YAMAHA
Revs Your Heart

SCARA ROBOTS
YK-X series

Product Lineup

YK-XE	• Low cost high performance model
YK-XG/YK-X	• Completely beltless model Note
YK-TW	• Orbit model
YK-XGS	• Wall mount & Inverse type
YK-XGP	• Dust-proof & Drip-proof type
YK-XEC/YK-XGC/YK-XC	• Clean type

Note. Except for YK1200X

ENGLISH

YK-X series

Comprehensive line of YAMAHA SCARA robots

History of 45 years

Completely beltless structure Note

Excellent maintenance ability

Arm length of 120 mm to 1200 mm,
full-selection of lineup is top in the world.
Completely beltless structure pursues
the features of SCARA robots to
their utmost limits.

Note. Except some models

Low cost high performance model

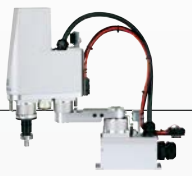
■Arm length 400mm to 710 mm
■Maximum payload 4 kg to 10 kg


YK400XE-4


YK510XE-10/YK610XE-10
YK710XE-10

Extra small model

■Arm length 120 mm to 220 mm
■Maximum payload 1 kg


YK120XG/YK150XG/YK180XG


YK180X/YK220X

Small model

■Arm length 250 mm to 400 mm
■Maximum payload 5 kg


YK250XG/YK350XG/YK400XG

Medium model

■Arm length 500 mm to 600 mm
■Maximum payload 5 kg to 20 kg


YK500XGL


YK500XG


YK600XGL


YK600XG/XGH

Large model

■Arm length 700 mm to 1200 mm
■Maximum payload 20 kg to 50 kg


YK700XG/YK800XG/
YK900XG


YK1000XG


YK1200XG/YK1200X

Orbit model

■Arm length 350 mm / 500 mm
■Maximum payload 5 kg


YK500TW

Wall mount & Inverse type

■Wall mount type/Type where the robot body is installed in the wall.
■Inverse type/Type where the wall mount type is installed upside down.

YK300XGS～YK1000XGS


Wall mount type


Inverse type

Dust-proof & Drip-proof type

Plays active part in the working environment with a large amount of water or dust (protection class equivalent to IP65).
●Please consult YAMAHA for anti-droplet protection for fluids other than water.。


YK250XGP/YK350XGP/YK400XGP
YK500XGLP/YK600XGLP


YK500XGP～YK1000XGP

Clean type

Achieves both high cleanliness and high performance, contributing to automation and labor saving of production systems in clean rooms.

■Arm length 180 mm to 1000 mm
■Maximum payload 1 kg to 20 kg


YK400XEC/YK510XEC/
YK610XEC/YK710XEC


YK250XGC


YK400XGC

YK-XE

Low cost high performance model

- Arm length 400 mm to 710 mm
- Maximum payload 10 kg

POINT 1

Both the high operation performance and low-price are provided.

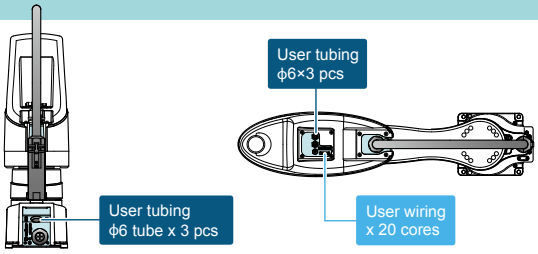
Both the high operation performance and low-price are provided. Production equipment with high cost performance can be constructed.

YK400XE-4 | YK510XE-10 | YK610XE-10 | YK710XE-10

POINT 2

Improved User Interface

Enhanced size and numbers of air tubes and user I/O for end effectors. Tubes and wires are positioned for easy layout and reduced risk of disconnection.
(YK510XE-10, YK610XE-10, YK710XE-10)



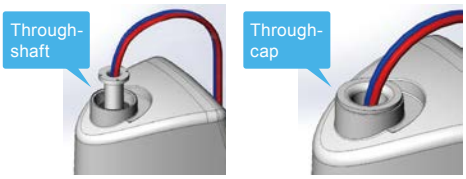
Note. YK400XE-4 provides the user wiring x 10 cores and the User tubing ϕ4 x 3 pcs.

POINT 3

Through-shaft and through-cap have been added.

