



YASKAWA

# SPOT WELDING ROBOT MOTOMAN-ES SERIES

VERTICALLY ARTICULATED ROBOT



Outstanding  
Usability



High-performance  
NX100  
Controller



6.5-inch  
Color  
LCD

*Evolution of Technology  
for Spot Welding*

Certified for  
ISO9001 and  
ISO14001



JAB  
QS Accreditation  
R009



JQA-0813



JQA-EM0924

# High Efficiency

MOTOMAN-ES series with improved short-pitch motion for higher-quality and higher-speed spot welding

With the synergy of a manipulator for spot welding with cables and hoses built into the upper arm, a high-performance NX100 controller, and a 6.5-inch color LCD on the programming pendant all working together, the MOTOMAN-ES series enables you to develop the arc-welding systems of your dreams.

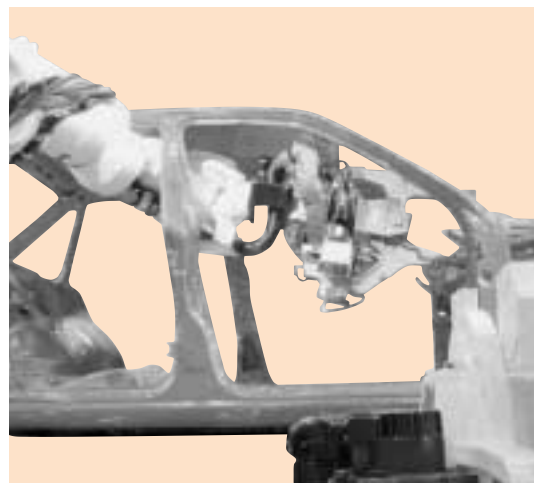
## For High-efficiency Systems

MOTOMAN-ES Series

### New torch cable in upper arm

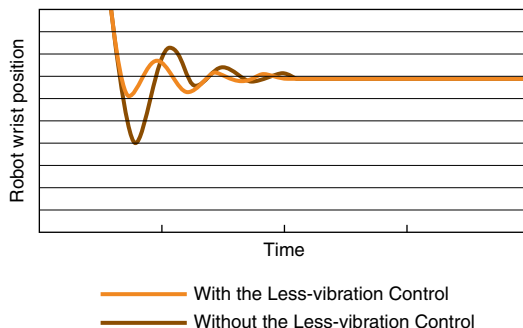
#### No cable interference

- In the MOTOMAN-ES series of spot-welding robots, the power supply, the cables, and the hoses are built into the upper arm of the manipulator. The slim arm with a spot-welding gun allows a space-saving layout in your system, enabling a welding close to a workpiece.
- The layout of the cables built into the upper arm extends the cable life, achieving less bending of the cables.
- An expanded range of  $\pm 200$  degrees for the rotating motion of the wrist enables the ES series to weld workpieces that are in shapes usually regarded as difficult.
- With no more troublesome cable interference during off-line teaching, you save valuable time for setting up.



#### Improved short-pitch motion

With the Less-vibration Control as one of the advanced functions in Advanced Robot Motion (ARM) control, the MOTOMAN-ES series aims for the fastest speed and the least vibration in the world. The Less-vibration Control reduces residual vibration, improves short-pitch motion, and greatly shortens cycle times.

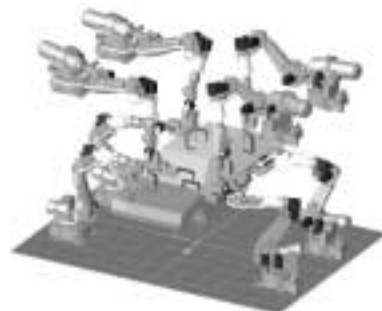


#### Controllable working envelope

- A mechanical stopper can be mounted on the turning axis. Changes can be easily made at anytime, even after having connected the external cable.
- Zone limit switches and variable mechanical stoppers can be mounted on the turning axis, upper arm, and lower arm.

#### Increased flexibility

- Increased allowable inertia of the wrist enables you to select the most suitable welding gun for the workpiece.
- The NX100 is capable of coordinated control of up to 36 axes for simultaneous control of four systems, each of which has 8 axes: 6 axes for the manipulator, 1 axis for the motor gun, and 1 axis for the truck. The NX100 also helps reduce cycle time with a double processing speed.\*1
- Two models with different payloads of 165 kg and 200 kg are available. Wall-mounted types, which enables constructing a space-saving production line with a high density robot layout are also available.



