YAMAHA ROBOT
Who we are and what we do

Over four decades of proven reliability
All at Yamaha, development in the field of robotics began with the implementation of robotic technologies on our motorcycle production line over thirty years ago. Since then, our industrial robot technologies have served as a backbone for manufacturing equipment in a wide variety of industries, including the assembly of electronic products, the transport of in-vehicle components, and the manufacture of large LCD panels. Over the years, we at Yamaha have done our utmost to always continue improving upon what we’ve put to market. Those efforts serve as a testament to our reliability when it comes to producing what businesses need.

A legacy of unique technologies and a keen sense for market
At Yamaha, development in the field of robotics began with the implementation of robotic technologies on our motorcycle production line over thirty years ago. Since then, our industrial robot technologies have served as a backbone for manufacturing equipment in a wide variety of industries, including the assembly of electronic products, the transport of in-vehicle components, and the manufacture of large LCD panels. Over the years, we at Yamaha have done our utmost to always continue improving upon what we’ve put to market. Those efforts serve as a testament to our reliability when it comes to producing what businesses need.

Testing environments that guarantee greater reliability
At Yamaha, we continue evaluating our technologies to ensure that our products are reliable. During product development, we conduct assessments and tests in our own anechoic chambers to ensure the kind of reliability and quality that you will find nowhere else. And when it comes to quality control, our customers can expect only high-quality craftsmanship achieved by rigid adherence to strict standards.

Yamaha quality means safety
We have a system in place which integrates the areas of manufacturing, sales and technology into one well-oiled machine. We leverage this system in the ultimate to produce consistency when it comes to inspection, manufacturing information, assembly, inspection and shipping processes. This allows us to provide high levels of quality, affordable prices, and quick deliveries. Processing and machining for key components is all done in-house. As a robot manufacturer, we provide the kind of quality that you will find nowhere else. And when it comes to quality control, our customers can expect only high-quality craftsmanship achieved by rigid adherence to strict standards.

YAMAHA ROBOT LINEUP

Motorless Single-Axis Actuator

See p. 20 for a quick selection table

Basic model

**LBAS**

<table>
<thead>
<tr>
<th>Feature</th>
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<tbody>
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<td>JIS C5 accuracy</td>
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<td>Standard surface</td>
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Advanced model

**LGXS**

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The TRANSERVO series brings you compact and economical single-axis robots which feature a fusion of the low cost of a stepper motor and the functionality of a servo motor.

Features and benefits of the SS type (slide type)

High-speed operation means lower production time

TRANSERVO leverages the vector control method to the greatest extent possible to maintain a constant payload even under high speed conditions. This means a drastic reduction in cycle time. This combined with the high-load ball screws means that the TRANSERVO series provides a maximum speed of one meter per second,* which is as fast as single-axis servo-motors found in the same category.

*Note: 0.5 m/s is the speed at which the load is 12 kg.

Features and benefits of the SR type (rod type)

Circulation type linear guide for high rigidity and accuracy

A lubricator used in the ball screw along with a contact scraper provide the product with a long service life extended periods where maintenance is not required. This combined with the high-load ball screws to maintain a constant payload even under high speed conditions. This means a drastic reduction in cycle time. This combined with the high-load ball screws means that the TRANSERVO series provides a maximum speed of one meter per second,* which is as fast as single-axis servo-motors found in the same category.

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Features and benefits of the STH type (slide table type)

High-speed operation means lower production time

Ball screw lubricator

Lubrication keep grease within a high-density flow due to supply at high speed. Nothing is wasted.

Features and benefits of the BD type (belt type)

For long stroke applications

The position detector is a resolver

The resolver used features a simple yet sturdy structure employing no electronic components or optical elements. This makes it extremely tough and great for use in harsh environments. Breakdown rates are also kept low and its structure offers the resolver an extremely long service life. There is no experience breakdowns of electronic components or which see moisture or oil sticking to the disk.
FLIP-X Series
SINGLE-AXIS ROBOTS

Our single-axis robot series includes 6 types and 29 variations, meaning a broad range of options are available.

**Optical encoder**
- Optical: High-resolution 3000-pulse encoder
- Risk of detection failure: Low risk

**Resolver**
- Resolver: Magnetic type
- High reliability

**Customization for each model available**
If you are looking to do special orders for any of our models (double sliders, wide sliders, etc.), please inquire with a sales representative.

Two-point contact guides featuring four rows of circular grooves help in dealing with large moment loads.

Two-point contact guides featuring four rows of circular grooves allow for less differential slip. Differential slip experienced by the ball is low when compared to four-point contact guides with two rows of Gothic arch grooves. This means that excellent rolling motions are provided even when dealing with large moment loads or poor installation surface accuracy. Malfunctions, such as that resulting from unusual wear, are also much less frequent.

PHASER Series
LINEAR MOTOR SINGLE-AXIS ROBOTS

Our highly rigid ball screws and guides are a huge help in letting you save on maintenance and management costs. Visit our website to find out what you can expect in terms of the service life of the given product under certain conditions.

A long service life means you save on maintenance and management.

- Maximum payload capacity of the MF series: 160 kg
- Lower noise levels and longer service lives

No critical speed restrictions required up to long strokes of 4 meters
Excellent performance during long-distance transport.

