YAMAHA ROBOT

History and approach

30 years of proven reliability.

YAMAHA’s robot development started as it was introduced in our motorcycles production line more than 30 years ago.

Since then, YAMAHA’s industrial robots have supported production equipment in a wide variety of industries, such as assembly of electronic products, transfer of in-vehicle components, and manufacture of large-scale LCD panels.

Over the years YAMAHA has striven to develop and improve the market and this is a testament to YAMAHA’s reliability.

Technical development based on the originally developed technologies and focusing on the needs of the market

‘Motor control technology’ absolutely necessary for precise and high-speed operation
‘Controller development technology’ is based on the highest evaluation standards and Signal processing technology allowing stable operation even under severe environmental conditions.

Rigidity, durability, and operability are features of YAMAHA’s products based on ‘Eco-technology’.

Evaluation system provides high reliability

YAMAHA continues to evaluate technology to assure product quality and reliability in the product development phase. This is achieved through the ‘anechoic chamber’ (YAMAHA’s equipment) to develop safe and reliable devices with the highest quality and reliability.

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YAMAHA ROBOT LINE UP

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Rigidity, durability, and operability are features of YAMAHA’s products based on “Control technology”.

Evaluation system provides high reliability

YAMAHA continues to evaluate technology to assure product reliability. In the product development phase, the evaluation is carried out “Anechoic chamber” (YAMAHA's equipment) to measure the high reliability and quality.

Verification process: This sequence is created to guarantee the best YAMAHA ROBOT, compliance with the international standards.

YAMAHA quality ensuring safety

Manufacturing, sales, and technology integrated system is utilized at its maximum level to establish a system that consistently perform a series of inspection, inspection, inspection, and “Anechoic chamber” (YAMAHA’s equipment) to measure the quality and reliability.

YAMAHA ROBOT LINE UP

CLOSED LOOP STEPPING SINGLE-AXIS ROBOTS

Compact & economical single-axis with cost of the stepping motor and

robot, TRANSERVO series, function of servo motor.

Closed-loop control for position feedback

Stepping motors provide great features such as low cost, yet they have a disadvantageous features at high speed and heavy current consumption when stopped.

The TRANSERVO by YAMAHA eliminates all these problems by adopting an innovative vector control method. In effect, the TRANSERVO delivers the same functions of a servo motor while using a lower cost stepping motor.

<table>
<thead>
<tr>
<th>Stepping Motors</th>
<th>Servo Motors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single phase &amp; two phase when it stops.</td>
<td>Digital design &amp; two phase when it stops.</td>
</tr>
<tr>
<td>ENGROWER, OPENING MODE</td>
<td>ENGROWER, OPENING MODE</td>
</tr>
<tr>
<td>Single-axis &amp; not back drive</td>
<td>Single-axis &amp; back drive</td>
</tr>
<tr>
<td>Energy saver</td>
<td>Energy saver</td>
</tr>
</tbody>
</table>

TRANSERVO combines the best features of both types

SG type (Slider type) Features & Benefits

Dynamic payload capacity of 46 kg (horizontal) and 20 kg (vertical).

As single phase and two phase motor are adopted, the payload is increased greatly. A maximum payload of 46 kg is achieved. This is the result of the vertical specifications.

Maximum speed of 1200 mm/sec.

The maximum speed is made 1 meter faster than that of the current model SSG06. The fact that all the equipment cost is achieved.

SS type (Slider type) Features & Benefits

High-speed operation slashes production time

Replacing the motor with the TRANSERVO maintains a constant payload even in the high-speed range. This helps to drastically cut down on the tact time. By combining this feature with high-load ball screws, the TRANSERVO has achieved a maximum speed of 1 meter per second which is as fast as single-axis servo motors in the same category.

Ideal 4-row circular groove 2-point contact guide provides longer service life

The guide maintains a satisfactory sliding movement with minimum ball differing. Even at a large magnitude load is applied or the installation surface accuracy (Refer to load) is low. The rigid design ensures that breakdowns from problems like abnormal wear will seldom occur.

SR type (Rod type) Features & Benefits

Long-term maintenance free.

A lubricator used in the ball screw and a grease-saving lubrication system. This helps to drastically cut down on the tact time. By combining this feature with high-load ball screws, the TRANSERVO has achieved a maximum speed of 1 meter per second which is as fast as single-axis servo motors in the same category.

The position detector is a resolver. The position detector in a resolver type has a longer life span compared to other detectors such as optical encoders whose electronic components break down or suffer from moisture, or oil that seeps to the disk.

RF type (Rotary type) Features & Benefits

First rotation axis model in TRANSERVO series

Maximum speed 420°/sec, Repeatability ±0.05mm. The RF type is a thin flexible motor that can be used in a wide variety of applications. The RF type can be used in the rotation transfer after chucking or the vertical rotation operation by combining it with the proper rod type.

BD type (Belt type) Features & Benefits

For long stroke applications

Maximum stroke 2000mm, Maximum speed 1000mm/sec. This type is applicable in the rotational motion of the rotation transfer model. A maximum stroke is 2000mm, ensuring high-speed operation. The motor body can be conveniently installed without removing exterior parts, such as the siren. Additionally, the encoder is provided as standard accessory. It helps the guide and belt securely to prevent loose from swinging and to drive the external length objects. This type is optimal for workspace positioning or long-distance transfer.
Single-axis robot series include 6 types and 29 variations for a wide range of selections.

Resolver with excellent environmental resistance capability
Resolver with high reliability is adopted to detect the motor position. This enables stable position detection even in a harsh environment where powder particles or oil mists exist. Additionally, a high resolution of 20480 pulses per revolution is provided.

4-row circular groove 2-point contact guide to support large moment load.
4-row circular groove 2-point contact guide with less differential slip is adopted. According to its structure, the differential slip of the ball is small when compared to the 3-row Gothic arch groove 4-point contact guide. This guide maintains excellent rigidity even when large moment loads are applied or the installation surface accuracy is poor, and its characteristics that are difficult to produce a friction, such as unusual wear.

Long-service life greatly reduces the maintenance and control costs.
YAMAHA’s highly rigid ball screw or guide greatly contributes to reduction of the customer’s maintenance and control costs. The service life can be calculated based on the grounds at YAMAHA’s website.

Low cost by YAMAHA’s in-house design components.
YAMAHA originally developed the magnetic scale and still manufactures it. As YAMAHA also manufactures other major components, large cost reduction is achieved. Today is an era that the linear is not a special mechanism and can be appropriately selected in comparison to the ball screw.

Particularly, when transferring a lightweight workpiece a long distance at a high speed, selecting the linear motor type will reduce the cost. YAMAHA originally developed the magnetic scale and still manufactures it. As YAMAHA also manufactures other major components, large cost reduction is achieved. Today is an era that the linear is not a special mechanism and can be appropriately selected in comparison to the ball screw.

