

! 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.



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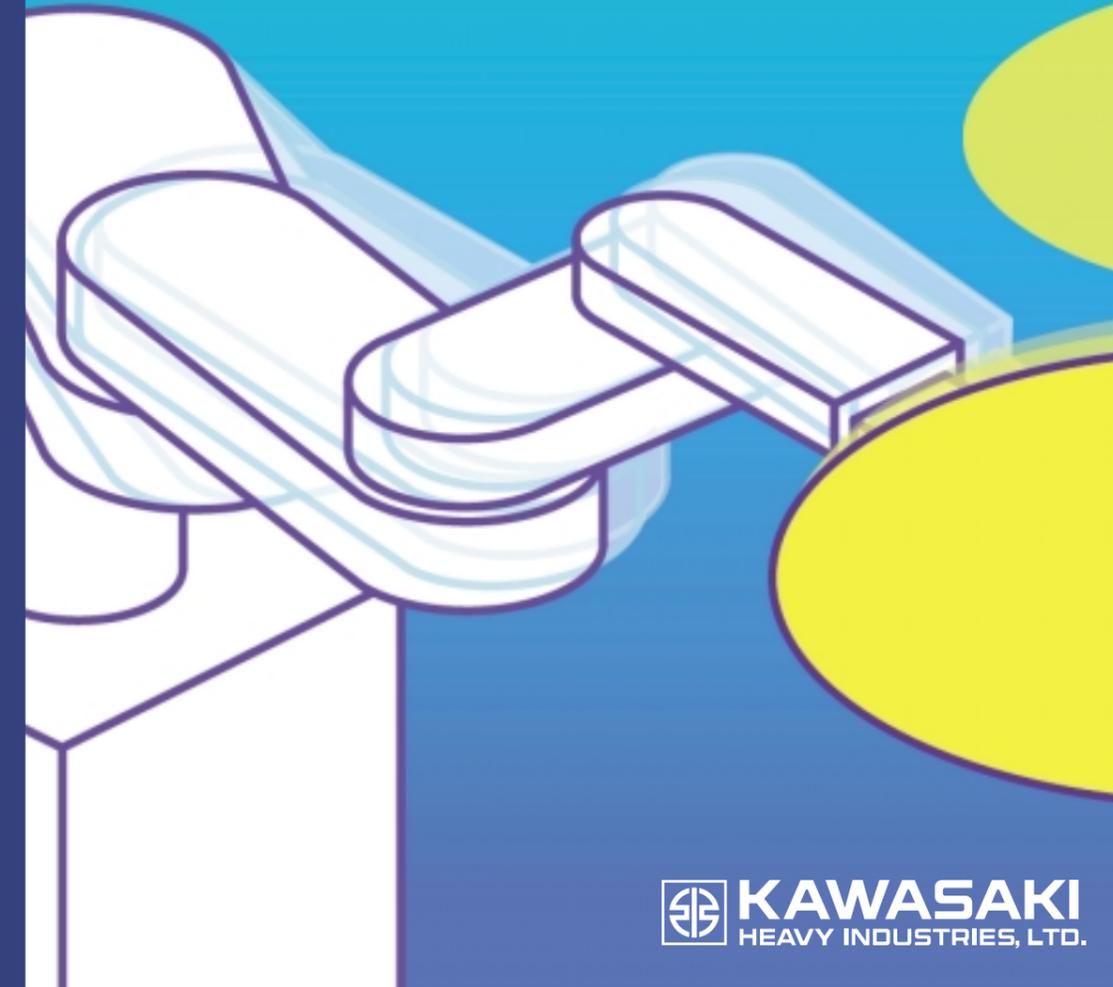
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Kawasaki Robot

