



# Robot Optimized for Handling Small-MOTOMAN Series (For Use with FS100 Controllers)

Vertically Articulated Robot

*Small but Mighty*



MH, HP Series

Robots optimized for handling can also be used for assembly and other applications.

Certified for  
ISO9001 and  
ISO14001



**JAB**  
QMS Accreditation  
R009



JQA-0813



JQA-EM0924

# High-speed Handling with a Compact Robot



MOTOMAN series of small robots has optimal features for handling: compact size, high speeds, and application expandability. These features contribute to making production facilities smaller and ideal for handling, and can improve productivity.

## High speed

### Increase productivity

- High-speed motions with a wide motion range
- Reduced cycle times by using the controller with a high-speed control cycle and a function to suppress vibrations in the robot's hand.

## Compact

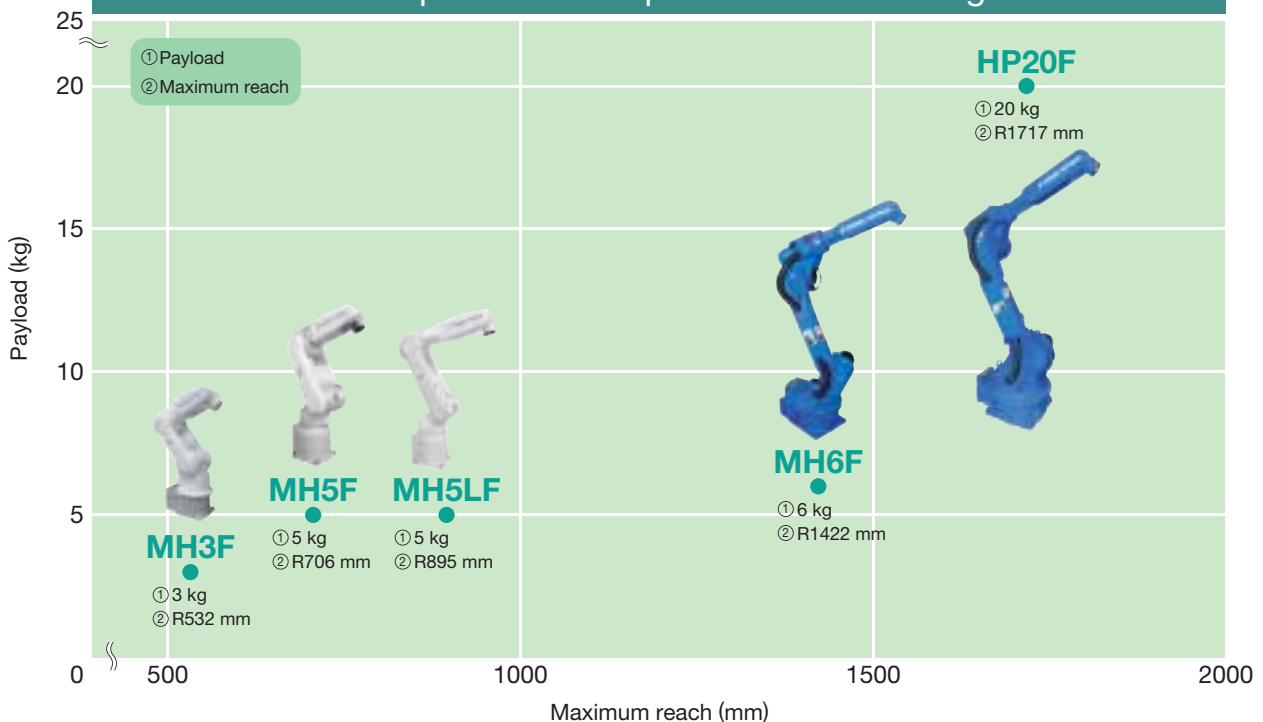
### Realize the compact production facilities of your dream

- Wide selection of small manipulators with payloads ranging from 3 kg to 20 kg
- Compact controller (470 W × 420 D × 200 H) for control of 8 axes

## Expandable (Optional)

- Enable user to develop their own application programs.
- Environment for users to develop their own application programs.
- Users can develop application control programs using C language.

