MITSUBISHI ELECTRIC

MITSUBISHI INDUSTRIAL ROBOT

MELFA RV-2SDB/RV-2SQB Series

RV-2SDB/RV-2SQB

MELSOFT iQ Platform

MELFANS web
MITSUBISHI ELECTRIC
FA NETWORK SERVICE ON WORLD WIDE

http://MitsubishiElectric.co.jp/melfansweb/english/

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
AUDIT AND CERTIFICATION ORGANIZATION FOR ENVIRONMENT AND QUALITY· JAPAN
UKAS ENVIRONMENTAL MANAGEMENT
EC97J1113
051

ISO 9001
BUREAU VERITAS
Certification
BUREAU VERITAS
1828
UKAS QUALITY MANAGEMENT
008

A compactly-built, vertical multi-axis articulated arm robot ideally suited for future-oriented assembly cells manufacturing a wide variety of products, each in varying quantities.

Features

Reduced in profile yet has a large operating radius

- The length and shape of the arm are designed for optimum performance with a maximum reach being further extended yet the ability retained to cover work area near to the unit.
- A greater operating radius is insured in applications calling for a ceiling-hung unit, as well.
- The robot has an enlarged swing area (-240° to +240°), enabling the rear space to be put to good use, too.

RV-2SDB/RV-2SQB   **CR1DA-771**   **CR1QA-771**

Advanced servo control backs up a high-speed high-accuracy operation

- Maximum combined speed is 4,400 mm/sec. Furthermore, the speed at which the wrist section (secondary arm) moves is boosted to cut down on cycle time in assembly operation.
- A positioning repeatability of as high as ±0.02 mm is realized. High-rigidity arm and active-gain control are combined to achieve a high straight-ahead motion accuracy.

### Arm design that allows for coordination with the peripheral apparatuses

- Flap arm construction further cuts back robot's minimum operating radius, securing a necessary motion space.
- Reduced protrusion of the elbow arm lessens possible interference in the rear space.
- The wrist section which is made less bulky provides easy access through a narrow opening.

A large variety of interfaces are offered to assure a high degree of scalability

- The robot comes standard with additional axis control interface, Ethernet interface, and encoder interface (for tracking purpose, available with SD Series only). This makes it easy to build a manufacturing system with robot placed at its heart.
- Input/output to and from the robot can be controlled directly from GOT without the intermediary of a sequencer. A simplified operating panel can be created without using ladder programs. (This feature is available with SD Series only.)

A rich new selection of software programs that guide users through their startup phases

- RT ToolBox2 : A computer software containing varied features essential for startup such as program editing, debugging and cycle time planning (optional).
- MELFA-Vision: Software designed to employ vision system for maximum ease of use (optional).
- MELFA-Works: A 3D robot simulator that provides powerful support for system design and preliminary study (optional).

Robot Arm

The robot can quickly change its posture in response to needs frequently arising during assembly operation.

Our assembly operation requires robot to take different posture from one step to another…

Axes at the end of the robot arm (J4 through J6) move at a high speed.
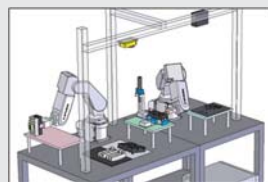
Assembly cell

Analyses indicate that making the arm change its posture faster is effective at achieving speedup of assembly operation. Therefore, provision is made to let axes at the end of the robot arm (J4, J5, and J6) move at a greater speed!!

Cycle time has been reduced by increasing the speed of axes J4, J5, and J6 up about 10% from our high-end model (RB-3SDB).

The robot's ability to handle work near at hand permits a compact layout.

We have had to allow some of the space adjacent to the robot to be wasted…

The upper (No. 1) arm (between J2 and J3 axes) employs a flap (collapsible) construction.

Close proximity is permitted!!

The arm is of flap construction.

