



Handling Robot for Picking and Packing MOTOMAN-MPP and MPK Series

MPP Series
MPK Series



Certified for
ISO9001 and
ISO14001



JAB
QMS Accreditation
R009



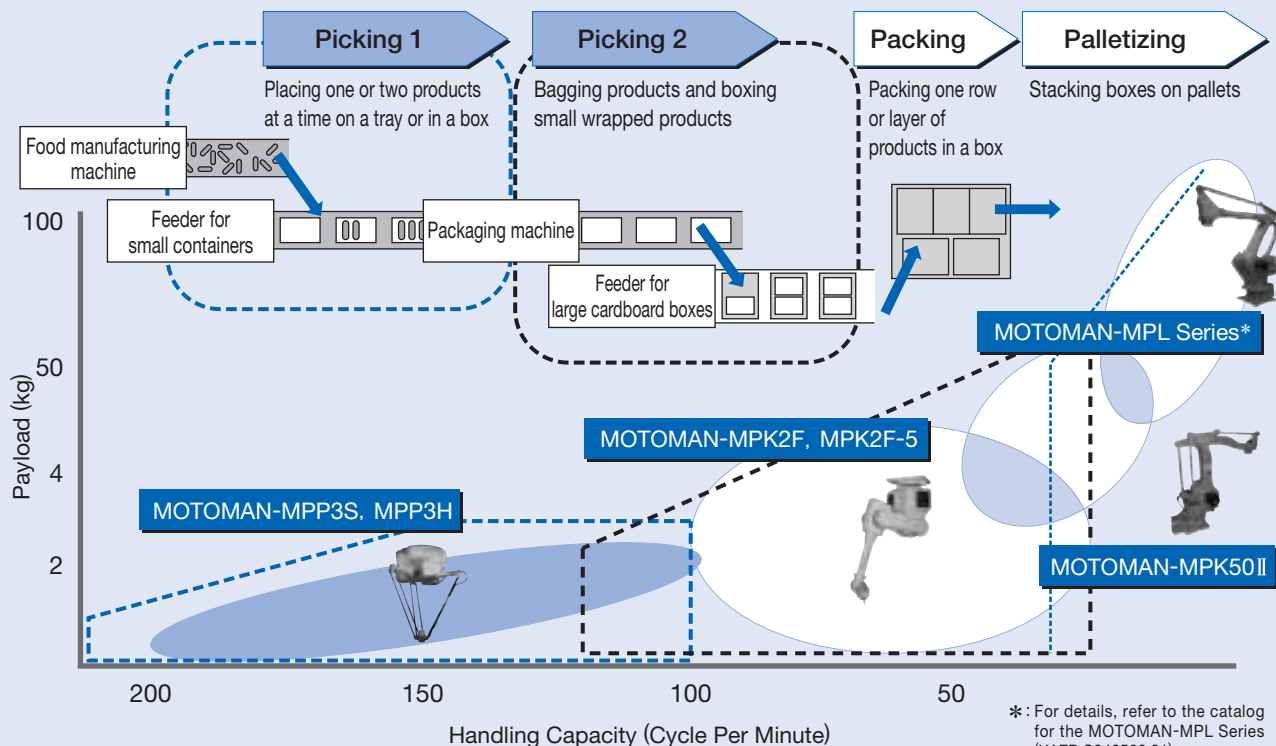
QUALITY SYSTEM
JQA-0813



ENVIRONMENTAL SYSTEM
JQA-EM0924

The MOTOMAN-MPP and MPK series offer logistics with automated transfer systems for the picking and packing processes.

Example of food manufacturing



Picking MOTOMAN-MPP3S, MPP3H

High productivity

The MPP series of robots can be installed in close proximity in a small space. As the best in their class, they also enable high-speed handling with a large motion range and improve productivity.

- 150 cpm*² with a 3 kg load and 230 cpm*³ with a 1 kg load are possible.
- Allowable inertia of the wrist is 0.017 kg·m², and high-speed handling with two hands is possible.

* 1: Handling in Adept cycle (25 mm × 305 mm × 25 mm) without positioning limit. Does not include the time for using suction to grab a workpiece.

* 2: Cycle per minute

* 3: With a limit in continuous operations

- Wiring and piping work can be easily performed through the hollow section(80 mm dia.) located at the center of the body.

Flexible and high-speed handling is maximized by using a function specially designed to synchronize two conveyors, the vision function and the production management function.

Even higher productivity can be achieved with Yaskawa's original robot design

Cycle times can be reduced with shorter suction time in addition to high-speed robot movements. The hollow structure of the robot (first in the industry) enables the installation of air valves inside the parallel link arms. The structure shortens the length of piping drastically, which achieves a reduction in the cycle time.

Large motion range with a small installation space

- MPP3S Range of motion : 800mm(dia.)×200mm(H)
Footprint : 650mm(dia.)
- MPP3H Range of motion : 1300mm(dia.)×300mm(H)
(Largest motion range in robots with 3kg payload)
Footprint : 750mm(dia.)
(Smallest footprint in robots with 3kg payload)

High level of cleanliness

The MPP series of robots are designed to maintain high level of cleanliness for food handling.

- Ball joints are free of grease because self-lubricating material approved by the Food Sanitation Law of Japan is used.
- Because they can be mounted on ceilings and maintenance is done from the top downwards, damage or contamination of workpieces and conveyors is prevented if a work tool, part, or grease falls during maintenance.
- The surface of the body, excluding arms, is smooth and easy to clean.
- Can be washed with acid- or alkaline-based disinfectant.
- Clean Class*: ISO class 5

*: Conforms to ISO-14644 standards (The above of the wrist flange surrounded by a down flow of 0.4m/s or more.)

