

SCARA ROBOTS

Arm length of 120mm to 1200mm!
Full-selection lineup is top in the world.



Product Lineup

YK-XG Series

History of 30 years

The first YAMAHA robots were SCARA robots. Since the first SCARA robot called "CAME" was produced in 1979, some 30 years of SCARA robot innovations have continually appeared. These SCARA robots have undergone countless modifications in an ever-changing marketplace and amassed a hefty record of successful products making them an essential part of the YAMAHA robot lineup.



1979
<YK7000>

Orbit type

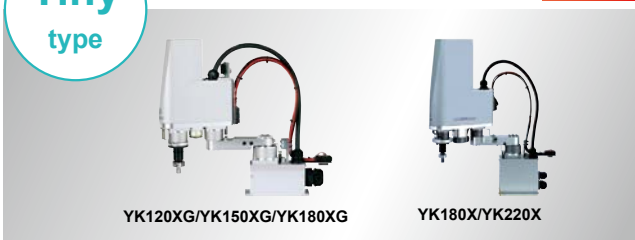
Omni directional model **P.284**



- Arm length : 500mm
- Maximum payload: 4kg

Tiny type

Micro-mini model **P.286**



- Arm length : 120mm to 220mm
- Maximum payload: 1kg

Small type

P.292

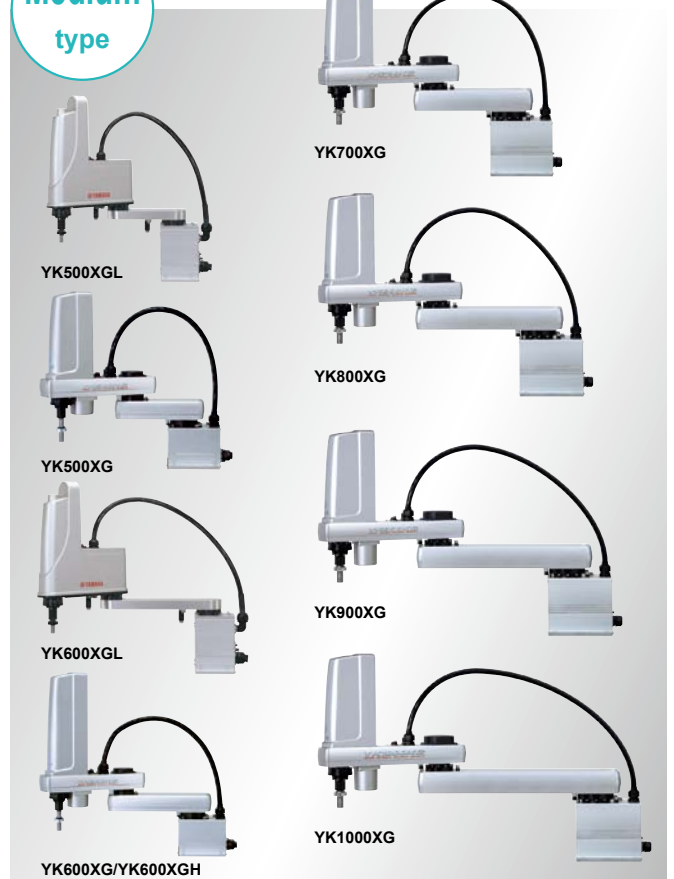


- Arm length : 250mm to 400mm
- Maximum payload: 5kg

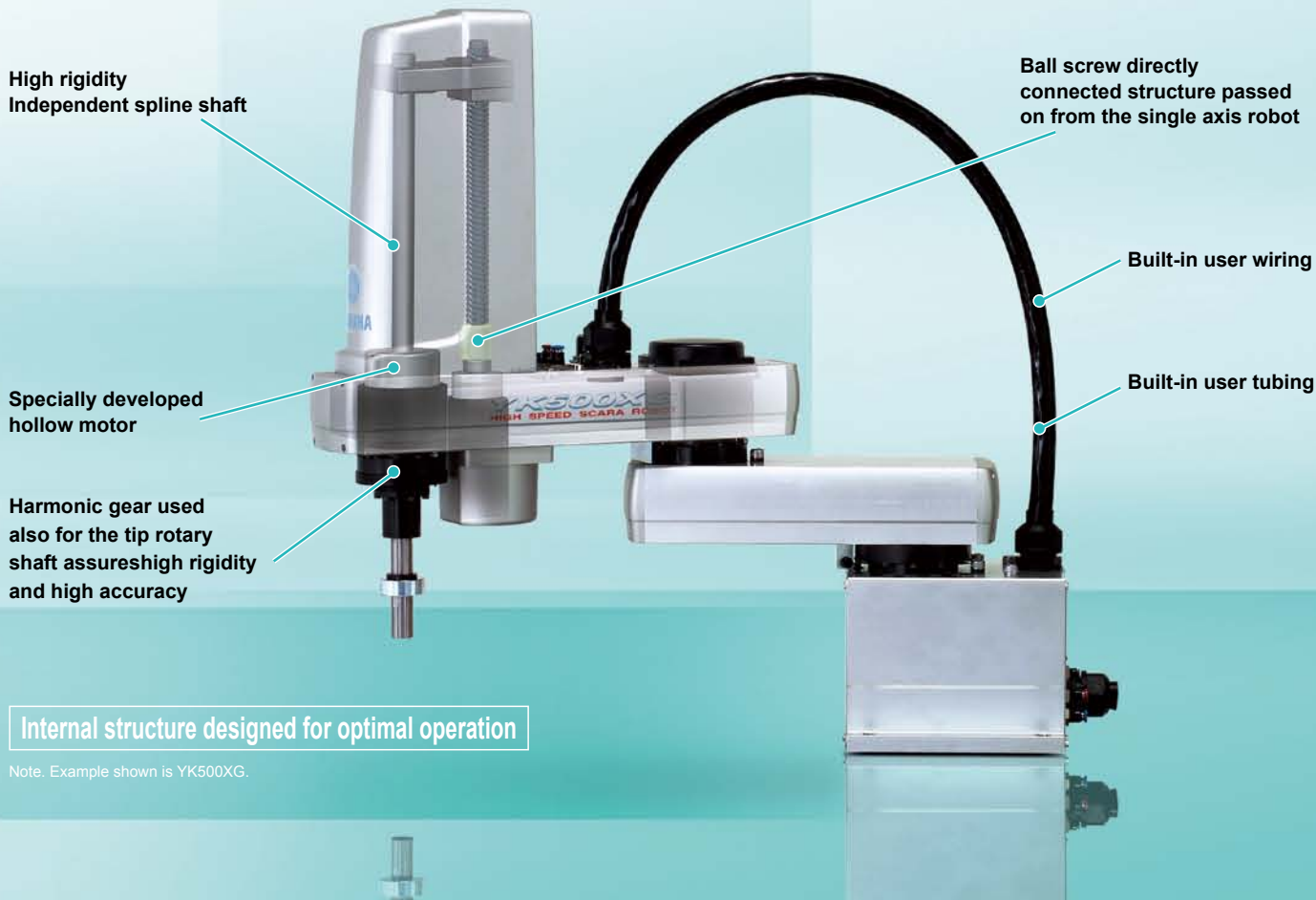
Completely belt-less structure makes it maintenance-free

Medium type

P.298



- Arm length : 500mm to 1000mm
- Maximum payload: 5kg to 20kg



High rigidity
Independent spline shaft

Ball screw directly
connected structure passed
on from the single axis robot

Specially developed
hollow motor

Built-in user wiring

Harmonic gear used
also for the tip rotary
