MOTOMAN-PL Series

Robots Optimized for Palletizin

Технические характеристики

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YASKAWA's extensive know-how in robotics technologies can meet the requirements of a wide range of systems.

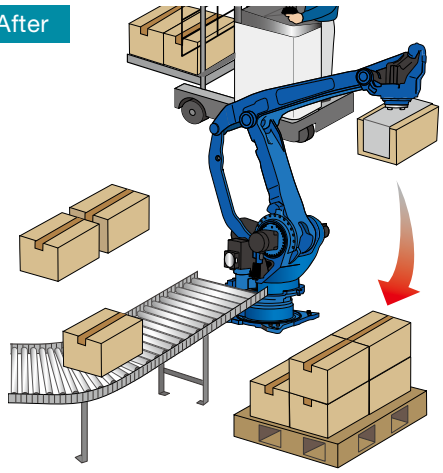
Automation and workforce savings

Releases workers from heavy labor and improves workforce savings. Supports all models

The MOTOMAN-PL series automates loading and unloading processes that are physically demanding for workers. Robots can work faster and with more accuracy than manual labor and help reduce costs because fewer operators are required.

Before

After



Palletizing boxes and sacks

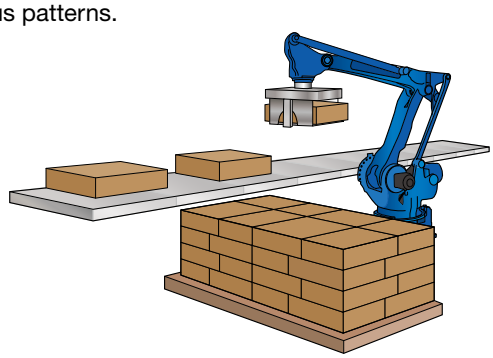
◀ MOTOMAN-PL190

High speed and accurate palletizing Supports MOTOMAN-PL190

The MOTOMAN-PL series can handle workpieces in various sizes and shapes. The capabilities of the PL190 are notably visible in the high-speed palletizing of boxes and sacks.

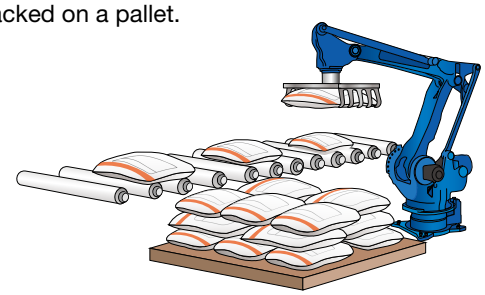
Palletizing boxes

In most cases, a gripper-type hand lifts a box-shaped workpiece by squeezing it from both sides. The gripper-type hand, which has a fixed plate on one side, can minimize gaps between workpieces and stack them in various patterns.



Palletizing sacks

In most cases, a hand lifts sacks by inserting its claw into the gaps between rollers and squeezing both sides of the workpiece. Workpieces maintain their shape originally formed by a bag shaping machine as they are quickly stacked on a pallet.



