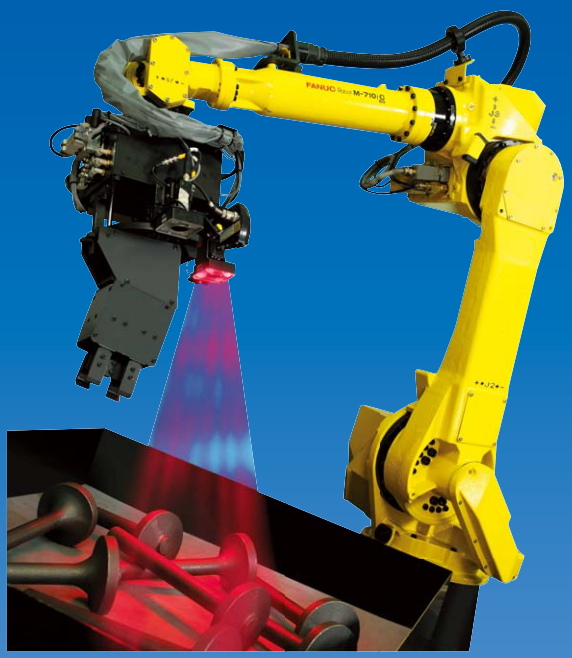
Intelligence, Robotization and Cost saving for the 21st Century

FANUC Robot *i* series



Intelligence, Robotization and Cost saving for the 21st Century

FANUC Robot *i* series

The FANUC Robot *i* series is a series of highly reliable intelligent robots with the sophisticated advanced controller R-30*i*B with intelligence and networking for versatile applications.

Intelligence

Vision and force sensing provides superior performance with integrated human skills.

Robotization

Versatile process solutions for applications with flexibility contribute efficient automation of any requirements in production.

Cost saving

Compact controller and the latest functions reduce the cost.

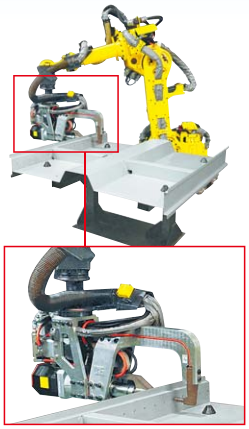
ROBOGUIDE

Auto-generation of optimized program realization of efficient robot system start-up and maintenance.

Intelligence

Learning Robot

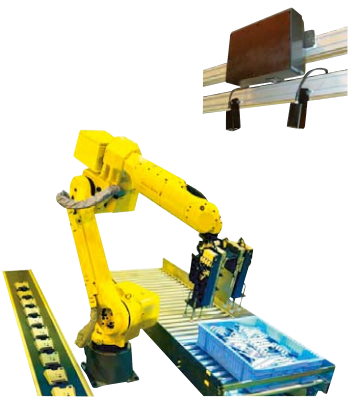
Learning robot realizes smooth and high speed motion by the suppression of robot vibration. This robot enhances the productivity of a unit robot and the efficiency of production line, which contributes to reduction of system cost. Also, Learning robot enhances the performance of handling a heavy jig and a heavy work-piece, which causes the vibration of a robot.



acceleration sensor

Bin picking robot

Bin picking robots with vision sensors view randomly piled parts and select a part and pick it up dexterously. The parts don't have to be arrayed for the robots to pick them up. The robots can support part model changes flexibly. The efficient automation of parts supply reduces human work.

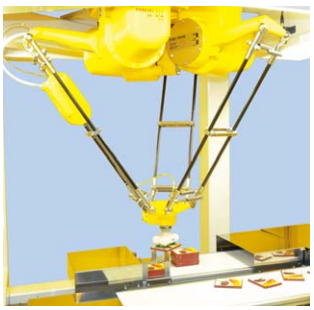


Force Sensor / Parts fitting and insertion

6-axis force sensor equipped on the robot wrist detects force and torque that act between the parts in real time. Force controlled motion by the sensor information enables the robot to achieve precise fitting and insertion operation of the parts. For parts assembled with gear engagement, the phase matching operation is performed using the detected force and torque information. Thus operation as assembly that requires human skill can be automated.

