ARTICULATED ROBOTS

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# YA SERIES MANIPULATOR SPECIFICATIONS

## Applications

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<td>7</td>
<td>7</td>
</tr>
<tr>
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<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

## Specifications

### Number of axes

- 6-axis: 6
- 7-axis: 7

### Payload

- 6-axis: 1 kg (max. 2 kg\(^{\text{a/3}}\))
- 7-axis: 1 kg

### Vertical reach

- 6-axis: 804 mm
- 7-axis: 559 mm

### Horizontal reach

- 6-axis: 545 mm
- 7-axis: 1203 mm

### Repeatability

- 6-axis: ±0.03 mm
- 7-axis: ±0.1 mm

### Range of Motion

#### B-axis (turning)

- 6-axis: -160° to +160°
- 7-axis: -180° to +180°

#### L-axis (lower Arm)

- 6-axis: -90° to +110°
- 7-axis: -110° to +110°

#### E-axis (elbow twist)

- 6-axis: -90° to +110°
- 7-axis: -110° to +110°

#### U-axis (upper arm)

- 6-axis: -90° to +110°
- 7-axis: -110° to +110°

#### T-axis (wrist twist)

- 6-axis: -360° to +360°
- 7-axis: -180° to +180°

### Maximum Speed

#### B-axis (wrist pitch/yaw)

- 6-axis: 200°/s
- 7-axis: 200°/s

### Allowable Moment

#### A-axis (wrist roll)

- 6-axis: 3.33 N.m
- 7-axis: 3.33 N.m

### Inertia

#### T-axis (wrist twist)

- 6-axis: 0.03 kg.m
- 7-axis: 0.03 kg.m

### Mass

- 6-axis: 15 kg
- 7-axis: 10 kg

### Power Requirements

- 6-axis: 0.5 kVA
- 7-axis: 0.5 kVA

## Optional Functionality

- Vision function
- External reference point control

## Optional PC software

- MotoSimEG-VRG for YAMAHA

## Device cable connector

- Standard: 0.5 kVA
- Option: 0.5 kVA

## YA series basic system contents

- Standard power supply cable 4m
- Optional power supply cable 10m/15m/20m
- Optional extension cable 4m/8m/12m
- YAP cable 8m

## Standard boards

- NPN (PNP\(^{\text{b/3}}\)) DIO board
- EtherNet board

## Option board

- NPN (PNP\(^{\text{b/3}}\)) expansion DIO board
- Conveyor synchronization board
- DeviceNet™ board
- PROFIBUS board
- EtherCAT board

---

Note 1. Varies in accordance with applications and motion patterns.

Note 2. When a load is more than 1 kg, the motion range will be smaller. Use the robot within the recommended motion range. For details, refer to the dimensional diagram on P.111.

Note 3. PNP model is an option. Take care not to mix NPN and PNP for DIO.
### Ordering method

<table>
<thead>
<tr>
<th>Model</th>
<th>Power cable length</th>
<th>Controller</th>
<th>Option I/O</th>
<th>Controller Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>YA-RJ</td>
<td>4L</td>
<td>YAC100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Specifications

<table>
<thead>
<tr>
<th>Controlled Axis</th>
<th>Payload</th>
<th>Repeatability</th>
<th>Range of Motion</th>
<th>Allowable Moment</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-axis (turning)</td>
<td>1 kg (max. 2 kg)</td>
<td>±0.03 mm</td>
<td>-160° to +160°</td>
<td>R-axis (wrist roll) 3.33 N.m</td>
</tr>
<tr>
<td>L-axis (lower Arm)</td>
<td>-90° to +110°</td>
<td></td>
<td></td>
<td>B-axis (wrist pitch/yaw) 3.33 N.m</td>
</tr>
<tr>
<td>U-axis (upper arm)</td>
<td>-290° to +105°</td>
<td></td>
<td></td>
<td>T-axis (wrist twist) 0.58 N.m</td>
</tr>
<tr>
<td>R-axis (wrist roll)</td>
<td>-180° to +180°</td>
<td></td>
<td></td>
<td>R-axis (wrist roll) 0.058 kg.m²</td>
</tr>
<tr>
<td>B-axis (wrist pitch/yaw)</td>
<td>-130° to +130°</td>
<td></td>
<td></td>
<td>B-axis (wrist pitch/yaw) 0.058 kg.m²</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>-360° to +360°</td>
<td></td>
<td></td>
<td>T-axis (wrist twist) 0.005 kg.m²</td>
</tr>
</tbody>
</table>

