Explosion-proof painting robots
and pre-configured paint packages

CAUTIONS TO BE TAKEN TO ENSURE SAFETY

- For those persons involved with the operation / service of your system, including Kawasaki Robot, they must strictly observe all safety regulations at all times. They should carefully read the Manuals and other related safety documents.
- Products described in this catalogue are general industrial robots. Therefore, if a customer wishes to use the Robot for special purposes, which might endanger operators or if the Robot has any problems, please contact us. We will be pleased to help you.
- Be careful as Photographs illustrated in this catalogue are frequently taken after removing safety fences and other safety devices stipulated in the safety regulations from the Robot operation system.

Kawasaki Robotics (USA), Inc.
Corporate Headquarters for Americas
28140 Lakeshore Drive, Wixom, MI 48393-U.S.A.
Phone: +1-248-446-4100 Fax: +1-248-446-4200

Global Network
Kawasaki Heavy Industries, Ltd.
Tokyo Head Office/Robot Division
1-14-5, Kaigan, Minato-ku, Tokyo 105-8315, Japan
Phone: +81-3-3435-6852 Fax: +81-3-3437-9860

Kawasaki Heavy Industries, Ltd.
Asahikawa Works/Robot Division
1-1, Kawasaki-cho, Asahikawa, Hokkaido 066-1666, Japan
Phone: +81-159-921-3642 Fax: +81-159-925-8002

Kawasaki Robotics (UK), Ltd.
Unit 4 Easter Court, Europa Boulevard, Westbrook Warrington
Cheshire, WA5 7TB, United Kingdom
Phone: +44-1925-71-3000 Fax: +44-1925-71-3001

Kawasaki Robotics GmbH
Im Taubental 32, 41468 Neuss, Germany
Phone: +49-2131-3426-0 Fax: +49-2131-3426-22

Kawasaki Robotics Korea, Ltd.
43, Namdong-daero 201beon-gil, Namdong-gu
Incheon, 21633, Korea
Phone: +82-32-821-6941 Fax: +82-32-821-6947

Kawasaki Robotics (Tianjin) Co., Ltd.
Bldg. 3, No. 10, Kang Jin Road, TEDA, Tianjin 300457, China
Phone: +86-22-5983-1898 Fax: +86-22-5983-1889

Kawasaki Motors Enterprise (Thailand) Co., Ltd.
Rayong Robot Center
119/10 Moo 4 T. Pluak Daeng, A. Pluak Daeng, Rayong 21140, Thailand
Phone: +66-38-955-040 Fax: +66-38-955-145

KawasakiRobotics.com

Materials and specifications are subject to change without notice.
High performance robots for any painting application.

The K series line of painting robots combines high operational performance with powerful programming flexibility. With four types, or eight models, of explosion-proof robots available, Kawasaki has a robot for any painting application, from a one-robot paint cell to a fully integrated, pre-configured paint package.

Features

A broad range of robots
Kawasaki offers four types of painting robots, ranging from the KF121 for small workpieces to the KJ314 for large workpieces like automobile bodies.

Built-in hoses
The hollow wrist (3R) prevents paint mist from adhering on tubes and cables and can minimize the chance of painting defects. The inner diameter of the hollow wrist is 70 mm.

Enhanced peripheral units
A control panel is provided to enhance the ease of system development and to interface with the robot traveling unit, workpiece transfer unit, rotation unit, and other devices.

Significant painting experience
Years of robotic painting experience gives Kawasaki the necessary background to provide a paint robot or pre-configured paint package that meets your exact needs. K series robots are equipped with advanced functionality and top of the line peripheral equipment, resulting in high quality painting for all applications.

