

Kawasaki Robot

Clean Robot

Japan & Asia



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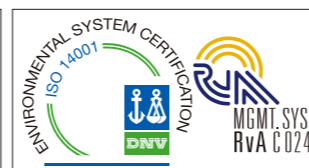
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*Materials and specifications are subject to change without notice.

Simple  friendly
Kawasaki Robot

 **CAUTIONS TO BE TAKEN TO ENSURE SAFETY**

- For those persons involved with the operation / service of your system, including Kawasaki Robot, they must strictly observe all safety regulations at all times. They should carefully read the Manuals and other related safety documents.
- Products described in this catalogue are general industrial robots. Therefore, if a customer wishes to use the Robot for special purposes, which might endanger operators or if the Robot has any problems, please contact us. We will be pleased to help you.
- Be careful as Photographs illustrated in this catalogue are frequently taken after removing safety fences and other safety devices stipulated in the safety regulations from the Robot operation system.



ISO certified in Akashi Works.

Kawasaki, the world's leading manufacturer of clean robots, offers optimum solutions for the future of your business.

Kawasaki Heavy Industries made Japan's first industrial robot in 1969, and has led the robot industry ever since. In 1995 Kawasaki began to manufacture clean robots, starting with the development of clean robots used exclusively for semiconductor and LCD manufacturing process equipment. Today our innovative lineup features a number of groundbreaking handling systems.

Kawasaki holds more than 100 patents in the field of robotics and automation, and has shipped more than 100,000 robots worldwide. The company has established global procurement, production, and after-sales service systems capable of not only supplying high quality clean robots and peripheral equipment, but also providing customers with the engineering they need for the automation systems used in the clean industry.

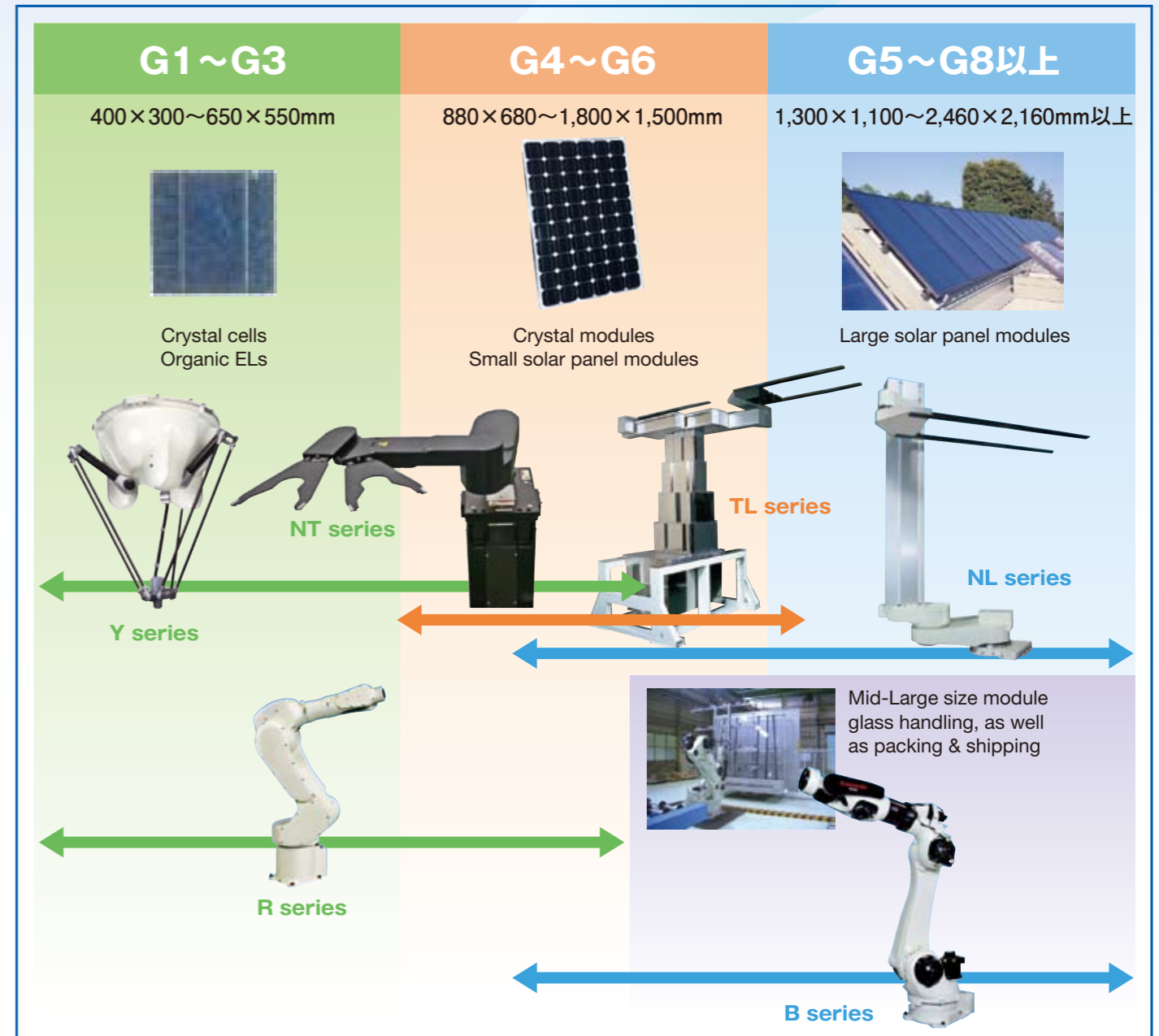
As a world leader in the manufacture of clean handling systems, Kawasaki can deliver optimum solutions adapted to the future needs of your business, including low-particle environments needed for fine technology and next generation 450 mm wafers.