shaft assures high rigidity
and high accuracy

Built-in user tubing

Internal structure designed for optimal operation

Note. Example shown is YK500XG.

Large
type

P.309



YK1200X

- Arm length : 1200mm
- Maximum payload : 50kg

Ceiling-mount
Inverse

Wall-mount / inverse model

P.310



Wall-mount type

Inverse type

- Wall-mount type
Type where the robot body is installed in the wall.
- Inverse type
Type where wall-mount type is mounted upside down.
- Built-to-order product. Contact us for the delivery period.

Dust-proof
Drip-proof

Dust-proof & drip-proof model

P.320



YK250XGP
YK350XGP
YK400XGP
YK500XGLP
YK600XGLP

YK500XP/YK600XP
YK700XP/YK800XP
YK1000P

Plays active part in the working environment with much water or dust (protection class equivalent to IP65).^{Note}

- Please consult our company for anti-droplet moisture protection for other than water.
- Built-to-order product. Contact us for the delivery period.



YK250XGP to 600XGLP
(Arm section)



YK250XGP to 600XGLP
(Base section)



YK500XP to 1000XP

- Equipped with anti-dust, anti-droplet connector to protect user wiring.

(Number of wires : 10 for YK250XGP to YK400XGP, 20 for YK500XP to YK1000XP)

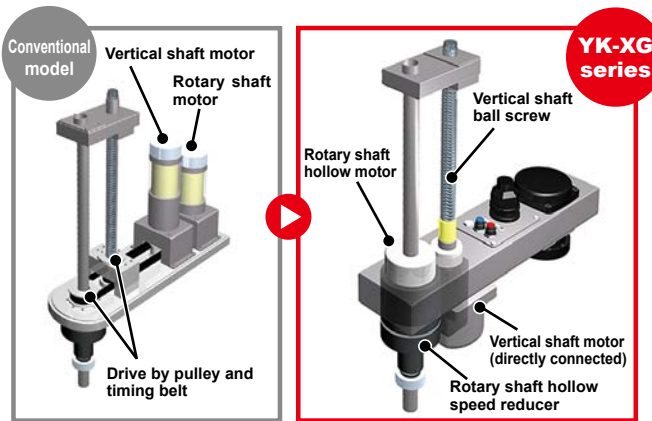
- Equipped with a port for air-purging joints of X, Y and R axes.