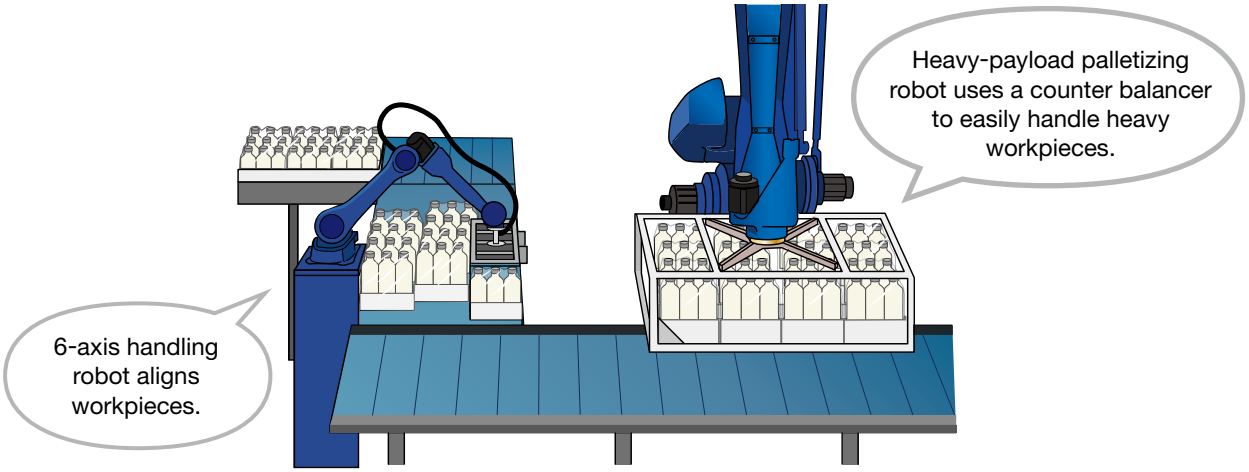
Palletizing shrink-wrapped beverages

◀ MOTOMAN-PL500

Heavy-payload robot significantly improves processing capacity.

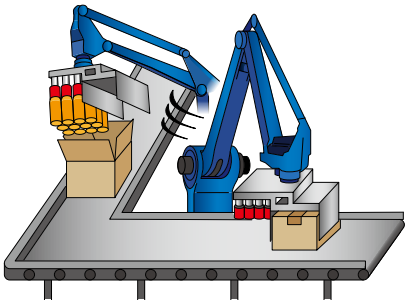
Supports MOTOMAN-PL500

After the handling robot aligns shrink-wrapped beverage trays, the palletizing robots holds and easily stacks multiple trays. The ability to palletize multiple workpieces in single cycle dramatically improves palletizing capacity.

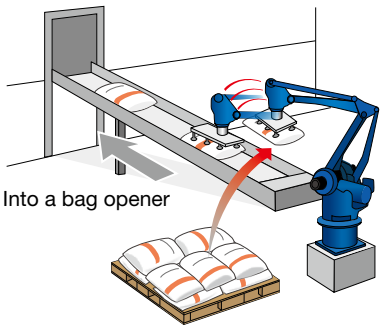


These robots have been used for a vast number of different workpieces and layouts. Contact your Yaskawa representative for details.

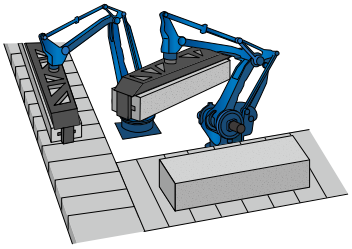
Simultaneous handling of bottles and boxes with multifunction hand



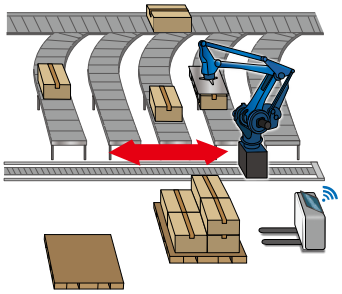
Depalletizing sacks and loading them into bag opener



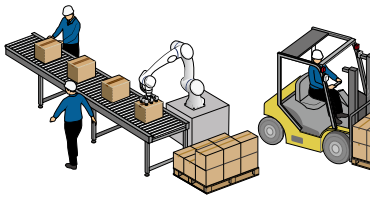
Palletizing stone material



Multi station palletizing with traverse track



Palletizing in close proximity to operators using collaborative robots*



*: For details on the collaborative robots, refer to the MOTOMAN-HC Series catalog (CHEP C941111 02).

Note: The hands shown on this page are not manufactured by Yaskawa. They must be prepared by the customer, separately.

Ideal for a variety of palletizing operations

MOTOMAN-PL Series

Yaskawa has an extensive lineup of models in the MOTOMAN-PL series to support the diverse needs of customers.

Product Lineup

Model	MOTOMAN-PL80	MOTOMAN-PL190	MOTOMAN-PL320	MOTOMAN-PL500	MOTOMAN-PL800
Payload	80 kg	190 kg	320 kg	500 kg	800 kg
Maximum Reach	2061 mm	3159 mm			
Processing Capacity*1	800 cycles/ h	1670 cycles/ h	1270 cycles/ h	770 cycles/ h	520 cycles/ h
Maximum Stacking Height (stacking space conditions)	1740 mm (1100×1100 mm)	2363 mm (1600×1600 mm)			
Workpiece Example*2	· Relatively lightweight cardboard boxes containing confectionery and paper products, etc. · Printed matter, such as books and bundled flyers	· Cardboard boxes containing beverages, food, etc. · Sacks containing rice, fertilizer, feed, etc.	Wood materials such as knockdown furniture	Shrink-wrapped beverages and beer barrels	Stone materials such as concrete blocks and bricks

*1: The transfer pattern is a reciprocating movement upward 400 mm, horizontal 2000 mm, and downward 400 mm when each model carries maximum payload.
*2: These are examples. Please contact your Yaskawa representative for details.