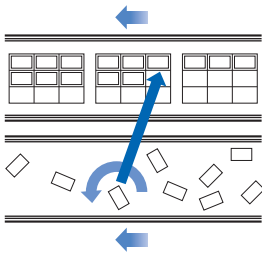


·MPP3 certified for cleanroom application by Fraunhofer IPA.
·MPP3H under application for Fraunhofer IPA cleanroom certification.



High productivity

With the fastest motion speed in its class, the MOTOMAN-MPK2 and MPK2F can quickly transfer many workpieces in a short period. Smooth, continuous operation is possible with high precision.

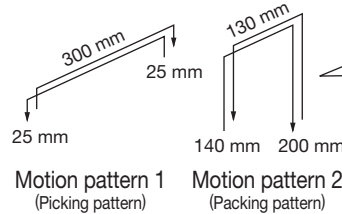


High-speed positioning

- Simultaneous positioning & transfer
- Max. speed of T-axis increased to 2000°/s



High-speed, continuous operation



Cycle time*

- Motion pattern 1
0.47 s
(128 cycles/min: 2 kg)
- Motion pattern 2
0.86 s
(70 cycles/min: 2 kg)

* : Does not include the time for grabbing and releasing a workpiece.

High level of cleanliness

Countermeasures against contamination

Manipulator's high level of cleanliness guarantees safety and sanitation of the transferred products.

- **Protection against corrosion & dust**
 - Exposed parts made from corrosion-resistant materials with surface treatment and washable coating
 - Cable and hoses protected in hollow shaft of arm
- **Protection against lubricants**
 - Multi-layered sealing construction on all drive shafts
 - Food-grade lubricant used (NSF H1 registered)

Washability (Disinfectant)

Stain-resistant surface and structure, washable coating, and water proofing against daily disinfectant washing.

- **Protection against dirt & particles**
 - No depressions of grooves to hold dirt
 - Particles do not collect or adhere.
- **Protection against disinfectant washing**
 - Washable coating withstands daily washing
 - Can be washed with disinfectants, including acidic or alkaline liquids.
 - Water-proof performance conforms to IP67 specifications (with tools mounted).

High flexibility in layout design

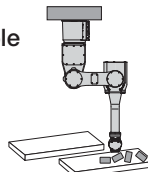
Enables flexibility regardless of space restrictions or installation method for high-density layouts.

Space-saving installation

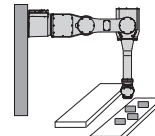


Dimensions

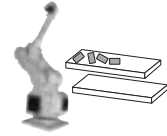
All installation methods possible



On ceiling



On walls



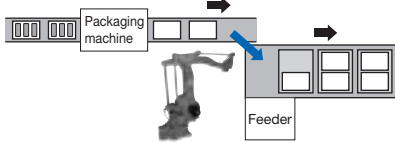
On floors

High productivity

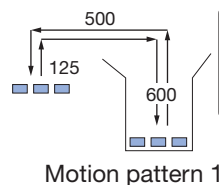
With a high payload and the highest speed in its class, many more workpieces can be picked up and packed in a short period of time.

High-speed packing

Increased efficiency by transferring and packing many workpieces from a single row or layer at one time.

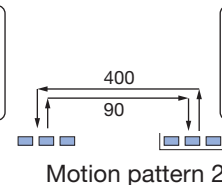


High-speed handling



Motion pattern 1

Cycle time*
• **1.1 s**
(55 cycles/min: 30 kg)



Motion pattern 2

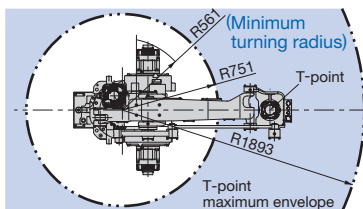
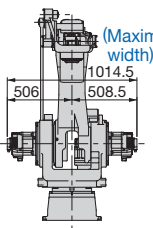
Cycle time*
• **0.6 s**
(100 cycles/min: 40 kg)

* : Does not include the time for grabbing and releasing a workpiece.

Space-saving installation

Compact design increases usability in restricted spaces or in high-density layouts.

- **Shortened maximum width**
- **Minimized minimum turning radius**



Multi-purpose

With a high-payload, a wide motion range, and a wide variety of the components, the MOTOMAN-MPK50 can be used as a palletizing robot for small workpieces.

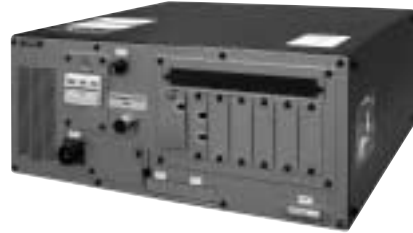
- **Max. payload: 50 kg** Can transfer many workpieces at one time
- **Wide motion range (Palletizing also possible)**
Maximum horizontal reach (T-point): 1893 mm,
Vertical motion range: 1668 mm,
S-axis turning range: -180° - +180°
- **Wide variety of components**
One cable (23-core), two air hoses (dia.: 10 mm), and one tube for field-bus cable (dia.: 12 mm) accommodated in hollow arm.
- **Protection Class** Body: IP54 (optional: IP65), Wrist: IP67
- **Options** Food-grade lubricant for food machinery

Can be used with robots with a 20 kg payload or less.

Optimum controller for handling and assembly

The FS100 robot controller is compact controller with improved performance and functions optimized for handling and assembly.