Work
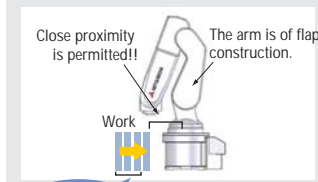
Layout is made more compact / Position/posture at minimum operating radius

The arm of flap construction further cuts back on minimum operating radius!! **R139.5mm**
Also, a broad motion space (maximum radius - minimum radius) is insured despite of reduced operating radius!! **About 360mm**
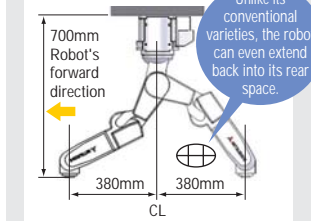
A compact layout can be obtained by making the most of the motion space thus secured.

The robot can cover a larger operating area with its arm oriented as it is.

Even with a ceiling-hung unit used with a compactly-built assembly cell…

The shoulder (J2 axis) is provided with an extended motion space.

700mm Robot's forward direction

Unlike its conventional varieties, the robot can even extend back into its rear space.
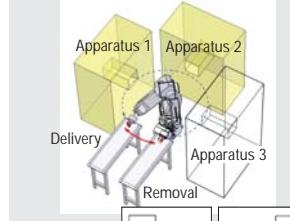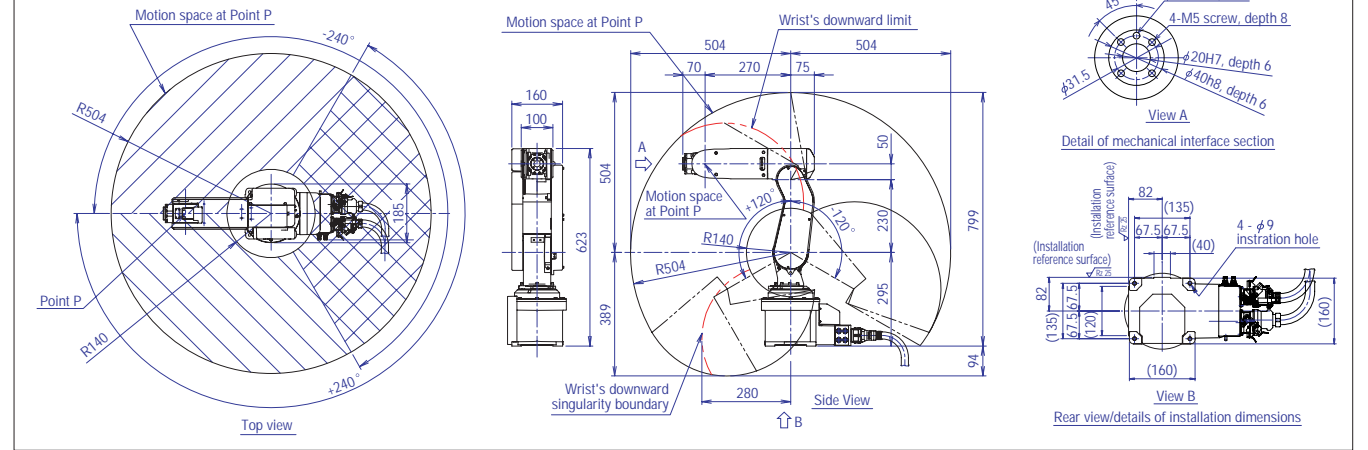
380mm   380mm
CL

The motion space of the shoulder (J2 axis) is extended on the minus side so that it can be rotated into a space in the backward direction. An ample work area is insured in a ceiling-hung installation, too.

A larger operating area obtained without the need to change the orientation of the robot means that needless motion will be lessened and cycle time will be shortened.

Robot has an omnidirectional (360-degree) reach.

We want to set up a work position in four directions to render our system compact…

The waist (J1 axis) is provided with a motion space beyond 360°.

Apparatus 1   Apparatus 2

Delivery   Apparatus 3

Removal

Examples of moving paths

The motion space for the waist (J1 axis) is broadened to 480°(±240°) so that it can rotate 360° and more (360° +α).

Shortest motion distance cuts back on cycle time and raises degree of freedom in robot arrangement.