Yamaha in-house components means lower costs

Many scales originally developed by Yamaha are still being produced by us today. We also manufacture other major components to ensure significant reductions in cost. Linear mechanisms are no longer something special as we are now in an era where they can stand shoulder to shoulder with ball screws as the go-to tool for the job.

The linear motor type will particularly provide lower costs when it comes to transporting lightweight workpieces over long distances at high speeds.

Comparison of single-axis robot models

**Model**
- MF7-150: Payload 10 (7)*3
- MF7-200: Payload 10 (7)*3

**Unit cost**
- MF7-150: 1650
- MF7-200: 1650

**Maximum speed**
- MF7-150: 1850
- MF7-200: 2550

**Accuracy**
- MF7-150: ±5 
- MF7-200: ±10

**Repeatability**
- MF7-150: 490
- MF7-200: 490

**Frame dimensions**
- MF7-150: 168 × 100 mm
- MF7-200: 168 × 100 mm

High speed, long travel

The ultimate appeal of linear motor single-axis robots is that there are critical speed limits like you would see when dealing with ball screws. Even long-distance travel means no reduction in maximum speeds. Standard maximum stroke goes up to 1050 mm with the MR type and up to 4000 mm with the MF type. Cycles times for long-distance transport have particularly seen drastic improvements.

Standard double carrier setup saves spaces and ensures great efficiency

This product allows you to lower the costs involved and decrease space used in comparison to the usage of two single-axis robots. No axis alignment is needed and tools can be shared, which shortens setup time. Lastly, an anti-collision control function is provided when making use of the RCK series controller.

Movement profile of linear single-axis PHASER and single-axis robot FLIP-X

Ball screw type single-axis robots (2 units)
- Space-saving double carriage

**FLIP-X**
- Single-axis robot FLIP-X
- Ball screw type single-axis robots (2 units)
- Space-saving double carriage

**PHASER**
- Single-axis robot PHASER
- Linear motor single-axis robots

See p. 23 for a quick selection table.
From compact, economical and light-duty systems to large, heavy-duty systems, a variety of pre-configured multi-axis systems are available.

- **Arm type**
- **Gantry type**
- **Moving arm type**

### XZ type
- **X**
- **Z**

### Pole type
- **P**

### Dual-synchronous drive
- The asynchronous motor combined with the synchronous motor provides effective power for the movement of heavy objects. The higher the speed, the higher the stability.

### Two-point contact guides featuring four rows of circular grooves
- Two-point contact guides featuring four rows of circular grooves allow for less differential slip. Differential slip can be reduced by the ball to be low when compared to four-point contact guides with two rows of Goltch arch grooves. This means that excellent rolling motions are provided even when dealing with large moment loads or poor installation surface accuracy. Malfunctions, such as those resulting from unusual wear, are also much less frequent.

### Resolver provides durability and reliable position detection
- The resolver is a detector featuring a simple yet robust structure which uses no electronic components or optical elements, making it extremely tough for usage in harsh conditions. It also seldom breaks down. The structure of the resolver presents no of the detection issues seen in other detectors, such as optical encoders with electronic components which experience breakage or have moisture and oil sticking to the disc.
- The mechanical specifications when it comes to absolute specifications and incremental specifications are shared by all controllers, meaning that you can switch to either absolute or incremental specifications with the mere setting of parameters.

### Save money
- Cutting down on the number of parts while boosting performance has allowed us to lower our prices. The inclusion of a resolver within the structure means that that we have eliminated the idea that absolute units have to be expensive. What’s more, mechanical components remain unchanged regardless of whether incremental unit specifications or absolute unit specifications are being used.

### Maintenance is easy
- Though a built-in structure is displayed, maintenance is made simple thanks to the ability to replace components like motors and ball screws on an individual basis.

One controller for multiple single-axis robots

- **Advantages of multi-axis controller operation**
  - Sequence control is simple and system upgrades are inexpensive.
  - More compact and saves more space than situations where multiple single-axis controllers are being operated.
  - Allows for a greater level of control.

- **RC221 and RCX240 (multi-axis controllers) provided mixed control involving the PHASER series (linear single-axis) and FLP-X series**

Robot setup

- **2-unit robot configuration**
  - A multi-task program used with this configuration allows for asynchronous, parallel control, making it possible to operate two robots simultaneously.
  - Using this alongside an auxiliary axis configuration means even more flexibility when it comes to assigning an axis to a task.

- **Synchronized double configuration**
  - This configuration allows for the addition of two motors to one axis on types of robots where motor units run separately, such as the linear motor single-axis PHASER series or the fl type (nut rotation type) FLP-X series.

- **Main auxiliary axis configuration**
  - Use this auxiliary axis configuration when it’s impossible to have simultaneous movement take place using the MOVE command. Axes configured as main auxiliary axes move only with the DRIVE command (meaning a separate movement command issued to a particular axis) and cannot be operated via the MOVE command. That means this configuration is recommended for operation on an axis to be used with a main robot.