- **Axis with brake**: L-axis, U-axis, S-axis (turning), R-axis (wrist roll), B-axis (wrist pitch/yaw), T-axis (wrist twist)
- **Maximum Speed**
  - S-axis (turning): 2.79 rad/s, 160°/s
  - L-axis (lower Arm): 2.27 rad/s, 130°/s
  - U-axis (upper arm): 3.49 rad/s, 200°/s
  - R-axis (wrist roll): 5.23 rad/s, 300°/s
  - B-axis (wrist pitch/yaw): 6.86 rad/s, 400°/s
  - T-axis (wrist twist): 8.72 rad/s, 500°/s

### Power Requirements

- 0.5 kVA

### Ambient Conditions

- **Ambient Temperature**
  - Operating: 0 to +40°C
  - Storage: -10 to +60°C
- **Relative Humidity** 90% max. (non-condensing)
- **Vibration Acceleration** 4.9 m/s² or less
- **Others**
  - Free from corrosive gasses or liquids, or explosive gasses
  - Free from exposure to water, oil, or dust
  - Free from excessive electrical noise (plasma)

### Notes

1. When a load is more than 1 kg, the motion range will be smaller. Use the robot within the recommended motion range. (See diagrams below)
2. The S-, R-, B-, and T-axes do not have any brakes. Make sure that the operation does not require brakes.
3. Varies in accordance with applications and motion patterns.

Note: Each axis uses a motor of 80 W or less.
### Ordering method

<table>
<thead>
<tr>
<th>YA-R3F</th>
<th>4L</th>
<th>YAC100</th>
<th>6-axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td></td>
<td>Controller</td>
<td></td>
</tr>
<tr>
<td>Power cable length (m)</td>
<td></td>
<td>Power cable length (m)</td>
<td></td>
</tr>
<tr>
<td>Draw</td>
<td>4.5</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Safety standard</td>
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<td>Safety standard</td>
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</tr>
<tr>
<td>CE mark</td>
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<td>CE mark</td>
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<tr>
<td>ISO 20638, EN 954-1, EN 954-2, EN 13850</td>
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<td>EN 60204-1, EN 60335-2-79</td>
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<td>EN 60204-1, EN 60335-2-79</td>
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</tr>
<tr>
<td>ISO 13850</td>
<td></td>
<td>ISO 13850</td>
<td></td>
</tr>
<tr>
<td>3-M8×P1.25 Depth 9</td>
<td></td>
<td>3-M8×P1.25 Depth 9</td>
<td></td>
</tr>
<tr>
<td>4-M5×P0.8 Depth 7</td>
<td></td>
<td>4-M5×P0.8 Depth 7</td>
<td></td>
</tr>
<tr>
<td>5H7 Depth 7</td>
<td></td>
<td>5H7 Depth 7</td>
<td></td>
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<tr>
<td>6H7 Depth 7</td>
<td></td>
<td>6H7 Depth 7</td>
<td></td>
</tr>
<tr>
<td>88±0.1155</td>
<td></td>
<td>88±0.1155</td>
<td></td>
</tr>
<tr>
<td>50±0.1</td>
<td></td>
<td>50±0.1</td>
<td></td>
</tr>
<tr>
<td>78±0.1</td>
<td></td>
<td>78±0.1</td>
<td></td>
</tr>
<tr>
<td>4 Air inlets</td>
<td></td>
<td>4 Air inlets</td>
<td></td>
</tr>
<tr>
<td>Tapped hole M5 (4 places) with pipe plug</td>
<td></td>
<td>Tapped hole M5 (4 places) with pipe plug</td>
<td></td>
</tr>
<tr>
<td>Arm side</td>
<td></td>
<td>Arm side</td>
<td></td>
</tr>
<tr>
<td>The cable that fits with the device's cable connector is an optional item. Please purchase it separately.</td>
<td></td>
<td>The cable that fits with the device's cable connector is an optional item. Please purchase it separately.</td>
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</tr>
<tr>
<td>&lt;Part number&gt; KEM-M4874-00</td>
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<td>&lt;Part number&gt; KEM-M4874-00</td>
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<tr>
<td>Base side</td>
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<td>Base side</td>
<td></td>
</tr>
<tr>
<td>The cable that fits with the device's cable connector is an optional item. Please purchase it separately.</td>
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<td>The cable that fits with the device's cable connector is an optional item. Please purchase it separately.</td>
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</tr>
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<td></td>
<td>&lt;Part number&gt; KEM-M4873-00</td>
<td></td>
</tr>
</tbody>
</table>