Kawasaki Clean Robots – Full Lineup

[Lineup for semiconductor manufacturing]



[Lineup for FPD and solar-panel manufacturing]



Parallel link robot
Y series

Horizontal articulated clean robot
NT series

Vertical articulated robot
B series

Simple and friendly
Kawasaki Robot

Horizontal Articulated Arm

NT series



A first in the industry!

“Robot for the Common Platform”

Single robot that can be used with up to 4 FOUPs (option for 5 FOUPs).

Features

- Can be used with up to 4 FOUPs with no track (option for up to 5 FOUPs). Single robot that can access all the EFEMs, and can be used with between 2 to 4 FOUPs without a track. Adding the special option enables the robot to be used with 5 FOUPs.
- High throughput
The throughput of the standard robot is 280 WPH (with aligner) and 400 WPH (without aligner). The optional special gripper increases the throughput to 700 WPH.
- Kawasaki’s original mechanism ensures long-term compliance with ISO Class 1 standards.
- Smooth operation
The specially designed drive system enables the robot to move incredibly smoothly and deliver high precision.
- 450 mm wafer compatible
The same robot currently being used for 300 mm wafers can also be used for 450 mm wafers.
- In addition to handling wafers, the NT series robots can also be used for solar panels, LCDs, and organic EL panels.
- Optional self-diagnosis and full-automatic programming functions are available.
- Compliant with SEMI-F47 standard. Instantaneous response to problems such as a drop in voltage, and automatic resumption of operation when voltage is restored.
- Compliant with SEMI-S2 standard. Sufficient consideration given to the environment and personal safety.
- Equipped with a collision detection function to lessen the damage caused by collisions.

