the controller. One side can be connected to a hand signal input connector located on the robot's main unit top surface. The other side is connected to a hand designed by the customer.

Standard teaching pendant

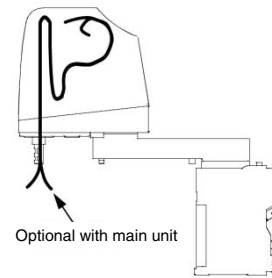
R32TB: For CR750/CR760
R33TB: For CR751

Dimensions	195mm (W) x 292mm (H) x 106mm (D)
Mass	Approx. 0.9kg (main unit only; excludes cables)
Display area	LCD display: 24 characters x 8 lines with backlight
Display language	Japanese, English



Designed to teach program creation, modification, management and operating position, and perform jog feed. Equipped with three position enable switches for safe use. The same teaching box can be switched among multiple robots. Power should be turned off when switching to another robot.

Internal wiring and piping set for hand

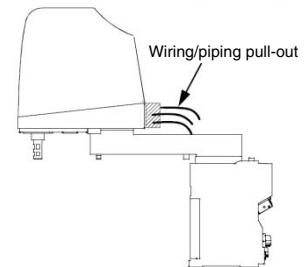


Optional with main unit

This air hose and cable set is designed to insert an input signal cable from the second arm to the shaft tip. The set includes an air hose, a hand input signal cable, and a fixing metal sheet, and comes with grease (for shaft top coating), silicon rubber, and cable ties.

External user wiring and piping box

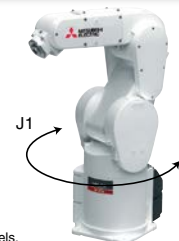
A useful option to pull out hand wiring and piping from inside the robot, such as taking an air hose and a signal line out from rear of the second arm. It comes with a joint to pull out the air hose, and a hole to secure with the cable clamp to draw out the signal line. The optional hand output cable and hand input cable can be fixed.



Stopper for changing the J1-axis operating range

	RV (*1)	RH
+J1	(Standard +240°) +210, +150, +90°	(Standard +170°) +150, +130°
-J1	(Standard -240°) -210, -150, -90°	(Standard -170°) -150, -130°

*1: Applicable to RV-2F only. Refer to specifications for other models.



Designed to limit the J1 axis operating range with a mechanical stopper of the robot's main unit and the controller parameter. Useful when there is a need to limit operating range, for example, an interference with a peripheral unit.

High-function teaching pendant

R56TB: For CR750/CR760
R57TB: For CR751

Dimensions	252mm (W) x 240mm (H) x 114mm (D)
Mass	Approx. 1.3kg (main unit only; excludes cables)
Interface	USB port x 1
Display area	6.5 inch TFT (640 x 480) Color touch screen, backlight
Display language	Japanese, English



Advanced teaching box with improved monitoring capability, in addition to the R32TB functions. Program editing, parameter settings, and other operations equivalent to RT ToolBox2 are available to streamline the debug operation.

Options Description

On-board Parallel I/O interface

<Input>

Type	DC input	
No. of outputs	32	
Insulation type	Photocoupler insulation	
Rated input voltage	12VDC	24VDC
Rated input current	Approx. 3mA	Approx. 7mA

<Output>

Type	Transistor output	
No. of outputs	32	
Insulation type	Photocoupler insulation	
Rated load voltage	12VDC /24VDC	
Maximum load current	0.1A per point	



Designed for the installation of additional external I/O. Cables to connect with external devices are not included. Please use the optional Remote Parallel I/O cables (5m, 15m). Available in both Sink type and Source type.

CC-Link interface

Communication function	Bit data/word data transmission
Station type	Intelligent device station
Support station	Local station (no master station function)
CC-Link compatible version	Ver.2 Extended cyclic setting ready
Occupied station no.	1/2/3/4 stations occupancy setting ready



The optional CC-Link interface with its CC-Link function is capable of making cyclic transmission of not only bit data but also word data as well to the robot controller.

MELFA-3D Vision

This 3D vision sensor for small robots is small and performs high-speed and high-accuracy measurements. This sensor is optimal as a replacement for a parts feeder. Its unique model-less recognition processing enables high-speed picking. (Applicable model: RV-F series)



Safety Option



Operators can enter an operation area without stopping robots.

Safety expansion module	Input signal	Safety input	2 systems (redundant)
		Exclusive stop input (SKIP)	1 system
		Encoder input for tracking	For 1 unit
	Exterior dimensions		92.6×127×51.2 mm
	Compatible robot controller		CR750/CR751 (D/Q)

About safety

- Please read carefully the Safety Manual attached to the product and operate the industrial robots as specified. Mitsubishi Electric assumes no responsibility for compensations regarding any failure or damage caused by usage other than described in the safety manual.
- When designing or manufacturing a safety circuit and/or an emergency stop circuit, please ensure to follow the descriptions listed in safety measures of Standard Specifications and/or Instruction Manual. Mitsubishi Electric assumes no responsibility for compensations regarding any failure or damage caused by safety circuit and emergency stop circuit other than the described details.

On-board Parallel I/O interface (Installed internally)

<Input>

Type	DC input	
No. of outputs	32	
Insulation type	Photocoupler insulation	
Rated input voltage	12VDC	24VDC
Rated input current	Approx. 3mA	Approx. 9mA

<Output>

Type	Transistor output	
No. of outputs	32	
Insulation type	Photocoupler insulation	
Rated load voltage	12VDC /24VDC	
Maximum load current	0.1A per point	



To use the external I/O, simply attach this optional item to the controller. Cables to connect with external devices are not included. Please use the optional Remote Parallel I/O cables (5m, 15m). I/O specifications are the same as the programmable controller interface. Available in both Sink type and Source type.

Force sensor set



The force sensor and interface unit detect a force applied to the arm to perform copying and fitting works in the same way as humans. Ideal for works that require delicate force adjustment and force detection.

Vision system



The In-Sight software developed exclusively for use with Mitsubishi Electric FA devices with enhanced linking to In-Sight, the vision system produced by COGNEX Corporation, offers better compatibility with FA devices, allowing it to be utilized more easily as a more user-friendly vision system.

Up to three robots and seven vision systems can be connected together to the same system by Ethernet connection. Easy Builder allows connection to vision systems, setting of job (vision programs) settings, and calibration between the robot and vision system to be completed easily and quickly. The included dedicated vision system commands enable vision system startup, job selection, and control of data receiving and other operations to be completed quickly and easily using a single command without any need for protocols.