[Robot's Outer Dimensions and Motion Space]

Motion space at Point P   -240°
R504   Point P   R140   -240°   Top view

Motion space at Point P   Wrist's downward limit
504   70   270   75   504
160   100   504   50   Motion space at Point P   R140   R504   623   389   230   295   799   94
Wrist's downward singularity boundary   280   Side View   ⇧B

φ5H7, depth 8   4-M5 screw, depth 8   45°   φ31.5   φ20H7, depth 6   φ40h8, depth 6
View A   Detail of mechanical interface section
82   (135)   67.5 67.5   (40)   4 – φ9 instration hole   (160)
View B   Rear view/details of installation dimensions

Specification

Robot Arm

Item		Unit	Specification
Type			RV-2SDB / RV-2SQB
Protection class			IP30
Installation			Floorstanding, ceiling-hung, and wall-mounted *1
Structure			Vertical articulated arm robot
Degrees of freedom			6
Arm length		mm	230+270
Maximum reach radius		mm	504
Operating range	J1	deg	480 (-240 to +240)
	J2		240 (-120 to +120)
	J3		160 (0 to +160)
	J4		400 (-200 to +200)
	J5		240 (-120 to +120)
	J6		720 (-360 to +360)
Maximum speed	J1	deg/s	225
	J2		150
	J3		275
	J4		412
	J5		450
	J6		720
Maximum composite speed		mm/s	4400
Cycle time			On the order of 0.6 sec.
Mass load capacity	Rated	kg	2.0
	Maximum	kg	3.0 (wrist, downward)
Position repeatability		mm	±0.02
Mass		kg	19

*1 There are limits to the motion space of J1.
*2 All axes are equipped with a brake.

Controller

Item		Unit	Specification		Remark
Type designation			CR1DA-771 (RV-2SDB)	CR1QA-771 (RV-2SQB)	
Robot language			MELFA-BASIC V		
Position teaching method			Teaching method, MDI method		
External input/output	Input/output	Point	0 input / 0 output (maximum 256/256, available as option)	8192 / 8192 (between sequencer and robot)	
	Dedicated input/output	Point	Assigned according to general-purpose I/O.		
	Input for shutdown purpose only	Point	1		
	Hand open/close input/output	Point	4 inputs / 0 output		4 additional outputs are available as option.
	External emergency shutdown input	Point	1		Double-redundant
	Door switch input	Point	1		Double-redundant
	Enabling device input	Point	1		Double-redundant
	Synchronization of additional axes	Point	1		Double-redundant
	Mode output	Point	1		Double-redundant
	Error output	Point	1		Double-redundant
Interface	RS-232	ports	1	–	Extensions for computer, vision sensor, etc.
	RS-422	ports	1	1	I/F dedicated to TB
	Ethernet	ports	1	1 (dual-use, user and TB)	10BASE-T / 100BASE-TX
	USB	ports	1	–	Device function only, mini-B terminal
	Additional-axis I/F	channels	1	1	SSCNET III
	Tracking I/F	channels	1	–	For connecting encoder cable
	Slot for hand	slots	1		Slot dedicated to air hand I/F
	Extension slot	slots	1	–	For installing optional I/F
Power supply	Input voltage range	V	Single phase, AC200 to 230±10% (180 to 253)		
	Power capacity	KVA	0.5		Not including in-rush current
	Frequency	Hz	50 / 60		
External dimensions		mm	240(W) x 290(D) x 200(H)		Protrusions excluded
Weight		kg	Approx. 9		
Structure			Self-contained floor type / open structure (IP20)		
CPU	Type designation		–	Q172DRCPU	iQ Platform-compliant

SQ Series Controller - New Capabilities

iQ Platform-Compliant High-Speed Communications

Robot CPU mounted on the basis of an iQ Platform-compliant sequencer enables data communications between the sequencer which controls and the robot which is controlled to occur much faster and in much greater volumes.
Input/output to and from external apparatuses can be controlled by each sequencer. This leads to a neat, clutter-free cabling.

Easily legible, information-rich robot status indication

The operational status of the robot is expanded on the sequencer-side memory without the intervention of software programs. Connection of GOT enables the robot's current data values, error description, etc. to be indicated on-screen. The result is a vividly-expressed, human-friendly display system.
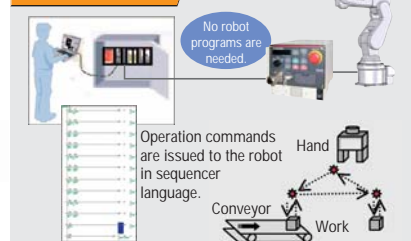
Robot can be readily operated under the control of sequencer language alone.