- Fits in a 19 inch rack and can be installed under conveyors.
- Improved performance and high-speed control obtained by improving resolutions for I/O commands as well as by reducing time for ladder scanning.
- High-speed positioning achieved by suppressing vibration of hands (MPP3S/MPP3H/MPK2F/MPK2F-5).
- Commands specifically designed for workpiece handling with synchronized conveyors.



Open controller

The FS100 robot controller offer an environment and functions that enable users to develop optimum application programs for their own use.

Functions	Descriptions	Remarks
MotoPlus	Allows users to customize application programs for robot control · Users can create robot control programs in C and install them in the controller.	MotoPlusDE (development environment) is optional.
MotomanSync <small>Optional</small>	Allows users to directly control the FS100 controller from the host controller by using the FS100 as servers. · Robots can be controlled directly from the host computer.	Compatible host computers: Windows, MP3200 controllers, Rockwell PLC*
Pendant Customization <small>Optional</small>	Provide the function to develop application programs for the programming pendant · WindowsCE application programs developed by users can be incorporated in the programming pendant.	—

*: Compatible with 1756-L61 ControlLogix and 1756-L35 CompactLogix controllers.

Hardware Options

- Programming pendant
- External axis (max.: 2 axes)
- I/O module (28 points, NPN or PNP)
- Counter module (2 channels)
- Analog input module (8 channels)
- Analog output module (4 channels)
- Major fieldbus interface boards
DeviceNet (master/slave), CC-Link (slave), PROFIBUS (slave), Ethernet/IP (slave, I/O communications)

Optional Functions

- Conveyor synchronization
- TCP
- Relative job
- Coordinated control
- Servo float
- Energy saving mode (with servomotor turn off limit)
- Software pendant
- Network (data transfer, FTP, Ethernet server)
- Bilingual display (Shown in the required language.)
- Vision function
- External reference point control
- Independent control
- Search
- Automatic backup

This is a low floor-type of robot controller that can be stacked up. The amplifier for three external axes and other options that previously required attachment tools can now be housed inside a standard cabinet, reducing the required space for installation by up to 50%. The safety functions have been strengthened by improving the safety performance of the speed limiting function and tool switching monitoring function.



Safety

Improved Safety Functions

- A safety fence can be installed in an area smaller than the robot motion area to save space. (New and optional function)
- Motion is limited to a set area by monitoring the position of the robot and tool.
- The Preventive Maintenance Function for Speed Reducer can detect speed reducer faults. The Preventive Maintenance Function for Hardware can prompt you to replace hardware before it breaks.

Easy Operation

- Editing or prohibiting editing instructions with the programming pendant makes controlling jobs easier. (JOB Line Comment-Out Function, JOB Line Edit-Protect Function, JOB Folder Function)

Save Space

- A safety fence can be installed in an area smaller than the robot motion area to save space. (New and optional function)
- Two DX200 robot controllers can be stacked. Installation width can be reduced by 30% compared with two DX100 controllers installed side-by-side.

* : Some models are excluded.

Picking & Packing Software MotoPick

Optional

MotoPick provides support for picking and packing with the software applications specially designed for those operations. A pattern for the arrangement of workpieces moving on a conveyor or a pattern for picking and placing operation can be easily selected or changed on a computer. This software helps improve overall productivity in conveyor lines.

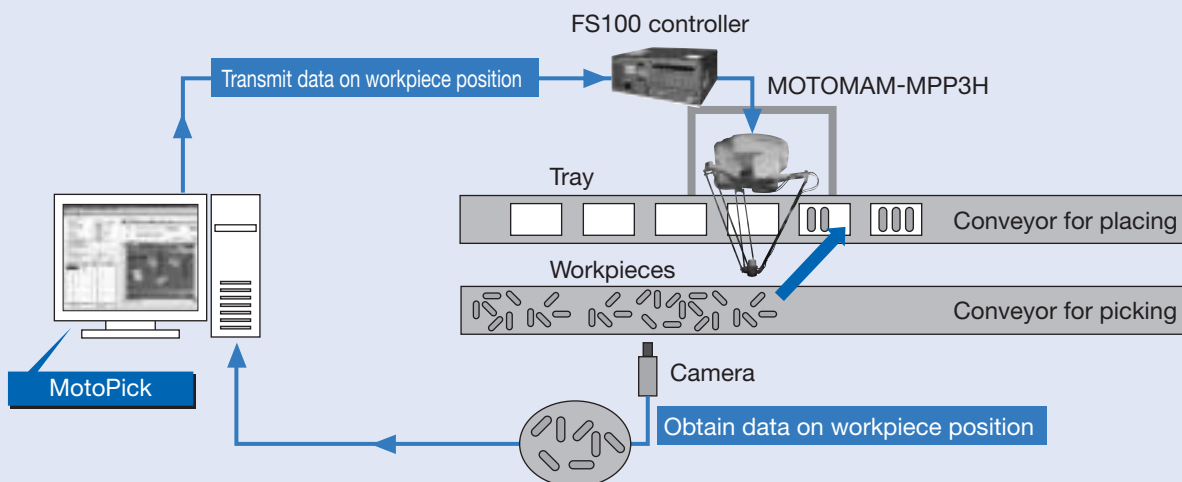
● Vision function

The camera connected to a computer running MotoPick can be adjusted and controlled. Data on positions of individual workpieces moving on a conveyor can automatically be obtained with the camera.

● Real time automatic scheduling

The motion patterns of the robot in pick and place applications are controlled based on the position data of workpieces that have been obtained by the camera and transferred to the robot's controller.

