Changes for the Better

MITSUBISHI ELECTRIC

MITSUBISHI INDUSTRIAL ROBOT

MELFA RV-3SD/3SDJ Series

RV-3SD

RV-3SDJ

MELFA

RV-SD series

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

ISO 14001 JACO EC97J1113 — UKAS ENVIRONMENTAL MANAGEMENT 051

ISO 9001 BUREAU VERITAS Certification — UKAS QUALITY MANAGEMENT 008

The Ultimate Series of Powerful Mitsubishi Robots Offering

- A new high performance controller design offers faster speed and greater accuracy.
- Enhanced compatibility with the Mitsubishi's family of automation products improves versatility.
- Compact but rigid arm designs are durable and flexible for applications in all industries.
- Dedicated Mitsubishi servo technology has been designed for each model to optimize overall performance.

MELFA

RV-SD series

Applicable models

RV-3SD

RV-3SDJ

CR1D-721/731

CR2D-721/731

Features

1 Improved Productivity

Fastest operation speed in class
[Maximum composite speed: 9.3 m/s (RV-6SD)]
Multiple complex tasks are handled by a single controller.

Shorter takt time
With a new, high-performance controller, I/O's and programs can be processed at high speed. This allows the takt time to be reduced by as much as 15%.

High operation accuracy [High-rigidity arm, active gain control]
The robot posture and load are monitored to adjust the servo gain and filter in real time. This achieves higher accuracy.

Environmental resistance [Arm: IP65]
This means that you can use the RV-SD series in wide-ranging applications regardless of the installation environment.

Direct connection to the GOT
The robot controller can be connected directly to our GOT-1000-series display via Ethernet. This achieves sequencer-free operation and ultimately reduces cost.

All models come standard with advanced functions
Control of additional axes, tracking function and Ethernet, which were all provided as options with the S series, are now standard features. You can save on the costs of options to reduce the overall system cost.

2 Improved Operability

Adoption of a new HMI (Human Machine Interface) results in significant improvement of operability.

New function wizards
Wizards for special functions such as additional axes, tracking and collision detection are included in the PC tools. These wizards reduce the time needed for startup, adjustment and maintenance.

New teaching pendant with graphical interface
The new teaching pendant **[R56TB]** offers significantly improved operability through its GUI reduces the time needed for startup, adjustment and maintenance.

3 Safety

Compliance with ISO-10218 (2006)
The RV-SD series helps your equipment as a whole comply with the safety standards.

CE UL LISTED

Compliance with various standards
The RV-SD series complies with the European Machinery Directive (CE) and available UL models.

4 Backward Compatibility

Fully compatible with S-series robot systems
Robot programs and I/O maps for S-series robots can be used 100%.

Model Structure

Robot model		RV-3SD	RV-3SDC	RV-3SDJ	RV-3SDJC	RV-3SD-SM	RV-3SDJ-SM
Robot arm (*1)	Number of axes	6 axes		5 axes		6 axes	5 axes
	Oil-mist specification (IP65)	○	—	○	—	○	○
	Clean specification (cleanliness class 10)	—	○	—	○	—	—
Controller	Open type (IP20)	○	○	○	○	—	—
	Oil-mist specification (IP54)	—	—	—	—	○ (*2)	○ (*2)

*1: The 6-axis model has no brake on the J4-axis and J6 axis. The 5-axis model has no brake on the J6-axis.
*2: The -SM specifications come standard with a controller protection box. The CR1D-MB (protection box) is supplied with the CR1D-721/737 (IP20).

New Functionality and Performance

Functions

1 New teaching pendant (optional)

Improved display performance and operability

- Teaching pendant **[R32TB]**
  Five times greater display performance (vs. R28TB)
- Ergonomic design improves operability.
- IP65 Protection

2 New enhanced teaching pendant (optional)

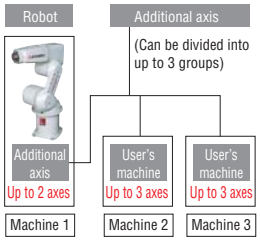
No need to bring a PC to the site

- Enhanced teaching pendant **[R56TB]**
  [VGA (640 x 480) touch panel] adopted
- Can utilize HMI tools equivalent to the RT-Tool Box on the teaching pendant.
- Can utilize USB memory to back up controller data.
- IP65 Protection

3 Additional axis function

No need for dedicated control device. Additional axes can be controlled with robot programs. This helps keep the system cost low.

