




**mitsubishi  
electric**

*Changes for the Better*

MITSUBISHI ELECTRIC INDUSTRIAL ROBOT


MELFA RV-6S/6SL Series  
RV-12S/12SL Series




 RV-6SL

 RV-6S



 RV-12SL

 RV-12S

**MELFA**  
**RV-S** series

Nagoya works, Mitsubishi Electric Corporation, has acquired certification for systems of environmental management under ISO 14001, and for quality management systems under ISO 9001.



# Even more Compact, with Greater Speed, Higher Payload, and Amazing Rigidity

High speed, high payload and miniaturization have been achieved through the use of Mitsubishi's own motors, amplifiers and 64-bit RISC chip, all dedicated for high performance robot applications. MELFA RV-S series robots provide solutions for value added systems.

**Speedy**

**Strong**

**Specialist**

RV-6S

RV-6SL

RV-12S

RV-12SL

CR3-535M

CR2B-574

## Features

### Improved Productivity

- **Fastest robots in their class with composite speeds up to 9.6 m/s (RV-12S)**  
It is possible to improve tact time and perform multiple, complex operations in one station.
- **High payload capacity up to 12 kg (26.4 lbs.)**  
A high payload capacity was achieved by incorporating hollow-structure motors, specifically designed for robot applications. More sophisticated, complex end of arm tooling is also supported.
- **High Precision Motion Control**  
Improved motion control through the use of a rigid arm design, and forward feed optimal trajectory control.
- **Hardened to Withstand Environmental Conditions - [arm IP65; body IP54]**  
The rotating joints and reduction gears are sealed within the motor's hollow structure, allowing the S-Series robots to be used in almost any environmental condition for a multitude of applications.
- **Space Saving**  
By incorporating the reduction gears and bearings within the hollow structure of the motors, incredible space savings were realized making the S-series our most compact robots yet.
- **Sophisticated**  
With true multi-tasking capability, additional axis control, and many other features, the robots are ready for any task.

### Reduction of Maintenance Cost

- [New] Impact Detection function - damage to peripheral devices are minimized
- [New] Position Restoration function - less time required for start-up, adjustment and maintenance tasks
- [New] Maintenance Forecast function: Notifies you when maintenance is due

### Providing Safety

- Fail safe brakes at all axes ensure the robot stays in place when the power is off.
- Redundant emergency stop breakers are provided for safe, efficient operation.

### System Compatibility and Commonality

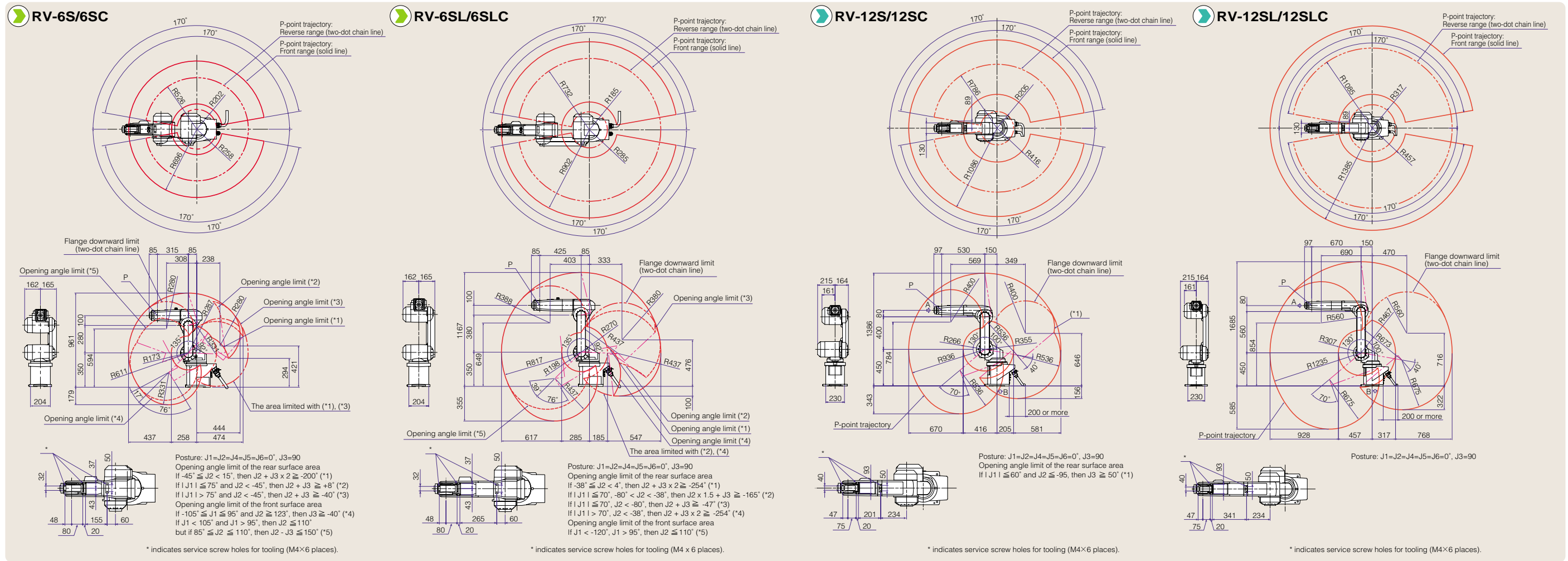
- Programming and operations are common for Mitsubishi's entire range of robots, from 1 kg payload capacity through 150 kg payload capacity, making the S-series easy to use and maintain.