Conveyor Synchronization System for the MPP3H with FS100 Robot Controllers

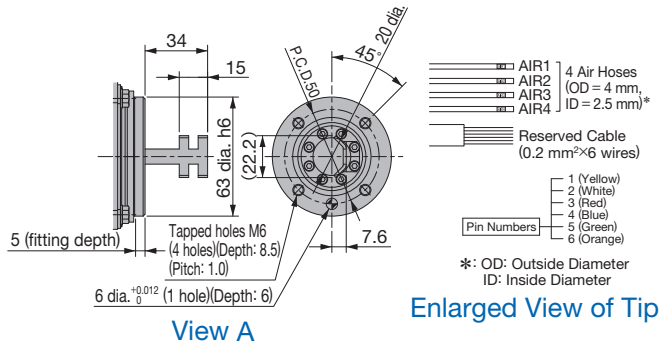
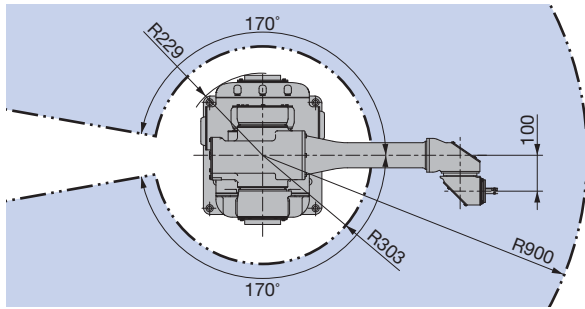




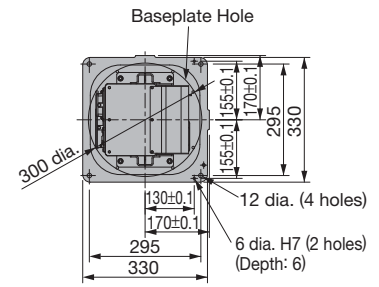
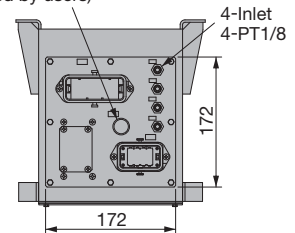
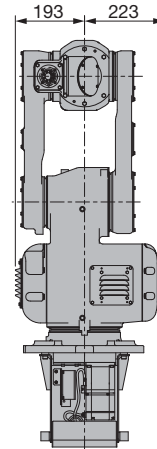
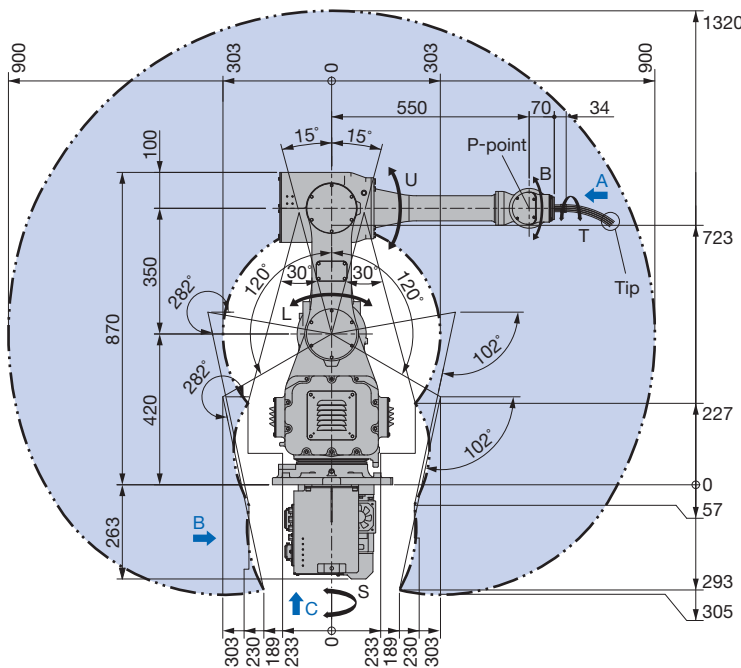
MOTOMAN-MPK2F

2 kg payload, R900 mm maximum reach **FS100**

■ Dimensions Units : mm : P-point Maximum Envelope



Connector for internal user I/O wiring harness:
RM15WTRZ-10P (with cap)
Matching connector:
RM15WTPZ-10S*HIROSE*
(provided by users)



Manipulator Specifications

Model	MOTOMAN-	MPK2F (for FS100)
Type	Standard Type	YR-MPK002F-B00
	Built-in Base Type	YR-MPK002F-B01
Controlled Axis	5 (vertically articulated)	
Payload	2 kg	
Repeatability*1	±0.5 mm	
Range of Motion	S-axis (turning)	-170° - +170°
	L-axis (lower arm)	-120° - +120°
	U-axis (upper arm)	-102° - +282°
	B-axis (wrist pitch/yaw)	-150° - +150°
	T-axis (wrist twist)	-270° - +270°
Maximum Speed	S-axis (turning)	5.59 rad/s, 320°/s
	L-axis (lower arm)	5.76 rad/s, 330°/s
	U-axis (upper arm)	5.76 rad/s, 330°/s
	B-axis (wrist pitch/yaw)	6.63 rad/s, 380°/s
	T-axis (wrist twist)	34.9 rad/s, 2000°/s

Allowable Moment	B-axis (wrist pitch/yaw)	3.5 N·m	
	T-axis (wrist twist)	1.5 N·m	
Allowable Inertia (GD²/4)	B-axis (wrist pitch/yaw)	0.065 kg·m²	
	T-axis (wrist twist)	0.012 kg·m²	
Mass	72 kg		
Ambient Conditions	Temperature	0°C to +40°C	
	Humidity	20% to 80%RH (non-condensing)	
	Vibration	4.9 m/s² or less	
	Others	<ul style="list-style-type: none"> Free from corrosive gasses or liquids, or explosive gasses Free from exposure to oil, or dust. Free from excessive electrical noise (plasma) 	
		Power Requirements*2	2.0 kVA

*1 : Conforms to ISO 9283.