Simple and friendly

Clean Robot

Japan & Asia

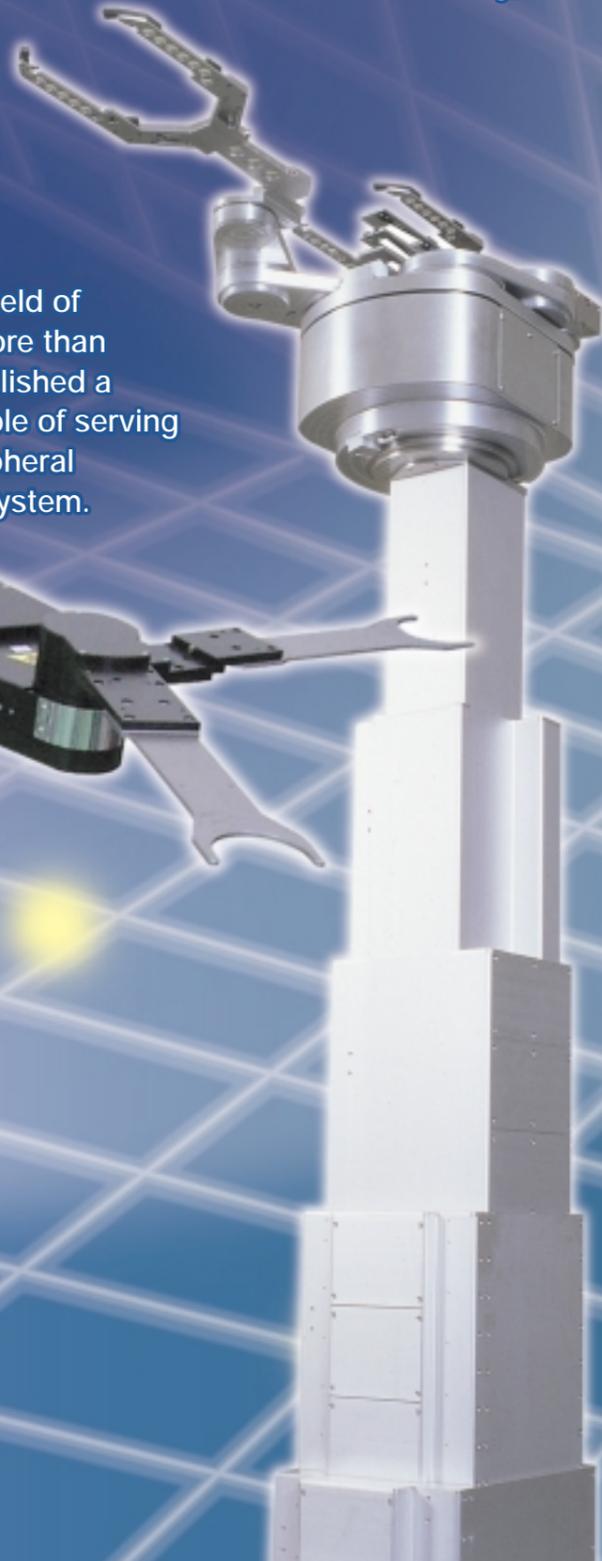


Kawasaki, a pioneer manufacturer of industrial robots has now opened the door to the future for the world of clean robots.

Kawasaki Heavy Industries made the Japan's first play back robot in 1969, embarking on the road to establishing itself as a pioneer in the field of robot manufacturing.

Since that time, Kawasaki has always remained a child of revolution in the industry, and in 1995 began the development of clean robots. Clean robot manufacturing at Kawasaki started out with the development of clean robots used exclusively for semiconductor and liquid crystal manufacturing process equipment. The innovative lineup comprised a new and radical carrier system.

Kawasaki holds more than 100 patents in the field of automation including robots and has delivered more than 60,000 robots worldwide. The company has established a global procurement and production system capable of serving the broad needs of the clean industries from peripheral equipment to the engineering of the automation system.



Consequently, Kawasaki is able to realize:

1 High throughput.

- High speed operation is realized by adopting an operation conveying system of high rigidity based on a gear train.
- Smooth operation based on continuous trajectory operation and accuracy control.
- High speed operation based on snake motion (Offset linear interpolation operation).

2 High accuracy positioning.

- High accuracy is realized by AC servo motor and Kawasaki's own unique control method.
- Provides high positioning accuracy by improving the control features through the high rigidity conveying system.
- Lost motion and hysteresis are minimized by the accurate gear train.

3 Optimum design meet the user's requirements.

- Realize outside dimensions and operation range that enable easy system layout.
- For small turning radius, swing arms are used, and for high speed light load, linear motions is used.
- Realizes a large Z stroke with its low minimum height.

