Kawasaki Heavy Industries, Ltd.
Robot Business Division
Tokyo Head Office/Robot Division
1-14-5, Kaigan, Minato-ku, Tokyo 105-8315, Japan
Phone: +81-3-3435-2501 Fax: +81-3-3437-9880

Akashi Works/Robot Division
1-1, Kawasaki-cho, Akashi, Hyogo 673-8666, Japan
Phone: +81-78-921-2946 Fax: +81-78-923-6546

Global Network
Kawasaki Robotics (USA), Inc.
28140 Lakeview Drive, Wixom, MI 48393, U.S.A.
Phone: +1-248-446-4100 Fax: +1-248-446-4200

Kawasaki Robotics (UK) Ltd.
Unit 4 Easter Court, Europa Boulevard, Westbrook Warrington
Cheshire, WA5 7ZB, 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 Fax: +49-2131-3426-22

Kawasaki Robotics Korea, Ltd.
43, Namdong-daero 21Beon-gil, Namdong-gu, Incheon, 21633, Korea
Phone: +82-32-821-6941 Fax: +82-32-821-6947

Kawasaki Robotics (Tianjin) Co., Ltd.
13/F, Building 6, No.13 Kehuan Road, TEDA, China
Phone: +86-22-5983-1888 Fax: +86-22-5983-1889

Kawasaki Motors Enterprise (Thailand) Co., Ltd.
(Rayong Robot Center)
119/10 Moo 4 TPlai Daeng, APlai Daeng, Rayong 21140
Thailand
Phone: +66-38-955-040-58 Fax: +66-38-955-145

https://robotics.kawasaki.com/

---

**Kawasaki Robot**

**duAro** Dual-arm SCARA Robot “duAro”

---

**Kawasaki Robot**

---

**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.

---

*Materials and specifications are subject to change without notice.*
Kawasaki’s innovative dual-arm collaborative robot, duAro enables humans and robots to work together in the same workspace.

**Features:**

**Space-Saving**
With its two co-axial arms, duAro can fit into a single-person space, and provides a wide collaborative working range.

**Easy Introduction**
The wheeled base that accommodates the arms and controller enables the user to move the robot to any location.

**Easy Teaching**
Direct teaching with dedicated tablet software enables non-skilled operators to teach and operate the robot intuitively.

**Safety**
In the event of a collision with the worker, the collision detection function will stop the duAro safely. In addition, the soft materials on the arm surfaces also reduce shocks.

**Caution!**
This function can reduce damage in case of an accident, but will not prevent accidents from occurring. Users are required to carry out safety risk management before use.
Advantages of dual-arm robots

- Handling of various types and sizes of workpieces is possible, unlike with single-arm robots.
- It is possible to handle various types and sizes of workpieces, which is not possible for single-arm robots. In addition, the coaxial construction enables the robot arms to reach around and work on the back side.
- Each arm can perform different tasks simultaneously, shortening the cycle time considerably.
- Tightening screws with a screw driver
- Holding a workpiece

Easy to Use

Standardized systems of peripheral equipment make the introduction of robots easier.

Quick Installation

Thanks to the pre-designed system packages, installation and startup are quicker, even when some items have to be customized.

Low Cost

The overall costs associated with system building can be reduced due to the use of common components.

High Quality

Pre-evaluated and tested systems provide stable quality.

Applications for the System Packages

- Various parts insertion
- Circuit board loading/unloading
- Handling of FPCs (flexible printed circuit boards)
- Screw tightening
- Gate cutting
- Box packing
- Rice ball tray packing
- Sealing
- Putting lids on lunch bowls
- Handling of FPCs

Programming Not Required

A standard set of operations for tightening screws has been developed and is readily available. Users can choose it on the tablet screen.

Easy Setting

To carry out the operational setting, all you have to do is input the parameters according to the specific screw to be handled. Tool changing can easily be made by changing the parameters only.

System Packages

Easy to Use

Standardized systems of peripheral equipment make the introduction of robots easier.

Quick Installation

Thanks to the pre-designed system packages, installation and startup are quicker, even when some items have to be customized.

Low Cost

The overall costs associated with system building can be reduced due to the use of common components.

High Quality

Pre-evaluated and tested systems provide stable quality.

