

# YASKAWA

## Robot Optimized for Painting MOTOMAN-EPX Series



Certified for  
ISO9001 and  
ISO14001



**JAB**  
QMS Accreditation  
R009



**JQA**  
QUALITY SYSTEM  
JQA-0813



**JQA**  
ENVIRONMENTAL  
SYSTEM  
JQA-EM0202

# Complete product lineup for better surface finish

Robot Optimized for Painting

## MOTOMAN-EPX Series

Explosion proof certification: Conforms to TIIS, FM, and ATEX.

Based on the concept of having a broad range of motion with a compact design, Yaskawa's MOTOMAN robots continue to evolve as optimized robot in functions and performance for each application. The rich lineup in the MOTOMAN-EPX series provides robots with a variety of features, including optimal wrist structures for each type of workpiece, arms with internally routed hoses, and a high-performance controller. The best robot for the application can be chosen to ensure high-quality painting.

### Manipulator lineup in accordance with workpiece size

General industrial applications, Small workpieces  
Mobile telephones, reflectors, etc.

Automotive industry applications, Large workpieces  
Automobile bodies, bumpers, heavy machine, steel products, house material, etc.

Small robot

Medium robot

Medium robot



EPX1250  
[ Orthogonal wrist ]



EPX2050  
[ Lemma wrist ]



EPX2050  
[ Hollow slim arm ]

Automotive industry applications, Large workpieces  
Automobile bodies, bumpers, construction equipment, etc.

Large robot



MPX3500  
[ Hollow arm ]

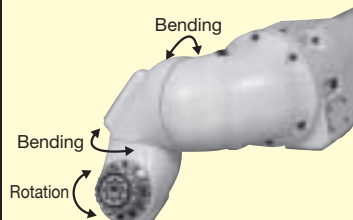
Note: Refer to the following catalog for details.  
MOTOMAN-MPX3500 (Catalog No.: CHEP C940321 13)

### Wrist Structures



#### Hollow wrist (H-type)

Hoses and cables can be contained inside the wrist. No interference with workpieces can shorten tact time.



#### Lemma wrist (L-type)

Without any singular point in front, the EPX robots with lemma wrists are ideal for painting horizontal and vertical planes as well as painting items in synchronization with the conveyor.