- Controlling the robot's traveling axes and turntable.
- Up to 8 axes can be controlled in addition to the robot.
- Standard function
- Utilizes Mitsubishi MR-J3□B servos for additional axes.



4 Synchronized outputs from additional axes

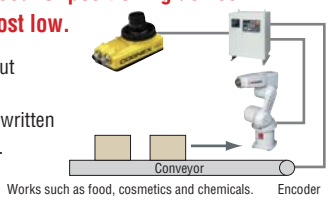
Improved safety of the entire system

- A signal is output from the auxiliary contacts for the main circuit contactor in the robot controller. The auxiliary contacts allow the servo amplifier contactor of each additional axis to synchronize with the robot servo status.
- This contact signal is output redundantly, which improves the safety of your equipment and makes it easy for the entire equipment to comply with the safety standards.

5 Conveyor tracking function

Improved process time. No need for positioning device. This helps keep the system cost low.

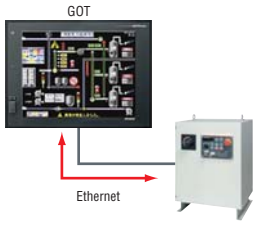
- The robot can be operated without stopping the conveyor.
- Robot programs can be easily written using MELFA-BASIC-V language.
- Standard function



6 GOT connection

No need for GOT connection ladder

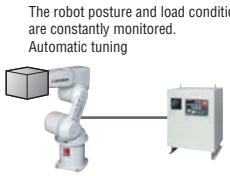
- The robot can be controlled directly from the GOT1000. (A dedicated robot screen must be created.)



7 Active gain control

Improved tracking accuracy and vibration-damping performance

- The motor is tuned for optimal control automatically based on the operating position, posture and load condition of the robot.



8 Ensuring of safety based on operation by two persons

[Enabling-device input function]

- Allows for connection of 3-position enabling devices to protect the robot system and multiple persons from danger.
- Since multiple operators must always be coordinated, safety improves.

●Redundant devices

9 New emergency-stop I/O function

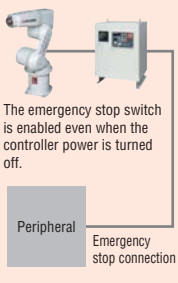
[Emergency-stop output function]

- Even when the robot controller power is cut off, you can still stop the peripherals by pressing the emergency stop switch on the panel or teaching pendant.

[Robot error output]

- If the robot generates an error, a safety contact signal is output in addition to an applicable I/O signal output on conventional models.

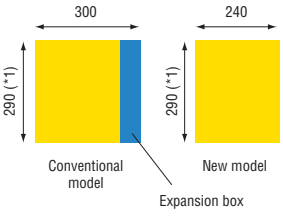
●These I/Os are all provided redundantly.



10 Compact controller

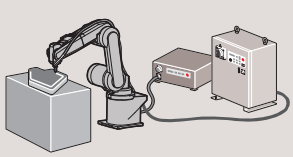
Reduced installation space

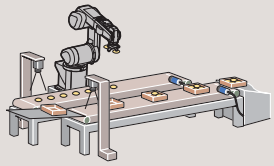
- The CR1D controller comes standard with an expansion slot. The optional expansion box required with the CR1A/B series is no longer required. The footprint has become smaller than conventional models.

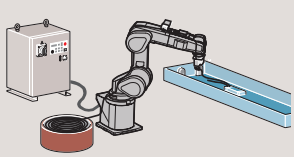


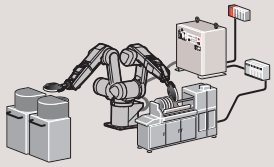
*1)The length of 215mm is necessary for rear side of controller because of machine-cable connection.