Note **IP 65** — **Class of protection against invasion of water : 5**
Prevents adverse effects by protecting from water injected from any direction. The standard requires to comply with conditions including the pressure of injected water of 30 KPa (30 KN/m² or 0.3 kgf/cm²), rate of injection of 12.5 liters/minute, and period of injection of 3 minutes.
Note. Water injected with the pressure over the above standard may invade the unit.
Class of protection against solid objects : 6
No invasion of dust.

Point 1

Completely beltless structure

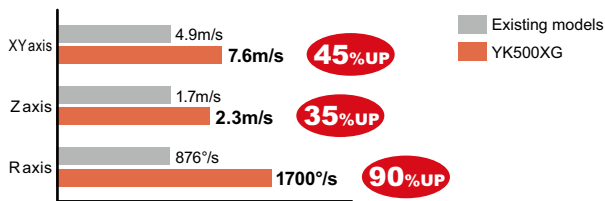
A totally beltless structure was achieved by using a ZR axis direct coupling structure. This direct drive structure drastically reduces wasted motion. It also maintains high accuracy over a long period of time. It ensure maintenance-free usage for extended periods with no worries about belt breakage, stretching or deterioration with age (feature applies to all XG series models and the YK180X/YK220X).



Point 2

High speed

The standard cycle time is fast of course but the YAMAHA design also stresses tact time in the actual usage region. A drastic improvement in maximum speed was made by changing the gear ratio and maximum motor rpm. This also resulted in a better tact time during long distance movement.



Point 3

Improved maintenance features

The covers on the YAMAHA SCARA robot YK-XG series can be removed from the front or upwards. The cover is separate from the cable so maintenance tasks are easy.

On ordinary robots replacing the grease on the harmonic gear takes a great deal of time and trouble because the gear must be disassembled and position deviations might occur. On YAMAHA SCARA robots however the harmonic gear is the grease-sealed type so no grease replacement is needed (YK-500XG to YK1000XG).

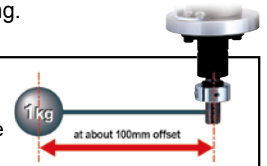
Point 4

Robot R axis inertia moment capacity

SCARA robot performance is not limited to just standard cycle time. Actual work situations include a diverse range of heavy work pieces as well as work with large offsets. Using a low R axis inertia moment in those cases will help drastically cut the cycle time. All YAMAHA SCARA robots have a speed reducer directly coupled to the tip of the rotating axis. The R axis produces an extremely high allowable inertia moment which delivers high speed operation compared to structures where positioning is usually done by a belt after decelerating.

YK120XG
(R axis allowable moment inertia : 0.1kgfcm²)

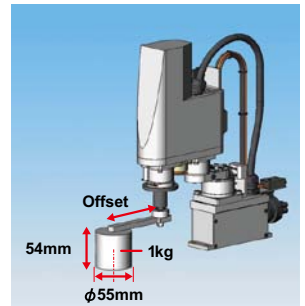
If the tip load weight is 1kg, it is possible to operate at about 100mm offset.



● R axis allowable inertia moment : Comparing YK120XG with competitor's models

A large inertia is generated when the offset from the R axis to the load center is large and this can severely restrict the acceleration during operation.

The allowable inertia moment on the YAMAHA XG series is exceedingly large compared to other company SCARA robots in the same class and so can operate at high speed even with a work offset.



Figures when using 1kg load (see view at upper right)

Offset (mm)	Inertia (kgfcm ²)	Operation	
		YK120XG	A Corp.
0	0.0039	○	○
45	0.025	○	×
97	0.1	○	×

○ : Operation OK

× : Operation deviates from allowable range of catalog values

◆ R axis allowable inertia moment: YK120XG.....0.1kgfcm²
A Corporation.....0.0039kgfcm²

Point 5

Hollow shaft and tool flange options are selectable

Useful options include a hollow shaft for easy wiring to the tip tool and a tool flange for tool clamping.