Comparison of single-axis robot models

<table>
<thead>
<tr>
<th>Model</th>
<th>Unit Cost (**)</th>
<th>Maximum speed (mm/sec)</th>
<th>Payload (kg)</th>
<th>Repeatability (µm)</th>
<th>Maximum stroke (mm)</th>
<th>Frame dimension (WxHxD-mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF7-750</td>
<td>1800</td>
<td>10/5/1.7</td>
<td>10</td>
<td>±10</td>
<td>1450</td>
<td>174x85x110</td>
</tr>
<tr>
<td>B10-145</td>
<td>1650</td>
<td>10</td>
<td>±60</td>
<td>2550</td>
<td>200x1481</td>
<td></td>
</tr>
</tbody>
</table>

High speed , Long stroke
The ultimate appeal of linear motor single-axis robots is that there is no critical speed limits such as with ball screws. There is no reduction in the maximum speed even when traveling long distances. Moreover, the maximum stroke is a standard setting of 2m on the MF type and 2.5m on the MF type. The cycle conveyance has been drastically improved.

Standard double carrier set-up for space saving and high efficiency.
Cost and space are reduced when compared to the use of two single-axis robots. Additionally, the axis alignment is not needed and the tools can also be made common. This shortens the setup time. (When using the RCX series controller, the anti-collision control function can be used.)

160 kg maximum payload capacity of MF Series
The MF series robot adopts the flat type magnet. It can transfer a heavy object at a high speed with a high accuracy.

Lower noise level and longer life
Comparing with ball screw type robots, there are few sliding and rotating sections so the operation is amazingly quiet. Moreover the coil and magnet do not make contact so there is no wear and the robot can be used for extended periods.
FLIP-X Series
SINGLE-AXIS ROBOTS

Single-axis robot series include 6 types and 29 variations for a wide range of selections.

- **T** Compact model
- **N** Nut rotation model
- **F** High rigidity model
- **B** Timing belt drive model
- **R** Rotary axis model

Resolver with excellent environmental resistance capability

Resolver with high reliability is adopted to detect the motor position. This enables stable position detection even in a harsh environment where powder particles or oil mist exist. Additionally, a high resolution of 20480 pulses per revolution is provided.

4-row circular groove 2-point contact guide to support large moment load.

4-row circular-groove 2-point contact guide with less differential slip is adopted. According to its structure, the differential slip of the ball is small when compared to the 3-row gothic-arch groove 4-point contact guide. This guide maintains excellent rigidity even when large moment loads are applied or the installation surface accuracy is poor, and its characteristics that are difficult to produce a malfunction, such as unusual wear.

Resistor with excellent environmental resistance capability

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<tbody>
<tr>
<td>MF7-153</td>
<td>5000</td>
<td>2500</td>
<td>35</td>
<td>10</td>
<td>2050</td>
<td>200x100x110</td>
</tr>
<tr>
<td>MF15</td>
<td>5500</td>
<td>3000</td>
<td>50</td>
<td>10</td>
<td>2050</td>
<td>200x100x110</td>
</tr>
<tr>
<td>MF20</td>
<td>6000</td>
<td>3500</td>
<td>75</td>
<td>10</td>
<td>2100</td>
<td>200x100x110</td>
</tr>
<tr>
<td>MF75</td>
<td>6500</td>
<td>4000</td>
<td>100</td>
<td>10</td>
<td>2500</td>
<td>250x100x110</td>
</tr>
<tr>
<td>MF30</td>
<td>7000</td>
<td>4500</td>
<td>150</td>
<td>10</td>
<td>3000</td>
<td>250x100x110</td>
</tr>
<tr>
<td>MF10</td>
<td>7500</td>
<td>5000</td>
<td>200</td>
<td>10</td>
<td>3500</td>
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High speed / Long stroke

The ultimate appeal of linear motor single-axis robots is that there is no critical speed limits such as with ball screws. There is no reduction in the maximum speed even when traveling long distances. Moreover, the maximum stroke is a standard setting of up to 2m on the MF type and up to 3m on the MR type. The circular conveyance has been drastically improved.

Standard double carrier set-up for space saving and high efficiency.

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160 kg maximum payload capacity of MF Series

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Lower noise level and longer life

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PHASER Series
LINEAR MOTOR SINGLE-AXIS ROBOTS

No speed deration needed up to 4m long stroke. Delivers superb performance in long distance transport.

 resolver
Wide variety of pre-configured multi-axis systems to choose from.
From compact economical light duty to large heavy duty systems.

Detection: Resolver

The position detector is a resolver. The resolver has a simple yet strong structure using non-electronic components or elements and 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 break down or suffer from moisture and oil that stick to the disk. Moreover, mechanical specifications for both absolute and incremental 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 XY-X 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.

Field Serviceable Structure

We achieved an even lower price by cutting down the number of parts while boosting basic performance. Using a resolver in the structure helped to finally eliminate the “absolute units are expensive” idea. Moreover, the mechanical components are the same regardless of whether incremental or absolute specifications are used.

Economy Solution

IDEAL FOR HIGH-SPEED PICK & PLACE TASKS

Ideal for high-speed pick & place tasks of small parts.
Positioning by servo control to eliminate mechanical adjustment.

One controller for multiple single-axis robots.
The advantage of multi-axis controller operation

- Sequence control is simple. System upgrades are inexpensive.
- More compact and saves more space than when operating multiple single-axis controllers.
- Allows more sophisticated control.
- Multi-axis controllers RK221/ RK240 provide mixed control of the [linear single-axis] PHASER series and FLIP-X series.

Robot set-up

2-axis controller setting: Using a multi-task program along with this 2-unit setting allows asynchronous multi-axis operation. Using the above setting on an auxiliary axis setting allows even more freedom in operating small parts.

Synchronized double carrier:
This setting allows adding 2 motors to 1 axis on robot types where the motor unit runs separately such as the linear single-axis PHASER series or the R-type (nut-rotation type) FLIP-X series.

Main auxiliary axis setting:
Use the auxiliary axis setting when simultaneous movement with the MOVE command is impossible. An axis set for the main auxiliary axis moves only by the DRIVE command (axis separate movement) and cannot operate from the MOVE command. Using this setting is recommended for operating on an axis that is not synchronized with the main robot.

Synchronized dual setting:
Make this setting when operating dual-drive (2-axis simultaneous control). Use the dual drive setting on gantry type Cartesian robots having a long Y axis stroke when stabilizing at high acceleration/deceleration or when high thrust is needed with high loads.

4-row 2-point groove guide rail for superb durability.

4-row circular-arc groove 2-point contact guide with less differential slip is adopted. When compared to the 2-row circular arch groove 4-point contact guide, the 4-row circular-arc 2-point contact guide has characteristics that the differential slip of the ball is small due to its structure and excellent rolling motion is maintained even when a large moment load is applied or the installation surface accuracy is poor. So the guide is difficult to produce a malfunction, such as unusual wear.

Ideal for high-speed pick & place tasks of small parts.
Positioning by servo control to eliminate mechanical adjustment.