Applications


Sealing


Conveyor tracking

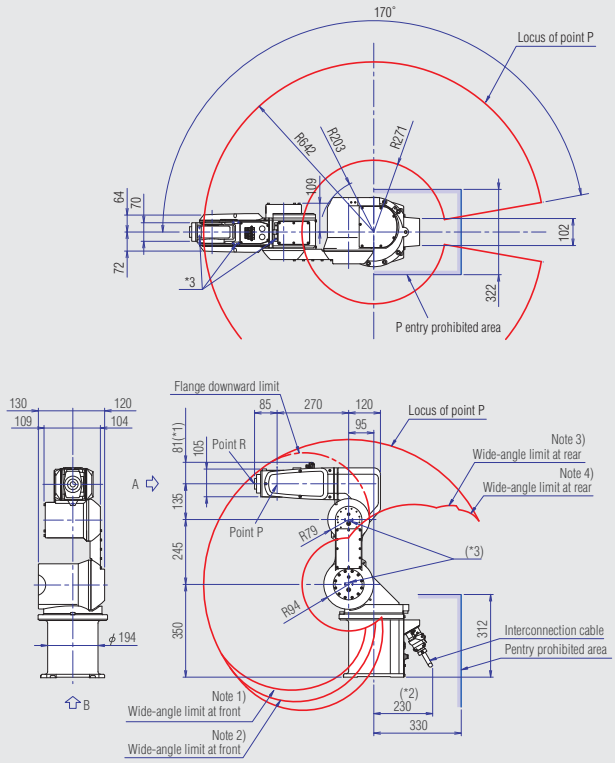

Electric devices


Wafer transfer

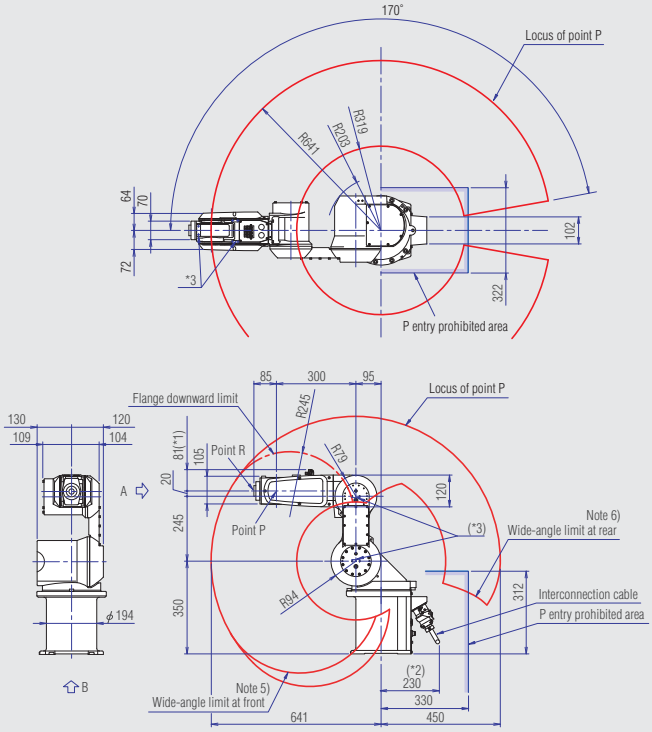
New Functionality and Performance

Robot Arm Outside Dimension/Movement Range Diagrams

RV-3SD

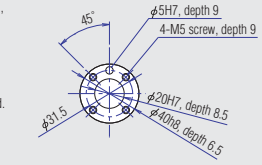


RV-3SDJ

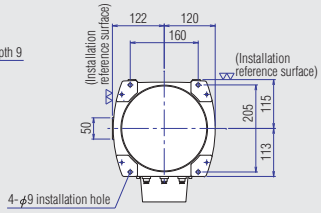


<Wide-angle/narrow-angle limits at front>
Note 1: When the J1-axis angle is inside the range of 170 deg ≧ J1 > 125 deg, the operating range of the J2-axis is limited to 125 deg > J2 ≧ -90 deg.
Note 2: When the J1-axis angle is inside the range of -125 deg > J1 ≧ -170 deg, the operating range of the J2-axis is limited to 130 deg > J2 ≧ -90 deg.