4 Unique functions in motion control.

- Reduces or eliminates damage caused by collisions with the collision detection function.
- Operation can be conducted easily with automatic instruction system.
- Offset linear interpolation operation is made possible, and high speed access is realized.

5 Worldwide support.

- Expanding our sales and service outlets in major areas worldwide.
- Providing reliable support by our well-trained Kawasaki staff.

Clean

Horizontal Articulated Arm

NX510

2-Link 1-Wrist

NX520

2-Link 2-Wrist

NX540

3-Link 1-Wrist

NX550

3-Link 2-Wrist

【Features】

- Operations corresponding to 2FOUP and 3FOUP without the need for track are realized.
- A minimum sweep diameter of $\varnothing 508$ mm is realized. It is possible to make replacement in the space necessary for a conventional track type robots.
- Attains ISO Class 1 with the unique structure.
- The arm structure has high rigidity, and access can be made freely to wafer stage of narrow pitch and FOUP at an arbitrary position.
- High throughput (Up to 200 WPH, two wrist, continuous operation of FOUP \Rightarrow Aligner \Rightarrow Stage) is realized.
- High linearity and high positioning accuracy.
- Compliance with SEMI-F47 Standard. It instantly responds to circumstances such as a drop in voltage, and when the voltage is restored, it automatically begins the operation again.
- Compliance with SEMI-S2 Standard. Sufficient consideration is given to the environment and safety.
- It is equipped with a collision detection function, which alleviates damage caused by collisions.
- By the adoption of an absolute encoder, homing is not required.