POINT **Increase productivity of production lines**

No. 1 payload and speed in its class

PL190 PL320

· With the highest payload in its class (190 kg, 320 kg), expands the range of available hands and sensors.
· Maximum speed is higher than former models with PL190 up to 37% faster and PL320 up to 53% faster.
· Lower wrist height (from 403 mm to 308 mm) reduces interference with the ceiling even when operating in narrow workspace.

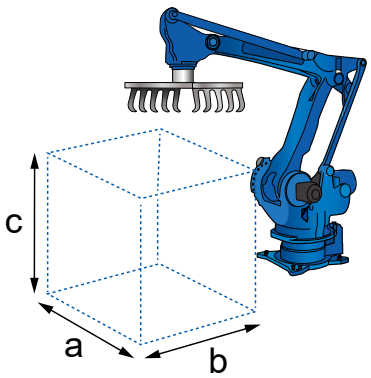
■Comparison of wrist height

Former model: MPL160Ⅱ MPL300Ⅱ
New model: PL190 PL320

Wide operation range and stacking height

· Both the wide operation range and stacking height can accommodate a variety of layouts and increase productivity.

Model		PL80	PL190	PL320	PL500	PL800
Maximum Stacking Height (c)	When the stacking space (a × b): 1100 × 1100 mm	1740 mm	2737 mm			
	When the stacking space (a × b): 1300 × 1300 mm	-	2624 mm			
	When the stacking space (a × b): 1600 × 1600 mm	-	2363 mm			

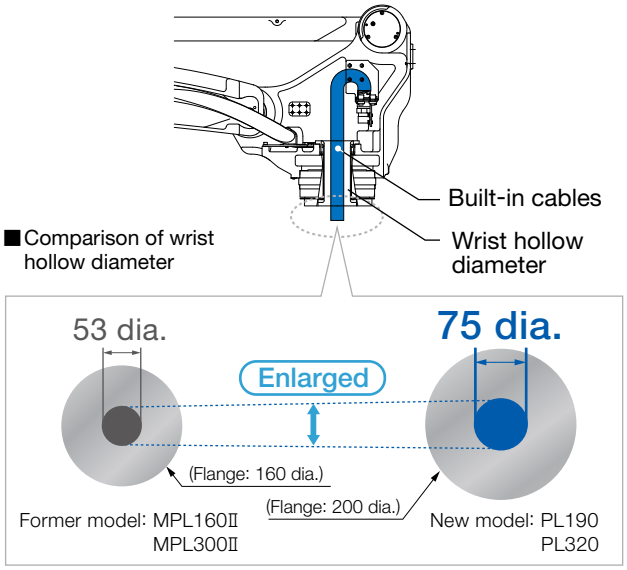


POINT **Compact equipment**

Hollow wrist reduces interference with hand cables and air hoses*.

- The hollow wrist allows hand cables and air hoses to be built in. This feature alleviates hand-related problems by preventing cables from becoming entangled or interfering with peripheral devices.
- PL190 and PL320: wrist hollow diameter is wider than former (from 53-mm dia. to 75-mm dia.).
  Wider range of built-in cables to further improve convenience.

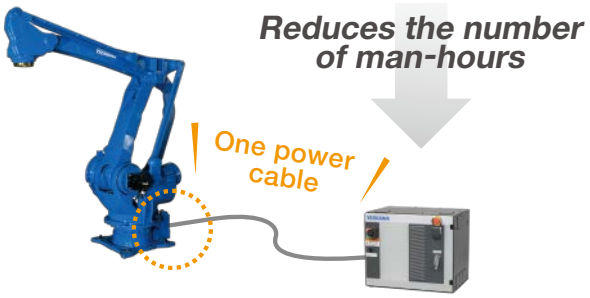
*: Excluding MOTOMAN-PL80



POINT **Improve equipment installation, operation, and maintenance**

Reduced wiring time

- Power cable is reduced to one cable, which reduces wiring time.