### Specifications

#### Controlled Axis

<table>
<thead>
<tr>
<th>Axis</th>
<th>Range of Motion</th>
<th>Maximum Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-axis (turning)</td>
<td>-160° to +160°</td>
<td>3.49 rad/s, 200°/s</td>
</tr>
<tr>
<td>L-axis (lower Arm)</td>
<td>-85° to +90°</td>
<td>2.62 rad/s, 150°/s</td>
</tr>
<tr>
<td>U-axis (upper arm)</td>
<td>-105° to +260°</td>
<td>5.24 rad/s, 300°/s</td>
</tr>
<tr>
<td>B-axis (wrist pich/yaw)</td>
<td>-120° to +120°</td>
<td>3.32 rad/s, 190°/s</td>
</tr>
<tr>
<td>R-axis (wrist roll)</td>
<td>-170° to +170°</td>
<td>5.24 rad/s, 300°/s</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>-360° to +360°</td>
<td>2.62 rad/s, 150°/s</td>
</tr>
</tbody>
</table>

#### Allowable Moment

<table>
<thead>
<tr>
<th>Axis</th>
<th>Allowable Moment</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-axis (wrist roll)</td>
<td>5.39 N.m</td>
</tr>
<tr>
<td>B-axis (wrist pich/yaw)</td>
<td>5.39 N.m</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>2.94 N.m</td>
</tr>
</tbody>
</table>

#### Allowable Inertia

<table>
<thead>
<tr>
<th>Axis</th>
<th>Allowable Inertia</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-axis (wrist roll)</td>
<td>0.1 kg.m²</td>
</tr>
<tr>
<td>B-axis (wrist pich/yaw)</td>
<td>0.1 kg.m²</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>0.03 kg.m²</td>
</tr>
</tbody>
</table>

#### Mass

| Mass | 27 kg |

#### Ambient Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>0 to +40˚C</td>
</tr>
<tr>
<td>Humidity</td>
<td>20 to 80%RH (non-condensing)</td>
</tr>
<tr>
<td>Vibration</td>
<td>4.9 m/s² or less</td>
</tr>
</tbody>
</table>

#### Others

- Free from corrosive gasses or liquids, or explosive gasses
- Free from exposure to water, oil, or dust
- Free from excessive electrical noise (plasma)

#### Power Requirements

0.5 kVA

Note 1. For wall-mounted installation, the S-axis operating range is ±25°.

Note 2. Varies in accordance with applications and motion patterns.

Note 3. SI units are used for specifications.
** YA-R5F 6-axis **

*Maximum payload 5 kg*  
*Longest Reach R706 mm*

## Ordering method

<table>
<thead>
<tr>
<th>Model</th>
<th>Power cable length</th>
<th>Controller</th>
<th>Option I/O</th>
<th>Option I/O</th>
<th>Option I/O</th>
<th>Option I/O</th>
<th>Option I/O</th>
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<tbody>
<tr>
<td>YA-R5F</td>
<td>4L</td>
<td>YAC100</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Specifications**

- **Controlled Axis**
  - S-axis (turning)
  - L-axis (lower Arm)
  - U-axis (upper arm)
  - B-axis (wrist pich/yaw)
  - T-axis (wrist twist)
  - R-axis (wrist roll)

- **Allowable Moment**
  - R-axis (wrist roll) 12 N·m
  - B-axis (wrist pich/yaw) 12 N·m
  - T-axis (wrist twist) 7 N·m
  - R-axis (wrist roll) 0.3 kg·m²
  - B-axis (wrist pich/yaw) 0.3 kg·m²
  - T-axis (wrist twist) 0.1 kg·m²

- **Mass**
  - Temperature 27 kg

- **Power Requirements**
  - 1.0 kVA

---

**Note.** This unit can also be used in combination with a travel axis or other external axis. Please contact us.

**Note.** Floor-mounted, wall-mounted, and ceiling-mounted types are available. Please contact us separately regarding wall-mounted or ceiling-mounted installations.

**Note.** Longest reach in a respective class (706 mm)

**Note.** Thanks to the higher control rate of the YAC100 controller and vibration-damping control of the arm, we have reduced the residual vibration when the arm stops moving, while shortening the cycle time and achieving the fastest speed in this class.