Customer support
Our professional staff is available to assist at any time, whether it’s during the initial planning and startup stages, or well into production.
## Standard specifications

### Degrees of freedom (axes)

<table>
<thead>
<tr>
<th>Type</th>
<th>KF121</th>
<th>KJ194 Floor</th>
<th>KJ194 Shelf</th>
<th>KJ194 Wall</th>
<th>KJ244 Floor</th>
<th>KJ244 Shelf</th>
<th>KJ244 Wall</th>
<th>KJ264 Floor</th>
<th>KJ264 Shelf</th>
<th>KJ264 Wall</th>
<th>KJ314</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. payload (kg)</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

### Motion range (°)

<table>
<thead>
<tr>
<th>Type</th>
<th>KF121</th>
<th>KJ194 Floor</th>
<th>KJ194 Shelf</th>
<th>KJ194 Wall</th>
<th>KJ244 Floor</th>
<th>KJ244 Shelf</th>
<th>KJ244 Wall</th>
<th>KJ264 Floor</th>
<th>KJ264 Shelf</th>
<th>KJ264 Wall</th>
<th>KJ314</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arm rotation (JT1)</td>
<td>±160</td>
<td>±120</td>
<td>±120</td>
<td>±30 - ±120</td>
<td>±120</td>
<td>±120</td>
<td>±30 - ±120</td>
<td>±120</td>
<td>±120</td>
<td>±30 - ±120</td>
<td>±120</td>
</tr>
<tr>
<td>Arm out-in (JT2)</td>
<td>±120</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
<td>±130 - ±80</td>
</tr>
<tr>
<td>Arm up-down (JT3)</td>
<td>±120</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
<td>±90 - ±65</td>
</tr>
<tr>
<td>Wrist swivel (JT4)</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
<td>±720</td>
</tr>
<tr>
<td>Wrist bend (JT5)</td>
<td>±120</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
<td>±270</td>
</tr>
<tr>
<td>Wrist twist (JT6)</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
<td>±130</td>
</tr>
</tbody>
</table>

### Max. Torque (N·m)

<table>
<thead>
<tr>
<th>Type</th>
<th>KF121</th>
<th>KJ194 Floor</th>
<th>KJ194 Shelf</th>
<th>KJ194 Wall</th>
<th>KJ244 Floor</th>
<th>KJ244 Shelf</th>
<th>KJ244 Wall</th>
<th>KJ264 Floor</th>
<th>KJ264 Shelf</th>
<th>KJ264 Wall</th>
<th>KJ314</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrist swivel (JT4)</td>
<td>7.8</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
<td>56.2</td>
</tr>
<tr>
<td>Wrist bend (JT5)</td>
<td>7.8</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
<td>43.4</td>
</tr>
<tr>
<td>Wrist twist (JT6)</td>
<td>0.17</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
<td>2.19</td>
</tr>
</tbody>
</table>

### Environmental conditions

<table>
<thead>
<tr>
<th>Type</th>
<th>KF121</th>
<th>KJ194 Floor</th>
<th>KJ194 Shelf</th>
<th>KJ194 Wall</th>
<th>KJ244 Floor</th>
<th>KJ244 Shelf</th>
<th>KJ244 Wall</th>
<th>KJ264 Floor</th>
<th>KJ264 Shelf</th>
<th>KJ264 Wall</th>
<th>KJ314</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature (°C)</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
<td>0 - 40</td>
</tr>
<tr>
<td>Relative humidity (%)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
<td>35 - 85 (no dew, no frost allowed)</td>
</tr>
</tbody>
</table>

### Installation

<table>
<thead>
<tr>
<th>Type</th>
<th>KF121</th>
<th>KJ194 Floor</th>
<th>KJ194 Shelf</th>
<th>KJ194 Wall</th>
<th>KJ244 Floor</th>
<th>KJ244 Shelf</th>
<th>KJ244 Wall</th>
<th>KJ264 Floor</th>
<th>KJ264 Shelf</th>
<th>KJ264 Wall</th>
<th>KJ314</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td>Floor, Wall</td>
<td></td>
</tr>
</tbody>
</table>

