

YASKAWA

Handling Robot for Clean Rooms MOTOMAN-MCL, MFL, MFS Series



MFL series



MCL series



MFS series



Certified for
ISO9001 and
ISO14001



JAB
QMS Accreditation
R009



QQA-0813



QQA-EM0202

High-speed Transfer of Large or Heavy Loads

Handling in clean rooms can be automated and productivity can be improved.

The extensive lineup for both vertically articulated robots, which can change posture easily and reverse or slant an object before placing it on a cassette or other container, and horizontally articulated robots, which have a small turning radius and can transfer LCD substrates in small spaces, can improve the productivity of a customer's equipment.

MCL series



MFL series

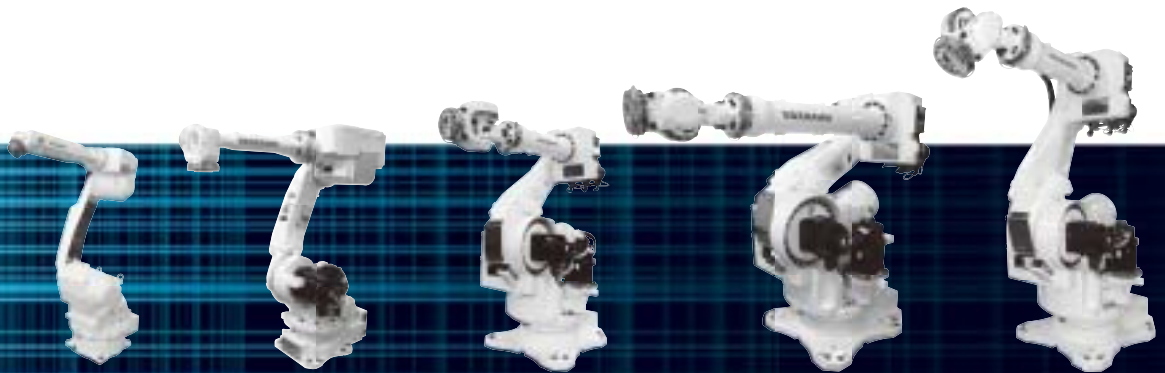


MFS series

MOTOMAN-MCL Series Vertically Articulated Robot with 6 Axes

Robot postures can be easily changed. The robot can reverse or slant an object before placing it on cassettes or other containers.

- A wide range of models are available
- High-speed transfer of a large or heavy load with a wide range of motion

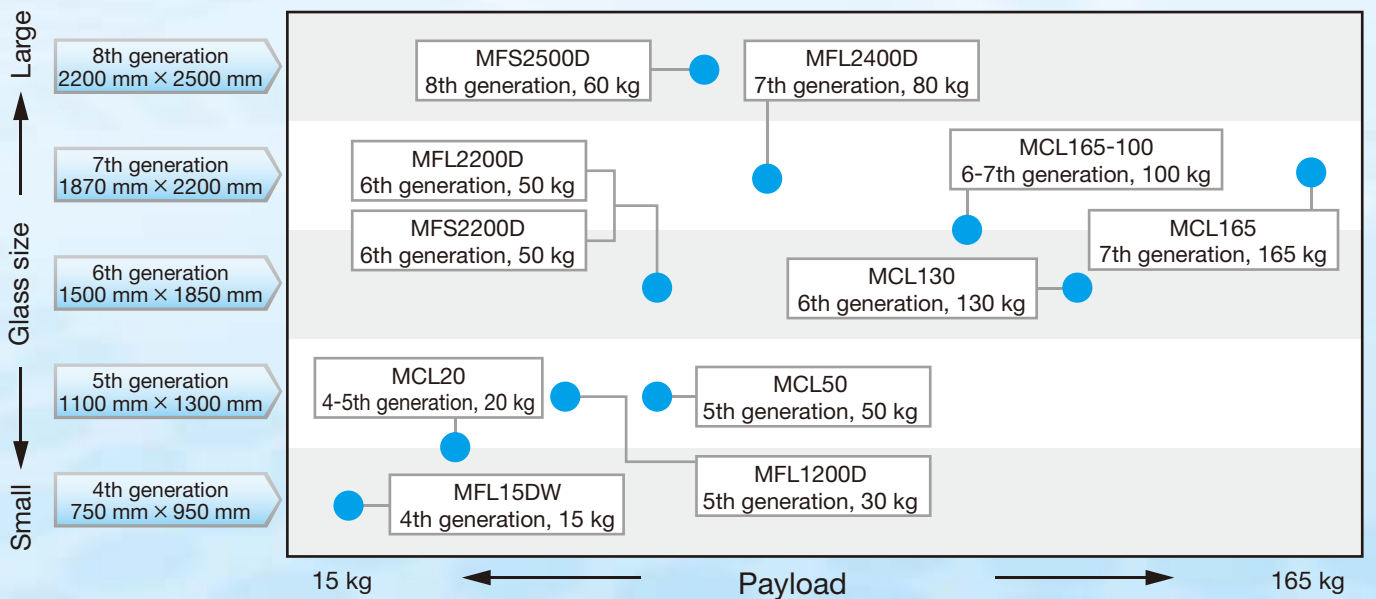


MCL series

MOTOMAN-	MCL20	MCL50	MCL130	MCL165-100	MCL165
Payload kg	20	50	130	100	165
Horizontal Reach mm	Min: R421; Max: R1658	Min: R500; Max: R2046	Min: R729; Max: R2650	Min: R950; Max: R3001	Min: R729; Max: R2650
Vertical Reach mm (measured from the floor)	2043	2441	3130	3480	3130
	See p. 6	See p. 7	See p. 8	See p. 9	See p. 10

Product lineup

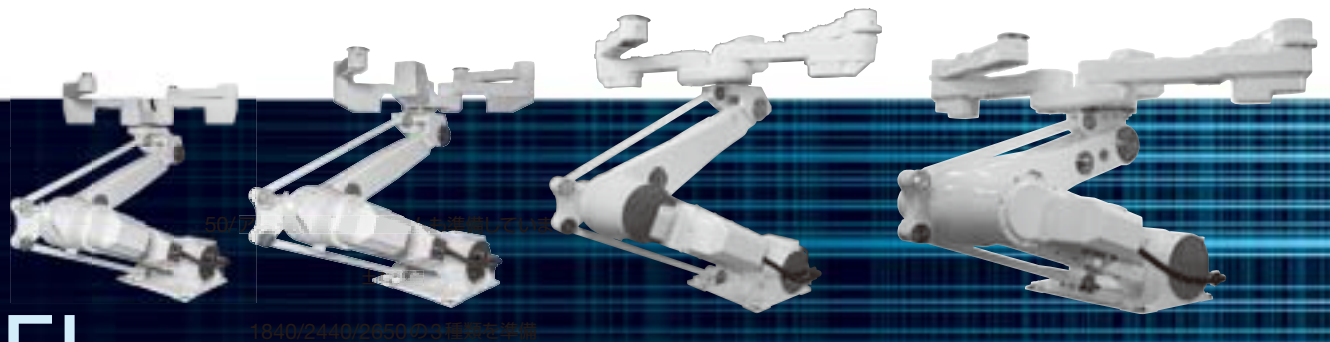
Lineup of optimal robots for a variety of glass substrate sizes



MOTOMAN-MFL Series Horizontally Articulated Robot with 4 Axes

Ideal systems can be built for a horizontal transfer in clean rooms.

- Compatible with the 4th, 5th, 6th, and 7th generation LCD substrates
- Installation in small space possible because of a shorter turning radius
- Long up-and-down stroke with a low path line



MFL series

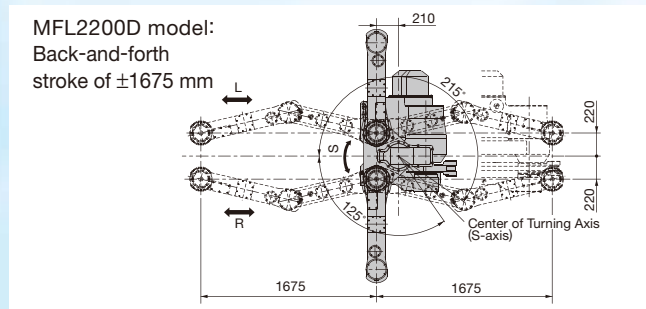
MOTOMAN-	MFL15DW -875/-1400/-2400	MFL1200D -1200/-1600/-2400	MFL2200D -1840/-2440/-2650	MFL2400D -1800/-2400
Payload kg	15/arm Single-arm model is also available.*	30/arm Single-arm model is also available.	50/arm Single-arm model is also available.	80/arm Single-arm model is also available.
Back-and-Forth Stroke mm	±1080	±1175	±1675	±2240
Up-and-Down Stroke mm	Three types: 875, 1400, and 2400 See p.11	Three types: 1200, 1600, and 2400 See p.12	Three types: 1840, 2440, and 2650 See p.13	Two types: 1800 and 2400 See p.14

* : Up-and-down stroke 875/1400 mm only

Features of Horizontally Articulated Robots

1 Flexible system layout in smaller space

An entire manipulator can be fit in the turning radius of a glass substrate. The horizontally articulated robots have a long up-and-down stroke with a low path line as well as a long pullback stroke so they can be installed at ideal locations for multi-level cassettes.



