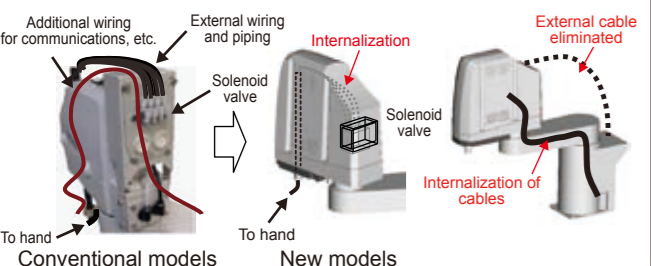


intelligent solutions for directing cellular manufacturing

Improved operability

Prevention of interference with cables

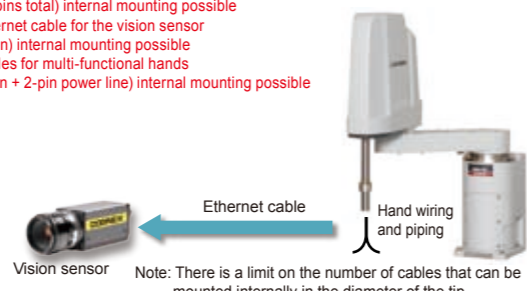
Internal installation of wiring and piping enabled through provision of internal channels in hand piping in the tip axes up to the hand mounts. Internal installation of cables minimizes the size of regions of possible robot interference and resolves issues related to twisting and intertwining of wiring and piping.



Compatibility with internal Ethernet cable tools

Internal installation of wiring and piping for connecting to multi-function hands and vision sensors enabled. A large-diameter shaft (ø20 mm → ø25 mm) employed to allow for additional hand tool wiring. (RH-6FH)

- Hand: 8 input points/8 output points (20 pins total) internal mounting possible
- Ethernet cable for the vision sensor (8-pin) internal mounting possible
- Cables for multi-functional hands (2-pin + 2-pin power line) internal mounting possible



Improved environmental resistance and maintainability

Expanded range of application with environmental resistance specifications

Lineup of special specifications including oil mist(waterproof) specifications and clean specifications. (RH-6FH)

Elimination of the need for maintenance

Long-term maintenance-free type, reduced maintenance costs.

New features

Coordinated control



Coordinated control between individual robots

Enables coordinated control between individual robots through CPU connection between robots. Simple to operate and use as normal operation mode in individual operation.



Coordinated transport

Enables transport of elongated or heavy objects using multiple miniature robots instead of a single larger robot.

[For Q type controllers only]

- ▶ Enables transport of elongated or heavy objects using multiple robots
- ▶ Enables installation work to be completed with positions between grippers

Interference avoidance feature



For automatic prevention of collisions between robots

Avoids the damage to a robot by detecting collisions between robots during JOG operation and in automatic operation mode before it occurs and then stopping the robot.



Decreases the operating load during startup operation

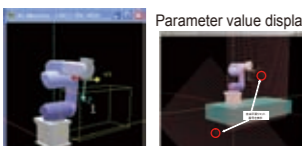
Reduces the number of recovery man-hours required after collisions due to teaching operation errors or failure to set interlocks

[For Q type controllers only]

- ▶ Decreases the amount of damage of the robot, hand, and worksheet during startup
- ▶ Prevents problems due to failure to set interlocks or other issues

Problems prevented through visualization

Graphic display features for RT ToolBox2 (PC software) enhanced to enable quick and easy display of active parameters, robot peripheral jigs, traveling axes and other objects.



- Display of user-defined regions
- Display of traveling axes
- Display of cubes, cones, and spheres
- Display of freedom-limited planes



RT ToolBox2 (mini ver.) combined with MELSOFT Navigator (Ver. 1.24A or later)

- ▶ Problems prevented through visualization of parameter setting values
- ▶ Cuts down the required number of man-hours using advanced operations and takt time verification

Convenient features

High-speed execution of programs

- Enables programs to be executed up to 1.2 times as fast as with conventional startup
- Works to shorten tact times using processing speeds of up to two times faster in arithmetic and condition branching operations

Security features

- Security features added for programs and parameters
- Read/write protection enabled for programs using passwords

Sustained tracking during emergency stop

- Operating paths sustained during device shutdown when an emergency stop is input
- Prevents interference with peripheral objects from occurring

Program startup from the teaching pendant

- ▶ Shortened takt times through increased processing speeds
- ▶ Intellectual property protected through use of security features
- ▶ Prevents interference and maintains safety during an emergency stop