Lineup of Robots Optimized for Handling





# MOTOMAN-MH3F

Payload: 3 kg  
Maximum Reach: R532 mm

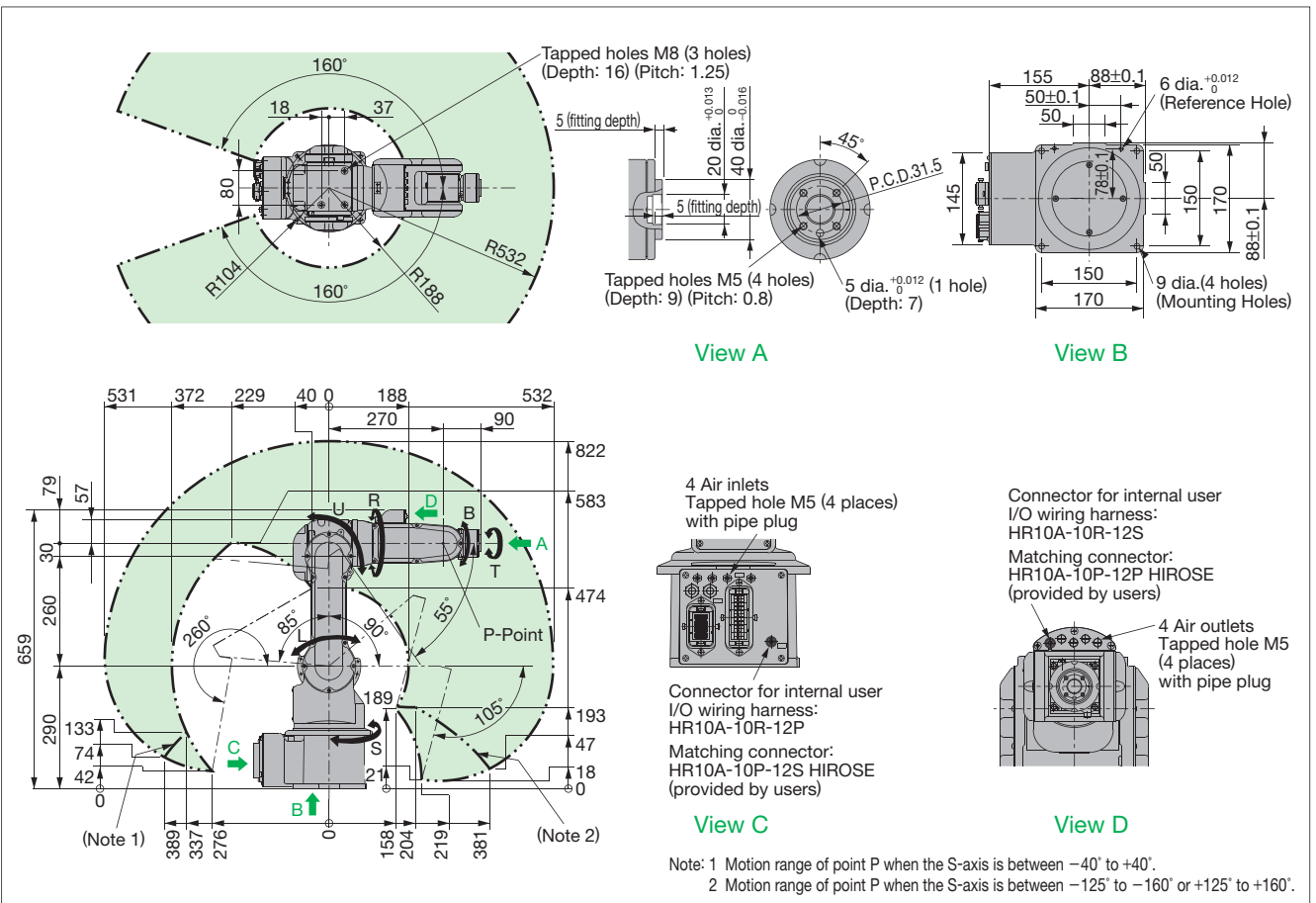


The MOTOMAN-MH3F, a compact manipulator with a motor of 80 W or less mounted on all axes, requires minimal space (baseplate: 240 mm × 170 mm). No fence is required for robot's working area. The robot can be used in applications such as automated guided vehicles (AGVs), testing equipment, and educational tools.

Standard models include four air hoses (diameter: 4 mm), and an internal user I/O wiring harness (0.2 mm<sup>2</sup> × 10) running through the U-arm. This structure simplifies wiring and tubing for easier system construction.

Floor-mounted, wall-mounted, and ceiling-mounted types are available.