Option specifications

"Through-shaft" or "through-cap" option for wiring and tubing that is convenient to run the air tubing and wiring can be selected.
The wiring and tubing routes can be investigated easily without designing and manufacturing a stay for installing the wiring and tubing. In addition, by passing the wiring and tubing through the inside of the main body, worries about wire breakage or disconnection are reduced during operation.

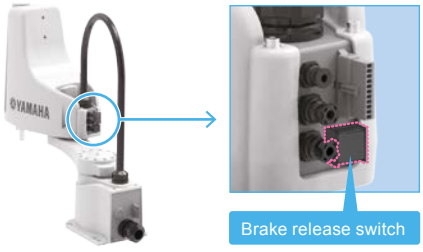


POINT 4

Brake release switch is selectable.

Option specifications

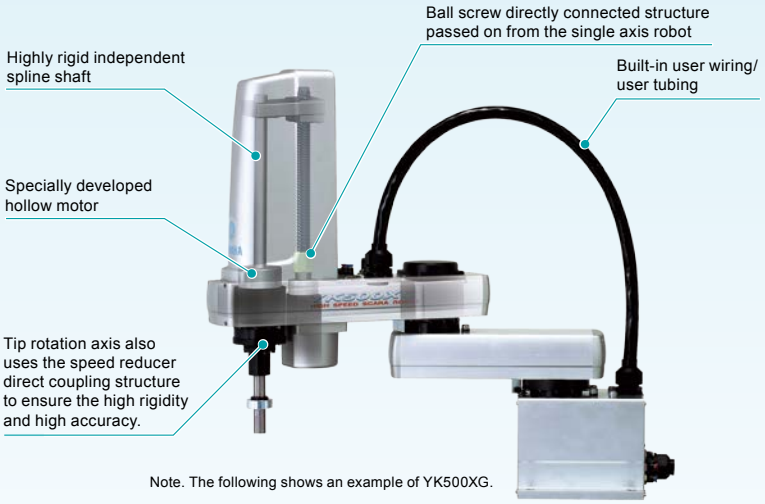
In the emergency stop state, the Z-axis brake is released and the Z-axis can be moved up or down while the brake release switch is held down. Releasing the switch applies the brake to the Z-axis. This improves the convenience during installation adjustment.



YK-XG/X

Completely beltless model

- Arm length 120 mm to 1200 mm
- Maximum payload 50 kg

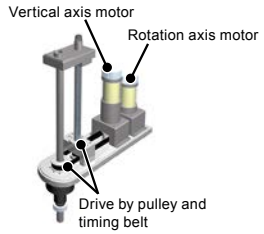


Note. The following shows an example of YK500XG.

POINT 1 Completely beltless structure

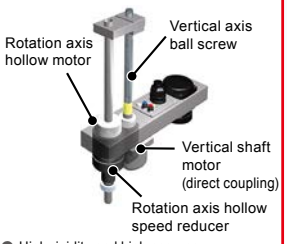
A completely beltless structure was achieved using a ZR-axis direct coupling structure. This completely beltless structure greatly reduces waste motion. This structure also maintains high accuracy for an extended period of time. Additionally, this structure ensures maintenance-free operation for an extended period of time without worrying about belt breakage, elongation, or secular deterioration (except for large model “YK1200X”).

Conventional model



- Rigidity and accuracy are determined by belt.
- Secular change, such as belt elongation occurs.

YK-XG series



- High rigidity and high accuracy
- No worry about belt elongation and breakage
- Maintenance free

POINT 2 Excellent maintenance ability

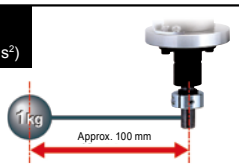
The covers of YAMAHA SCARA robot YK-XG series can be removed forward or upward. The cover is separated from the cable, so the maintenance work is easy. Additionally, the grease replacement of the speed reducer needs many steps to disassemble the gear and may cause positional deviation. However, since the speed reducer of the YAMAHA SCARA robot uses long-life grease, the grease replacement is not needed.

POINT 3 High-speed transfer is possible even with heavy workpieces and large offsets.

The SCARA robot performance cannot be expressed only by the standard cycle time. In actual operating environments, there are various workpieces, such as heavy workpiece or workpiece with large offset. At this time, since the robot with low R-axis tolerable moment of inertia needs to decrease the speed during operation, the cycle time decreases greatly. All YAMAHA SCARA robot YK-XG types have the tip rotation axis directly coupled to the speed reducer.
Since the R-axis tolerable moment of inertia is very high when compared to a general structure in which the moment of inertia is transmitted by a belt after decelerating, the robot can operate at a high speed even with workpieces that have been offset.