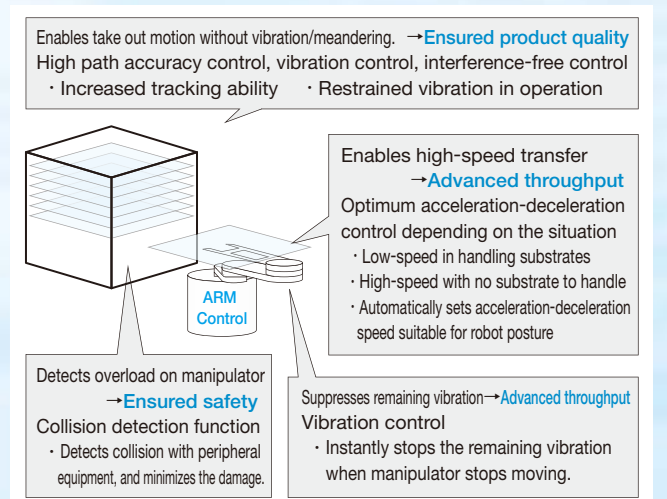
2 Reduced running costs with high cleanliness

High cleanliness is ensured by using drive axes built with a high-reliability, enclosed structure. Running cost will be reduced, because maintenance is easy without the need for exhaust fans and filters.

3 Variety of useful functions for transferring large glass substrates

●ARM (Advanced Robot Motion) Control

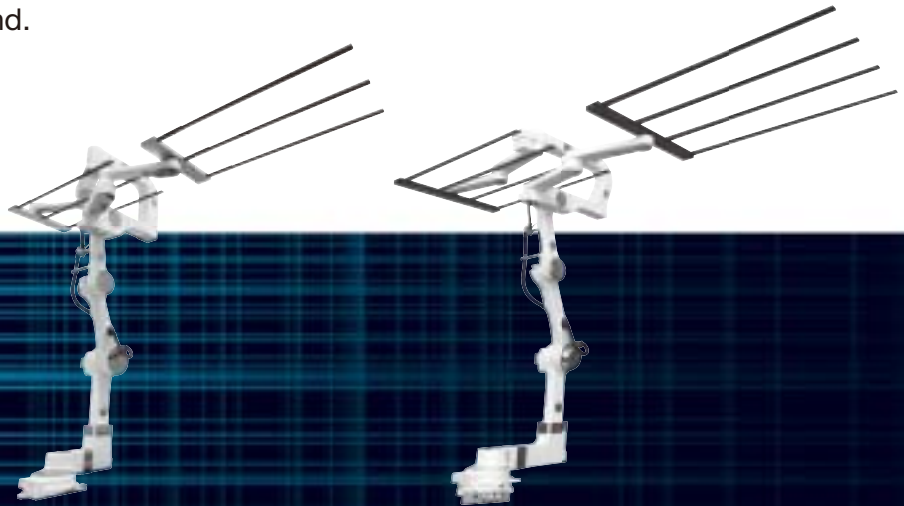
The ARM control enables high-speed and high-accuracy transfer for high throughput.



MOTOMAN-MFS Series Horizontally Articulated Robot with 6 Axes

High-speed and stable transfer improve productivity!

- Compatible with the 6th and the 8th generation LCD substrates
- Vertical axis, composed of three independent joints and two arms, enables horizontal hand movement and corrects hand position without changing the height of the hand.



MFS series

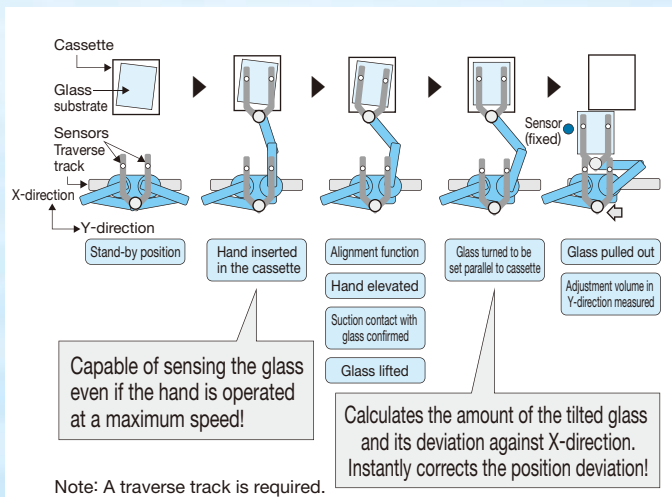
MOTOMAN-		MFS2200D	MFS2500D
Payload	kg	50/arm	60/arm
Back-and-Forth Stroke	mm	±1780	±2300
Up-and-Down Stroke	mm	3600	4000

See p.15

See p.16

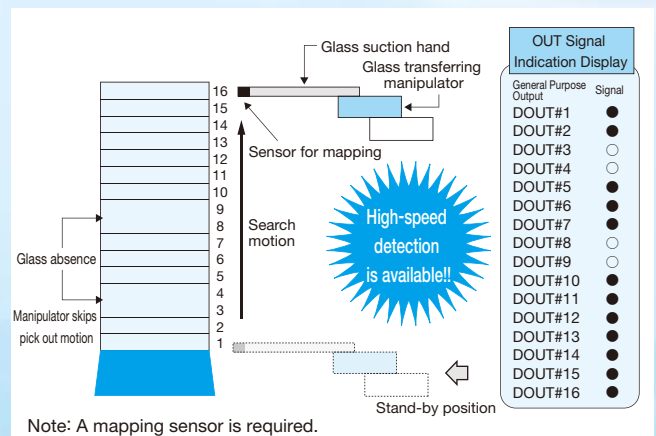
●Alignment Function (Optional)

- No alignment devices required.
- Non-contact detection enables position correction without damaging the glass.



●Mapping Function (Optional)

- Enables high-speed detection from bottom to top of the cassette. Reduces cycle time by skipping pick out motions for blank space in the cassette.
- Enables high-speed communication with an interface to other devices including your host computer.



MOTOMAN-MCL20

Compatible with DX100

6-axis vertically articulated robot, 20 kg payload

Flexible system layout with high degree of freedom

Vertically-articulated robots with six degrees of freedom can easily change the position of an object. They can reverse, slant, or hold the object horizontally or vertically.

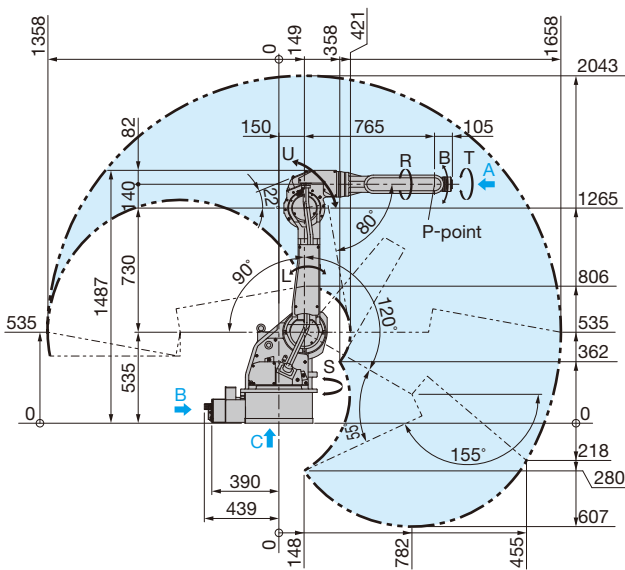
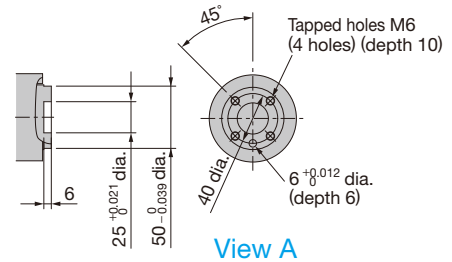
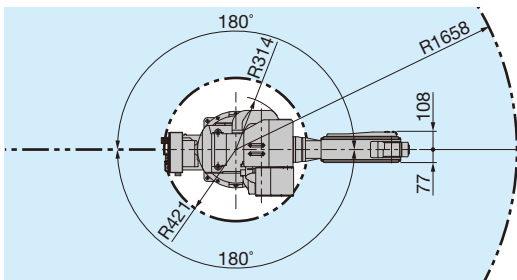
Expanded applications with a large payload

With a 20-kg payload, robots can easily transfer LCD glass substrates and semi-conductor wafers and then place them on multi-level cassettes.



ISO Class
3

Dimensions Unit : mm []: P-point Maximum Envelope

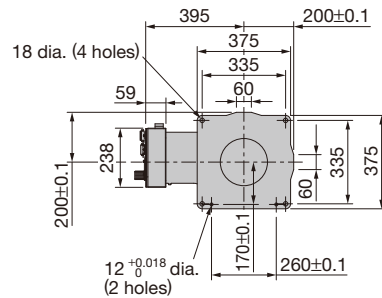


Exhaust port for manipulator internal air* (outer diameter 34 mm)
*: Air duct of 34 mm internal diameter should be provided for robot internal air suction.

4×Air inlet (PT1/8 tapped hole, with pipe plug)

Connector for internal user I/O wiring harness: HR10A-10R-12P
Matching connector: HR10A-10P-12S (provided by users)

View B



View C

Manipulator Specifications

Model	MOTOMAN-MCL20*1	
Type	YR-MCL0020-A00	
Structure	Vertically articulated, 6 degrees of freedom	
Payload	20 kg	
Repeatability*2	±0.08 mm	
Range of Motion	S-axis (turning)	-180° - +180°
	L-axis (lower arm)	-90° - +120°
	U-axis (upper arm)	-155° - +180°
	R-axis (wrist roll)	-165° - +165°
	B-axis (wrist pitch/yaw)	-50° - +230°
	T-axis (wrist twist)	-360° - +360°
Maximum Speed	S-axis (turning)	2.88 rad/s, 165°/s
	L-axis (lower arm)	2.88 rad/s, 165°/s
	U-axis (upper arm)	2.88 rad/s, 165°/s
	R-axis (wrist roll)	3.49 rad/s, 200°/s
	B-axis (wrist pitch/yaw)	3.49 rad/s, 200°/s
	T-axis (wrist twist)	3.49 rad/s, 200°/s

Allowable Moment	R-axis (wrist roll)	39.2 N·m
	B-axis (wrist pitch/yaw)	31.4 N·m
	T-axis (wrist twist)	29.4 N·m
Allowable Inertia (GD ² /4)	R-axis (wrist roll)	3.0 kg·m ²
	B-axis (wrist pitch/yaw)	3.0 kg·m ²
	T-axis (wrist twist)	2.2 kg·m ²
Painting Color	Munsell notation N9.5 or equivalent	
Approx. Mass	280 kg	
Clean Class*3	ISO class 3	
Ambient Conditions	Temperature	+15°C to +35°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less. 	
	Power Requirement*4	2.0 kVA

*1 : MCL20F for FS100 controller is also available. Contact your Yaskawa representative for more information.