## Dimensions Units : mm



## Manipulator Specifications

Model	MOTOMAN-MH3F	
Type	YR-MH0003F-A00	
Controlled Axis	6 (Vertically articulated)	
Payload	3 kg	
Repeatability*1	±0.03 mm	
Range of Motion	S-axis (turning)	-160° - +160°
	L-axis (lower arm)	-85° - +90°
	U-axis (upper arm)	-105° - +260°
	R-axis (wrist roll)	-170° - +170°
	B-axis (wrist pitch/yaw)	-120° - +120°
	T-axis (wrist twist)	-360° - +360°
Maximum Speed	S-axis (turning)	3.49 rad/s, 200°/s
	L-axis (lower arm)	2.62 rad/s, 150°/s
	U-axis (upper arm)	3.32 rad/s, 190°/s
	R-axis (wrist roll)	5.24 rad/s, 300°/s
	B-axis (wrist pitch/yaw)	5.24 rad/s, 300°/s
	T-axis (wrist twist)	7.33 rad/s, 420°/s
Allowable Moment	R-axis (wrist roll)	5.39 N·m
	B-axis (wrist pitch/yaw)	5.39 N·m
	T-axis (wrist twist)	2.94 N·m
Allowable Inertia (GD <sup>2</sup> /4)	R-axis (wrist roll)	0.1 kg·m <sup>2</sup>
	B-axis (wrist pitch/yaw)	0.1 kg·m <sup>2</sup>
	T-axis (wrist twist)	0.03 kg·m <sup>2</sup>
Mass	27 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	<ul style="list-style-type: none"> <li>Free from corrosive gasses or liquids, or explosive gasses</li> <li>Free from exposure to water, oil, or dust</li> <li>Free from excessive electrical noise (plasma)</li> </ul>
Power Requirements*2	0.5 kVA	

\*1 : Conforms to JIS B 8432.

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

Note : SI units are used for specifications.