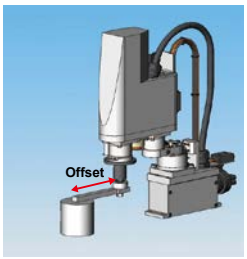
YK120 to 220XG
(R-axis tolerable moment of inertia: 0.01 kgfcms^2)

When the tip load weight is 1 kg, it is possible to operate at approx. 100 mm offset.



Optimal acceleration and deceleration are set automatically.

The moment of inertia varies depending on the shape of the workpiece and the offset distance from the R-axis tip to the load center of gravity. When the offset is large even with the same payload, this value increases.
So, the acceleration during operation needs to be reduced.
With the RCX340, the optimum acceleration is automatically set by simply setting the moment of inertia value, so there is no need for troublesome settings.



POINT 4 Through shaft and tool flange options are selectable.

Through shaft that allows easy wiring to the tip tool and tool flange for tool mounting are provided as options.

Through shaft option convenient for routing of air tubes and harness wires
Note. YK250XG to YK400XG
YK500XGL/YK600XGL

Tool flange option for easy mounting of a tool to the tip
Note. YK250XG to YK1000XG

YK-TW

Orbit model

- Arm length 350 mm / 500 mm
- Maximum payload 5 kg

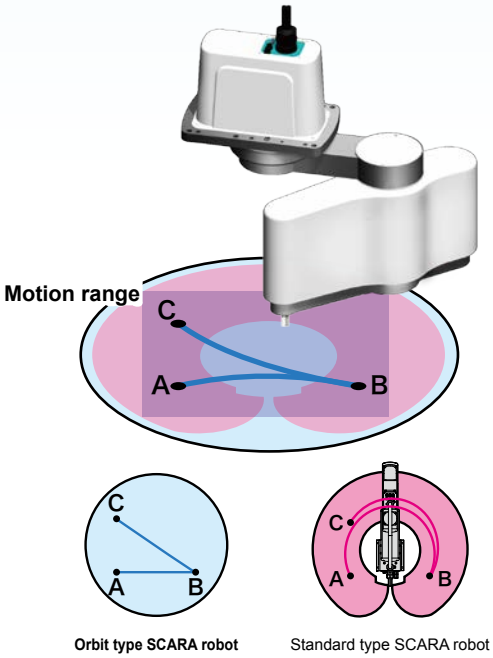
POINT 1

Layout design freedom

User: We want a smaller equipment footprint.

YK-TW can move anywhere through the full ϕ 1000 mm Note 2 work envelope.

Featuring a ceiling-mount configuration with a wide arm rotation angle, the YK-TW can access any point within the full ϕ 1000 mm downward range. This eliminates all motion-related restrictions with regard to pallet and conveyor placement operations, while dramatically reducing the equipment footprint.



Orbit type SCARA robot　　Standard type SCARA robot

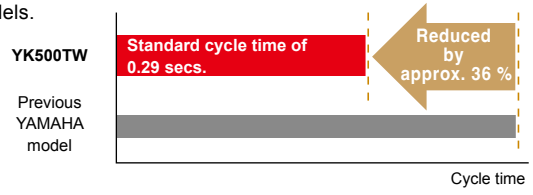
POINT 2

Higher productivity

User: We need to reduce cycle time.

Standard cycle time of 0.29 secs. Note 2

Y-axis (arm 2) passes beneath the X-axis (arm 1) and it has a horizontal articulated structure, allowing it to move along the optimal path between points. Moreover, the optimized weight balance of the internal components reduces the cycle time by 36 % as compared to previous models.



The standard cycle time for moving a 1-kg load horizontally 300 mm and up/down 25 mm is shortened by approximately 36 % compared to existing YAMAHA models.

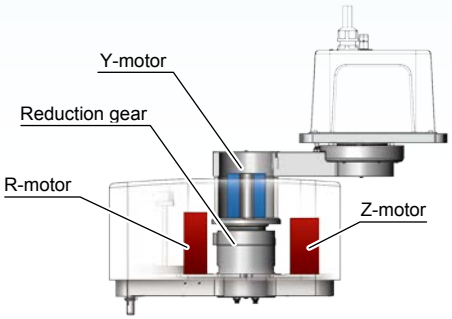
POINT 3

High quality

User: We want a high precision assembly system.