\*1: Compared to conventional models.

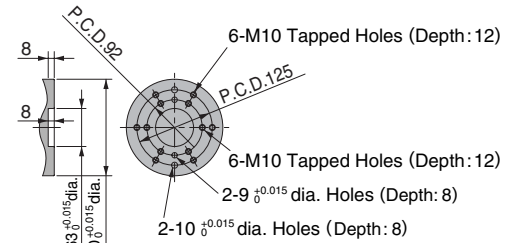
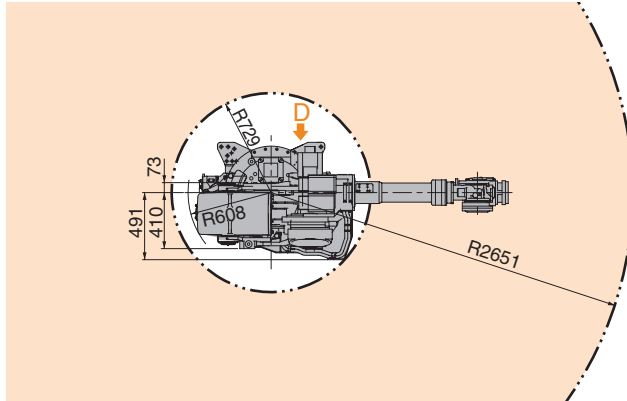




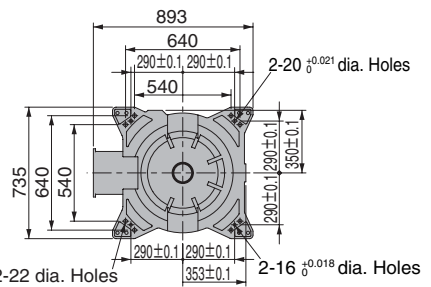
# MOTOMAN-ES165N

165 kg payload, R2651 mm maximum reach

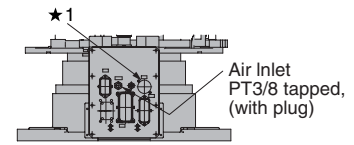
## ■ Dimensions Units : mm [ ] : P-point Maximum Envelope



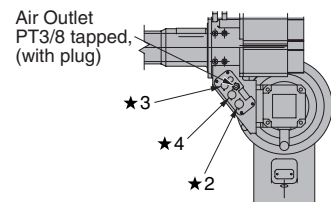
View A



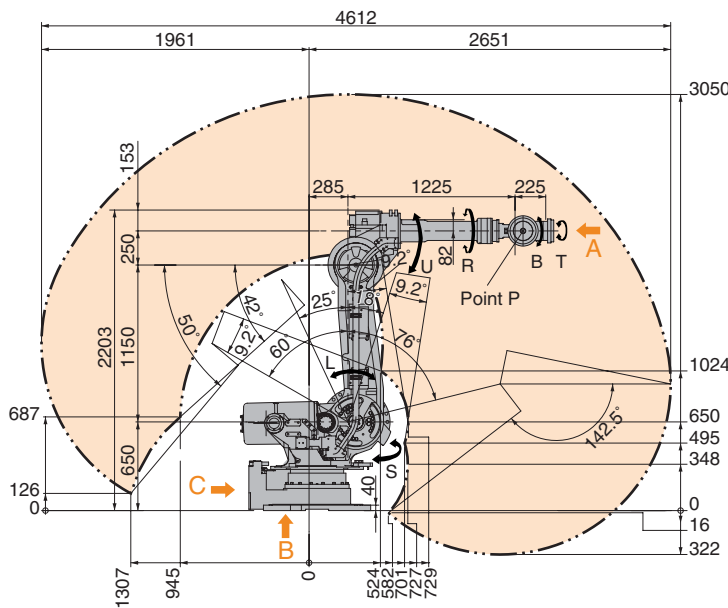
View B



View C



View D



	Connected to	Connector Type	Plug Type (Prepared by user)
★1	Cable	JL05-2A28-21PC	JL05-6A28-21S
★2	Cable	JL05-2A22-14SC	JL05-6A22-14P
★3	Power cable on external axis	JL05-2A18-1SC	JL05-6A18-1P
★4	Signal cable on external axis	JL05-2A20-29SC	JL05-6A20-29P

