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Mitsubishi Electric Corporation Industrial Robot

MELFA Technical News

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January. 2011

Subject: **Instructions for Replacement of New/Old Vertical Multi-Joint Robots (RV-1A/2AJ→RV-2SD/2SQ)**

Applicable to: **RV-1A/2AJ Series→RV-2SD/SQ series**

Thank you for your continued patronage of the Mitsubishi Industrial Robot.
This newsletter presents the information on notes at the replacement from vertical revolute robot RV-1A/2AJ Series to RV-2SD/2SD Series.

Contents

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Instructions for Replacement of New/Old Vertical Multi-Joint Robots (RV-1A/2AJ→RV-2SD/2SQ)

1. New/Old Lineups

The RV-1A/2AJ Series improved as RV-2SQ/2SD Series, and all the model names changed as "1A/2AJ" → "2SQ" or "2SD".

Series	Controller
RV-1A	CR1-571
RV-2AJ	CR1-571

⇒

Series	Controller
RV-2SD/2SDB	CR1DA-771
RV-2SQ/2SQB	CR1QA-772

・CR1DA controller →Controller for SD Series.
・CR1QA controller →Controller for SQ Series.
Robot controller for iQPlatform.

2. New/Old Specifications

2.1 Robot Specifications

Degree of freedom			6	5	6
Installation posture			On floor, hanging		On floor, hanging,(against wall (Note1))
Structure			Vertical, multiple-joint type		
Drive system			AC servo motor (J1 to J3:50W with breke、 J4,J6:15W no brake、 J5:15W with brake)		AC servo motor (2SD/2SQ : J1: 100W no brake、 J2,J3:100W with brake, J4,J6: 50W no brake、 J5:50W with brake) (2SDB/2SQB : All axes have the brake)
Position detection method			Absolute encoder		
Arm length	Upper arm	mm	250		230
	Fore arm		160		270
Operating range	Waist (J1)	Degree	300 (−150～+150)		480 (−240～+240)
	Shoulder (J2)		180 (−60～+120)		240 (−120～+120)
	Elbow (J3)		95 (+65～+155)	230 (−110～+120)	160 (0～+160)
	Wrist twist (J4)		320 (−160～+160)	—	400 (−200～+200)
	Wrist pitch (J5)		180 (−90～+90)		240 (−120～+120)
	Wrist roll (J6)		400 (−200～+200)		720 (−360～+360)
Speed of motion	Waist (J1)	Degree/s	180		225
	Shoulder (J2)		90		150
	Elbow (J3)		135		275
	Wrist twist (J4)		180	—	412
	Wrist pitch (J5)		180		450
	Wrist roll (J6)		210		720
Maximum resultant velocity		mm/sec	Approx. 2,200	Approx. 2,100	4,400
Load	Maximum(Note2)	kg	1.5	2	3
	Rating		1	1.5	2
Pose repeatability		mm	±0.02		
Ambient temperature		℃	0～40		
Mass		kg	Approx. 19	Approx. 17	19
Allowable moment load	Wrist twist (J4)	N・m	1.44	—	4.17
	Wrist pitch (J5)		1.44	2.16	4.17
	Wrist roll (J6)		0.73	1.1	2.45
Allowable inertia	Wrist twist (J4)	kg・m2	2.16×10^{-2}	—	0.18 (0.27) (Note4)
	Wrist pitch (J5)		2.16×10^{-2}	3.24×10^{-2}	0.18 (0.27) (Note4)
	Wrist roll (J6)		5.62×10^{-3}	8.43×10^{-3}	0.04 (0.1) (Note4)
Arm reachable radius front paxis		mm	418	410	504
Tool wiring (Note3)			Hand input 4 point(Hand section), hand output 4 point(Base section), Motorized hand output (Hand section)		Hand input 4 point / hand output 4 point
Tool pneumatic pipes			Primary side: φ4×4pcs(Base to fore arm section)		
Supply pressure		Mpa	0.5 ±10 %		
Protection specification			IP30		
Degree of cleanliness			—		
Painting color			Light gray (Equivalent to Munsell: 7.65Y7.6/0.73)		Light gray (Equivalent to Munsell: 0.08GY7.64/0.81)

Note1) When used by mounting on the wall, a special specification that limits the operating range of the J1 axis will be used. Please give an order separately.

Note2) The maximum load capacity is the mass with the mechanical interface posture facing down word at the ± 10° limit.

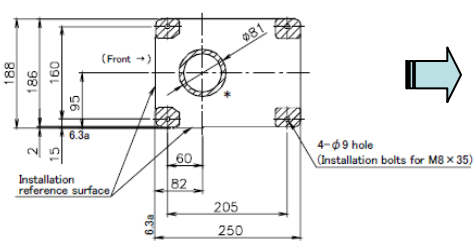
Note3)The pneumatic hand interface (option) is required when the tool (hand) output is used. Also, if the solenoid set (option) is used, four points of hand outputs are used for other options.

Note4)"(value)" indicates the Allowable inertia when the Optimum acceleration/deceleration control is used, and the load is set.