*2 : Conforms to ISO 9283.

*3 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MCL50

Compatible with DX100

6-axis vertically articulated robot, 50 kg payload



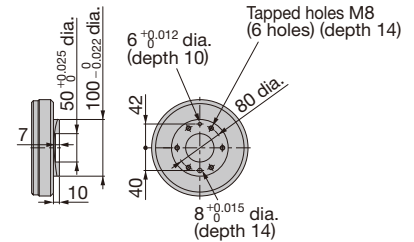
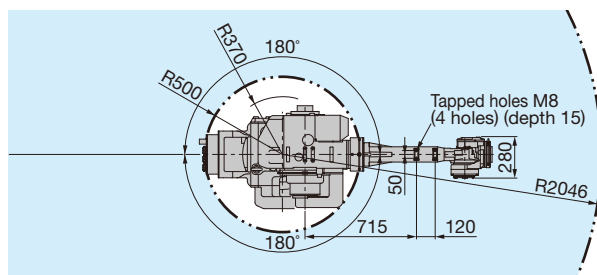
Wide range of motion for heavy-weight handling

Heavy weight handling is achieved because of the high degree of freedom and the wide working envelope (R2046 mm).

Space-saving

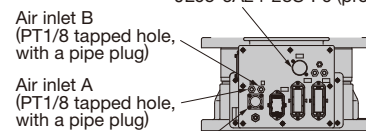
The small radius of the interference area (R370 mm) saves installation space and makes the design of the system layout more flexible allowing for more efficient clean room utilization.

Dimensions Unit : mm [---]: P-point Maximum Envelope

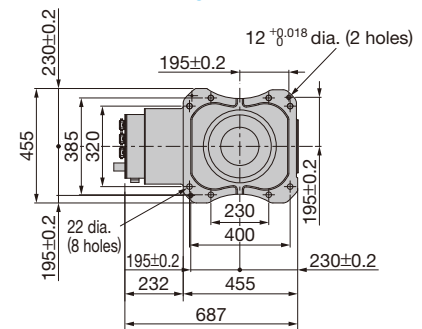


View A

Connector for internal user I/O wiring harness:
JL05-2A24-28PC-F0 (with cap)
Matching connector:
JL05-6A24-28S-F0 (provided by users)



View B



View C

Manipulator Specifications

Model	MOTOMAN-MCL50	
Type	YR-MCL0050-A00	
Structure	Vertically articulated, 6 degrees of freedom	
Payload	50 kg	
Repeatability*1	±0.07 mm	
Range of Motion	S-axis (turning)	-180° - +180°
	L-axis (lower arm)	-90° - +135°
	U-axis (upper arm)	-160° - +260°
	R-axis (wrist roll)	-360° - +360°
	B-axis (wrist pitch/yaw)	-125° - +125°
	T-axis (wrist twist)	-360° - +360°
Maximum Speed	S-axis (turning)	2.97 rad/s, 170°/s
	L-axis (lower arm)	2.97 rad/s, 170°/s
	U-axis (upper arm)	2.97 rad/s, 170°/s
	R-axis (wrist roll)	3.49 rad/s, 200°/s
	B-axis (wrist pitch/yaw)	3.32 rad/s, 190°/s
	T-axis (wrist twist)	4.36 rad/s, 250°/s

Allowable Moment	R-axis (wrist roll)	196 N·m
	B-axis (wrist pitch/yaw)	196 N·m
	T-axis (wrist twist)	127 N·m
Allowable Inertia (GD ² /4)	R-axis (wrist roll)	13 kg·m ²
	B-axis (wrist pitch/yaw)	13 kg·m ²
	T-axis (wrist twist)	5.5 kg·m ²
Painting Color	Munsell notation N9.5 or equivalent	
Approx. Mass	550 kg	
Clean Class*2	ISO class 5	
Ambient Conditions	Temperature	+15 to +35°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3	4.5 kVA	

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MCL130

Compatible with DX100

6-axis vertically articulated robot, 130 kg payload

Excellent handling performance with high degree of freedom

The MOTOMAN-MCL130 is a 6-axis, vertically articulated robot with a 130-kg payload and can handle heavy workpieces at high speeds while changing their positions.

Wide range of motion for flexible system layout

The MOTOMAN-MCL130 is able to transport heavy objects through a wide range with a maximum horizontal reach of R2650 mm and a maximum vertical reach of 3130 mm, and supports flexible system layout.

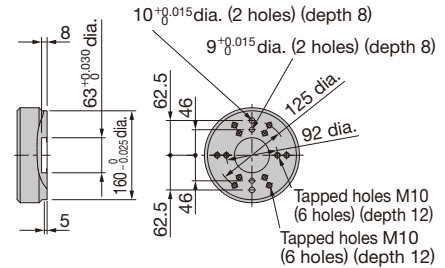
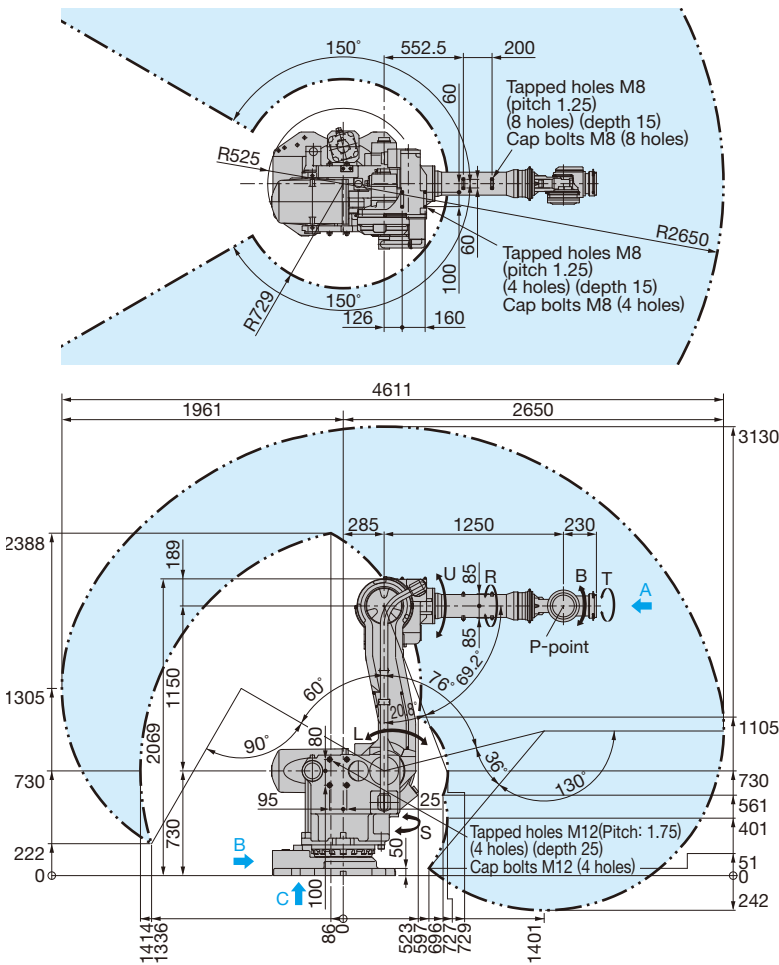


ISO Class
6

Dimensions Unit : mm



P-point Maximum Envelope



View A

Exhaust port B for manipulator internal air (PT1/8 Tapped with a pipe plug)

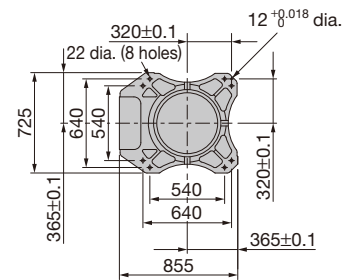
Air inlet A (PT3/8 tapped hole, with a pipe plug)

Air inlet B (PT3/8 tapped hole, with a pipe plug)

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

Exhaust port A for manipulator internal air* (outer diameter 34 mm)
*: Air duct of 34 mm internal diameter should be provided for robot internal air suction.

