YASKAWA

Collaborative Robots

MOTOMAN-HC Series

Robot System Solutions

MOTOMAN-HC Series

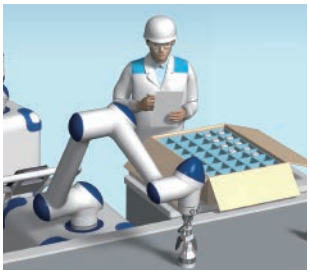
Find solutions for integrating robots into your factory with YASKAWA's collaborative robots.

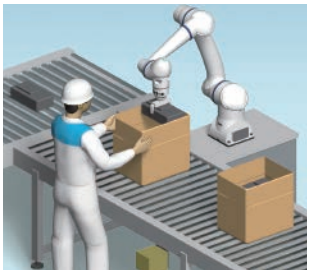
YASKAWA has the answer

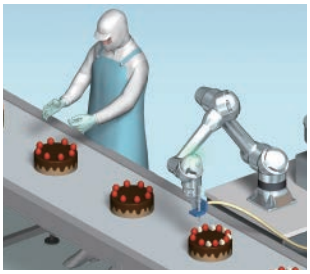
We can meet our customers' diverse needs with a wide range of functions and components.

Application examples

Machine-to-machine transfer, picking and placing/packaging parts, quality inspections/measurements
See application examples on page 6 and 7.







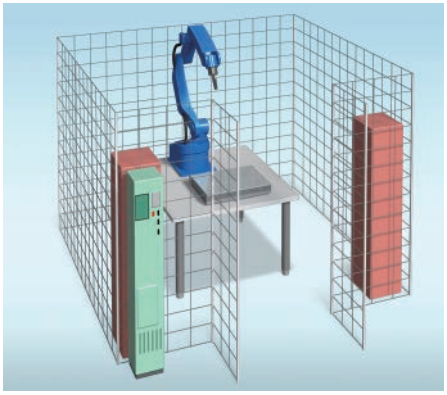
Is it possible to integrate robots into our factory?

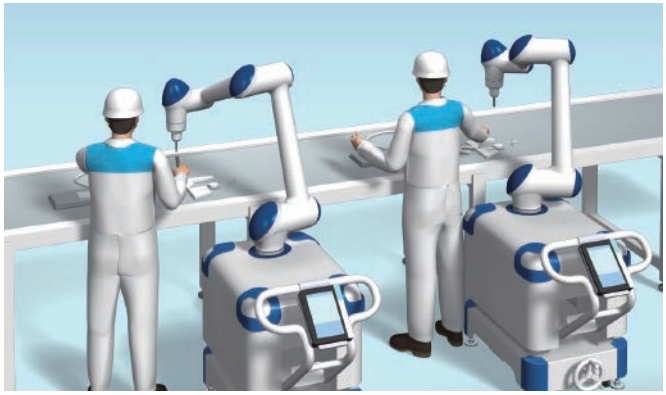
The MOTOMAN-HC series has the answers to the challenges you are facing in integrating robots into your factory.

Challenge 1 Insufficient space to set up a robot and a safety fence

Q How can we install robots if there is not enough space to set up a safety fence?

A The collaborative robot can be used without a safety fence because it is equipped with optimal safety functions. This makes the installation process easier and eliminates the need to secure large spaces, such as those used for conventional industrial robots.

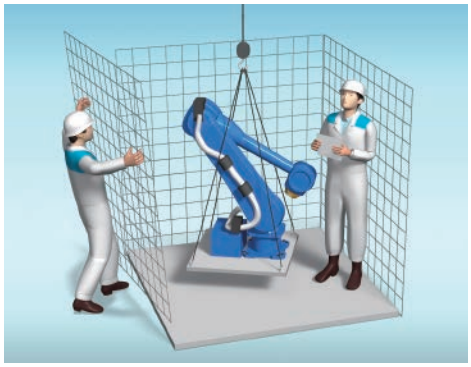


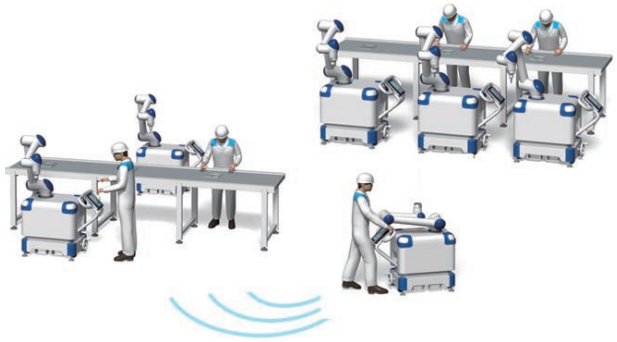


Challenge 2 Difficulty in changing layouts once the robot is installed

Q Safety fences and other equipment have to be moved when changing the position of an industrial robot that has already been installed. Can this process be simplified?

A The collaborative robot can be easily transported since it can be used without a safety fence. This allows for more flexible changes to layouts according to customers' production plans.





The HC series complies with the international standard ISO 10218-1 (JIS B 8433-1 for Japanese Industrial Standards). The safety function of the robot controller also complies with the international standard ISO 13849-1PLd (Cat.3), and has received safety certification by a third-party certification body. These safety functions allow the HC series systems to be constructed without safety fences. However, in all cases, a risk assessment (→ page 24) must be conducted.

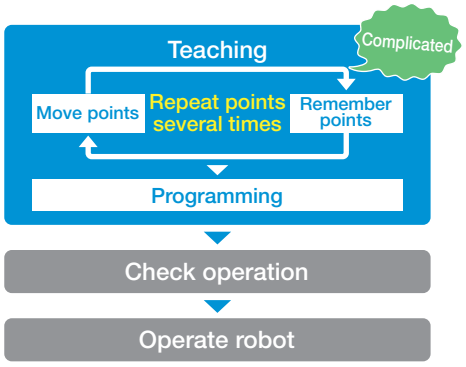
Challenge 3 Safety of workers performing operations near robots

Q Can the safety of workers be guaranteed when they work close to robots?

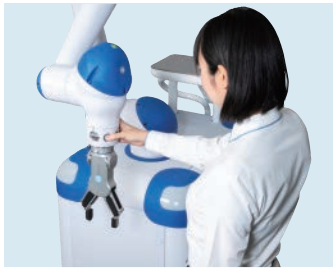
A The intrinsically safe design of the HC series robots prevents a worker's fingers and hands from being caught in the robot arm and enables safe operation. The PFL function (→ page 8) allows the robot to stop automatically when it detects a force that exceeds preset limits and minimizes any damage that may be caused by contact between humans and robots.

Challenge 4 Difficulty teaching because workers are unfamiliar with robot operations

Q Can people who are not familiar with industrial robots or have no specialist knowledge carry out the process of teaching robots?



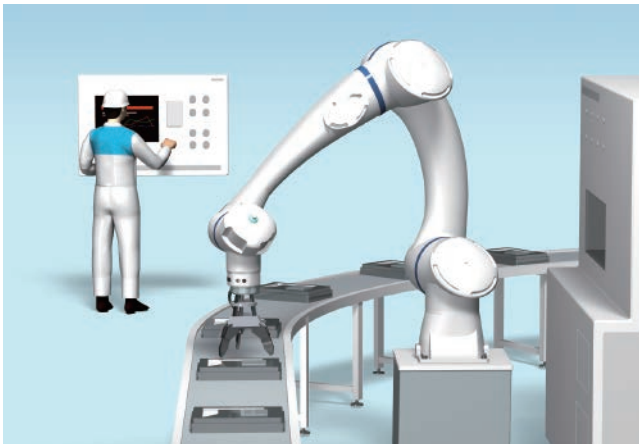
A Conventional teaching requires complicated setting processes, but with the HC series robots, even workers who are unfamiliar with robots can intuitively teach positions for robots using the direct teach function (→ page 9) and the Smart Pendant (→ page 18).


Direct teach function


Smart Pendant

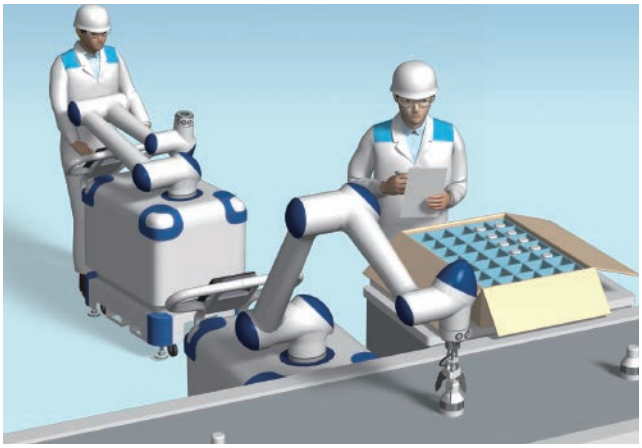
Applications

The MOTOMAN-HC series makes production lines more compact by eliminating the need for a safety fence.



Machine-to-machine transfer

The collaborative robot can be used to transfer parts inside working areas or between machines, without using a safety fence. A dust- and drip-proof specification model can be selected for post-processes which require cleaning or machining processes which use lubricants such as cutting oil. While the robot is in operation, workers check that the robot is operating normally and check the quality of processed parts. In addition to reducing repetitive tasks by workers, the robot can also be set up rapidly on existing production lines since it can be operated without any safety fences. This creates a highly flexible layout that can easily be integrated into customers' equipment.

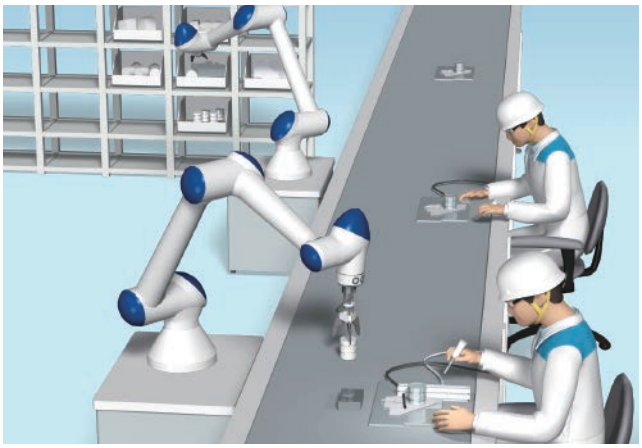


Pick and place, packaging

The collaborative robot can be used to perform tasks such as sorting, picking, placing, and packaging. Workers can install the robot on lines where needed and check the operation status. When the robot is used in combination with a vision sensor, the robot can perform picking operations by detecting parts or products with different shapes. The layout and the position of the robot can be changed according to production status. The robot can also relieve workers from repetitive tasks and correctly pick, place, and package parts or products to improve accuracy and quality.