- **Synchronized dual configuration**
  - Set things up like this when conducting dual-drive operation (meaning simultaneous control of two axes). Use this dual-drive configuration on gantry-type Cartesian robots characterized by a long Y-axis stroke when going about elaboration during high levels of acceleration or deceleration, or in situations involving heavy loads and high levels of thrust.

### Ideal for picking and placing small parts at high speeds

Positioning via servo control means no mechanical adjustments required.

- **High speed**
  - Ultra high-speed positioning and placing means greater productivity. The YP320X, YP330X, YP340X and YP350X provide both excellent high-speed performance and high repeated positioning accuracy (+/-0.02 mm).

- **Compact size**
  - The YP320X unit has a compact size with an overall length of 108 mm and weighs only 3 kg. These specifications allow for the building of a compact production line that interfaces less with its surroundings.
An outstanding, diverse lineup featuring arm lengths ranging from 120 to 1200 mm. Delivers high-speed and high-precision operations for increased productivity.

### Extra small type SCARA model

- YK120XG
- YK150XG
- Arm length: 120 mm to 230 mm
- Minimum payload: 1 kg

### Small type

- YK250XG
- YK350XG
- Arm length: 200 mm to 430 mm
- Minimum payload: 2 kg

### Medium type

- YK400XGL
- YK500XG
- YK600XGL
- Arm length: 400 mm to 600 mm
- Minimum payload: 4 kg to 10 kg

### Large type

- YK700XGL
- YK900XG
- YK1200XG
- Arm length: 700 mm to 1,200 mm
- Minimum payload: 10 kg to 30 kg

### Wall mount/inverse type

- YK250XGP
- YK350XGP
- YK400XGP
- Arm length: 200 mm to 1,050 mm
- Minimum payload: 20 kg

### Dust-proof & drip-proof model

- YK700XGLP
- YK800XGLP
- YK900XGLP
- Arm length: 700 mm to 1,400 mm
- Minimum payload: 30 kg

### Conventional model

- YK1200XGP
- YK1500XGP
- YK1800XGP
- Arm length: 1,200 mm to 1,800 mm
- Minimum payload: 30 kg to 50 kg

### Optical encoder

- Optical encoder
  - Measured on the YK-XG series
  - Resolution: 1024 counts

### Resolver

- Resolver
  - Magnetic type
  - Resolution: 1024 counts

### Compatibility moment of the R axis

- YK120XG
  - Allowable inertial moment of the R axis
  - Available in 1 kg load

### Comparison of YK120XG and a competitor's model

<table>
<thead>
<tr>
<th>Model</th>
<th>Allowable inertial moment of the R axis (kg·m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YK120XG</td>
<td>0.55</td>
</tr>
<tr>
<td>Competitor</td>
<td>0.76</td>
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</table>

### Features of the wall mount/inverse type

- This model provides improved efficiency and reliability when deployed in production at an affordable price.

### Improved maintenance features

- Covers used in the Yamaha SCARA robot YK-XG series can be removed from the front or in an upward motion. Maintenance is easy since covers are completely unattached to the cable.

### Affordable, superior performance

- The model provides improved maintenance and reliability when deployed in production at an affordable price.

### Features of the dust-proof/drip-proof type

- Dust-proof and drip-proof models ensure high rigidity and resilience against electronic noise, high impact resistance and high resistance against condensation of dew and the sticking of oil or dust on the flange. Maintenance is easy since covers are completely unattached to the cable.

### High speed

- While standard cycle times are in no doubt fast, our designs also put a focus on cycle times in the regions where usage is taking place. Drastic improvements in maximum speeds were achieved through changes made to gear ratios and maximum motor RPM, resulting in better cycle times during long-distance movement.

### Dust-proof and drip-proof type

- Dust-proof and drip-proof models are available.

### Hollow shaft and tool flange options available

- Usual add-ons include a hollow shaft to facilitate easy wiring leading to the tip of the tool and a tool flange used for clamping tools.

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**Note:** YK250XG/YK350XG/YK400XG/YK500XGL/YK600XGL of the tool and a tool flange used for clamping tools.

**Improvement in the wall mount/inverse type**

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Equip with high positioning accuracy and high speed. Defeats the limitations of other SCARA and parallel-link robots, leaving smaller equipment footprint and no dead space at the center of the work envelope.

Covers bases within a 1,000-millimeter² reach
The YK-TW series features SCARA robots with wide rotation angles and a ceiling mount configuration, with the YK350TW model capable of a reach of up to 1,000 mm under the arm. This greatly reduces footprint and lets them be free of movement restrictions during palletizing and conveyor belt assembly operations.

Repeated positioning accuracy: ±0.01 mm*1 (XY axes)
YK-TW robots boast higher repeated positioning accuracy than that of parallel-link robots. This was achieved by striving to produce optimal weights on the robots’ internal construction. Furthermore, the robots are equipped with highly rigid but lightweight robotic arms that are fitted with finely tuned motors, allowing them to perform with high precision.

Covers bases within a 1,000-millimeter² reach
The YK-TW series can be selected from one that suits your needs from the 14 available.