YK-TW offers a repeated positioning accuracy of ±0.01 mm Note1 (XY axes).

Higher repeated positioning accuracy than that offered by a parallel-link robot. This was accomplished by optimizing the robot's weight balance through an extensive re-design of its internal construction. The lightweight yet highly rigid arm has also been fitted with optimally tuned motors to enable high accuracy positioning.



Hollow construction

Y-motor and reduction gear feature a hollow construction which allows them to be housed inside the harness arm.

360 ° Rotation.

Optimized rotation center of gravity moment

Weight balance was optimized by placing the R-motor and Z-motor at the left and right sides respectively.

Reduced inertia enableshigh-speed motion.

POINT 4

Suitable for a wide range of applications

User: We need to move heavy workpieces at high speeds.

YK-TW handles payloads up to 5 kg.

Handles loads up to 5 kg. Also accommodates arm-end tools which tend to be heavy, making it highly adaptable to various applications.

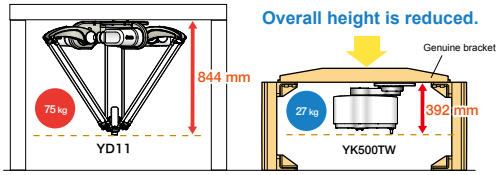
POINT 5

Smaller equipment footprint

User: We want to reduce the height of our equipment.

YK-TW offers both a lower height and a smaller footprint.

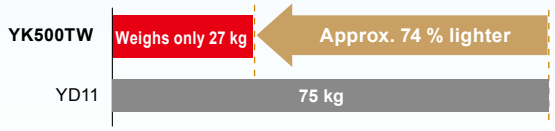
YK-TW height is only 392 mm. This compact size enables more freedom in the equipment layout design.



POINT 6 Easy installation

User: Parallel-link robots require large frames which complicates installation…

YK-TW has a total height of only 392 mm, and weighs only 27 kg.
Lower inertia = Lighter frame



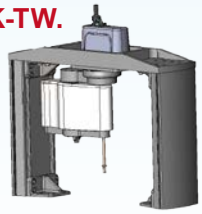
POINT 7 Reduce the number of steps

User: Preparing the frame is extra work.

We can optionally provide a dedicated frame for the YK-TW.

With no need for complex calculations of strength, startup steps can be reduced.

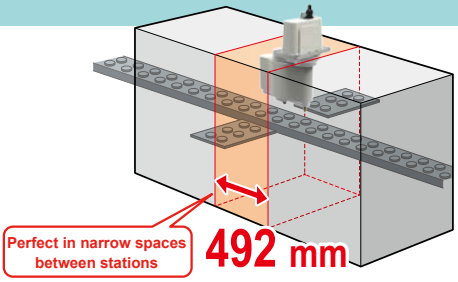
Note. For details on dimensions and price, please contact Yamaha.



POINT 8 Ideal for narrow space applications

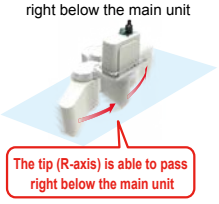
User: We need to install in limited space, such as between equipment.

Minimum installation width 492 mm Note 1



Underpass motion

Optimize use of the space right below the main unit



Note 1. Applies to the YK350TW Note 2. Applies to the YK500TW

Common Features of Yamaha SCARA

Resolver is used for position detector.

As the resolver uses a simple and rigid structure without using electronic components and optical elements, it features high environment resistance and low failure ratio. Detection problems due to electronic component breakdown, dew condensation on or oil sticking to the disk that may occur in optical encoders do not occur in the resolver due to its structure. Additionally, as the absolute specifications and incremental specifications use the same mechanical specifications and common controller, the specifications can be changed only by setting parameters. Furthermore, even when the absolute battery is consumed completely, the robot can still operate as the incremental specifications. So, even if a trouble occurs, the line stop is not needed to ensure the safe production line.

Note. The resolver has a simple structure without using electronic components.
So, the resolver is highly resistant to low and high temperatures, impacts, electrical noise, dust particles, and oil, etc., and is used in automobiles, trains, and aircrafts that particularly require the reliability.

Optical encoder

- Optical type
- Electronic components are required and structure is complicated.
- Electronic component malfunction, or dew condensation on or oily content sticking to disk may occur easily.