View B



View C

Manipulator Specifications

Model	MOTOMAN-MCL130	
Type	YR-MCL0130-A00	
Structure	Vertically articulated, 6 degrees of freedom	
Payload	130 kg	
Repeatability*1	±0.2 mm	
Range of Motion	S-axis (turning)	-150° - +150°
	L-axis (lower arm)	-60° - +76°
	U-axis (upper arm)	-130° - +240°
	R-axis (wrist roll)	-360° - +360°
	B-axis (wrist pitch/yaw)	-130° - +130°
	T-axis (wrist twist)	-360° - +360°
Maximum Speed	S-axis (turning)	2.27 rad/s, 130°/s
	L-axis (lower arm)	2.27 rad/s, 130°/s
	U-axis (upper arm)	2.27 rad/s, 130°/s
	R-axis (wrist roll)	3.75 rad/s, 215°/s
	B-axis (wrist pitch/yaw)	3.14 rad/s, 180°/s
	T-axis (wrist twist)	5.24 rad/s, 300°/s

Allowable Moment	R-axis (wrist roll)	735 N·m
	B-axis (wrist pitch/yaw)	735 N·m
	T-axis (wrist twist)	421 N·m
Allowable Inertia (GD ² /4)	R-axis (wrist roll)	45 kg·m ²
	B-axis (wrist pitch/yaw)	45 kg·m ²
	T-axis (wrist twist)	15 kg·m ²
Painting Color	Munsell notation N9.5 or equivalent	
Approx. Mass	1300 kg	
Clean Class*2	ISO class 6	
Ambient Conditions	Temperature	+15°C to +35°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less. 	
Power Requirement*3	5.5 kVA	

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MCL165-100

Compatible with DX100

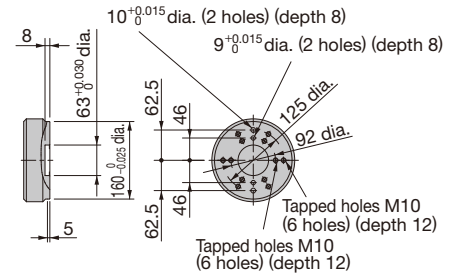
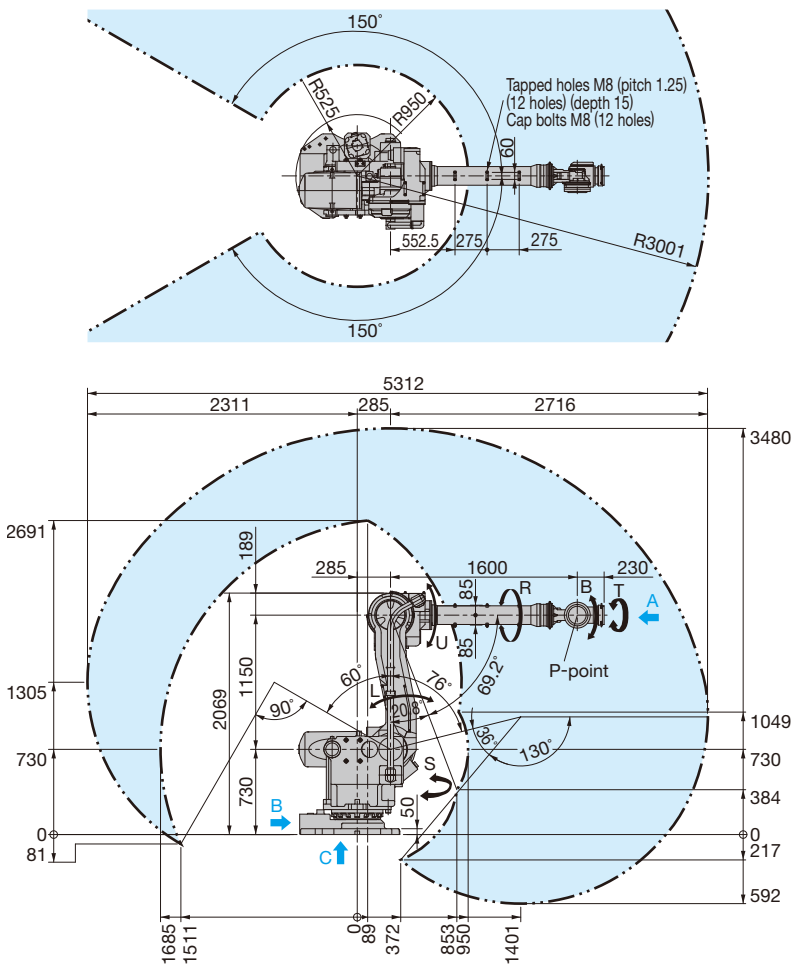
6-axis vertically articulated robot, 100 kg payload



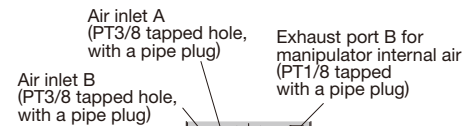
Heavy-load handling with a wide range of motion

The handling of heavy loads can be easily automated and efficiency greatly improved with the MOTOMAN-MCL165-100, featuring a high payload (100 kg) and a wide motion range (R3001 mm).

Dimensions Unit : mm []: P-point Maximum Envelope

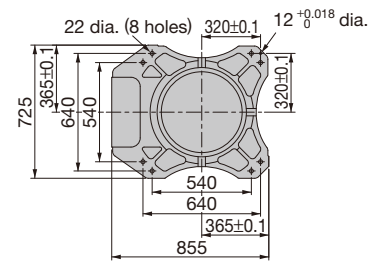


View A



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

View B



View C

Manipulator Specifications

Model	MOTOMAN-MCL165-100	
Type	YR-MCL0165-A10	
Structure	Vertically articulated, 6 degrees of freedom	
Payload	100 kg	
Repeatability*1	± 0.3 mm	
Range of Motion	S-axis (turning)	- 150° - +150°
	L-axis (lower arm)	- 60° - +76°
	U-axis (upper arm)	- 130° - +240°
	R-axis (wrist roll)	- 360° - +360°
	B-axis (wrist pitch/yaw)	- 130° - +130°
	T-axis (wrist twist)	- 360° - +360°
Maximum Speed	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)	833 N·m
	B-axis (wrist pitch/yaw)	833 N·m
	T-axis (wrist twist)	490 N·m
Allowable Inertia (GD ² /4)	R-axis (wrist roll)	75 kg·m ²
	B-axis (wrist pitch/yaw)	75 kg·m ²
	T-axis (wrist twist)	25 kg·m ²
Painting Color	Munsell notation N9.5 or equivalent	
Approx. Mass	1325 kg	
Clean Class*2	ISO class 6	
Ambient Conditions	Temperature	+15°C to +35°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less. 	
	Power Requirement*3	6.0 kVA

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

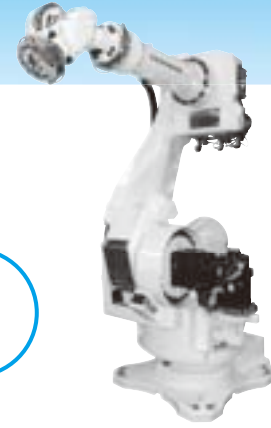
MOTOMAN-MCL165

Compatible with DX100

6-axis vertically articulated robot, 165 kg payload

Ideal robot for transferring large or heavy loads

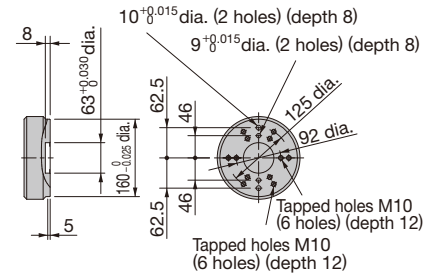
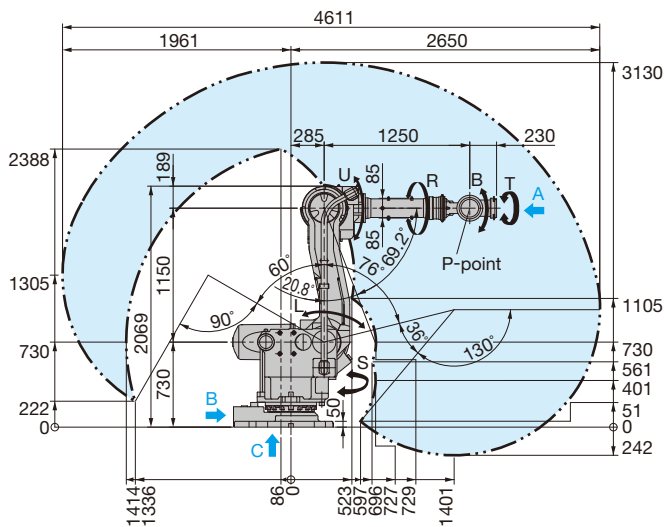
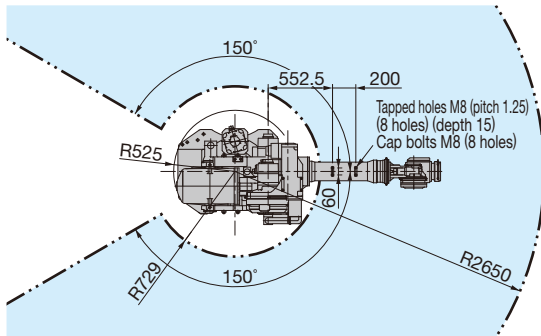
With a high payload of 165 kg, the MOTOMAN-MCL165 is the perfect robot for handling heavy loads. System layouts can be custom designed, because the robot can handle heavy loads with a wide range of motion. The MOTOMAN-MCL165 has a maximum horizontal reach of R2650 mm and a maximum vertical reach of 3130 mm.



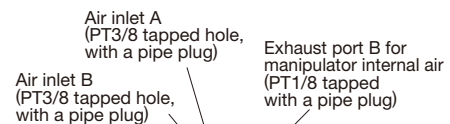
ISO Class
6

Dimensions Unit : mm

: P-point Maximum Envelope



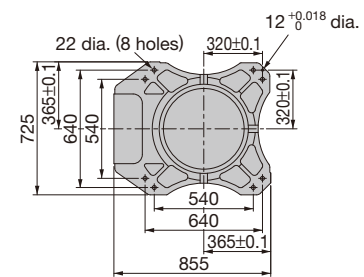
View A



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

Exhaust port A for manipulator
internal air*(outer diameter 34 mm)
*: Air duct of 34 mm internal
diameter should be provided for
robot internal air suction.