Vertical bellows improve cleanliness reliability
FLIP-XC
Single-axis clean room robots
□ Stroke: 50 mm to 2,050 mm
□ Suction rate: 15 to 90 NL/min
□ Cleanliness class: ISO 3 (ISO14644-1)
□ Maximum payload: 120 kg (horizontal installation)
□ Stroke: 50 mm to 800 mm
□ Suction rate: 15 to 90 NL/min
□ Cleanliness class: Class 10
□ Maximum payload: 12 kg (horizontal installation)

Easy to maintain
XY-XC
Clean room cartesian robots
□ Stroke: 60 mm to 250 mm
□ Suction rate: 15 to 60 NL/min
□ Cleanliness class: Class 10
□ Maximum payload: 20 kg
□ Maximum speed: 1,000 mm/sec
□ User piping: Three 1/4 inch standard air tubes

Reduced approx. 36%
Standard cycle time down to 0.29 seconds²
TIK-TW robots are able to move with more flexibility in a horizontal plane. They are built with a second arm (Y-axis) that moves under the first (X-axis). Due to their multi-joint structure, TI-TW robots can move more efficiently from point-to-point. Furthermore, with the weight balance of the internal components optimized, TI-TW robots have their cycle time reduced by 36% as compared to previous models.

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Only 392 mm and 27 kg
Lower inertia, no bulky frame.

YK-TW Series
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Optimized gravitational moment reduction
Obtained weight balance by placing R-motor and Z-motor on the left and right.

YK-TW / YK-XGC
See p. 24 for a quick selection table

See p. 24-25 for a quick selection table

Designed for the electronics, food, and medical industries, and engineered for great suction and low particle emission. Delivers high cleanliness and excellent performance.

FLIP-XC
Single-axis clean room robots
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□ Suction rate: 15 to 90 NL/min
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Fully beltless for higher rigidity
SSC
Single-axis clean room robots (TRANSERVO)
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□ Suction rate: 15 to 90 NL/min
□ Cleanliness class: Class 10
□ Maximum payload: 12 kg (horizontal installation)

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Clean room cartesian robots
Reduce stiffness at high altitude allows efficient to be designed to suit the environment. In addition, the robots are equipped with suction joints installed as standard features and use a flexible air suction arm to achieve high cleanliness. Their slide tables are also equipped with stainless steel sheets to reduce fan noise.

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Choose what fits your needs from a wide range of control systems.

Controllers come pre-programmed with servo parameters and acceleration patterns so you can operate the robot straightaway.

** CONTROLLERS **

### YAMAHA ROBOT LINEUP

Cameras

Slave

**YAMAHA ROBOT LINEUP 15**

TS-P

SR1-P

Choose what fits your needs from a wide range of control systems.

- **Cameras**
- **Slave**

**CONTROLLERS**

5 to 8 axes

3, 4 axes

2 axes

1 axis

up to 16 axes

PCX is capable of connecting to the RCX series controller.

Note: Up to four SR1 series controllers can be connected to the RCX series controller.

- **Online command**
- **I/O point trace**
- **Program**
- **Remote command**

**TVS**

**TS-S2**

Stepper motors

**TS-SH**

Controller controls

**SR1-P**

**TS-SD**

(Programmable Logic Controller)

**TS-S2**

Stepper motors

**TS-SH**

Controller controls

**SR1-P**

**TS-SD**

(Programmable Logic Controller)

**TS-S2**

Stepper motors

**TS-SH**

Controller controls

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**TS-SD**

(Programmable Logic Controller)

**TS-S2**

Stepper motors

**TS-SH**

Controller controls

**SR1-P**

**TS-SD**

(Programmable Logic Controller)

**TS-S2**

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**TS-S2**

Stepper motors

**TS-SH**

Controller controls

**SR1-P**

**TS-SD**

(Programmable Logic Controller)

**TS-S2**

Stepper motors

**TS-SH**

Controller controls

**SR1-P**

**TS-SD**

(Programmable Logic Controller)
**Yamaha Robot Lineup**

**ELECTRIC GRIPPERS**

See p. 23 for a quick selection table

### YRG Series

**EASY OPERATION ENABLED BY YAMAHA'S ROBOT LANGUAGE.**

#### Gripping force control

- Can be set in increments of 1% to the range of 30% to 100%.

#### Measuring

- Measures a workpiece by detecting its position.

#### Speed control

- Speed can be set in increments of 1% to the range of +100% to -100%.

#### Multi-point control

- Up to 10,000 positioning points possible.

#### Workpiece check function

- When gripper force is lower than specified, the force is increased or decreased to the safe side.

**S type Single cam type**

- Fast, compact, lightweight

**W type Double cam type**

- High-gripping force

**3-finger type**

- Compact, high rigidity, long stroke

**Screw type**

- Straight style
  - High-precision, long stroke
- “T” style

**Electric grippers for positioning, speed control, and high-precision gripping performance**

**Easy operation enabled by Yamaha’s robot language.**

**Supports a variety of applications by being combined with vision system**

- With YRG grippers integrated into the robot vision system (YV2), RX240 can be used to control the camera for positioning and workpiece handling. An advanced system, but easily constructed.

- The RX240 controller can be used too.