---

**Units: mm**

- **View A**
  - P-point: Maximum Envelop

- **View B**
  - Air inlet (with pipe plug)

- **View C**
  - 2×Air inlet (with pipe plug)

- **View D**
  - Base side
  - The cable that fits with the device's cable connector is an optional item. Please purchase it separately.
  - Part number: KEM-M4873-10 (Two connectors)

- **Base side**
  - Air inlet (with pipe plug)
  - 2×Air inlet (with pipe plug)

---

**Note.** SI units are used for specifications.

**Note 2.** Varies in accordance with applications and motion patterns.

**Note 1.** For wall-mounted installation, the S-axis operating range is ±30°.

**Care and Maintenance**

- Free from excessive electrical noise (plasma)
- Free from exposure to water, oil, or dust
- Free from corrosive gasses or liquids, or explosive gasses

---

**Condition**

- Ambient
  - Temperature: 0 to +45°C
  - Humidity: 20 to 80%RH (non-condensing)
  - Vibration: 4.9 m/s² or less
  - Others:
    - Free from corrosive gasses or liquids, or explosive gasses
    - Free from exposure to water, oil, or dust
    - Free from excessive electrical noise (plasma)
Note. Thanks to the higher control rate of the YAC100 controller and vibration-damping control of the arm, we have reduced the residual vibration when the arm stops moving, while shortening the cycle time and achieving the fastest speed in this class.

Note. This unit can also be used in combination with a travel axis or other external axis. Please contact us.

Note. Floor-mounted, wall-mounted, and ceiling-mounted types are available. Please contact us separately regarding wall-mounted or ceiling-mounted installations.

Note. Longest reach in a respective class (895 mm)

### Specifications

**Controlled Axis**

<table>
<thead>
<tr>
<th>Payload</th>
<th>5 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeatability</td>
<td>±0.03 mm</td>
</tr>
</tbody>
</table>

**Range of Motion**

- **S-axis (turning)**: -170° to +170°
- **L-axis (lower arm)**: -65° to +150°
- **U-axis (upper arm)**: -135° to +255°
- **B-axis (wrist pitch/yaw)**: -135° to +135°
- **T-axis (wrist twist)**: -360° to +360°

**Maximum Speed**

- **S-axis (turning)**: 4.71 rad/s, 270°/s
- **L-axis (lower arm)**: 4.89 rad/s, 280°/s
- **U-axis (upper arm)**: 5.24 rad/s, 300°/s
- **B-axis (wrist roll)**: 7.85 rad/s, 450°/s
- **B-axis (wrist pitch/yaw)**: 7.85 rad/s, 450°/s
- **T-axis (wrist twist)**: 12.57 rad/s, 720°/s

**Allowable Moment**

- **R-axis (wrist roll)**: 12 N·m
- **B-axis (wrist pitch/yaw)**: 12 N·m
- **T-axis (wrist twist)**: 7 N·m

**Allowable Inertia**

- **R-axis (wrist roll)**: 0.3 kg·m²
- **B-axis (wrist pitch/yaw)**: 0.3 kg·m²
- **T-axis (wrist twist)**: 0.1 kg·m²

**Mass**

- **Temperature**: 0 to +45°C
- **Humidity**: 20 to 80%RH (non-condensing)
- **Vibration**: 4.9 m/s² or less
- **Others**: Free from corrosive gasses or liquids, or explosive gasses

**Power Requirements**

1.0 kW

Note 1. For wall-mounted installation, the S-axis operating range is ±30°.

Note 2. Varies in accordance with applications and motion patterns.

Note. SI units are used for specifications.
**YA-R6F**

- **Maximum payload**: 6 kg
- **Longest Reach**: R1422 mm

### Ordering method

<table>
<thead>
<tr>
<th>Model</th>
<th>Power cable length</th>
<th>Controller</th>
<th>Option I/O</th>
<th>Network option</th>
</tr>
</thead>
<tbody>
<tr>
<td>YA-R6F</td>
<td>4L</td>
<td>YAC100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Specifications

#### Controlled Axis
- **Payload**: 6 kg
- **Repeatability**: ±0.08 mm

#### Range of Motion
- **S-axis (turning)**: -170° to +170°
- **L-axis (lower Arm)**: -90° to +155°
- **U-axis (upper arm)**: -175° to +250°
- **R-axis (wrist roll)**: -180° to +180°
- **B-axis (wrist pitch/yaw)**: -45° to +225°
- **T-axis (wrist twist)**: -360° to +360°

#### Maximum Speed
- **S-axis (turning)**: 3.84 rad/s, 220°/s
- **L-axis (lower Arm)**: 3.49 rad/s, 200°/s
- **U-axis (upper arm)**: 10.65 rad/s, 610°/s
- **R-axis (wrist roll)**: 7.16 rad/s, 410°/s
- **B-axis (wrist pitch/yaw)**: 7.16 rad/s, 410°/s
- **T-axis (wrist twist)**: 10.65 rad/s, 610°/s

#### Allowable Moment
- **R-axis (wrist roll)**: 11.8 N·m
- **B-axis (wrist pitch/yaw)**: 9.8 N·m
- **T-axis (wrist twist)**: 5.9 N·m