MITSUBISHI INDUSTRIAL ROBOT MELFA RH-3FH/RH-6FH Series

Changes for the Better



for a greener tomorrow



MITSUBISHI INDUSTRIAL ROBOT MELFA RH-3FH/RH-6FH Series Configurations options

Robot arm

Classification	Name	Type	3FH	6FH	Functional specifications
Robot arm	Solenoid valve (RH-3/6FH)	1F-VDO□□-01(Sink) 1F-VDO□□E-01(Source)	○	○	With a 4-valve solenoid valve cable □ indicates the number of valves(1,2,3,4)
	Hand output cable	1F-GR60S-01	○	○	Straight cable for 4-solenoid valve systems, total length of 600 mm, with a robot connector on one side and unterminated on the other side, equipped with a splash-proof grommet
	Hand input cable	1F-HC35C-01	○	○	8-point type, total length of 1200 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
	Hand (curl) tube	1E-ST0408C-300	○	○	Compatibility with φ4-4 solenoid valve systems (L = 300 mm)
	Internal wiring and piping set for hand	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, comes with securement hardware) For 200mm 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, comes with securement hardware) For 340mm 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 + φ4-4 solenoid valve systems, comes with securement hardware)
	External user wiring and piping box	1F-UT-BOX	○	○	Box for external wiring of user wiring (hand I/O, hand tube)
	Machine cable (replacement for shorter 2m type) *1	1S-02UCBL-03	○	—	2m long cable for securement purpose (A 2 cable is supplied instead of standard one)
		1S-02UCBL-01	—	○	2m long cable for securement purpose (A 2 cable is supplied instead of standard one)
Machine cable, for extension/fixd	1S-05CBL-03	○	—	Extension type, extended length; 5m (2wires set with power and signal wires)	
	1S-10CBL-03	○	—	Extension type, extended length; 10m (2wires set with power and signal wires)	
	1S-15CBL-03	○	—	Extension type, extended length; 15m (2wires set with power and signal wires)	
	1S-05CBL-01	—	○	Extension type, extended length 5m (2-wire set with power and signal wires)	
	1S-10CBL-01	—	○	Extension type, extended length 10m (2-wire set with power and signal wires)	
	1S-15CBL-01	—	○	Extension type, extended length 15m (2-wire set with power and signal wires)	
Machine cable, for direct/flexible	1S-05LUCBL-03	○	—	Direct type, 5m, instead of the standard one	
	1S-10LUCBL-03	○	—	Direct type, 10m, instead of the standard one	
	1S-15LUCBL-03	○	—	Direct type, 15m, instead of the standard one	
	1S-05LUCBL-01	—	○	Direct type, 5m, instead of the standard one	
	1S-10LUCBL-01	—	○	Direct type, 10m, instead of the standard one	
	1S-15LUCBL-01	—	○	Direct type, 15m, instead of the standard one	
Changes to the J1 axis operating range	1F-DH-01	○	○	Stopper for hardware limitation of J1 axis, changes due to customer installations	

*1: This is a special specification for shipping. Inquire for delivery and prices.

Controller

Classification	Name	Type	Functional specifications
Controller	Simple version teaching box (7 m, 15 m)	R32TB(- **)	7 m: Standard, 15 m: Custom ("15" is included in the model name), for Controller CR750-*
	High-function teaching pendant (7 m, 15 m)	R56TB(- **)	7 m: Standard, 15 m: Special (model name ends in -15), for Controller CR750-*
	Remote Parallel I/O (Sink type) (Source type)	2A-RZ361 2A-RZ371	32 output points / 32 input points
	Remote Parallel I/O cable (5m, 15m)	2A-CBL**	CBL05: 5 m, CBL15: 15 m, not terminated at one end. For 2A-RZ361/371
	On-board Parallel I/O interface (Internal) (Sink type) (Source type)	2D-TZ368 2D-TZ378	32 output points / 32 input points
	On-board Parallel I/O cable (5m, 15m)	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
	Controller protection box	CR750-MB	With a built-in CR750-D/Q for improved dust-proofing to IP54 (dedicated CR750)
	Personal computer support software	3D-11C-WINJ	With simulation function (CD-ROM)
	Personal computer support software -mini	3D-12C-WINJ	Simple version (CD-ROM)
3D-CAD-Simulator	3D-21C-WINJ	Multifunction CAD-Software (Layout and tact time study, Interference check, Virtual controller). Add-in software for Solidworks *1	

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

Service part

Classification	Name	Type	3FH	6FH	Functional specifications
Service part	Backup battery	ER6	○	○	Installed in the robot arm (Quantity: 3 pc.)
		Q6BAT	○	○	Installed in the controller (Quantity: 1 pc.)