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

Note : SI units are used for specifications.



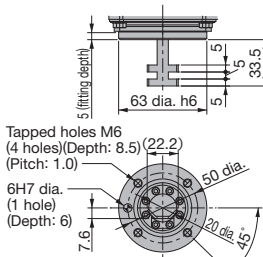
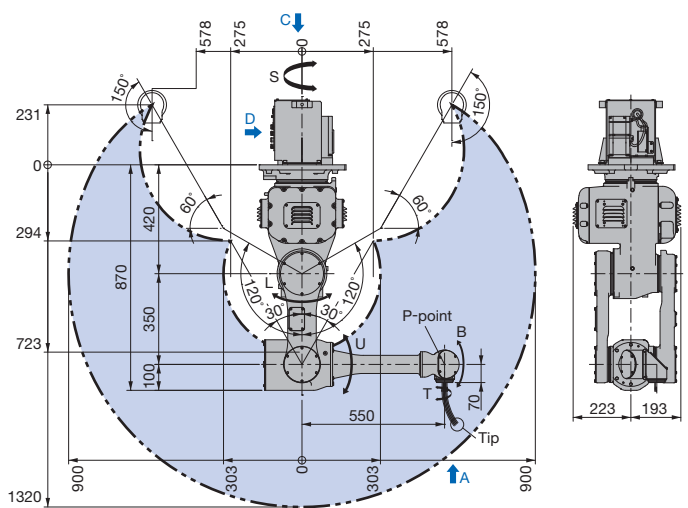
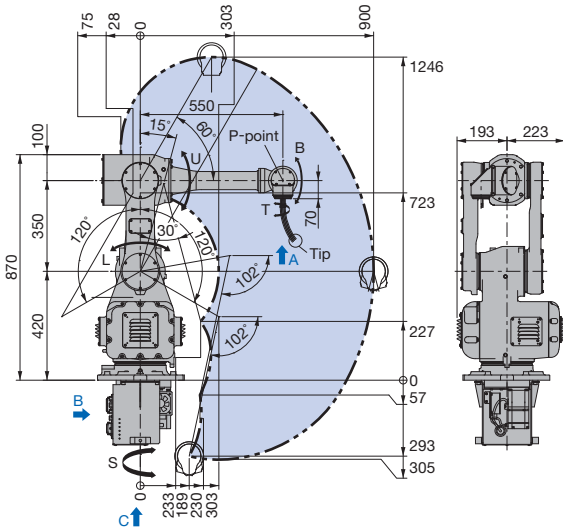
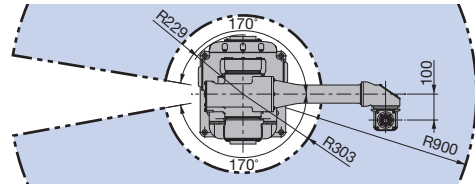
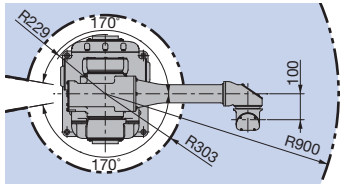
MOTOMAN-MPK2F-5

5 kg payload, R900 mm maximum reach FS100

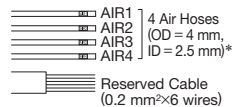
■ Dimensions Units : mm P-point Maximum Envelope

Floor-mounted Type, Built-in Base Type
Model: YR-MPK002F-A10

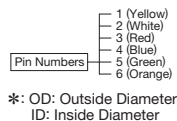
Ceiling-mounted Type, Built-in Base Type
Model: YR-MPK002F-A20



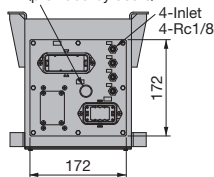
View A



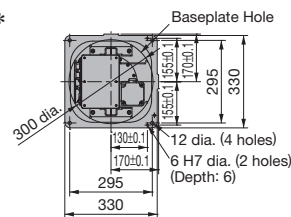
Enlarged View of Tip



*: OD = Outside Diameter
ID = Inside Diameter

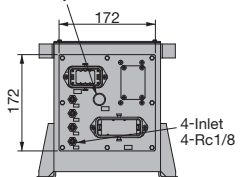


View B



View C

Connector for internal user I/O wiring harness:
RM15WTRZ-10S (with cap)
Matching connector:
RM15WTPZ-10P*HIROSE*
(provided by users)