<Wide-angle/narrow-angle limits at rear>
Note 3: When the J2-axis angle is inside the range of -30 deg > J2 > -60 deg, the operating range of the J3-axis is limited to the range where "4 * J2 + 3 * J3 > -180" and "171 deg ≧ J3 > -20 deg" are both satisfied.
Note 4: When the J2-axis angle is inside the range of -60 deg > J2 ≧ -90 deg, the operating range of the J3-axis is limited to the range where "2.7 * J2 + J3 > -142" and "171 deg ≧ J3 > -20 deg" are both satisfied.



View A: Details of Hand Installation Flange
(J6 = 0°)
(Conforming to ISO 9409-1)



View B Rear Surface Diagram; Installation Dimension Detail

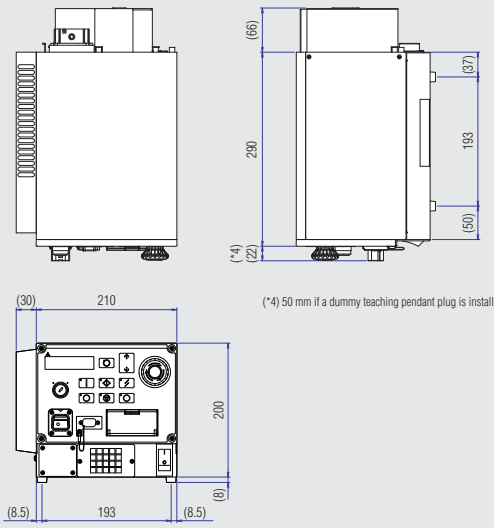
<Wide-angle/narrow-angle limits at front>
Note 5: When the J1-axis angle is inside the range of 170 deg ≧ J1 > 125 deg, the operating range of the J2-axis is limited to 125 deg > J2 ≧ -90 deg.

<Wide-angle/narrow-angle limits at rear>
Note 3: When the J2-axis angle is inside the range of -30 deg > J2 ≧ 90 deg, the operating range of the J3-axis is limited to the range where "14 x J2 + 9 x J3 > -1530" and "137 deg > J3 > -100 deg" are both satisfied.

Note
(*1) Indicates the dimension when the solenoid valve (optional) is installed.
(*2) Indicates the space required for the interconnection cable.
(*3) Indicates the screw hole (M4) used for affixing user wiring and piping.

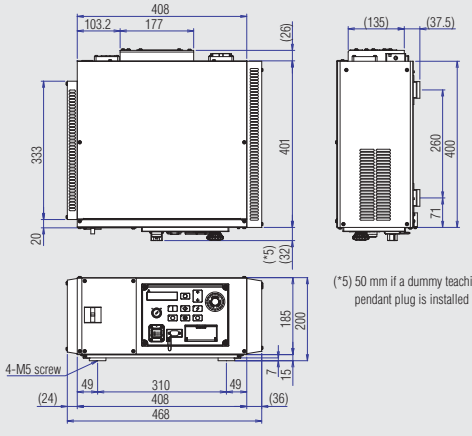
Controller – External Dimensions

CR1D-700 series



(*4) 50 mm if a dummy teaching pendant plug is installed

CR2D-700 series



(*5) 50 mm if a dummy teaching pendant plug is installed

Specifications

Robot Arm

Type		Unit	RV-3SD/3SDC	RV-3SDJ/3SDJC
Machine class			Standard (oil mist)/clean	
Installation			Floor type, ceiling type (wall-mounted type *4) / Floor type	
Protection degree/clean specification			IP65 / Class 10 *5	
Degrees of freedom *6			6	5
Operating range	J1	deg	340	340
	J2		225	225
	J3		191	237
	J4		320	–
	J5		240	
	J6		720	
Maximum speed	J1	deg/s	250	250
	J2		187	187
	J3		250	250
	J4		412	–
	J5		412	
	J6		660	
Maximum composite speed (point R) *7		mm/sec	5,500	5,300
Load capacity	Rated	kg	3	
	Maximum	kg	3.5	
Positioning repeatability (at rated load)		mm	±0.02	
Mass		kg	37	33
Allowable moment	J4	N•m	5.83	–
	J5		5.84	
	J6		3.9	
Allowable inertia *8	J4	kg•m^2	0.137	–
	J5		0.137	
	J6		0.047	
Tool wiring			Hand – 8 input points, 8 output points, 8 spare leads	
			(AWG#25 [0.16mm^2] with shield)	
Tool pneumatic pipes	Primary		ϕ6 x 2pcs	
	Secondary		ϕ4 x 8pcs (optional)	