System Package Example (screw-tightening & assembling)

Packaged Components:
- Base chuck
- Screw feeder
- Electric screw driver
- Package software

Customized parts:
- Gripper for substrate transfer
- Workpiece setting

System Package Advantages

- Various parts insertion
- Circuit board loading/unloading
- Handling of FPCs (Flexible Printed Circuit boards)
- Screw tightening
- Gate cutting
- Box packing
- Rice ball tray packing
- Sealing
- Putting lids on lunch bowls
- Handling of FPCs

Package Software

Applications for the System Packages

- Various parts insertion
- Circuit board loading/unloading
- Handling of FPCs (flexible printed circuit boards)
- Screw tightening
- Gate cutting
- Box packing
- Sealing
- Rice ball tray packing
- Putting lids on lunch bowls
- Handling of FPCs
duAro 1
Standard Specifications

Tasks such as part assembling and screw tightening can be performed on the same work bench and conveyors that human workers are using.

<table>
<thead>
<tr>
<th>Structure: Horizontal articulated type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of freedom (axes)</td>
</tr>
<tr>
<td>Max. payload (kg)</td>
</tr>
<tr>
<td>Max. reach (mm)</td>
</tr>
<tr>
<td>Positional repeatability (mm)</td>
</tr>
</tbody>
</table>

- Arm rotation (°): JT1 -170 to +170, JT2 -140 to +500
- Arm up-down (°): JT3 0 to +150
- wrist swivel (°): JT4 -360 to +360

- Mass (kg): Approx. 230 (including controller, excluding options)
- Installation: Floor mount
- Environmental conditions: Ambient temp (°C): 5 - 40°
- Relative humidity (%): 35 - 85 (no dew, no frost allowed)
- Controller / Power requirements: F61 / 2kVA

Please consult with Kawasaki for operations beyond these conditions.

duAro 2
Standard Specifications

Compared to duAro1, the vertical stroke (Z-axis) has been extended to 550mm and the payload capacity to 3kg (each arm). Thanks to the long vertical stroke, packing into a deep box is possible with ease.

<table>
<thead>
<tr>
<th>Structure: Horizontal articulated type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of freedom (axes)</td>
</tr>
<tr>
<td>Max. payload (kg)</td>
</tr>
<tr>
<td>Max. reach (mm)</td>
</tr>
<tr>
<td>Positional repeatability (mm)</td>
</tr>
</tbody>
</table>

- Arm rotation (°): JT1 -170 to +170, JT2 -140 to +500
- Arm up-down (°): JT3 0 to +150
- wrist swivel (°): JT4 -360 to +360

- Mass (kg): Approx. 230 (including controller, excluding options)
- Installation: Floor mount
- Environmental conditions: Ambient temp (°C): 5 - 40°
- Relative humidity (%): 35 - 85 (no dew, no frost allowed)
- Controller / Power requirements: F61 / 2kVA

Please consult with Kawasaki for operations beyond these conditions.
Offline Programming Software

Kawasaki Robot Solutions

Kawasaki Robot’s offline programming tool
Enables a variety of production configurations

The application can build 3D models of robots, peripherals and products to verify various system configurations. Verification of operation time of of robots and interference with surrounding objects ahead of introduction can reduce the risks associated with the initial system launch. The tool also has rich support functionality to create motions and programs for the robots, thereby contributing to a reduction in working hours.

Robot simulation technology

The virtual robot controller technology that Kawasaki has developed over the years can estimate motion trajectories and cycle times as accurately as the hardware robot controllers. The same tablet as one used for the real robot can be used.

Layout design

Capture data from 3D-CAD to arrange the products (STL format).

Interference check function allows for checking if there is a contact among models.

Interactive wizard ensures reliable operations even for those who are unfamiliar with layout design.

Operation environment

Available in Windows environments.

Supported OS: Windows 7, 10 (x86, X64)

On a 64-bit computer, it runs in the 32-bit compatible mode.

Available in Japanese, English, German and Chinese (simplified characters)

Teaching and programming

Teach point modeling facilitates checks for working positions and moves robots to their working positions.

Coordinated movement setting allows for teaching multiple arms easily.

The status of robot operations and I/O signals can also be checked.

Table and Software

Table-based software for duAro offers easy programming with intuitive touch operation.

User-friendly touch panel is used to teach and operate the robot. A wireless connection eliminates the need for complicated wiring. Switching between the cooperative and individual operations of the arms can also be done from the tablet.

Verification of operation time of robots and interference with surrounding objects ahead of introduction can reduce the risks associated with the initial system launch. The tool also has rich support functionality to create motions and programs for the robots, thereby contributing to a reduction in working hours.