Visual line tracking

An overhead camera upstream from the robot detects parts on the conveyor flowing on it with high speed, and the robot tracks each of them before picking up. For a high volume flowing system, multiple robots connected via a network can be applied to share the handling tasks between them.



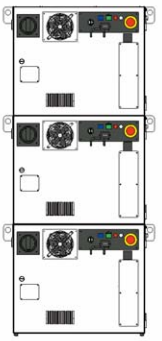
This function can also perform storing the picked parts in order into trays or boxes flowing on another conveyor. It helps to realize various kinds of parts distribution automation.

Cost saving

The compact R-30*i*B robot controller reduces cost by reducing the required factory floor space.

Energy, space saving

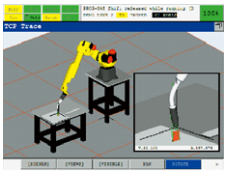
- Cabinet size of spot welding robot is significantly reduced and it is less than half in volume. Stacking up to three A cabinets can reduce more space.
- Energy consumption is reduced through low power design and energy regeneration option.
- Stand-by energy is reduced by cooling fan control and brake control.



*i*Pendant

Powerful graphical functions

- Jogging direction and motion path can be displayed in graphic display.
- Safety zone can be confirmed from various angles.
- Process information such as welding current or voltage can be displayed and confirmed on the path.



DCS (Dual check safety)

Safety function based on ISO 13849-1

- Restricting the robot work envelope reduces the required floor space.
- Replacing safety devices such as zone switch with DCS reduces the installation cost.
- Using safety network reduces interconnection, which improves reliability and maintainability.

Integrated PMC

Integrated PMC that executes ladder programs is highly improved

- Large capacity ladder programs can be executed at high speed.
- Various functions such as parallel processing of multi- path ladder programs and step sequence are supported.
- Replacing PLC to control peripheral devices with Integrated PMC reduces installation cost.

Robotization

Various functions are prepared to maximize the flexibility of the robot. FANUC provides the best robot system for our customer.

Spot welding

Arc welding

Assembly

Load / Unload

Bin picking

Deburring

Logistics

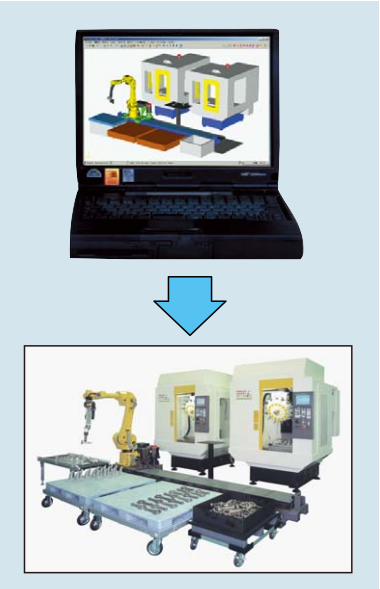
Food packing

Medical goods handling

ROBOGUIDE

Robot System Intelligent Teaching Tool

- Animation tool that easily enables a quick and low cost verification of robot application systems
- Easy creation of layout for devices and machines. Special skills are not required
- Robot Simulation
  - Cycle time simulation
  - Robot trajectory display
  - Over heat estimation
  - Power and reducer life estimation
  - Cable simulation
  - NCGuidePro and PLC Connection
- Support *i*RVision teaching and simulation on ROBOGUIDE



- Robot application specific tools with highly efficient operation
  - WeldPRO, ChamferingPR
  - SpotPRO
  - PalletPROTP
- Optimization of robot movement
  - Cycle time reduction
  - Path optimization of continuous motion
  - Power reduction
  - Reducer life expansion
- Extreme reduction of start-up time and maintenance time with offline checking. Achievable even on the shop floor

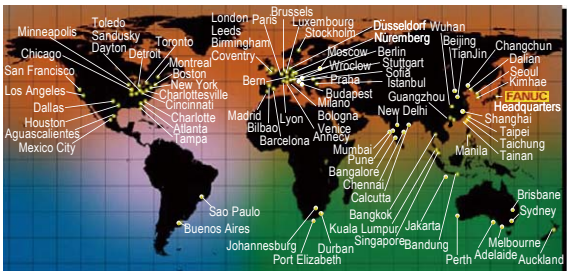
Safety & Reliability and Maintenance & Support

Industrial standards conformance for safety, quality and environment

FANUC Robot *i* series are manufactured at ISO9001 and ISO14001 certified fully automated factory with robotization under strict quality control. FANUC Robot *i* series has compliance with the European safety standards (machine directive, EMC directive, and low voltage directive) and has been certified with the CE marking, TÜV marking and TÜV EMC marking, when choosing the European specification for the robot.