View D

Manipulator Specifications

Model		MOTOMAN-MPK2F-5		
Type		YR-MPK002F-A10 (floor-mounted type, built-in base type)	YR-MPK002F-A20 (ceiling-mounted type, built-in base type)	
Controlled Axis		5 (vertically articulated)		
Payload		5 kg		
Repeatability*1		±0.5 mm		
Range of Motion	S-axis (turning)	-170° - +170°		
	L-axis (lower arm)	-120° - +120°		
	U-axis (upper arm)	-102° - +60°	-60° - +240°	
	B-axis (wrist pitch/yaw)	-15° - +15°*3		
	T-axis (wrist twist)	-270° - +270°		
Maximum Speed	S-axis (turning)	5.59 rad/s, 320°/s		
	L-axis (lower arm)	5.76 rad/s, 330°/s		
	U-axis (upper arm)	5.76 rad/s, 330°/s		
	B-axis (wrist pitch/yaw)	6.63 rad/s, 380°/s		
	T-axis (wrist twist)	34.9 rad/s, 2000°/s		
Allowable Moment	B-axis (wrist pitch/yaw)	2.26 N·m		
	T-axis (wrist twist)	0 N·m		
	B-axis (wrist pitch/yaw)	0.065 kg·m ²		
	T-axis (wrist twist)	0.012 kg·m ²		
Mass		72 kg		
	Ambient Conditions	Temperature	0°C to +40°C	
		Humidity	20% to 80%RH (non-condensing)	
		Vibration	4.9 m/s ² or less	
Others	<ul style="list-style-type: none"> Free from corrosive gasses or liquids, or explosive gasses Free from exposure to oil, or dust. Free from excessive electrical noise (plasma) 			
Power Requirements*2		1.5 kVA		

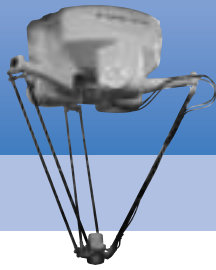
*1 : Conforms to ISO 9283.

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

*3 : Motion range of the B-axis is the angle of the B-axis to the ground.

In some postures, the motion range of the B-axis may be limited depending on the relative angle to the upper arm.

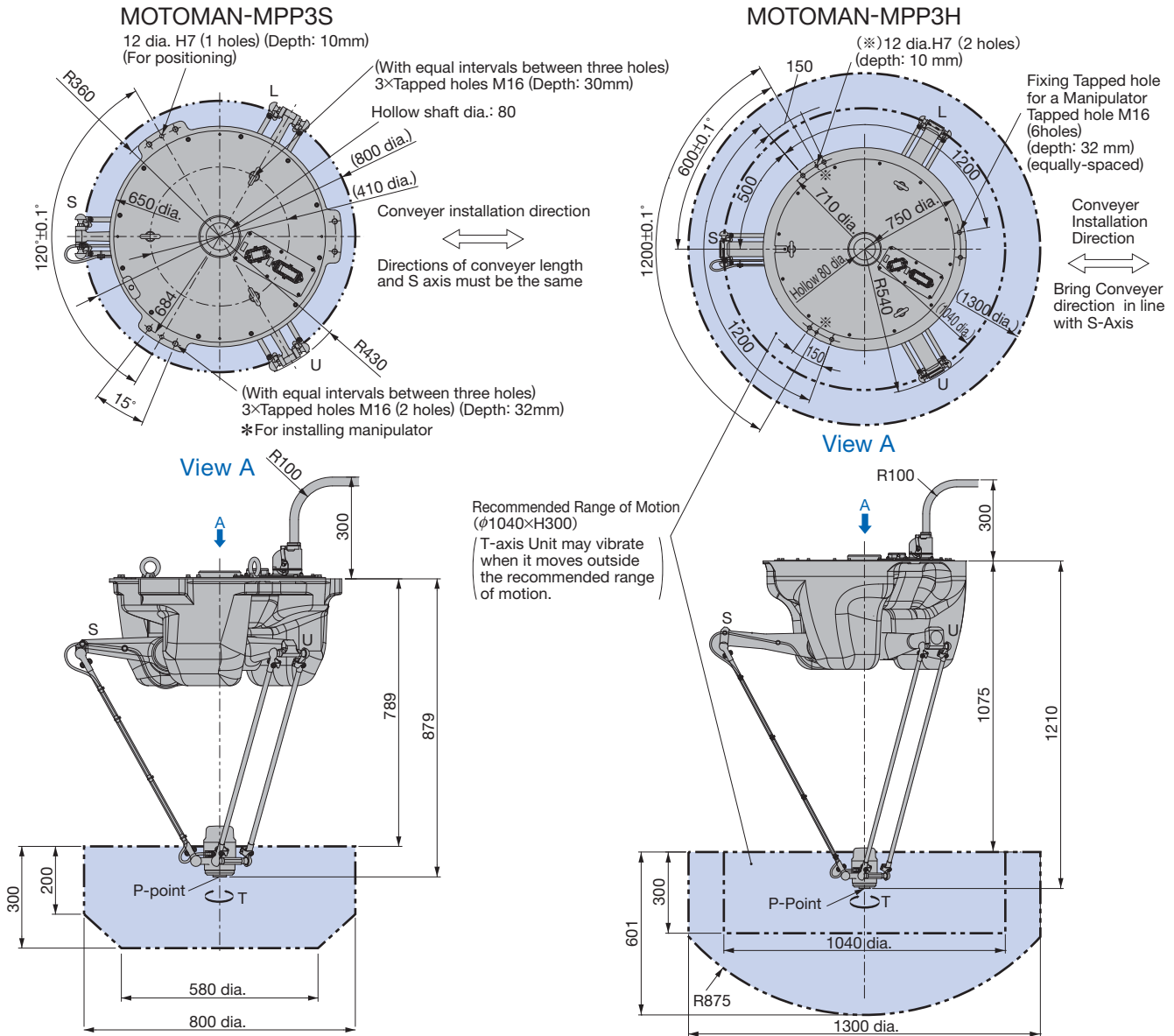
Note : SI units are used for specifications.