View B



View C

Manipulator Specifications

Model	MOTOMAN-MCL165	
Type	YR-MCL0165-A00	
Structure	Vertically articulated, 6 degrees of freedom	
Payload	165 kg	
Repeatability*1	±0.2 mm	
Range of Motion	S-axis (turning)	-150° - +150°
	L-axis (lower arm)	-60° - +76°
	U-axis (upper arm)	-130° - +240°
	R-axis (wrist roll)	-360° - +360°
	B-axis (wrist pitch/yaw)	-130° - +130°
	T-axis (wrist twist)	-360° - +360°
Maximum Speed	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)	883 N·m
	B-axis (wrist pitch/yaw)	883 N·m
	T-axis (wrist twist)	490 N·m
Allowable Inertia (GD ² /4)	R-axis (wrist roll)	51.25 kg·m ²
	B-axis (wrist pitch/yaw)	51.25 kg·m ²
	T-axis (wrist twist)	15 kg·m ²
Painting Color	Munsell notation N9.5 or equivalent	
Approx. Mass	1300 kg	
Clean Class*2	ISO class 6	
Ambient Conditions	Temperature	+15°C to +35°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3	6.0 kVA	

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MFL15DW

Compatible with DX200

4-axis horizontally articulated robot, 15 kg/arm payload

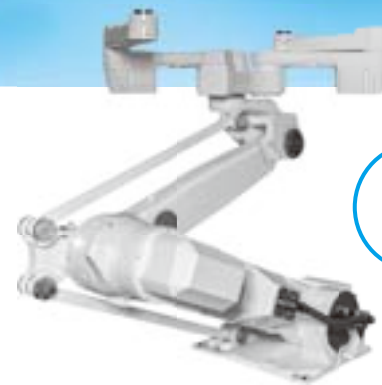
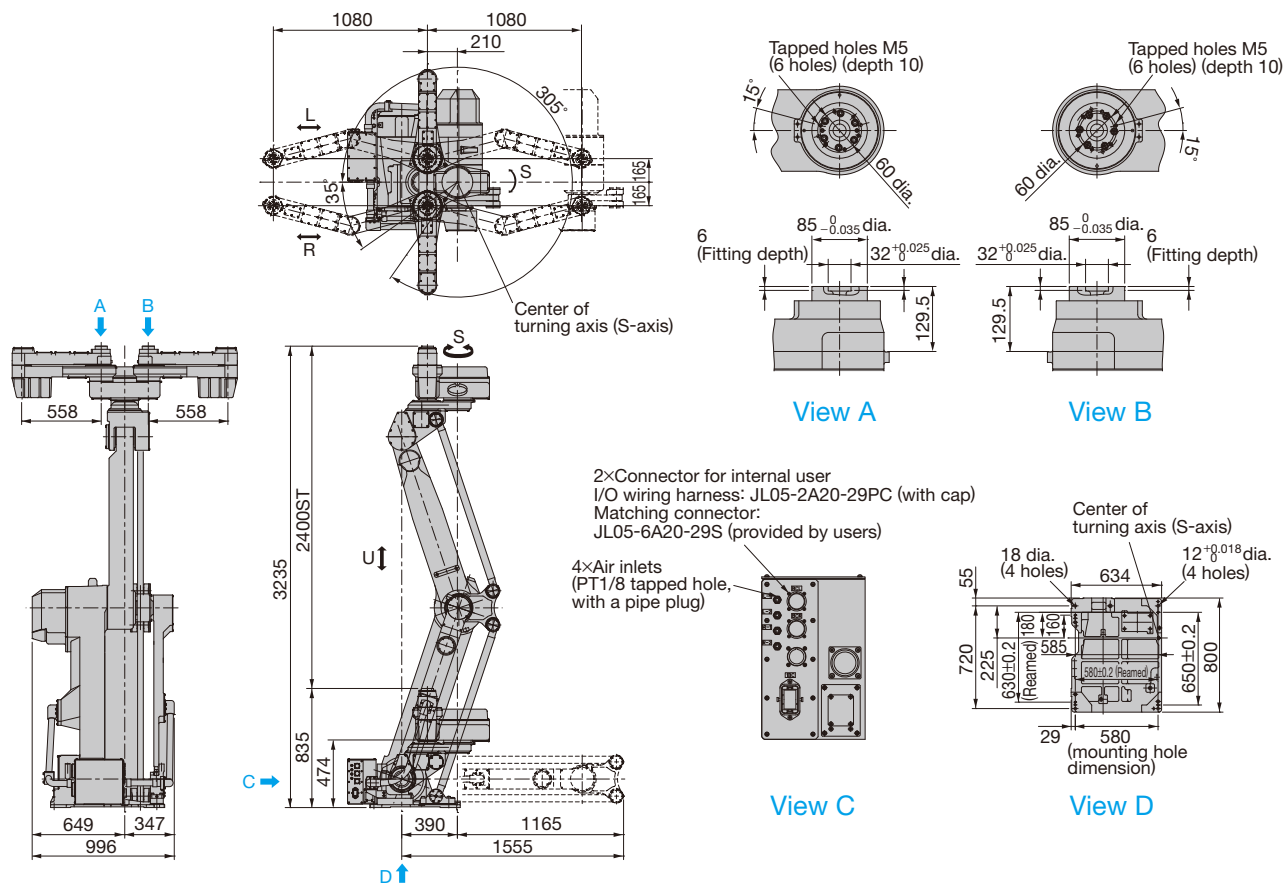
Space saving robot for the 4th generation LCD glass substrate

A shorter turning radius enables transfer of the 4th generation LCD glass substrates (750 mm × 950 mm class). Three models with the same back-and-forth stroke (± 1080 mm) and different up-and-down strokes (875 mm, 1400 mm, 2400 mm) are available to create optimal layouts for multi-level cassettes.

Dimension diagrams and specifications for MFL15DW-2400 (up-and-down stroke, 2400 mm) are shown below.

Contact your Yaskawa representative for dimension diagrams and specifications of other models.

Dimensions Unit : mm



Single-arm model is also available.*

*: Up-and-down stroke 875/1400 mm only

Manipulator Specifications

Model	MOTOMAN-MFL15DW-2400	
Type	YR-MFL015D-D31	
Structure	Horizontally articulated, 4 degrees of freedom	
Payload	15 kg/arm	
Repeatability*1	± 0.3 mm	
Range of Motion	U-axis (up/down)	2400 mm
	S-axis (turning)	$-305^\circ - +35^\circ$
	L, R-axis (sideways)	-1180 mm - $+1080$ mm
Maximum Speed	U-axis (up/down)	1720 mm/s max.
	S-axis (turning)	3.14 rad/s, 180°/s
	L, R-axis (sideways)	2000 mm/s max.
Allowable Moment	L, R-axis (sideways)	30 N·m

Allowable Inertia (GD ² /4)	L-, R-axis (sideways)	2.6 kg·m ²
	Painting Color: Munsell notation N9.5 or equivalent	
Approx. Mass		720 kg
Clean Class*2		ISO class 4
Ambient Conditions	Temperature	+15°C to +35°C
	Humidity	20% to 80%RH (non-condensing)
	Vibration	4.9 m/s ² or less (0.5G or less)
	Others	<ul style="list-style-type: none"> Free from corrosive gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3		4.0 kVA

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MFL1200D

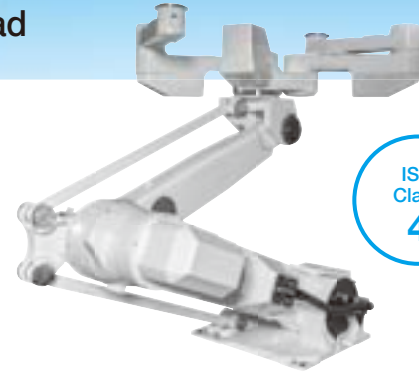
Compatible with DX200

4-axis horizontally articulated robot, 30 kg/arm payload

Space saving robot for the 5th generation LCD glass substrate

A shorter turning radius enables transfer of the 5th generation LCD glass substrates (1000 mm × 1200 mm class). Three models with the same back-and-forth stroke (± 1175 mm) and different up-and-down strokes (1200 mm, 1600 mm, 2400 mm) are available to create optimal layouts for multi-level cassettes.