World wide customer service

FANUC operates customer service and supports systems anywhere in the world through subsidiaries and affiliates. FANUC provides the highest quality service with the quickest response at the location nearest you.



FANUC Training Center

FANUC Training Center offers a variety of intensive training courses from introductory to sophisticated knowledge and skills for teaching, operation, engineering and maintenance training on FANUC robot and its application. Experience with on-site robot training enhances your plant operation.

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Robot *i*(E)-22, 2012.10, Printed in Japan

Intelligence, Robotization and Cost saving for the 21st Century FANUC Robot *i* series

Robot model		M-1*i*A		M-3*i*A			LR Mate 200*i*C			ARC Mate 0*i*A	ARC Mate 100*i*C M-10*i*A			ARC Mate 120*i*C M-20*i*A		M-710*i*C				R-1000*i*A		R-2000*i*B			
		M-1*i*A/0.5S	M-1*i*A/0.5A	M-3*i*A/6S	M-3*i*A/6A	M-3*i*A/12H	LR Mate 200*i*C	LR Mate 200*i*C/5H	LR Mate 200*i*C/5L	ARC Mate 0*i*A	100*i*C/10S M-10*i*A/10S	100*i*C M-10*i*A	100*i*C/6L M-10*i*A/6L	120*i*C M-20*i*A	120*i*C/10L M-20*i*A/10L	M-710*i*C/50	M-710*i*C/70	M-710*i*C/20L	M-710*i*C/50H	R-1000*i*A /80F	R-1000*i*A /100F	R-2000*i*B /165F	R-2000*i*B /210F	R-2000*i*B /250F	R-2000*i*B /210FS
Controller axes		4 axes	6 axes	4 axes	6 axes	3 axes	6 axes	5 axes	6 axes	6 axes	6 axes			6 axes		6 axes			5 axes	6 axes		6 axes			
Max. load capacity at wrist		0.5kg (standard) 1kg (option)		6kg		12kg	5kg			3kg	10kg		6kg	20kg	10kg	50kg	70kg	20kg	50kg	80kg	100kg	165kg	210kg	250kg	210kg
Motion range	J1	Diameter 280mm, Height 100mm		Diameter 1350mm, Height 500mm			5.93rad (340°)			6.28rad (360°)	5.93rad (340°)			5.93rad (340°)		6.28rad (360°)				6.28rad (360°)		6.28rad (360°)			
	J2						3.49rad (200°)		4.01rad (230°)	4.36rad (250°)	4.36rad (250°)			4.54rad (260°)		3.93rad (225°)				4.28rad (245°)		2.37rad (136°)			
	J3						6.77rad (388°)		6.51rad (373°)	7.94rad (455°)	5.93rad (340°)	7.76rad (445°)	5.41rad (230°)	8.00rad (458°)		7.68rad (440°)		7.54rad (432°)	7.68rad (440°)	6.28rad (360°)		6.32rad (362°)		6.23rad (357°)	4.08rad (233.9°)
	J4	12.57rad (720°)		12.57rad (720°)		–	6.63rad (380°)	4.19rad (240°)	6.63rad (380°)	6.63rad (380°)	6.63rad (380°)			6.98rad (400°)		12.57rad (720°)		6.98rad (400°)	4.08rad (234°)	12.57rad (720°)		12.57rad (720°)			7.33rad (420°)