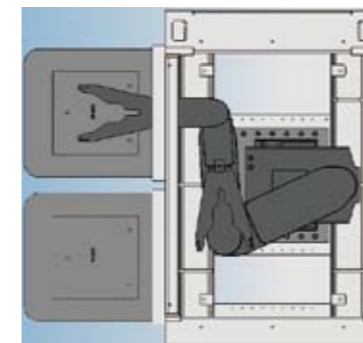
Specifications

Model	NT410	NT420	NT510	NT520	NT620
Structure	Horizontal articulated type				
Degree of freedom	4 axes	5 axes	4 axes	5 axes	5 axes
Motion range	θ1axis (rotation JT2)	340 °	340 °	340 °	340 °
	Z axis (up-down JT3)	400 mm	400 mm	470 mm	470 mm
	θ2 axis (rotation JT4)	340 °	340 °	340 °	340 °
	H1 axis (rotation JT6)	340 ° (380 °)*2	340 ° (380 °)*2	340 ° (380 °)*2	340 ° (380 °)*2
	H2 axis (rotation JT7)	—	340 °	—	380 °
Maximum reach	1,230 mm	1,280 mm	1,230 mm	1,280 mm	1,250.7 mm
Repeatability	±0.1 mm (Wafer Center)				
Cleanliness*1	ISO Class 1				

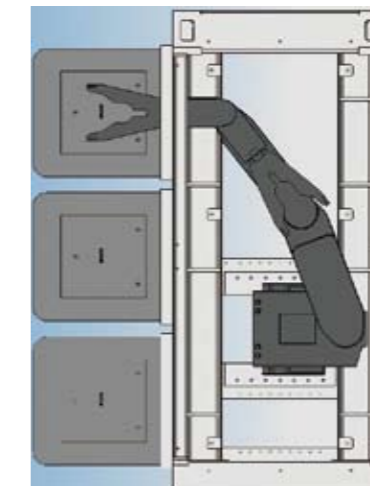
*1: Measured in our clean booth *2: As option

Layout example

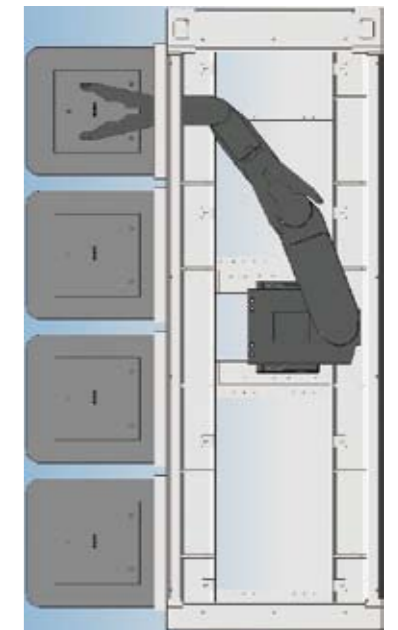
The NT-series robots are able to access all the EFEMs, and can be used with between 2 to 4 FOUPs without a track. (Single robot can access all the EFEMs with 2 to 4 FOUPs without a track.)



2 FOUP



3 FOUP



4 FOUP



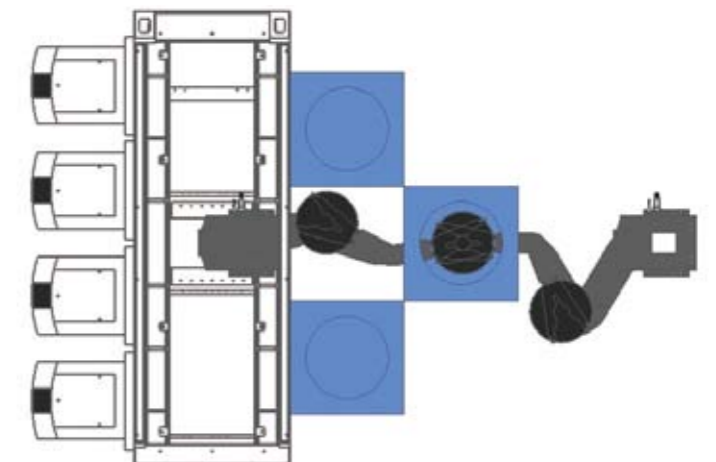
NT410 / NT510

NT420 / NT520

NT620

Application example

The wide motion range of the NT series makes it possible to access the main chamber without the need for a shuttle or an extra robot.