You do not have to get acquainted with robot language!
MELFA Series RV-2SDB/2SQB comes provided with features which let the sequencer control the robot as if it were a single piece of actuator, thus doing away with the intervention of robot language.
Sequencer language is all that is needed to control the robot as it performs varied tasks including pick-and-place and aligning of workpieces.
(MELFA Series can run just as well on ordinary robot language, too.)

Robot can be readily operated under the control of sequencer language alone!!

We wonder if time it takes for us to get acquainted with robot language wouldn't justify …

Programming can be accomplished by the sequencer language you are accustomed to use.

No robot programs are needed.

Operation commands are issued to the robot in sequencer language.
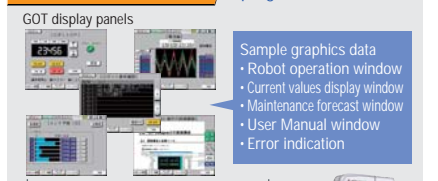Hand   Conveyor   Work

MELFA Series RV-S2SDB/2SQB come with features capable of implementing robot control directly from a sequencer.

You can save on the time required to get acquainted with robot language!! Your robot system can be started simply and quickly by a sequencer language.

Setting of robot's internal data can be easily achieved and displayed on GOT.

It would be nice if we can keep track of robot information together with all other associated information on a single system operation console.

Various essential data and information on the robot are displayed on GOT without the intervention of robot programs.

GOT display panels

Sample graphics data
- Robot operation window
- Current values display window
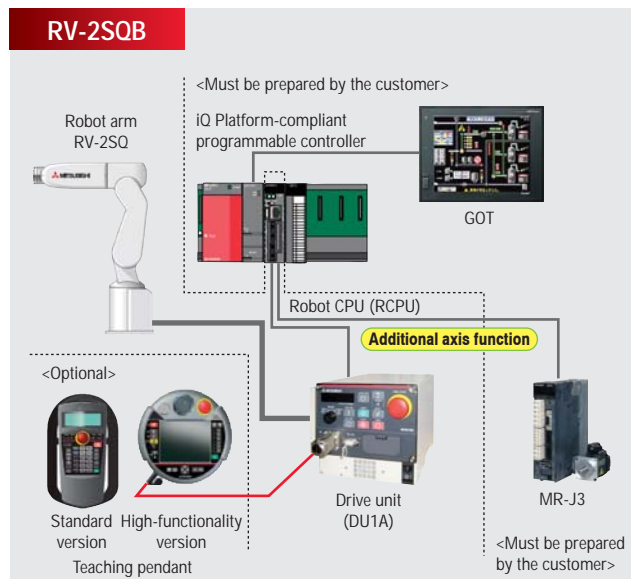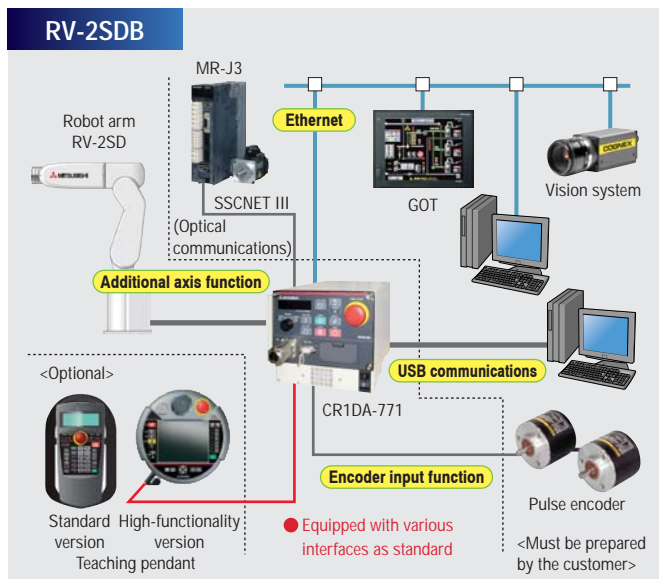- Maintenance forecast window
- User Manual window
- Error indication

GOT1000

Various data is stored in a memory shared by sequencer multi-CPUs.