Durable and Reliable Position

The position detector is a resolver. The resolver has a simple yet strong structure using non-electronic components or elements and 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 break down or suffer from moisture and oil that stick to the disk. Moreover, mechanical specifications for both absolute and incremental are common to all controllers so one can switch to either absolute or incremental specifications just by setting a parameter.

Wide variety of pre-configured multi-axis systems to choose from.
From compact economical light duty to large heavy duty systems.

Field Serviceable Structure

Even though it uses a built-in structure, components such as the motor and ball screw can be replaced individually so maintenance tasks are smooth and simple.

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4-row 2-point groove guide rail for superb durability.

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Durable and Reliable Position Detection: Resolver
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Economy Solution
We achieved an even lower price by cutting down the number of parts and simple.

Field Serviceable Structure
Even though it uses a built-in structure, components such as the motor and ball screw can be replaced individually so maintenance tasks are smooth and simple.

YP-X Series
PICK & PLACE ROBOTS
Quick selection table ➤ P21

Ideal for high-speed pick & place tasks of small parts.
Positioning by servo control to eliminate mechanical adjustment.

YP- X Series
CARTESIAN ROBOTS
Quick selection table ➤ P19

Wide variety of pre-configured multi-axis systems to choose from.
From compact economical light duty to Large heavy duty systems.

Multi-Flip / Multi-Phaser
MULTI-AXIS ROBOT

One controller for multiple single-axis robots.

The advantage of multi-axis controller operation
● Sequence control is simple. System upgrade is inexpensive.
● More compact and saves more space than when operating multiple single-axis controllers.
● Allows more sophisticated control.
● Multi-axis controllers RCK221/RCK240 provide mixed control of the (linear single-axis) PHASER series and FLIP-X series.

Robot set-up
2-unit robot setting:
Using a multi-task program along with this 2-unit setting allows asynchronous high-speed pick & place operation. Using this along with an auxiliary axis setting allows even more freedom in handling tasks.

Synchronized double carrier:
This setting allows adding 2 motors to 1 axis on robot types where the motor unit runs separately such as the linear motor single-axis PHASER series or the H-type (nut rotation type) PHASER series.

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YP220BX, YP320X, YP330X)
are assured.

Compact size
Compact size with an overall length of 1.35m (YP220BX) and moving distance of 109mm (YP220BX) and moving distance of 109mm (YP220BX) and moving distance of 109mm (YP220BX) and moving distance of 109mm (YP220BX).
Arm length of 120mm to 1200mm. Widest selection in industry. High-speed high-precision operation contributes to increased productivity.

Tiny type SCARA model

- YK120XG, YK120XG
  - Arm length: 120mm to 330mm
  - Maximum payload: 5kg

Medium type

- YK250XG, YK250XG
  - Arm length: 350mm to 600mm
  - Maximum payload: 10kg

- YK400XG, YK400XG
  - Arm length: 400mm to 1000mm
  - Maximum payload: 20kg

- YK500XG, YK500XG
  - Arm length: 500mm to 1000mm
  - Maximum payload: 50kg

Wall-mount / inverse model

- YK500XG, YK500XG
  - Arm length: 500mm to 1000mm
  - Maximum payload: 20kg

Dust-proof & drip-proof model

- YK500XG, YK500XG
  - Arm length: 500mm to 1000mm
  - Maximum payload: 20kg

Features of wall-mount / inverse type

- Completely beltless structure ensures high rigidity.
- Improved maintenance features
- Dust-proof and drip-proof type

Superior performance at low cost

Dust-proof and Drip-proof type

Bellows improved dust/drip-proof capability

The conventional robot was renovated to a Dust-proof and drip-proof type comprising a completely beltless structure that can be used in a work environment where water droplets or dust particles scatter. Bell deterioration is eliminated and the robot is highly resistant to harsh environments. Additionally, using optical belts offers high rigidity, which allows this robot to be used in highly demanding fields.

YK-XG Series

Direct Drive beltless model

YK-XR

Low cost high performance model

YK-XG Wall-mounted / inverse model

YK-XGP Dust-proof & drip-proof model

30 Years of History

The first robot YAMAHA released was YK-XR model. Since then, YK-XG model have been produced in 1979, some 30 years of YK-XG SCARA robots have been developed. These SCARA robots have undergone countless modifications, in an ever-changing market, and amassed a hefty record of successful products making them an essential part of the YAMAHA robot lineup.

High-speed high-precision operation contributes to increased productivity.

- Using a completely beltless structure exclusively, 29% to 35% increase in maximum speed is achieved compared to the conventional model.
- The standard cycle time is fast, but the YAMAHA design also stresses cycle 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 cycle time during long-distance movement.

Environmentally rugged resolver provides closed loop control

- The position detector is a resolver. The resolver has a simple yet strong structure using no electronic components or elements so these features make the structure extremely tough in harsh environments with a low breakdown rate.
- The resolver has no of the detection problems that occur in other detectors such as optical-encoders whose electronic components break down or suffer from moisture or dirt at the plate, etc. Moreover, specifications for both absolute and incremental are common to all controllers so one can switch to either absolute or incremental just by setting a parameter.
- Also if the absolute battery is completely worn down, the SCARA can operate on incremental. 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 removed and now a backup period extending 1 year.

Superior rotary 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 allows the robot to maintain a high level of high precision and high speed. The standard cycle time is fast, but the YAMAHA design also stresses cycle 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 cycle time during long-distance movement.

Optical encoder

- Magnetic type with only the iron core and ensuring less potential failure
- High rigidity is imparted and electric noise

 resolver

- Electronic parts are required and structure is complicated.
- Easily damaged with dust, condensation, oil, etc.

Optical encoder

- Simple structure with only the iron core
- Extremely tough in harsh environments with a low breakdown rate.
- Using not electronic components or elements so these features make the structure extremely tough in harsh environments with a low breakdown rate.

Completely beltless structure

- A totally beltless structure was achieved by using a 2R axis direct coupling structure for the direct drive three structure drastically reduces wasted motion. It also maintains high accuracy over a long period of time. It ensure maintenance-free usage for at least 10 years without any problems about belt breakage, detecting or determination with age (features apply to all XG series models and the YK1000XG/16220XG).

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High speed

- The standard cycle time is fast, but the YAMAHA design also stresses cycle 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 cycle time during long-distance movement.

Dust-proof and drip-proof type

- Bellows improved dust/drip-proof capability

- Equivalent to protection grade IP06X(IP66X/02X)
- Dust-proof and drip-proof connector for use wiring is available as a standard.

Hollow shaft and tool flange options are selectable

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

Improved maintenance features

- The covers on the YAMAHA SCARA robot YK-XG series can be removed from the front or upward. The cover is separate from the cable so maintenance tables are easy. An ordinary robot replacing the grease on the harmonic gear takes a great deal of time and trouble because the gear must be disassembled and position deviations may occur. However, the harmonic gear in the grease sealed type so no grease replacement is needed (YK500XG to YK1000XG).