# MOTOMAN-EPX1250

Small painting robot, 5 kg payload

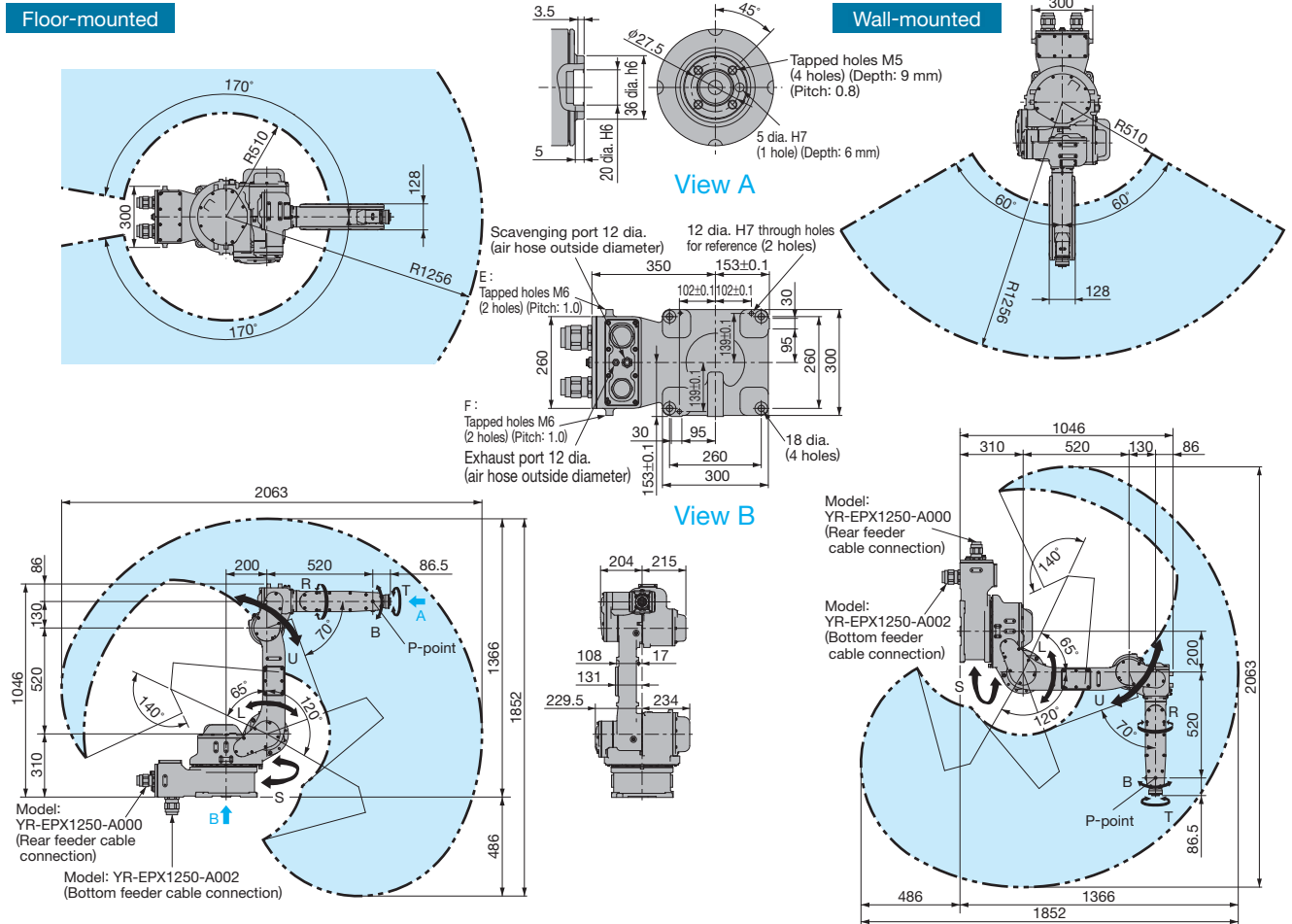
Orthogonal wrist



## Ideal for Painting Small Parts!

- The compact design enables a broad range of motion.
- Space-saving painting booth has been achieved by a compact controller and various mounting methods for the manipulator.
- A compact bell gun can be mounted for high-quality painting.

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



## ■ Manipulator Specifications

Model	MOTOMAN-EPX1250	
Type	YR-EPX1250-*0**	
Controlled Axis	6 (Vertically articulated)	
Payload	5 kg	
Repeatability*1	±0.15 mm	
Range of Motion	S-axis (turning)	-170° - +170° (-60° - +60° when mounted on the wall)
	L-axis (lower arm)	-65° - +120°
	U-axis (upper arm)	-165° - +205°
	R-axis (wrist roll)	-190° - +190°
	B-axis (wrist pitch/yaw)	-145° - +145°
	T-axis (wrist twist)	-360° - +360°
Max. Speed	S-axis (turning)	3.23 rad/s, 185°/s
	L-axis (lower arm)	3.23 rad/s, 185°/s
	U-axis (upper arm)	3.23 rad/s, 185°/s
	R-axis (wrist roll)	6.28 rad/s, 360°/s
	B-axis (wrist pitch/yaw)	7.16 rad/s, 410°/s
	T-axis (wrist twist)	8.73 rad/s, 500°/s

Allowable Moment*2	R-axis (wrist roll)	8.0 N-m (0.82 kgf-m)
	B-axis (wrist pitch/yaw)	8.0 N-m (0.82 kgf-m)
	T-axis (wrist twist)	3.0 N-m (0.3 kgf-m)
Allowable Inertia (GD <sup>2</sup> /4)	R-axis (wrist roll)	0.20 kg-m <sup>2</sup>
	B-axis (wrist pitch/yaw)	0.20 kg-m <sup>2</sup>
	T-axis (wrist twist)	0.07 kg-m <sup>2</sup>
Mass		110 kg
Ambient Conditions	Temperature	0 to +40°C
	Humidity	20 to 80%RH (non-condensing)
	Vibration	4.9 m/s <sup>2</sup> or less
	Others	Free from excessive electrical noise (plasma)
Power Requirements*3		max. 1.5 kVA
Installation		Floor, Wall, or Ceiling-mounted
Max. Mass of Painting Devices on Robot		5 kg including parts mounted in the wrist
Max. Mass for Painting Devices on Robot Base		10 kg each for E and F sections (See View B)
Type of Explosion-proof		Combination of pressurized (ia2G4) and intrinsic safety (ia2G4).
Explosion Proof Certification		TIIS, FM, ATEX

\*1 : Conforms to ISO 9283.