2.2 Outside dimensions ,Operating range diagram

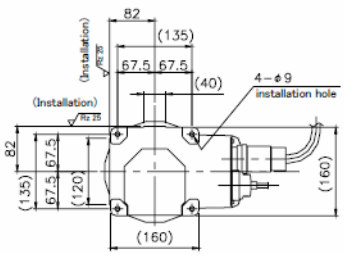
1) Detail of installation dimension, Detail of mechanical interface

Conventional Model

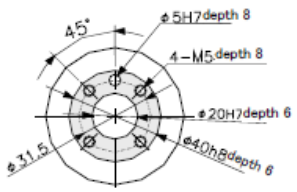


Detail of installation dimension
(RV-1A/2AJ Series)

New Model



Detail of installation dimension
(RV-2SD/2SQ Series)

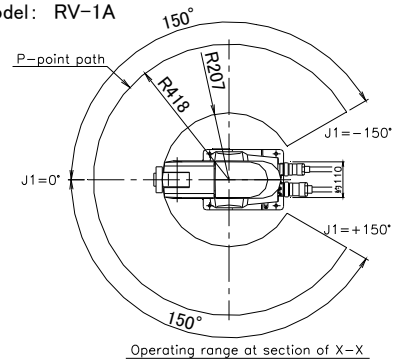


Detail of mechanical interface
(RV-1A/2AJ/2SD/2SQ Series)

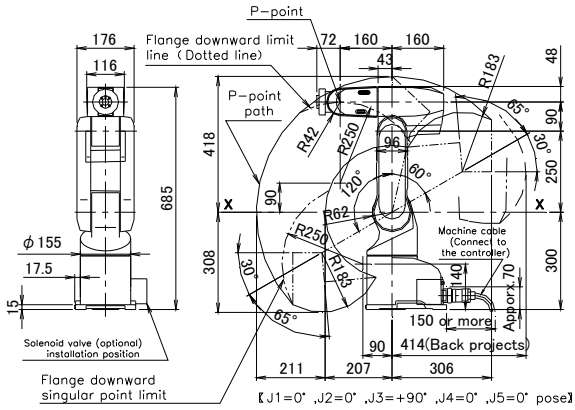
Instructions for Replacement of New/Old Vertical Multi-Joint Robots (RV-1A/2AJ→RV-2SD/2SQ)