	J5	–	5.24rad (300°)	–	5.24rad (300°)	–	4.19rad (240°)	12.57rad (720°)	4.19rad (240°)	4.89rad (280°)	4.89rad (280°)	6.63rad (380°)		6.28rad (360°)		4.36rad (250°)		4.89rad (280°)	12.57rad (720°)	4.36rad (250°)		4.36rad (250°)			
	J6	–	12.57rad (720°)	–	12.57rad (720°)	–	12.57rad (720°)	–	12.57rad (720°)	12.57rad (720°)	12.57rad (720°)			15.71rad (900°)		12.57rad (720°)		15.71rad (900°)	–	12.57rad (720°)		12.57rad (720°)			7.33rad (420°)
Max. speed *3	J1	–		–			6.11rad/s (350°/s)		4.71rad/s (270°/s)	3.93rad/s (225°/s)	3.84rad/s (220°/s)	3.67rad/s (210°/s)		3.40rad/s (195°/s)		3.05rad/s (175°/s)	2.79rad/s (160°/s)	3.05rad (175°)		2.97rad/s (170°/s)	2.27rad/s (130°/s)	1.92rad/s (110°/s)	1.66rad/s (95°/s)	1.66rad/s (95°/s)	1.92rad/s (110°/s)
	J2						6.11rad/s (350°/s)		4.71rad/s (270°/s)	3.75rad/s (215°/s)	4.01rad/s (230°/s)	3.32rad/s (190°/s)		3.05rad/s (175°/s)		3.05rad/s (175°/s)	2.09rad/s (120°/s)	3.05rad (175°)		2.44rad/s (140°/s)	1.92rad/s (110°/s)	1.92rad/s (110°/s)	1.57rad/s (90°/s)	1.48rad/s (85°/s)	1.57rad/s (90°/s)
	J3						6.98rad/s (400°/s)		4.71rad/s (270°/s)	3.93rad/s (225°/s)	4.71rad/s (270°/s)	3.67rad/s (210°/s)		3.14rad/s (180°/s)		3.05rad/s (175°/s)	2.09rad/s (120°/s)	3.14rad/s (180°/s)	3.05rad/s (175°/s)	2.79rad/s (160°/s)	2.09rad/s (120°/s)	1.92rad/s (110°/s)	1.66rad/s (95°/s)	1.54rad/s (88°/s)	1.66rad/s (95°/s)
	J4	52.34rad/s (3000°/s)	25.13rad/s (1440°/s)	69.81rad/s (4000°/s)	34.90rad/s (2000°/s)	–	7.85rad/s (450°/s)			7.42rad/s (425°/s)	7.15rad/s (410°/s)	6.98rad/s (400°/s)		6.28rad/s (360°/s)	6.98rad/s (400°/s)	4.36rad/s (250°/s)	3.93rad/s (225°/s)	6.11rad/s (350°/s)	3.05rad/s (175°/s)	4.01rad/s (230°/s)	2.97rad/s (170°/s)	2.62rad/s (150°/s)	2.09rad/s (120°/s)		2.27rad/s (130°/s)
	J5	–	25.13rad/s (1440°/s)	–	34.90rad/s (2000°/s)	–	7.85rad/s (450°/s)	12.57r/s (720°/s) 20.94r/s (1200°/s)	7.85rad/s (450°/s)	7.42rad/s (425°/s)	7.15rad/s (410°/s)	6.98rad/s (400°/s)		6.28rad/s (360°/s)	6.98rad/s (400°/s)	4.36rad/s (250°/s)	3.93rad/s (225°/s)	6.28rad/s (360°/s)	12.57rad/s (720°/s)	4.01rad/s (230°/s)	2.97rad/s (170°/s)	2.62rad/s (150°/s)	2.09rad/s (120°/s)		2.27rad/s (130°/s)
	J6	–	25.13rad/s (1440°/s)	–	34.90rad/s (2000°/s)	–	12.57rad/s (720°/s)	–	12.57rad/s (720°/s)	10.91rad/s (625°/s)	10.65rad/s (610°/s)	10.50rad/s (600°/s)		9.60rad/s (550°/s)	10.50rad/s (600°/s)	6.20rad/s (355°/s)	3.93rad/s (225°/s)	10.47rad/s (600°/s)	–	6.11rad/s (350°/s)	4.36rad/s (250°/s)	3.84rad/s (220°/s)	3.32rad/s (190°/s)		3.49rad/s (200°/s)