## Model Structure

Type	RV-6S	RV-6SL	RV-6SC	RV-6SLC	RV-12S	RV-12SL	RV-12SC	RV-12SLC
Maximum load mass	6kg				12kg			
Reach	696mm	902mm	695mm	901mm	1086mm	1385mm	1086mm	1385mm
Environment specification	IP65 (J4 to J6)	IP54 (J1 to J3)	Clean class 10 (0.3 μm)		IP65 (J4 to J6)	IP54 (J1 to J3)	Clean class 10 (0.3 μm)	
Standard classification	Standard model		Special specification model		Standard model		Special specification model	
Connected controller	CR3-535M (vertical type, dust-proof specification IP54), CR2B-574 (horizontal installation type, open structure IP20) *1							

\*1: Select either one of the controller types according to the purpose.

## Robot Arm External Dimension/Movement Range Diagrams



## Specification

### Robot Body

Type	Unit	RV-6S/6SC	RV-6SL/6SLC	RV-12S/12SC	RV-12SL/12SLC
Structure		Vertical multiple-joint type			
Degrees of freedom		6			
Drive system		AC servo motor (brakes for all axes)			
Position detection method		Absolute encoder			
Maximum load capacity (rated) *2	kg	6 (5)		12 (10)	
Arm length	mm	280+315	380+425	400+530	560+670
Maximum reach radius	mm	696	902	1086	1385
Operating range	Waist J1	340 (±170), can be limited after shipment (in 45° intervals)			
	Shoulder J2	227 (-92 to +135)			
	Elbow J3	285 (-107 to +166) 295 (-129 to +166)			
	Wrist twist J4	320 (±160)			
	Wrist pitch J5	240 (±120)			
	Wrist roll J6	720 (±360)			
Maximum speed	Waist J1	401	250	276	230
	Shoulder J2	321	267	230	172
	Elbow J3	401	267	267	200
	Wrist twist J4	352			
	Wrist pitch J5	450			
	Wrist roll J6	660			
Maximum composite speed *3	mm/sec	Approx. 9300	Approx. 8500	Approx. 9600	Approx. 9500
Cycle time *4		Order of 0.4 seconds	Order of 0.6 seconds	Order of 0.7 seconds	Order of 0.7 seconds
Position repeatability	mm	±0.02	±0.02	±0.05	±0.05
Ambient temperature		0 to 40			
Mass	kg	Approx. 58	Approx. 60	Approx. 93	Approx. 98
Tool wiring *5		8 input points/8 output points (No.2 arm)			
Tool pneumatic pipes		Primary: φ6 x 2, Secondary: φ4 x 8 Primary: φ6 x 2, Secondary: φ6 x 8			
Installation posture		Installation on floor, hanging (hanging on wall *6)			
Machine cable		5 m (connector at both ends)		7 m (fixed on the controller side)	
Protection specification		IP65 (J4 to J6) IP54 (J1 to J3)			