YK-XG series

Conventional model

- Vertical shaft motor and Rotary shaft harmonic motor

- Vertical shaft motor and Rotary shaft harmonic motor

YK-XG series

- Vertical shaft motor and Rotary shaft harmonic motor

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- Equivalent to protection grade IP06X(IP66X/02X)
- Dust-proof and drip-proof connector for use wiring is available as a standard.
Arm length of 120mm to 1200mm.
Wide selection in industry.
High-speed high-precision operation contributes to increased productivity.

**Tiny type SCARA model**
- YK120XG / YK120XGP / YK120XGK#
  - Arm length: 120mm to 220mm
  - Maximum payload: 1kg
  - Arm length: 220mm to 300mm
  - Maximum payload: 1kg

**Medium type**
- YK300XG
- YK400XG
- YK500XG
- YK600XG
  - Arm length: 300mm to 400mm
  - Maximum payload: 8kg to 20kg

**Large type**
- YK700XG
- YK1000XG
- YK1200X
  - Arm length: 500mm to 600mm
  - Maximum payload: 20kg

**Wall-mount / inverse model**
- YK250XG
- YK300XG
- YK400XG
- YK500XG
  - Arm length: 300mm to 400mm
  - Maximum payload: 20kg

**Dust-proof & drip-proof model**
- YK250XGP
- YK300XGP
- YK400XGP
- YK500XGP
  - Arm length: 300mm to 400mm
  - Maximum payload: 20kg

**Note:**
- Example shown is YK500XG.

### Environmentally Resolved Resolver provides closed loop control

The resolver has a simple yet strong structure using no electronic components or elements so these features make the structure extremely tough in harsh environments with a low backlash rate. The resolver structure has none of the detection problems that occur in other detectors such as optical encoders whose electronic components break down or suffer from moisture or oil that sticks to the disk. Moreover, specifications for both absolute and incremental are common to all controllers so one can switch to either absolute or incremental just by selecting a parameter. Also if the absolute battery is completely worn down, the SCARA can operate on incremental 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.

### High-reliability resolver

The position detector is a resolver. The resolver has a simple yet strong structure using no electronic components or elements so these features make the structure extremely tough in harsh environments with a low backlash rate. The resolver structure has none of the detection problems that occur in other detectors such as optical encoders whose electronic components break down or suffer from moisture or oil that sticks to the disk. Moreover, specifications for both absolute and incremental are common to all controllers so one can switch to either absolute or incremental just by selecting a parameter. Also if the absolute battery is completely worn down, the SCARA can operate on incremental 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.

### Improved maintenance features

The covers on the YAMAHA SCARA robot YK-XG series can be removed from the front or rearwards. The cover is separate from the cable so maintenance task is easy. An ordinary robot replacing the grease on the harmonic gear takes a great deal of time and trouble because the gear must be disassembled and position corrections must be carried out in the event of grease leakage but the harmonic gear in the grease-sealed type as no grease replacement is needed (YK-500XG to YK1000XG).

### Superior performance at low cost

Entry models are provided at YAMAHA’s lowest price without changing specifications.

### Features of wall-mount / inverse type

Completely beltless structure ensures high rigidity.

### Dust-proof and Drip-proof type

Bellows improved dust/drip-proof capability.
Superior Positioning Accuracy and High Speed
Enables a smaller equipment footprint by eliminating the dead space at the center of the movement range.

YK-TW can move anywhere through the full ±1000 mm² work envelope. Featuring a ceiling-mount configuration with a wide arm rotation angle, the YK-TW can access any point within the full ±1000 mm downward range. This eliminates all motion-related restrictions with regard to pallet and conveyor placement operations, while dramatically reducing the equipment footprint.

YK-TW offers a repeated positioning accuracy of ±0.01 mm² (XY axes). Higher repeated path linearity than that of 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.

Ideal for narrow space applications

YK-TW offers both a lower profile and a smaller footprint. YK-TW height is only 302 mm. This compact size enables more freedom in the equipment layout design.

YK-TW has a total height of only 392 mm, and weighs only 27 kg.

YK-TW offers a lower profile and a smaller footprint.

Class 10 rating sealed structure reduces particle generation, and air-intake efficiency improvement to establish both high cleanliness and high performance.

YK-XGC/XC Clean room SCARA robots
- Arm length: 1000mm to 1000mm
- Intake air: 30 to 50N/min
- Degree of cleanliness: CLASS ISO3 (ISO14644-1)
- Maximum payload: 20kg

Completely beltless structure improves rigidity.

FLIP-XC Clean room Single-axis robots
- Stroke: 30 to 2050mm
- Intake air: 30 to 50N/min
- Cleanliness rating: CLASS 10
- Maximum payload: 120kg (Horizontal installation)

Clean room Single-axis robots (TRANSERVO)
- Stroke: 30 to 800mm
- Intake air: 15 to 50N/min
- Cleanliness rating: CLASS 10
- Maximum payload: 12kg (Horizontal installation)

Clean room applications of “FLIP-X series.” An appropriate model suitable for the application can be selected from 14 models ranging from lightweight and compact model to large model with a maximum payload of 120kg. A suction joint is available as a standard, low dust emission grease is used, and dust exclusion sheet with excellent durability is mounted on the slide table surface to achieve high cleanliness.

Improved maintenance features

XYZ-Clean room cartesian robots
- Intake air: 60 to 120N/min
- Cleanliness rating: CLASS 10
- Maximum payload: 20kg
- Maximum speed: 1000mm/sec
- Note: User tube 0.6×35 pin connector 34 conductors, 0.3 sq
- Note: User tube hose 6 air tubes

Clean room application type of “Cartesian robot.” Use of stainless steel clients with excellent durability makes it possible to design the opening at its minimum level. Furthermore, on a super-high speed unit of the SEAWAN speed is used for the 20th second of 8000, the cycle time is greatly shortened.

FLIP-X Clean room Single-axis robots
- Stroke: 30 to 3000mm
- Intake air: 15 to 50N/min
- Cleanliness rating: CLASS 10
- Maximum payload: 170kg (Horizontal installation)

Clean room specifications of “FLIP-X series.” An appropriate model suitable for the application can be selected from 14 models ranging from lightweight and compact model to large model with a maximum payload of 170kg. A suction joint is available as a standard, low dust emission grease is used, and dust exclusion sheet with excellent durability is mounted on the slide table surface to achieve high cleanliness.

Bellows on vertical axis improves reliability of the clean performance.

Clean room Single-axis robots (TRANSERVO)
- Stroke: 30 to 800mm
- Intake air: 15 to 50N/min
- Cleanliness rating: CLASS 10
- Maximum payload: 12kg (Horizontal installation)

Clean room applications of “TRANSERVO series.” Use of a newly developed vector control system with adoption of stopping mode makes it possible to achieve the best performance and operability similar to the届毕业生 he lead axis.