Quality inspections and measurements

Quality inspections and measurements of parts can be performed side-by-side with workers when the collaborative robot is used in combination with distance measurement sensors and vision sensors. Workers check the entire product and the robot inspects sections of the product where precision is required to ensure consistent quality.
A compact layout can be constructed since collaborative robots can be operated without safety fences. Collaboration between the workers and the robot can reduce workloads and improve production quality.



Assembly

The collaborative robot can assemble products together with workers. The robot transports the required parts to workers who assemble products, such as tightening screws and fitting.
The robot can be placed even in limited spaces such as assembly lines since collaborative robots can be operated without safety fences. In addition to reducing the workload of workers, the robot can improve product quality since it not only improves work efficiency, but also helps workers assemble parts in the exact order.

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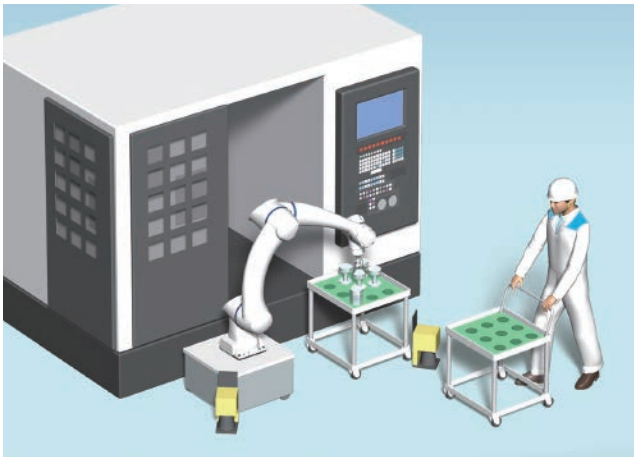
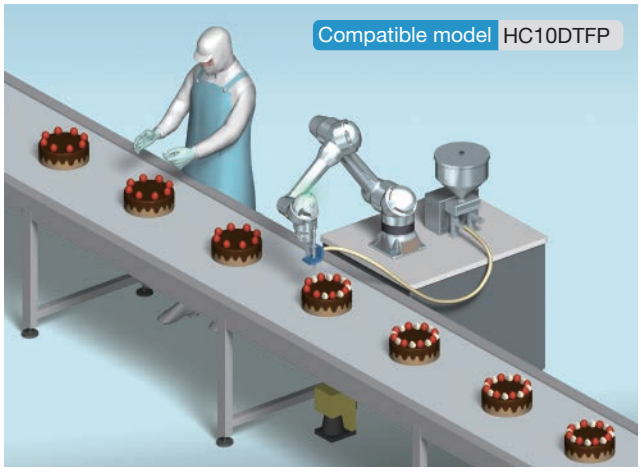


Workpiece loading and unloading for processing machines

A dust- and drip-proof specification model can perform loading and unloading for processing machines (machine tending) instead of workers.
The collaborative robot can automate the repetitive tasks of machine tending and deliver improvements in productivity because it works irrespective of time while handling environments with flying cutting oil (coolant).



Filling of liquid food products

The MOTOMAN-HC10DTFP features a food-safe surface that prevents paint from peeling and mixing with food. The surface can also be washed with specific cleaning solutions because of its improved resistance to cleaning solutions.
Collaborative robots designed for easy maintenance and sanitation can now be integrated into various processes in food factories. Dividing work roles between robots and workers allows processes once thought difficult to automate to be partially automated, improving both food product quality and productivity.

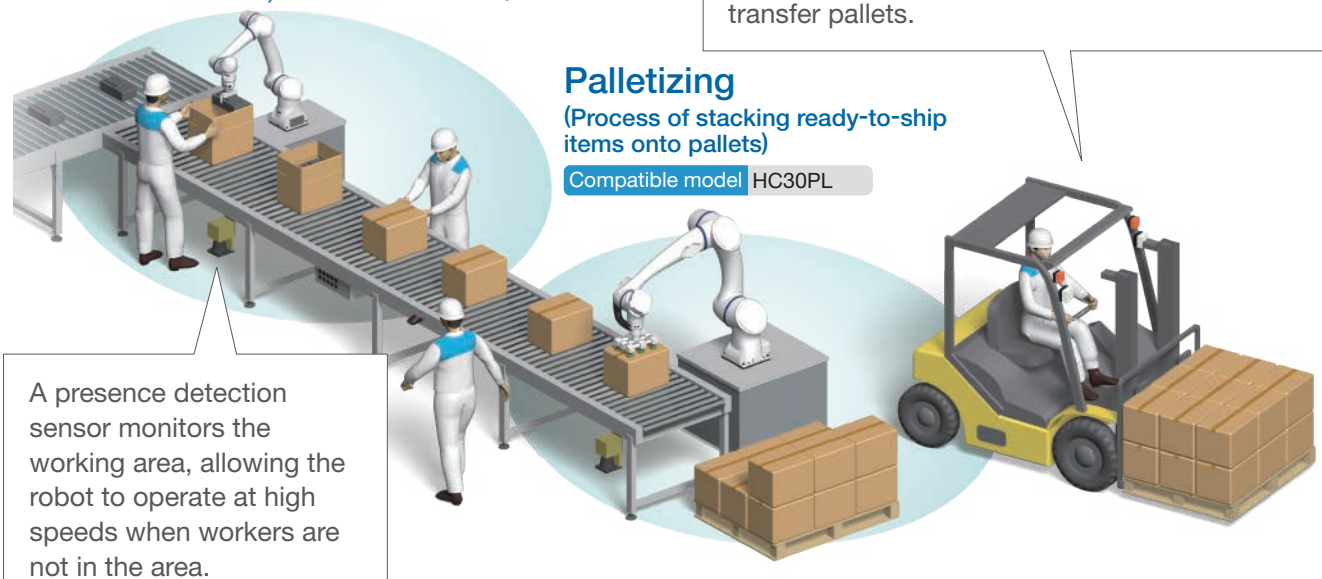
Packing and palletizing

The collaborative robot can automate logistical processes for food, pharmaceuticals, cosmetics and other products in a smaller, shared workspace with workers.

Packing
(Process of packaging items into containers, such as small boxes)

Palletizing
(Process of stacking ready-to-ship items onto pallets)

Compatible model HC30PL



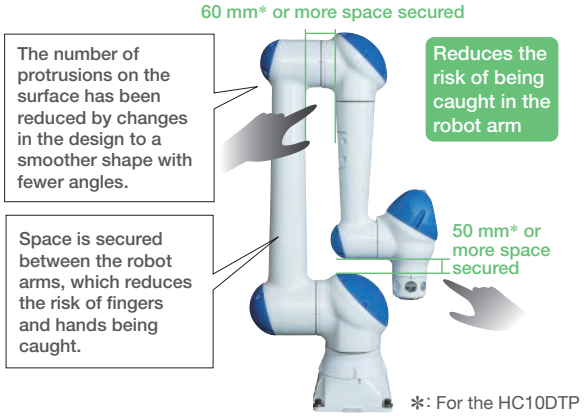
The elimination of a safety fence allows a forklift to enter the working area to directly pick and transfer pallets.

A presence detection sensor monitors the working area, allowing the robot to operate at high speeds when workers are not in the area.

MOTOMAN-HC Series Features

Use safely

Safe design to reduce the risk of fingers and hands being caught



Safety functions for collaborative work

▶ PFL (Power and Force Limiting) function
The PFL function stops the robot when it detects an external force. The robot will automatically stop when it detects an external force exceeding the preset limit value, such as when there is contact or a collision between the robot and a worker or the robot and an object.
[International standard ISO 13849-1PLd (Cat.3) certification has been received from a third-party certification body.]

▶ Escape from clamping function
This function frees a worker or object when they become caught in the robot. Since the robot moves in a rewinding motion, the worker or object can be released smoothly.

Note: The above functions are enabled during collaborative operation mode only.

"PLUG & PLAY" for immediate use

・A variety of “YASKAWA PLUG & PLAY KITs" are available for the HC Series that include end effectors and peripheral devices that can be easily connected and configured.

Features of PLUG & PLAY KITs

▶ 1. Wide variety of end effectors and peripheral devices
The optimal end effector for the required work and workpiece being handled can be selected.

▶ 2. Easy connections
The end effector mounting flange at the tip of the robot conforms to the standard "ISO 9409-1-50-4-M6", enabling peripheral devices conforming to the same standard to be connected easily. The robot also includes a variety of built-in cables to make setup easy.

▶ 3. Easy setup
Some YASKAWA PLUG & PLAY KITs include an installation package and setup guide for performing batch configurations when installing peripheral devices to the robot. This eliminates the need to refer to manuals for peripheral devices and the robot when performing setup.

▶ 4. Easy operation
Some YASKAWA PLUG & PLAY KITs feature dedicated operating screens, enabling information to be displayed and configured using intuitive operations.

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Operate easily

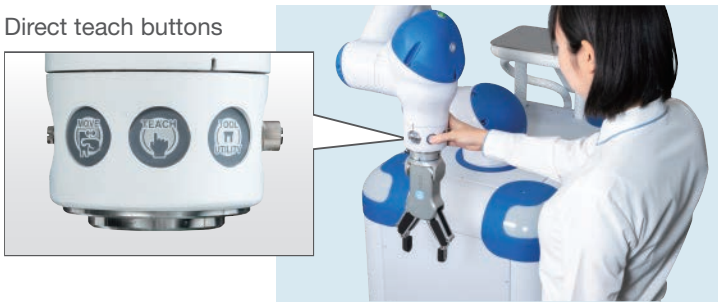
Direct teach function

・The HC series is equipped with a direct teach function. A worker can use this function to teach positions by directly moving the robot arm by hand. Even people who are unfamiliar with robot operations can easily teach positions.