Specially Designed Software for Palletizing

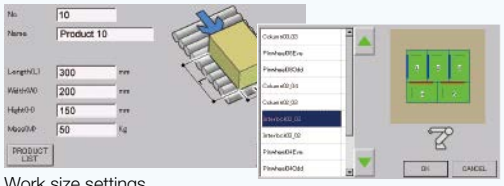
MOTOPAL

MOTOPAL is a software program that runs on a programming pendant and is designed to provide technical support for palletizing. MOTOPAL helps to reduce setup time and increase work efficiency.

POINT

- Simplify operations with a dedicated display for palletizing
- Automatically generate stacking programs
- Check stacking conditions
- Easy to select and switch between tasks

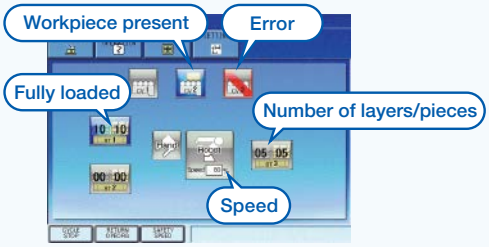
【JOB Creation Window】



Work size settings

Stacking pattern settings

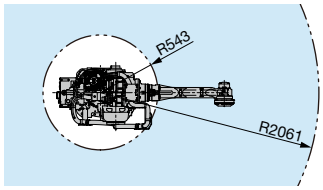
【Operation Status Window】

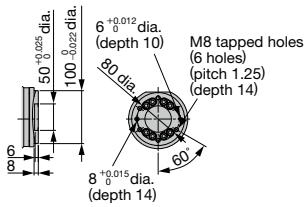


PL80

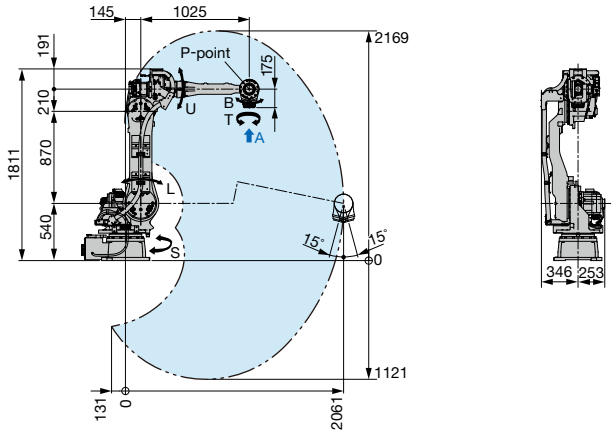
■ Dimensions Units: mm ⬚: P-point Maximum Envelope

Note: Refer to individual dimension diagrams for detailed dimensions and specifications of the following models.





View A



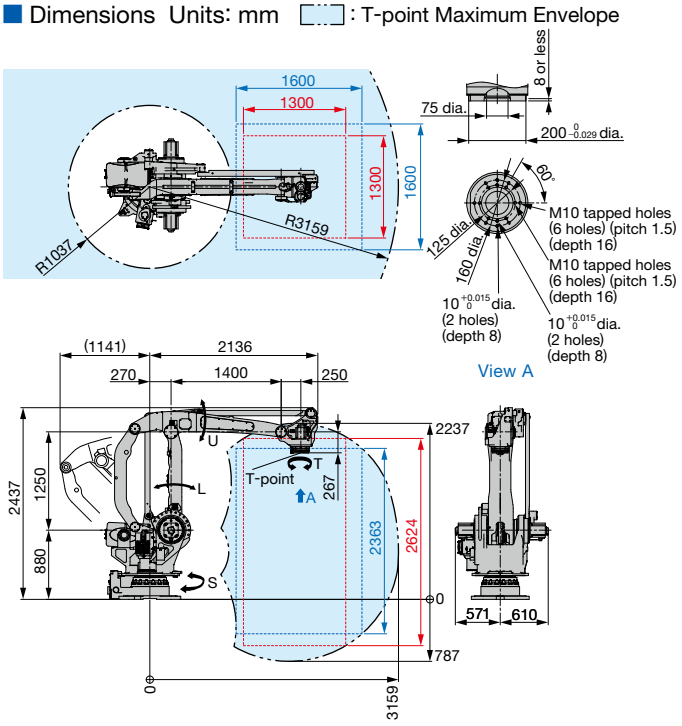
Model		MOTOMAN-PL80
Type		YR-1-05VX80-A00
Controlled Axis		5 (vertically articulated)
Payload	Wrist	80 kg
	U-arm*1	10 kg
Maximum Reach		2061 mm
Repeatability*2		0.03 mm
Range of Motion	S -axis (turning)	−180° −+180°
	L -axis (lower arm)	− 90° −+135°
	U-axis (upper arm)	−160° −+ 35°
	B -axis (wrist pitch/yaw) *3	− 15° −+ 15°
	T -axis (wrist twist)	−360° −+360°
Maximum Speed*4	S -axis (turning)	3.14 rad/s. 180°/s
	L -axis (lower arm)	3.14 rad/s. 180°/s
	U-axis (upper arm)	3.14 rad/s. 180°/s
	B -axis (wrist pitch/yaw)	3.14 rad/s. 180°/s
	T -axis (wrist twist)	8.72 rad/s. 500°/s
Allowable Moment	B -axis (wrist pitch/yaw)	78.4 N·m
	T -axis (wrist twist)	20.5 N·m
Allowable Inertia (GD²/4)	B -axis (wrist pitch/yaw)	48 kg·m²
	T -axis (wrist twist)	25 kg·m²
Approx. Mass		565 kg
IEC Protection Class		Body: IP54, Wrist: IP67
Ambient Conditions	Temperature	0 ℃ to +45 ℃
	Humidity	20% to 80%RH (non-condensing)
	Vibration	4.9 m/s² (0.5 G) or less
	Altitude	1000 m or less
Power Requirements*5		4.5 kVA
Mounting		Floor