# MOTOMAN-MH5F/-MH5LF

Payload: 5 kg  
Maximum Reach: R706 mm/R895 mm

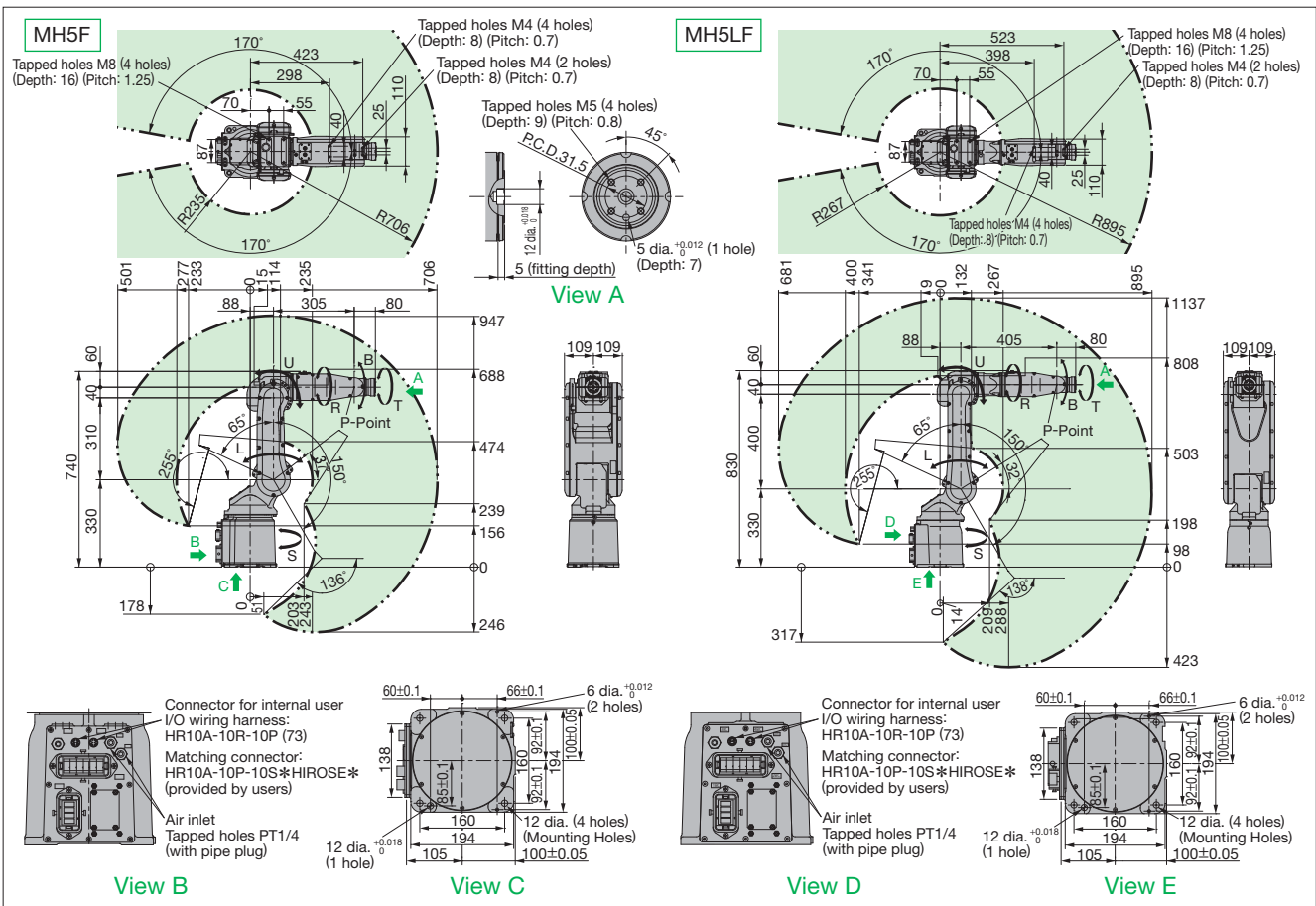


The small FS100 controller has a high-speed control cycle and a function to suppress vibrations in the robot's hand for reduced residual vibration when starting and stopping to shorten cycle times and to realize the highest speed in their class.

Longest reach in a respective class (MH5F: 706 mm; MH5LF: 895 mm)

Floor-mounted, wall-mounted, and ceiling-mounted types are available.

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



## Manipulator Specifications

Model	MOTOMAN-MH5F	MOTOMAN-MH5LF
Type	YR-MH0005F-A00	YR-MH005LF-A00
Controlled Axis	6 (Vertically articulated)	
Payload	5 kg	
Repeatability*1	$\pm 0.02$ mm	$\pm 0.03$ mm
Range of Motion	S-axis (turning)	$-170^\circ - +170^\circ$
	L-axis (lower arm)	$-65^\circ - +150^\circ$
	U-axis (upper arm)	$-136^\circ - +255^\circ$
	R-axis (wrist roll)	$-190^\circ - +190^\circ$
	B-axis (wrist pitch/yaw)	$-135^\circ - +135^\circ$
	T-axis (wrist twist)	$-360^\circ - +360^\circ$
Maximum Speed	S-axis (turning)	6.56 rad/s, 376°/s
	L-axis (lower arm)	6.11 rad/s, 350°/s
	U-axis (upper arm)	6.98 rad/s, 400°/s
	R-axis (wrist roll)	7.85 rad/s, 450°/s
	B-axis (wrist pitch/yaw)	7.85 rad/s, 450°/s
	T-axis (wrist twist)	12.57 rad/s, 720°/s

Model	MOTOMAN-MH5F	MOTOMAN-MH5LF	
Allowable Moment	R-axis (wrist roll)	12 N·m	
	B-axis (wrist pitch/yaw)	12 N·m	
	T-axis (wrist twist)	7 N·m	
Allowable Inertia (GD <sup>2</sup> /4)	R-axis (wrist roll)	0.3 kg·m <sup>2</sup>	
	B-axis (wrist pitch/yaw)	0.3 kg·m <sup>2</sup>	
	T-axis (wrist twist)	0.1 kg·m <sup>2</sup>	
Mass		27 kg	
		29 kg	
Ambient conditions	Temperature	0°C to +45°C	
	Humidity	20 to 80%RH (non-condensing)	
	Vibration	4.9 m/s <sup>2</sup> or less	
	Others	<ul style="list-style-type: none"> <li>Free from corrosive gasses or liquids, or explosive gasses</li> <li>Free from exposure to water, oil, or dust</li> <li>Free from excessive electrical noise (plasma)</li> </ul>	
Power Requirements*2	1 kVA		

\*1 : Conforms to JIS B 8432.

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

Note : SI units are used for specifications.