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5, HIGASHI-KU, NAGOYA, JAPAN

Safety Warning

- To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

When exporting any of the products or related technologies described in this catalogue, you must obtain an export license if it is subject to Japanese Export Control Law.



Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems)

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New publication, effective Mar. 2012
Specifications are subject to change without notice.

MELFA RH-F Series of high-speed robots equipped with

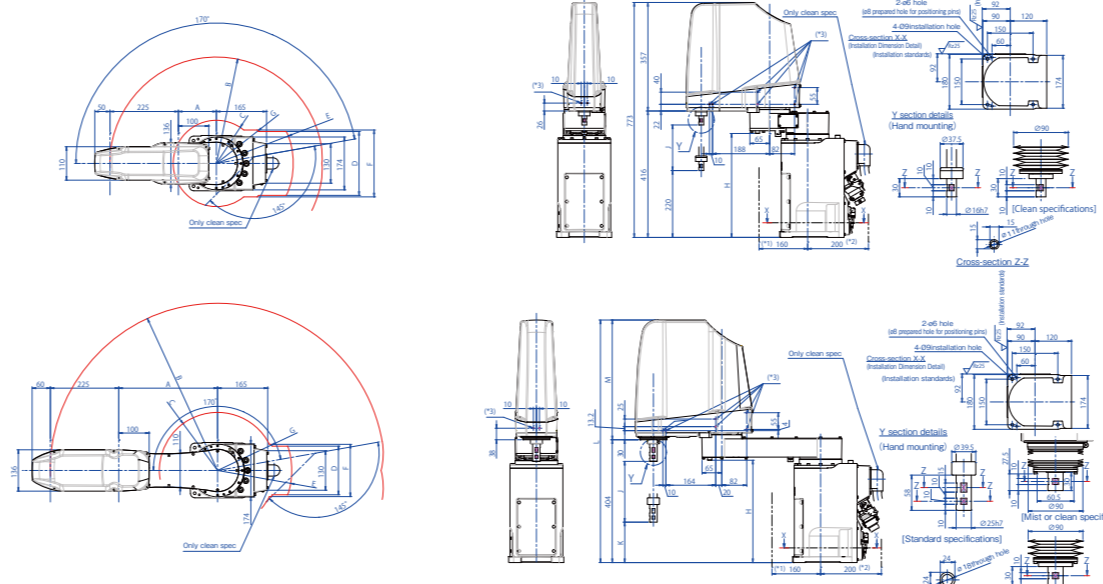
intelligent solutions for directing cellular manufacturing

- Equipped with the features and know-how required for cellular manufacturing.
- Developed for high-speed, high-accuracy, and high-duty operations for increasing productivity on customer site.
- Continuing the useful features of the former SD Series models.
- New 3 kg model added to the line-up for every customer need.

MELFA RH-F SERIES



Robot specifications



Variable dimensions

Robot series	A	B	C	D	E	F	G	H	J
RH-3FH35xx, RH-6FH35xx	125	R350	R142	210	R253	220	R174	342	150
RH-3FH35xxC, RH-6FH35xxM/C	125	R350	R142	224	R253	268	R196	342	120
RH-3FH45xx, RH-6FH45xx	225	R450	R135	210	R253	220	R174	337	150
RH-3FH45xxC, RH-6FH45xxM/C	225	R450	R135	224	R253	268	R197	337	120
RH-3FH55xx, RH-6FH55xx	325	R550	R191	160	R244	172	R197	337	150
RH-3FH55xxC, RH-6FH55xxM/C	325	R550	R191	160	R244	260	R222	337	120

*1: Space required for the battery replacement
 *2: Space required for the interconnection cable
 *3: Screw holes (M4, 6 mm long) for affixing user wiring and piping. (6 locations on both sides and 2 locations on the front of the No. 2 arm.)