---

### Wrist types

<table>
<thead>
<tr>
<th>Type</th>
<th>KF121</th>
<th>KJ194 / KJ264 / KJ314</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBR</td>
<td>3R (ø70 mm)</td>
<td>JT5 (Roll)</td>
</tr>
<tr>
<td>JT5 (Bend)</td>
<td>3R (ø70 mm)</td>
<td>JT6 (Roll)</td>
</tr>
<tr>
<td>JT4 (Roll)</td>
<td>3R (ø70 mm)</td>
<td>JT6 (Roll)</td>
</tr>
</tbody>
</table>

---

4: Conforms to ISO9283

2: Maximum reach: The RBR (Roll Bend Roll) wrist refers to the distance from the center of JT1 to the center of JT5. The BBR (Bend Bend Roll) wrist is the distance from the top arm center line to the JT4 axis. The 3R (Roll Roll Roll) wrist is the distance from JT1 to the axis cross-point between JT4 and JT5.

3: Other than China and Korea

4: Depends on the payload and motion patterns

5: Hose built-in

6: Operating range of JT1 is dependent on the side of mounting surface. The range is "+120 - 30" in the case of the left side. The range is "+30 - 120" in the case of the right side.
**KJ244 Floor**

**KJ244 Wall**

**KJ244 Shelf**
Motion range & dimensions

KJ314

SECTION E-E

VIEW B

SECTION D-D

VIEW E

SECTION D-D

VIEW F

VIEW C

SECTION D-D

VIEW H

SECTION D-D

VIEW G

Installation dimensions

Detail A

VIEW E

Working range based on point P

Counterbore ø34 (Ref. SECTION D-D)

Parallel pin

4-M8 Dp22

8-M6 Dp12

6-M6 Dp14

4-M8 Dp22 4-M8 Dp22

Motion range & dimensions

11 12
Controller

E series

The E Controller combines high performance, unprecedented reliability, a host of integrated features and simple operation, all in a compact design.

Features

Compact

The overall volume of the E controller has been reduced. The small footprint of this compact controller allows for installation in "high-density" applications.

Explosion-proof teach pendant

The explosion-proof teach pendant’s large, color LCD touch panel allows users to edit, teach and monitor information such as current position and I/O signals in the explosion-proof area. The interface panel can be customized to meet user preferences, and the backlit screen is easy to read in dark locations.

User-friendly operation

The easy-to-use teach pendant now incorporates motor power and cycle start at your fingertips. Multiple information screens can be displayed simultaneously and the intuitive teaching interface is simple to use.

Painting control functions (option)

This flexible system is compatible with a range of painting devices, and allows you to control the color change valve, electro-pneumatic regulator and the rotation of the discharge control gear pump all from the controller’s CPU board. You can also set up painting conditions and conduct discharge rate calibration on the teach pendant screen.

Increased memory storage

The enhanced CPU capacity of the E controller results in more accurate trajectory control, faster program execution, and quicker file saving and trajectory control, faster program execution, and quicker file saving and loading. In addition, the amount of memory provides greater program storage capacity, and the USB port makes it easy to connect external storage devices.

Easy maintenance

Modular components with limited cables translate into easy diagnostics and maintenance. A host of maintenance functions are available, including self-diagnostics on hardware and application errors to minimize troubleshooting and reduce MTTR (Mean Time To Repair). Remote diagnostics via the web server function enables service support from anywhere in the world.

Highly expandable

By installing an additional amplifier, travel unit, gear pump or a servo-powered part-positioning product, the system can accept up to three external axes. The system is compatible with a large number of field buses for controlling peripheral devices. The addition of a software sequencer function (KLogic), which can be edited on the teach pendant, makes it easy to structure a sophisticated system.