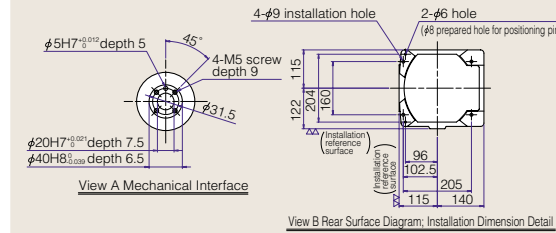
\*2: The maximum load capacity is the maximum mass capacity when the wrist flange is pointing downward (±10°).  
\*3: Value at the hand flange surface when all the axes are combined.  
\*4: Value at a load of 1 kg for RV-6S□ and at a load of 5 kg for RV-12S□ when the robot reciprocates 25 mm vertically and 300 mm horizontally.  
\*5: To use the tool (hand) output, the (optional) pneumatic hand interface is required.  
\*6: The movement range of the J1 axis is limited in the special specification that allows the robot to hang on a wall.

### Controller

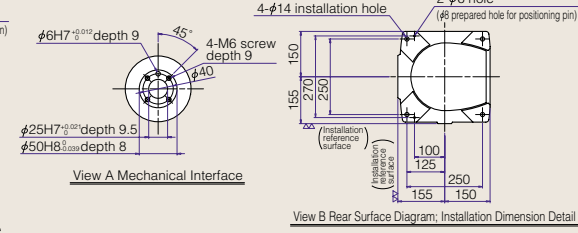
Type	Unit	CR3-535M	CR2B-574
Path control method		PTP control, CP control	
Number of axes controlled		Up to 6 axes simultaneously, and up to 8 axes for additional axis control	
CPU		64bit RISC/DSP	
Robot language		MELFA-BASIC IV	
Position teaching method		Teaching method, MDI method	
Memory capacity	Numbers of teaching points and steps	points 2,500	steps 5,000
	Number of programs	steps 88	
	General-purpose I/O	points 32/32 (up to 256/256 when using the optional, additional I/O unit)	
External I/O	Dedicated I/O	points Assigned from general-purpose I/O (one point, "STOP," is fixed)	
	Hand I/O	points 8 inputs/0 output (8/8 when the pneumatic hand interface is used)	
	Emergency stop input	points 1 (support 2 contacts)	
	Emergency stop output	points 1 (support 2 contacts)	
Interface	Door switch input	points 1 (support 2 contacts)	
	RS-232C	ports 1 (for connecting a personal computer, vision sensor etc.)	
	RS-422	ports 1 (for connecting a teaching pendant)	
	Slot dedicated to hand	slots 1 (for connecting a pneumatic hand interface)	
Interface	Extension slot	slots 2 (for connecting optional extensions)	3 (for connecting optional extensions)
	SSCNET	ports 1 (for connecting additional axes)	0 (the optional additional axis interface is used for connection)
	Memory expansion slot	slots 1 (for connecting an optional memory cassette)	
	Robot I/O link	channels 1 (for connecting a parallel I/O unit)	
Operating temperature range	°C	0 to 40	
Relative humidity	%RH	45 to 85	
Power supply	Input voltage range	V 3-phase, AC 180 to 253	Single phase, AC 180-253
	Power capacity *7	KVA 3.0 (excluding inrush current)	2.0 (excluding inrush current)
External dimensions	mm	450(W) x 380(D) x 625(H)	460(W) x 400(D) x 200(H)
Mass	kg	Approx. 60	Approx. 20
Structure (protection specification)		Self-contained floor type/closed structure [IP54]	Self-contained floor type/closed structure [IP20]
Grounding *8		100 or less (D-class grounding)	

\*7: The power capacity is the rated value at normal operation. Please be aware that the power capacity does not take inrush current applied when the power supply is turned on into consideration. The power capacity should be considered a guideline, and the guaranteed operation depends on the input power supply voltage.  
\*8: Grounding is conducted at the customer's own risk.