MOTOMAN-MPP3S/MPP3H

3 kg payload, 1300 mm (dia.)×300 mm (H) maximum reach **FS100**

■ Dimensions Units : mm : P-point Maximum Envelope



■ Manipulator Specifications

Model	MOTOMAN	MPP3S	MPP3H
Type		YR-MPP0003S-A00	YR-MPP0003H-A00
Controlled Axis		Parallel link (4 degrees of freedom)	
Payload		3 kg	
Repeatability*1		±0.1 mm	
Repeatability (T-axis rotation)		±1 arc-min or less	
Range of Motion		800 mm (dia.) × 200 mm (H)	1300 mm (dia.) × 300 mm (H)
Cycle Time for 25 × 305 × 25 mm motion pattern		1 kg: 230 cpm*2 3 kg: 150 cpm	
T-axis	Range of Motion	-360° - +360°	
	Allowable Inertia (GD ² /4)	1 kg: 0.0013 kg·m ² or less 3 kg: 0.017 kg·m ² or less	1 kg: 0.0013 kg·m ² or less 2 kg: 0.009 kg·m ² or less 3 kg: 0.017 kg·m ² or less
Mass		95 kg	115 kg
IEC Protection Class		IP67	
Clean Class		ISOclass5*3	

Model	MOTOMAN	MPP3S	MPP3H
Ambient Conditions	Temperature	0°C to +40°C	
	Humidity	20% to 80%RH (non-condensing)	
	Vibration	4.9 m/s ² (0.5G) or less	
	Others	<ul style="list-style-type: none"> Free from corrosive gasses or liquids, or explosive gasses Free from excessive electrical noise (plasma) 	
Power Requirements*4		1.5 kVA	

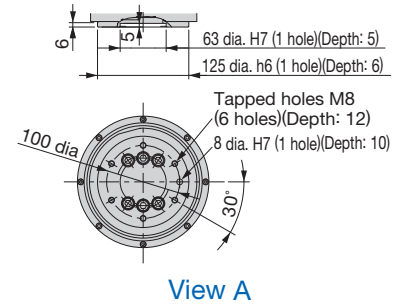
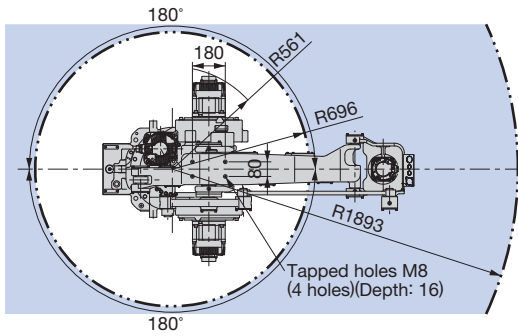
- *1 : Conforms to ISO 9283.
 - *2 : With a limit in continuous operations (No continuous operation limit: 185 cpm or less)
 - *3 : Cleanroom standards: ISO14644-1
 - *4 : MPP3 certified for cleanroom application by Fraunhofer IPA. MPP3H under application for Fraunhofer IPA cleanroom certification.
 - *5 : Varies in accordance with applications and motion patterns.
- Note: SI units are used for specifications.



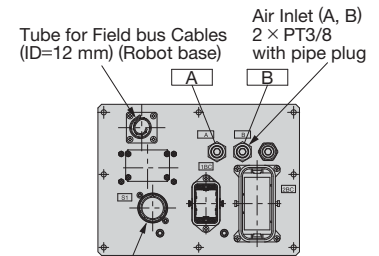
MOTOMAN-MPK50 II

50 kg payload, R1893 mm maximum reach DX200

■ Dimensions Units : mm : T-point Maximum Envelope

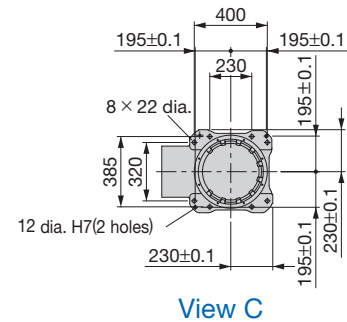
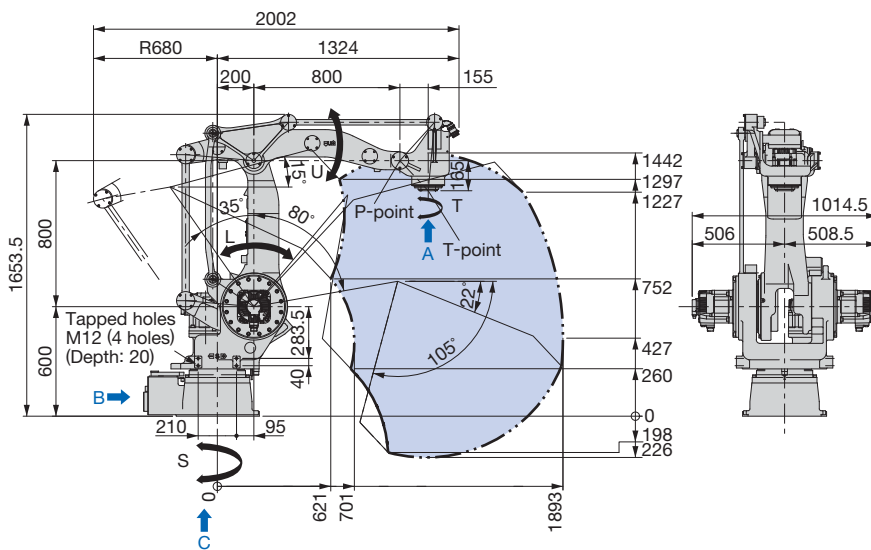