Detection failure

Resolver

- Magnetic type
- Simple structure only with iron core and winding has less potential failure factors.
- Immune to shock and electric noise.

High reliability

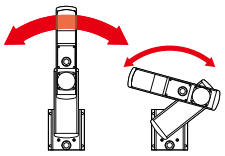
Zone control (= Optimal acceleration/deceleration automatic setting) function

In the SCARA robot, the load applied to the motor and speed reducer in the arm folded state greatly differs from that in the arm extended state. YAMAHA SCARA robot automatically selects optimal acceleration and deceleration from the arm postures at operation start and operation end. Therefore, the robot does not exceed the tolerance value of the motor peak torque or speed reducer allowable peak torque only by entering the initial payload. So, full power can be extracted from the motor whenever needed and high acceleration/deceleration are maintained.

For X-axis of YK500XG

The torque in the arm folded state is 5 or more times different from that in the arm extended state.

This may greatly affect the service life, vibration during operation, and controllability.



If the motor torque exceeds the peak value
→This may adversely affect the controllability and mechanical vibration, etc.

If the torque exceeds the tolerable peak torque value of the speed reducer
→This may cause early breakage or extremely shorten the service life.

Robot stops at a desired position accurately to ensure long service life.

YK-XGS

Wall mount & Inverse type

Wall mount type

Inverse type

POINT

Hanging type is renewed. Completely beltless structure and high rigidity

As the conventional hanging type is changed to the wall mount type, the flexibility of the system design is improved. The production equipment can be downsized. Additionally, as an inverse type that allows upward operation is also added to the product lineup, the flexibility of the working direction is widened. Furthermore, use of a completely beltless structure achieves a maximum payload of 20 kg and a R-axis tolerable moment of inertia of 1 kgm^2 Note that are the top in the class. A large hand can also be installed. So, this robot is suitable for heavy load work.

Note. YK700XGS to YK1000XGS

YK-XGP

Dust-proof & Drip-proof type

POINT

Up/down bellows structure improves the dust-proof and drip-proof performance.

The dust-proof and drip-proof type that can be operated even in a work environment where water or particle dust scatters was renewed to a completely beltless structure. The belt does not deteriorate and poor environment resistance is improved. Additionally, an up/down bellows structure is used to improve the dust-proof and drip-proof performance.

Note. YK250XGP to YK600XGLP

Protection class equivalent to IP65 (IEC60529)

Seals are added to the joints to maintain the dust-proof and dripproof performance without air purging. The robot conforms to the protection class equivalent to IP65 (IEC60529).

IP 6 5

Class of protection against invasion of water: 5

Water injected from any direction does not affect adversely.
The standard pressure of the injected water is 30 KPa (30 KN/m^2, 0.3 kgf/cm).
The injection speed is 12.5 liters/min. and the injection time is 3 min.
Note. The water injected under conditions exceeding those shown above may enter the unit.

Class of protection against solid objects: 6

No invasion of particle dust.

Dust-proof and drip-proof connector for user wiring is provided as standard.

YK250XGP to 600XGLP
(arm part)

YK250XGP to 600XGLP
(base part)

Clean SCARA robots

Suitable for electronics component, food, and medical unit related work in clean room.
High sealing structure, dust generation prevention, and improvement of suction efficiency are achieved.
Both the high cleanliness degree and high performance are established.

YK-XEC

Low cost high performance model

Clean type of the low cost high performance SCARA Robot "YK-XE" series.
Main specifications maintain the same performance as YK-XE, making this model ideal for introducing clean specifications at a low price.

- Arm length: 400 to 710 mm
- Intake air: 55 to 60 Nℓ/min
- Degree of cleanliness: ISO CLASS 4(ISO14644-1)
- Maximum payload: 4 to 10 kg

YK400XEC

POINT 1

Maintained affordability even with clean models

We have achieved affordability even with clean models.
Arm length options are available, mirroring the YK-XE series with 4 models to choose from.


YK400XEC


YK510XEC


YK610XEC


YK710XEC

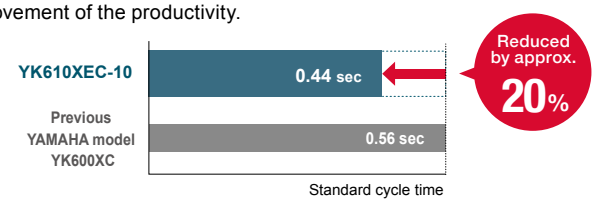
POINT 2

Improvement of productivity by high-speed operation

By reviewing the arm structure, the vibration is reduced and the motion is optimized to shorten the standard cycle time.
High-speed, less-vibration, and agile operation contributes to improvement of the productivity.