∗1: The mountable load on the U-arm will vary depending on the load mass of the wrist part.
∗2: Repeatability conforms to ISO 9283.
∗3: The range of motion of the B-axis is an angle in the downward vertical direction. In some postures, however, the motion of the B-axis may be restricted depending on the angle with respect to the upper arm.
∗4: The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.
∗5: The power requirement value is obtained using Yaskawa's in-house measurement conditions and will vary depending on the load, motion pattern, or cycle time.

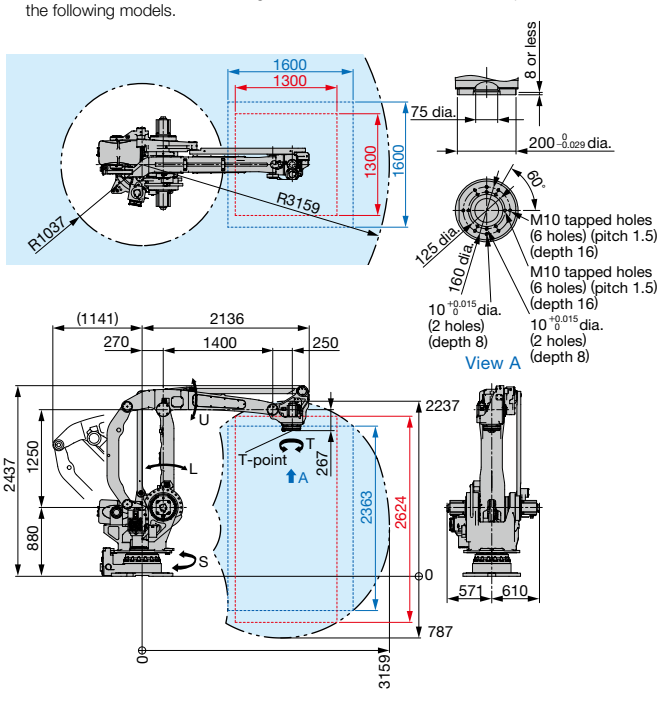
PL190

PL320

■ Dimensions Units: mm ⬚: T-point Maximum Envelope



Note: Refer to individual dimension diagrams for detailed dimensions and specifications of the following models.