Direct teach buttons

・The direct teach buttons are built into the tip of the robot arm. The robot positions can be taught by pressing these buttons. This makes teaching easier because a programming pendant does not need to be held when teaching positions.

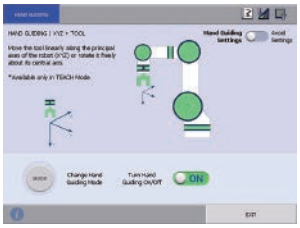
Direct teach buttons



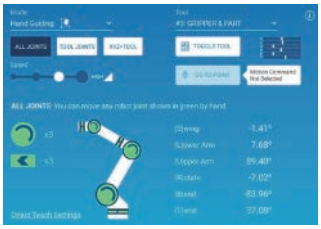
Dedicated direct teach screens

・There are user-friendly teaching operation screens dedicated to direct teach in the programming pendant and Smart Pendant. The settings related to direct teach can be easily configured on these pages.

【Dedicated direct teach screens】



Programming pendant screen

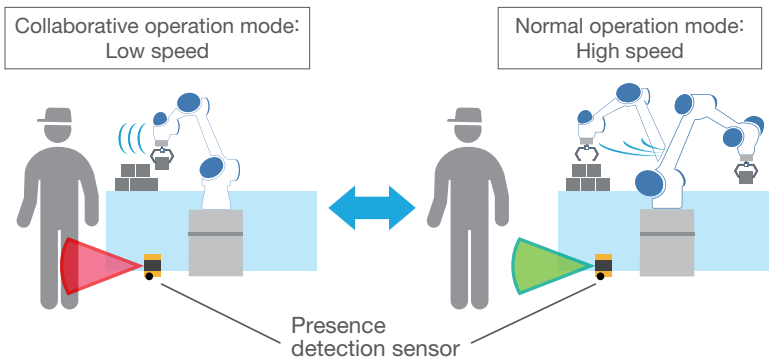


Smart Pendant screen

Achieve work efficiency

・The HC series can switch between two modes: collaborative operation mode and normal operation mode.
・In collaborative operation mode, the robot moves slowly for safety. If the robot makes contact with a worker or object, the safety functions stop the robot safely. In normal operation mode, the safety functions are disabled to allow high-speed movement in the same manner as a normal robot.

・Used in combination with a presence detection sensor, the robot can switch between collaborative operation mode when workers are nearby and normal operation mode when no workers are around, achieving both safety and work efficiency.



MOTOMAN-HC Series Lineup

The MOTOMAN-HC series offers an extensive range of products for different applications and purposes.

Model	HC10DTP	HC10DTP (Dust- and Drip-proof Specification)	HC10DTFP (Food Specification)
	 10DTP	 10DTP	 10DTFP
Payload	10 kg	10 kg	10 kg
Maximum Reach	1379 mm (up to end-flange)	1379 mm (up to end-flange)	1379 mm (up to end-flange)
IEC Protection Class	IP20	IP66/IP67	IP66/IP67
Hand-carry Type → See p. 16 and 17	○	○	-

○ : Available, - : Not available

Superior environmental resistance

HC20SDTP
(Dust- and Drip-proof Specification)

Target models: 10DTP 10DTFP 10SDTP 20DTP 20SDTP 30PL

- The overall protection class of robots with the dust- and drip-proof specification or food specification is IP66/IP67, allowing them to be used in environments where they are exposed to liquids, such as water and cutting oil, and dust, such as chips.
- The robots are built with consideration for sanitation management, and designed to be easy to clean and prevent the accumulation of dust and dirt. The robots are also built for safety with the use of food-grade grease.

Heavy-payload model

Target models: 20DTP 20SDTP 30PL

- Models with 20-kg and 30-kg payloads, which are heavy payloads for a collaborative robot, can be used to transfer large or multiple workpieces.
- With a payload of 30 kg, one of the top-class payloads for a collaborative robot, the MOTOMAN-HC30PL is ideal for palletizing heavy objects.
  The robot can be used without a safety fence, allowing a robot to stack heavy objects and a worker to change pallets in the same workspace at the same time, which improves efficiency throughout the process.

Note: The image shows "CoboPal", a palletizing system package developed by FAMS (Food & Agri Mechatro Solution Inc.), a Yaskawa Group company.

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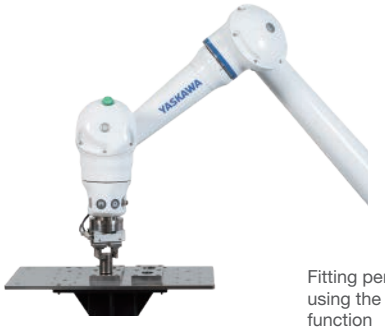
HC10SDTP (Dust- and Drip-proof Specification)	HC20DTP (Dust- and Drip-proof Specification)	HC20SDTP (Dust- and Drip-proof Specification)	HC30PL (Dust- and Drip-proof Specification)
 10SDTP	 20DTP	 20SDTP	 30PL
10 kg	20 kg	20 kg	30 kg
1082 mm (up to end-flange)	1900 mm (up to end-flange)	1412 mm (up to end-flange)	1600 mm*
IP66/IP67	IP66/IP67	IP66/IP67	IP66/IP67
-	-	-	-

*: 1700 mm for payloads of 27 kg or less

Force control function



Fitting performed using the force control function

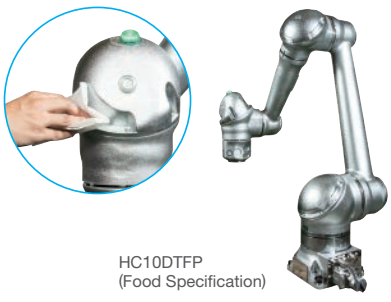
Target models: 10DTP 10DTP * Target models are constantly being added.

- The robot's built-in torque sensor enables force control to be performed. This force control function can be used for pressing and fitting as soon as the robot arrives. There is also no need to purchase a force sensor and install it to the tip of the robot arm.

Application examples: Applying tape to cardboard boxes, insertion of bearings and gears, etc.

- The Smart Pendant has a dedicated screen that can be used to easily create operating programs and make adjustments to force control.

Special specification for the food industry



HC10DTFP (Food Specification)

Target models: 10DTFP

- The food specification uses a special surface treatment to prevent contamination by foreign objects due to peeling paint. The robots can also be washed with specific cleaning solutions*, which makes the food specification optimal for the food industry that requires strict sanitation management.

*Specific cleaning solutions: Alcohol or acidic/alkaline cleaning solutions (make sure to follow specified PH and concentrations).

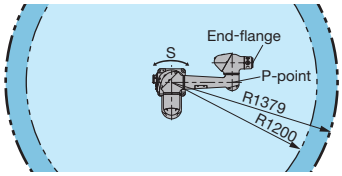
MOTOMAN-HC Series Specifications

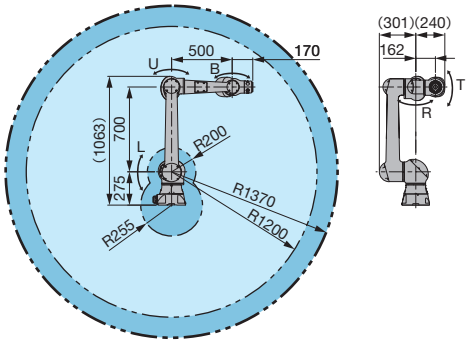
HC10DTP

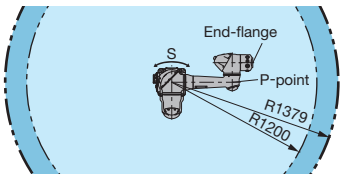
HC10DTP
(Dust- and Drip-proof Specification)

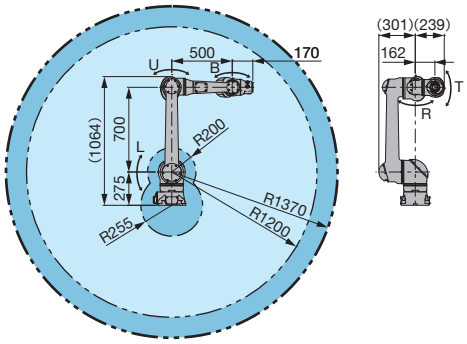
■ Dimensions Units: mm ▭: P-point Maximum Envelope ▭: End-flange Maximum Envelope

Note: Refer to individual dimension diagrams for details including the shape of the flange and dimensions.