## ■ Manipulator Specifications

Model	MOTOMAN-ES165N	
Type	YR-ES165N-A00	
Controlled Axis	6 (Vertically articulated)	
Payload	165 kg	
Repeatability*1	±0.2 mm	
Range of Motion	S-axis (turning)	±180°
	L-axis (lower arm)	+76° to -60°
	U-axis (upper arm)	+230° to -142.5°
	R-axis (wrist roll)	±360° [±205°]*3
	B-axis (wrist pitch/yaw)	±130° [±120°]*3
Maximum Speed	T-axis (wrist twist)	±360° [±200°]*3
	S-axis (turning)	1.92 rad/s, 110°/s
	L-axis (lower arm)	1.92 rad/s, 110°/s
	U-axis (upper arm)	1.92 rad/s, 110°/s
	R-axis (wrist roll)	3.05 rad/s, 175°/s
	B-axis (wrist pitch/yaw)	2.53 rad/s, 145°/s
	T-axis (wrist twist)	4.19 rad/s, 240°/s

Allowable Moment	R-axis (wrist roll)	921 N · m
	B-axis (wrist pitch/yaw)	921 N · m
	T-axis (wrist twist)	490 N · m
Allowable Inertia (GD <sup>2</sup> /4)	R-axis (wrist roll)	85 kg · m <sup>2</sup>
	B-axis (wrist pitch/yaw)	85 kg · m <sup>2</sup>
	T-axis (wrist twist)	45 kg · m <sup>2</sup>
Mass	1100 kg	
Ambient Conditions	Temperature	0 °C to +45 °C
	Humidity	20 to 80%RH (non-condensing)
	Vibration	Less than 4.9 m/s <sup>2</sup>
	Others	<ul style="list-style-type: none"> <li>Free from corrosive gasses or liquids, or explosive gasses</li> <li>Clean and dry</li> <li>Free from excessive electrical noise (plasma)</li> </ul>
Power Requirements*2	7.5 kVA	

\*1: Conforms to JIS B 8432.

\*2: Varies in accordance with applications and motion patterns.

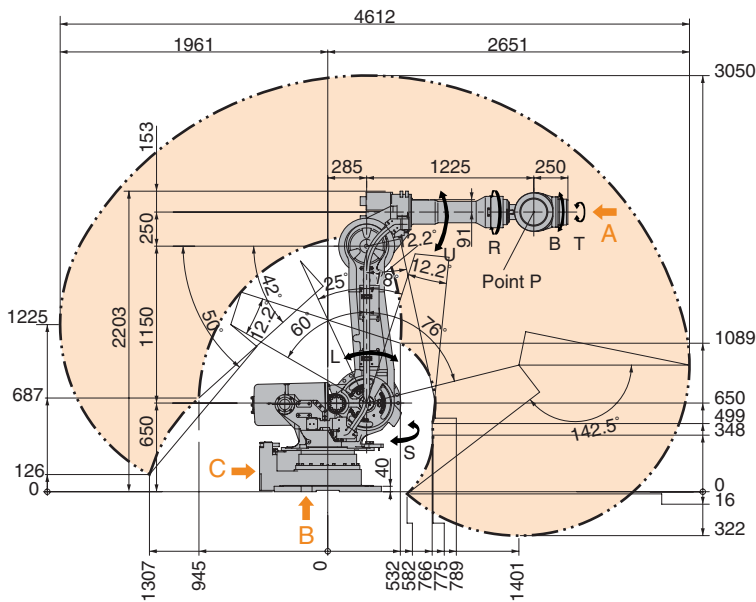
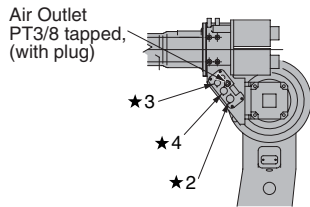
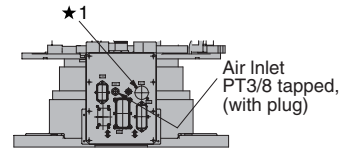
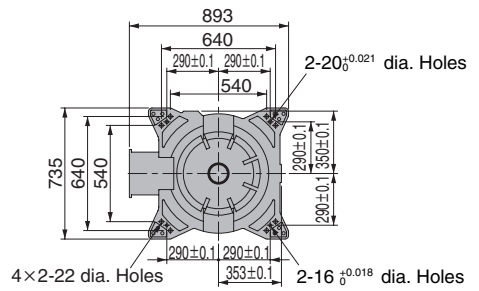
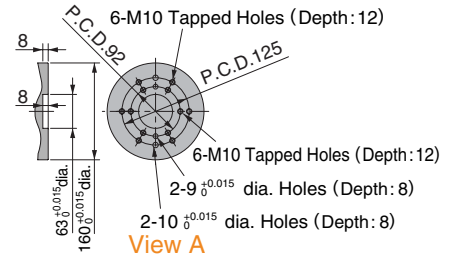
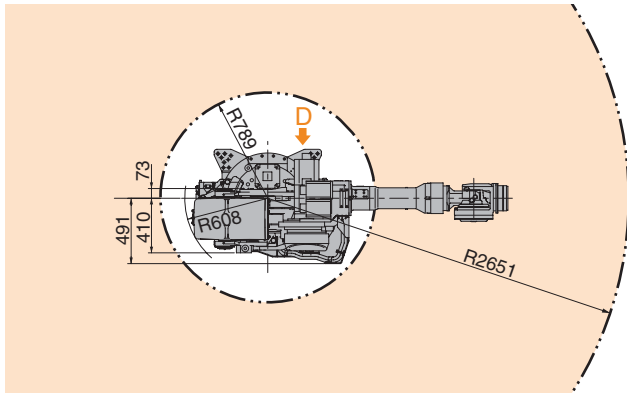
\*3: When used with an external cable.