Repeatability		±0.02 mm		±0.1 mm			±0.02 mm		±0.03 mm	±0.08 mm	±0.05 mm	±0.08 mm	±0.1 mm	±0.08 mm	±0.1 mm	±0.07 mm		±0.15 mm		±0.2 mm		±0.2 mm	±0.3 mm		
Mechanical unit mass		14kg Note1)	17kg Note1)	160kg	175kg	155kg	27kg	26kg	29kg	110kg	130kg			250kg		560kg		540kg		620kg	665kg	1,170kg	1,240kg	1,270kg	1,250kg
Application	Arc welding									●	●			●		●		●							
	Spot welding															●				●		●	●	●	●
	Handling	●		●			●				●			●		●		●	●	●		●	●	●	●
	Sealing						●				●			●		●		●		●		●	●	●	
	Assembling		●		●		●				●			●		●		●		●		●	●	●	
	Others						Mold release spray Deburring				Mold handling Deburring			Mold handling Deburring		Mold handling Deburring Laser cutting						Mold handling Press to press handling			
Intelligent robot	3D Laser Vision sensor	● Note2)		● Note1)			●				●			●		●				●		●	●	●	●
	Force sensor	● Note2)		● Note1)			●				●			●		●				●		●	●	–	–
Remarks		Note1)Not include weight of stand Note2)Locate a sensor outside of robot. It is not possible to mount sensor to robot arm *2		Note1)The robot arm acceleration should be restricted for the sensor. *1,*2			Dust/drip-proof package (option), Incorporated solenoid valve (option), 5 axis high speed wrist (option). The following variations are provided for special purpose applications. Water-proof type for washing: LR Mate 200*i*C/5WP Clean class 100 type : LR Mate 200*i*C/5C, /5LC Clean class 10 type : LR Mate 200*i*C/5C, /5LC 2nd Food type : LR Mate 200*i*C/5F *2			*2	TIG welding package (option) Material handling conduit (option) Dust/drip-proof package (option) *1, *2			TIG welding package (option) Material handling conduit (option) Dust/drip-proof package (option) *1, *2		Dust/drip-proof package (option) Water-proof type for washing (option) The following variations are provided for special purpose applications. Short arm type: M-710*i*C/50S *1		Dust/drip-proof package (option) *1	Dust/drip-proof package (option) Spot welding solution arm (option) *1		Dust/drip-proof package (option)、Spot welding solution arm (option) The following variations are provided for special purpose applications. Long arm R-2000*i*B/125L,/175L,/185L : Payload Small sized R-2000*i*B/170CF : Payload Upside-down R-2000*i*B/150U,/220U : Payload High-speed palletizing R-2000*i*B/100H : Payload Press handling R-2000*i*B/100P : Payload Water-proof type for washing R-2000*i*B/210WE : Payload Cable integrated type R-2000*i*B/220US : Payload *1			