A suction joint is available as a standard, low dust emission grease is used, and stainless steel sheet with excellent durability is mounted on the slide table surface to achieve high cleanliness.
YK-TW can move anywhere through the full \( \pm 1000 \text{mm} \) work envelope. Featuring a ceiling-mount configuration with a wide arm rotation angle, the YK-TW can access any point within the full \( \pm 1000 \text{mm} \) downward range. This eliminates all motion-related restrictions with regard to pallet and conveyer placement operations, while dramatically reducing the equipment footprint.

YK-TW offers a repeated positioning accuracy of \( \pm 0.01 \text{mm} \) (XY axes). Higher repeated pose and position accuracy than that of 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.

YK-TW offers both a lower profile and a smaller footprint. YK-TW height is only 392 mm. This compact size enables more freedom in the equipment layout design. YK-TW weighs only 27 kg. YK-TW has a total height of only 392 mm, and weighs only 27 kg.

Ideal for narrow space applications

Standard cycle time of 0.29 secs.\(^2\)

YK-TW offers a repeated positioning accuracy of \( \pm 0.01 \text{mm} \) (XY axes). Higher repeated pose and position accuracy than that of 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.

Bellows on vertical axis improves reliability of the clean performance.

FLIP-XC

Clean room Single-axis robots

- Stroke : 3D to 3050mm
- Intake air : 15 to 200N/m² min
- Cleanliness rating : CLASS 10
- Maximum payload : 120kg (Horizontal installation)

Clean room specifications of "FLIP-X series". An appropriate model suitable for the application can be selected from 3D max stroke range high-speed and compact model is large stroke with a maximum payload of 120 kg. A suction air joint is available as a standard, low dust emission grease is used, and bellows on vertical axis improve the cleanliness.

Improved maintenance features

XY-XC

Clean room cartesian robots

- Intake air : 0 to 250N/m² min
- Cleanliness rating : CLASS 10
- Maximum payload : 20kg
- Maximum speed : 1000mm/sec

Clean room application type of "Cartesian robot". Use of stainless steel sheet with excellent durability makes it possible to design the opening at its minimum level. The robot is applicable to CLASS10 with extreme safety. Furthermore, as the high-speed axis of the SEPAR axis is used for the 25-N/m² up to 300N/m², the cycle time is greatly shortened.
Wide range of control systems to choose from. From single axis positioner to multi-axis comprehensive absolute controller covering DC Stepping Motor, AC Servo Motor, and Linear Motor.

CONTROLLERS

Controller

IVY System

Simple "plug-and-play" set up with conveyor tracking features in one

IVY System layout

Gives you a ready-to-go robot controller equipped with an image processing function by just setting an IVY board in your 4-axis robot controller RX240 or RX240S. Putting "eyes" in your robot allows you to search and take workpieces, find deviations in workpiece position and make corrections even in the case of large errors, expanding the range of applications.

Seamlessly integrated vision system in robot controller

Other machine vision products on the market use different formats, so a coordinate conversion program had to be written into the controller.

The IVY system has an integrated controller so robot point data is stored in one easy step. Camera control and lighting control are handled by an integrated operation within the robot controller with an easy to understand operation that reduces the man-hours needed for equipment setup.

Super simple calibration

Conventional equipment combining "image processing equipment + robot" requires an extreme amount of time and trouble due to the task of "calibrating" that aligns the camera coordinates with the robot coordinates. On the IVY system however the operator only has to follow conversation-type instructions from the programming box as operation is simple and finishes in a short time.

The IVY system also automatically corrects these coordinates even if the robot installation position has changed during tasks such as clamping, clamping robot Z axis, and clamping the frame of a robot.

Powerful support software

The low-cost and high-performance TS-Manager allows anyone to perform all the tasks. It also comes loaded with real-time trace function such as current values, shape, load factors, current values, and voltage values.

Control using different programs

Controls using just one robot program

Just follow instructions on the Wizard!
CONTROLLERS

Wide range of control systems to choose from. From single axis positioner to multi-axis comprehensive absolute controller covering DC Stepping Motor, AC Servo Motor, and Linear Motor.

YAMAHA ROBOT LINE UP

TS-P Slave
3 / 4 axes

SR1-P Controller
12 / 16 axes

P12-13

CONTROLLERS

Simple "plug-and-play" set up with conveyor tracking features in one

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Simple and easy to understand

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Simple and easy to understand
**YAMAHA ROBOT LINE UP**

**i V Y 2 System**

**ROBOT VISION FOR THE RCX340**

A robot-integrated vision system means simplicity, high functionality, and reliability. Ease of original iVY, with greatly improved performance.

**Supporting five-megapixel cameras** *(Choose from 380,000 pixels, 2 megapixels, 2 megapixels and 6 megapixels).* Detailed edge detection is possible even if workpieces are touching each other or have a complex shape.

**254 types can be registered** Setup changes require only that part numbers are changed. Up to 254 types can be registered even if workpieces are touching each other or have a complex shape.

**Conveyor tracking capability up to 100 CPM.** The vision camera detects the position and orientation of parts on moving conveyor for pick & place application.

**System configuration illustration iVY2**

**Easy operation by YAMAHA's robot language.**

**Electric gripper**

**Gripping control**

**Multi-point Control**

**Workpiece presence check function**

**Electric gripper for high-precision gripping force, positioning, and speed control** YRG delivers gripping power control, speed and acceleration control, multi-point positioning, and measuring of workpiece, which have been difficult for air-driven devices. The YRG proves a flexible fit for a wide range of applications.

**Controllable with a single controller**

**Combination with a vision system supports a wide range of applications**

As the YRG series is combined with controller integrated robot vision “iVY2 System,” the operations from the positioning using the camera to workpiece handling can be controlled in the batch mode using the RCX340 controller. Sophisticated systems can be easily configured.

**Approximately double the search speed** Compared to previous model!

Even a large number of workpieces can be registered within a short time.

Approximately double that of the previous model. Even a large number of workpieces can be detected at high speed. This can be used for a wide variety of applications, including molded plastic parts or food items.

**System configuration illustration IVY2**

**With monitor output** Monitor the search status or search execution during automatic operation.

**Control multiple robots for additional increase in productivity.**

**Electric control**

**Fast adjustment of the stroke in the multi-axis direction**

**Multi-point Control**

**Electric control**

**Combination with a vision system supports a wide range of applications**

As the YRG series is combined with controller integrated robot vision “iVY2 System,” the operations from the positioning using the camera to workpiece handling can be controlled in the batch mode using the RCX340 controller. Sophisticated systems can be easily configured.

**Workpiece presence check function**

**Electric gripper outputs the HOLD signal.** Missing workpiece gripping and workpiece drop during transfer can be checked. No external sensor is needed.
A robot-integrated vision system means simplicity, high functionality, and reliability. Ease of original iVY, with greatly improved performance.

Supporting five-megapixel cameras* (Choose from 300,000 pixels, 1.3 megapixels, 2 megapixels and 5 megapixels).