NX550



NX520



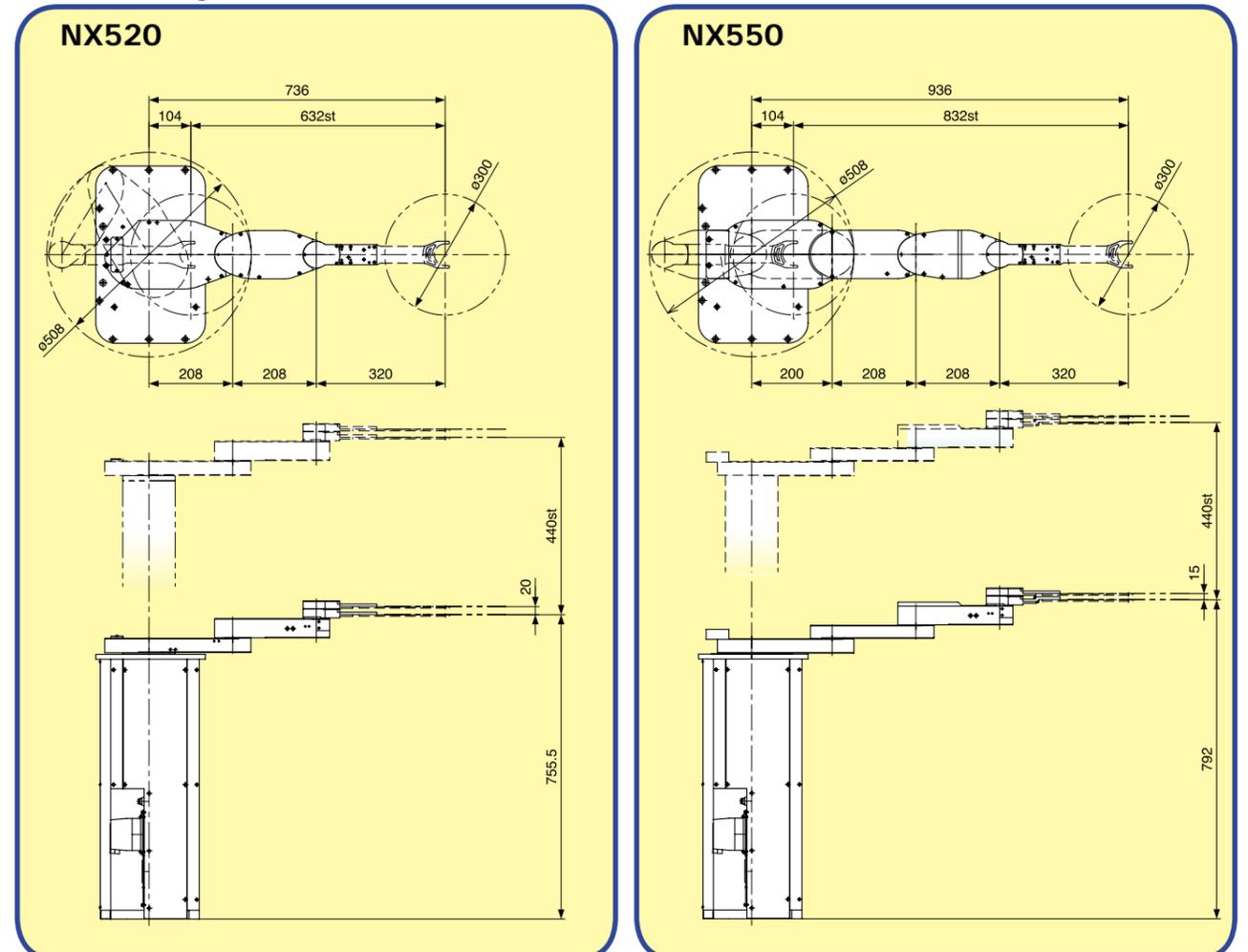
NX540



● Standard Specifications

Model	NX510	NX520	NX540	NX550		
Degree of Freedom	4	5	4	5		
Motion Range	Axis	Rotation:JT2	330 °	330 °	318 °	410 °
	Z Axis	Up/Down:JT3	440mm	440mm	440mm	440mm
	X Axis	In/Out:JT4	832mm	832mm	1,232mm	1,232mm
	W Axis (Lower)	Rotation:JT6	336 °	336 °	366 °	390 °
	W Axis (Upper)	Rotation:JT7	-	336 °	-	390 °
Repeatability	± 0.1 mm (Wafer Center)					
Cleanliness	ISO Class 1 (Measured by Kawasaki)					

● Motion Range & Dimensions



NS410 NS510

Single Arm

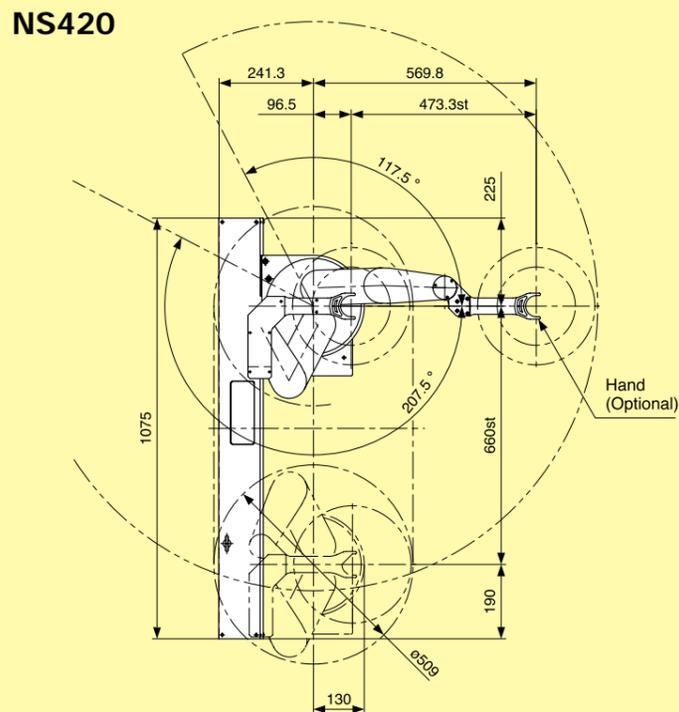
NS411

Single Arm + with FLIP

【Features】

- Owing to the high rigidity and high accuracy mechanical structure, open cassette, stable transfer to various ports and high speed motion are realized.
- By our own unique state-of-the-art vibration insulation control, high accuracy, high speed operation is realized.
- Compliance with SEMI-F47 Standard. It instantly responds to circumstances such as a drop in voltage, and when the voltage is restored, it automatically begins the operation again.
- Compliance with SEMI-S2 Standard. Sufficient consideration is given to the environment and safety.
- It is equipped with a collision detection function, which minimizes damage caused by collisions.
- By the adoption of an absolute encoder homing is not necessary.
- With an optional track unit, NS411 can make access up to 4 wafer ports.