Robot series	A	B	C	D	E	F	G	H	J	K	L	M
RH-6FH3520-S15	125	R350	R142	210	R253	220	R174	342	200	133	798	386
RH-6FH3520C-S15	125	R350	R142	224	R253	268	R196	342	200	133	798	386
RH-6FH3534-S15	125	R350	R142	210	R253	220	R174	342	340	43	938	526
RH-6FH3534C-S15	125	R350	R142	224	R253	268	R196	342	340	43	938	526
RH-6FH4520-S15	225	R450	R135	210	R253	220	R174	337	200	133	798	386
RH-6FH4520C-S15	225	R450	R135	224	R253	268	R197	337	200	133	798	386
RH-6FH4534-S15	225	R450	R135	210	R253	220	R174	337	340	43	938	526
RH-6FH4534C-S15	225	R450	R135	224	R253	268	R197	337	340	43	938	526
RH-6FH5520-S15	325	R550	R191	160	R244	172	R197	337	200	133	798	386
RH-6FH5520C-S15	325	R550	R191	160	R244	259	R222	337	200	133	798	386
RH-6FH5534-S15	325	R550	R191	160	R244	259	R222	337	340	43	938	526
RH-6FH5534C-S15	325	R550	R191	160	R244	259	R222	337	340	43	938	526

Robot series	A	B	C	D	E	F	G	H	J	K	L	M
RH-6FH3520-S15	125	R350	R142	224	R253	268	R196	342	200	133	798	386
RH-6FH3534-S15	125	R350	R142	224	R253	268	R196	342	340	43	938	526
RH-6FH4520-S15	225	R450	R135	224	R253	268	R197	337	200	133	798	386
RH-6FH4534-S15	225	R450	R135	224	R253	268	R197	337	340	43	938	526
RH-6FH5520-S15	325	R550	R191	160	R244	259	R222	337	200	133	798	386
RH-6FH5534-S15	325	R550	R191	160	R244	259	R222	337	340	43	938	526

Type	Unit	RH-3FH3515/12C -D1(-/Q1)-S15	RH-3FH4515/12C -D1(-/Q1)-S15	RH-3FH5515/12C -D1(-/Q1)-S15	RH-6FH35xx/C -D1(-/Q1)-S15	RH-6FH45xx/C -D1(-/Q1)-S15	RH-6FH55xx/C -D1(-/Q1)-S15
Machine class		Standard / Clean			Standard *7 / Clean *8		
Protection degree		IP20 / ISO3			IP54 *9 / ISO3		
Installation		Floor type			Floor type *10		
Structure		Horizontal, multiple-joint type					
Degrees of freedom		4					
Drive system		AC servo motor					
Position detection method		Absolute encoder					
Maximum load capacity (Rating)	kg	3 (1)			6 (3)		
Arm length	No. 1 arm No. 2 arm	125	225	325	125	225	325
Maximum reach radius	mm	350	450	550	350	450	550
Operating range	J1	340 (±170)			340 (±170)		
	J2	290 (±145)			290 (±145)		
	J3(Z)	150 (Clean specification : 120) *1			xx=20 : 200 / xx=34 : 340		
	J4(θ)	720 (±360)			720 (±360)		
Maximum speed	J1	420			400		
	J2	720			670		
	J3(Z)	1100			2400		
	J4(θ)	3000			2500		
Maximum composite speed *3	mm/sec	6800	7500	8300	6900	7600	8300
Cycle time *4	sec	0.51	0.46	0.41	0.29	0.29	0.29
Position repeatability	X-Y composite	±0.010			±0.010		
	J3(Z)	±0.01			±0.01		
	J4(θ)	±0.004			±0.004		
Ambient temperature	°C	0 to 40					
Mass	kg	29	29	32	36	36	37
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: φ6 × 2 Secondary: φ4 × 8					
Machine cable		5m (connector on both ends)					
Connected controller *6		CR750-D/Q					

*1: Take note that on the models of environment-resistant specifications (C: Clean specification, M: Mist specification), the operating range of the vertical axis is smaller than on the standard models. The environment-resistant specifications are factory-set custom specifications. For the approximate timeframe for delivery, contact the Mitsubishi Electric dealer or sales agent near you.
 *2: Value for high-speed positioning mode. *3: The value assumes composition of J1, J2, and J4. *4: 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.) *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/CR751-D: Standalone type, CR751-Q: iQ Platform compatible type. 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.
 *7: Please contact Mitsubishi Electric dealer since the environmental resistance may not be secured depending on the characteristics of oil use. (Direct jet to the bellows excluded. IP54 of the CE specifications prevent direct jet to the shaft.) *8: Preservation of cleanliness levels depends on conditions of a downstream flow of 0.3 m/s in the clean room and internal robot suctioning. An ø8-mm coupler for suctioning is provided at the back of the base. *9: Mounting a bellows to the shaft tip makes the protection degree compliant with IP65. However, avoid direct jet to the bellows. For the method to mount the bellows, consult with the Mitsubishi Electric dealer. *10: Ceiling type available. If you require it, consult with the Mitsubishi Electric dealer.