Detected edge detection is possible even if workpieces are touching each other or have a complex shape.

Approximately double the search speed Comparing to previous models!

Even with a large number of workpieces, a single search allows detection even for a large workpiece, improving tact-up.

A single search shows detection for a large workpiece, improving tact-up.

Conveyor tracking capability up to 100 CPM.

The vision camera detects the position and orientation of parts on moving conveyor for pick & place application.

System configuration illustration iVY2

* The illustration above shows an example system with the tracking board and an iVY2 unit. (When the lighting control signal is turned on)

** Connections to the STD.DIO, ACIN, and SAFETY connectors are not shown in the above illustration.

With monitor output

Monitor the search status during automatic operation.

With monitor output

Monitor the search status during automatic operation.

254 types can be registered

Set changes require only that part numbers be changed.

Conveyor tracking capability up to 100 CPM.

The vision camera detects the position and orientation of parts on moving conveyor for pick & place application.

Control multiple robots for additional increase in productivity.

Easy operation by YAMAHA’s robot language.

YRG delivers gripping power control, speed and acceleration control, multi-point positioning, and measuring of workpieces, which have been difficult for air-driven devices. YRG proves a flexible fit for a wide range of applications.

Gripping force control

The gripping force can be set in 1% increments. A fragile or deformable workpiece, such as glass or rubber, can also be gripped. The gripping force is constant even when the finger position is changed.

Multi-point Control

The finger position can be set at 30% to 100% of the stroke. This contrib-utes to efficiency improvement of the line with corresponding to the workpiece size. This contributes to efficiency improvement of the line with corresponding to the workpiece size. This contributes to efficiency improvement of the line with corresponding to the workpiece size. This contributes to efficiency improvement of the line with corresponding to the workpiece size.

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Combination with a vision system supports a wide range of applications

As the YRG series is combined with controller integrated robot vision “iVY2 System,” the operations from the positioning using the camera to workpiece handling can be controlled in the batch mode using the RCK340 controller. Sophisticated systems can be easily configured.

* Can also be used with the RC340 controller
LINEAR CONVEYOR MODULES

From "simple flow" to "controlled move" 
Construct a rapid-throughput line for increased profitability.

Module system for easy line layout change
A transfer line is configured by connecting LC100 modules as required. Of course, new line configuration and line change can be started up rapidly by selecting excess modules for the maintenance of excess modules to other line, and storing at required. Of course, new line configuration can be performed speedily. Additionally, operations, such as inspection, and line change can be started up.

High-speed movement and smooth deceleration stop using servo control prevent mechanical stopper collision.
Smooth deceleration stop by servo control. Since workspace deviation by stopper collision or damage is eliminated, the high-speed movement is possible.

Efficient move between tasks in line
● Narrow pitch movement is possible.
● Movement time can be reduced by combining use of different movement, such as using pitch-feed for the same processes and pitch-time processes while transferring three workpieces at the same time as a high speed in long-time processes.

Performing tasks directly on the conveyor

Conventional system

- Has to retract the work from the pallet to the work table.

L C M 1 0 0

Work space can be eliminated a work table

L C M 1 0 0

Can perform work as the slider

High-speed movement

Narrow pitch movement

Conveyor line in the work table

High-speed movement

Narrow pitch movement

Accurate stop

Effective slider movement

Reduced space allows sophisticated system layouts

Since these robots can be installed close to workpieces or other equipment, you can reduce the space required for your production facility. The robots can perform the same processes as the robots close to each other, with each other, or while being to another location of the robots that can not be used, or to approach the workspace in a way that avoids obstructions, giving you more freedom to design the layout for shorter cycle time and reduced space.

"Elbow movement" unique to 7-axis models allows optimal posture to be maintained

The 7-axis U-type robots allow "elbow movement," changing only the elbow angle without affecting the position or posture of the tool. This allows the robots to move closer to the work area without interfering with each other, making it easier to work in tight spaces. This type of movement allows for greater flexibility and precision in applications requiring close proximity handling.

Increase productivity Ideal for constructing compact cells, moving and assembling small parts, or inspection processes.

Increase productivity Ideal for constructing compact cells, moving and assembling small parts, or inspection processes.
**TRANSEVO**

**CLOSED LOOP STEPPING MOTOR SINGLE-AXIS ROBOTS**

<table>
<thead>
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<th>Type</th>
<th>Size (mm) Note 1</th>
<th>Model</th>
<th>Load (mm)</th>
<th>Maximum payload(kg) Note 2</th>
<th>Maximum speed (mm/sec) Note 3</th>
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**Note 1:** Size is the approximate cross sectional size. **Note 2:** Maximum speed varies with the payload. See the SR type page for more details. **Note 3:** Maximum speed with arm type/cable carrier specifications.

**XY-X**

**CARTESIAN ROBOTS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Load (mm)</th>
<th>Maximum payload (kg)</th>
<th>Maximum speed (mm/sec)</th>
<th>Stroke (mm)</th>
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<tbody>
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<td>45</td>
<td>67</td>
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<td>W55 + H75</td>
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**Note 1:** Size is the approximate cross sectional size.
## T R A N S E R V O

### CLOSED LOOP STEPPING MOTOR SINGLE-AXIS ROBOTS

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### PH A S E R

#### LINEAR MOTOR SINGLE-AXIS ROBOTS

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### XY - X CARTESIAN ROBOTS

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<th>Maximum speed (mm/sec)</th>
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</table>

### FLIP - X SINGLE-AXIS ROBOTS

<table>
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<th>Maximum speed (mm/sec)</th>
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<tr>
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</table>

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**Note:** The above tables provide specifications and values. Please consult the user manual for detailed information.
Multipoint position control: 10,000 max.  
Workpiece size judgment: 0.01 mm units (by ZON signal)

Holding power control: 30 to 100% (1% steps)  
Speed control: 20 to 100% (1% steps)  
Acceleration control: 1 to 100% (1% steps)

YK-XG/YK-XR/YK-TW/YK-XGS/YK-XGP SCARA ROBOTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Arm length (mm)</th>
<th>Maximum payload (kg)</th>
<th>Standard cycle time (sec)</th>
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YK-XG/YK-XR/YK-TW/YK-XGS/YK-XGP SCARA ROBOTS

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<tr>
<th>Type</th>
<th>Model</th>
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<th>Maximum payload (kg)</th>
<th>Standard cycle time (sec)</th>
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YK-XG/YK-XR/YK-TW/YK-XGS/YK-XGP SCARA ROBOTS

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<th>Type</th>
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<tr>
<td>YK350XG-P</td>
<td>350</td>
<td>0.1</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>YK350XC-P</td>
<td>350</td>
<td>0.1</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>YK350XR-S</td>
<td>350</td>
<td>0.1</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>YK350XS-S</td>
<td>350</td>
<td>0.1</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>YK350XG-S</td>
<td>350</td>
<td>0.1</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>YK350XC-S</td>
<td>350</td>
<td>0.1</td>
<td>0.29</td>
<td></td>
</tr>
</tbody>
</table>