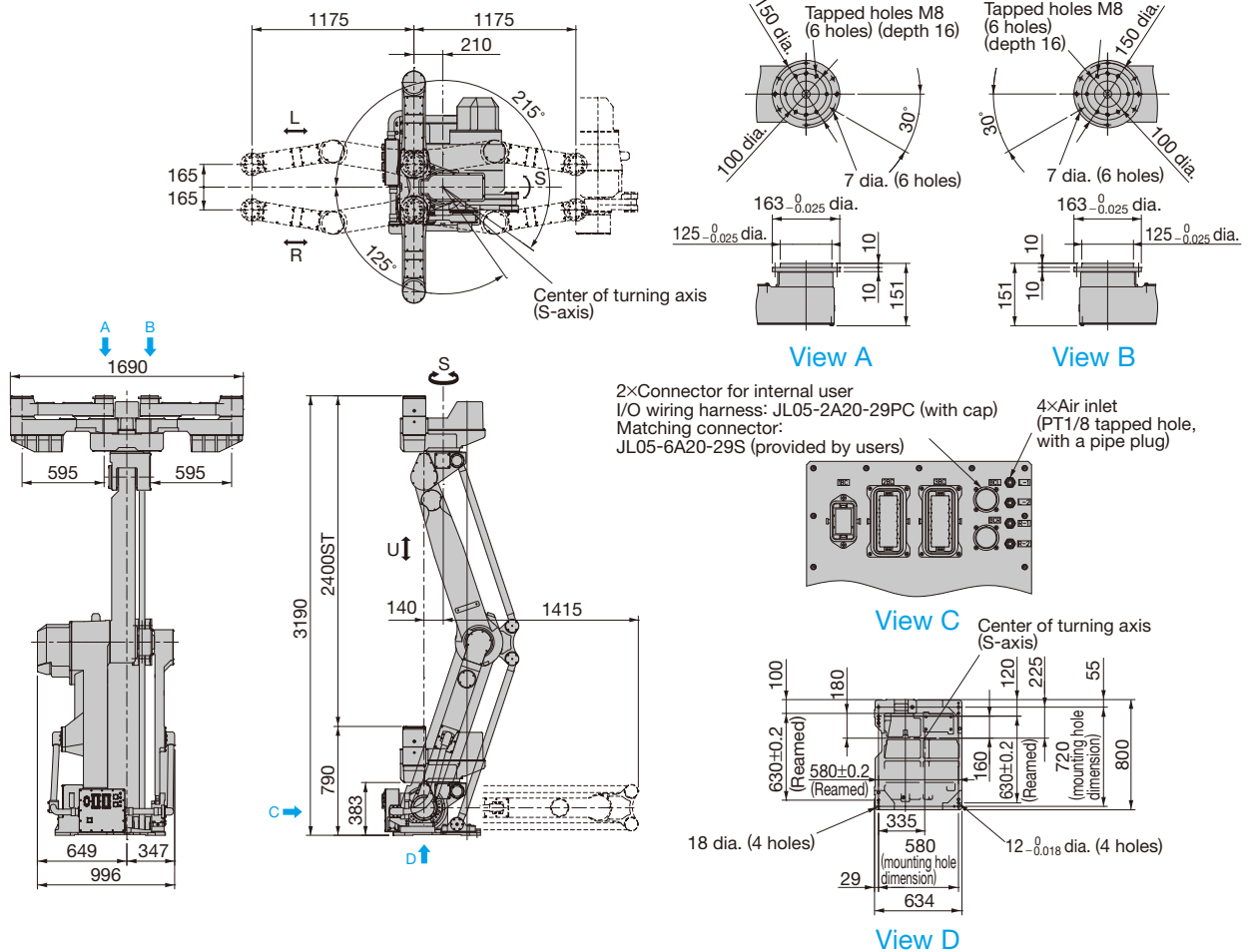
Dimension diagrams and specifications for MFL1200D-2400 (up-and-down stroke, 2400 mm) are shown below. Contact your Yaskawa representative for dimension diagrams and specifications of other models.



ISO Class
4

Single-arm model is also available.

Dimensions Unit : mm



Manipulator Specifications

Model	MOTOMAN-MFL1200D-2400	
Type	YR-MFL020D-A20	
Structure	Horizontally articulated, 4 degrees of freedom	
Payload	30 kg/arm	
Repeatability*1	±0.2 mm	
Range of Motion	U-axis (up/down)	2400 mm
	S-axis (turning)	-215° - +125°
	L-, R-axis (sideways)	- 1175 mm - +1175 mm
Maximum Speed	U-axis (up/down)	1720 mm/s max.
	S-axis (turning)	3.14 rad/s, 180°/s
	L-, R-axis (sideways)	2100 mm/s max.
Allowable Moment	L-, R-axis (sideways)	100 N·m

Allowable Inertia (GD ² /4)	L-, R-axis (sideways)	15 kg·m ²
	Painting Color: Munsell notation N9.5 or equivalent	
Approx. Mass		800 kg
Clean Class*2		ISO class 4
Ambient Conditions	Temperature	+15°C to +35°C
	Humidity	20% to 80%RH (non-condensing)
	Vibration	4.9 m/s ² or less (0.5G or less)
	Others	<ul style="list-style-type: none"> Free from corrosive gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3		4.0 kVA

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MFL2200D

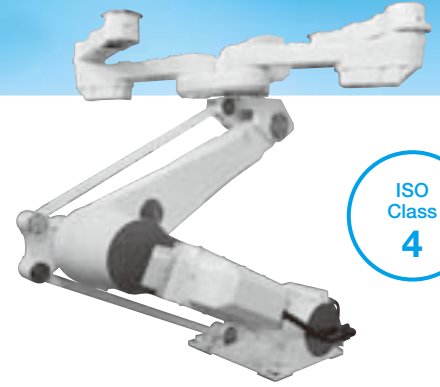
Compatible with DX100

4-axis horizontally articulated robot, 50 kg/arm payload

High-speed transfer to multi-level cassettes

The MOTOMAN-MFL2200D robots can transfer the 6th generation, large LCD glass substrates (1500 mm × 1850 mm class). Large LCD glass substrates can be loaded to or unloaded from multi-level cassettes at high speeds by using a long up-and-down stroke (1840 mm, 2440 mm, 2650 mm), a low path line, and double arms.

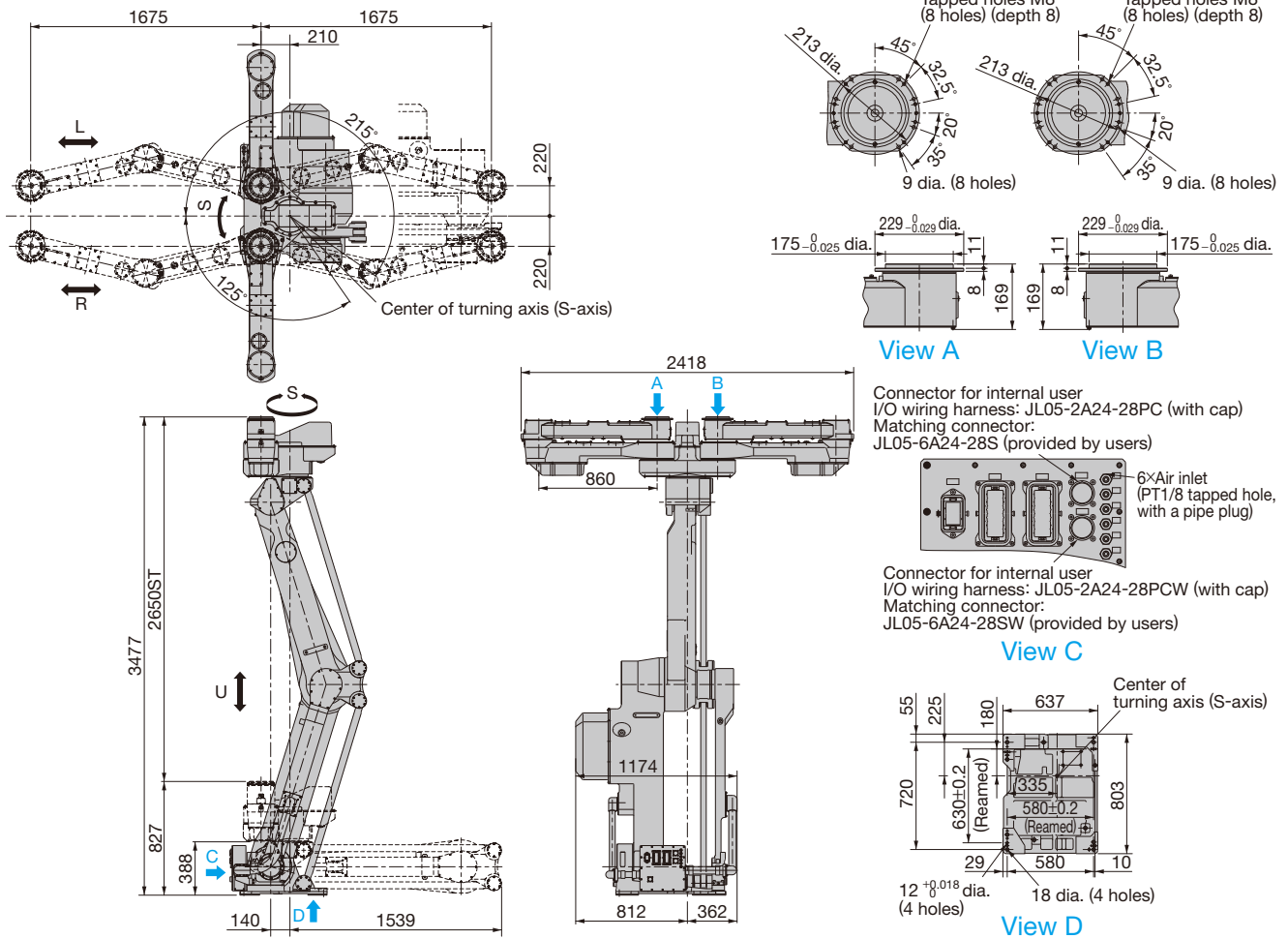
Dimension diagrams and specifications for MFL2200D-2650 (up-and-down stroke, 2650 mm) are shown below. Contact your Yaskawa representative for dimension diagrams and specifications of other models.



ISO Class 4

Single-arm model is also available.