Specifications

**Standard**

- E35/E37
- E45/E47

**Option**

- E25/E27

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
<th>W500 × D550 × H1,400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>Enclosed structure with indirect cooling system</td>
</tr>
<tr>
<td>Number of controlled axes</td>
<td>Max. 9</td>
</tr>
<tr>
<td>Drive system</td>
<td>Full digital servo system</td>
</tr>
<tr>
<td>Coordinate systems</td>
<td>Joint, Base, Tool</td>
</tr>
<tr>
<td>Types of motion control</td>
<td>Joint / Linear / Circular interpolated motion</td>
</tr>
<tr>
<td>Programmation</td>
<td>Point to point teaching or language based programming</td>
</tr>
<tr>
<td>Memory capacity (MB)</td>
<td>8</td>
</tr>
<tr>
<td>General purpose signals</td>
<td>External operation: 32, Teach stop: Max. 128</td>
</tr>
<tr>
<td>Operation panel</td>
<td>E-Stop switch, Teach/repeat switch <strong>✽</strong>, Control power light (Cycle start, motor-on, hold/run, and error reset are activated from the teach pendant)</td>
</tr>
<tr>
<td>Cable length</td>
<td>3 inside the booth, 3 outside the booth</td>
</tr>
<tr>
<td>Teach pendant</td>
<td>Max. 10</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>120 (E25/E27), 170 (E35/E37, E45/E47)</td>
</tr>
</tbody>
</table>

**Power requirements**

- E35/E37
  - AC440–480V×10%, 60 Hz, 3Ø 7.3 kVA (E35)/5.1 kVA (E37) **✽**
  - Protective ground, Leakage current: Maximum 15 mA

- E45/E47
  - AC380–415V×10%, 50/60 Hz, 3Ø 7.3 kVA (E45)/5.1 kVA (E47) **✽**
  - Protective ground, Leakage current: Maximum 10 mA

- E25/E27
  - AC200–220V×10%, 50/60 Hz, 3Ø 10 kVA (E25)/5.6 kVA (E27)
  - Class-A ground (for intrinsic explosion-proof safety circuits)
  - Class-D ground (standard for robots), Leakage current: Maximum 100 mA

**Environmental conditions**

- Ambient temperature (ºC) 0 - 45
- Relative humidity (%) 35 - 85 (no dew, not frost allowed)
- Body color Munsell 10GY9/1 equivalent
- Teach pendant TFT color LCD display with touch panel, E-Stop switch, Teach lock switch, Enable switch
- Auxiliary storage unit USB memory
- Interface USB, EtherCAT, 100BASE-TX, RS-232C

**Option switch**

- **✽** 1: The E45/E47 comes with three switches to change between teach/teach 100%/repeat, as standard equipment.
- **✽** 2: Power requirements ensure maximum operation of a robot, not those required for normal operations.

System configuration diagram

- Optional device
  - Option switch **✽**
  - 100V power outlet **✽**
  - Brake release switch **✽**
  - Teach pendant
  - Terminal software

- Optional board
  - BID board, 32 I/O points each, Max. four boards (128 points)
  - DeviceNET board, master/slave
  - CC-Link board, slave
  - PROFIBUS board, master/slave
  - Ethernet/IP board, master/slave
  - CANopen board, slave
  - Conveyor I/F board

- External axis
  - Optional device
  - External axis motor
  - Terminal software
  - USB memory
  - USB
  - Ethernet
  - RS-232C
  - Auxiliary software

- Key board
  - Option switch **✽**
  - 100V power outlet **✽**
  - Brake release switch **✽**
  - Teach pendant
  - Terminal software
  - USB memory
  - USB
  - Ethernet
  - RS-232C
  - Auxiliary software

- USB memory
  - USB
  - Ethernet
  - RS-232C
  - Auxiliary software

- Option switch **✽**

For details, see the “Option” field for Operation panel in the Specifications.

**✽** 3: For details, see the “Option” field for Operation panel in the Specifications.

**✽** 4: Standard for the E45/E47

**✽** 5: Standard for the E35/E37 and E45/E47
Our pre-configured paint packages allow production to begin almost instantly.