Horizontal Articulated Arm

NS series



Features

- The long term field operation of many NS series robots prove they have the reliability and high level of performance needed for wafer handling.
- Compliant with SEMI-F47 standard. Instantaneous response to problems such as a drop in voltage, and automatic resumption of operation when voltage is restored.
- Compliant with SEMI-S2 standard. Sufficient consideration given to the environment and personal safety.
- Equipped with a collision detection function to lessen the damage caused by collisions.
- The flip enables the NS411 to handle wafers at both horizontal and vertical angles.
- The NS511 is a ceiling mounted type designed for use in a wet (chemical liquid) environment. It features a wide motion range with a reach of over 900 mm.
- A track may also be used.

NS410/NS510

Single arm

NS411

Single arm with FLIP

NS420

Double arm

NS511

Drip-proof specification

with FLIP



Specifications

Model	NS410	NS411	NS420	NS510	NS511	
Structure	Horizontal articulated type					
Degree of freedom	3 axes	4 axes	4 axes	3 axes	4 axes	
Motion range	Y axis (travel: JT1)	2 FOUP:660 mm/3 FOUP:1,070 mm/4 FOUP:1,670 mm		—	—	
	θ axis (rotation JT2)	380 °	325 °	325 °	360 °	473 °
	Z axis (up-down JT3)	380 mm	380 mm	380mm	440 mm	440 mm
	X axis (up-down JT4)	710 mm	798 mm	X1 : 646.8mm / X2 : 646.8mm	598 mm	816.5 mm
	F axis (rotation JT5)	—	156°	—	—	200°
Repeatability	±0.1 mm (wafer center)					
Cleanliness*1	ISO Class 2			ISO Class 5		

*1: Measured in our clean booth

Horizontal Articulated Arm

NX series



NX510

2 links, single arm

NX520

2 links, double arm

Features

- Can be used with 2 or 3 FOUPs without a track.*1
- Realizes a minimum sweep diameter of 508 mm, leaving plenty of space to make the necessary replacements for conventional track type robots.
- Unique structure meets the standards for ISO Class 1.
- Arm structure exhibits high rigidity, and can freely access wafer stages with a narrow pitch as well as FOUPs in arbitrary positions.
- Realizes high throughput (up to 200 WPH, 2-wrist, continuous operation from the FOUP to the Aligner to the Stage).
- High linearity and incredibly precise positioning.
- Compliant with SEMI-F47 standard. Instantaneous response to problems such as a drop in voltage, and automatic resumption of operation when voltage is restored.
- Compliant with SEMI-S2 standard. Sufficient consideration given to the environment and personal safety.
- Equipped with a collision detection function to lessen the damage caused by collisions.

*1 : There are some conditions for 3FOUP.



NX520

Specifications

Model	NX510	NX520	
Structure	Horizontal articulated type		
Degree of Freedom	4 axes	5 axes	
Link	2	2	
Motion Range	θ axis (rotation JT2)	330 °	330 °
	Z axis (up-down JT3)	440 mm	440 mm
	X axis (In/Out JT4)	832 mm	832 mm
	W Axis (Lower) (rotation JT6)	336 °	336 °
	W Axis (Upper) (rotation JT7)	—	336 °
Repeatability	±0.1 mm (Wafer Center)		
Cleanliness*2	ISO Class 1		

*2: Measured in our clean booth

Horizontal Articulated Arm

TT series



Features

- All the features of the NT series have been carried over to the TT series, including the ability to access up to 4 FOUPs.
- Kawasaki's unique and highly rigid telescopic mechanism delivers high-speed handling in high and low positions.
- Compliant with SEMI-F47 standard. Instantaneous response to problems such as a drop in voltage, and automatic resumption of operation when voltage is restored.
- Compliant with SEMI-S2 standard. Sufficient consideration given to the environment and personal safety.