Improved productivity

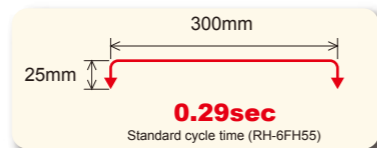
With the fastest high-speed operation in its class

Produced the fastest operating performance in its class using motors, high-rigidity arms, and unique driver control technology developed by Mitsubishi Electric. Improved productivity through shortened cycle times.

[XY Combination: 8300 mm/s (RH-3FH, RH-6FH)]

[J4 (θ axis): 3000 deg/s (RH-3FH), 2400 deg/s (RH-6FH)]

[Standard cycle time: 0.29 s, shortened by 31% (RH-6FH) compared to that for the previous model]



Improved speed for vertical movements

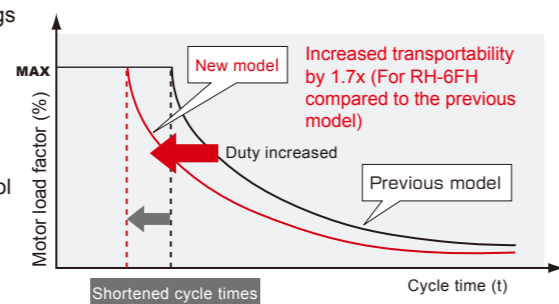
Improved speeds for the vertical movements essential for transport of casings and other assemblies using horizontal multi-joint robots.

[Z-axis speed: 2400 mm/s, twice as fast as the conventional speed!! (RH-6FH), fastest in its class]

Improved continuous operability

Improved continuous operability using motors and unique driver control technology developed by Mitsubishi.

[Approx. 1.7 times the transportability (RH-6FH) of previous models]



Note) Shortening rate varies depending on operational patterns and load amounts.

Full use of installation space

Dramatically improved operating range for the J1 axis (±127° → ±170°).

Improved flexibility for robot layout design considerations

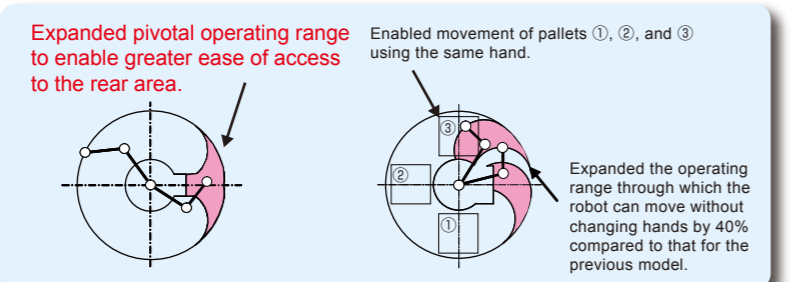
Effective use of access space around entire perimeter.

Shortened takt times by eliminating

unnecessary movements and expanding

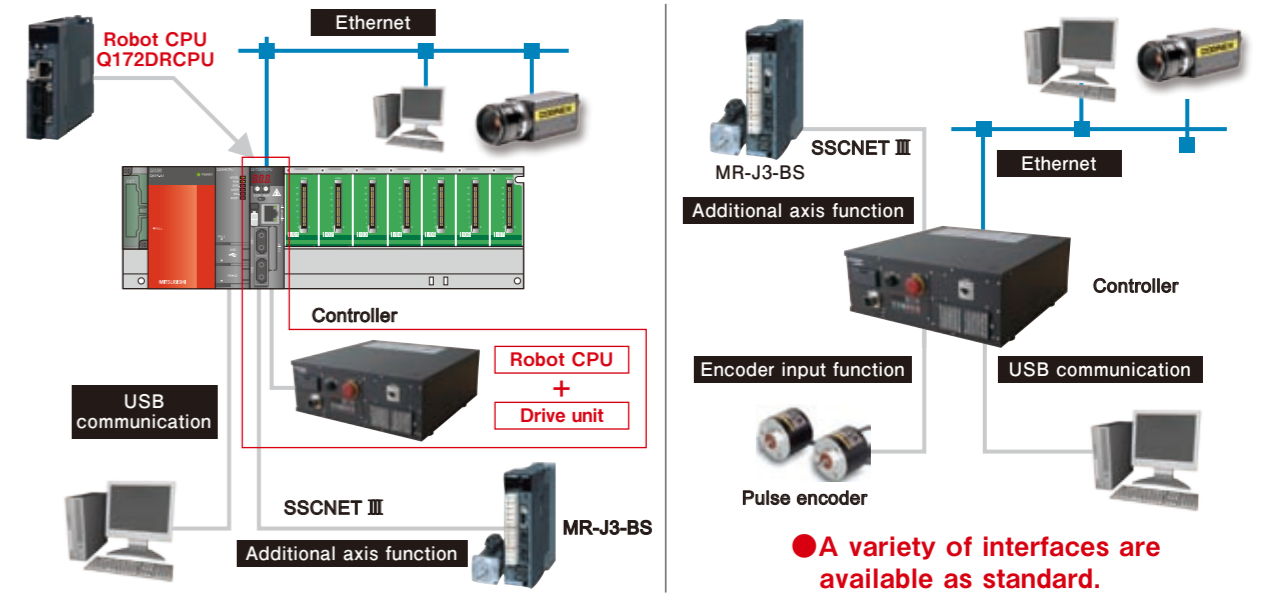
the operating range through which the robot