#### Allowable Inertia
- **R-axis (wrist roll)**: 0.27 kg·m²
- **B-axis (wrist pitch/yaw)**: 0.08 kg·m²
- **T-axis (wrist twist)**: 0.08 kg·m²

#### Mass
- 130 kg

#### Ambient Conditions
- **Temperature**: 0 to +45°C
- **Humidity**: 20 to 80%RH (non-condensing)
- **Vibration**: 4.9 m/s² or less
- **Others**:
  - Free from corrosive gasses or liquids, or explosive gasses
  - Free from exposure to water, oil, or dust
  - Free from excessive electrical noise (plasma)

#### Power Requirements
- 1.0 kVA

---

**Note:** Thanks to the higher control rate of the YAC100 controller and vibration-damping control of the arm, we have reduced the residual vibration when the arm stops moving, while shortening the cycle time and achieving the fastest speed in this class.

**Note:** Longest reach in its class (1422 mm) and increased moment capacity of the wrist.

**Note:** Thanks to the higher control rate of the YAC100 controller and vibration-damping control of the arm, we have reduced the residual vibration when the arm stops moving, while shortening the cycle time and achieving the fastest speed in this class.

**Note:** Floor-mounted, wall-mounted, and ceiling-mounted types are available. Please contact us separately regarding wall-mounted or ceiling-mounted installations.

**Note:** This unit can also be used in combination with a travel axis or other external axis. Please contact us.
### Ordering method

<table>
<thead>
<tr>
<th>Model</th>
<th>Power cable length</th>
<th>Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>YA-U5F</td>
<td>4L</td>
<td>YAC100</td>
</tr>
</tbody>
</table>

#### Specifications

- **Controlled Axis**: 7
- **Payload**: 5 kg
- **Repeatability**: ±0.06 mm

#### Range of Motion

<table>
<thead>
<tr>
<th>Axis</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-axis (turning)</td>
<td>-180° to +180°</td>
<td>-180° to +180°</td>
</tr>
<tr>
<td>L-axis (lower Arm)</td>
<td>-110° to +110°</td>
<td>-110° to +110°</td>
</tr>
<tr>
<td>E-axis (elbow twist)</td>
<td>-170° to +170°</td>
<td>-170° to +170°</td>
</tr>
<tr>
<td>U-axis (upper arm)</td>
<td>-90° to +115°</td>
<td>-90° to +115°</td>
</tr>
<tr>
<td>R-axis (wrist roll)</td>
<td>-180° to +180°</td>
<td>-180° to +180°</td>
</tr>
<tr>
<td>B-axis (wrist pitch/yaw)</td>
<td>-110° to +110°</td>
<td>-110° to +110°</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>-180° to +180°</td>
<td>-180° to +180°</td>
</tr>
</tbody>
</table>

#### Maximum Speed

<table>
<thead>
<tr>
<th>Axis</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-axis (turning)</td>
<td>3.49 rad/s, 200°/s</td>
<td>3.49 rad/s, 200°/s</td>
</tr>
<tr>
<td>L-axis (lower Arm)</td>
<td>3.49 rad/s, 200°/s</td>
<td>3.49 rad/s, 200°/s</td>
</tr>
<tr>
<td>E-axis (elbow twist)</td>
<td>3.49 rad/s, 200°/s</td>
<td>3.49 rad/s, 200°/s</td>
</tr>
<tr>
<td>U-axis (upper arm)</td>
<td>3.49 rad/s, 200°/s</td>
<td>3.49 rad/s, 200°/s</td>
</tr>
<tr>
<td>R-axis (wrist roll)</td>
<td>3.49 rad/s, 200°/s</td>
<td>3.49 rad/s, 200°/s</td>
</tr>
<tr>
<td>B-axis (wrist pitch/yaw)</td>
<td>4.01 rad/s, 230°/s</td>
<td>4.01 rad/s, 230°/s</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>6.11 rad/s, 350°/s</td>
<td>6.11 rad/s, 350°/s</td>
</tr>
</tbody>
</table>

#### Allowable Moment

- **R-axis (wrist roll)**: 14.7 N m
- **B-axis (wrist pitch/yaw)**: 14.7 N m
- **T-axis (wrist twist)**: 7.35 N m

#### Allowable Inertia

- **R-axis (wrist roll)**: 0.45 kg m²
- **B-axis (wrist pitch/yaw)**: 0.45 kg m²
- **T-axis (wrist twist)**: 0.11 kg m²