Specifications

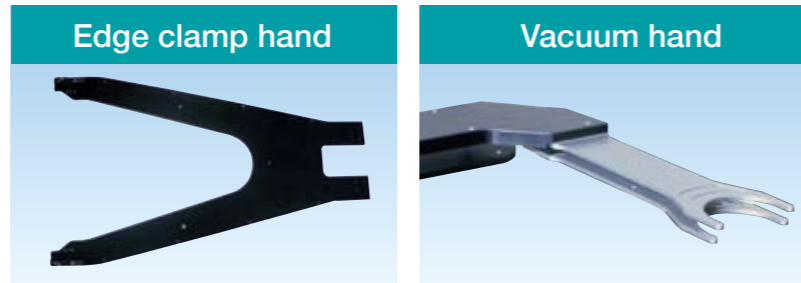
Model	TT220	
Structure	Telescopic horizontal articulated type	
Degree of freedom	5 axes	
Motion range	θ1 axis (rotation JT2)	340 °
	Z axis (up-down JT3)	740 mm
	θ2 axis (rotation JT4)	340 °
	H1 axis (rotation JT6)	340 ° (380 °)*2
	H2 axis (rotation JT7)	340 ° (380 °)*2
Maximum reach	1,230 mm	
Repeatability	±0.1 mm (Wafer Center)	
Cleanliness*1	ISO class 1	

*1: Measured in our clean booth *2: As option



Grippers

Kawasaki can supply grippers for handling wafers organic electroluminescent panels and 450mm wafers, as well as other special types of grippers. In addition, Kawasaki can assemble user-designed grippers to be equipped with the robot.



Controller

Features

- Compact packaging. Meets all the SEMI-F47 standards.
- Ethernet communication port installed as standard enables a high level of communication.
- Allows for flexible processing of various kinds of software.
- Allows for the independent operation of the two arms as well as multi-axis controls.
- Uniform servo amplifiers for all the axes.
- Compliant with SEMI-S2 safety standards.

Specifications

Controller model		D60	D61
Dimensions		W320 × H300 × D130 mm	W445 × H429 × D130 mm
Degree of freedom		maximum 7 axes	maximum 12 axes
Drive system		Full digital servo system	
Type of Control	Teach mode	Joint (operating) mode / Base coordinate system	
	Repeat mode	Joint interpolation, Linear interpolation, Offset linear interpolation	
Teaching method		Manual, semi-automatic, full-automatic teaching	
External signals		External emergency stop, safety fence, external stop	
Communi-cations*1	Hardware	RS232C × 1	RS232C × 2
	Software	Ethernet K-Utility (Kawasaki's original communication command for clean robots)	
Power requirement	Voltage	Single phase, AC208 V ±10%, 50/60 Hz	
	Standard	SEMI-F47	
Ambient temperature		for operation: 5 ~ 30 °C	
Options	Teaching device	Teach pendant, operation box.	
	Input signal*1	Maximum 16 channels	Maximum 96 channels
	Output signal*1	Maximum 8 channels	Maximum 80 channels
Matching robot arm		NT, TT, NS, NX and NV series	

*1 : Please consult with us for customized communication commands.



D60 controller

D61 controller

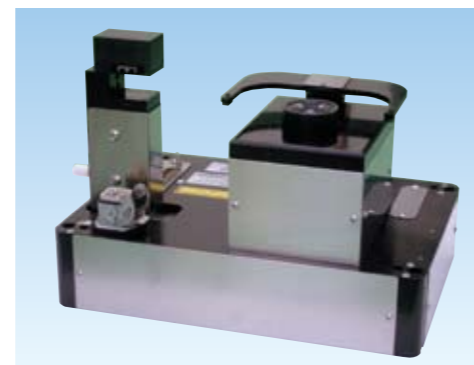


Aligner NS004

Features

- Quick speed alignment. (only 2.5 seconds)
Can be set in any number of angles.
- Robot controller can also be used to control the aligner.
- Optional lift pin setup is available for on-center pickup.
- Automatic switchover function between 200 mm and 300 mm. (option)
- Quartz wafer alignment is also possible.
- Delivers an alignment accuracy of ± 0.1 degrees. Fine mode can also be selected.

※NS004 can be used for 450mm wafers.



Horizontal articulated type

NV series



A horizontal articulated robot arm ideal for handling wafers within a vacuum environment.