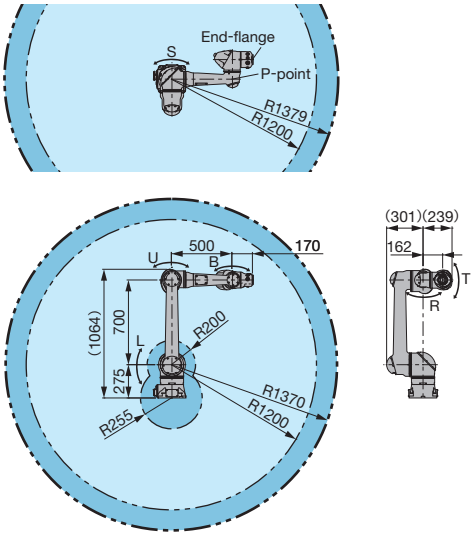


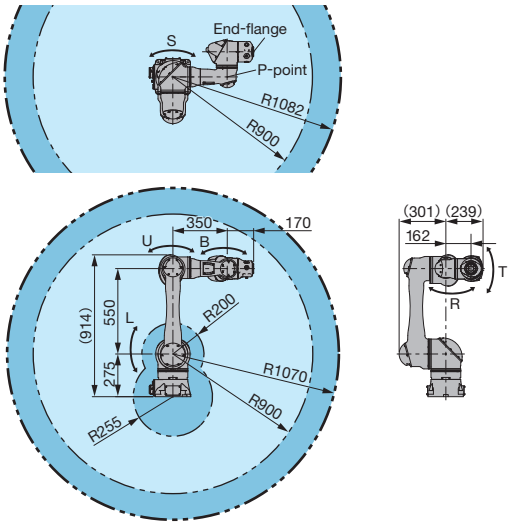
Model		MOTOMAN-HC10DTP	MOTOMAN-HC10DTP (Dust- and Drip-proof Spec.)
Type		YR-1-06VXCP10-A00	YR-1-06VXCP10-B00
Controlled Axis		6 (vertically articulated)	6 (vertically articulated)
Payload		10 kg	10 kg
Maximum Reach		1379 mm (up to end-flange)	1379 mm (up to end-flange)
Repeatability*1		0.05 mm	0.05 mm
Range of Motion	S -axis (turning)	-210°– +210°	-210°– +210°
	L -axis (lower arm)	-180°– +180°	-180°– +180°
	U -axis (upper arm)	-290°– +290°	-290°– +290°
	R -axis (wrist roll)	-210°– +210°	-210°– +210°
	B -axis (wrist pitch/yaw)	-180°– +180°	-180°– +180°
	T -axis (wrist twist)	-210°– +210°	-210°– +210°
Maximum Speed*2	S -axis (turning)	2.27 rad/s, 130°/s	2.27 rad/s, 130°/s
	L -axis (lower arm)	2.27 rad/s, 130°/s	2.27 rad/s, 130°/s
	U -axis (upper arm)	3.14 rad/s, 180°/s	3.14 rad/s, 180°/s
	R -axis (wrist roll)	3.14 rad/s, 180°/s	3.14 rad/s, 180°/s
	B -axis (wrist pitch/yaw)	4.36 rad/s, 250°/s	4.36 rad/s, 250°/s
	T -axis (wrist twist)	4.36 rad/s, 250°/s	4.36 rad/s, 250°/s
Maximum Speed of the Tip*2	Collaborative operation mode	1000 mm/s *5	1000 mm/s *5
	Normal operation mode	2000 mm/s	2000 mm/s
Allowable Moment	R -axis (wrist roll)	27.4 N·m	27.4 N·m
	B -axis (wrist pitch/yaw)	27.4 N·m	27.4 N·m
	T -axis (wrist twist)	9.8 N·m	9.8 N·m
Allowable Inertia (GD²/4)	R -axis (wrist roll)	0.78 kg·m²	0.78 kg·m²
	B -axis (wrist pitch/yaw)	0.78 kg·m²	0.78 kg·m²
	T -axis (wrist twist)	0.10 kg·m²	0.10 kg·m²
Approx. Mass		48 kg	58 kg
IEC Protection Class		IP20	IP66/IP67
Ambient Conditions	Temperature	0 ℃ to +40 ℃	
	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		1.0 kVA	
Mounting*4		Floor, ceiling, wall, tilt	
Compatible Controller		YRC1000micro, YRC1000	

*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.
*4: When wall- or tilt-mounted, the S-axis motion range is limited.
*5: A safe speed must be set based on the results of the risk assessment.

HC10DTFP
(Food Specification)

HC10SDTP
(Dust- and Drip-proof Specification)





Model		MOTOMAN-HC10DTFP (Food Spec.)	MOTOMAN-HC10SDTP (Dust- and Drip-proof Spec.)
Type		YR-1-06VXCP10-F00	YR-1-06VXSCP10-B00
Controlled Axis		6 (vertically articulated)	6 (vertically articulated)
Payload		10 kg	10 kg
Maximum Reach		1379 mm (up to end-flange)	1082 mm (up to end-flange)
Repeatability*1		0.05 mm	0.05 mm
Range of Motion	S -axis (turning)	-210˚– +210˚	-210˚– +210˚
	L -axis (lower arm)	-180˚– +180˚	-180˚– +180˚
	U -axis (upper arm)	-290˚– +290˚	-290˚– +290˚
	R -axis (wrist roll)	-210˚– +210˚	-210˚– +210˚
	B -axis (wrist pitch/yaw)	-180˚– +180˚	-180˚– +180˚
	T -axis (wrist twist)	-210˚– +210˚	-210˚– +210˚
Maximum Speed*2	S -axis (turning)	2.27 rad/s, 130˚/s	2.27 rad/s, 130˚/s
	L -axis (lower arm)	2.27 rad/s, 130˚/s	2.27 rad/s, 130˚/s
	U -axis (upper arm)	3.14 rad/s, 180˚/s	3.14 rad/s, 180˚/s
	R -axis (wrist roll)	3.14 rad/s, 180˚/s	3.14 rad/s, 180˚/s
	B -axis (wrist pitch/yaw)	4.36 rad/s, 250˚/s	4.36 rad/s, 250˚/s
	T -axis (wrist twist)	4.36 rad/s, 250˚/s	4.36 rad/s, 250˚/s
Maximum Speed of the Tip*2	Collaborative operation mode	1000 mm/s *5	1000 mm/s *5
	Normal operation mode	2000 mm/s	2000 mm/s
Allowable Moment	R -axis (wrist roll)	27.4 N·m	27.4 N·m
	B -axis (wrist pitch/yaw)	27.4 N·m	27.4 N·m
	T -axis (wrist twist)	9.8 N·m	9.8 N·m
Allowable Inertia (GD²/4)	R -axis (wrist roll)	0.78 kg·m²	0.78 kg·m²
	B -axis (wrist pitch/yaw)	0.78 kg·m²	0.78 kg·m²
	T -axis (wrist twist)	0.10 kg·m²	0.10 kg·m²
Approx. Mass		58 kg	56 kg
IEC Protection Class		IP66/IP67	IP66/IP67
Ambient Conditions	Temperature	0 ˚C to +40 ˚C	
	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		1.0 kVA	
Mounting*4		Floor, ceiling, wall, tilt	
Compatible Controller		YRC1000micro, YRC1000	

*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.
*4: When wall- or tilt-mounted, the S-axis motion range is limited.
*5: A safe speed must be set based on the results of the risk assessment.

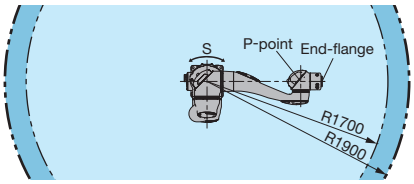
MOTOMAN-HC Series Specifications

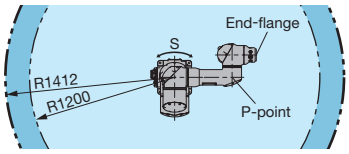
HC20DTP
(Dust- and Drip-proof Specification)

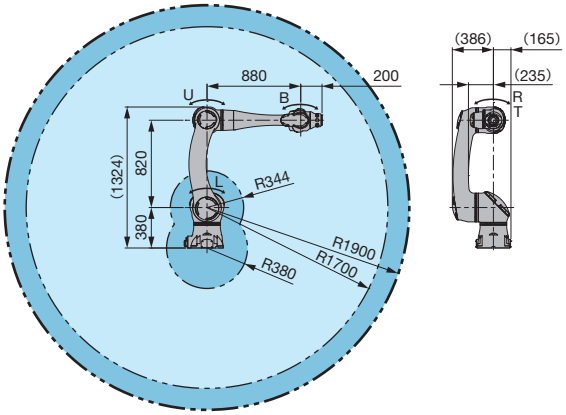
HC20SDTP
(Dust- and Drip-proof Specification)

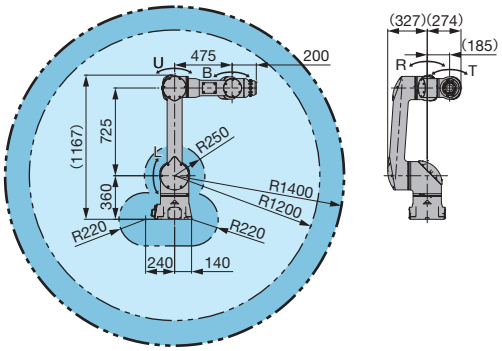
■ Dimensions Units: mm ▭: P-point Maximum Envelope ▭: End-flange Maximum Envelope

Note: Refer to individual dimension diagrams for details including the shape of the flange and dimensions.