Note: SI units are used for specifications.

# MOTOMAN-ES200N

200 kg payload, R2651 mm maximum reach

## Dimensions Units : mm : P-point Maximum Envelope



View A

View B

View C

View D

## Manipulator Specifications

Model	MOTOMAN-ES200N	
Type	YR-ES200N-A00	
Controlled Axis	6 (Vertically articulated)	
Payload	200 kg	
Repetability*1	±0.2 mm	
Range of Motion	S-axis (turning)	±180°
	L-axis (lower arm)	+76° to -60°
	U-axis (upper arm)	+230° to -142.5°
	R-axis (wrist roll)	±360° [ ±205° ]*3
	B-axis (wrist pitch/yaw)	±125° [ ±120° ]*3
Maximum Speed	T-axis (wrist twist)	±360° [ ±200° ]*3
	S-axis (turning)	1.67 rad/s, 95°/s
	L-axis (lower arm)	1.48 rad/s, 85°/s
	U-axis (upper arm)	1.67 rad/s, 95°/s
	R-axis (wrist roll)	2.01 rad/s, 115°/s
	B-axis (wrist pitch/yaw)	1.92 rad/s, 110°/s
	T-axis (wrist twist)	3.32 rad/s, 190°/s

	Connected to	Connector Type	Plug Type (Prepared by user)
★1	Cable	JL05-2A28-21PC	JL05-6A28-21S
★2		JL05-2A22-14SC	JL05-6A22-14P
★3	Power cable on external axis	JL05-2A18-1SC	JL05-6A18-1P
★4	Signal cable on external axis	JL05-2A20-29SC	JL05-6A20-29P

Allowable Moment	R-axis (wrist roll)	1274 N · m
	B-axis (wrist pitch/yaw)	1274 N · m
	T-axis (wrist twist)	686 N · m
Allowable Inertia (GD <sup>2</sup> /4)	R-axis (wrist roll)	120 kg · m <sup>2</sup>
	B-axis (wrist pitch/yaw)	120 kg · m <sup>2</sup>
	T-axis (wrist twist)	70 kg · m <sup>2</sup>
Mass		1130 kg
Ambient Conditions	Temperature	0 °C to +45 °C
	Humidity	20 to 80%RH (non-condensing)
	Vibration	Less than 4.9 m/s <sup>2</sup>
	Others	<ul style="list-style-type: none"> <li>Free from corrosive gasses or liquids, or explosive gasses</li> <li>Clean and dry</li> <li>Free from excessive electrical noise (plasma)</li> </ul>
Power Requirements*2		7.5 kVA

\*1 : Conforms to JIS B 8432.

\*2 : Varies in accordance with applications and motion patterns.

\*3 : When used with an external cable.

Note: SI units are used for specifications.

# Spot Welding Applications

Spot-welding system at high speeds with simultaneous control for multi axes



## For High-quality Systems

MOTOMAN-ES Series

### Revolutionary controller NX100

#### Improved path accuracy and absolute-position accuracy

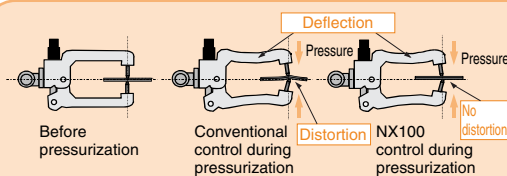
The lag time after a command is minimized with new algorithm for high-accuracy path control, which is one of the features of Yaskawa's unique Advanced Robot Motion (ARM) control. This results in an improvement of up to 50%\*1 for the path accuracy of the robots.