\*2 : Gravitational units are shown in parentheses.

\*3 : Varies in accordance with applications and motion patterns.

Note: SI units are used for specifications.

# MOTOMAN-EPX2050

Medium painting robot, 10 kg payload

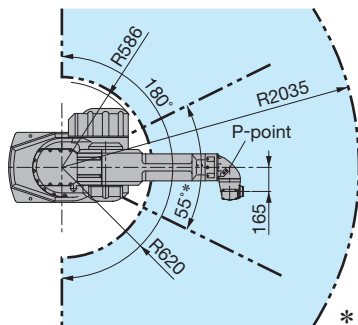
Lemma wrist



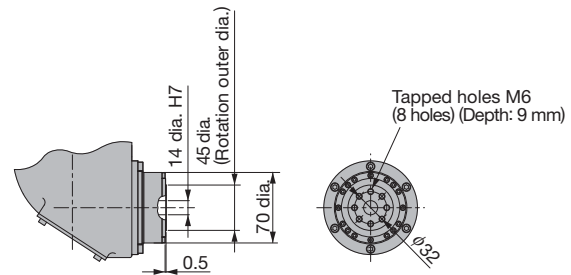
## Ideal for painting horizontal and vertical planes in synchronization with the conveyor.

- Teaching for painting synchronized with conveyor movement is easy, because the wrist has no singular points in the front area.
- With a MOTOFEEDER, painting workpieces on mesh and on spindles is possible.
- Compact controller saves space.

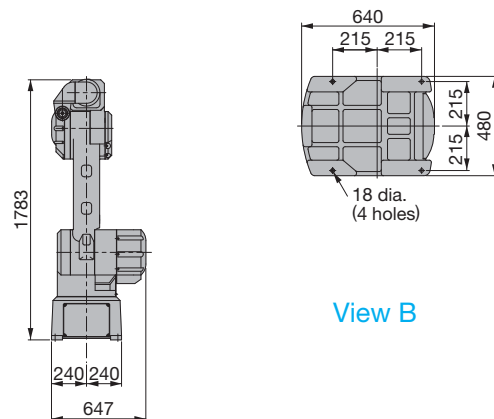
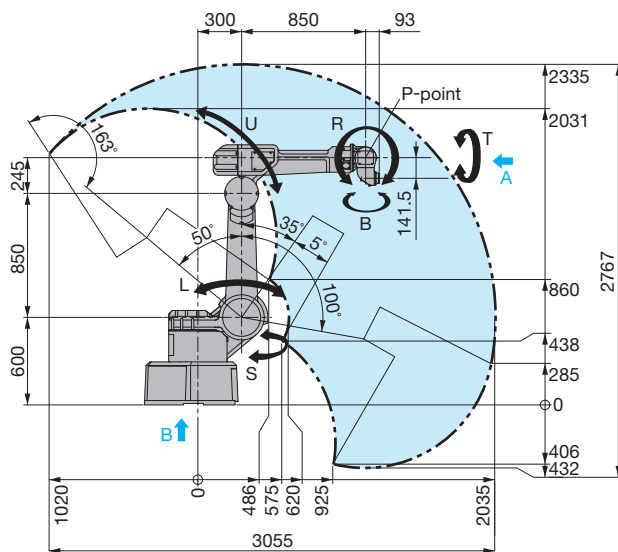
### ■ Dimensions Units : mm : P-point Maximum Envelope



\* : When mounted on the wall



View A



View B

### ■ Manipulator Specifications

Model	MOTOMAN-EPX2050	
Type	YR-EPX2050- <b>*3**</b>	
Controlled Axis	6 (Vertically articulated)	
Payload	10 kg	
Repeatability*1	±0.5 mm	
Range of Motion	S-axis (turning)	-90° - +90° (-27.5° - +27.5° when mounted on the wall)
	L-axis (lower arm)	-50° - +100°
	U-axis (upper arm)	+5° - +163° *4
	R-axis (wrist roll)	-260° - +260° *5
	B-axis (wrist pitch/yaw)	-270° - +270°
Max. Speed	T-axis (wrist twist)	-260° - +260°
	S-axis (turning)	123.5°/s
	L-axis (lower arm)	120°/s
	U-axis (upper arm)	123.5°/s
	R-axis (wrist roll)	360°/s
	B-axis (wrist pitch/yaw)	360°/s
	T-axis (wrist twist)	360°/s