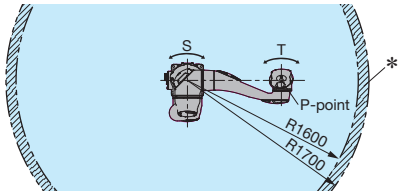


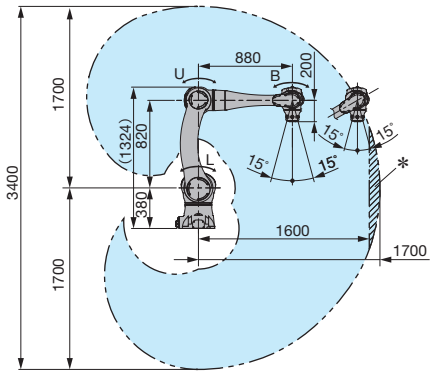


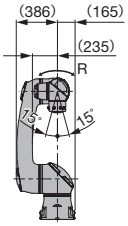
Model		MOTOMAN-HC20DTP (Dust- and Drip-proof Spec.)	MOTOMAN-HC20SDTP (Dust- and Drip-proof Spec.)
Type		YR-1-06VXCP20-B00	YR-1-06VXSCP20-B00
Controlled Axis		6 (vertically articulated)	6 (vertically articulated)
Payload		20 kg	20 kg
Maximum Reach		1900 mm (up to end-flange)	1412 mm (up to end-flange)
Repeatability*1		0.05 mm	0.05 mm
Range of Motion	S -axis (turning)	-210°–+210°	-210°–+210°
	L -axis (lower arm)	-180°–+180°	-180°–+180°
	U -axis (upper arm)	- 67°–+247°	-290°–+290°
	R -axis (wrist roll)	-210°–+210°	-210°–+210°
	B -axis (wrist pitch/yaw)	-180°–+180°	-180°–+180°
	T -axis (wrist twist)	-210°–+210°	-210°–+210°
Maximum Speed*2	S -axis (turning)	1.40 rad/s, 80°/s	1.83 rad/s, 105°/s
	L -axis (lower arm)	1.40 rad/s, 80°/s	1.57 rad/s, 90°/s
	U -axis (upper arm)	2.09 rad/s, 120°/s	2.35 rad/s, 135°/s
	R -axis (wrist roll)	2.27 rad/s, 130°/s	2.27 rad/s, 130°/s
	B -axis (wrist pitch/yaw)	3.14 rad/s, 180°/s	3.14 rad/s, 180°/s
	T -axis (wrist twist)	3.14 rad/s, 180°/s	3.14 rad/s, 180°/s
Maximum Speed of the Tip*2	Collaborative operation mode	1000 mm/s *5	1000 mm/s *5
	Normal operation mode	2000 mm/s	2000 mm/s
Allowable Moment	R -axis (wrist roll)	58.8 N·m	58.8 N·m
	B -axis (wrist pitch/yaw)	58.8 N·m	58.8 N·m
	T -axis (wrist twist)	29.4 N·m	29.4 N·m
Allowable Inertia (GD²/4)	R -axis (wrist roll)	4.0 kg·m²	4.0 kg·m²
	B -axis (wrist pitch/yaw)	4.0 kg·m²	4.0 kg·m²
	T -axis (wrist twist)	2.0 kg·m²	2.0 kg·m²
Approx. Mass		140 kg	97 kg
IEC Protection Class		IP66/IP67	IP66/IP67
Ambient Conditions	Temperature	0 °C to +40 °C	
	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		1.5 kVA	
Mounting*4		Floor, ceiling, wall, tilt	
Compatible Controller		YRC1000micro, YRC1000	

*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.
*4: When wall- or tilt-mounted, the S-axis motion range is limited.
*5: A safe speed must be set based on the results of the risk assessment.

HC30PL
(Dust- and Drip-poof Specification)







*: The shaded area shows the added range of motion when the payload is 27 kg or less.

Model		MOTOMAN-HC30PL (Dust- and Drip-proof Spec.)
Type		YR-1-06VXCP30-B00
Controlled Axis		6 (vertically articulated)
Payload		30 kg
Maximum Reach		1600 mm *5
Repeatability*1		0.05 mm
Range of Motion	S -axis (turning)	-210˚ – +210˚
	L -axis (lower arm)	-154˚ – +180˚
	U -axis (upper arm)	- 67˚ – +247˚
	R -axis (wrist roll)	- 15˚ – + 15˚
	B -axis (wrist pitch/yaw)*2	- 15˚ – + 15˚
	T -axis (wrist twist)	-210˚ – +210˚
Maximum Speed*3	S -axis (turning)	1.40 rad/s, 80˚/s
	L -axis (lower arm)	1.40 rad/s, 80˚/s
	U -axis (upper arm)	2.09 rad/s, 120˚/s
	R -axis (wrist roll)	1.95 rad/s, 112˚/s
	B -axis (wrist pitch/yaw)	2.30 rad/s, 132˚/s
	T -axis (wrist twist)	3.14 rad/s, 180˚/s
Maximum Speed of the Tip*3	Collaborative operation mode	1000 mm/s *6
	Normal operation mode	2000 mm/s
Allowable Inertia (GD²/4)	T -axis (wrist twist)	2.0 kg·m²
Approx. Mass		140 kg
IEC Protection Class		IP66/IP67
Ambient Conditions	Temperature	0 ˚C to +40 ˚C
	Humidity	20% to 80%RH (non-condensing)
	Vibration	4.9 m/s² (0.5 G) or less
	Altitude	1000 m or less
Power Requirements*4		1.5 kVA
Mounting		Floor*7
Compatible Controller		YRC1000micro, YRC1000

*1: Repeatability conforms to ISO 9283.
*2: The range of motion of the B-axis is an angle in the downward vertical direction. In some postures, however, the motion of B-axis may be restricted depending on the angle with respect to the upper arm.
*3: The maximum speed in this table is the available maximum value and will vary depending on the load, posture, or range of motion.
*4: 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.
*5: The maximum reach is 1700 mm for payloads of 27 kg or less.
*6: A safe speed must be set based on the results of the risk assessment.
*7: This manipulator can be mounted on the floor only. Ceiling-, wall-, and tilt-mounting methods are not available.

Hand-carry Type Features

Easy to move and set up

· MOTOMAN-HC10DTP and -HC10DTP (Dust- and Drip-proof Specification) can be used as a hand-carry type when mounted on a movable cart. The hand-carry type can be easily moved and set up. This allows it to be moved to the necessary process and support changing layouts, which will improve the flexibility of production processes.

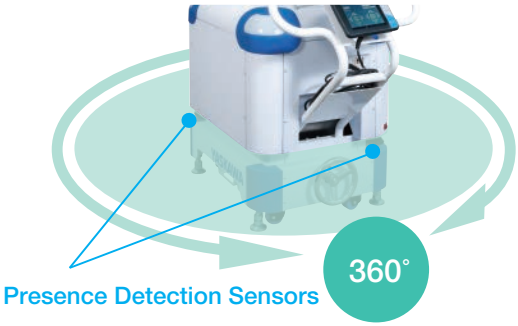
· Since the hand-carry type can be used by simply connecting it to a 100-VAC power supply, it can be used in places other than production sites. (A three-phase, 200-VAC specification is also available.)

Use immediately

· The hand-carry type comes with the equipment necessary for the customer's operating environment. This eliminates the need to arrange peripheral devices, enabling it to be used immediately.

Presence Detection Sensors Standard

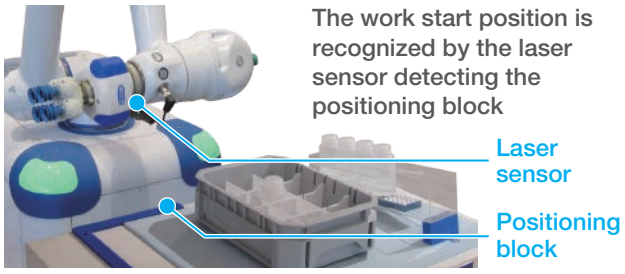
· It comes standard with presence detection sensors for 360-degree area monitoring. This is useful as a safety measure, such as for suppressing robot movement when workers are detected.



Laser Sensor Position Shift Function Standard

· The robot comes standard with a laser sensor installed at its tip. After the movable cart has been moved and set up, the work start position of the robot is accurately positioned so that work can be started immediately.

Note: An optional positioning unit with positioning pins is also available. A specification that does not include a laser sensor position shift function is also available.



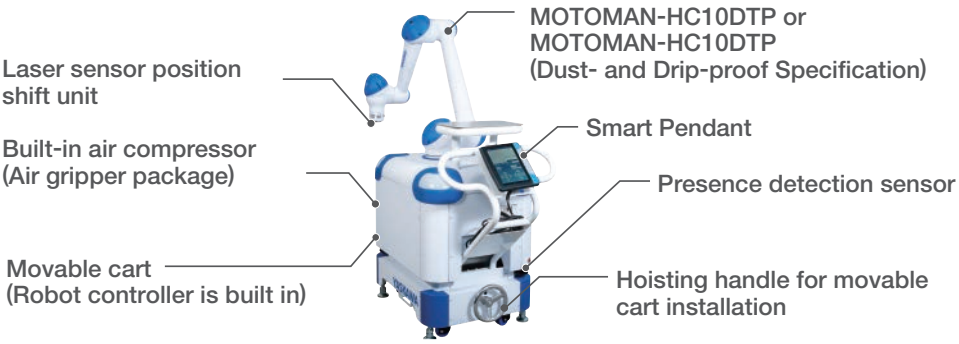
Wires and hoses for end effectors Standard

· Packages are available for each type of end effector. Packages for air grippers and electric grippers have the necessary wires and hoses built-in, making setup easy. The air gripper package includes a built-in air compressor.

Workbench Optional

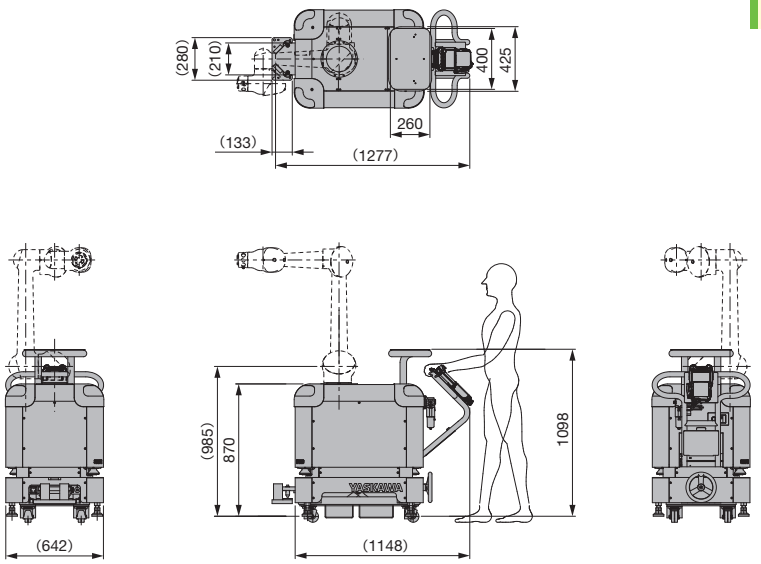
· A table on which workpieces can be temporarily placed can also be added (mountable mass: 20 kg).

Equipment configuration



Dimensions Units: mm

Note: Refer to individual dimension diagrams for details including the shape of the flange and dimensions.