Dimensions Unit : mm



Manipulator Specifications

Model	MOTOMAN-MFL2200D-2650	
Type	YR-MFL050D-A20	
Structure	Horizontally articulated, 4 degrees of freedom	
Payload	50 kg/arm	
Repeatability*1	±0.2 mm	
Range of Motion	U-axis (up/down)	2650 mm
	S-axis (turning)	-215° - +125°
	L-, R-axis (sideways)	-1675 mm - +1675 mm
Maximum Speed	U-axis (up/down)	1330 mm/s max.
	S-axis (turning)	3.14 rad/s, 180°/s
	L-, R-axis (sideways)	3250 mm/s max.
Allowable Moment	L-, R-axis (sideways)	250 N·m
	Allowable Inertia (GD ² /4)	L-, R-axis (sideways)
Painting Color	Munsell notation N9.5 or equivalent	
Approx. Mass	1020 kg	
Clean Class*2	ISO class 4	
Ambient Conditions	Temperature	+15°C to +35°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3	3.5 kVA	

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MFL2400D

Compatible with DX100

4-axis horizontally articulated robot, 80 kg/arm payload

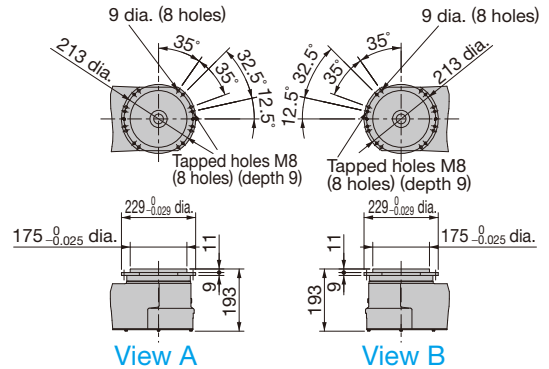
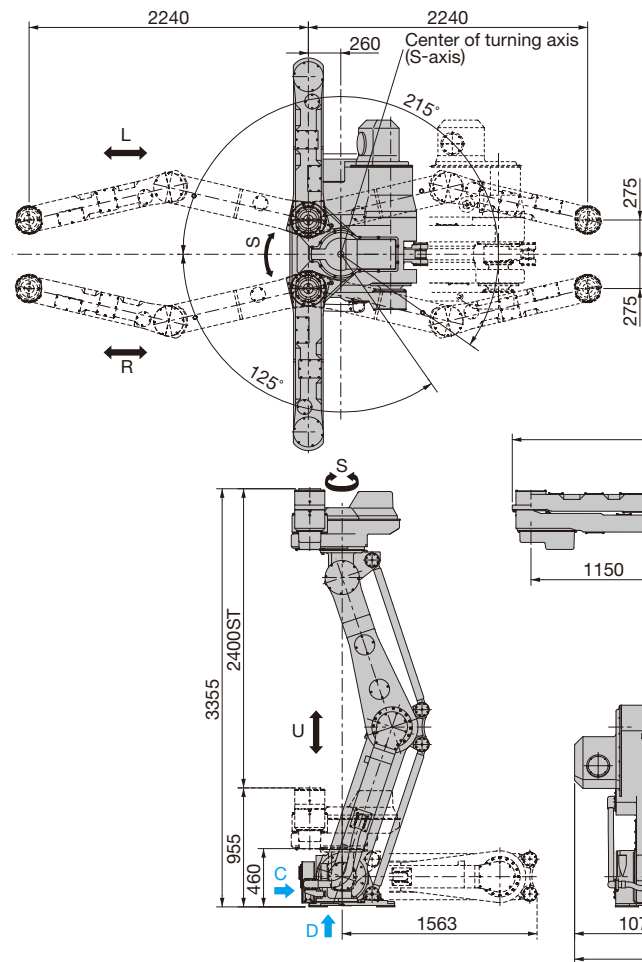
Highest-class motion speed for higher throughput

The MOTOMAN-MFL2400D robots can transfer the 7th generation, large LCD glass substrates (1870 mm × 2200 mm class). Large LCD glass substrates can be handled with double arms at a maximum speed of 3600 mm/s. A wide range of motion is realized with a low path line and a long up-and-down stroke (1800 mm, 2400 mm). These features contribute to higher throughput.

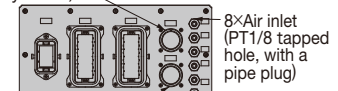
Dimension diagrams and specifications for MFL2400D-2400 (up-and-down stroke, 2400 mm) are shown below.

Contact your Yaskawa representative for dimension diagrams and specifications of other models.

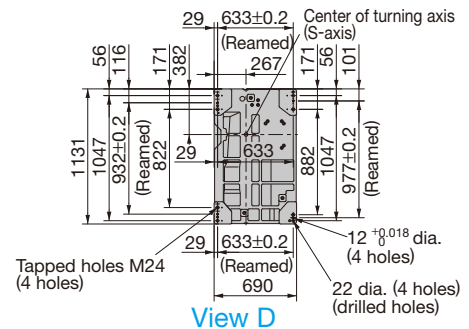
Dimensions Unit : mm



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



View C
Connector for internal user
I/O wiring harness: JL05-2A24-28PCW (with cap)
Matching connector: JL05-6A24-28SW (provided by users)



View D

Manipulator Specifications

Model	MOTOMAN-MFL2400D-2400	
Type	YR-MFL080D-A10	
Structure	Horizontally articulated, 4 degrees of freedom	
Payload	80 kg/arm	
Repeatability*1	±0.2 mm	
Range of Motion	U-axis (up/down)	2400 mm
	S-axis (turning)	-215° - +125°
	L-, R-axis (sideways)	-2240 mm - +2240 mm
Maximum Speed	U-axis (up/down)	1350 mm/s max.
	S-axis (turning)	3.14 rad/s, 180°/s
	L-, R-axis (sideways)	3600 mm/s max.
Allowable Moment	L-, R-axis (sideways)	410 N·m

Allowable Inertia (GD ² /4)	L-, R-axis (sideways)	92.5 kg·m ²
	Painting Color	Munsell notation N9.5 or equivalent
Approx. Mass		1400 kg
Clean Class*2		ISO class 4
Ambient Conditions	Temperature	+15°C to +25°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3		5.0 kVA

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MFS2200D

Compatible with DX100

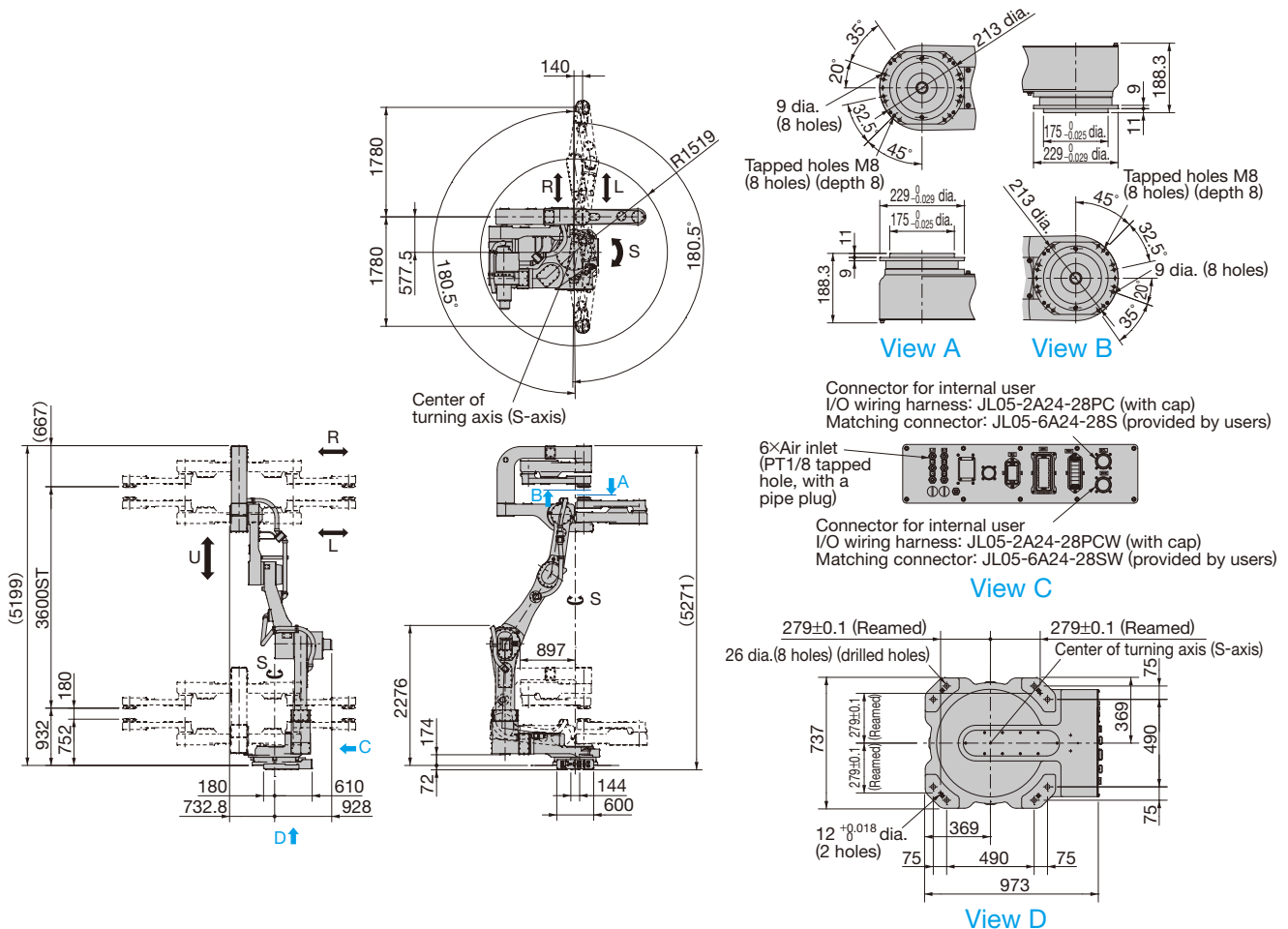
6-axis horizontally articulated robot, 50 kg/arm payload

High-speed and stable transfer improve productivity

Yaskawa's single link strut mechanism achieved a high degree of rigidity and freedom and enable the transfer of ultra-large, 6th generation LCD glass substrates (1500 mm × 1800 mm class).