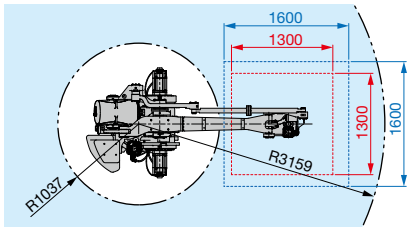
Model		MOTOMAN-PL190	MOTOMAN-PL320
Type		YR-1-04LXH190-A00	YR-1-04LXH320-A00
Controlled Axis		4 (vertically articulated)	4 (vertically articulated)
Payload		190 kg	320 kg
Maximum Reach		3159 mm	3159 mm
Repeatability*1		0.05 mm	0.05 mm
Range of Motion	S -axis (turning)	−180° −+ 180°	−180° −+ 180°
	L -axis (lower arm)	− 45° −+ 90°	− 45° −+ 90°
	U-axis (upper arm)	−120° −+15.5°	−120° −+15.5°
	T -axis (wrist twist)	−360° −+ 360°	−360° −+ 360°
Maximum Speed*2	S -axis (turning)	2.44 rad/s, 140°/s	2.09 rad/s, 120°/s
	L -axis (lower arm)	2.53 rad/s, 145°/s	1.92 rad/s, 110°/s
	U-axis (upper arm)	2.53 rad/s, 145°/s	1.92 rad/s, 110°/s
	T -axis (wrist twist)	7.33 rad/s, 420°/s	5.23 rad/s, 300°/s
Allowable Inertia ($GD^2/4$)	T -axis (wrist twist)	90 kg·m²	160 kg·m²
Approx. Mass		1680 kg	1680 kg
IEC Protection Class		Body: IP54, Wrist: IP67	
Ambient Conditions	Temperature	0 ℃ to +45 ℃	
	Humidity	20% to 80%RH (non-condensing)	
	Vibration	4.9 m/s² (0.5 G) or less	
	Altitude	1000 m or less	
Power Requirements*3		9.5 kVA	9.5 kVA
Mounting		Floor	

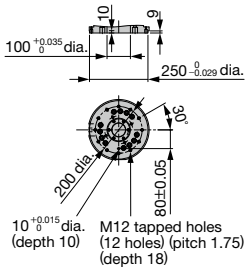
*1: Repeatability conforms to ISO 9283.
*2: The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.
*3: The power requirement value is obtained using Yaskawa's in-house measurement conditions and will vary depending on the load, motion pattern, or cycle time.

PL500

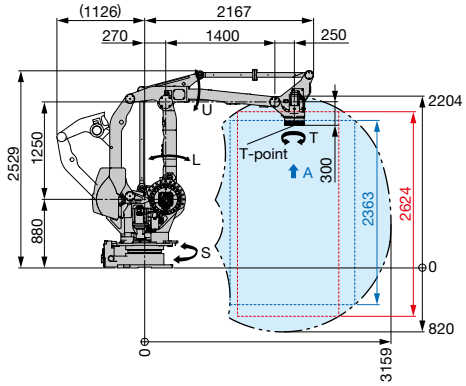
■ Dimensions Units: mm ⬚: T-point Maximum Envelope

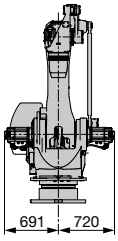
Note: Refer to individual dimension diagrams for detailed dimensions and specifications of the following models.