2) Outside dimensions ,Operating range diagram

Conventional Model: RV-1A

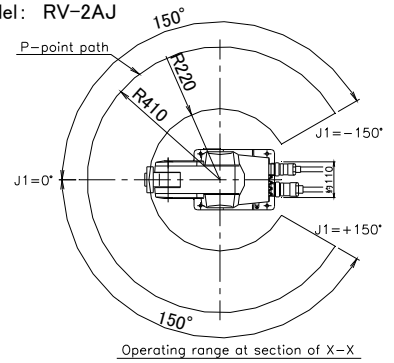


Operating range at section of X-X

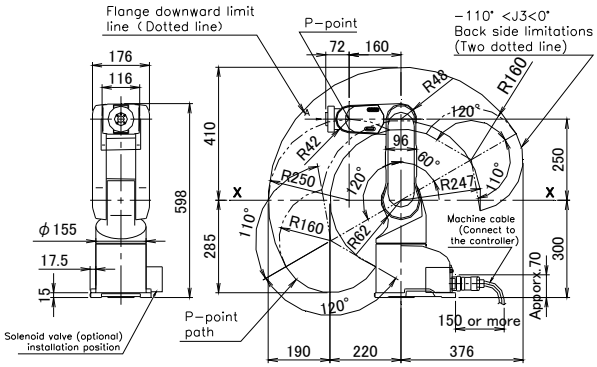


【J1=0° ,J2=0° ,J3=+90° ,J4=0° ,J5=0° pose】

Conventional Model: RV-2AJ

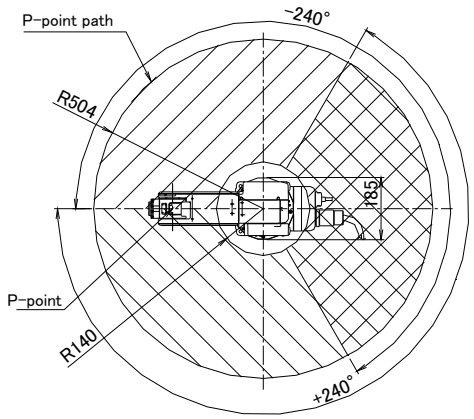


Operating range at section of X-X

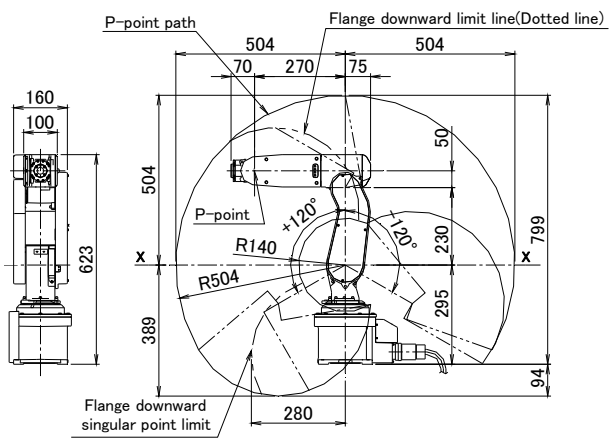


【J1=0° ,J2=0° ,J3=+90° ,J5=0° pose】

New Model: RV-2SD/2SQ Series

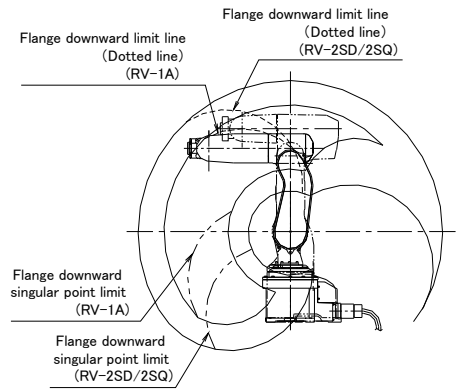


Operating range at section of X-X



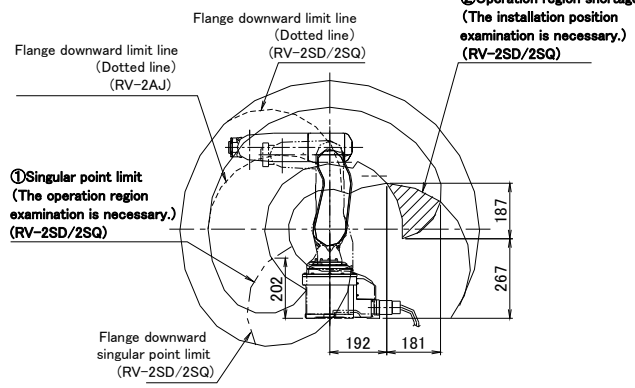
【J1=0° 、J2=0° 、J3=+90° 、J4=0° 、J5=0° pose】

Operating range comparison between RV-1A Series and 2SD/2SQ Series
(When you match installed side and the J1 axis center.)



Range of motion comparison between RV-1A and 2SD/2SQ
(When you match installed side and the J1 axis center.)

Operating range comparison between RV-2AJ Series and 2SD/2SQ Series
(When you match installed side and the J1 axis center.)



Range of motion comparison between RV-2AJ and 2SD/2SQ
(When you match installed side and the J1 axis center.)
Note above-mentioned ① and clause ② at the replacement.

Instructions for Replacement of New/Old Vertical Multi-Joint Robots (RV-1A/2AJ→RV-2SD/2SQ)

2.3 Controller Specifications

The outside dimension of controller is changed. The servo amp for additional axis also is changed from MR-J2S to MR-J3 also. See below for details.

Item		Unit	Specification			Difference
			Conventional Model	New Model		
			1A, 2AJ Serise	2SD/2SDB Serise	2SQ/2SQB Serise	
Controller model			CR1-571	CR1DA-771	CR1QA-772	Model name changed
Program language			MELFA-BASICⅣ (or Mov e master command)	MELFA-BASICⅤ or MELFA-BASICⅣ (Note1)		Upward compatible language
Capacity	No. of points	point	2,500	13,000		Capacity increased
	No. of steps	step	5,000	26,000		Capacity increased
	No. of programs	unit	88	256		Capacity increased
External I/O (Standard)	General I/O	point	16/16 (Max. 240/240 by option)	0/0 (Max. 256/256 by option)	0/0 (Max. 8192/8192)	(Note2): 1A/2AJ/2SD: genera I/O (maximum option) 2SQ: Multi-CPU share device (maximum)
	Dedicated input /output	point	Assigned with general input/output	Assigned with general input/output	Assign to the multi-CPU share device.	
	Special stop input	point	—	1		New function
	Hand I/O	point	4(sink/souce altanative)/0			Up to 4 output points can be added as an option
	Emergency stop input	point	1	1 (redundant)		Redundant
	Door switch input	point	1	1 (redundant)		Redundant
	Additoinal axis synchronous out	point	1	1 (redundant)		Redundant
	Emergency stop output	point	1	1 (redundant)		Redundant
	Enabling device input	point	—	1 (redundant)		New function
	Error output	point	—	1 (redundant)		New function
	Mode output	point	—	1 (redundant)		New function
Interface	RS-232	port	1		—	
	RS-422(for T/B)	port	1			
	Hand dedicated slot	slot	1			Dedicated for pneumatic hand interface
	Memory -expansion slot	slot	—	1	—	
	Function-enhancement slot	slot	0 (Note4)	1	0 (Note3)	
	Robot I/O Link (Additional Parellel I/O Unit)	ch	1		0 (Note3)	For general I/O increase
	Ethernet	ch	0 (optional) 10BASE-T	1 10BASE-T/100BASE-Tx	0 (Note3)	
	USB	port	—	1	0 (Note3)	
	Function of additional axis	ch	0 (optional) MR-J2S compliant	1 MR-J3 compliant		SSCNETⅢ
	Encoder input	ch	0 (optional)	1	0 (Note3)	
	Key switch interface	port	—	—	1	For key switch installation
Input Power Source	Input voltabe range	Vac	Single phase 90～132 (Single phase 180～242)(Note5)	Single phase 180～253		
	Power capacity	kVA	0.7	0.5		Does not include rush current
Outside Dimension		mm	212(W)×290(D)×151(H)	240(W)×290(D)×200(H)		See the dimensional drawing.
Configuration			Open type(IP20)			
compliants	Safety (ISO)		compliant			ISO-10218
	UL		—	option available		UL1740
	CE		compliant			EMC command
	RoHS		× (Pb free phase 1)	○ (Pb free phase 3)		2008/10～