# MOTOMAN-MH6F

Payload: 6 kg  
Maximum Reach: R1422 mm

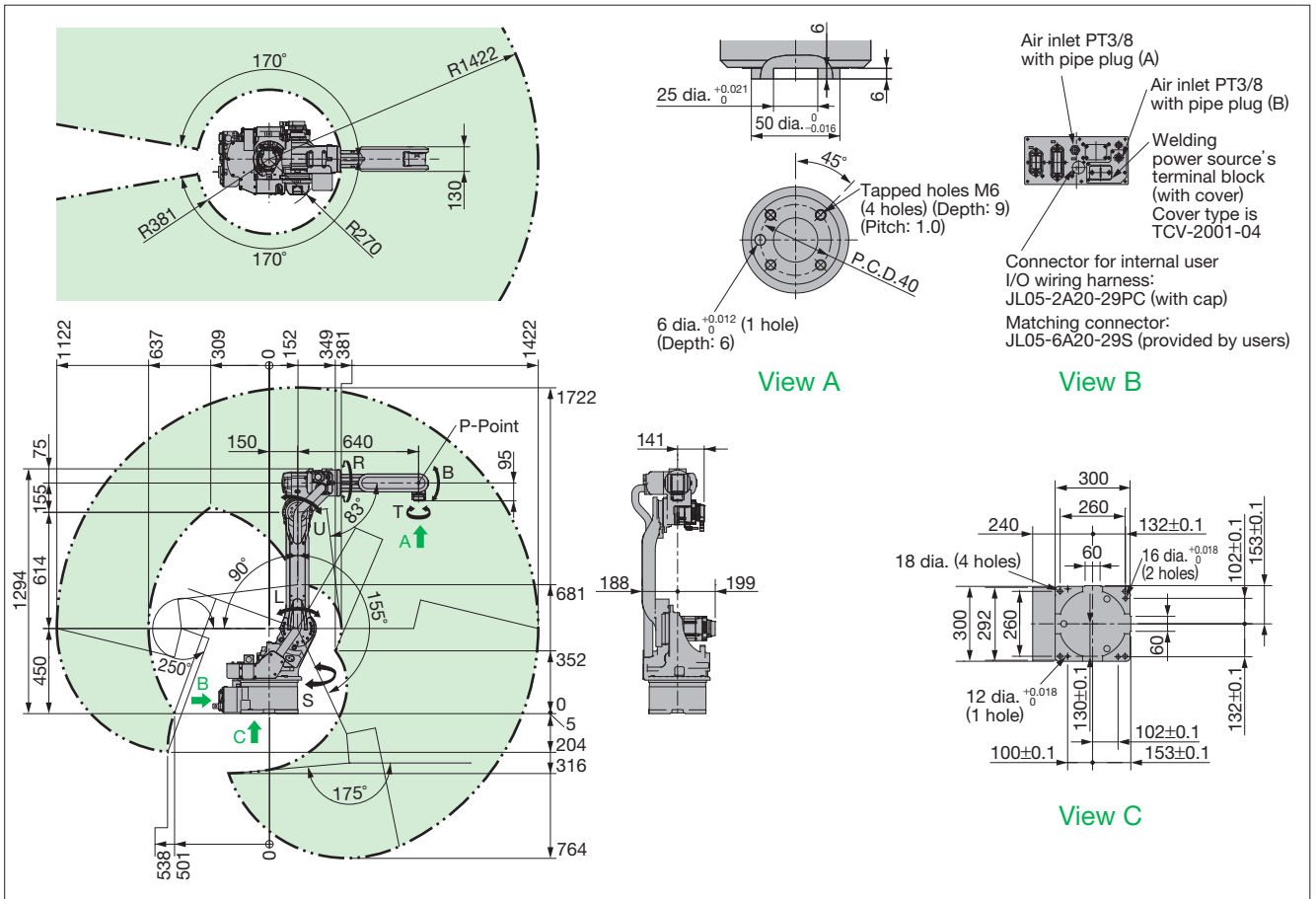


The small FS100 controller has a high-speed control cycle and a function to suppress vibrations in the robot's hand for reduced residual vibration when starting and stopping to shorten cycle times and to realize the highest speed in their class.

Longest reach in its class (1422 mm) and increased moment capacity of the wrist.

Floor-mounted, wall-mounted, and ceiling-mounted types are available.