L-type Wrist	Allowable Moment*2	R-axis (wrist roll)	30.4 N·m (3.1 kgf·m)
		B-axis (wrist pitch/yaw)	19.6 N·m (2.0 kgf·m)
		T-axis (wrist twist)	9.8 N·m (1.0 kgf·m)
Allowable Inertia (GD <sup>2</sup> /4)		R-axis (wrist roll)	0.97 kg·m <sup>2</sup>
		B-axis (wrist pitch/yaw)	0.40 kg·m <sup>2</sup>
		T-axis (wrist twist)	0.10 kg·m <sup>2</sup>
Mass			370 kg
Ambient Conditions	Temperature		0 to +40°C
	Humidity		20 to 80%RH (non-condensing)
	Vibration		4.9 m/s <sup>2</sup> or less
	Others		Free from excessive electrical noise (plasma)
Power Requirements*3			max. 5.0 kVA
Installation			Floor or Wall-mounted
Max. Weight of Painting Devices on Arm			20 kg including parts mounted in the wrist
Type of Explosion-proof			Combination of pressurized (fia2G4) and intrinsic safety (ia2G4).
Explosion Proof Certification			TIIS, FM, ATEX*6

\*1 : Conforms to ISO 9283.

\*2 : Gravitational units are shown in parentheses.

\*3 : Varies in accordance with applications and motion patterns.

\*4 : For the range of +5° to +10° : the R-axis motion range is limited to -260° to -65°, and +60° to +260°.

\*5 : For the range of -145° to -20°, and +215° to +260° : the B-axis motion range is limited to -195° to +15°.

\*6 : Application being planned

Note: SI units are used for specifications.