### RV-6S/6SL Series Common Parts

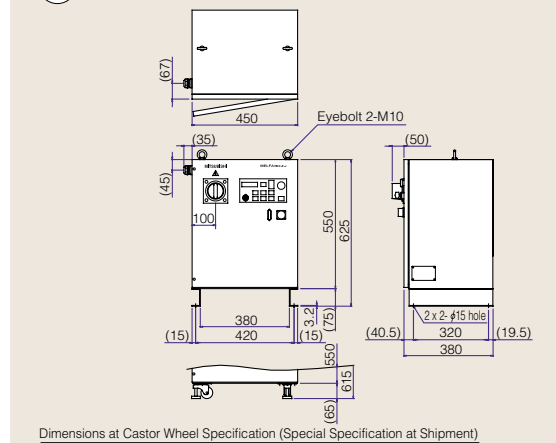


### RV-12S/12SL Series Common Parts

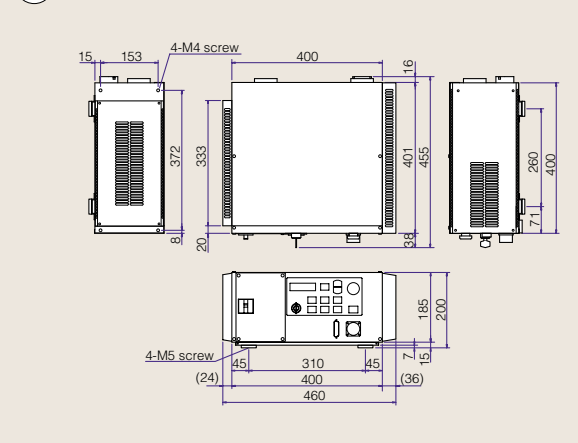


## Controller External Dimension Diagram

### CR3-535M



### CR2B-574



Dimensions at Castor Wheel Specification (Special Specification at Shipment)

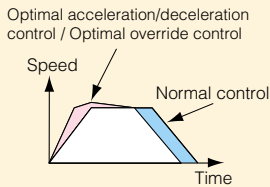


# -Highly Capable Robots

## Functions

### [1] Optimal Acceleration/Deceleration Control / Optimal Override Function

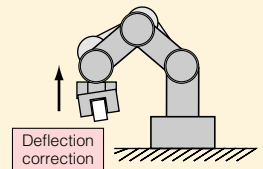
- The optimal acceleration/deceleration time and speed are automatically set according to the operation position, posture and load conditions of the robot.



Tact time is reduced.  
Startup time is reduced.

### [2] Deflection Correction

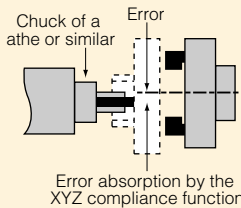
- The deflection of the robot arm due to gravity is taken into account.
- The amount of deflection is calculated according to the operation position, posture and load conditions.



Palletizing precision is improved.  
Trajectory precision is improved.

### [3] XYZ Compliance Control

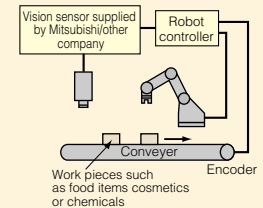
- The rigidity of the robot is reduced so that the robot can be adjusted by external force.
- The direction of compliance can be specified.



Tooling costs are reduced.  
Line stops happen less frequently.  
Startup time is reduced.

### [4] Conveyor Tracking Function

- It is possible to make the robot carry out its intended operation while it follows the conveyor without stopping the conveyor.
- Programming this kind of application is easily done with the robot language (MELFA BASIC IV).

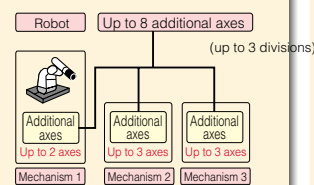


Operation tact is improved.  
Positioning devices are not required.

\* The optional tracking interface card is required.

### [5] Additional Axis Control

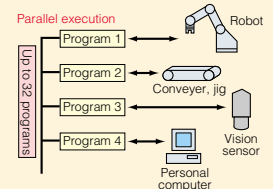
- The travel axes and turn table of the robot can be controlled.
- Up to 8 axes, in addition to the robot arm, can be controlled.



Dedicated control devices are not required.  
Can be controlled by robot's programming.

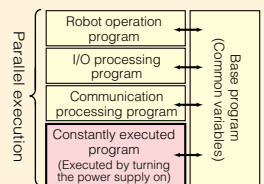
### [6] Multi-Tasking Function

- This function enables the robot to process several user programs in parallel. Several created programs, including robot operation, I/O signal processing, communication with external devices such as vision sensors and personal computers, and various calculation processes, can be processed in parallel.
- Processes can be given different priorities.
- Up to 32 programs can be execute in parallel.



Note 1: The processing time varies depending on the program volume and calculation.

Note 2: The default setting value is 8 programs.



Tact time is shortened.  
System costs are reduced.