View A

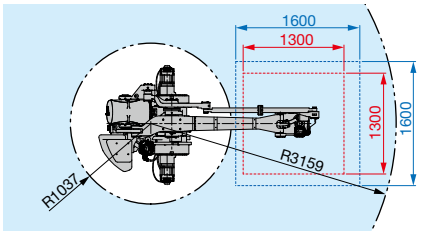


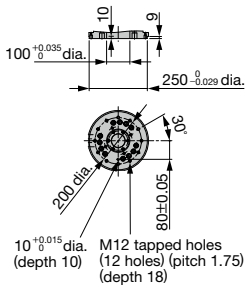


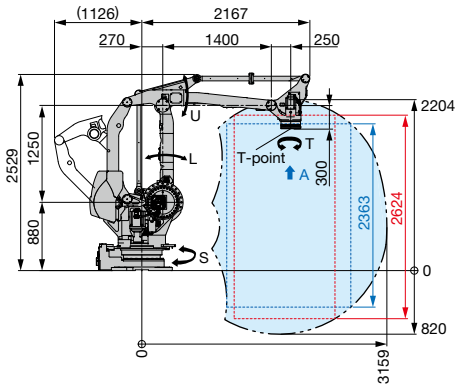
Model		MOTOMAN-PL500
Type		YR-1-04LXH500-A00
Controlled Axis		4 (vertically articulated)
Payload		500 kg
Maximum Reach		3159 mm
Repeatability*1		0.05 mm
Range of Motion	S -axis (turning)	−180° −+ 180°
	L -axis (lower arm)	− 45° −+ 90°
	U-axis (upper arm)	−120° −+15.5°
	T -axis (wrist twist)	−360° −+ 360°
Maximum Speed*2	S -axis (turning)	1.48 rad/s, 85°/s
	L -axis (lower arm)	1.48 rad/s, 85°/s
	U-axis (upper arm)	1.48 rad/s, 85°/s
	T -axis (wrist twist)	3.40 rad/s, 195°/s
Allowable Inertia ($GD^2/4$)	T -axis (wrist twist)	200 kg·m²
Approx. Mass		2390 kg
IEC Protection Class		IP54
Ambient Conditions	Temperature	0 ℃ to +45 ℃
	Humidity	20% to 80%RH (non-condensing)
	Vibration	4.9 m/s² (0.5 G) or less
	Altitude	1000 m以下
Power Requirements*3		8.0 kVA
Mounting		Floor

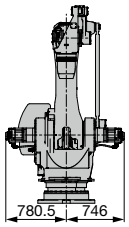
*1: Repeatability conforms to ISO 9283.
*2: The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.
*3: The power requirement value is obtained using Yaskawa's in-house measurement conditions and will vary depending on the load, motion pattern, or cycle time.

PL800









Model		MOTOMAN-PL800
Type		YR-1-04LXH800-A00
Controlled Axis		4 (vertically articulated)
Payload		800 kg
Maximum Reach		3159 mm
Repeatability*1		0.05 mm
Range of Motion	S -axis (turning)	−180° −+ 180°
	L -axis (lower arm)	− 45° −+ 90°
	U-axis (upper arm)	−120° −+15.5°
	T -axis (wrist twist)	−360° −+ 360°
Maximum Speed*2	S -axis (turning)	1.13 rad/s, 65°/s
	L -axis (lower arm)	1.13 rad/s, 65°/s
	U-axis (upper arm)	1.13 rad/s, 65°/s
	T -axis (wrist twist)	2.18 rad/s, 125°/s
Allowable Inertia (GD²/4)	T -axis (wrist twist)	550 kg·m²
Approx. Mass		2560 kg
IEC Protection Class		IP54
Ambient Conditions	Temperature	0 ℃ to +45 ℃
	Humidity	20% to 80%RH (non-condensing)
	Vibration	4.9 m/s² (0.5 G) or less
	Altitude	1000 m以下
Power Requirements*3		8.0 kVA
Mounting		Floor

*1: Repeatability conforms to ISO 9283.
*2: The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.
*3: The power requirement value is obtained using Yaskawa's in-house measurement conditions and will vary depending on the load, motion pattern, or cycle time.

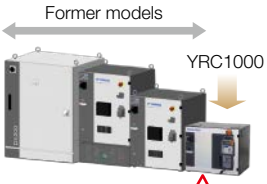
YRC1000 Robot Controller

Programming Pendant

YRC1000 Robot Controller

POINT Smallest size in the world reduces installation space

This 125 L compact size controller does not require a transformer and has built-in external axis amplifiers for two axes*.



Realized this size by building in two external axes* and eliminating the need for a transformer.

POINT Global standardization (Universal size)

- Common size for use in Japan and overseas.
- Overseas models do not require a transformer to adapt to the required power supply voltage.

POINT New motion control (high precision and high speed)

- Cycle time improved by max. 10% (compared with the former model) due to optimized acceleration/deceleration control (depends on conditions).
- Significantly reduces error in path accuracy caused by differences in motion speed (improved by 80% compared with the former model).

POINT Lighter programming pendant with better operability

- Weighs only 730 g, the lightest programming pendant in its class, with improved cable installation.
- Can confirm robot positions and postures on the 3D robot model display.
- Touch screen allows intuitive operation to easily move the cursor and scroll.

Pick up Saves energy with the power regeneration function

Energy generated during motor deceleration (regenerative power) is returned to the power supply. This reduces electric power consumption by a maximum of 30% compared with the former model (depends on applications and motion patterns).