Package Name		Electric Gripper Package		Air Gripper Package	
		100-VAC Specification	200-VAC Specification	100-VAC Specification	200-VAC Specification
Type		YHT-1-06VXCP10-A11*2	YHT-1-06VXCP10-A21*2	YHT-1-06VXCP10-A11*2	YHT-1-06VXCP10-A21*2
Package Contents		Presence detection sensor (for status display and area monitoring) and I/O cable (manipulator - terminal block -YRC 1000micro)			
		-		Compressor (built-in) (including air filter and regulator)	
Application		For moving and installing collaborative robots			
Mountable Manipulator		MOTOMAN-HC10DTP MOTOMAN-HC10DTP (Dust- and Drip-proof Specification)			
Mountable Controller		YRC1000micro			
Mountable Pendant		Smart Pendant *3			
Approx. Mass*1		238 kg	210 kg	238 kg	210 kg
IEC Protection Class		-			
Power Supply		100 VAC, 50 Hz/60 Hz	Three-phase: 200/220 VAC, 50 Hz/60 Hz Single-phase: 200/230 VAC, 50 Hz/60 Hz *4	100 VAC, 50 Hz/60 Hz	Three-phase: 200/220 VAC, 50 Hz/60 Hz Single-phase: 200/230 VAC, 50 Hz/60 Hz *4
Length of Cable for Primary Source		4 m	- *5	4 m	- *5
Ambient Conditions	Temperature	0 °C to +40 °C			
	Humidity	20% to 80%RH (non-condensing)			
	Vibration	4.9 m/s² (0.5 G) or less			
	Altitude	1000 m or less			
Installation Method		Accessory adjuster installation (fastened with anchor bolts)			
Mounting		Floor			

*1: The mass with the controller, pendant, and transformer (only 100-VAC Specification) mounted
The masses of manipulators are shown as follows.
HC10DTP (YR-1-06VXCP10-A00): 48 kg
HC10DTP (Dust- and Drip-proof Specification) (YR-1-06VXCP10-B00): 58 kg

*2: A specification that does not include a laser sensor position shift function is also available (types ending in "-A10" and "-A20").
*3: A programming pendant can also be used. Contact your Yaskawa representative for details.
*4: Selectable from three-phase or single-phase
*5: The primary source cable must be prepared by customers.

Tablet-type Programming Pendant
Smart Pendant

The Smart Pendant is a programming pendant that uses simple operations to teach robots and can be easily used even by people with little to no experience with robots.

Feature 1: Large touchscreen monitor

・The Smart Pendant is equipped with a large, user-friendly 10.1" touchscreen.

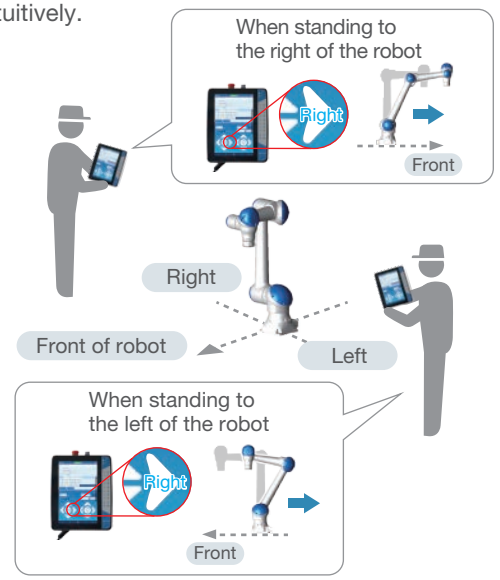
・Operability has been improved as required information can be viewed on an easy-to-understand display.

Job list

Tool setting

Feature 2: Smart mode

・The Smart Pendant features smart mode, which matches the operating direction of the robot to the orientation of the worker holding the Smart Pendant, so the direction of robot movement can be understood intuitively.

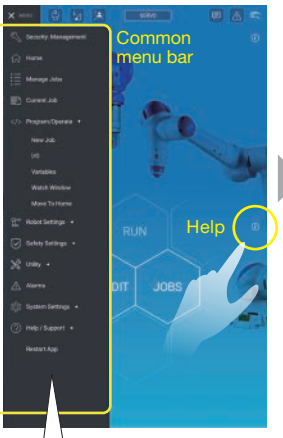


Note: The robot can also be operated in the normal manner (without smart mode).

Feature 3: Guidance and help function

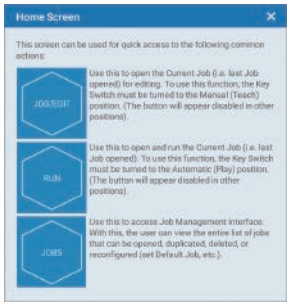
・The Smart Pendant is equipped with a guidance and help function for beginners to improve their understanding of the Smart Pendant operations.

Main menu



The common menu bar is at the left side which can be displayed at any screen.

Help function



Icons are placed throughout the screen to display explanations of functions.

Robot Controller

YRC1000micro / YRC1000

▲YRC1000micro
(Japan, Asia, and North America model)

Items	YRC1000micro		YRC1000
	Japan, Asia, and North America model specifications	Europe model specifications	
Configuration	Open structure IP20*2		Dust proof structure IP54 (area of backside duct fan: IP2X)
Dimensions	425 (W)×315 (D)×180 (H) mm, 24 L	425 (W) ×315 (D) ×250 (H) mm, 33 L	598 (W)×427 (D)×490 (H) mm, 125 L
Approx. Mass	16.5 kg (External axis amplifiers for up to two axes can be built in.)	20 kg (External axis amplifiers for up to two axes can be built in.)	70 kg max. (External axis amplifiers for up to three axes can be built in.)
Cooling System	Direct cooling		Indirect cooling
Ambient Temperature	During operation: 0℃ to +40℃, During storage: -10℃ to +60℃		During operation: 0℃ to +45℃, During storage: -10℃ to +60℃
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	Single-phase 200/230 VAC (+10% to -15%), 50/60 Hz (±2%) Three-phase 200/220 VAC (+10% to -15%), 50/60 Hz (±2%) Optional: Single-phase 100/115 VAC, 50/60 Hz*3		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		Grounding resistance: 100 Ω or less for 200-V class, 10 Ω or less for 400-V class
Digital I/Os*1	Specialized signals: 7 inputs and 1 output General signals: 5 inputs and 7 outputs (7 transistor outputs) Expanded safety general signals: 6 inputs and 5 outputs (5 transistor outputs)		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: 1,500 steps max.		JOB: 200,000 steps, 10,000 instructions CIO ladder: 20,000 steps max.
Expansion Slots	PCI express: 1 slot*4		PCI express: 2 slots
LAN (Connection to Host)	1 (10BASE-T/100BASE-TX)		2 (10BASE-T/100BASE-TX)
Interface	Not possible		RS-232C: 1ch
Drive Units	SERVOPACK for AC servomotors		

*1: I/O points are limited to achieve the functions of the MOTOMAN-HC series. Contact your Yaskawa representative for details.
*2: The YRC1000micro has an open structure (IP20) and must be used in a clean environment (free from electrically-conductive dirt and dust) that meets the standard of pollution degree 2 specified in IEC 60664-1.
*3: MOTOMAN-HC20DTP, -HC30PL are not supported. The external dimensions and mass will differ because the transformer module must be added. Contact your Yaskawa representative for details.
*4: Available expansion slots for the YRC1000micro are limited to one to achieve the functions of the MOTOMAN-HC series.

▶ Programming Pendant

Items	Smart Pendant	Programming Pendant
Dimensions	215 (W) ×69 (D) ×284 (H) mm	152 (W)×49.5 (D)×300 (H) mm
Approx. Mass	1.120 kg	0.730 kg
Display	10.1 WXGA TFT LCD, 1280×800 pixels, LED backlight, touch panel	5.7 VGA TFT LCD, 640×480 pixels, touch panel

3D Vision Package

MotoSight3D

Bin picking, which used to be impossible with robots, can be automated with the high-performance 3D vision package.

Range of detectable workpieces have increased — Works exceptionally well with metal workpieces

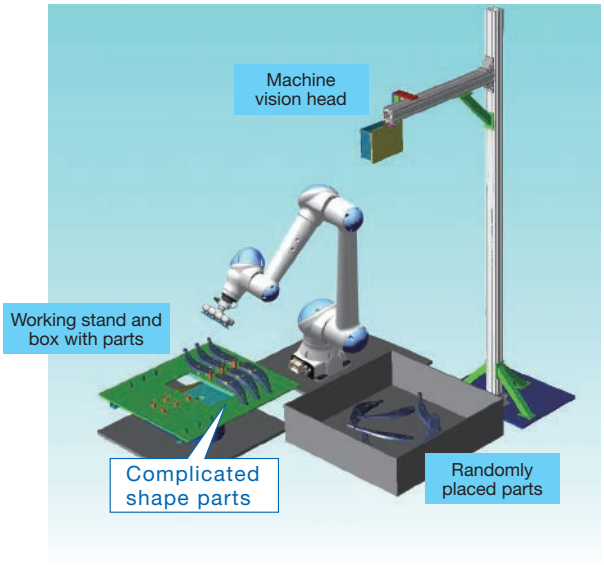
- Greasy parts with high reflection of light can be handled.
- Parts with curved surface or with complicated structure can be handled. ➡ **Optimal for pressed parts for automobile.**
- Target parts size (approx.)
  10×10 mm (when using RV300) to 1,000×1,000 mm (when using RV1100)

Highly accurate detection capability — Reduces the number of processes

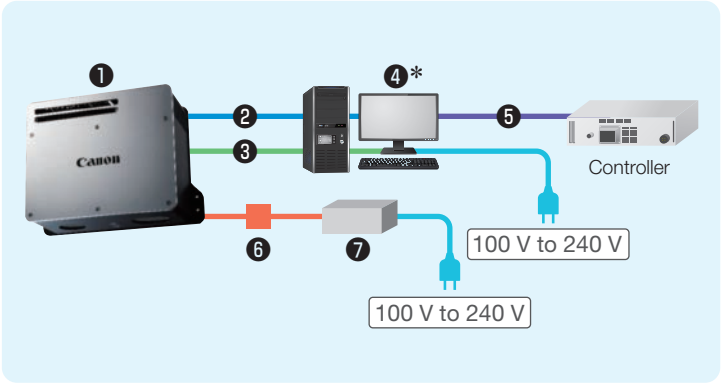
- 3D position posture (6 degree-of-freedom) can be detected with one measurement.
- Temporary placing table or other positioning sensors are not needed.

Very simple setting operation — Reduces setup time

- Workpiece can be registered by inputting the CAD data and imaging the piled parts.