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



## Manipulator Specifications

Model	MOTOMAN-MH6F	
Type	YR-MH0006F-A00	
Controlled Axis	6 (Vertically articulated)	
Payload	6 kg	
Repeatability*1	±0.08 mm	
Range of Motion	S-axis (turning)	-170° - +170°
	L-axis (lower arm)	-90° - +155°
	U-axis (upper arm)	-175° - +250°
	R-axis (wrist roll)	-180° - +180°
	B-axis (wrist pitch/yaw)	-45° - +225°
	T-axis (wrist twist)	-360° - +360°
Maximum Speed	S-axis (turning)	3.84 rad/s, 220°/s
	L-axis (lower arm)	3.49 rad/s, 200°/s
	U-axis (upper arm)	3.84 rad/s, 220°/s
	R-axis (wrist roll)	7.16 rad/s, 410°/s
	B-axis (wrist pitch/yaw)	7.16 rad/s, 410°/s
	T-axis (wrist twist)	10.65 rad/s, 610°/s
Allowable Moment	R-axis (wrist roll)	11.8 N·m
	B-axis (wrist pitch/yaw)	9.8 N·m
	T-axis (wrist twist)	5.9 N·m
	T-axis (wrist twist)	0.27 kg·m <sup>2</sup>
Allowable Inertia (GD <sup>2</sup> /4)	R-axis (wrist roll)	0.27 kg·m <sup>2</sup>
	B-axis (wrist pitch/yaw)	0.27 kg·m <sup>2</sup>
	T-axis (wrist twist)	0.06 kg·m <sup>2</sup>
Mass	130 kg	
Ambient conditions	Temperature	0°C to +45°C
	Humidity	20 to 80%RH (non-condensing)
	Vibration	4.9 m/s <sup>2</sup> or less
	Others	<ul style="list-style-type: none"> <li>Free from corrosive gasses or liquids, or explosive gasses</li> <li>Free from exposure to water, oil, or dust</li> <li>Free from excessive electrical noise (plasma)</li> </ul>
Power Requirements*2	1.5 kVA	

\*1 : Conforms to JIS B 8432.

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

Note : SI units are used for specifications.