# MOTOMAN-EPX2050

Medium painting robot, 15 kg payload

Hollow slim arm\*

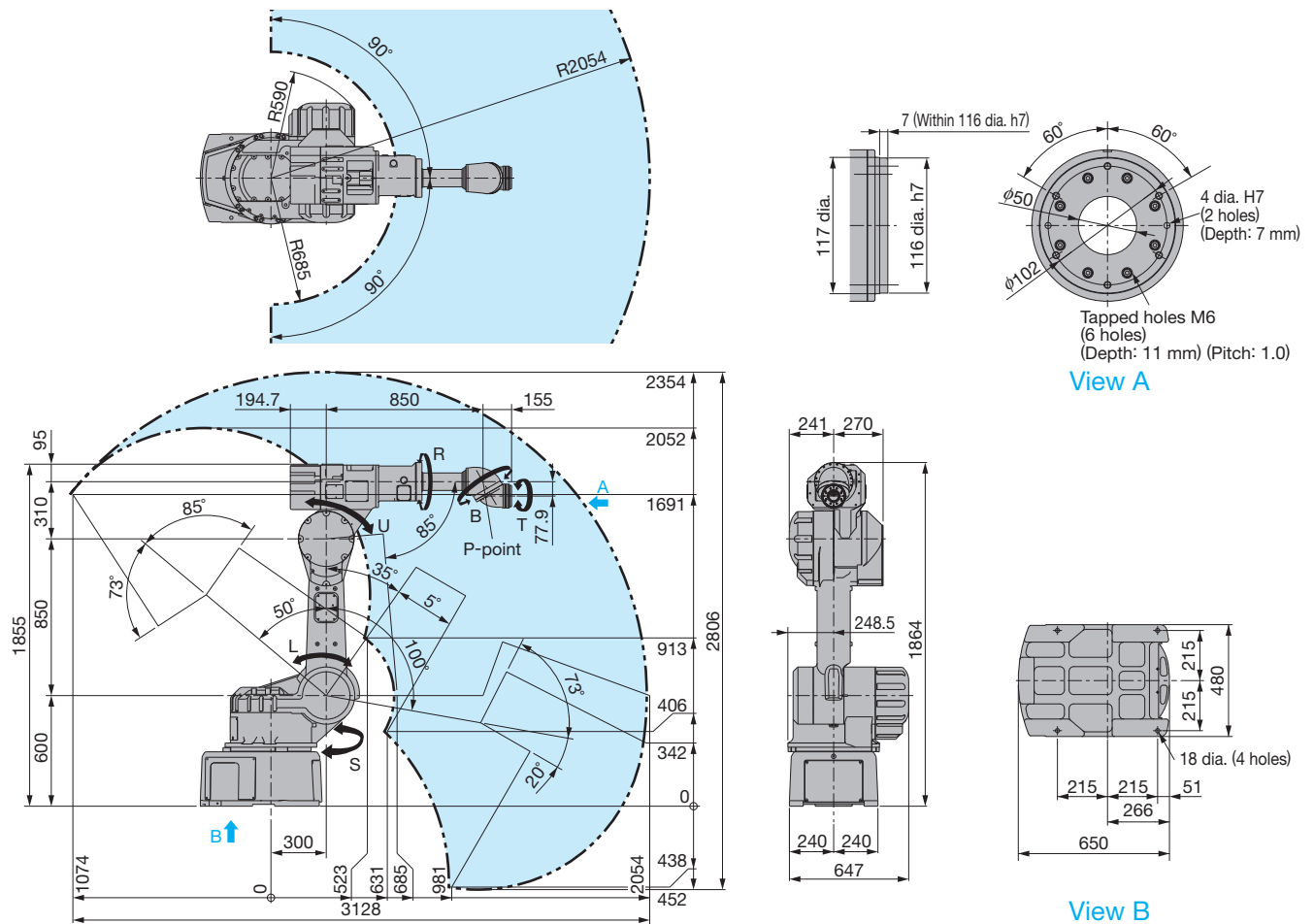


## Hollow, slim arm!

- No interference with workpieces, because tubes for painting guns can be installed inside the hollow, slim arm.
- Painting devices can be mounted on the arm to shorten color changing time and save paint and thinner.

\*: Inner diameter 50 mm

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



## Manipulator Specifications

Model	MOTOMAN-EPX2050	
Type	YR-EPX2050-5**	
Controlled Axis	6 (Vertically articulated)	
Payload	15 kg	
Repeatability*1	±0.5 mm	
Range of Motion	S-axis (turning)	-90° - +90°
	L-axis (lower arm)	-50° - +100°
	U-axis (upper arm)	+5° - +163°
	R-axis (wrist roll)	-360° - +360°
	B-axis (wrist pitch/yaw)	-360° - +360°
T-axis (wrist twist)	-360° - +360°	
Max. Speed	2.0 m/s	

H-type Wrist	Allowable Moment*2	R-axis (wrist roll)	45.8 N-m (4.67 kgf-m)
		B-axis (wrist pitch/yaw)	33.8 N-m (3.45 kgf-m)
		T-axis (wrist twist)	10.8 N-m (1.1 kgf-m)
Allowable Inertia (GD <sup>2</sup> /4)		R-axis (wrist roll)	1.45 kg-m <sup>2</sup>
		B-axis (wrist pitch/yaw)	0.79 kg-m <sup>2</sup>
		T-axis (wrist twist)	0.10 kg-m <sup>2</sup>
Mass			540 kg
Ambient Conditions	Temperature	0 to +40°C (FM standard: 0 to +45°C)	
	Humidity	20 to 80%RH (non-condensing)	
	Vibration	4.9 m/s <sup>2</sup> or less	
	Others	Free from excessive electrical noise (plasma)	
Power Requirements*3			max. 5.0 kVA
Installation			Floor or Wall-mounted
Max. Weight of Painting Devices on Arm			40 kg including parts mounted in the wrist
Type of Explosion-proof		Combination of pressurized (fia2G4) and intrinsic safety (ia2G4).	
Explosion Proof Certification		TIIS, FM, ATEX	

\*1 : Conforms to ISO 9283.

\*2 : Gravitational units are shown in parentheses.

\*3 : Varies in accordance with applications and motion patterns.