System Configuration



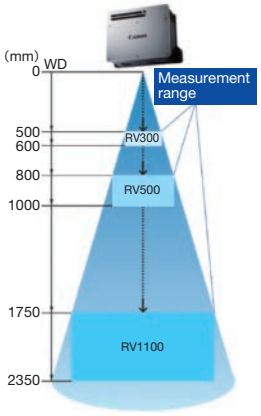
*: Contact your Yaskawa representative for information on how to select a PC when using a general PC or other PCs.

Device Composition Table

NO.	Name	Specification
1	Machine Vision Head	Select from RV1100/ RV500/RV300
2	Communications Cable (PC - sensor)	Cable length: 16 m (optional: 36 m)
3	Vision Cable (PC - sensor)	Cable length: 16 m (optional: 36 m)
4*	PC (optional)	Industrial PC
5	Communications Cable (PC - YRC1000micro)	Cable length: 10 m
6	Power Cable (thin)	Cable length: 5 m
	Power Cable (thick)	Cable length: 10 m
7	Power Source Box and Cable	—

Machine Vision Head Specifications

Items		RV1100	RV500	RV300
Measurement	Measurement distance	1750 mm to 2350 mm	800 mm to 1000 mm	500 mm to 600 mm
	Measurement range	1160 mm × 1160 mm × 600 (H) mm	540 mm × 540 mm × 200 (H) mm	340 mm × 340 mm × 100 (H) mm
	Target minimum workpiece size Note: Necessary projection area	45 × 45 mm	20 × 20 mm	10 × 10 mm
Time	Measurement + recognition time	2.5 s	1.8 s	1.8 s
	Measurement cycle	5.0 s	3.0 s	3.0 s
Recognition	Recognition method	3D CAD matching		
	Repeatability	±0.5 mm	±0.15 mm	±0.1 mm
	Number of types to be registered	200 types		
Function (standard)	Empty pallet judgment function	Function to judge whether the pallet is empty or not		
	Pallet measurement function	Function to measure the position of thrown-in pallet		
	Interference check function	Function to detect interference between the hand and the workpiece or between the hand and the pallet		
	Calibration function	Function to perform the calibration of the robot and the machine vision head		
	Exposure time automatic adjustment function	Function that eliminates gloss of industry components/parts, and halation due to oil adhesion		
Main Unit	Dimensions (Protrusions are not included)	252 (W) × 206 (D) × 124 (H) mm		
	Approx. Mass	6.4 kg		



Measurement range example of each product

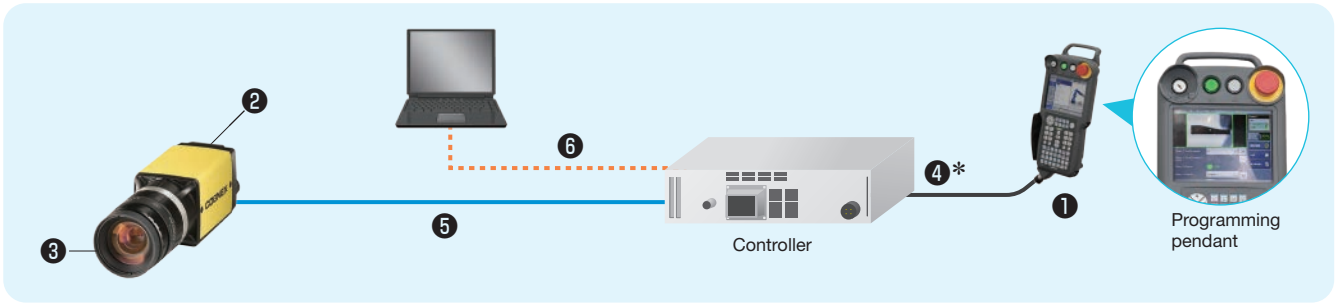
2D Vision Package

MotoSight2D

MotoSight2D is a vision package that enables the operation of vision systems using a programming pendant with YASKAWA's own software.

Note: The Smart Pendant is not compatible with this function.

System Configuration



*: An external box must be installed for the controller.

Device Composition Table

NO.	Name	Specification
❶	MotoSight2D (PP application + MotoPlus + macro job)	Settings installed prior to shipping
❷	2D Vision Camera (built-in image processing device)	Select a standard, high-spec, or ultra-high-spec model.
❸	Lens	Focal distance: 4 / 6 / 8 / 12 / 16 / 25 / 35 / 50 / 75 mm
❹	External Box for YRC1000micro for MotoSight2D	With built-in 24-V power supply and PoE hub, wiring of communications cable (Ethernet)
❺	Camera Communications Cable	Connect the camera with the controller Cable length: 5 m (flexible/mobile cable) *Total cable length up to 35 m with an optional extension cable.
❻	Cable for PC Connection	Connect the controller with the PC Cable length: 5 m *Use PC only during maintenance or detailed settings for camera jobs.

2D Vision Camera Lineup

Model		Application	Resolution	CPU Speed Ratio*	Image Processing Function
Standard Model MS8101	In-Sight 8101M-363-40 or equivalent	Position correction (for automobile parts, electronic parts, etc.)	1280 × 1024 pixels	× 1.0	COGNEX Full tool set
High-spec Model MS8401	In-Sight 8401M-363-50 or equivalent	High-speed processing, including conveyor synchronization (for high-speed picking of food, etc.)	1280 × 1024 pixels	× 4.0	COGNEX Full tool set
Ultra-high-spec Model MS8402	In-Sight 8402M-363-50 or equivalent	High precision and wide field of view (for transfer of automobile glass parts, etc.)	1600 × 1200 pixels	× 4.0	COGNEX Full tool set

*: Refers to the ratio where the CPU speed of the standard model is "1.0".

6-axis Force Sensing Control Function

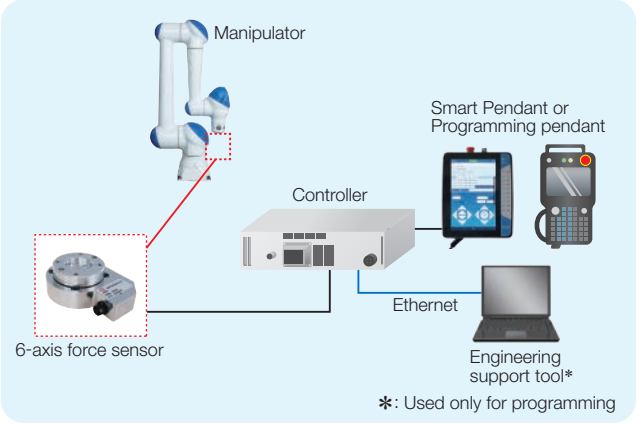
MotoFit

Changes in force that robot is subjected to are detected by 6-axis force sensor and fed back to robot movements.

Force Sensor Specifications

Force Sensor Type		250 N/20 N·m	500 N/100 N·m
Rated Load	Fx, Fy, Fz	± 250 N	± 500 N
	Mx, My	± 20 N·m	± 100 N·m
	Mz	± 20 N·m	± 100 N·m
Linearity		± 2%FS	± 2%FS
Cross-axis Sensitivity		± 2%FS	± 2%FS
Temperature Characteristics		± 0.5%FS/℃	± 0.7%FS/℃
Dimensions		80-mm dia. × 37 mm	100-mm dia. × 40 mm
Mass		0.5 kg	1.9 kg
Protection Rating		IP67	IP67
Operating Temperature		0 ℃ to +45 ℃	
Storage Temperature		-10 ℃ to +60 ℃	
Humidity		20% to 80%RH (non-condensing)	
HC Series Compatible Models		10-kg payload models	20-kg payload models

System Configuration



*: Used only for programming

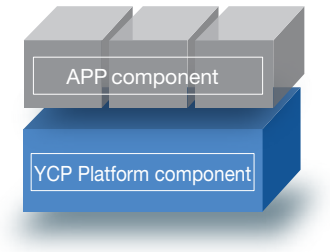
YASKAWA Cockpit

YASKAWA Cockpit, a core component of the i³-Mechatronics concept, is an original software that performs digital management.

i³-Mechatronics
New value with "i cube", digital data solution

Concept of i³-Mechatronics

The word "mechatronics" was first coined by an engineer at Yaskawa Electric in 1969. This word consists of the term "mechanism", which is short for mechanical engineering, and "electronics", which encompasses the idea of electrical engineering. Our passion for automation is built in to this word.
Yaskawa added three "i"s (integrated, intelligent, and innovative) to the word, "mechatronics" to help identify solutions to business challenges right at the customers' production sites by incorporating the use of data in mechatronics products.



YASKAWA Cockpit

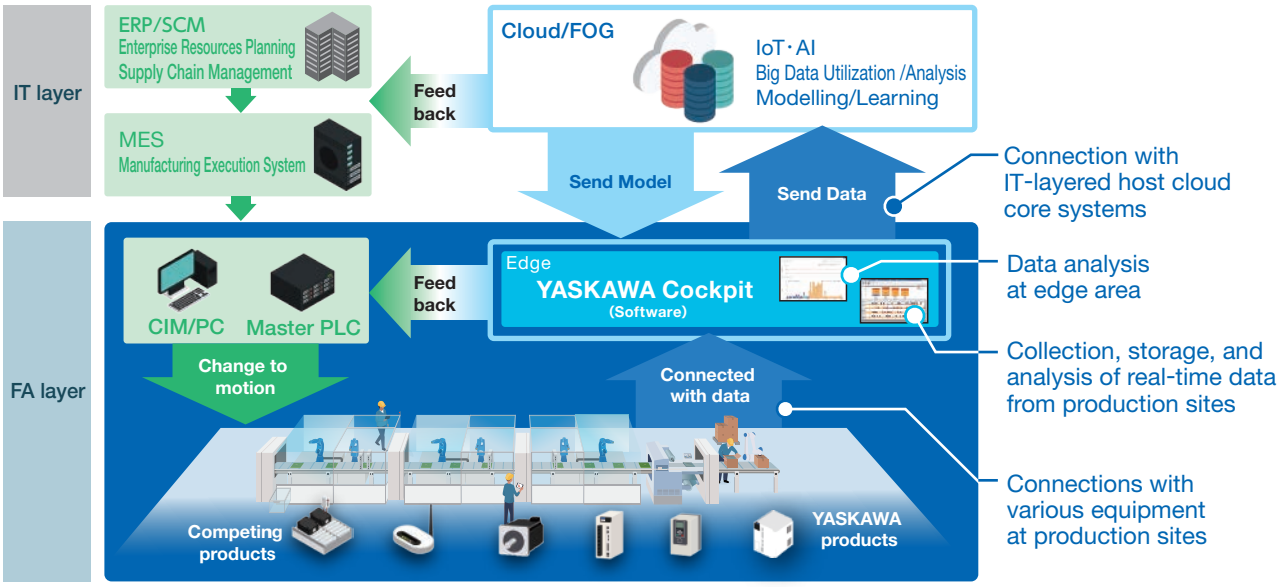
· Collect, store, and analyze real-time data from production sites
· Establish connections with equipment other than YASKAWA products
· Freely customize and add optional functions depending on production sites

Item	Function
APP component	Application software to add functions to YASKAWA Cockpit. Functions can be selected from Yaskawa's lineup or developed and added by customers. APPs will be developed sequentially.
YCP* Platform component	Basic software for YASKAWA Cockpit

*: Abbreviation of YASKAWA Cockpit
Note: Functions of YASKAWA Cockpit include those that are under development. Contact your Yaskawa representative for more details.