Note1:The program of MELFA-BASICIV can be used by MELFA-BASICV, if program is converted by RT ToolBox2 (option).

Note2: I/O number →It came to be able to select the best option in network or PIO.

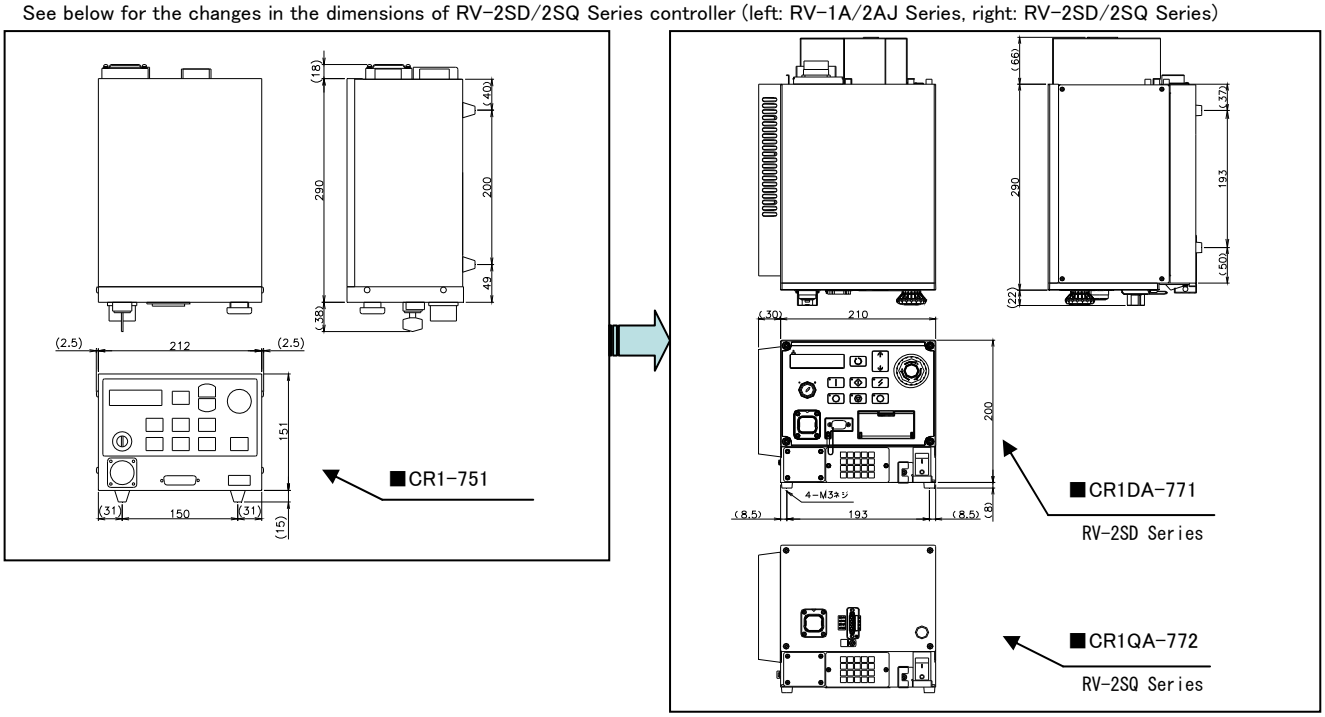
Note3: SQ function enhancing →It corresponds with the sequencer function enhancing unit.

Note4: It increases it with CR1-EB3. (Slot3)

Note5: It corresponds by the setting change of the input power-supply voltage setting connector when using it with AC180-242V.