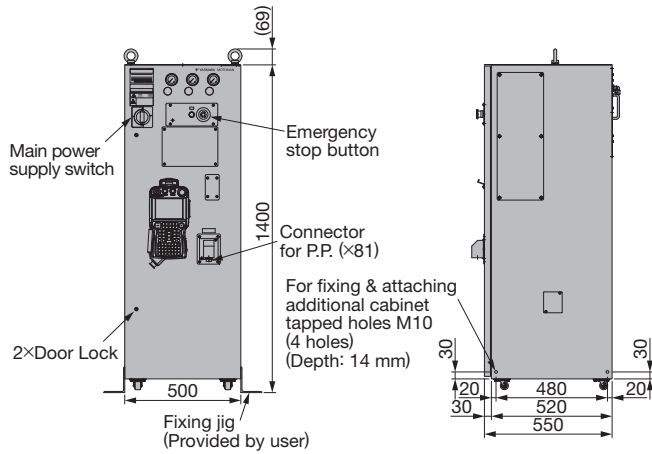
Note: SI units are used for specifications.

# CONTROLLER

## Specialized Controller for Painting

### ■ Dimensions Units: mm

Note: The following drawings shows models with Japanese specifications. Dimensions of models designed in accordance with FM or ATEX certification are different.



Approx. mass: 120 kg

### Programming Pendant



Standard type



Explosion-proof type

### ■ Controller Specifications

Configuration	Free-standing, enclosed type
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%, -15%) at 60 Hz (Japan) Three-phase 200 VAC (+10%, -15%) at 50 Hz (Japan)
Grounding	Grounding resistance: 100 Ω or less Note: When using an explosion-proof programming pendant, the grounding resistance must be 10 Ω or less and 100 Ω or less.
Digital I/Os	Specialized signals: 17 inputs and 3 outputs General signals: 40 inputs and 40 outputs Max.I/O (optional): 1,024 inputs and 1,024 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 (10BASE-T/100BASE-TX)
Interface	RS-232C: 1ch
Control Method	Software servo control
Drive Units	For robot axes: SERVOPACK for AC Servomotors (can be controlled up to 6 axes) Time required for unit replacement: 5 minutes Maintenance: One amplifier, six axes at one time For external axes: One converter combined with one amplifier per axis
Painting Color	Munsell notation 5Y7/1 (reference value)
Communication Port	CC-Link, DeviceNet (registered trademark of the ODVA), PROFIBUS (registered trademark of PROFIBUS User Organization)

### ■ Programming Pendant Specifications

Type	Standard	Explosion-proof
Dimensions	169 (W)×314.5 (H)×50 (D) mm	235 (W)×203 (H)×78 (D) mm
Mass	0.986 kg	1.25 kg
Material	Reinforced plastics	Reinforced plastics
Operation Device	Select keys, axis keys, numerical/application keys, mode selector switch with keys (mode: teach, play, and remote), emergency stop button, enable switch, compact flash card interface device (compact flash is optional.)	Select keys, axis keys, numerical/application keys, emergency stop button, enable switch
Display	5.7-inch color LCD, touch panel 640×480 pixels (Alphanumeric characters, Chinese characters, Japanese letters, Others)	5.7-inch monochrome LCD, backlit white LED, touch panel 320×240 pixels (Alphanumeric characters, Chinese characters, Japanese letters, Others)
IEC Protection Class	IP65	IP54
Cable Length	Standard: 8 m, Max.: 36 m (with optional extension cable)	Standard: 8 m (20 m optional), Max.: 50 m (with optional extension cable)