# MOTOMAN-HP20F

Payload: 20 kg  
Maximum Reach: R1717 mm

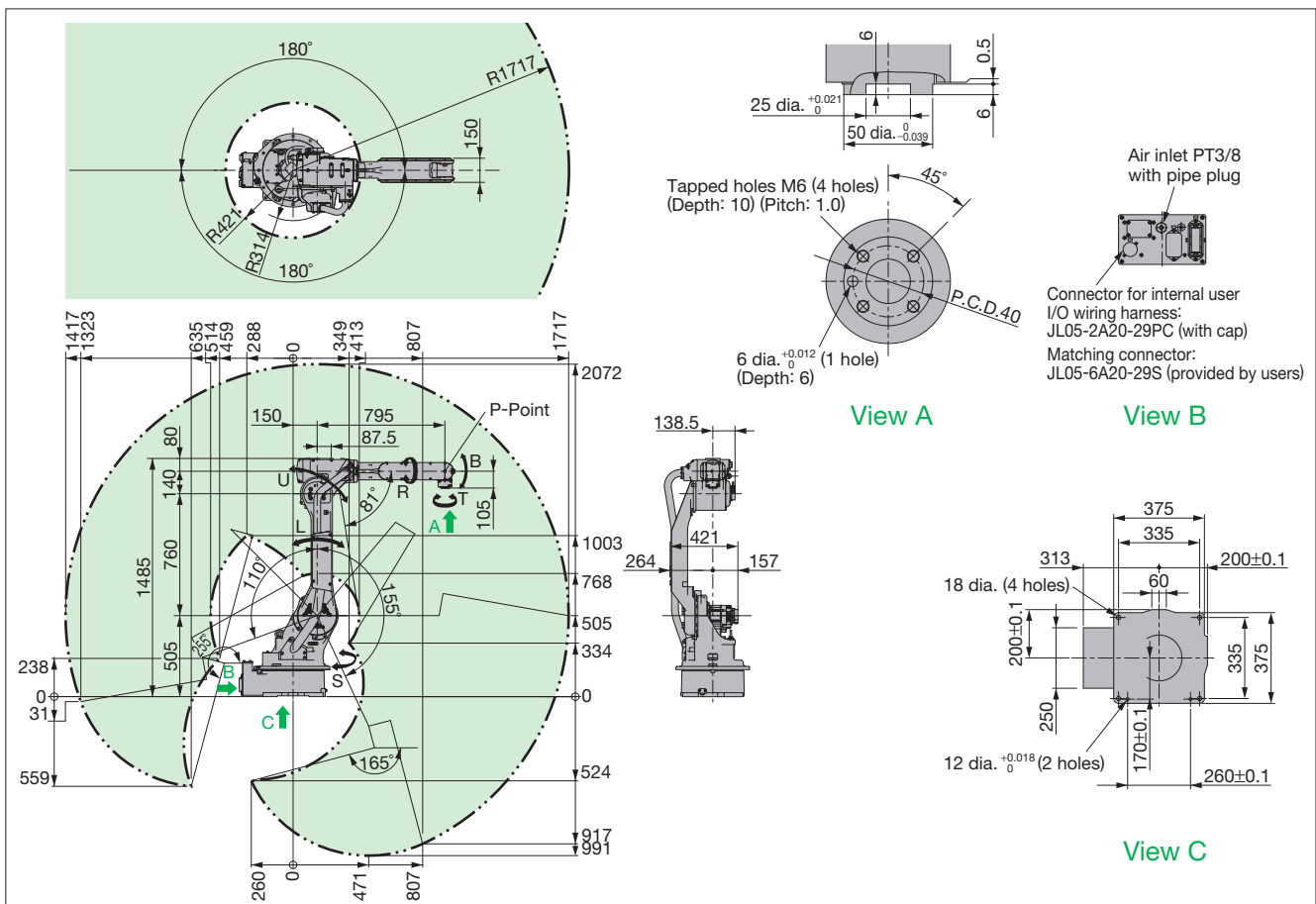


The small FS100 controller has a high-speed control cycle and a function to suppress vibrations in the robot's hand for reduced residual vibration when starting and stopping to shorten cycle times and to realize the highest speed in their class.

Slim body with a narrower wrist and a smaller interference radius improves accessibility to workpieces, jigs, and peripheral devices.

Floor-mounted, wall-mounted, and ceiling-mounted types are available.

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



## Manipulator Specifications

Model	MOTOMAN-HP20F	
Type	YR-HP0020F-A00	
Controlled Axis	6 (Vertically articulated)	
Payload	20 kg	
Repeatability*1	±0.06 mm	
Range of Motion	S-axis (turning)	-180° - +180°
	L-axis (lower arm)	-110° - +155°
	U-axis (upper arm)	-165° - +255°
	R-axis (wrist roll)	-200° - +200°
	B-axis (wrist pitch/yaw)	-50° - +230°
	T-axis (wrist twist)	-360° - +360°
Maximum Speed	S-axis (turning)	3.44 rad/s, 197°/s
	L-axis (lower arm)	3.05 rad/s, 175°/s
	U-axis (upper arm)	3.26 rad/s, 187°/s
	R-axis (wrist roll)	6.98 rad/s, 400°/s
	B-axis (wrist pitch/yaw)	6.98 rad/s, 400°/s
	T-axis (wrist twist)	10.47 rad/s, 600°/s

Allowable Moment	R-axis (wrist roll)	39.2 N·m
	B-axis (wrist pitch/yaw)	39.2 N·m
	T-axis (wrist twist)	19.6 N·m
Allowable Inertia (GD <sup>2</sup> /4)	R-axis (wrist roll)	1.05 kg·m <sup>2</sup>
	B-axis (wrist pitch/yaw)	1.05 kg·m <sup>2</sup>
	T-axis (wrist twist)	0.75 kg·m <sup>2</sup> *3
Mass		268 kg
Ambient conditions	Temperature	0°C to +45°C
	Humidity	20 to 80%RH (non-condensing)
	Vibration	4.9 m/s <sup>2</sup> or less
	Others	<ul style="list-style-type: none"> <li>Free from corrosive gasses or liquids, or explosive gasses</li> <li>Free from exposure to water, oil, or dust</li> <li>Free from excessive electrical noise (plasma)</li> </ul>
Power Requirements*2		2.0 kVA

\*1 : Conforms to JIS B 8432.

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

\*3 : Only for downward movement of the T-axis.

Refer to the MOTOMAN-HP20F INSTRUCTIONS for details.

Note : SI units are used for specifications.



# High-speed Compact Controller for Handling FS100

## Optimum controller for handling and assembly

The FS100 is a compact controller with improved performance and functions optimized for handling and assembly. Can be used with robots with a 20-kg payload or less.