**Servo control enables smooth and fast, collision-free stop-and-go.**

- The LCM100 module system utilizes servo control, which allows workpieces to slow down gently and avoid collisions with stoppers that would cause them to go out of line or become damaged. In this way, servo also ensure that workpiece movements are able to continue at high speed.

#### Configurable production lines that saves space

- The LCM100 is bidirectional and can move freely back and forth at high speeds. This makes it possible to streamline operations that use the same processes, enabling cost savings and smaller transfer lines. Not only is it able to seamlessly decelerate, change speeds, and stop precisely at designated locations, it is also able to move specific sliders in the reverse direction, allowing for greater flexibility in designing line operations.

**Removable modules allow easy line layout change**

- Create transfer lines wherever needed by connecting just one module to the transfer line._RX240 controllers can start up quickly too. In addition, extra modules from shortened lines can be reused for others or stored for maintenance.

**Efficient transfer between work stations in line operation**

- Tasks can travel in incremental movements. Transportation time can be reduced by moving incrementally in repeating processes and moving at high speed between processes.

**No more need for pulling workpieces from the line**

- Reduced operation time and space saves costs.

**LDM100**

**LINEAR CONVEYOR MODULES**

See p. 26 for basic specifications

**Go from "flow" to "move." Accelerate your production line and revenue growth.**

- Production line using LDM100 increases production.

- Space-saving

- Lineless control costs

- Direct-pulling

- Effective performance on slider

**Removable modules allow easy line layout change**

- Create transfer lines wherever needed by connecting just one module to the transfer line. RX240 controllers can start up quickly too. In addition, extra modules from shortened lines can be reused for others or stored for maintenance.

**Efficient transfer between work stations in line operation**

- Tasks can travel in incremental movements. Transportation time can be reduced by moving incrementally in repeating processes and moving at high speed between processes.

**No more need for pulling workpieces from the line**

- Reduced operation time and space saves costs.
Increase productivity Ideal for constructing compact cells, moving and assembling small parts, or inspection processes.

YAMAHA ROBOT LINEUP
VERTICALLY ARTICULATED ROBOTS

6-axis robots
YA-R6F YAMAHA ROBOT LINEUP
YA-R5F
YA-R5LF
YA-RJ
YAMAHA ROBOT LINEUP
YA-U5F YA-U10F YA-U20F

7-axis robots
YA-U6F
YA-U16F
YA-U26F

High-speed operation reduces cycle time
Thanks to high-speed, low-inertia AC servo motors, an arm designed to be lightweight, and the latest control technology, these robots achieve an operating speed that is best in their class. From supply, assembly, inspection, and packing to palletization, all applications can enjoy shorter cycle time and improved productivity.

High wrist load workpieces are also supported
With a wrist section that has the highest allowable moment of inertia in its class, these robots can support jobs involving a high wrist load, or simultaneous handling of multiple workpieces.

Dramatically reduce line setup time with a simulator
We provide software* that lets you use 3D CAD data to construct a production facility in virtual space on a computer, and easily perform teaching before the actual production line is completed, dramatically reducing the setup time.

6-axis robots
5-axis
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. Properly setting the arm in a position close to each other or other processing can be integrated and shortened.

“Elbow movement” unique to 7-axis models allows optimal posture to be maintained
The 7-axis U-type robots allow “elbow movements”, changing only the elbow angle without affecting the position or posture of the tool. This permits operation to avoid nearby obstructions.

7-axis robots
6-axis robots
S-axis: Allows horizontal body rotation
L-axis: Allows forward/backward movement
U-axis: Allows the arm to raise and lower
R-axis: Allows arm rotation
B-axis: Allows wrist of the arm to tilt up and down
T-axis: Allows wrist of the arm to rotate

Free arm movement further boosts productivity.
7-axis robots
S-axis: Allows horizontal body rotation
L-axis: Most forward/backward movement
E-axis: Allows the arm to twist
U-axis: Allows the arm to raise and lower
R-axis: Allows arm rotation
B-axis: Allows wrist of the arm to tilt up and down
T-axis: Allows wrist of the arm to rotate

High wrist load workpieces are also supported
With a wrist section that has the highest allowable moment of inertia in its class, these robots can support jobs involving a high wrist load, or simultaneous handling of multiple workpieces.
## Robonity MOTORLESS SINGLE-AXIS ACTUATORS