Note: Ultra-small type: Maximum payload: 0.5 kg (100mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning)

Other type: Maximum payload: 2kg (300mm in the horizontal direction, 25mm reciprocating in the reciprocating direction, coarse positioning)
### YK-XG/YK-XR/YK-TW/YK-XGS/YK-XGP SCARA ROBOTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Arm length (mm)</th>
<th>Maximum payload (kg)</th>
<th>Standard cycle time (sec) (^{1,2})</th>
<th>Repeatability (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiny type</td>
<td>YK18XG</td>
<td>180</td>
<td>1.0</td>
<td>0.28</td>
<td>0.03</td>
<td>350</td>
</tr>
<tr>
<td>Small type</td>
<td>YK20XG</td>
<td>200</td>
<td>1.0</td>
<td>0.28</td>
<td>0.03</td>
<td>350</td>
</tr>
<tr>
<td>Standard</td>
<td>YK25XG</td>
<td>250</td>
<td>1.5</td>
<td>0.39</td>
<td>0.035</td>
<td>380</td>
</tr>
<tr>
<td>Medium type</td>
<td>YK30XGS</td>
<td>300</td>
<td>2.0</td>
<td>0.49</td>
<td>0.04</td>
<td>400</td>
</tr>
<tr>
<td>Large type</td>
<td>YK35XG</td>
<td>350</td>
<td>2.5</td>
<td>0.63</td>
<td>0.045</td>
<td>420</td>
</tr>
<tr>
<td>Wall-mount / inverse type</td>
<td>YK40X</td>
<td>400</td>
<td>3.0</td>
<td>0.78</td>
<td>0.05</td>
<td>440</td>
</tr>
<tr>
<td>Dust-proof &amp; drip-proof type</td>
<td>YK45XGP</td>
<td>450</td>
<td>3.5</td>
<td>0.92</td>
<td>0.055</td>
<td>460</td>
</tr>
<tr>
<td>Orbital type</td>
<td>YK50XGP</td>
<td>500</td>
<td>4.0</td>
<td>0.99</td>
<td>0.06</td>
<td>490</td>
</tr>
</tbody>
</table>

Note 1: Ultra small type: Maximum payload: 0.5kg (100mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning). Small type: Maximum payload: 1.0kg (200mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning). Small type: Maximum payload: 1.5kg (250mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning). Medium type: Maximum payload: 2.0kg (300mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning). Large type: Maximum payload: 2.5kg (350mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning).

Note 2: Maximum payload of option specifications (with tool flange attached or with user wiring and tubing routed through spline shaft) is 4kg.

Note 3: Values in parentheses ( ) apply for tool flange specifications.

### YK-XG ELECTRIC GRIPPER

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Holding power (N)</th>
<th>Open/close stroke (mm)</th>
<th>Maximum speed (mm/sec)</th>
<th>Repeatability (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact single cam</td>
<td>YRG-2540FS</td>
<td>250</td>
<td>10-90</td>
<td>0.03</td>
<td>0.18</td>
<td>100</td>
</tr>
<tr>
<td>Single cam</td>
<td>YRG-2540F</td>
<td>250</td>
<td>10-90</td>
<td>0.03</td>
<td>0.18</td>
<td>100</td>
</tr>
<tr>
<td>YRG-2540FG</td>
<td>250</td>
<td>10-90</td>
<td>0.03</td>
<td>0.18</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Double cam</td>
<td>YRG-4240FS</td>
<td>420</td>
<td>10-90</td>
<td>0.03</td>
<td>0.18</td>
<td>100</td>
</tr>
<tr>
<td>Screw type Straight style</td>
<td>YRG-4240F</td>
<td>420</td>
<td>10-90</td>
<td>0.03</td>
<td>0.18</td>
<td>100</td>
</tr>
<tr>
<td>Screw type &quot;T&quot; style</td>
<td>YRG-2540FT</td>
<td>250</td>
<td>10-90</td>
<td>0.03</td>
<td>0.18</td>
<td>100</td>
</tr>
<tr>
<td>Delta fingers</td>
<td>YRG-2518ST</td>
<td>250</td>
<td>10-90</td>
<td>0.03</td>
<td>0.18</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: Holding power control: 30% to 100% (1% steps) / Speed control: 20% to 100% (1% steps) / Acceleration control: 1 to 100% (1% steps) / Maximum payload: 0.5kg (100mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning). Other type: Maximum payload: 2kg (300mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning).

### CLEAN ROOM SINGLE-AXIS ROBOTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Size (mm)</th>
<th>Load (kg)</th>
<th>Maximum payload (kg)</th>
<th>Maximum speed (mm/sec)</th>
<th>Stroke (deg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4L</td>
<td>C4LH</td>
<td>W4LSH5</td>
<td>6</td>
<td>6</td>
<td>2.4</td>
<td>360</td>
</tr>
<tr>
<td>C5L</td>
<td>C5LH</td>
<td>W5LSH5</td>
<td>9</td>
<td>9</td>
<td>2.4</td>
<td>450</td>
</tr>
<tr>
<td>C6L</td>
<td>C6LH</td>
<td>W6LSH5</td>
<td>12</td>
<td>12</td>
<td>4.0</td>
<td>500</td>
</tr>
<tr>
<td>C8</td>
<td>C8H</td>
<td>W8LSH5</td>
<td>18</td>
<td>18</td>
<td>2.0</td>
<td>720</td>
</tr>
<tr>
<td>C10</td>
<td>C10H</td>
<td>W10LSH5</td>
<td>25</td>
<td>25</td>
<td>4.0</td>
<td>1000</td>
</tr>
<tr>
<td>C12L</td>
<td>C12LH</td>
<td>W12LSH5</td>
<td>30</td>
<td>30</td>
<td>6.0</td>
<td>1500</td>
</tr>
<tr>
<td>C14</td>
<td>C14H</td>
<td>W14LSH5</td>
<td>40</td>
<td>40</td>
<td>8.0</td>
<td>2000</td>
</tr>
<tr>
<td>C16</td>
<td>C16H</td>
<td>W16LSH5</td>
<td>50</td>
<td>50</td>
<td>10.0</td>
<td>3000</td>
</tr>
<tr>
<td>C18</td>
<td>C18H</td>
<td>W18LSH5</td>
<td>60</td>
<td>60</td>
<td>12.0</td>
<td>4000</td>
</tr>
<tr>
<td>C20</td>
<td>C20H</td>
<td>W20LSH5</td>
<td>75</td>
<td>75</td>
<td>14.0</td>
<td>5000</td>
</tr>
<tr>
<td>C25</td>
<td>C25H</td>
<td>W25LSH5</td>
<td>100</td>
<td>100</td>
<td>16.0</td>
<td>7000</td>
</tr>
</tbody>
</table>

Note: Sizes are the approximate cross sectional size.