Standard cycle time 0.42 sec Note.

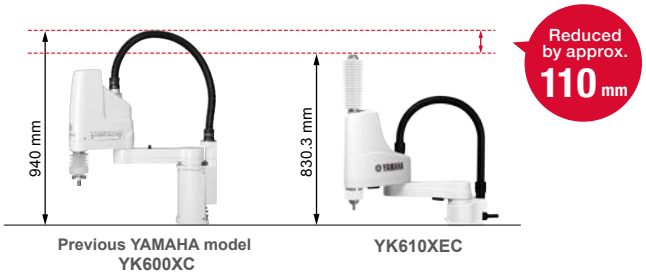
Note. For YK510XEC



POINT 3

Compact Design

We have downsized the overall height by up to 110 mm compared to our existing models with the same arm length. This allows for a reduction in equipment size, making it usable even in environments with height restrictions that posed installation challenges for previous models.



YK-XGC/XC

High payload and High accuracy model

The Z-axis spline is covered with bellows made of materials with low dust generation and other sliding parts are sealed completely.
Harnesses are also incorporated completely and the inside of the robot is sucked from the rear of the base to prevent dust generation.

- Arm length: 180 mm to 1000 mm
- Intake air: 30 to 60 Nℓ/min
- Degree of cleanliness: CLASS ISO3(ISO14644-1)/CLASS10(FED-STD-209D)
- Maximum payload: 20 kg

YK250XGC

YK400XGC

POINT 1

Vertical bellows structure improves the reliability of the clean performance.

As a beltless structure is used, no dust generation caused by the belt occurs. Furthermore, as the YK-XGC was renewed to a structure, in which the bellows are installed on the Z-axis vertically, the reliability of the clean performance was further improved.

Note. Except for YK500XC to YK1000XC

POINT 2

Completely beltless structure improves the rigidity.

A completely beltless structure was achieved using a ZR-axis direct coupling structure. As a speed reducer is coupled to the tip rotation axis, the R-axis tolerable moment of inertia is very high and the high-speed movement is possible even with a heavy workpiece or largely offset workpiece.

Note. Except for YK500XC to YK1000XC

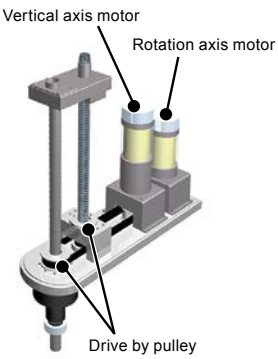
POINT 3

High durability

As a beltless structure is used, the robot can be operated without worry about belt elongation and secular change [Note].
Additionally, the bellows installed on the Z-axis use material with high durability to ensure the durability performance.

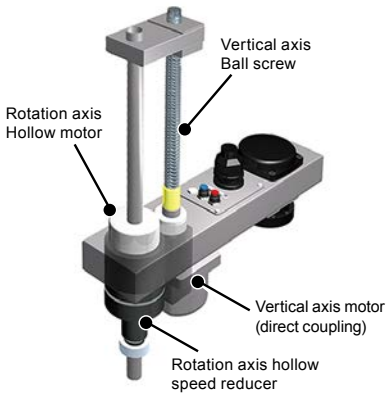
Note. Except for YK500XC to YK1000XC

Conventional model



- Rigidity and accuracy are determined by belt.
- Secular change, such as belt elongation occurs.

YK-XGC type
(Including YK180XC/YK220XC)



- High rigidity and high accuracy
- No worry about belt elongation and breakage
- Maintenance free