### Basic model LBAS

<table>
<thead>
<tr>
<th>Model</th>
<th>LBAS04</th>
<th>LBASIS</th>
<th>LBASIS6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeated positioning accuracy*1</td>
<td>+/-0.01 mm</td>
<td>+/-0.005 mm</td>
<td>+/-0.005 mm</td>
</tr>
<tr>
<td>Deceleration mechanism</td>
<td>Ground ball screw, Ground ball screw</td>
<td>Ground ball screw, Ground ball screw</td>
<td>Ground ball screw, Ground ball screw</td>
</tr>
<tr>
<td>Stroke (or equivalent)</td>
<td>50 to 800 mm</td>
<td>50 to 150 mm</td>
<td>50 to 100 mm</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>20 Nm</td>
<td>0.6 Nm (AC servo)</td>
<td>0.6 Nm (AC servo)</td>
</tr>
<tr>
<td>Belt drive load</td>
<td>50 mm to 800 mm</td>
<td>10 mm to 300 mm</td>
<td>10 mm to 300 mm</td>
</tr>
<tr>
<td>Maximum payload*2 Horizontal (or equivalent)</td>
<td>20 kg</td>
<td>0.6 kg (AC servo)</td>
<td>0.6 kg (AC servo)</td>
</tr>
<tr>
<td>Vertical</td>
<td>5 kg</td>
<td>0.2 kg (AC servo)</td>
<td>0.2 kg (AC servo)</td>
</tr>
<tr>
<td>Rated thrust</td>
<td>15 kg</td>
<td>0.5 kg (AC servo)</td>
<td>0.5 kg (AC servo)</td>
</tr>
<tr>
<td>Overall length</td>
<td>ST + 211.5 mm</td>
<td>ST + 202 mm</td>
<td>ST + 161.5 mm</td>
</tr>
<tr>
<td>Typical dimensions range and tolerance</td>
<td>+/-0.01 mm</td>
<td>+/-0.005 mm</td>
<td>+/-0.005 mm</td>
</tr>
</tbody>
</table>

1. Unidirectional repeatability.
2. Motor speed may not be reached in the event of short travel distances or other operating conditions.
3. The values of the rated thrust and maximum payload are based on the assumption that the installed motors output the rated torque.
4. Install suction joints when using in a clean room environment. The cleanliness level is achieved at a usage of 1000 mm/sec or less.
5. The suction rate required varies with the operating conditions and operating environment.

### Advanced model LGXS

<table>
<thead>
<tr>
<th>Model</th>
<th>LGX05S</th>
<th>LGX05SL</th>
<th>LGX05L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeated positioning accuracy*1</td>
<td>+/-0.005 mm</td>
<td>+/-0.005 mm</td>
<td>+/-0.005 mm</td>
</tr>
<tr>
<td>Deceleration mechanism</td>
<td>Ground ball screw, Ground ball screw</td>
<td>Ground ball screw, Ground ball screw</td>
<td>Ground ball screw, Ground ball screw</td>
</tr>
<tr>
<td>Stroke (or equivalent)</td>
<td>50 to 300 mm</td>
<td>50 to 150 mm</td>
<td>50 to 100 mm</td>
</tr>
<tr>
<td>Maximum payload*2 Horizontal (or equivalent)</td>
<td>40 kg</td>
<td>1.0 kg (AC servo)</td>
<td>1.0 kg (AC servo)</td>
</tr>
<tr>
<td>Vertical</td>
<td>10 kg</td>
<td>0.4 kg (AC servo)</td>
<td>0.4 kg (AC servo)</td>
</tr>
<tr>
<td>Rated thrust</td>
<td>15 kg</td>
<td>0.5 kg (AC servo)</td>
<td>0.5 kg (AC servo)</td>
</tr>
<tr>
<td>Overall length</td>
<td>ST + 131.5 mm</td>
<td>ST + 106.5 mm</td>
<td>ST + 73.5 mm</td>
</tr>
<tr>
<td>Typical dimensions range and tolerance</td>
<td>+/-0.005 mm</td>
<td>+/-0.005 mm</td>
<td>+/-0.005 mm</td>
</tr>
</tbody>
</table>

1. Unidirectional repeatability.
2. Motor speed may not be reached in the event of short travel distances or other operating conditions.
3. The values of the rated thrust and maximum payload are based on the assumption that the installed motors output the rated torque.
4. Install suction joints when using in a clean room environment. The cleanliness level is achieved at a usage of 1000 mm/sec or less.
5. The suction rate required varies with the operating conditions and operating environment.

### T RANSERVO CLOSED LOOP STEPPER MOTOR SINGLE-AXIS ROBOTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Load (mm)</th>
<th>Maximum payload*2 (kg)</th>
<th>Maximum speed*3 (mm/sec)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SS type (Slide type) / Foldback model</strong></td>
<td>SS04-S</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>SS05-S</td>
<td>15</td>
<td>4</td>
<td>6</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>SS06-S</td>
<td>20</td>
<td>5</td>
<td>6</td>
<td>400</td>
</tr>
</tbody>
</table>

1. The suction amount required varies with the operating conditions and operating environment.
2. Install air suction joints when using in a clean room environment. The cleanliness level is achieved at a usage of 1000 mm/sec or less.
3. The values of the rated thrust and maximum payload are based on the assumption that the installed motors output the rated torque.
4. Install suction joints when using in a clean room environment. The cleanliness level is achieved at a usage of 1000 mm/sec or less.
5. The suction rate required varies with the operating conditions and operating environment.

---

1. Unidirectional repeatability.
2. Motor speed may not be reached in the event of short travel distances or other operating conditions.
3. The values of the rated thrust and maximum payload are based on the assumption that the installed motors output the rated torque.
4. Install suction joints when using in a clean room environment. The cleanliness level is achieved at a usage of 1000 mm/sec or less.
5. The suction rate required varies with the operating conditions and operating environment.