Dimensions Unit : mm



Manipulator Specifications

Model	MOTOMAN-MFS2200D-3600	
Type	YR-MFS050D-A00	
Structure	Horizontally articulated, 6 degrees of freedom	
Payload	50 kg/arm	
Repeatability*1	±0.2 mm	
Range of Motion	U-axis (up/down)	3600 mm
	S-axis (turning)	- 180.5° - +180.5°
	L-, R-axis (sideways)	- 1780 mm - +1780 mm
	Left-Right	- 50 mm - +50 mm
Maximum Speed	Twist	-6° - +6° (Within the range of U-axis motion: 100 - 1750mm) -0.5° - +0.5° (Other than above mentioned range)
	U-axis (up/down)	950 mm/s
	S-axis (turning)	1.57 rad/s, 90°/s
	L-, R-axis (sideways)	3600 mm/s max.
Allowable Moment	L-, R-axis (sideways)	353 N·m
	Allowable Inertia (GD ² /4)	L-, R-axis (sideways)
Painting Color	Munsell notation N9.5 or equivalent	
Approx. Mass	2430 kg	
Clean Class*2	ISO class 4	
Ambient Conditions	Temperature	+15°C to +25°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3	12.0 kVA	

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

MOTOMAN-MFS2500D

Compatible with DX100

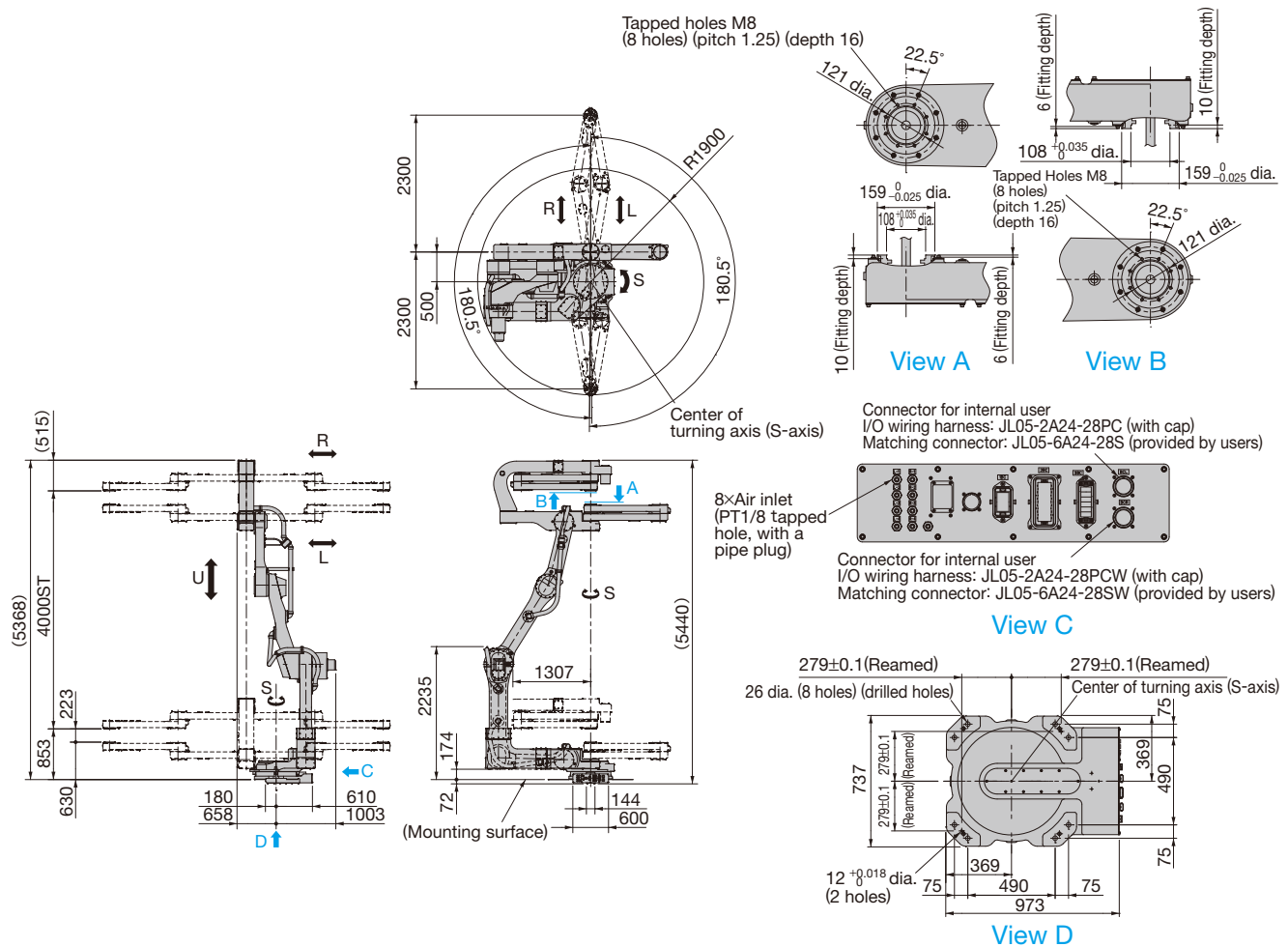
6-axis horizontally articulated robot, 60 kg/arm payload

Flexible movements reduce incidental expenses

Vertical axis, composed of three independent joints and two arms, enables horizontal hand movement and corrects hand position without changing the height of the hand.



■ Dimensions Unit : mm



■ Manipulator Specifications

Model	MOTOMAN-MFS2500D-4000	
Type	YR-MFS060D-A00	
Structure	Horizontally articulated, 6 degrees of freedom	
Payload	60 kg/arm	
Repeatability*1	±0.2 mm	
Range of Motion	U-axis (up/down)	4000 mm
	S-axis (turning)	-180.5° - +180.5°
	L-, R-axis (sideways)	-2300 mm - +2300 mm
	Left-Right movement	-50 mm - +50 mm
	Twist movements	-0.5° - +0.5°
Maximum Speed	U-axis (up/down)	1150 mm/s
	S-axis (turning)	1.57 rad/s, 90°/s
	L-, R-axis (sideways)	3800 mm/s max.
Allowable Moment	L-, R-axis (sideways)	470 N·m

Allowable Inertia (GD ² /4)	L-, R-axis (sideways)	140 kg · m ²
	Painting Color	Munsell notation N9.5 or equivalent
Approx. Mass	2500 kg	
Clean Class*2	ISO class 4	
Ambient Conditions	Temperature	+15°C to +25°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 gas or liquid, or explosive gas or liquid Free from exposure to water Free from excessive electrical noise (plasma) The flatness of the mounting surface must be 0.5mm or less.
Power Requirement*3	12.0 kVA	

*1 : Conforms to ISO 9283.

*2 : Conforms to ISO 14644 standards (with suction inside the robot in an environment with a down flow of 0.4 m/s or more).

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

Note : SI units are used for the specifications.

Robot Controller

DX200·DX100 (Clean room use specifications)



Low box



Tall box

DX200 (Clean room use specifications)

Controller	Configuration	Dust proof IP54
	Compatible Models	MFL15DW, MFL1200D
	Dimensions *	800 mm (W) × 550 mm (D) × 900 mm (H)
	Mass	200 kg
	Cooling System	Indirect cooling
	Ambient Temperature	During operation: 0°C to +25°C During storage: -10°C to +60°C
	Relative Humidity	10% to 90% (non-condensing)
	Power Supply	Three-phase 200 VAC (+10% to -15%) at 50/60 Hz (Japan) Three-phase 220 VAC (+10% to -15%) at 60 Hz (Japan)
	Grounding	Grounding resistance: 100 Ω or less
	Digital I/Os	Specialized signals (hardware): 28 inputs and 7 outputs General signals (standard max): 40 inputs and 40 outputs (Transistor output: 32, Relay output: 8) Max.I/O (optional): 4096 inputs and 4096 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: 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	

DX100 (Clean room use specifications)

Controller	Configuration	Dust proof IP54	
	Compatible Models	MCL series, MFS series, MFL2200D and MFL2400D	
	Dimensions */ Mass	MCL20	425 mm (W) × 450 mm (D) × 1250 mm (H) / 100 kg
		MFS series	850 mm (W) × 550 mm (D) × 900 mm (H) / 200 kg
		Others	Tall box: 800 mm (W) × 550 mm (D) × 900 mm (H) / 200 kg Low box: 600 mm (W) × 1500 mm (D) × 550 mm (H) / 200 kg
	Cooling System	Indirect cooling	
	Ambient Temperature	During operation: 0°C to +25°C During storage: -10°C to +60°C	
	Relative Humidity	10% to 90% (non-condensing)	
	Power Supply	Three-phase 200 VAC (+10% to -15%) at 50/60 Hz (Japan) Three-phase 200 VAC (+10% to -15%) at 60 Hz (Japan)	
	Grounding	Grounding resistance: 100 Ω or less	
	Digital I/Os	Specialized signals (hardware): 23 inputs and 5 outputs General signals (standard max): 40 inputs and 40 outputs (Transistor output: 32, Relay output: 8) Max.I/O (optional): 2048 inputs and 2048 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: 2 slots for main CPUs, 1 slot for servo CPU and 1 additional slot for sensor board	
	LAN (Connection to Host)	1 (10BASE-T/100BASE-TX)	
	Interface	RS-232C: 1ch	
Control Method	Software servo control		
Drive Units	SERVOPACK for AC servomotors		

* : Does not include protruding parts.

Programming Pendant

The programming pendant has a touch panel with many icons and pictures for greater visibility and operability. This significantly improves efficiency in debugging at startup.

Specifications

Dimensions	169 (W) × 50 (D) × 314.5 (H) mm
Mass	0.990 kg
Material	Reinforced plastics (screws are made of stainless steel)
Operation Device	Select keys, axes 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 memory interface device
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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LITERATURE NO. KAEP C940580 02B <1>-0

Published in Japan September 2017
16-8-43