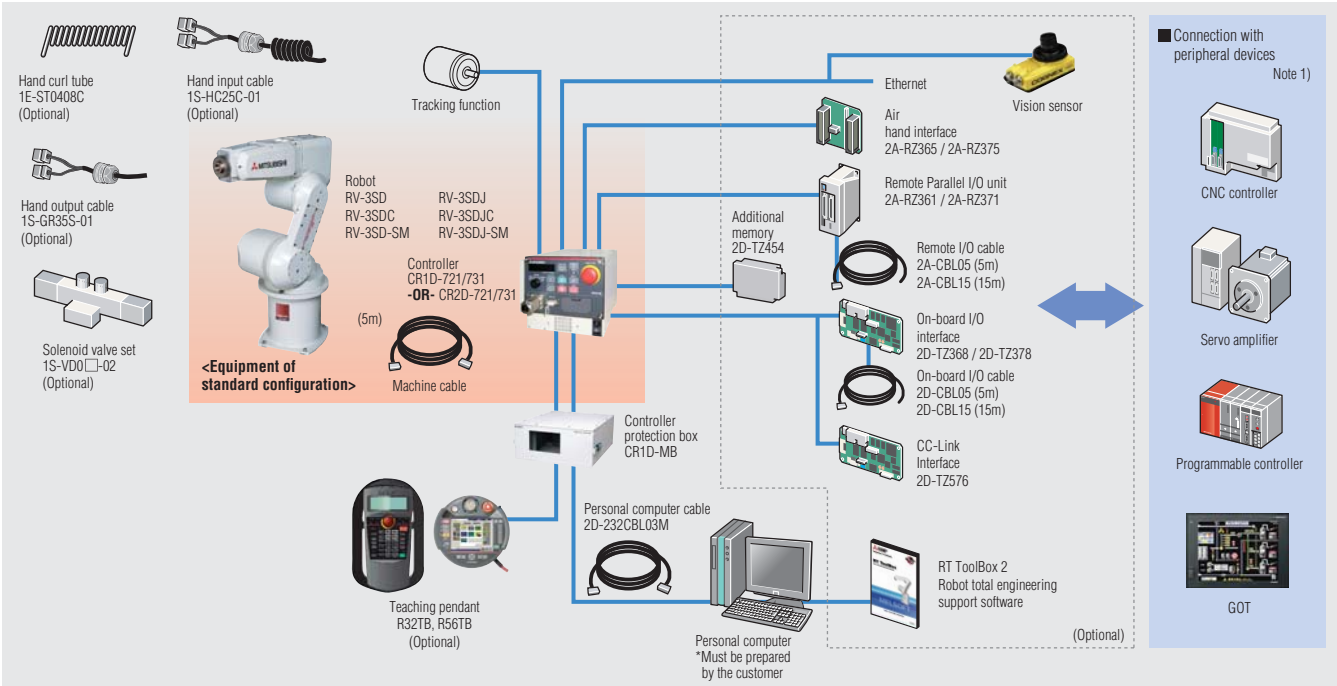
*4: The wall-mounted specification is a custom specification where the operating range of the J1-axis is limited.
*5: Air must be suctioned from inside to achieve cleanliness class 10.
*6: The 6-axis model has no brake on the J4-axis and J6-axis, while the 5-axis model has no brake on the J6-axis.
*7: The maximum speed when the optimal acceleration/deceleration mode is enabled (flange surface).
*8: When the optimal acceleration/deceleration mode is enabled, values up to twice the indicated specification can be supported.
Note: The maximum load capacity can be achieved only when the flange is affixed in downward direction.