2.4 Controller Dimension

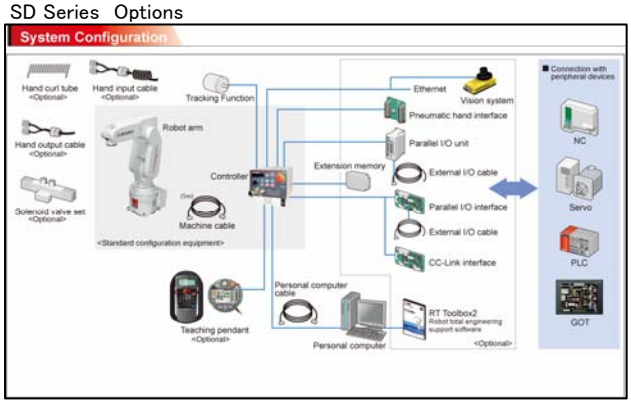
See below for the changes in the dimensions of RV-2SD/2SQ Series controller (left: RV-1A/2AJ Series, right: RV-2SD/2SQ Series)



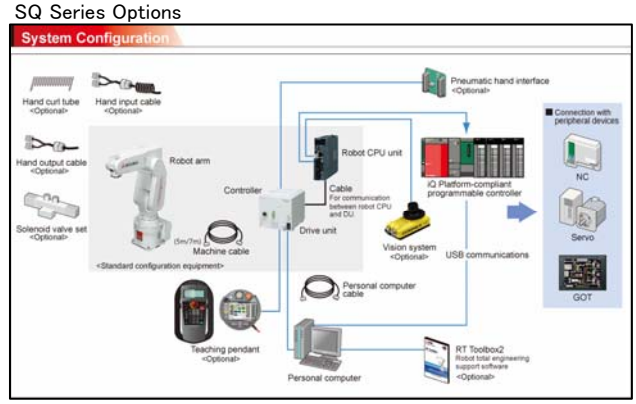
2.5 Options

(1) 2SD/2SQ Option System Configuration

SD Series Options



SQ Series Options



(2) Comparison of Robot Options

Item	Specification		Compatible
	Conventional	New	
	1A/2AJ Series	2SD/2SQ Series	
Solenoid valve set	1E-VD01 (Sink type) 1E-VD02 (Sink type) 1E-VD01E (Source type) 1E-VD02E (Source type)		○
Hand output cable	1E-GR35S		○
Hand input cable	1A-HC20	1S-HC30C-11	×
Hand curl tube	1A-ST0402C 1A-ST0404C	1E-ST0402C 1E-ST0404C	×
Pneumatic hand set	4A-HP01	—	—
Motorized hand set	4A-HM01 4A-HM01E	—	—
Stopper for changing the operating range (J1 Axis to J3 Axis)	—	1S-DH-11J1 1S-DH-11J2 1S-DH-11J3	●
Machine Cable Extention (fix type)	1A-□□CBL-1	1S-□□CBL-11	×
Machine Cable Extention (Hi-f lex type)	1A-□□LCBL-1	1S-□□LCBL-11	×

○ : Same
● : New option
× : Not compatible
— : Not supported

(3) Comparison of Robot Controller Options

Item	Specification			1A/2AJ /2SD Compatible	1A/2AJ /2SQ Compatible	Note
	Conventional	New				
	1A/2AJ Series	2SD Serise	2SQ Serise			
Pneumatic hand interface	2A-RZ365(Sink)/2A-RZ375(Source)			○	○	Common to all models
Parallel I/O unit	2A-RZ361(Sink)/2A-RZ371(Source)		◆	○	×	Common to 1A/2AJ/2SD
External I/O cable	2A-CBL□□		◆	○	×	Common to 1A/2AJ/2SD (Parallel I/O unit compliant)
Parallel I/O interface	(with built-in standard)	2D-TZ368(Sink) /2D-TZ378 (Source)	◆	●	—	2SD:PIO (Installation when it is necessary)
External I/O cable(New)	—	2D-CBL□□	◆	●	—	Parallel I/O interface compliant
CC-Link interface	2A-HR575	2D-TZ576	◆	×	×	2SD:ver.2 compliant
Additional axis interface	2A-RZ541	☆		☆	☆	
Ethernet interface	2A-HR533	☆	◆	☆	×	2SQ:MELFA-VISION can connect the sequencer() without using it.
Expansion option box	CR1-EB	—	—	×	×	
Tracking Function	2A-RZ581	☆	◆	☆	×	
Extended serial interface	2A-RZ581	—	◆	×	×	2SD: RS-232 port in front of controller can be used.
Extension memory cassette	—	2D-TZ454	—	×	×	2SQ:Uncorrespondence
Controller protection box	CR1B-MB	—		—	—	
Teaching pendant (T/B)	R28TB	R32TB		×	×	2SD/2SQ:The controller can connect R28TB with the conversion cable.
Teaching pendant (T/B)	—	R56TB		●	●	2SD/2SQ:New T/B
Personal computer cable	RS-MAXY-CBL	2D-232CBL03M	◆	×	×	
RT Tool Box2	3A-0□C-WINE	3D-1□C-WINE		◎	◎	

○ : Same unit
◎ : Upward compatible
● : New option
☆ : Standard equipment
◆ : With Mitsubishi PLC
× : Not compatible
— : Not supported

3. Compatibility

See below for compatibility of new/old models.