### [8] Position Restoration Support Function

- The origin data can be corrected simply by reproducing some of the previous teaching points if gaps occurred in the hand/arm movement, the motor or belt is replaced, or the robot is reinstalled. Conventional operations of setting the origin again and teaching again are no longer necessary.

Startup time and line stop times are reduced.  
Maintenance costs are reduced.

\* The optional personal computer support software is required.

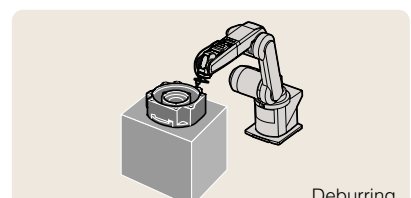
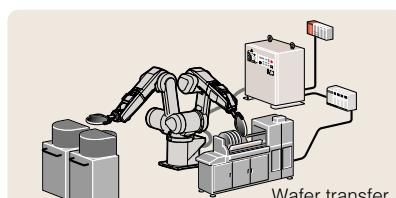
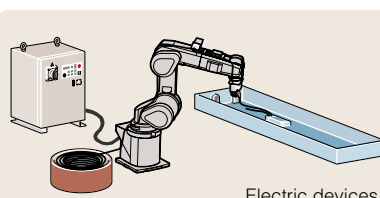
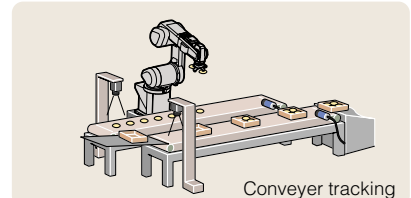
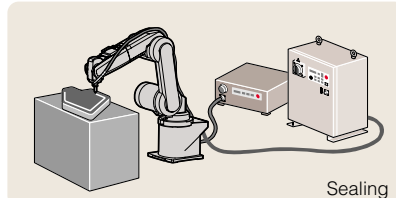
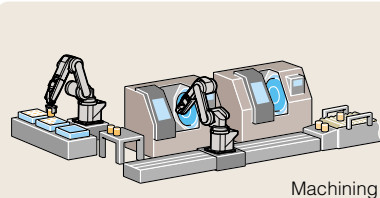
### [9] Maintenance Forecast Function

- This function analyses the load conditions while the robot is actually operating and, based on the analysis, estimates the time when maintenance such as lubrication and belt replacement are required.

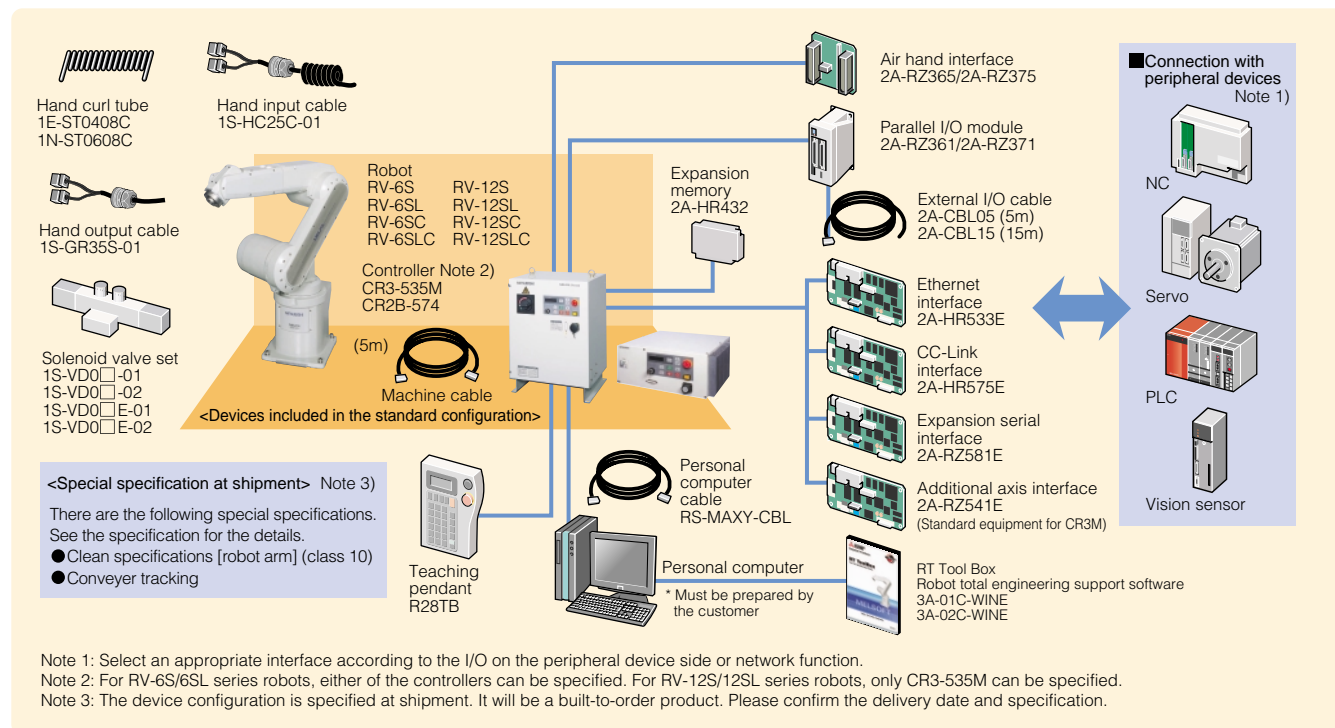
Line stop times and maintenance costs are reduced.