● Motion Range & Dimensions



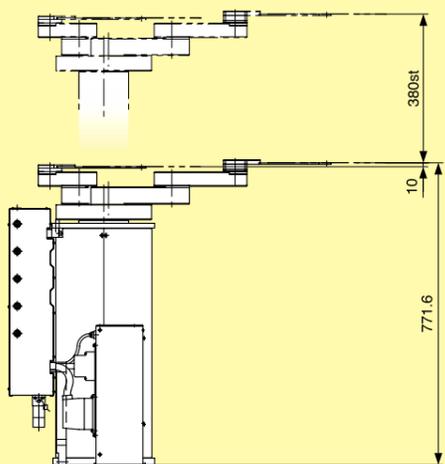
NS420

Double Arm

NS410



NS420



NS511

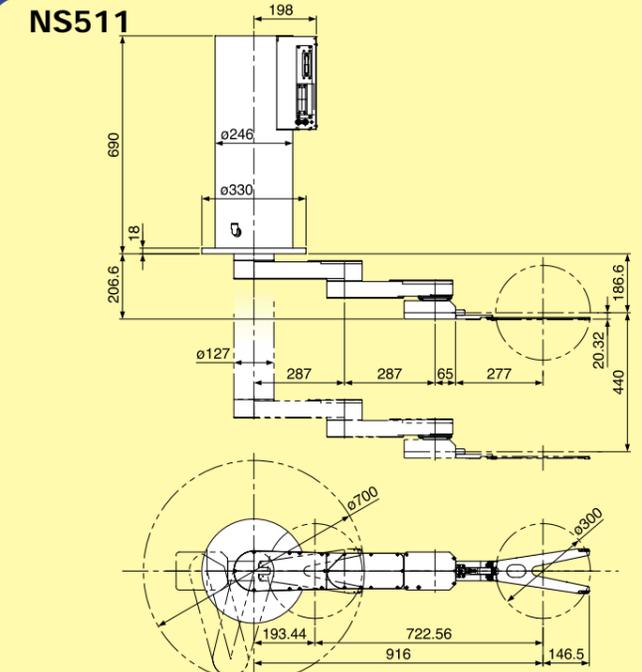
Drip-Proof Specification
+ with FLIP



【Features】

- Designed for wet (chemical liquid) environment.
- Access is possible to vertical ports.
- It has a long reach of longer than 900 mm, enabling a broad operating range.
- Utilizing our own unique state-of-the-art vibration insulation control, high accuracy, high speed operation is realized.
- Compliance with SEMI-F47 Standard. It instantly responds to circumstances such as a drop in voltage, and when the voltage is restored, it automatically begins the operation again.
- Compliance with SEMI-S2 Standard. Sufficient consideration is given to the environment and safety.
- It is equipped with a collision detection function, which minimizes damage caused by collisions.
- By the adoption of an absolute encoder homing is not necessary.

● Motion Range & Dimensions



● Standard Specifications

Model	NS410	NS411	NS420	
Degree of Freedom	3	4	4	
Motion Range	Y Axis Travel:JT1	2port : 660mm 3port : 1,070mm 4port : 1,670mm		
	Axis Rotation:JT2	380 °	325 °	325 °
	Z Axis Up/Down:JT3	380mm	380mm	380mm
	X Axis In/Out:JT4	710mm	798mm	X1 : 646.8mm / X2 : 646.8mm
	F Axis Rotation:JT5	-	156 °	-
Repeatability	± 0.1mm (Wafer Center)			
Cleanliness	ISO Class 2			

Model	NS510	NS511	
Degree of Freedom	3	4	
Motion Range	Y Axis Travel:JT1	-	
	Axis Rotation:JT2	360 °	473 °
	Z Axis Up/Down:JT3	440mm	440mm
	X Axis In/Out:JT4	598mm	816.5mm
	F Axis Rotation:JT5	-	200 °
Repeatability	± 0.1mm (Wafer Center)		
Cleanliness	ISO Class 2	Class 100 (FS209E)	

TS520



[Features]

- A compact design based on telescopic structure is achieved. Owing to double arm specifications, a minimum pass line of 930 mm and vertical stroke of 1,590 mm are realized.
- A high speed operation consisting of placing and fetching operation of wafers + movement to the next position in a total time of less than 4 seconds has been realized.
- A large operation range was secured within a small installation area (530 x 370 mm).
- Owing to the high rigidity and high accuracy mechanical structure, open cassette, stable transfer to various ports and high speed motion are realized.
- By the adoption of an absolute encoder homing is not necessary.