3.1 Robot Compatibility

Type	Item	Specification		Compatibility	Note
		Conventional	New		
		1A/2AJ Series	2SD/2SD Series		
Outside dimensions	Installation dimension	Installation dimension changed		×	Miniaturization of installed part
	Operating range	Operating range changed		△	
Tooling	Hand wiring	Hand wiring changed		×	no change in the hand output wiring only
	Hand piping	Hand piping changed		×	no change in the number of piping
	Preliminary wiring	Preliminary wiring changed		×	
Maintenance	Backup battery	A6BAT	ER6	×	

○: Full compatible、 ×: Not compatible、 △: The real use region is covered (note1)。

Note 1: Operating range

1) When RV-1A is replaced with RV-2SD/2SQ, all use region is covered.

2) When RV-2AJ is replaced with RV-2SD/2SQ, the following replacement examination is necessary.

①There is a flange downward singular limit in a lower region, and examine use that avoids this region, please.

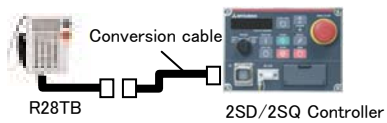
②The operation region under the back includes the lack region, and examine use that avoids this region, please.

3.2 Controller Compatibility

Type	Item	Specification			Compatibility	Note
		Conventional	New			
		1A/2AJ Series	2SD Series	2SQ Series		
Operation	T/B	R28TB	R32TB		★	Connectable with a conersion cable
	Enhanced T/B	—	R56TB		●	
	T/B Desorption Switch	Available	N/A(※1)		×	Compliant with safety standards
	I/O Map	0-9999		10000-18191	※2	
	Programming Language	MELFA-BASICⅣ	MELFA-BASICⅤ (Ⅳ also available)		◎	
	move master commanc		Not supported		×	
	PC Support S/W	RT ToolBox	RT ToolBox2		◎	RT ToolBox 2 is av ailable for conv entional models as well
Mainten ance	Backup Battery	ER6	Q6BAT		×	Commoditized with PLC maintenance parts

◎: Upward compatible、○Full compatible、●: New funciton、×: Not compatible、★: Alternativ es av ailable

Conversion cable is required to connect R28TB to a new controller. The conversion cable "2D-28CON" is available for purchase.



※1: Removal of T/B Removal Switch

T/B emergency stop error occurs when T/B is removed from the controller. Use caution in removing the T/B during the automatic operation. The emergency stop can be canceled with a dummy connector.

※2: I/O Map

Standard I/O address of CR1-571 controller of RV-1A/2AJ Series is 0~15; the next address is 32~ when the additional I/O.

I/O address of built-in I/O interface of CR1DA-771 controller of RV-2SD Series is, on the contrary, 0~31, and the next address is 32~ when the additional I/O is connected. (This corresponds to expand 16-31 on I/O map for CR1DA-771)

It becomes the common device between multis CPU about CR1QA-772 for RV-2SQ.

4. MELFA-BASIC

4.1 MELFA－BASICⅤ

MELFA-BASICV is available for the robot controller of CR1DA-771/CR1QA-772.
MELFA-BASICV is more user-friendly and easier-to-describe than MELFA-BASICⅣ

4.2 Features of MELFA-BASICⅤ and Ⅳ

MELFA-BASICⅤ has new features as shown below:

(1) Line numbers are not necessary. Conventional line numbers are automatically numbered as step numbers, which saves troubles of numbering of line numbers, improves programming efficiency, and reduces programmer's loss.
(2) Lower-case letters are available for commands and variable names for improved readability.
(3) Commands and functions are added for better functionality.

4.3 Comparison with MELFA-BASICⅤ and Ⅳ

(1) See below for the comparison between MELFA-BASICⅤ and Ⅳ

Item	MELFA-BASICⅣ	MELFA-BASICⅤ
Program Name	Up to 12 capital letters and numbers (Less than 4 characters are recommended for O/P display)	
Available Characters	・Alphabetic characters (capital letters only. Lower-case letters s are used for comments and character-string data only) ・Numbers ・Symbols	・Alphabetic characters (capital/lower-case letters) ・Numbers ・Symbols
Step No. (Line No.)	Needs to be entered as a line number in programming	Automatically numbered as a step number in registering programs.
Line Length	Up to 127 characters	Up to 240 characters
Variable Name	Up to 8 characters. All alphabetical characters forvariable names are converted into capital letters.	Up to 16 characters. Alphabetical characters (capital & lower-case) can be used for variable names. Not case-sensitive. Characters are converted into the first characters registered in
Label	Up to 8 characters. All alphabetical characters for label names are converted into capital letters.	Up to 16 characters. Alphabetical characters (capital & lower-case) can be used for label names. Not casesensitive. Characters are converted into the first characters registered in readout.
Instruction Word Function System State Variable	All in capital letters. Registration is done in capital letters as well.	Alphabetical capital/lower-case letters. Not casesensitive for registration. Characters are converted into the first characters registered in readout.
How to Specify "Jumpto" Command in Branch Instruction (Goto, GoSub)	Use label or line number to specify.	Use label to specify.