* YK250XG/YK350XG/YK400XG/YK500XGL/YK600XGL



Hollow shaft option for easy routing of air tubes and harness wires



Tool flange option for easy mounting of a tool to the tip

Point 6

Environmentally rugged resolver provides closed loop control



The position detector is a resolver. The resolver has a simple yet strong structure using not electronic components or elements and so has great features such as being extremely tough in harsh environments as well as a low breakdown rate. The resolver structure has none of the detection problems that occur in other detectors such as optical encoders whose electronic components breakdown or suffer from moisture or oil that sticks to the disk. Moreover, **mechanical specifications for both absolute and incremental specifications are common to all controllers** so one can switch to either absolute or incremental specifications just by setting a parameter.

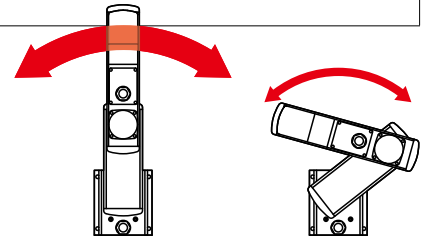
Also even if the absolute battery is completely worn down, the SCARA can operate on incremental specifications so in the unlikely event of trouble one can feel secure knowing that there will be no need to stop the production line. The backup circuit has been completely renovated and now has a backup period extending to 1 year.

Note. The resolver has a simple structure not using electronic components at all. It is highly resistant to low and high temperatures, impacts, electrical noise, dust particles, oil, etc. and is used in automobiles, trains, and airplanes.

Point 7

Zone control (=Automatically sets the maximum acceleration/deceleration) function

On SCARA robots there is a large difference in the load applied to the motor and the speed reducer depending on whether the robot arm is folded or extended. YAMAHA SCARA robots however **can automatically set** an optimal maximum acceleration and deceleration using the arm status when starting operation and the arm status when ending operation. This capability means that just entering the initial payload will prevent the robot from exceeding tolerance values for **motor peak torque** and **speed reducer allowable peak torque**. So full power can be extracted from the motor whenever needed and a high level of acceleration/deceleration maintained.



Note. A motor torque that exceeds the peak value will cause bad effects on robot controllability and cause mechanical vibration. Also, exceeding the speed reducer allowable peak torque value will cause early stage robot breakdowns and lead to a drastic drop in the robot service life span.

Type	Model	Arm length (mm)	Maximum payload (kg)	Standard cycle time (sec) ^{Note 2}	Detailed info page	
Standard	Orbit type	NEW YK500TW	500	4.0	0.29	P.284
		YK120XG	120			P.286
	Tiny type	YK150XG	150		0.33	P.287
		YK180XG	180	1.0		P.288
		YK180X	180		0.39	P.289
		YK220X	220		0.42	P.290
	Small type	NEW YK250XG	250			P.292
		NEW YK350XG	350	5.0 (4.0) ^{Note 3}	0.49	P.294
		NEW YK400XG	400			P.296
	Medium type	NEW YK500XGL	500	5.0 (4.0) ^{Note 3}	0.59	P.298
		YK500XG	500	10.0	0.45	P.300
		NEW YK600XGL	600	5.0 (4.0) ^{Note 3}	0.63	P.301
		YK600XG	600	10.0	0.46	P.303
		YK600XGH	600		0.47	P.304
		YK700XG	700		0.42	P.305
		YK800XG	800	20.0	0.48	P.306
		YK900XG	900		0.49	P.307
	Large type	YK1000XG	1000		0.49	P.308
YK1200X		1200	50	0.91	P.309	
Ceiling-mount / inverse type	NEW YK300XGS ^{Note 1}	300	5.0 (4.0) ^{Note 3}	0.49	P.310	
	NEW YK400XGS ^{Note 1}	400			P.312	
	NEW YK500XGS	500	10.0	0.45	P.314	
	NEW YK600XGS	600		0.46	P.315	
	NEW YK700XGS	700		0.42	P.316	
	NEW YK800XGS	800	20.0	0.48	P.317	
	NEW YK900XGS	900		0.49	P.318	
	NEW YK1000XGS	1000		0.6	P.319	
Dust-proof & drip-proof type	NEW YK250XGP	250			P.320	
	NEW YK350XGP	350	5.0	0.49	P.322	
	NEW YK400XGP	400			P.324	
	NEW YK500XGLP	500	4.0	0.74	P.326	
	NEW YK500XGP	500	8.0	0.55	P.328	
	NEW YK600XGLP	600	4.0	0.74	P.329	
	NEW YK600XGP	600	8.0	0.56	P.331	
	NEW YK600XGHP	600		0.57	P.332	
	NEW YK700XGP	700		0.52	P.333	
	NEW YK800XGP	800	18.0	0.58	P.334	
NEW YK900XGP	900		0.59	P.335		
NEW YK1000XGP	1000			P.336		

Note 1. The YK300XGS and YK400XGS are made-to-order items.

Note 2. Standard cycle time: with 2kg payload.

Note 3. When an option (tool flange option or hollow spline shaft option for user wiring/tubing) is installed, the maximum payload is 4kg.