- 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.
- Commands specifically designed for workpiece handling with synchronized conveyors.



## Open controller

Custom-made functions and windows can be created for various purposes and users.

- **MotoPlus** Optional  
Sophisticated and flexible robot control programs that were not possible with INFORM and CIO ladder programs can be developed by using C languages.
- **Customization of programming pendant** Optional  
Operation windows for the programming pendant can be customized using VC++ and C# languages in accordance with needs and applications.
- **Interface panels** Optional  
The windows in the operation panel can be created to look the same in the programming pendant.



### Hardware Options

- Programming pendant
- IP54 protective structure
- External axis (max.: 2 axes)
- I/O module (28 points, NPN or PNP)
- Counter module (2 channels)
- Analog I/O module (8 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

## FS100 Controller Specifications

Items	Specifications
Configuration	Standard: IP20 (open structure), Option: IP54 (dustproof housing)
Dimensions	470 (W)×420 (D)×200 (H) mm (Protrusions are not included.)
Mass	20 kg
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	Single-phase 200/230 VAC (+10% to -15%), 50/60 Hz*1 Three-phase 200/220 VAC (+10% to -15%), 50/60 Hz*2
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) : 1,024 inputs and 1,024 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	Six axes for robots Two more axes can be added as external axes. (Can be installed in the controller.)
Painting Color	Munsell notation 5Y7/1 (reference value)

\* 1 : For the MOTOMAN-MH3F, -MH5F, or -MH5LF

\* 2 : For the MOTOMAN-MH6F or -HP20F

## 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: JZRCR-YPP03-1)  
For maintenance, the programming pendant is required. One programming pendant can be used with more than one controller.
- Dummy connector (model: CBL-FRC063-1)  
The dummy connector must be inserted when the programming pendant is not connected or when the software pendant is used.
- The programming pendant (YPP01-1) for a DX100 controller cannot be connected to the FS100 controller because of differences in their specifications.

### Easy pre-examination

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

\* : MOTOMAN Simulator Enhanced Graphics

Note : ROBCAD is a registered trademark of UGS Corp.

IGRIP is a registered trademark of DELMIA Corp.



Operation Screen

# Small-MOTOMAN Series

Sales Department

**HEAD OFFICE**

2-1 Kurosaki-Shiroishi, Yahatanishi-ku, Kitakyushu, Fukuoka 806-0004, Japan  
Phone: +81-93-645-7745 Fax: +81-93-645-7746

**YASKAWA America, Inc.**

100 Automation Way, Miamisburg, OH 45342, U.S.A.  
Phone: +1-937-847-6200 Fax: +1-937-847-6277

**YASKAWA Europe GmbH**

Kammerfeldstr. 1, 80591 Allershausen, Germany  
Phone: +49-8166-90-0 Fax: +49-8166-90-103

**YASKAWA Nordic AB**

Bredbandet 1vån. 3 varvsholmen 392 30 Kalmar, Sweden  
Phone: +46-480-417-800 Fax: +46-480-417-999

**YASKAWA Electric (China) Co., Ltd.**

12F, Carlton Bldg., No.21 HuangHe Road, HuangPu District, Shanghai 200003, China  
Phone: +86-21-5385-2200 Fax: +86-21-5385-3299

**YASKAWA SHOUGANG ROBOT CO., LTD.**

No.7 Yongchang North Road, Beijing E&T Development Area China 100176  
Phone: +86-10-6788-2858 Fax: +86-10-6788-2878

**YASKAWA Robotics India Limited**

#426, Udyog Vihar Phase-IV, Gurgaon, Haryana, India  
Phone: +91-124-475-8500 Fax: +91-124-475-8542

**YASKAWA Electric Korea Co., Ltd**

9F, Kyobo Securities Bldg., 26-4, Yeouido-dong, Yeongdeungpo-gu, Seoul 150-737, Korea  
Phone: +82-2-784-7844 Fax: +82-2-784-8495

**YASKAWA Electric (Singapore) PTE Ltd**

151 Lorong Chuan, #04-02A New Tech Park, Singapore 556741  
Phone: +65-6282-3003 Fax: +65-6289-3003

**YASKAWA Electric (Thailand) Co. Ltd.**

252/246, 4th Floor Muang Thai-Phatra Office Tower II Rachadapisek Road,  
Huaykwang Bangkok, 10320 Thailand  
Phone: +66-2-693-2200 Fax: +66-2-693-4200




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