● Standard Specifications

Model	TS520	
Degree of Freedom	4	
Motion Range	Axis Rotation:JT2	330 (Option:360 °)
	Z Axis Up/Down:JT3	1,590mm
	X1 Axis In/Out:JT4	536mm
	X2 Axis In/Out:JT5	536mm
Repeatability	± 0.1 mm (Precision at the end of hand)	
Cleanliness	ISO Class 2	

TS300 series

TS311



[Features]

- Realizes a large Z stroke with its low minimum height.
- Vertical layout of the unit can support buffer cassettes and mini-stockers.
- Owing to the high rigidity and high accuracy mechanical structure, open cassette, stable transfer to various ports and high speed motion are realized.
- By the adoption of an absolute encoder homing is not necessary.

● Standard Specifications

Model	TS310	TS311	TS312	
Degree of Freedom	4	4	3	
Motion Range	Y Axis Travel:JT1	1,100 mm/1,540 mm	460 mm/600 mm	-
	Axis Rotation:JT2	470 °	470 °	470 °
	Z Axis Up/Down:JT3	380 mm	660 mm	660 mm
	X Axis In/Out:JT4	317mm(1) 448.5mm(2)	320mm(1) 453.5mm(2)	320mm(1)
Repeatability	± 0.1 mm (Precision at the end of hand)			
Cleanliness	ISO Class 2			

(1) Arm length is 90 mm (2) Arm length is 135 mm

Arm variation made possible by Kawasaki

Kawasaki's clean robots can optimally perform with high efficiency the various functions required of the wafer transfer robots used in semiconductor manufacturing equipment.

Ultra-Thin High Rigidity Type

Ultra-thin type that can be applied to limited space within the unit. High rigidity based on the gear train can also correspond to transfer of masks that are heavy weight.



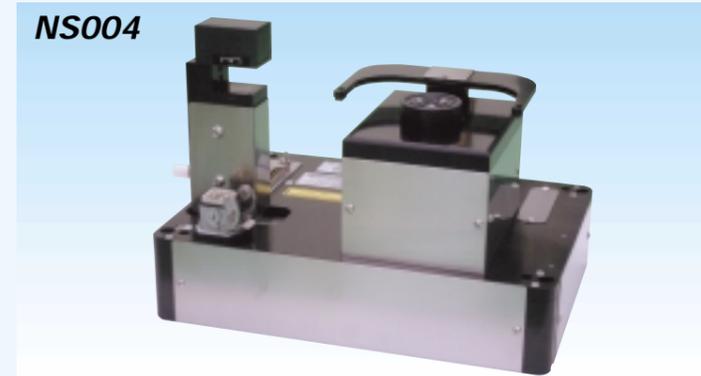
High Speed Long Stroke Type

A simple structure consisting of a belt drive system directly connected to the motor realizes the high stroke, high speed operation of the vertical axis.



High Accuracy, High Speed Aligner

NS004

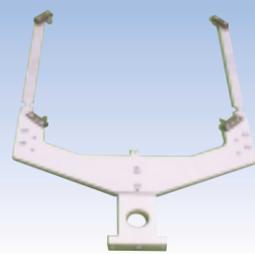


[Features]

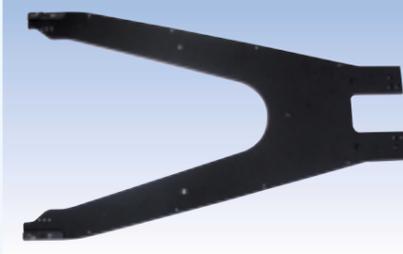
- High speed alignment (Time for alignment only is 2.5 seconds). Setting is possible at an arbitrary angle.
- The same controller as the robot controller is used, and addition is simple.
- Optional lift pin setup is available for on-center pick-up.
- Automatic switchover function (Optional in case of NS004) between 200 mm and 300 mm.
- Alignment of quartz wafer is also possible (NS003 /004).