---

20 | YAMAHA ROBOT LINEUP | YAMAHA ROBOT LINEUP | 21
### FLIP-X SINGLE-AXIS ROBOTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Lead (mm)</th>
<th>Maximum payload (kg)</th>
<th>Maximum speed (mm/sec)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T type</td>
<td>Compact model</td>
<td>65 x 63</td>
<td>T6L, T6LH</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>T type</td>
<td>65 x 63</td>
<td>T6L, T6LH</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>F type</td>
<td>65 x 66</td>
<td>T6L</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

### PHASER LINEAR MOTOR SINGLE-AXIS ROBOTS

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Carriage</th>
<th>Maximum payload (kg)</th>
<th>Maximum speed (mm/sec)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>168 x 80</td>
<td>MF7</td>
<td>Single</td>
<td>2.5</td>
<td>500</td>
<td>2500</td>
</tr>
<tr>
<td>168 x 80</td>
<td>MF7D</td>
<td>Double</td>
<td>2</td>
<td>500</td>
<td>2500</td>
</tr>
<tr>
<td>168 x 80</td>
<td>MF15</td>
<td>Single</td>
<td>30</td>
<td>500</td>
<td>2500</td>
</tr>
<tr>
<td>168 x 80</td>
<td>MF15D</td>
<td>Double</td>
<td>40</td>
<td>500</td>
<td>2500</td>
</tr>
<tr>
<td>168 x 80</td>
<td>MF15D</td>
<td>Single</td>
<td>40</td>
<td>500</td>
<td>2500</td>
</tr>
<tr>
<td>210 x 100</td>
<td>MF20</td>
<td>Double</td>
<td>160</td>
<td>500</td>
<td>2500</td>
</tr>
<tr>
<td>210 x 100</td>
<td>MF20D</td>
<td>Double</td>
<td>160</td>
<td>500</td>
<td>2500</td>
</tr>
</tbody>
</table>

### XY-X CARTESIAN ROBOTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Axis</th>
<th>Number of axes</th>
<th>Maximum payload (kg)</th>
<th>Maximum stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1L</td>
<td>X axis</td>
<td>1</td>
<td>1.5</td>
<td>1200</td>
</tr>
<tr>
<td></td>
<td>Y axis</td>
<td>1</td>
<td>1.5</td>
<td>1200</td>
</tr>
<tr>
<td></td>
<td>Z axis</td>
<td>1</td>
<td>0.5</td>
<td>1000</td>
</tr>
<tr>
<td>F1LH</td>
<td>X axis</td>
<td>1</td>
<td>1.5</td>
<td>1200</td>
</tr>
<tr>
<td></td>
<td>Y axis</td>
<td>1</td>
<td>1.5</td>
<td>1200</td>
</tr>
<tr>
<td></td>
<td>Z axis</td>
<td>1</td>
<td>0.5</td>
<td>1000</td>
</tr>
</tbody>
</table>

### YP-X PICK & PLACE ROBOTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Axes</th>
<th>X axis</th>
<th>Y axis</th>
<th>Z axis</th>
<th>A axis</th>
<th>B axis</th>
<th>Maximum payload (kg)</th>
<th>Cycle time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YP2200E</td>
<td>2-axes</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0.45</td>
</tr>
<tr>
<td>YP2200E2S</td>
<td>2-axes</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0.45</td>
</tr>
<tr>
<td>YP3200A</td>
<td>4-axes</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0.45</td>
</tr>
</tbody>
</table>

### YRG 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>Single</td>
<td>YRG-1000</td>
<td>35</td>
<td>150</td>
<td>300</td>
<td>0.4</td>
<td>300</td>
</tr>
<tr>
<td>Double</td>
<td>YRG-2000</td>
<td>70</td>
<td>300</td>
<td>500</td>
<td>0.4</td>
<td>500</td>
</tr>
<tr>
<td>Double</td>
<td>YRG-3000</td>
<td>105</td>
<td>500</td>
<td>750</td>
<td>0.4</td>
<td>750</td>
</tr>
</tbody>
</table>
### CLEAN ROOM SCARA ROBOTS

<table>
<thead>
<tr>
<th>Model/Type</th>
<th>Model</th>
<th>Arm length (mm)</th>
<th>Maximum payload (kg)</th>
<th>Standard cycle timea (sec)</th>
<th>Biflex structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra small type</td>
<td>YK120</td>
<td>120</td>
<td>0.1</td>
<td>0.40</td>
<td>Y</td>
</tr>
<tr>
<td>Small type</td>
<td>YK220</td>
<td>220</td>
<td>0.2</td>
<td>0.40</td>
<td>Y</td>
</tr>
<tr>
<td>Medium type</td>
<td>YK320</td>
<td>320</td>
<td>0.3</td>
<td>0.40</td>
<td>Y</td>
</tr>
<tr>
<td>Large type</td>
<td>YK600</td>
<td>600</td>
<td>0.5</td>
<td>0.40</td>
<td>Y</td>
</tr>
</tbody>
</table>

1. Extra small type: Maximum payload 0.1 kg (100 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
2. Small type: Maximum payload 0.2 kg (200 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
3. Medium type: Maximum payload 0.3 kg (300 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
4. Large type: Maximum payload 0.5 kg (500 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
5. *Approximate size of unit’s cross section.