The deflection compensation function (optional) increases the absolute-position accuracy by 2 to 5 times\*1. This feature improves welding quality and reduces faulty welding related to the absolute positioning accuracy for all applications.

\*1: Compared to conventional models.

#### Improved deflection compensation

The accuracy in deflection compensation function for motor gun has been further improved. It allows you Less-warp Welding, which minimizes the deviation from the arc strike position and the warp of the workpieces originated by the deflection of the gun during the pressurization.



## For User-friendly Systems

MOTOMAN-ES Series

### Programming pendant filled with functions

#### Color display & touch panel

The programming panel required for teaching and maintenance has a 6.5-inch color LCD with a touch panel function of 640×480 pixels. Using icons, drawings, and operations similar to Windows, the operations are even easier than ever before. The on-screen Guidance Help Function allows you to confirm the program to operate the programming pendant.

Note: Windows is a registered trademark of Microsoft Corporation, U.S.A.

#### Enhanced ladder editing

The programming pendant enables a remarkably increased debugging efficiency of I/O signals in setting up the system on site, allowing you to edit a ladder diagram on the screen. With an increased memory capacity of 10,000 steps, no external PLC is required.



#### Easy pre-examination

For cell simulation, an easy pre-examination is available on your PC by optional high-speed 3D graphics ROTSY\*2 (optional). It also supports ROBCAD and IGRIP for the line simulation.

\*2: Robot Off-line Teaching System of YASKAWA

Note: ROBCAD is a registered trademark of Tecnomatix Technologies Ltd.

IGRIP is a registered trademark of DELMIA Corp.



Operation Screen



# MOTOMAN-ES SERIES

## ■ NX100 Specifications

Items	Specifications
Configuration	Dust proof
Dimensions	*1 500(W)×500(D)×1200(H) mm (Possible to control 2 external axes.)
	*2 600(W)×550(D)×1200(H) mm (Possible to control 2 external axes.)
Mass	*1 100 kg max. (Possible to control 2 external axes.)
	*2 150 kg max. (Possible to control 2 external axes.)
Cooling System	Indirect cooling
Ambient Temperature	During operation : 0°C to +45°C During storage : -10°C to +60°C
Relative Humidity	90% max. (non-condensing)
Power Supply	Three-phase 200/220 VAC (+10% to -15%), 60 Hz (Japan) Three-phase 200 VAC (+10% to -115%), 50 Hz (Japan)
Grounding	Grounding resistance : 100Ω or less
Digital I/Os	Specialized signals : 17 inputs and 3 outputs General signals : 40 inputs and 40 outputs Max.I/O (optional) : 1024 inputs and 1024 outputs
Positioning System	By serial encoder
Programming Capacity	JOB : 60,000 steps
	10,000 instructions CIO ladder : 10,000 steps max.
Expansion Slots	PCI: 2 slots for main CPUs and 1 slot for servo CPU
LAN (Connection to Host)	1 (10BaseT/100BaseTX)
Interface	RS-232C:1ch
Control Method	Software servo control
Drive Units	For robot axes: One drive unit for AC servo with 6 axes Time required for replacement: 5 minutes (One unit includes amplifiers for 6 axes) For external axes: Combined converter and amplifier per axis.(optional)
Painting Color	Munsell notation 5Y 7/1 (reference value)
Safety Classification	Category IV

\*1 : For small size manipulator.

\*2 : For large size manipulator.

The MOTOMAN-ES165N and ES200N are large size manipulators.

## ■ Programming Pendant Specifications

Items	Specifications
Dimensions	199(W)×338(H)×60(D) mm
Mass	1.32 kg
Material	Reinforced plastics
Operation Device	Select keys, axes keys, numerical/application keys, mode keys (mode: teach, play, and remote) emergency stop button, deadman switch, compact flash card interface device (compact flash is optional.)
Display	6.5 -inch color LCD, touch panel 640×480 pixels (Alphanumeric characters, Chinese characters, Japanese letters,Others)
IEC Protection Class	IP65
Cable Length	Standard: 8 m, Max.: 36 m (optional)

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YASKAWA

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

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