(2) See below for the commands added to MELFA-BASICⅤ

Classification	Description	Command	Function	Outline
Variable	Numeric variable	&	Defines the long integral type of numeric variable	Data range: -2147483648～2147483647 (normal integral type is -32768～32767)
Command	Definition	Def Long	Defines the long integral type of numeric variable	Data range: -2147483648～2147483647 (normal integral type is -32768～32767)
Command	Robot operation control	Fine J	Checks the arrival at the destination	Specifies the robot positioning condition with joint degree value
Command	Robot operation control	Fine P	Checks the arrival at the destination	Specifies the robot positioning condition with distance
Command	Robot operation control	MvTune	Defines the operation property of robot motion charctor	Standard mode (initial value), high-speed positioning mode, excursion
Command	Definition	Base	Selection of coordinate system that becomes standard of location control. The function for the work coordinate system is added.	The world coordinate system can be moved, and be rotated by the method of specifying the base conversion data directly. The method of specifying the defined coordinate system number is added.
Function	Position variable	Zone3	Checks if the specified position is within the specified area	Checks if the point is in/out of cubic defined by 3points
State Variable	User definition field	M_Uar32	Return the value showing if it is in or out	Inside and outside information on the user area is returned by the bit corresponding to area 1-32.
State Variable	State variable	M_BsNo	Return the number of a present base coordinate system	Reading of base coordinates number being set now (0: a system initial value and 1-8: the work coordinate system number and -1: Set it excluding the following.)
State Variable	State variable	P_WkCord	The work coordinates are set the reference to the work coordinate data being set now new.	It reads or present work coordinates value is set from of the setting work coordinates number 1-8.

4.4 Precaution in Using MELFA-BASIC IV on MELFA-BASIC V

(1) RV-2SD/2SQ Series have new controller, CR1DA-771/CR1QA-772, with more improved control/drive performances than RV-1A/2AJ Series. Therefore, Following checking are necessary by the actual robot operation.
Clearance around arm while robot motion, Cycle time, waiting time

Amplification:

The above-mentioned performance improvement is due to the speed-up of the processing performance that originates in the processor abilities of the motion processing, the operation processing, and the condition branching processing, etc. The method of processing each instruction is the same as the past and doesn't have the change. There is a possibility of not operating correctly in the part where interlock is not taken though the problem is not in the part where interlock is taken with an external equipment and I/O, etc. when the program is misappropriated by this performance gain. Therefore, please confirm notes, and execute the adjustment as follows.

【Note】

① The robot-operation completion time is reduced as the acceleration/deceleration time in the robot operation is reduced die to the improved drive function. Check the timing of the area in operation without interlock (the area where the operation of peripheral device <positioning etc.> is completed while the robot is in motion).

② Due to the changes in the acceleration/deceleration time of robot, the motion excursion may differ from the current excursion. Check Clearance around arm while robot motion.

③ Check if the timer value is appropriate where the operation timing is up to the Dly command as the robot operation time and processing speed of program is high.

(2)The data that relates to the posture of a positional variable cannot be misappropriated because the number of axes is different when replacing it from RV-2AJ (5 axis) with RV-2SD/2SQ (6 axis). Please teach newly, and use data concerning this posture on that.

(3)The move master command cannot be used, and make the program newly with MELFA-BASIC Ⅴ, please when you replace it from RV-1A/2AJ with RV-2SD/2SQ.

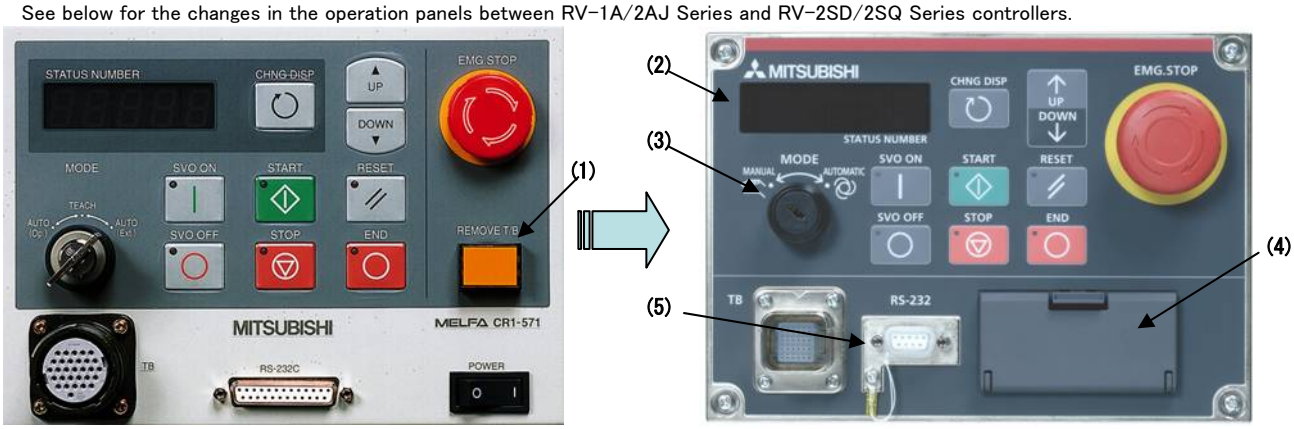
5. Special I/O Signal

See below for the changes in special I/O signals of RV-2SD/2SQ Series. The mode-selection switch on the operational panel changes from 3 positions(RV-1A/2AJ) to 2 positions for simplified operation. Signal names, functions, I/O allocation remains the same. 2SQ Series has new I/O allocation with PLC I/O