If you need to get your painting system up and running quickly, Kawasaki pre-configured paint packages are your best option. Paint packages can be customized to your specific part requirements, and these compact, ready-to-use units can be easily installed in limited space with minimal start-up time.

Peripheral Equipment

Efficient, high quality, automated spray painting is achieved by combining high performance part positioning products, advanced paint spray control systems and highly developed painting robots and atomizers. Kawasaki’s peripheral equipment provides an ideal painting environment for any application.

Pre-configured paint packages
Kawasaki Robotics’ pre-configured paint packages include a Kawasaki paint robot and a part positioning product that vary in motion and workpiece capacity, and can be used for any paint application. Each option is driven by servo motors that are controlled as external axes by the robot controller, which results in high quality painting.

Painting unit control panel (air panel)
The air panel allows you to control changes to discharge rate, atomizing air and air patterns, to handle even the most complex work applications. Functions such as automatic color change and washing for each specified cycle could be incorporated, depending on customer need.

Robot travel unit
The robot travel unit coordinates robot movement with additional part positioning products so the paint process can take place on a moving component. The Kawasaki robot travel unit is used frequently for the painting of automobiles, construction machinery and septic tanks.

KOSMOS line control software
In painting processes where two or more robots are in operation, the KOSMOS line control panel provides real-time status information and access to production management information.

Line monitoring function
Monitor metrics for the whole system from the LCD screen, including robot and peripheral unit operation, painting conditions and system errors, among others.

Data setting function
Easily change coating requirements and communicate with the control panel using the intuitive, customizable touch panel interface. You can also monitor the following:

• Paint flow rate, atomizing air pressure, pattern air pressure, and the other painting requirement settings
• Time chart setting for color change, gun cleaning, etc.
• Program number setting for each workpiece type and color
• CCV number setting for each color

Statistical functions
View production, error and paint consumption statistics, among other valuable metrics.
**Small-sized painting applications**

**Servo Tombow**

Smooth, high quality painting

- **Smooth movement**
  - Servo motion control ensures smooth movement, eliminating workpiece slippage

- **Higher paint quality**
  - For small cubical boxes (electronic appliances such as TV cabinets, etc.), the spray gun can be oriented to each surface at a right angle. The distance between the gun and the surface can also be adjusted simply by entering a value. These features enable easy operation and enhance painting quality.

- **Coordinated movement with robot**
  - The Servo Tombow’s table rotation is synchronized with the robot’s movements, assuring a uniform paint finish. The Tombow table offers 360 degrees of rotation.

- **Prevents paint mist accumulation**
  - To minimize paint mist accumulation, workpieces can be positioned above a water tank when spraying.

**Specifications**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Standard</th>
<th>Heavy load carrying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table load</td>
<td>20 kg x 2 tables</td>
<td>40 kg x 2 tables</td>
</tr>
<tr>
<td>No. of control axes</td>
<td>Robot 6 + Servo Tombow 2</td>
<td></td>
</tr>
<tr>
<td>Control method</td>
<td>Servo control</td>
<td></td>
</tr>
<tr>
<td>Teaching playback method</td>
<td>PTP teaching + CP control</td>
<td></td>
</tr>
<tr>
<td>Position detection method</td>
<td>Absolute encoder</td>
<td></td>
</tr>
<tr>
<td>Arm Diameter (mm)</td>
<td>1,000, 1,200, 1,400, 1,600, 1,800</td>
<td></td>
</tr>
<tr>
<td>Operation angle</td>
<td>180°</td>
<td></td>
</tr>
<tr>
<td>Indexing time (sec)</td>
<td>Standard 2 / 180°, Heavy 2 / 180°</td>
<td></td>
</tr>
<tr>
<td>Table Operation angle</td>
<td>Infinite revolution</td>
<td></td>
</tr>
<tr>
<td>Indexing angle</td>
<td>90° and arbitrary angle</td>
<td></td>
</tr>
<tr>
<td>Indexing time (sec)</td>
<td>0.8 / 90°, 1.2 / 90°</td>
<td></td>
</tr>
<tr>
<td>Uninterrupted rotary speed (rpm)</td>
<td>Max. 120 / 45</td>
<td></td>
</tr>
<tr>
<td>Rotary direction</td>
<td>Normal / Reverse rotation</td>
<td></td>
</tr>
<tr>
<td>Explosion protection</td>
<td>Air pressurized explosion protection and intrinsically safe</td>
<td></td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>Approx. 140 - 160</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Munsell 10GY9/1 equivalent</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The standard arm diameters are 1,000 mm, 1,200 mm, 1,400 mm, 1,600 mm, and 1,800 mm. The work loading table and loading fixtures to be prepared by the purchaser.