### ■ Functions

Category	Function	Description
Operation	Coordinate System	Includes joint, rectangular/cylindrical, tool, and user coordinates
	Modification of Teaching Points	Adding, deleting or correcting robot axes and external axes.
	Inching Operation	Allows inching
	Locus Confirmation	Includes forward/reverse and continuous feeding
	Speed Adjustment	Allows automatic speed adjustment to match cycle time
	Timer Setting	Possible every 0.01 s
Safety Features	Short-cut Function	Includes direct-open function
	Interface	CF (Compact Flash) card slot [ Standard type: At programming pendant Explosion-proof type: At front panel of controller ] RS232C (At Control Circuit Board) LAN (100BASE-TX/10BASE-T) (At Control Circuit Board) (Optional)
	Essential Measures	Japanese Industrial Standard (JIS)
	Running Speed Limit	User definable
	Enable Switch	3 position type. Servo power can be turned on at the middle position only. (Located on programming pendant)
	Collision Proof Frames	Includes doughnut-sector frame, cubic frame (user coordinates)
Maintenance Function	Self-diagnosis	Classifies errors and two types of alarms (major and minor) and displays the data
	User Alarm Display	Displays alarm messages for peripheral devices
	Machine Lock	Allows test-run of peripheral devices without robot motion
	Door Interlock	Allows door to open only when main power switch is OFF.
	System Monitoring	Controls power-ON time, servo power-ON time, playback time, moving time, operating time
	Alarm Display	Displays alarm messages and previous alarm records
Programming Function	I/O Diagnosis	Provides simulated enabled/disabled output possible
	T.C.P. Calibration	Automatically calibrates parameters for end effectors
	Programming	Interactive Programming
	Robot Motion Control	Includes joint coordinates, linear/circular interpolation, and tool coordinates
	Speed Setting	Uses percentage for joint coordinates, 0.1 mm/s, for interpolations, angular velocity for TCP fixed motion
	Program Control Instruction	Includes jump, call, timer, pause, execution of some instructions during robot motion
Others	Variables	Global, local variables
	Types	Byte, integer, double integer, real, character, position
	I/O Instructions	Includes discrete I/O control and pattern I/O processing
	Painting Unit Control Instructions	Includes spray ON/OFF (anticipation available) and painting conditions output
	Painting Characteristics Filing	Multi-gun shift (up to 4 guns available) Includes amount of spray, pattern, atomizing, high-voltage, delay time of spraying, delay time of atomizing
	Utilities	Includes 3-dimensional shift, optional setting coordinate shift, mirror imaging, robot zero-point check
Automatic Operation	Job registration table	
Conveyor Synchronization	Allows static conveyor teaching	

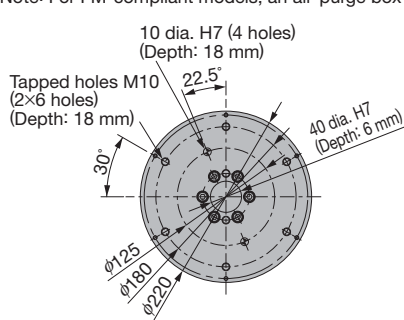
# MOTOFEEDER

## Special Workpiece Feeder

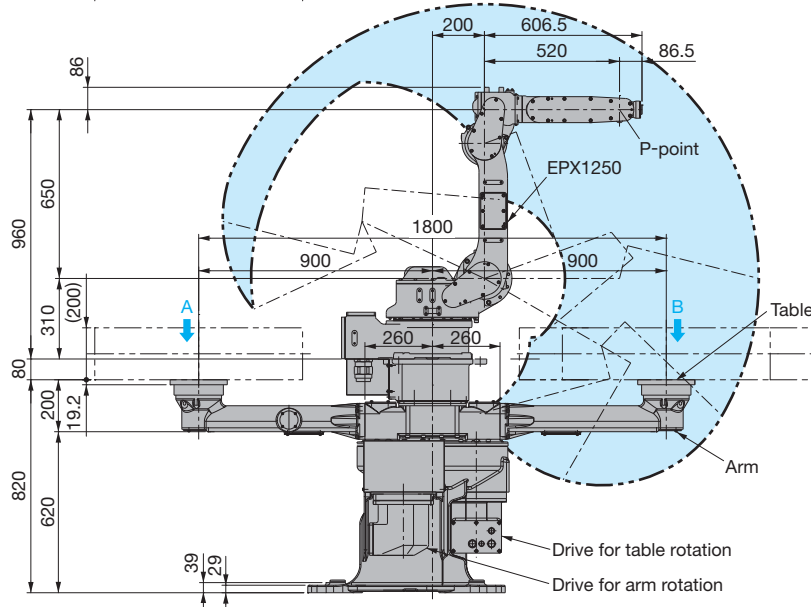
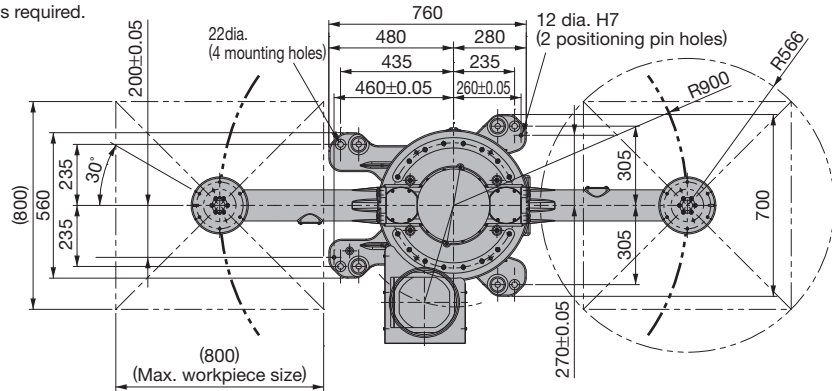
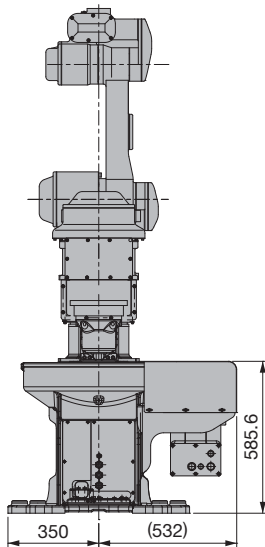
- With a robot mounted on a MOTOFEEDER used for small workpieces (Max: 800 mm × 800 mm), a smaller space is required.
- Both indexed positioning and spindle rotations are possible.
- Air panels for painting devices are available (optional).