Various hands

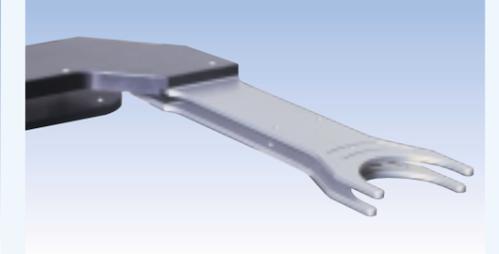
Edge hole hand



Edge clamp hand with centering mechanism



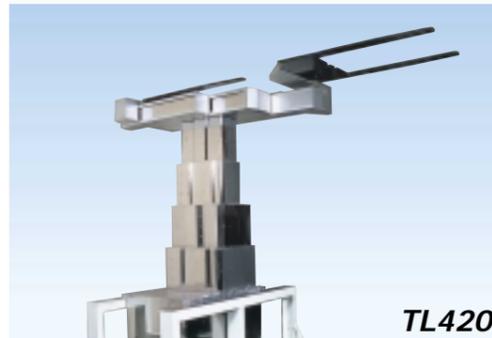
Vacuum hand



Telescopic Arm

TL series

For transfer of large-type FPD



TL420

[Features]

- A compact design based on telescopic structure. Owing to double arm specifications, minimum pass line of 925 mm, vertical stroke of 1,420 mm was realized.
- Utilizing our unique mechanism that suppresses the generation of particles, high cleanliness is secured.
- High speed operation based on our own unique double slide arm structure. Horizontal operation of 1,500 mm/1.2 seconds and vertical operation of 1,400 mm/2.1 seconds have been achieved.
- AC servo drive system based on vibration insulation servo control is adopted, and high speed, high accuracy smooth operation is realized.
- By the adoption of an absolute encoder homing is not necessary.

● Standard Specifications

Model	TL420S (TL420T)	TL421S (TL421T)	TL220S (TL220T)	TL221S (TL221T)	TL410S (TL410T)	TL411S (TL411T)	TL210S (TL210T)	TL211S (TL211T)
Degree of Freedom	Freedom4/Drive Axes6(Freedom5/Drive Axes7)				Freedom3/Drive Axes4(Freedom4/Drive Axes5)			
Motion Range	Standard Arm	Long Arm	Standard Arm	Long Arm	Standard Arm	Long Arm	Standard Arm	Long Arm
Y Axis	Travel:JT1 (1,260mm/2,460mm/3,660mm)							
Axis	Rotation:JT2 330°							
Z Axis	Up/Down:JT3 1,420mm							
Upper Arm	In/Out:JT4 1,500mm							
Lower Arm	In/Out:JT5 1,500mm							
Repeatability	±0.2mm(Precision at the end of hand)				±0.2mm(Precision at the end of hand)			

Vertical Articulated Arm

FC series

For general purpose



A six-axis high-performance robot that is compact and enables all kinds of positions. In particular, the 3 freedom movements at the wrist portion allow operation of 3-dimensional curve trajectory. The positions of the wafer and glass can be freely changed from horizontal to vertical or oblique.

It can be used for assembly work, fetching of work, drive-in work, etc.

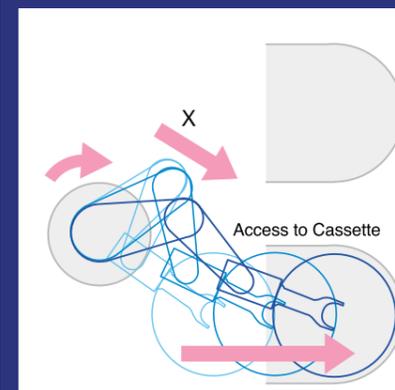
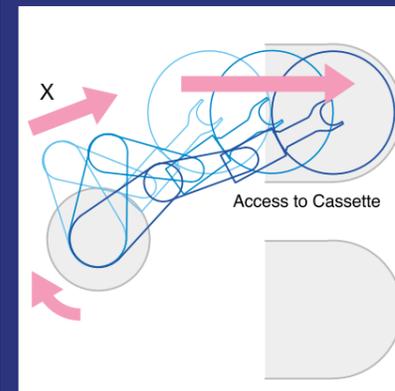
● Standard Specifications