**External view and dimensions**

- About 1,000, 1,200, 1,400, 1,600, 1,800
- About 520
- About 700

**Small-sized painting applications**

**Servo Tombow - R**

Enhanced space efficiency

- **Space saving**
  - The robot is installed at the center of the pre-configured Servo Tombow painting package, allowing for a smaller and more efficient workspace.

- **Adaptable to all painting conditions**
  - The tables and arm can be positioned and speed-controlled with a high level of precision. The tables can also be continuously rotated and fixed at any desired angle, making it possible to select the best painting method for the workpiece.

- **Enhanced paint quality**
  - Because there are few obstacles surrounding the tables, the robot can move freely and in-booth turbulence is minimized. This results in an enhanced paint quality.

- **Ideal for automated transportation equipment**
  - This system attaches and removes workpieces behind the paint robot. As a result, this system can be easily combined with automated transportation equipment that uses conveyors or delivery robots.

**Specifications**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Standard</th>
<th>Heavy load carrying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table load</td>
<td>20 kg x 2 tables</td>
<td>40 kg x 2 tables</td>
</tr>
<tr>
<td>No. of control axes</td>
<td>Robot 6 + Servo Tombow 2</td>
<td></td>
</tr>
<tr>
<td>Control method</td>
<td>Servo control</td>
<td></td>
</tr>
<tr>
<td>Teaching playback method</td>
<td>PTP teaching + CP control</td>
<td></td>
</tr>
<tr>
<td>Position detection method</td>
<td>Absolute encoder</td>
<td></td>
</tr>
<tr>
<td>Arm Diameter (mm)</td>
<td>1,800, 2,000, 2,200, 2,600</td>
<td></td>
</tr>
<tr>
<td>Operation angle</td>
<td>180°</td>
<td></td>
</tr>
<tr>
<td>Indexing time (sec)</td>
<td>4 / 180°</td>
<td></td>
</tr>
<tr>
<td>Table Operation angle</td>
<td>Infinite revolution</td>
<td></td>
</tr>
<tr>
<td>Indexing angle</td>
<td>90° and arbitrary angle</td>
<td></td>
</tr>
<tr>
<td>Indexing time (sec)</td>
<td>1.0 / 90°, 1.7 / 90°</td>
<td></td>
</tr>
<tr>
<td>Uninterrupted rotary speed (rpm)</td>
<td>Max. 120 / 45</td>
<td></td>
</tr>
<tr>
<td>Rotary direction</td>
<td>Normal / Reverse rotation</td>
<td></td>
</tr>
<tr>
<td>Explosion protection</td>
<td>Air pressurized explosion protection and intrinsically safe Explosion-proof composite type (Expib II BT4 / Exib II BT4)</td>
<td></td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>Approx. 550-690 (without robot)</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Munsell 10GY9/1 equivalent</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** A set of work loading tables and loading fixtures are necessary. Install the Manipulator KF121 onto a tombow-R with an arm length of 1,800 mm or 2,000 mm. Install the Manipulator KF192 / 193 / 194 onto a tombow-R with an arm length of 2,200 mm or 2,600 mm.