\* The optional personal computer support software is required.

## Main Uses



## System Configuration



## Configuration Options

Classification	Name	Type	Supported model Note 1)	Compatibility Note 2)	Specification outline
Robot arm	Solenoid valve set	1S-VD0-02	6S	New	Sink type. 1 to 4 connections: with solenoid valve output cables
		1S-VD0-01	12S	New	
		1S-VD0-E-02	6S	New	Source type. 1 to 4 connections: with solenoid valve output cables
		1S-VD0-E-01	12S	New	
	Hand output cable	1S-GR35S-01	Common	New	One end not processed, supporting 4 connections
	Hand input cable	1S-HC25C-01		New	8-point support, with drip-proof grommet
	Hand curl tube	1E-ST0408C	6S	○	Support for $\phi$ 4-4 connection
		1N-ST0608C	12S	○	Support for $\phi$ 6-4 connection
	Stopper for changing movement range of axis J1	1S-DH-02	6S	New	Stopper part (installed by the customer)
		1S-DH-01	12S	New	
Controller	Machine cable extension fixing	1S-□□CBL-01	6S	New	Extension type, amount of extension: 5m, 10m, 15m
	Machine cable extension flexing	1S-□□LCBL-01		New	
	Machine cable extension fixing	1S-□□CBL-02	12S	New	Extension type, amount of extension: 5m, 10m, 15m
	Machine cable extension flexing	1S-□□LCBL-02		New	
	Teaching pendant (7m, 15m)	R28TB(-**)	Common	○	IP65, Standard: 7m, Special: 15m
	Pneumatic hand interface	2A-RZ365		○	Sink type 8 output points for hand
		2A-RZ375		○	Source type 8 output points for hand
	Parallel I/O unit	2A-RZ361		○	Sink type 32 output points/32 input points
		2A-RZ371		○	Source type 32 output points/32 input points
	External I/O cable (5, 15m)	2A-CBL**		○	CBL05: 5 m, CBL15: 15 m, one end is not processed
	Ethernet interface (10BASE-T)	2A-HR533E		○	10BASE-T, 10 Mbps
	CC-Link interface	2A-HR575E		○	CC-Link intelligent device station (1 or 4 stations)
	Additional axis interface	2A-RZ541E		○	SSCNET maximum 8 axes (standard equipment for CR3M)
	Built-in vision sensor	4A-RZ511		○	Built-in vision sensor (japanese only)
	Expansion serial interface	2A-RZ581E		○	RS232C x 2, RS422 x 1 (Encoder input x 2: Special specification)
	Expansion memory	2A-HR432		○	User program area after expansion: 2 MB
	Personal computer support software	3A-01C-WINE		●	With simulation function (CD-ROM)
	Personal computer support software mini	3A-02C-WINE		●	Simplified version
Service part	Backup battery	A6BAT	Common	○	For IBM PC/AT compatible machines, 3 m
		ER6		○	For internal use in the mechanism (number of batteries used: 5)
				○	In the controller (number of batteries used: 1)

Note 1: Common: Common for RV-6S/6SL series and RV-12S/12SL series, 6S: For RV-6S/6SL series, 12S: For RV-12S/12SL series

Note 2: <Compatibility with conventional robot> New: Special option for this type, ○: Can use conventional (CR\*, model) options, ●: Upgrade of conventional options

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