Specification sheet

		Model	Arm length (mm)	Z-axis stroke (mm)	Maximum payload (kg)	Standard cycle time (sec) Note 1	Beltless structure Note 4
Standard type	Extra small model (Tiny)	YK120XG	120	50	1.0	0.33	○
		YK150XG	150	50	1.0	0.33	○
		YK180XG	180	50	1.0	0.33	○
		YK180X	180	100	1.0	0.39	○
		YK220X	220	100	1.0	0.42	○
	Small model	YK250XG	250	150	5.0 (4.0) Note 3	0.43	○
		YK350XG	350	150	5.0 (4.0) Note 3	0.44	○
		YK400XE-4	400	150	4.0 (3.0) Note 3	0.41	-
		YK400XG	400	150	5.0 (4.0) Note 3	0.45	○
	Medium model	YK500XGL	500	150	5.0 (4.0) Note 3	0.48	○
		YK500XG	500	200/300	10.0	0.42	○
		YK510XE-10	510	200	10.0 (9.0) Note 3	0.38	-
		YK600XGL	600	150	5.0 (4.0) Note 3	0.54	○
		YK600XG	600	200/300	10.0	0.43	○
		YK610XE-10	610	200	10.0 (9.0) Note 3	0.39	-
		YK600XGH	600	200/400	20.0 (19.0) Note 3	0.47	○
	Large model	YK700XGL	700	200/300	10.0 (9.0) Note 3	0.50	○
		YK710XE-10	710	200	10.0 (9.0) Note 3	0.42	-
		YK700XG	700	200/400	20.0 (19.0) Note 3	0.42	○
		YK800XG	800	200/400	20.0 (19.0) Note 3	0.48	○
		YK900XG	900	200/400	20.0 (19.0) Note 3	0.49	○
		YK1000XG	1000	200/400	20.0 (19.0) Note 3	0.49	○
		YK1200X	1200	400	50.0	0.91	-
		YK1200XG	1200	400	50.0	0.61	○
Orbit model		YK350TW	350	130	5.0	0.32	-
		YK500TW	500	130	5.0 (4.0) Note 3	0.29	-
Wall mount & Inverse type		YK300XGS Note 2	300	150	5.0 (4.0) Note 3	0.49	○
		YK400XGS Note 2	400	150	5.0 (4.0) Note 3	0.49	○
		YK500XGS	500	200/300	10.0	0.45	○
		YK600XGS	600	200/300	10.0	0.46	○
		YK700XGS	700	200/400	20.0	0.42	○
		YK800XGS	800	200/400	20.0	0.48	○
		YK900XGS	900	200/400	20.0	0.49	○
		YK1000XGS	1000	200/400	20.0	0.49	○
Dust-proof & Drip-proof type		YK250XGP	250	150	4.0	0.50	○
		YK350XGP	350	150	4.0	0.52	○
		YK400XGP	400	150	4.0	0.50	○
		YK500XGLP	500	150	4.0	0.66	○
		YK500XGP	500	200/300	10.0	0.55	○
		YK600XGLP	600	150	4.0	0.71	○
		YK600XGP	600	200/300	10.0	0.56	○
		YK600XGHP	600	200/400	18.0	0.57	○
		YK700XGP	700	200/400	20.0	0.52	○
		YK800XGP	800	200/400	20.0	0.58	○
		YK900XGP	900	200/400	20.0	0.59	○
		YK1000XGP	1000	200/400	20.0	0.59	○
Clean type	Extra small model	YK180XC	180	100	1.0	0.42	○
		YK220XC	220	100	1.0	0.45	○
	Small model	YK250XGC	250	150	4.0	0.50	○
		YK350XGC	350	150	4.0	0.52	○
		YK400XGC	400	150	4.0	0.50	○
		YK400XEC-4	400	150	4.0	0.45	-
	Medium model	YK500XC	500	200/300	10.0	0.53	-
		YK500XGLC	500	150	4.0	0.66	○
		YK510XEC-10	510	200	10.0	0.42	-
		YK600XC	600	200/300	10.0	0.56	-
		YK600XGLC	600	150	4.0	0.71	○
		YK610XEC-10	610	200	10.0	0.44	-
	Large model	YK700XC	700	200/400	20.0	0.57	-
		YK710XEC-10	710	200	10.0	0.49	-
		YK800XC	800	200/400	20.0	0.57	-
		YK1000XC	1000	200/400	20.0	0.60	-

Note 1. Standard cycle time measurement conditions 25 mm vertical, 300 mm horizontal reciprocating motion (Tiny only 25 mm vertical, 100 mm horizontal reciprocating motion)
Note 2. The YK300XGS and YK400XGS are custom-order products. For details about the delivery time, please contact YAMAHA.
Note 3. For the option specifications (tool flange mount type and user wiring/tubing through spline type), the maximum payload becomes the value in ( ).
Note 4. The beltless construction significantly reduces lost motion, thus maintaining high accuracy for a long period of time. The belt can be used comfortably and maintenance-free for a long period of time without worrying about belt breakage, elongation, or ageing.

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