**External view and dimensions**

- About 1,900, 2,000, 2,200, 2,600
Small-sized painting applications

Servo Twister

A compact, sophisticated system

- **Small installation space**
The minimum installation space required for this system is 2,200 mm wide x 1,966 mm long for a 600 x 600 mm table. Its compact size allows for installation in a narrow, hand-spraying booth.

- **Rotary table functions**
The Servo Twister provides rotary coating, indexed coating and rotary synchronization functions.

- **Shared coating program**
The robot and painting table are integrated into one unit, so programs can be shared by more than one robot.

### Specifications

**Table load**
- Standard: 20 kg x 2 tables
- Heavy load carrying: 60 kg x 2 tables

**No. of control axes**
- Standard: Robot 6 + Servo Twister 2

**Control method**
- Standard: Servo control

**Teaching playback method**
- Standard: PTP teaching + CP control

**Position detection method**
- Standard: Absolute encoder

**Arm**
- **Length (mm)**: 650, 800
- **Operation angle**: 135°
- **Indexing time (sec)**: 1.8 / 135°

**Table**
- **Operation angle**: Infinite revolution
- **Indexing angle**: 90° and arbitrary angle
- **Indexing time (sec)**: 0.8 / 90°
- **Uninterrupted rotary speed (rpm)**: Max. 90
- **Rotary direction**: Normal / Reverse rotation

### External view and dimensions

![External view and dimensions](image)

Medium-sized painting applications

Servo Shuttle

The ultimate table painting package

- **Highly efficient**
  Servo motion control ensures smooth movement while providing high speed work transfers, table rotation and continuous rotation tracking with the robot and any standby feeder position.

- **Higher coating quality**
  The combination of controlled table positions, a high speed precision robot and the Servo Shuttle results in high quality painting.

- **Increased table load**
  Paint large items such as automobile instrument panels.

- **Simple installation**
  The pre-configured Servo Shuttle painting package is easy to install and still allows for the painting of complex workpieces.

### Specifications

**Table load**
- Standard: 50 kg x 2 tables
- Heavy load carrying: 60 kg x 2 tables

**No. of control axes**
- Standard: Robot 6 + Servo Shuttle 2

**Control method**
- Standard: Servo control

**Teaching playback method**
- Standard: PTP teaching + CP control

**Position detection method**
- Standard: Absolute encoder

**Shuttle**
- **Stroke (mm)**: 2,000, 2,700, 3,200, 4,000
- **Max. speed (mm / sec)**: 1,000
- **Operation angle**: Infinite revolution
- **Indexing angle**: 90° and arbitrary angle
- **Indexing time (sec)**: 0.8 / 90°
- **Uninterrupted rotary speed (rpm)**: Max. 90
- **Rotary direction**: Normal / Reverse rotation
- **Intermediate stop function**: Intermediate stop function and multiple coating control function are available
- **Explosion protection**: Air pressurized explosion protection and intrinsically safe
- **Mass (kg)**: Approx. 300 - 500
- **Color**: Munsell 10GY9/1 equivalent

Note: The work loading table and loading fixtures to be prepared by the purchaser.

### External view and dimensions

![External view and dimensions](image)
Pre-configured paint packages

**Medium-sized workpiece painting package**

**Servo Wing**

High quality table painting with a small footprint

- **Space saving**
  This pre-configured painting package can handle large workpieces while its efficient layout minimizes its overall footprint.

- **Less time spent teaching**
  A single program can be used because the left and right arms can be set for the same painting positions, thus reducing teaching time.

- **Minimize booth contamination & airflow turbulence**
  Slim arms without fixed rails mean painting can be done above a water tank. This reduces contamination and airflow turbulence in the paint booth.