#### Power Requirements

- **Rated Power**: 1.0 kVA

#### Ambient Conditions

- **Temperature**: 0 to +40°C
- **Humidity**: 20 to 80%RH (non-condensing)
- **Vibration**: 4.9 m/s² or less

#### Others

- Free from corrosive gasses or liquids, or explosive gasses
- Free from exposure to water, oil, or dust
- Free from excessive electrical noise (plasma)

### Note

- Note 1. Varies in accordance with applications and motion patterns.
- Note 2. SI units are used for specifications.
Ya-U10F

Maximum payload 10 kg

Specifications

Controlled Axis Payload Repeatability
7 10 kg ±0.1 mm

Range of Motion

<table>
<thead>
<tr>
<th>Axis</th>
<th>Units</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-axis (turning)</td>
<td>mm</td>
<td>-180°</td>
<td>+180°</td>
</tr>
<tr>
<td>L-axis (lower Arm)</td>
<td>mm</td>
<td>-110°</td>
<td>+110°</td>
</tr>
<tr>
<td>E-axis (elbow twist)</td>
<td>mm</td>
<td>-170°</td>
<td>+170°</td>
</tr>
<tr>
<td>U-axis (upper arm)</td>
<td>mm</td>
<td>-135°</td>
<td>+135°</td>
</tr>
<tr>
<td>R-axis (wrist roll)</td>
<td>mm</td>
<td>-180°</td>
<td>+180°</td>
</tr>
<tr>
<td>B-axis (wrist pitch/yaw)</td>
<td>mm</td>
<td>-110°</td>
<td>+110°</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>mm</td>
<td>-180°</td>
<td>+180°</td>
</tr>
</tbody>
</table>

Maximum Speed

<table>
<thead>
<tr>
<th>Axis</th>
<th>Units</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-axis (turning)</td>
<td>rad/s</td>
<td>2.97</td>
<td>170°/s</td>
</tr>
<tr>
<td>L-axis (lower Arm)</td>
<td>rad/s</td>
<td>2.97</td>
<td>170°/s</td>
</tr>
<tr>
<td>E-axis (elbow twist)</td>
<td>rad/s</td>
<td>2.97</td>
<td>170°/s</td>
</tr>
<tr>
<td>U-axis (upper arm)</td>
<td>rad/s</td>
<td>3.49</td>
<td>200°/s</td>
</tr>
<tr>
<td>R-axis (wrist roll)</td>
<td>rad/s</td>
<td>3.49</td>
<td>200°/s</td>
</tr>
<tr>
<td>B-axis (wrist pitch/yaw)</td>
<td>rad/s</td>
<td>3.49</td>
<td>200°/s</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>rad/s</td>
<td>6.98</td>
<td>400°/s</td>
</tr>
</tbody>
</table>

Allowable Moment

<table>
<thead>
<tr>
<th>Axis</th>
<th>Units</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-axis (wrist roll)</td>
<td>Nm</td>
<td>31.4</td>
<td>1.0</td>
</tr>
<tr>
<td>B-axis (wrist pitch/yaw)</td>
<td>Nm</td>
<td>31.4</td>
<td>1.0</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>Nm</td>
<td>19.6</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Allowable Inertia (GD²/Hz²)

<table>
<thead>
<tr>
<th>Axis</th>
<th>Units</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-axis (wrist roll)</td>
<td>kg.m²</td>
<td>31.4</td>
<td>1.0</td>
</tr>
<tr>
<td>B-axis (wrist pitch/yaw)</td>
<td>kg.m²</td>
<td>31.4</td>
<td>1.0</td>
</tr>
<tr>
<td>T-axis (wrist twist)</td>
<td>kg.m²</td>
<td>6.98</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Mass

60 kg

Power Requirements

1.0 kVA

Ambient Conditions

Temperature: 0 to +40°C
Humidity: 20 to 80%RH (non-condensing)
Vibration: 4.9 m/s² or less
Others:
- Free from corrosive gasses or liquids, or explosive gasses
- Free from exposure to water, oil, or dust
- Free from excessive electrical noise (plasma)

Note 1. Varies in accordance with applications and motion patterns.
Note 2. SI units are used for specifications.

Notes:
- The flange is equipped with a cable through hole. When mounting equipment such as an attachment, ensure that no foreign liquid, oil, or dust go into hole.
- A bolt is mounted for T-axis grease replenished. When attaching an attachment to 80 dia. -0.035/0 part of the T-axis, enough space for the grease zerk (A-MTE6X1) is required to the shape of the attachment.
Note. High degree of motion like a human arm with its 7-axis arm.

Note. The high flexibility of motion makes operation possible even in narrow spaces inaccessible to humans.