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

Note: For FM-compliant models, an air-purge box is required.



View A and B



### ■ MOTOFEEDER Standard Specifications

Items	Specifications	
Number of Axis	2 (changing gears for tables)	
Control Method	AC servo drive control	
Max. Load	Table Heavy loads: 40 kg One-spindle, high-speed rotation models: 20 kg/table Two-spindle, high-speed rotation models: 10 kg/table	
	Repeatability	±0.55 mm, when table R is 300 mm.
Motion Range	Arm: -180° to +180° Table: Continuous rotation	
	Max. Speed	Arm: 120°/s Table for heavy loads: 270°/s Table for high-speed rotation: 900°/s
Allowable Moment of Inertia (GD <sup>2</sup> /4)	Table Heavy loads: 2.8 kg · m <sup>2</sup> One-spindle, high-speed rotation models: 1.4 kg · m <sup>2</sup> /table Two-spindle, high-speed rotation models: 0.7 kg · m <sup>2</sup> /table	
	Mass	1400-mm table pitch: 400 kg 1600-mm or 1800-mm table pitch: 430 kg
Ambient Conditions	Temperature	0°C to +40°C
	Humidity	20 % to 80% RH (non-condensing)
	Vibration	4.9 m/s <sup>2</sup> or less
	Others	Free from excessive electrical noise (plasma)
Air Panel (Optional)	Analog or 3-step control for one or two guns	

Items	Specifications
Explosion-proof Structure	Combination of pressurized enclosure and intrinsic safety TIIS: fia2G4*1 /ia2G4*2 FM: Pressurization*1/intrinsic safety*2
Explosion Proof Certification	TIIS, FM, ATEX (Application being planned)
Others	Continuous rotation or indexed positioning

\*1 : When power is on. \*2 : When power is off.

Note: The allowable moment of inertia shown here is the value used for tables for heavy loads 40 kg and tables for high-speed rotation 20 kg.

Confirm that the calculated moment of inertia takes into account the maximum weight and the offset from the rotational center of the table and that it does not exceed the allowable moment of inertia.

### ■ MOTOFEEDER Lineup

- ① EPX1250: Mounted; table pitch: 1,600 mm
- ② EPX1250: Mounted; table pitch: 1,800 mm  
(See the dimensional drawing on this page.)
- ③ EPX1250: Not mounted; table pitch: 1,400 mm
- ④ EPX1250: Not mounted; table pitch: 1,600 mm
- ⑤ EPX1250: Not mounted; table pitch: 1,800 mm
- ⑥ EPX2050-A300: Not mounted; table pitch: 1,400 mm
- ⑦ EPX2050-A300: Not mounted; table pitch: 1,600 mm
- ⑧ EPX2050-A300: Not mounted; table pitch: 1,800 mm

Note: Contact your Yaskawa representative for more information.

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**YASKAWA**

YASKAWA ELECTRIC CORPORATION

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. Specifications are subject to change without notice for ongoing product modifications and improvements.

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LITERATURE NO. KAEP C940420 05C <3>-0

Published in Japan September 2015  
15-7-41