Sample graphics data can be downloaded from MELFANSWeb website.

❰ Product Configuration ❱

RV-2SDB

- Robot arm RV-2SD
- MR-J3
- Ethernet
- SSCNET III (Optical communications)
- GOT
- Vision system
- Additional axis function
- USB communications
- CR1DA-771
- Encoder input function
- Pulse encoder
- <Optional>
- Standard version / High-functionality version — Teaching pendant
- ● Equipped with various interfaces as standard
- <Must be prepared by the customer>

RV-2SQB

- Robot arm RV-2SQ
- <Must be prepared by the customer>
- iQ Platform-compliant programmable controller
- GOT
- Robot CPU (RCPU)
- Additional axis function
- Drive unit (DU1A)
- MR-J3
- <Optional>
- Standard version / High-functionality version — Teaching pendant
- <Must be prepared by the customer>

❰ Configurations Options ❱

Classification	Name	Type	Specification overview	RV-2SDB	RV-2SQB
Robot arm	Solenoid valve set	1E-VD01/VD01E	Solenoid valve (with an output cable, 1 valve) (sink/source)	○	○
		1E-VD02/VD02E	Solenoid valve (with an output cable, 2 valves) (sink/source)	○	○
	Hand output cable	1E-GR35S	With a robot-side connector, not terminated at another end	○	○
	Hand input cable	1S-HC30C-11	With a robot-side connector, not terminated at another end	○	○
	Hand curl tube	1E-ST0402C	φ4 tube, number of sets - 2	○	○
		1E-ST0404C	φ4 tube, number of sets - 4	○	○
	Stopper for changing motion space	1S-DH-11J1	For effecting change to J1 axis mechanism (±210 deg., ±150 deg., ±90 deg.)	○	○
		1S-DH-11J2	For effecting change to J2 axis mechanism (±30 deg.)	○	○
		1S-DH-11J3	For effecting change to J3 axis mechanism (+70 deg.)	○	○
	Machine cable, for extension/fixed	1S-10CBL-03	Replacement type: 10m	○	○
		1S-15CBL-03	Replacement type: 15m	○	○
	Machine cable, for extension/flexible	1S-10LCBL-03	Replacement type: 10m	○	○
		1S-15LCBL-03	Replacement type: 15m	○	○
Controller	Teaching pendant, standard version	R32TB	7m: Standard / 15m: Custom	○	○
	High-function teaching pendant	R56TB	7m: Standard / 15m: Custom	○	○
	Air hand interface	2A-RZ365/375	8 output points, used exclusively for hand (sink/source)	○	○
	Parallel I/O unit	2A-RZ361/371	32 output points / 32 input points (sink/source)	○	×
	External I/O cable	2A-CBL05/2A-CBL15	Cable length: 5m / 15m, not terminated at one end (for 2A-RZ361/371)	○	×
	Parallel I/O interface	2D-TZ368/378	32 output points / 32 input points (sink/source)	○	×
	External I/O cable	2D-CBL05/2D-CBL15	Cable length: 5m / 15m, not terminated at one end (for 2D-TZ368/378)	○	×
	CC-Link interface	2D-TZ576	CC-Link intelligent device station, Version 2.0, 1 to 4 stations	○	×
	PROFIBUS interface	2A-RZ577	Slave station, combined total number of input and output data: 192 words	○	×
	DeviceNet Slave interface	2D-TZ571	Slave station, Release 2.0 is supported	○	×
	Additional memory	2D-TZ454	User program area with additional memory: 2MB	○	×
	Perssonal computer support softwware	3D-11C-WINJ	With simulation function (CD-ROM)	○	○
	Perssonal computer support softwware-mini	3D-12C-WINJ	Simple version (CD-ROM)	○	○
	Personal computer cable	2D-232CBL03M	For PC-AT compatible machine, 3m	○	×
	MELFA-Vision	3D-51C-WINJ	COGNEX Vision System-compliant	○	○
	3D simulator (MELFA-Works)	3D-21C-WINJ	Add-in to Solidworks software	○	○
Service part	Backup battery	ER6	Installed in the robot arm (Quantity: 4pcs)	○	○
		Q6BAT	Installed in the controller (Quantity: 1pc)	○	○