View A



Connector for internal user I/O wiring harness (Base side):
 JL05-2A24-28PC (with cap)
 Matching connector:
 JL05-6A24-28S (provided by users)

View B



View C

Manipulator Specifications

Model	MOTOMAN-MPK50II		Allowable Inertia (GD ² /4)	T-axis (wrist twist)	5.5 kg·m ²
Type	YR-MPK0050-J00		Mass		670 kg
Controlled Axis	4 (vertically articulated)		Ambient Conditions	Temperature	0°C to +45°C
Payload	50 kg			Humidity	20% to 80%RH (non-condensing)
Repeatability*1	±0.5 mm			Vibration	4.9 m/s ² or less
Range of Motion	S-axis (turning)	-180° - +180°	Others	• Free from corrosive gasses or liquids, or explosive gasses	
	L-axis (lower arm)	-35° - +80°		• Free from exposure to water, oil, or dust	
	U-axis (upper arm)	-105° - +15°		• Free from excessive electrical noise (plasma)	
	T-axis (wrist twist)	-350° - +350°			
Maximum Speed	S-axis (turning)	3.23 rad/s, 185°/s	Power Requirements*2	4.0 kVA	
	L-axis (lower arm)	3.75 rad/s, 215°/s			
	U-axis (upper arm)	3.75 rad/s, 215°/s			
	T-axis (wrist twist)	6.53 rad/s, 374°/s			

*1 : Conforms to ISO 9283.

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

Note : SI units are used for specifications.

FS100 CONTROLLER

■ FS100 Controller Specifications

Items	FS100
Configuration	Standard: IP20 (open structure)
Dimensions*1	470 (W)×420 (D)×200 (H) mm (Does not include protruding parts.)(Possible to control two external axes)
Mass	20 kg
Manipulator	MOTOMAN-MPP3S, -MPP3H, -MPK2F, -MPK2F-5
Cooling System	Direct cooling
Ambient Temperature	During operation : 0°C to +40°C During storage : -10°C to +60°C
Relative Humidity	90% max. (non-condensing)
Power Supply	Three-phase 200/220 VAC (+10% to -15%), 50/60 Hz
Grounding	Grounding resistance: 100 Ω or less
Digital I/Os	Specialized signals : 10 inputs and 1 output General signals : 28 inputs and 28 outputs Max. I/O (optional) : 1024 inputs and 1024 outputs
Positioning System	By serial encoder
Programming Capacity	JOB: 10,000 steps, 1,000 instructions CIO ladder: 1,500 steps
Expansion Slots	MP2000 bus × 5 slots
LAN (Connection to Host)	1 (10BASE-T/100BASE-TX)
Interface	RS-232C: 1ch
Control Method	Software servo control
Drive Units	For robot axes: One drive unit for AC servo with 4 to 6 axes (depend on the type) For external axes: Two more axes*2 can be added. (Can be installed in the controller.)
Painting Color	Munsell notation 5Y7/1 (reference value)

*1: Protrusions are not included.

*2: One axis for robots in the SIA and SDA series

■ Programming Pendant Specifications Optional

Items	Specifications
Dimensions	169 (W)×314.5 (H)×50 (D) mm
Mass	0.990 kg
Material	Reinforced plastics
Operation Device	Select keys, axis keys (8 axes), numerical/application keys, Mode switch with key (mode: teach, play, and remote), emergency stop button, enable switch, compact flash card interface device (compact flash is optional.), USB port (1 port)
Display	640×480 pixels color LCD, touch panel (Alphanumeric characters, Chinese characters, Japanese letters, Others)
IEC Protection Class	IP65
Cable Length	Standard: 8 m, optional: 20 m max.

Note: A programming pendant or a dummy connector is required with the FS100. (Sold separately.)

- Programming pendant (model: JZRRCR-YPP03-1)
For maintenance, the programming pendant is required. One programming pendant can be used with more than one controller.
- Dummy connector (model: CBL-FRC063-2)
The dummy connector must be inserted when the programming pendant is not connected or when the software pendant is used.

DX200 CONTROLLER

DX200 Controller Specifications

Items	Specifications
Configuration	Dust proof
Dimensions	600 (W)×520 (D)×730 (H) mm (Possible to control three external axes)
Mass	100 kg max.
Manipulator	MOTOMAN-MPK50II
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%), 50/60 Hz (±2%)
Grounding	Grounding resistance : 100 Ω or less
Digital I/Os	Specialized signals : 23 inputs and 5 outputs General signals : 40 inputs and 40 outputs Max. I/O (optional) : 4096 inputs and 4096 outputs
Positioning System	By serial encoder
Programming Capacity	JOB : 200,000 steps, 10,000 instructions CIO ladder : 20,000 steps
Expansion Slots	PCI : 2 slots
LAN (Connection to Host)	1 (10BASE-T/100BASE-TX)
Interface	RS-232C : 1ch
Control Method	Software servo control
Drive Units	SERVOPACK for AC servomotors (can control up to 9 axes)
Painting Color	Front panel: Light gray (Munsell notation N7.7 or equivalent) Body except front panel: Dark gray (Munsell notation N3 or equivalent)

Programming Pendant Specifications

Items	Specifications
Dimensions	169 (W)×314.5 (H)×50 (D) mm
Mass	0.998 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 (1 port)
Display	5.7-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 (with optional extension cable)

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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.

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