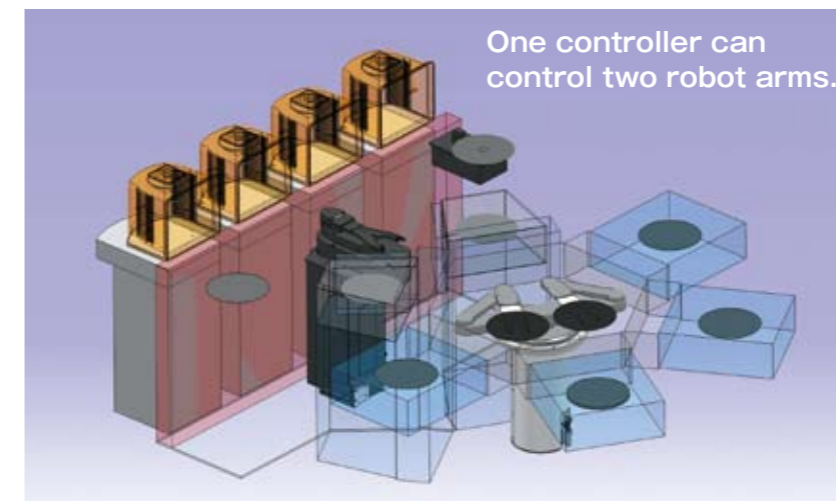
Features

- Delivers high speed handling of wafers and organic electroluminescent panels with minimum vibration.
- Realizes a compact and light weight design.
- Can be used with the D60, the D61 controller for the NS, NX and NT series robots.
- A single D61 controller can be used to control both an atmospheric environment robot and a vacuum environment robot.



NV111

NV120



One controller can control two robot arms.

Specifications

Model		NV111	NV120
Structure		Horizontal articulated type	
Degree of freedom		3 axes	4 axes
Motion range	θ axis (rotation JT2)	360°	540°
	Z axis (up-down JT3)	30mm	90mm
	X axis (in/out JT4)	-686mm ~ +686mm	1080mm
Repeatability		±0.1mm (wafer center)	
Max. ultimate pressure		1.33×10 ⁻⁴ Pa	

Parallel link type

Y series

Solar panel A high-speed pick and place robot that offers a wide range of applications for solar panel assembly.

YF03N



Features

- The 3 kg payload capacity of this robot enables it to pick and place solar panels at very high speeds.
- The robot's large motion range (1,300 mm diameter and 500 mm Z-stroke) expands its range of applications within solar-panel assembly lines.
- High repeatability ensures high productivity and accurate picking and placing.
 - positional repeatability : ±0.1 mm
 - angular repeatability : ±0.1°
- Highly rigid arm that minimizes vibration.
- The shaft-less design prevents mechanical trouble and makes maintenance easy.
- Use of a vision sensor enables high-speed, safe handling at high speeds.