Signal	Name	1A/2AJ Series Output Condition	2SD/2SQ Series Output Condition
ATEXTMD	Remote Mode Output	Key switch on the operational panel is Auto (Ext.)	The key switch on the operational panel is AUTOMATIC and IOENA is ON
TEACHMD	Teach Mode Output	Key switch on the operational panel is TEACH	The key switch on the operational panel is MANUAL
ATTOPMD	Auto Mode Output	Key switch on the operational panel is Auto (Op.)	The key switch on the operational panel is AUTOMATIC and IOENA is OFF

6. Operation Panel

See below for the changes in the operation panels between RV-1A/2AJ Series and RV-2SD/2SQ Series controllers.



CR1-571Controller Operational Panel
RV-1A/2AJ Series

CR1DA-771/CR1QA-772Controller Operational Panel (CR1DA-771)
RV-2SD/2SQ Series

See below for the changes of the controller operation panel of RV-2SD/2SQ Series CR1DA-771/CR1QA-772

(1) T/B removal switch is removed to comply with the safety standard (ISO).

(2) "User Information" and "Maker Information" is added to the display panel (STATUS NUMBER).

(3) 3 positions for a mode-selector switch ("AUTO (Op.)", "TEACH," and "AUTO (Ext.)" 2 positions ("AUTOMATIC" and "MANUAL") for better operability.
"AUTOMATIC": Operation from the operational panel or external device is effective
"MANUAL": Operation is effective from T/B only when T/B is effective T

(4) Interface cover (USB interface and battery is mounted; CR1QA-772 is unused) for better maintainability.

(5) RS-232 connector changes to 9P (not for CR1QA-772) to save space.

Note) To reset the power of CR1QA-772 (RV-2SQ Series), PLC needs to reset as well (required to change parameters)

Instructions for Replacement of New/Old Vertical Multi-Joint Robots (RV-1A/2AJ→RV-2SD/2SQ)

7. Teaching Pendant (T/B)

See below for the changes of Teaching pendant from RV-1A/2AJ Series (R28TB) to RV-2SD/2SQ Series (R32TB).

Side of T/B

Back of T/B

RV-1A/2AJ Series Teaching pendant(R28TB)

RV-2SD/2SQ Series Teaching pendant (R32TB)

See below for the outline of changes:

(1)More display digit numbers/characters.
R28TB: 161 characters x 4 lines R32TB: 24 characters x 8 lines (8x8 fonts)

(2) Improved operability and portability (easier to grip) based on ergonomic design.
Better operability and visibility with improved button layout and design

(3) Improved dropping-impact resistance for better strength.

8. PC Support Software

PC support software "RT Tool Box 2" is now available for CR1DA-771/CR1QA-772. The "RT Tool Box 2" has easy operation same as GX developer.

Function		Tool Box (Ver G3a) Standard: 3A-01C-WINJ Mini: 3A-02C-WINJ	Tool Box2 (Ver 1.6) Standard: 3D-11C-WINJ Mini: 3D-12C-WINJ	Note
Connectable Controller	CR1DA-771 (RV-2SD)	×	○	
	CR1QA-772 (RV-2SQ)	△ (CPU direct connection only)	○	
	CR1-571	○	○	
OS		Windows2000,WindowsXP (Windows98,WindowsMe,WindowsNT4.0)	Windows2000,WindowsXP,WindowsVista 32-bit ver. Only	
Communication Method	RS-232C	○	○	
	Ethernet	○	○	
	CR1QA-772(iQ Platform)	△ (CPU direct connection only)	○(GOT transparent for Ver. 1.1Ver.1.1) ※1	
	USB	×	○	
Target Language	Move Master Command	○	○	
	MELFA-BASICⅣ	○	○	
	MELFA-BASICⅤ	○	○	
Editorial Control		Controls by file or connected controller	Controls by work space (Up to 32 controllers can be registered at a time)	
File Management		Save programs and batch backup files separately	Save programs and batch backup files as a workspace	
Program Editing	Editing Style	line edit	screen edit	
	Display Option	×	Color -coded by order Balloon help display	
Parameter Editing	Setting Method	List of parameters + parameter screen	Enriched parameter screen	
Simulation Function (Mini ver. not supported)	Display of Virtual Controller	×	○	
	Calculation of Takt Time	○	○	
	JOG Operation	○	○	
	Hand Lineup	×	○	
	Current Position Teach	○	○	
	Setting of Brake Point	×	○	
	Tool JOG/Work JOG	×	○	
	3D Veiwer	○	○ (display function addition of user definition area, free plane limit, and basic object)	

○:Function available ×:Function not available △:Limited function

※1:The directly connected Ethernet connection uncorresponds between GOT-PLC. (As of 2010.7.)