*1: Controller is R-30*i*B *2: Controller is R-30*i*A Mate *3: In case of short motion, the axis speed doesn't reach maximum one.

		M-900iA			M-900iB	M-2000iA		M-410iB					M-430iA			F-100iA			F-200iB	Top Mount Robot				Robot model	
R-2000iB /165R	R-2000iB /200R	M-900iA/350	M-900iA /260L	M-900iA /400L	M-900iB/700	M-2000iA /900L	M-2000iA /1200	M-410iB /140H	M-410iB/160	M-410iB/300	M-410iB/450	M-410iB/700	M-430iA/4FH	M-430iA/2PH	M-430iA/2P	100iA/104 100iA/104L	100iA/105 100iA/105L	100iA/105 100iA/105LS		ARC Mate 120iC/20T M-20iA/20T	M-710iC/50T	M-710iC/70T	R-2000iB /200T		
		6 axes			6 axes	6 axes		5 axes	4 axes				5 axes	6 axes		4 axes	5 axes		6 axes	6 axes	6 axes			6 axes	Controller axes
165kg	200kg	350kg	260kg	400kg	700kg	900kg	1200kg (standard) 1350kg (option)	140kg	160kg	300kg	450kg	700kg	4kg	2kg		136kgf (1333N) Note1)			100kg	3kg Note1) 20kg Note2)	50kg	70kg	200kg	Max. load capacity at wrist	
		6.28rad (360°)			6.28rad (360°)	5.76rad (330°)		6.28rad (360°)					6.28rad (360°)		6.28rad (360°)	250mm (104) 500mm (104L)	250mm (105) 500mm (105L)	250mm (105S) 500mm (105LS)	φ500×300mm Min.Pitch&yaw: ±0.174rad (±10°) Min.roll: ±0.349rad (±20°)	Max.10m	Max.10m		Max.10m	J1	Motion range
3.23rad (185°)		2.62rad (150°)		2.69rad (154°)	2.69rad (154°)	2.79rad (160°)		2.71rad (155°)	2.51rad (144°)		2.53rad (145°)	2.51rad (144°)	4.01rad (230°)		4.01rad (230°)	6.64rad (380°)				5.24rad (300°)	4.56rad (261°)		4.28rad (245°)	J2	
6.37rad (365°)		3.90rad (223.4°)	3.69rad (211.3°)	2.79rad (160°)	2.79rad (160°)	2.88rad (165°)		1.95rad (112°)	2.37rad (136°)		2.36rad (135°)	2.37rad (136°)	6.69rad (383°)		6.98rad (400°)	270mm				10.23rad (586°)	8.57rad (491°)		7.09rad (406°)	J3	
12.57rad (720°)		12.57rad (720°)			12.57rad (720°)	12.57rad (720°)		0.35rad (20°) Note1)	9.42rad (540°)				5.24rad (300°)	6.63rad (380°)	6.63rad (380°)	12.56rad (720°)	6.46rad (370°)	12.56rad (720°)		6.98rad (400°)	12.57rad (720°)		12.57rad (720°)	J4	
		4.36rad (250°)		4.26rad (244°)	4.26rad (244°)	4.19rad (240°)		12.57rad (720°)	–	–	–	–	9.42rad (540°)	5.24rad (300°)	5.24rad (300°)	–	3.14rad (180°)	12.56rad (720°)		4.88rad (280°) Note3) 6.28rad (360°) Note4)	4.36rad (250°)		4.36rad (250°)	J5	
12.57rad (720°)		12.57rad (720°)			12.57rad (720°)	12.57rad (720°)		–	–	–	–	–	–	9.42rad (540°)	9.42rad (540°)	–	–	–		9.42rad (540°) Note3) 15.7rad (900°) Note4)	12.57rad (720°)		12.57rad (720°)	J6	
1.92rad/s (110°/s)	1.57rad/s (90°/s)	1.75rad/s (100°/s)		1.40rad/s (80°/s)	1.40rad/s (80°/s)	0.79rad/s (45°/s)		2.44rad/s (140°/s)	2.27rad/s (130°/s)	1.48rad/s (85°/s)	1.22rad/s (70°/s)	1.05rad/s (60°/s)	5.24rad/s (300°/s)		5.24rad/s (300°/s)	200mm/s				–	–		–	J1	Max. speed *3
1.75rad/s (100°/s)	1.48rad/s (85°/s)	1.66rad/s (95°/s)	1.83rad/s (105°/s)	1.40rad/s (80°/s)	1.40rad/s (80°/s)	0.52rad/s (30°/s) (standard) 0.44rad/s (25°/s) (option)		2.01rad/s (115°/s)	2.27rad/s (130°/s)	1.57rad/s (90°/s)	1.22rad/s (70°/s)	1.05rad/s (60°/s)	5.59rad/s (320°/s)		5.24rad/s (300°/s)	0.960rad/s (55°/s)				3.05rad/s (175°/s)	3.05rad/s (175°/s)	2.09rad/s (120°/s)	1.22rad/s (70°/s)	J2	