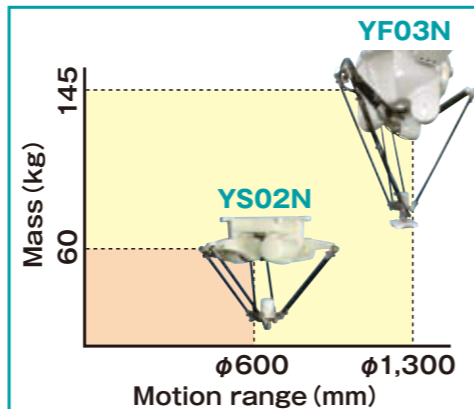
YS02N



Features

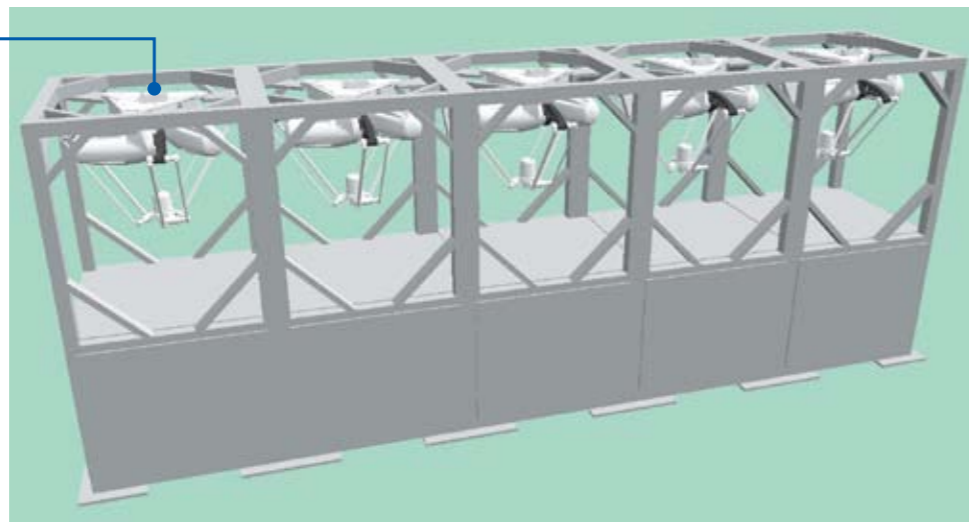
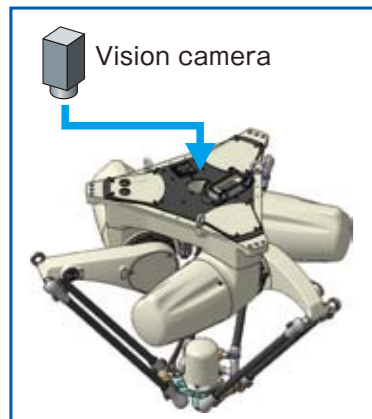
- The compact size and smaller footprint enable high-density layout of multiple robots.
- With a significantly lighter body weight of 60 kg, this robot can also be installed on a cantilever mount.
- Despite the compact design, this robot boasts a motion range of 600 mm in diameter.
- Speeds of up to 200 cycles per minute (for a 0.5 kg payload operation with a vertical stroke of 25 mm and horizontal stroke of 305 mm).
- This robot is designed so that the main parts can be exchanged in units, greatly facilitating the task of exchanging the parts and minimizing maintenance downtime.
- The robot's top mounting base is provided with a hollow space at the center for installing a camera. By installing a camera that is compatible with the Vision system, images of the work area can be easily captured.

Size Comparison



High-density layout example

- Delivers a high-density layout that was not possible with the YF03N.



Specifications

Model		YS02N	YF03N
Max. payload		2 kg	3 kg
Degree of freedom	Standard	4 axes	4 axes
	Option	—	5 axes
Motion range		φ600×H200 mm	φ1,300×H500 mm
Cycle time (payload) *1		0.30 sec. (0.5 kg) 0.36 sec. (2 kg)	0.27 sec. (1 kg) 0.45 sec. (3 kg)
Positional repeatability		± 0.04 mm	± 0.1 mm
Angular repeatability		± 0.1°	± 0.1°
IP rating		IP 65	IP 65
Mass		60 kg	145 kg
Controller	Type	E91 / E94 / E97	
	Teach pendant	TFT color LCD with touch panel	
Interface		USB, Ethernet	

*1: Time for one cycle of (25mm up, 305mm horizontal and 25mm down).

Option

The Bernuilli gripper (non-contact type) is ideal for wafer handling.



Vertical articulated arm

R series

Solar panel **LCD panel** **Organic EL**

Features

- A compact 6-axis high-performance robot.
- Ideal for handling in clean rooms.
- The 3-freedom movement at the wrist allows for operation along a 3-dimensional curve trajectory. The position of the wafer and glass substrate can be freely changed from a horizontal to a vertical or oblique position.

Specifications

Model		RC05L
Max. payload		5 kg
Degree of freedom		6 axes
Motion range	Arm rotation (JT1)	±165°
	Arm out-in (JT2)	+135 ~ -80°
	Arm down-up (JT3)	+118 ~ -172°
	Wrist swivel (JT4)	±360°
	Wrist bend (JT5)	±145°
	Wrist twist (JT6)	±360°
Repeatability		±0.03 mm
Mass		37 kg
Cleanliness*1		ISO Class 5

*1: Measured in our clean booth



System application example

- Kawasaki boasts a wide product lineup that ranges from robots to ancillary systems.