### Specifications

| Table load | 30 kg x 2 tables |
| No. of control axes | Robot 6 + Servo Wing 2 |
| Control method | Servo control |
| Teaching playback method | PTP teaching + CP control |
| Position detection method | Absolute encoder |
| Arm stroke (mm) | 2,670 |
| Indexing time (sec) | 3.2 |
| Table operation angle | Infinite revolution |
| Indexing angle | 90° and arbitrary angle |
| Indexing time (sec) | 1.2 / 90° |
| Uninterrupted rotary speed (rpm) | Max. 90 |
| Rotary direction | Normal / Reverse rotation |
| Intermediate stop function | Intermediate stop and multiple coating control functions are available |
| Explosion protection | Air pressurized explosion protection and intrinsically safe |
| Mass (kg) | 970 |
| Color | Munsell 10GY9/1 equivalent |

*Note: The arm index time indicates the time of arm movement from the intermediate stop position to the painting position. The arm index time varies depending on the intermediate stop position.*

**Medium-sized workpiece painting package**

**Servo Spinner**

A new dimension in line coating

- **Flexible component placement**
  You can choose the ideal painting position for the workpiece, which reduces contamination of the paint booth.

- **Increase efficiency**
  Painting is performed as the table rotates, minimizing the robot’s wait time and increasing efficiency.

### Specifications

| Table load | 20 kg / 60 kg |
| No. of control axes | Robot 6 + Servo Spinner 1 |
| Control method | Servo control |
| Teaching playback method | PTP teaching + CP control |
| Position detection method | Absolute encoder |
| Table operation angle | Infinite revolution |
| Indexing angle | 90° and arbitrary angle |
| Indexing time (sec) | 0.8 / 90°, 1.1 / 90° |
| Uninterrupted rotary speed (rpm) | Max. 50 / Max. 45 |
| Rotary direction | Normal / Reverse rotation |
| Explosion protection | Air pressurized explosion protection and intrinsically safe |
| Mass (kg) | 60 |
| Color | Munsell 10GY9/1 equivalent |

### External view and dimensions
Pre-configured paint packages

Large-sized workpiece painting package

Servo Turntable

Complete surface painting with uninterrupted turntable rotation

- **Flexible Workpiece Placement**
  The integrated control of the robot and table allows any painting position to be achieved according to the work shape.

- **Compatible with Many Paint Applications**
  This system accommodates various types of painting applications, such as synchronous control, arbitrary-angle indexing, and paint spraying with continuous rotation of the table.

External view and dimensions

Specifications

<table>
<thead>
<tr>
<th>Standard</th>
<th>Heavy load carrying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table load</td>
<td>Max. 500 kg</td>
</tr>
<tr>
<td>No. of control axes</td>
<td>Robot 6 + Servo Turntable 1</td>
</tr>
<tr>
<td>Control method</td>
<td>Servo control</td>
</tr>
<tr>
<td>Teaching playback method</td>
<td>PTP teaching + CP control</td>
</tr>
<tr>
<td>Position detection method</td>
<td>Absolute encoder</td>
</tr>
<tr>
<td>Operation angle</td>
<td>Infinite revolution</td>
</tr>
<tr>
<td>Indexing angle</td>
<td>90° and arbitrary angle</td>
</tr>
<tr>
<td>Indexing time (sec)</td>
<td>2.5 / 90°</td>
</tr>
<tr>
<td>Uninterrupted rotary speed (rpm)</td>
<td>Max. 10</td>
</tr>
<tr>
<td>Rotary direction</td>
<td>Normal / reverse rotation</td>
</tr>
<tr>
<td>Explosion protection</td>
<td>Air pressurized explosion protection and intrinsically safe</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>180 (without table jig)</td>
</tr>
<tr>
<td>Table diameter (mm)</td>
<td>Available up to ø2,000</td>
</tr>
<tr>
<td>Color</td>
<td>Munsell 10GY9/1 equivalent</td>
</tr>
</tbody>
</table>

Option: Foot switch function
- Uninterrupted normal rotation, rotation stop
- Uninterrupted rotation, 45°, 90°, 180° indexing (changeable indexing angle), rotation stop