### CLEAN ROOM CARTESIAN ROBOTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Axes</th>
<th>Moving range (mm)</th>
<th>Maximum speed (mm/sec)</th>
<th>Maximum payload (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 axes</td>
<td>SKYX4C</td>
<td>4</td>
<td>150 to 1500</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>3 axes</td>
<td>SKYX4C (3-DOF)</td>
<td>3</td>
<td>150 to 1500</td>
<td>1000</td>
<td>3</td>
</tr>
<tr>
<td>4 axes</td>
<td>SKYX4C (4-DOF)</td>
<td>4</td>
<td>150 to 1500</td>
<td>1000</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: Ultra small type: Maximum payload: 0.5kg (100mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning). Small type: Maximum payload: 2kg (300mm in the horizontal direction, 25mm reciprocating in the vertical direction, coarse positioning).
# Y P - X  PICK & PLACE ROBOTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Axes</th>
<th>Structure</th>
<th>Maximum payload (kg)</th>
<th>Cycle time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YP220BX</td>
<td>2 axes</td>
<td>Belt - Belt -</td>
<td>3</td>
<td>0.45</td>
</tr>
<tr>
<td>YP320X</td>
<td>2 axes</td>
<td>Ball screw - Belt -</td>
<td>3</td>
<td>0.57</td>
</tr>
<tr>
<td>YP220BXR</td>
<td>3 axes</td>
<td>Belt - Belt Rotation axis</td>
<td>1</td>
<td>0.62</td>
</tr>
<tr>
<td>YP320XR</td>
<td>3 axes</td>
<td>Ball screw - Belt Rotation axis</td>
<td>1</td>
<td>0.67</td>
</tr>
<tr>
<td>YP330X</td>
<td>4 axes</td>
<td>Ball screw Ball screw Belt Rotation axis</td>
<td>3</td>
<td>0.57</td>
</tr>
<tr>
<td>YP340X</td>
<td>4 axes</td>
<td>Ball screw Ball screw Belt Rotation axis</td>
<td>1</td>
<td>0.67</td>
</tr>
</tbody>
</table>

# YA  Vertically articulated robots

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Application</th>
<th>Number of axes</th>
<th>Payload (kg)</th>
<th>Vertical reach (mm)</th>
<th>Horizontal reach (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-axis</td>
<td>YA-RJ</td>
<td>Handling (general)</td>
<td>6-axis</td>
<td>1 kg (max. 2 kg*)</td>
<td>909</td>
<td>545</td>
</tr>
<tr>
<td></td>
<td>YA-R3F</td>
<td></td>
<td></td>
<td>3</td>
<td>804</td>
<td>532</td>
</tr>
<tr>
<td></td>
<td>YA-R5F</td>
<td></td>
<td></td>
<td>5</td>
<td>1193</td>
<td>706</td>
</tr>
<tr>
<td></td>
<td>YA-R5LF</td>
<td></td>
<td></td>
<td>5</td>
<td>1560</td>
<td>895</td>
</tr>
<tr>
<td></td>
<td>YA-R6F</td>
<td>Assembly / Placement</td>
<td>6-axis</td>
<td>6</td>
<td>2486</td>
<td>1422</td>
</tr>
<tr>
<td>7-axis</td>
<td>YA-U5F</td>
<td></td>
<td></td>
<td>5</td>
<td>1007</td>
<td>559</td>
</tr>
<tr>
<td></td>
<td>YA-U10F</td>
<td></td>
<td></td>
<td>10</td>
<td>1203</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>YA-U20F</td>
<td></td>
<td></td>
<td>20</td>
<td>1498</td>
<td>910</td>
</tr>
</tbody>
</table>

* When a load is more than 1 kg, the motion range is reduced. Use the robot within the recommended motion range.
Carrying and transferring equipment

- Handling parts

**POINT**

1. Space saving layout using double carrier. (N15 / N18)

High-speed screw tightening unit

- Positioning 2 nut runners at the same time for a large work piece.
- 2 screws at opposite locations tightened at the same time.

**POINT**

1. Performs high-speed, high-accuracy screw tightening on large work pieces such as large construction materials.

Application of adhesive agent

- Application of adhesive agent within a large size liquid crystal surface processing unit.

**POINT**

1. Capable of handling large size workpieces.
2. Also applicable to cutting work with a cutter, surface check with a camera, etc.

Sealing

- Spreading sealant to mating faces of the cases.

**POINT**


IC palletizing within the unit

- ICs are taken out of the pallet and parts are transferred to the specified place by the XYZ Cartesian robot.
- Application as a part of the machine used in the process where a die is attached to the circuit board using thermocompression bonding in the manufacture of semiconductors.

**POINT**

1. By using the RCX controller, it is possible to use the result of the operation based on variables during palletizing.
Part assembly machine

- Automotive clutch assembly
- Efficient alternate assembly of two different parts

**POINT**

1. Double-arm ensures a short tact time along with a space-saving footprint.
2. Double-arm specifications selectable as standard feature.
3. Y axis and Z axis strokes are selectable separately for left and right. (Special orders available)
4. Nut rotation type X axis supports long stroke and also maintains maximum speed.

Assembly cell (independent cell)

- Base machine of independent type assembly cell.

**POINT**

1. Optimum for multi type variable quantity production.
2. Setting up reception places forms a construction of multiple number of cells.

Precision part assembler (1)

- Assembly of small size precision parts.

**POINT**

1. High speed assembly.
2. Narrow machine width, and settable with a tiny pitch.

Precision part assembler (2)

- Assembly of small size precision parts.

**POINT**

1. Speed increased even more when used in combination with a rotary table.

Finished product inspection, touch-panel type evaluation machine

- Finished product function test.
- Developed software evaluation.
- Push-button type quality check.

**POINT**

1. Supports a variety of systems in a product lineup that is top class in its field with arm lengths from 120mm to 1200mm.
2. Space saving.
3. Using SCARA, judgment is made through image processing by pushing each button.

Assembly cell (line cell)

- Base machine of line type assembly cell.

**POINT**

1. Utilization of advantages of SCARA with a wide operation range.
2. Form a line to any length by coupling these cells together.
Special purpose tester

Test stage

Assembly stage

- When placed between 2 turn tables, handling of both tables is possible.

---

Sealing correction

- Sealing tasks for placing gaskets or applying adhesives in parts
- Coating trajectory correction using iVY system

---

Assembly cell

Handling unit for special purpose tester

---

Small part palletizing

- Assemble a sorting pallet for the automated machine in the next process.

---

Point

1. Utilization of advantages of SCARA which has a wide operation range.

---

Sealing correction

- Sealing tasks for placing gaskets or applying adhesives in parts
- Coating trajectory correction using iVY system

---

Loading parts into assembler machine

- Loads unsorted parts or components into automated equipment.

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Point

1. Utilization of advantages of SCARA which has a wide operation range.

---

Yamaha ROBOTICS

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Specifications and appearance are subject to change without prior notice.

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