can move without changing hands.

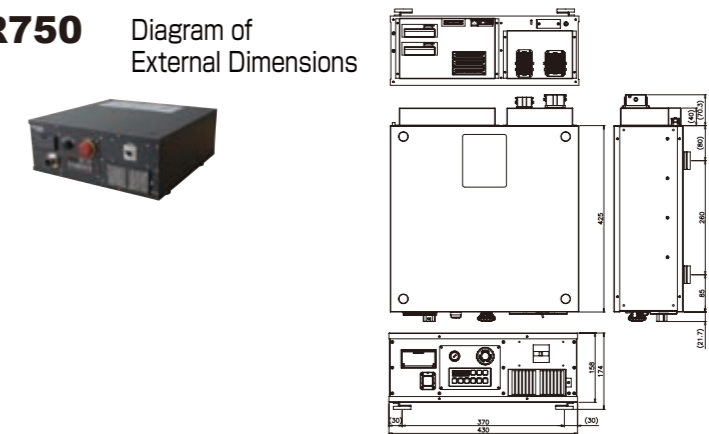


Controller specifications

Q Type controller configuration (iQ Platform compatible) D Type controller configuration (Standalone)



CR750 Diagram of External Dimensions



Type	Unit	CR750-Q	CR750-D
Robot CPU		Q172DRCPU	—
Path control method		PTP control and CP control	
Number of axes controlled		Simultaneously 4-axis	
Robot language		MELFA-BASIC V	
Position teaching method		Teaching method, MDI method	
Memory capacity	Number of teaching points	13,000	39,000
	Number of steps	26,000	78,000
	Number of programs	256	512
External input/output	General-purpose I/O	0 input/0 output (8192 input points/8192 output points with the multiple CPU common device)	
	Dedicated I/O	Assigned to multiple CPU common device.	
	Hand open/close	Assigned to general-purpose I/O.	
	Emergency stop input	8 input / 8 output	
	Door switch input	1 (redundant wires included)	
	Enabling device input	1 (redundant wires included)	
	Emergency stop output	1 (redundant wires included)	
	Mode output	1 (redundant wires included)	
	Robot error output	1 (redundant wires included)	
	Synchronization of additional axes	1 (redundant wires included)	
Interface	RS-422	1 (Teaching pendant; dedicated T/B)	
	Ethernet	1 (dedicated T/B)	1 (dedicated T/B), 1 (for customer) 10BASE-T / 100BASE-TX
	USB	1 (USB port for the PLC CPU unit)	1 (mini B terminal for Ver. 2.0 device functions only)
	Additional-axis interface	1 (SSCNET III)	
	Extension slot	—	
	Encoder input	2 *1	
Ambient temperature	°C	0 to 40 (drive unit)/0 to 55 (Robot CPU)	
Relative humidity	%RH	45 to 85	
Power supply	Input voltage range	Single phase AC 180 V to 253 V *2	
	Power capacity *3	2	
External dimensions (including legs)	mm	430 (W) × 425 (D) × 174 (H)	430 (W) × 425 (D) × 174 (H)
Weight	kg	Approx.20	Approx.20
Structure [protective specification]		Self-contained floor type/open structure [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.