1.92rad/s (110°/s)	1.66rad/s (95°/s)	1.66rad/s (95°/s)		1.40rad/s (80°/s)	1.40rad/s (80°/s)	0.52rad/s (30°/s)		2.36rad/s (135°/s)	2.36rad/s (135°/s)	1.75rad/s (100°/s)	1.22rad/s (70°/s)	1.05rad/s (60°/s)	5.59rad/s (320°/s)		5.93rad/s (340°/s)	85mm/s			Horizontal: 1500mm/s Vertical: 300mm/s	3.14rad/s (180°/s)	3.05rad/s (175°/s)	2.09rad/s (120°/s)	1.57rad/s (90°/s)	J3	
2.62rad/s (150°/s)	2.09rad/s (120°/s)	1.83rad/s (105°/s)	2.09rad/s (120°/s)	1.75rad/s (100°/s)	1.75rad/s (100°/s)	0.87rad/s (50°/s)		2.36rad/s (135°/s)	5.24rad/s (300°/s)	3.32rad/s (190°/s)	3.14rad/s (180°/s)	2.09rad/s (120°/s)	6.28rad/s (360°/s)	8.73rad/s (500°/s)	5.24rad/s (300°/s)	1.22rad/s (70°/s)				6.28rad/s (360°/s)	4.36rad/s (250°/s)	3.93rad/s (225°/s)	1.92rad/s (110°/s)	J4	
2.62rad/s (150°/s)	2.09rad/s (120°/s)	1.83rad/s (105°/s)	2.09rad/s (120°/s)	1.75rad/s (100°/s)	1.75rad/s (100°/s)	0.87rad/s (50°/s)		7.33rad/s (420°/s)	–	–	–	–	34.91rad/s (2000°/s)	8.73rad/s (500°/s)	5.24rad/s (300°/s)	–	0.436rad/s (25°/s)	0.855rad/s (49°/s)		6.28rad/s (360°/s)	4.36rad/s (250°/s)	3.93rad/s (225°/s)	1.92rad/s (110°/s)	J5	
3.84rad/s (220°/s)	3.32rad/s (190°/s)	2.97rad/s (170°/s)	3.49rad/s (200°/s)	2.79rad/s (160°/s)	2.79rad/s (160°/s)	1.22rad/s (70°/s)		–	–	–	–	–	–	29.67rad/s (1700°/s)	12.57rad/s (720°/s)	–	–	–		9.60rad/s (550°/s)	6.20rad/s (350°/s)	3.93rad/s (225°/s)	2.71rad/s (155°/s)	J6	
		±0.3 mm		±0.5 mm	±0.3 mm	±0.5 mm	±0.3 mm	±0.2 mm	±0.5 mm				±0.5 mm			±0.035 mm			±0.1 mm	±0.08 mm Note5)	±0.07 mm Note5)		±0.3 mm Note5)	Repeatability	
1,480kg	1,540kg	1,720kg	1,800kg	3,150kg	2,800kg	9,600kg	8,600kg	1,200kg (without controller)	1,940kg (Including controller)		2,430kg (Including controller)	2,700kg (Including controller)	55kg	57kg	45kg	111kg (104) 130kg (104L)	120kg (105) 139kg (105L)	121kg (105S) 140kg (105LS)	190kg	185kg	410kg		1,100kg	Mechanical unit mass	
																				●	●			Arc welding	Application
●	●	●	●	●	●											●	●	●	●		●		●	Spot welding	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				●	●	●		●	Handling	
●	●	●	●	●	●															●	●		●	Sealing	
●	●	●	●	●	●														●	●	●		●	Assembling	
		Mold handling Press to press handling			Mold handling								Food and Pharmaceutical Handling			Fixturing			Lifter,Locater, Deburring, Inspection, Measurement					Others	
●	●	●	●	●	–	●	●	–	–	–	–	–	–	–	–	–	–	–	●	●	●		●	3D Laser Vision sensor	Intelligent robot
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–		–	Force sensor	
125kg,175kg,185kg 170kg 150kg, 220kg 100kg 100kg 210kg 220kg		Dust/drip-proof package (option) Spot welding solution arm (option) The following variations are provided for special purpose applications. Press handling M-900iA/200P: Payload 200kg Press handling M-900iA/150P: Payload 150kg *1			Dust/drip-proof package (option) Spot welding solution arm (option) *1	*1		Note1) The wrist interface is always toward to downward. The angle is variable up to 20 degrees width. *1					*1			Max. static load capacity at wrist: 158kgf (1548 N) Note1) Max. impulse load capacity at wrist: 180kgf (1764 N) Note1) at center of faceplate *1			*1	Note1) Standard welding torch mode Note2) High inertia mode Note3) The specification of “Cable integrated J3 Arm” Note4) The specification of “Conventional dress-out” Note5) This value is not available for gantry. *1			Remarks	