Note. Assembles and handles heavy objects up to 20 kg.

Note. Many installation options: on the floor, on the wall or on the ceiling. Please contact us separately regarding wall-mounted or ceiling-mounted installations.

Note. Folds to compact size when not in use.

The high flexibility of motion makes operation possible even in narrow spaces inaccessible to humans.

Note. By utilizing internal user I/O wiring harness and air lines integrated in the arm, layout can be planned offline without worrying about peripheral interference.

Note. External axis specification for a hand can be accommodated. Contact YAMAHA regarding your requirements.

(Internal user I/O wiring harness and air lines specifications: two air hoses and sixteen-core cables)

Maximum payload 20 kg

Maximum payload 20 kg

Maximum load 20 kg
YAC100 controller specifications

- **Configuration**
  Standard: IP20 (open structure)

- **Dimensions**
  470 mm (W) × 420 mm (D) × 200 mm (H)
  (Protrusions are not included.)

- **Mass**
  20 kg

- **Cooling System**
  Direct cooling

- **Ambient Temperature**
  During operation: 0˚C to +40˚C
  During storage: -10˚C to +60˚C

- **Relative Humidity**
  90% max. (non-condensing)

- **Power Supply**
  Single-phase 200/230 VAC (+10% to -15%), 50/60 Hz
  Three-phase 200/220 VAC (+10% to -15%), 50/60 Hz

- **Grounding**
  Grounding resistance: 100 Ω or less

- **Digital I/Os**
  Specialized signals: 8 inputs and 11 output
  General signals : 16 inputs and 16 outputs
  Max. I/O (optional) : 1,024 inputs and 1,024 outputs

- **Positioning System**
  By serial encoder

- **Programming Capacity**
  JOB: 10,000 steps, 1,000 instructions
  CIO ladder: 1,500 steps

- **Expansion Slots**
  MP2000 bus × 5 slots

- **LAN (Connection to Host)**
  1 (10BASE-T/100BASE-TX)

- **Interface**
  RS-232C: 1ch

- **Control Method**
  Software servo control

- **Drive Units**
  Six axes for robots. Two more axes can be added as external axes. (Can be installed in the controller.)

- **Painting Color**
  Munsell notation 5Y7/1 (reference value)

YAP programming pendant specifications

- **Dimensions**
  169 mm (W) × 314.5 mm (H) × 50 mm (D)

- **Mass**
  0.990 kg

- **Material**
  Reinforced plastics

- **Operation Device**
  Select keys, axis keys (8 axes), numerical/application keys, Mode switch with key (mode: teach, play, and remote), emergency stop button, enable switch, compact flash card interface device (compact flash is optional.), USB port (1 port)

- **Display**
  640 × 480 pixels color LCD, touch panel
  (Alphanumeric characters, Chinese characters, Japanese letters, Others)

- **IEC Protection Class**
  IP65

- **Cable Length**
  Standard: 8 m, 4 m / 8 m / 12 m extension cable
  (maximum 20 m)

**Optimum controller for handling and assembly**

The YAC100 is a compact controller with improved performance and functions optimized for handling and assembly.

- Fits in a 19-inch rack and can be installed under conveyors.
- Commands specifically designed for workpiece handling with synchronized conveyors.

**Hardware Options**

- External axis (max: 2 axes)
- I/O module (28 points, NPN or PNP)
- Major fieldbus interface boards: DeviceNet™ (master/slave), CC-Link (slave), PROFIBUS (slave), EtherNet/IP™ (slave, I/O communications), EtherCAT (slave)

**Optional Functions**

- Conveyor synchronization
- Vision function
- External reference point control
- Software pendant

**Regarding the concurrent I/O ladder program**

The YAC100 controller is equipped with an NPN (or PNP) for standard I/O. Dedicated input/output is assigned to this standard I/O board. For this reason, if dedicated input/output is to be assigned to various types of field bus, concurrent I/O ladder program settings must be made.

Sample programs can be downloaded from our website. Note
http://global.yamaha-motor.com/business/robot/

Note. The member site requires registration.

**A robot simulator that implements the same functionality as the actual controller**

MotoSim EG-VRG for YAMAHA

Virtual programming before the actual line is completed allows major reduction in line startup time.

- **Modeling layout**
  Models of workers and workpieces can be easily laid out.

- **Intuitive control of models**
  Models can be moved intuitively, simply by using the mouse.

- **Programming and debugging**
  Automatic generation of robot operating programs, job editing, and job analysis can be performed easily.

- **Intuitive robot operation**
  The robot’s posture can be operated intuitively, allowing more efficient teaching.