Model	FC02N	FC06N/FC06L	FC10N/FC10L	FC20N	FC30N/FC30L	FC45N	FC60L
Degree of Freedom	6 (Option:7)						
Motion Range	Arm Revolution:JT1	±160°					
	Arm In/Out:JT2	+150° ~ -60°					
	Arm Up/Down:JT3	+120° ~ -155°					
	Wrist Rotation:JT4	±360°					
	Wrist Bending:JT5	±135°					
Wrist Twisting:JT6	±145°						
	±270°						
Wrist Twisting:JT6	±130°						
Wrist Twisting:JT6	±360°						
Repeatability	±0.03mm	±0.05mm/±0.1mm	±0.1mm		±0.15mm		
Maximum Transportable Weight	2kg	6kg	10kg	20kg	30kg	45kg	60kg
Cleanliness	Less than 10 of 0.3µm particles/CF (FC02/06/10/20)						

Unique functions in motion control

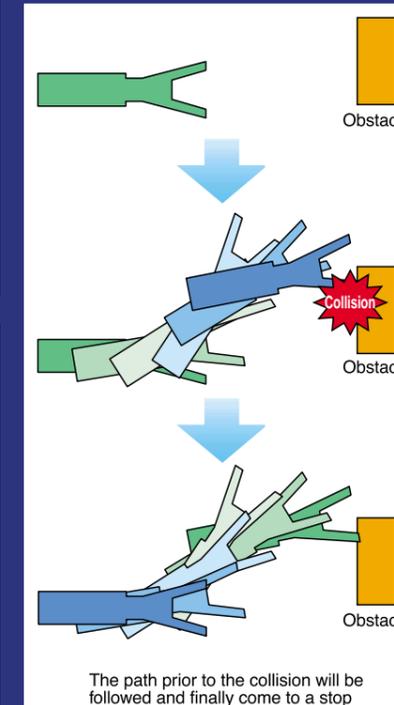
Offset Linear Interpolation

By combining the operations of (Revolution) and X (Forward and backward motions) simultaneously, access can be made to positions which cannot be applied to by X (Forward and backward motions) alone without dropping the speed of operation.



Collision Detection

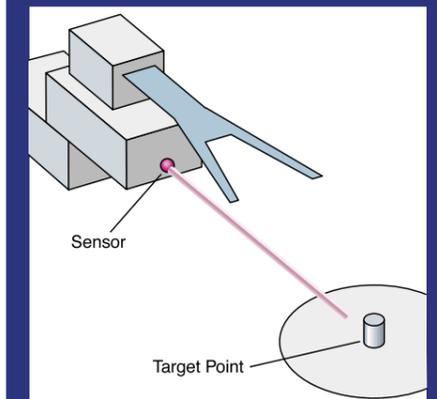
- It monitors the differences between the calculated speed and the actual speed, and in case an abnormality occurs, it will change to escape operation.
- As soon as a collision is detected, the operation is terminated and the path prior to the collision will be followed and finally come to a stop, thereby minimizing the collision shock.
- The function is based on 6-axes robots' reliable technology.



Automatic Instruction

For those cases where the wafer is repeatedly carried to the target point at high accuracy, having a system in which the robot itself finds the operation target point is very convenient. In our products, we have adopted our own unique non-contact automatic instruction system that makes use of sensors. The robot moves automatically to the target point and the three-dimensional position is deduced by the sensor. The target point that has been deduced is converted into the encoder value of each axis and reflected in the instruction point.

In comparison with the vision system, the space it occupies and the unit's cost is reduced significantly.



LOG Function

The LOG functions of the operation history and error history are equipped as standard. Furthermore, in the event troubles occur, it is also equipped with an error message function that classifies the trouble spot and displays sentences as the standard.

Worldwide Support

Our customers may use a Kawasaki clean robot anywhere in the world without worry thanks to the global support network we have established.

In the major cities of the world, we have established local offices and set up service centers. Using these offices as our bases overseas, we have expanded our distributor network and are striving to develop a well-crafted and complete support system.