Kawasaki Robot’s offline programming tool
Enables a variety of production configurations

The application can build 3D models of robots, peripherals and products to verify various system configurations. Verification of operation time of of robots and interference with surrounding objects ahead of introduction can reduce the risks associated with the initial system launch. The tool also has rich support functionality to create motions and programs for the robots, thereby contributing to a reduction in working hours.

Robot simulation technology

The virtual robot controller technology that Kawasaki has developed over the years can estimate motion trajectories and cycle times as accurately as the hardware robot controllers. The same tablet as one used for the real robot can be used.

Layout design

Capture data from 3D-CAD to arrange the products (STL format).

Interference check function allows for checking if there is a contact among models.

Interactive wizard ensures reliable operations even for those who are unfamiliar with layout design.

Operation environment

Available in Windows environments.

Supported OS: Windows 7, 10 (x86, X64)

On a 64-bit computer, it runs in the 32-bit compatible mode.

Available in Japanese, English, German and Chinese (simplified characters)

Teaching and programming

Teach point modeling facilitates checks for working positions and moves robots to their working positions.

Coordinated movement setting allows for teaching multiple arms easily.

The status of robot operations and I/O signals can also be checked.

Options

Hardware Options

Options for separated type

The arms and cabinet cart can be separated and installed on user’s equipment individually.

Arm extension adapter for duAro 1

The arm length of duAro1 can be extended by 100mm, using an optional special extension adapter.
Easy vision system setup using a tablet

It is possible to carry out initial setup, calibration and programming using a tablet. The time required for setting up the vision system can be considerably reduced.

Built-in Vision System (for the F Controller)

The vision processing software can be installed inside the F controller, which eliminates the need for an external vision PC. This offers a low-cost, space-saving solution. The vision system can be operated from a tablet or PC.

Specifications for the F Controller vision system

- **Camera**: 1.6 million pixels, monochrome/color
- **Number of cameras**: 1 to 4
- **Detecting method**: Shape recognition by pattern matching
- **Number of positions to register**: Up to 100
- **Language**: English, Japanese, Chinese (simplified characters)

Mounting a hand-eye camera

A camera can be mounted directly on the duAro’s JT4 axis.
- **Typical accessories**: Camera, lens, lighting equipment and bracket are purchased as a set.
- **Mounting the camera**: The camera on the robot arm, pictures can be taken close to the workpiece. (Standard camera: focal length 1000mm, field of vision: 30-60mm)
- **Mounting angle**: ±30° and ±60°
- **Depending on the position of the Z-axis (JT3)**, please be careful about possible interference with the other arm.

Mounting a fixed camera

- **Camera**: This camera is mounted on a separate stand, not on the robot. Typical accessories such as a camera, lens, lighting equipment are purchased as a set.
- **Camera mounted at distance**: The camera mounted at distance can capture wide angle pictures. (Standard camera: focal length 1,000mm, field of vision: 250-370mm)

Vision System Applications

An example of a 2-point measurement

- Measurement by fixed camera of a gripped workpiece
- Measurement by hand-eye and calibration of the workpiece positions
- Indexing after simultaneous calibration of both the gripping and positioning errors

Using the optional conveyor tracking function

- Taking an upstream picture at the distance (JT3)
- Processing the workpiece at a position by the conveyor

Safe Robot Operation Monitoring

By monitoring the robot operation, safety features can be configured for the shared workspace.
- **Space-saving** is possible by controlling the robot workspace.
- **The safety features** can be altered according to safety signal inputs.
- **Certifications**: IEC61508 (SIL2), ISO10218-1 and 13849-1 (PLd/Category 3)

Speed monitoring

- Monitoring the speed of the robot at specified positions to ensure that it is below a predetermined speed.

Force monitoring

- Monitoring the force applied to the robot at specified positions to ensure it is below a predetermined value.

Collision detection

- Monitoring the impact applied to the robot at specified positions to ensure it is below a predetermined value.

System configuration

- Standard I/O
  - 16 points
- Optional I/O
  - IDD board: IO 32 points each
  - Conveyor I/F board
  - Motor for external axis
  - USB IF connector
  - Teach pendant
  - Brake release box
  - Primary power cable
  - Built-in vision system
  - Ethernet
  - Terminal software

Certifications:
- IEC61508 (SIL2), ISO10218-1 and 13849-1 (PLd/Category 3)
- Dual-axis cooperative operation, or Single-arm individual operation
- Direct teaching, simple teaching by tablet

Certifications:
- IEC61508 (SIL2), ISO10218-1 and 13849-1 (PLd/Category 3)
- Dual-axis cooperative operation, or Single-arm individual operation
- Direct teaching, simple teaching by tablet