- **Robot simulation**
  The robot can be watched as it operates, allowing visual verification.
Accessories and part options

YAP programming box (with 8m cable)

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>YAP-J</td>
<td>KEN-M5110-0J</td>
<td>Japanese</td>
</tr>
<tr>
<td>YAP-E</td>
<td>KEN-M5110-0E</td>
<td>English</td>
</tr>
<tr>
<td>YAP-C</td>
<td>KEN-M5110-0C</td>
<td>Chinese</td>
</tr>
</tbody>
</table>

Power cable (robot cable)

<table>
<thead>
<tr>
<th>Manipulator name</th>
<th>Model</th>
<th>Cable length</th>
<th>Cable diameter</th>
<th>Bending radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>YA-RJ</td>
<td>KEM-M4710-40</td>
<td>4 m</td>
<td>φ8.5 mm</td>
<td>85.0 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>φ13.5 mm</td>
<td>140.0 mm</td>
</tr>
<tr>
<td>YA-R5F/R5LF/R6F</td>
<td>KEM-M4712-40</td>
<td>4 m</td>
<td>φ17.5 mm</td>
<td>180.0 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>φ19.5 mm</td>
<td>200.0 mm</td>
</tr>
<tr>
<td>YA-U5F/U10F</td>
<td>KEM-M4713-40</td>
<td>4 m</td>
<td>φ17.5 mm</td>
<td>180.0 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>φ19.5 mm</td>
<td>200.0 mm</td>
</tr>
<tr>
<td>YA-U20F</td>
<td>KEM-M4714-40</td>
<td>4 m</td>
<td>φ17.5 mm</td>
<td>180.0 mm</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>φ16.1 mm</td>
<td>180.0 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>φ19.5 mm</td>
<td>200.0 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>φ26.0 mm</td>
<td>260.0 mm</td>
</tr>
</tbody>
</table>

Device cable connector (connector for user wiring)

<table>
<thead>
<tr>
<th>Manipulator name</th>
<th>Part position</th>
<th>Model</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>YA-RJ</td>
<td>Base side</td>
<td>KEM-M4870-00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arm side</td>
<td>KEM-M4870-10</td>
<td></td>
</tr>
<tr>
<td>YA-R3F</td>
<td>Base side</td>
<td>KEM-M4873-00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arm side</td>
<td>KEM-M4874-00</td>
<td></td>
</tr>
<tr>
<td>YA-R5F/R5LF</td>
<td>Base side</td>
<td>KEM-M4873-10</td>
<td>Two connectors</td>
</tr>
<tr>
<td></td>
<td>Arm side</td>
<td>KEM-M4874-10</td>
<td>Two connectors</td>
</tr>
<tr>
<td>YA-R6F</td>
<td>Base side</td>
<td>KEM-M4870-20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arm side</td>
<td>KEM-M4870-30</td>
<td></td>
</tr>
<tr>
<td>YA-U5F</td>
<td>Base side</td>
<td>KEM-M4873-30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arm side</td>
<td>KEM-M4870-40</td>
<td></td>
</tr>
<tr>
<td>YA-U10F</td>
<td>Base side</td>
<td>KEM-M4873-30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arm side</td>
<td>KEM-M4870-50</td>
<td></td>
</tr>
<tr>
<td>YA-U20F</td>
<td>Base side</td>
<td>KEM-M4870-60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arm side</td>
<td>KEM-M4870-40</td>
<td></td>
</tr>
</tbody>
</table>

Extension cable for YAP (extension cable for programming box)

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KEN-M531F-10</td>
<td>4 m</td>
</tr>
<tr>
<td></td>
<td>KEN-M531F-20</td>
<td>8 m</td>
</tr>
<tr>
<td></td>
<td>KEN-M531F-30</td>
<td>12 m</td>
</tr>
</tbody>
</table>

Dummy connector for YAP

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>YAP dummy connector</td>
<td>KEN-M5163-00</td>
</tr>
</tbody>
</table>

Maintenance parts

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery unit for YA-RJ/R3F</td>
<td>KEM-M53G3-10</td>
</tr>
<tr>
<td>Battery unit for YA-R5F/R5LF/R6F</td>
<td>KEM-M53G3-00</td>
</tr>
<tr>
<td>Battery unit for YA-U5F/U10F/U20F</td>
<td>KEM-M53G3-00</td>
</tr>
<tr>
<td>Battery unit for YAC100 controller</td>
<td>KEN-M5163-00</td>
</tr>
<tr>
<td>AC fan motor</td>
<td>KEN-M6175-00</td>
</tr>
</tbody>
</table>