Controller

Type		Unit	CR1D-721(RV-3SD) / CR1D-731(RV-3SDJ)
Path control method			PTP control and CP control
Number of axes controlled			Up to 6 axes simultaneously
Robot language			MELFA-BASIC V
Position teaching method			Teaching method, MDI method
Memory capacity	Number of teaching points	points	13,000
	Number of steps	steps	26,000
	Number of programs	steps	256
External input/ output	General-purpose I/O	points	0 input/0 output (Up to 256/256 when options are used)
	Dedicated I/O		Assigned according to general-purpose I/O.
	Hand open/close	points	8 inputs/0 output (8/8 when the pneumatic hand interface is used)
	Emergency stop input	points	1 (2 contacts are supported)
	Door switch input	points	1 (2 contacts are supported)
	Enabling device input	points	1 (2 contacts are supported)
	Emergency stop output	points	1 (2 contacts are supported)
	Mode output	points	1 (2 contacts are supported)
	Robot error output	points	1 (2 contacts are supported)
	Synchronization of additional axes	points	1 (2 contacts are supported)
Interface	RS-232C	ports	1 (for the connection of a personal computer, vision sensor, etc.)
	Ethernet	ports	1 (dedicated teaching pendant port), 1 (for customer) 10BASE-T/100BASE-T
	USB	slots	1 (Version 1.1 device functions only)
	Additional-axis interface	channels	1(SSCNET III)
Operating temperature range		˚C	0 to 40
Relative humidity		%RH	45 to 85
Power supply	Input voltage range	V	Single-phase, AC 180 to 253 *9
	Power capacity	KVA	1.0 (not including rush current)
External dimensions (including legs)		mm	240(W) x 290(D) x 200(H)
Weight		kg	Approx. 9
Structure [protection function]			Self-contained floor type, open structure
Grounding		Ω	100 or less (class D grounding)

*9: The rate of fluctuation of power-supply voltage is within 10%.

System Configuration



Note 1) Select an appropriate interface according to the I/Os or network function of the peripheral.

Configurations Options

Classification	Name	Type	Compatibility (*)	Specification overview
Robot arm	Solenoid valve set	1S-VD0□-02	○	1 to 4 valves connected: With solenoid valve cable
	Hand output cable	1S-GR35S-01	○	4 valves connected type with one end not treated
	Hand input cable	1S-HC25C-01	○	8-point type with splash-proof grommet
	Hand curl tube	1E-ST0408C	○	ϕ4-4 valves connected type
	Stopper for changing J1-axis operating range	1S-DH-03	○	Stopper part (Changeable to 30, 60, 90 or 120.) Installation is the customer's responsibility.
	Machine cable, for extension/fixed	1S-□□CBL-03	○	Extension type / Extended length: 5m, 10m, 15m
	Machine cable, for extension/flexible	1S-□□LCBL-03	○	Extension type / Extended length: 5m, 10m, 15m
Controller	Teaching pendant (7m, 15m)	R32TB(-**)	New	7m: Standard / 15m: Custom ("-15" is specified in the model name)
	Enhanced teaching pendant (7m, 15m)	R56TB(-**)	New	7m: Standard / 15m: Custom ("-15" is specified in the model name)
	Air hand interface (sink / source)	2A-RZ365 / 2A-RZ375	○	8 output points, used exclusively for hand
	Parallel I/O unit (sink / source)	2A-RZ361 / 2A-RZ371	○	32 output points / 32 input points
	External I/O cable (5m, 15m)	2A-CBL**	○	CBL05: 5m CBL15: 15m One end not treated, for 2A-RZ361
	Parallel I/O interface (sink / source)	2D-TZ368 / 2D-TZ378	New	32 output points / 32 input points
	External I/O cable (5m, 15m)	2D-CBL**	New	CBL05: 5m CBL15: 15m One end not treated, for 2D-TZ368
	CC-Link interface	2D-TZ576	New	CC-Link intelligent device station, Version 2.0, 1 to 4 stations
	Additional memory	2D-TZ454	New	User program area with additional memory: 2MB
	RT-ToolBox 2	3D-11C-WINE	New	With simulation function (CD-ROM)
	RT-ToolBox 2 LT	3D-12C-WINE	New	Lite version (CD-ROM)
	PC cable	2D-232CBL03M	New	For PC-AT compatible machine, 3m
Service part	Backup battery	A6BAT	○	Installed in the robot arm (Quantity: 5pcs)
		Q6BAT	New	Installed in the controller (Quantity: 1pc)

(*) <Compatibility with conventional models> New: New option / ○: Option for conventional models can be used

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
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