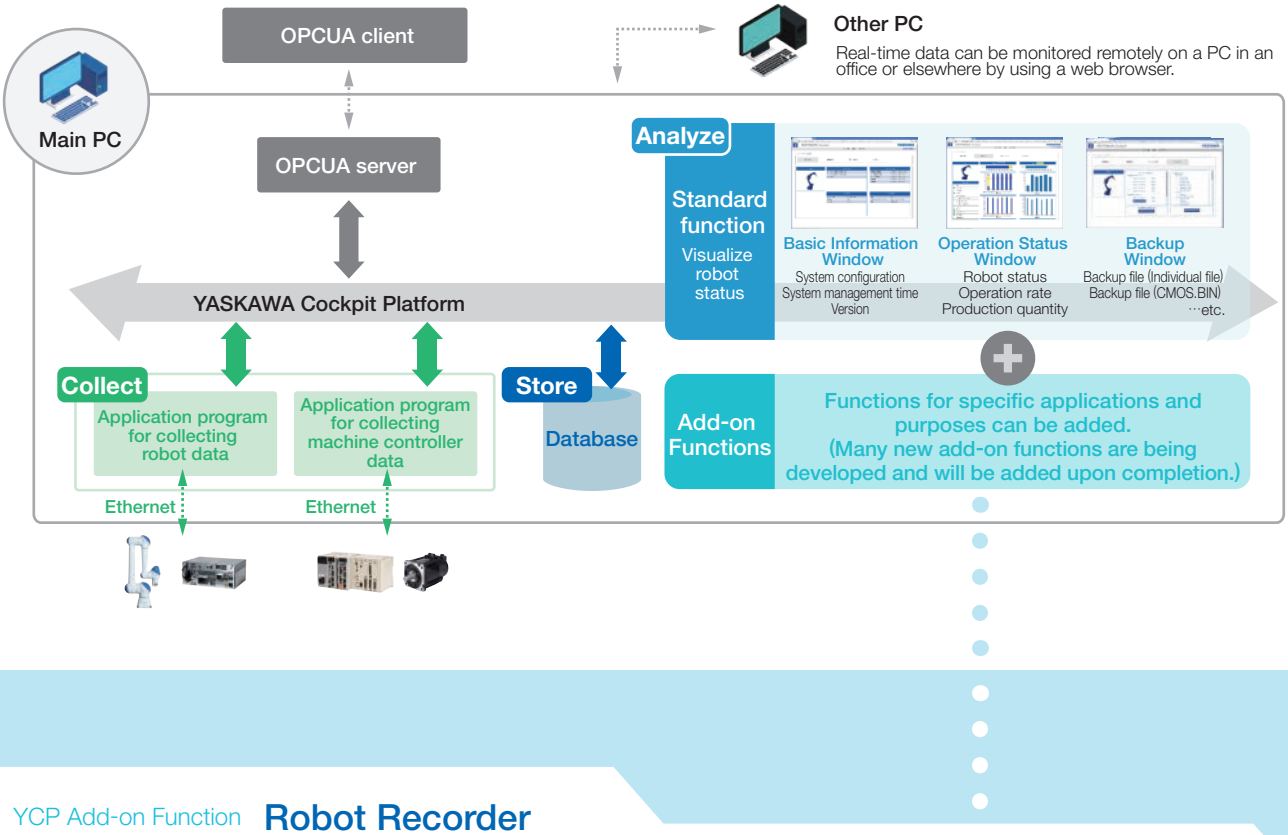
Complete automation of production sites, integrate and analyze equipment data

Data from production sites that are automated by integrating components and processes is collected and stored in real time using YASKAWA Cockpit. This data is used for AI learning and big data analysis in cooperation with host systems. Production operations can be transformed by learning models and analysis results that are fed back to production sites.



System configuration and basic functions of YASKAWA Cockpit

The YCP Platform collects, stores, and analyzes data collected in real time from robot and machine controllers at production sites. The system is equipped with a standard function to visualize the status of robots and functions tailored to robot applications can be added. The YCP screen display can be viewed on the main PC screen and other PC screens.



YCP Add-on Function

Robot Recorder

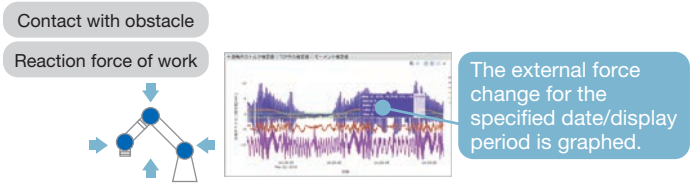
Visualize the data from torque sensors built into the collaborative robot in detail

YASKAWA Cockpit + Collaborative robot torque sensors

Each axis of the collaborative robot is equipped with a torque sensor. The value of the load the torque sensor receives from outside the robot can be checked on the programming pendant. However, the displayed information is limited in some ways. For example, the values cannot be viewed as a numeric change.
This add-on function allows the values of the torque sensors to be monitored in detail, and it is useful for such purposes as estimating the causes of problems and failure prediction monitoring.

● External force monitor

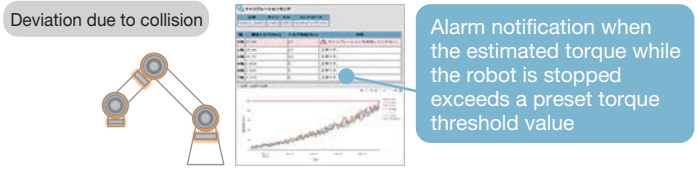
The change in the external force detected by the torque sensors on the robot is displayed in a graph.



In addition to external force, the line number of the executed job, alarms, and other information are also displayed, so the information can also be used to estimate the causes of problems.

● Sensor status monitor

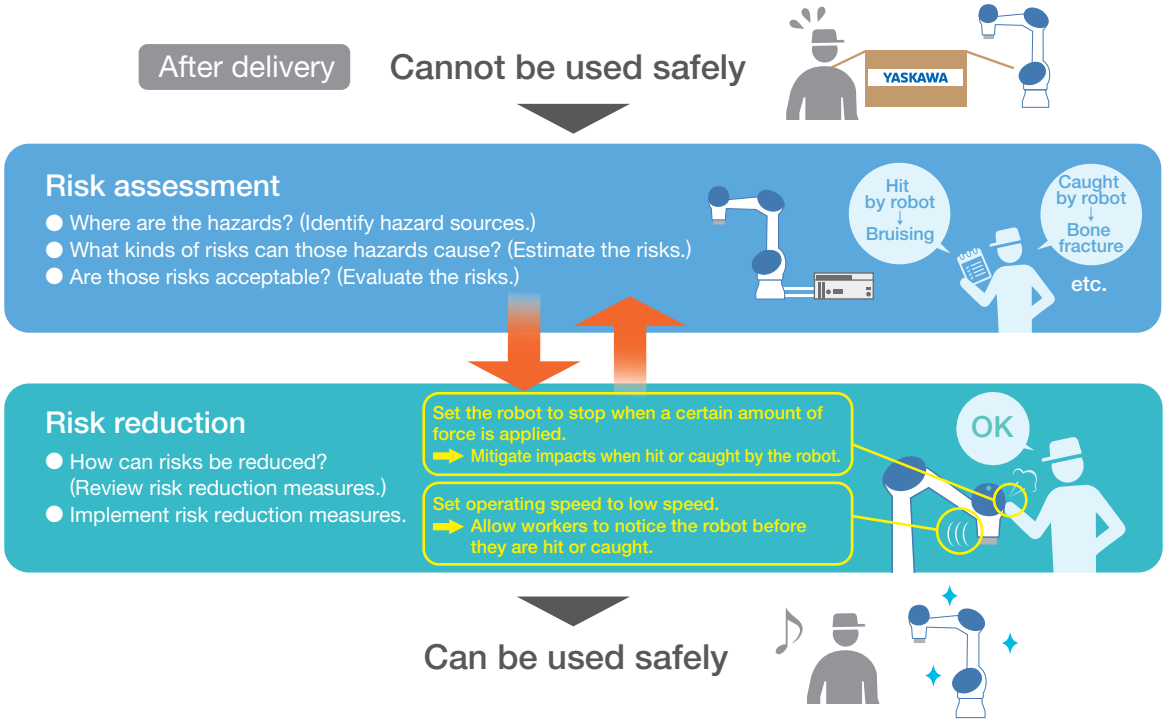
Deviation in the home position of the torque sensor for each axis is monitored, and alarm notification is provided to perform calibration when a threshold value is reached.



MOTOMAN-HC Series

What is a risk assessment?

The HC series collaborative robot cannot be used safely as delivered without a safety fence. The customer (including the system integrator) must conduct risk assessments and implement risk reduction measures on their own, and then check if potential hazards have been eliminated.



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