### CLEAN ROOM SCARA ROBOTS

<table>
<thead>
<tr>
<th>Model/Type</th>
<th>Model</th>
<th>Arm length (mm)</th>
<th>Maximum payload (kg)</th>
<th>Standard cycle timea (sec)</th>
<th>Biflex structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra small type</td>
<td>YK120</td>
<td>120</td>
<td>0.1</td>
<td>0.40</td>
<td>Y</td>
</tr>
<tr>
<td>Small type</td>
<td>YK220</td>
<td>220</td>
<td>0.2</td>
<td>0.40</td>
<td>Y</td>
</tr>
<tr>
<td>Medium type</td>
<td>YK320</td>
<td>320</td>
<td>0.3</td>
<td>0.40</td>
<td>Y</td>
</tr>
<tr>
<td>Large type</td>
<td>YK600</td>
<td>600</td>
<td>0.5</td>
<td>0.40</td>
<td>Y</td>
</tr>
</tbody>
</table>

1. Extra small type: Maximum payload 0.1 kg (100 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
2. Small type: Maximum payload 0.2 kg (200 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
3. Medium type: Maximum payload 0.3 kg (300 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
4. Large type: Maximum payload 0.5 kg (500 mm in the horizontal direction, 25 mm in the vertical direction, rough positioning).
5. *Approximate size of unit’s cross section.
### LCM100 Linear conveyor module

<table>
<thead>
<tr>
<th>Basic specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td><strong>Drive method</strong></td>
</tr>
<tr>
<td><strong>Bearing method</strong></td>
</tr>
<tr>
<td><strong>Max. speed</strong></td>
</tr>
<tr>
<td><strong>Max. payload</strong></td>
</tr>
<tr>
<td><strong>Module length</strong></td>
</tr>
<tr>
<td><strong>Max. number of sliders</strong></td>
</tr>
<tr>
<td><strong>Max. size of unit's cross-section</strong></td>
</tr>
<tr>
<td><strong>Controller</strong></td>
</tr>
<tr>
<td><strong>Communication I/F</strong></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
</tr>
</tbody>
</table>

1. The repeated positioning accuracy derived when a slider moving from the same direction (unidirectional) is used.
2. The unidirectional positioning accuracy derived when the position-correcting function through RFID was used.
3. Per slider.
4. The maximum payload is 14 kg when used together with belt module as parts required for use with the belt are attached to the slider.

### LCM100 Belt module

<table>
<thead>
<tr>
<th>Basic specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td><strong>Drive method</strong></td>
</tr>
<tr>
<td><strong>Bearing method</strong></td>
</tr>
<tr>
<td><strong>Max. speed</strong></td>
</tr>
<tr>
<td><strong>Max. payload</strong></td>
</tr>
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</tr>
</tbody>
</table>

### LCC140 Controller

<table>
<thead>
<tr>
<th>Basic specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Controlled robots</strong></td>
</tr>
<tr>
<td><strong>Outline dimensions (W x H x D)</strong></td>
</tr>
<tr>
<td><strong>Max. body weight</strong></td>
</tr>
<tr>
<td><strong>Input voltage</strong></td>
</tr>
<tr>
<td><strong>Maximum power consumption</strong></td>
</tr>
<tr>
<td><strong>External input/output</strong></td>
</tr>
<tr>
<td><strong>Network option</strong></td>
</tr>
<tr>
<td><strong>Programming box</strong></td>
</tr>
</tbody>
</table>

### YA Vertically articulated robots

#### Type 6-axis

<table>
<thead>
<tr>
<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>YR-20</td>
<td>Handling (general)</td>
<td>6</td>
<td>1</td>
<td>988</td>
<td>870</td>
</tr>
<tr>
<td>YR-20F</td>
<td></td>
<td>6</td>
<td>1</td>
<td>988</td>
<td>870</td>
</tr>
<tr>
<td>YR-20FL</td>
<td></td>
<td>6</td>
<td>1</td>
<td>988</td>
<td>870</td>
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<tr>
<td>YR-20LF</td>
<td></td>
<td>6</td>
<td>1</td>
<td>988</td>
<td>870</td>
</tr>
<tr>
<td>YR-20LF2</td>
<td></td>
<td>6</td>
<td>1</td>
<td>988</td>
<td>870</td>
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</tbody>
</table>

#### Type 7-axis

<table>
<thead>
<tr>
<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>YR/20</td>
<td>Assembly / Placement</td>
<td>7</td>
<td>1</td>
<td>990</td>
<td>780</td>
</tr>
<tr>
<td>YR/20F</td>
<td></td>
<td>7</td>
<td>1</td>
<td>990</td>
<td>780</td>
</tr>
<tr>
<td>YR/20FL</td>
<td></td>
<td>7</td>
<td>1</td>
<td>990</td>
<td>780</td>
</tr>
<tr>
<td>YR/20LF</td>
<td></td>
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<td>1</td>
<td>990</td>
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</tr>
<tr>
<td>YR/20LF2</td>
<td></td>
<td>7</td>
<td>1</td>
<td>990</td>
<td>780</td>
</tr>
</tbody>
</table>

*Notice: payload is reduced when the load is more than 1 kg. Use the robot within the recommended motion range.*