■ YRC1000 Robot Controller Specifications

Items	Specifications
Configuration	Dust proof structure IP54 (area of backside duct fan: IP2X)
Dimensions	598 (W)×427 (D)×490 (H) mm, 125 L
Approx. Mass	85 kg max. (External axis amplifiers for up to two axes can be built in.)*
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)
Altitude	2000 m (with temperature derating) Derating condition of over 1000 m: max. ambient temperature decreases 1% per 100 m.
Power Supply	Japan: three-phase 200 VAC to 240 VAC (+10% to −15%), 50/60 Hz (±2%) Asia and Europe: three-phase 380 VAC to 440 VAC (+10% to −15%), 50/60 Hz (±2%) (neutral grounding) North America: three-phase 380 VAC to 480 VAC (+10% to −15%), 50/60 Hz (±2%) (neutral grounding)
Grounding	Grounding resistance: 100 Ω or less for 200-V class, 10 Ω or less for 400-V class
Digital I/Os	Specialized signals: 19 inputs and 6 outputs General signals: 40 inputs and 40 outputs (32 transistor outputs, 8 relay outputs)
Positioning System	Serial communications (absolute encoder)
Programming Capacity	JOB: 200,000 steps, 10,000 instructions CIO ladder: 20,000 steps max.
Expansion Slots	PCI express: 2 slots
LAN (Connection to Host)	2 (10BASE-T/100BASE-TX)
Interface	RS-232C: 1ch
Control Method	Software servo control
Drive Units	SERVOPACK for AC servomotors

■ Programming Pendant Specifications

Items	Specifications
Dimensions	152 (W)×49.5 (D)×300 (H) mm
Approx. Mass	0.730 kg
Material	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.), USB port (USB 2.0, 1 port)
Display	5.7-inch TFT color LCD, touch panel VGA 640×480 pixels (alphanumeric characters, Chinese characters, Japanese letters, and others)
IEC Protection Class	IP54
Cable Length	Standard: 8 m, max.: 36 m (with optional extension cable)

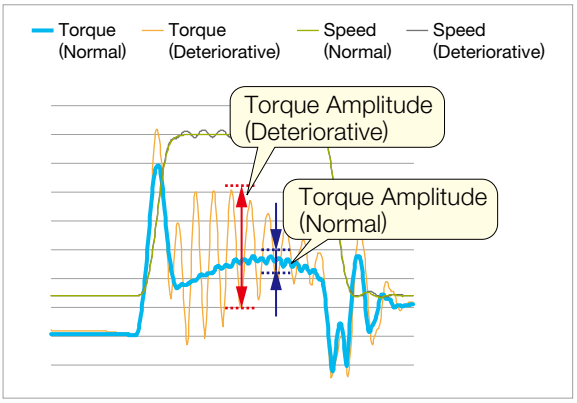
*: External axis amplifiers for three axes can be built in for PL80.
Note: The controller features and specifications on this page are for the manipulators described in this catalog.

YRC1000's Optimized Functions for Palletizing

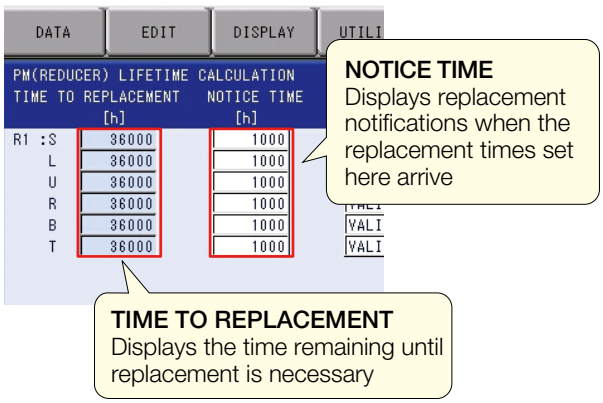
Preventive maintenance function for the speed reducer

With the YRC1000, users are provided with information to predict speed reducer failures. Warnings are output when diagnostics indicate a deteriorative speed reducer based on torque amplitude.
In addition, service life is estimated based on the torque and speed on each axis during operation. Users will be notified about the timing to replace the speed reducer.

Torque Waveforms When Normal or Deteriorative



Diagnosis by Service Life Estimation



Further improvement in production process

YASKAWA Cockpit

YASKAWA Cockpit, a core component of the i³-Mechatronics concept, is an original software that performs digital management. Combined with automated solutions using robots and peripheral devices, the digital data management by YASKAWA Cockpit helps identify solutions to business challenges right at the customers' production sites.
For details, refer to the i3-Mechatronics catalog (KAEP A00024 00).

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