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.
The “duAro” dual-arm SCARA robot: An innovative robot that can collaboratively work with humans.

Features

**Innovative design**
The duAro robot, with its two coaxial arms operated by one controller, can fit into a one-person space. In addition to providing independent arm operation, the single axis configuration enables the robot to easily perform coordinated arm movements, much like a human.

**Collaborative operations**
Low-power motors, a soft body, speed, force and work zone monitoring, and a deceleration function enable the duAro to safely collaborate with humans in work operations. In the unlikely event of a collision, the collision detection function instantaneously stops the robot’s movement.

**Installation flexibility**
The slim cart allows for installation in tight spaces, and the option for integrated or separate (arms and controller are installed separately) installation helps duAro fit into a variety of layouts.

**Easy teaching**
The lead-through teach function allows the user to easily teach the robot tasks by hand guiding its arms. Teaching operations can also be conveyed via a tablet which can be connected to multiple robots.

**Enhanced options**
Both the duAro1 and duAro2 have options for integrated 2D vision, expanded and remote I/O, Bluetooth connectivity, and encoder-supported conveyor synchronization.

Designed to fit into a single-person space, the duAro works well side-by-side with humans.

**Robot’s working range similar to humans**
The duAro robots’ coaxial arms provide a similar working range as the average person’s.

**No line changes required to introduce duAro**
One duAro occupies the space of a single person, so no line changes are necessary for the robot.

**Collision detection function**
If the duAro detects contact with a person or object, the collision detection function instantaneously stops the robot’s movement.

In order to reduce risk, customers shall, at their own responsibility, establish and implement a risk assessment to coexist with people in customers’ work operations before and during use of the duAro.

The collision detection function is designed to reduce the risk of accident. However, this function has its limitations and cannot prevent all accidents, and it is not a substitute for safe and attentive use. It is the customers’ responsibility to set up, use and operate the duAro, and please be careful at all times.

duAro is a trademark of Kawasaki Heavy Industries, Ltd.
Cumulative costs are lower than those of conventional robots, thanks to lowered costs for line changes.

The graph is a concept.

Cumulative costs are lower than those of conventional robots, thanks to lowered costs for line changes.

The more automated, the more cost-effective

Features

Easy to deploy

The robot only requires a power line and an air connection, making it easy to install within a single-person space.

System is easy to configure

A tablet is available for teaching multiple robots.

Benefits of deployment

Lower total cost

- Even simple grippers are able to handle large workpieces
- The coaxial configuration enables the robot to reach equipment at its back
- The two arms can perform different operations to reduce cycle time
Available for a wide range of applications

- Fastening screws
- Arranging electronic parts in bulk
- Filling cups with soup
- Loading rice balls onto trays
- Packaging confections
- Assembling printed circuit boards
- Dispensing
- Inspection of assembled printed circuit boards
- Inspecting electronic chips
- Spray-coating / UV curing
- Loading onto and unloading off of a board inspection device
- Integrating 2D vision
- Fastening screws
- Optional separate type

**Controller options**

The F61 Controller is specifically designed for duAro robots, enabling independent operation of two arms and is standard for world-wide use. It contains an additional power block and connections to accommodate their second arm, and additional dedicated I/O ports for each arm. I/O can be expanded, or remote I/O can be added, based on the needs of your application.

The compact F61 controller is versatile in its installation - it can be housed inside duAro's slim cabinet (integrated), or on its own, connected to the robot through cables (separated). The F61 also has options for integrated 2D vision, Bluetooth connectivity and encoder-supported conveyor synchronization.

<table>
<thead>
<tr>
<th>F61 Controller</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Signals</td>
<td></td>
</tr>
<tr>
<td>External Signal</td>
<td>16</td>
</tr>
<tr>
<td>E-stop, Hold, etc.</td>
<td>16 (max 80)</td>
</tr>
<tr>
<td>Including remote I/O</td>
<td>128 (max 144)</td>
</tr>
<tr>
<td>Input</td>
<td>16</td>
</tr>
<tr>
<td>Output</td>
<td>16</td>
</tr>
<tr>
<td>Addition</td>
<td>64 (max 80)</td>
</tr>
<tr>
<td>Including remote I/O</td>
<td>128 (max 144)</td>
</tr>
<tr>
<td>EtherNet/IP (Scanner, Adapter), CC-Link (Adapter), PROFINET (Adapter)</td>
<td></td>
</tr>
</tbody>
</table>
**Robot Teacher 2**

The duAro tablet software offers an easy teach method with intuitive touch operations.

You can use familiar touch operations on a visually simple display to operate and teach your robots. Wireless support eliminates the need for complicated wiring. Its ease of use, even for those with little experience operating a robot, helps reduce programming time.

**System requirement for tablets**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Android 5.1 - 7.0</td>
</tr>
<tr>
<td>dp*1</td>
<td>Width of the smallest side of the tablet in 600 dp or greater</td>
</tr>
<tr>
<td>Processor</td>
<td>ARM</td>
</tr>
</tbody>
</table>

**Tested Device**

<table>
<thead>
<tr>
<th>Device</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galaxy Tab 2</td>
<td>Samsung</td>
</tr>
<tr>
<td>ZenPad 10</td>
<td>ASUS</td>
</tr>
</tbody>
</table>

**Linking with a tablet**

The tool can link with the tablet used for the robots. Interfering models are highlighted and the robot’s working position (teaching point model) and motion trajectories are displayed.

**Monitoring**

The state of simulated I/O signals are shown in graphs. You can monitor the running program steps as well as the robot’s status.

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**Program editing**

Keeping those who are unfamiliar in mind, this tool allows you to add instructions for editing a program. To compare programs before and after modification, you have the ability to review modification details during programming.

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**Teaching and programming**

Teach point modeling facilitates checks for working positions and moves robots to their working positions. Coordinated movement setting allows you to easily teach multiple arms. You can check the status of robot operations and I/O signals.

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**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. You can connect and operate the tablet the same way you would the real robot.

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**Operation environment**

Available in common Windows environments. Supported OS: Windows® XP, 7, 10 (x86, x64)

Available in four languages. Japanese/English/Chinese/German

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**Drawing**

Interfering models are highlighted and the robot’s working position (teaching point model) and motion trajectories are displayed.
Kawasaki vision system

We’ve customized and introduced an advanced 2D-vision system for the quick and flexible support of the broad duAro applications.

Features

Easy to Use

The easy operation menu customized for the duAro enables first time users of industrial robots and vision devices to quickly take full advantage of its functions (an application specific advanced menu is also available to customers). Also, you can use a tablet to make the duAro conduct correction movements easily, with no need to edit programs. (Sophisticated processing, such as variety discrimination or barcode recognition, requires AS programs.)

Embedded in duAro’s compact body

All vision devices are embedded in or can be attached to the duAro; small form factor without any need to rearrange wiring after moving the duAro.

Minimize burden of reconfiguration after moving the duAro

Reconfiguration of a robot is usually required after moving it or moving equipment around it. However, with the vision system, the helpful “device correction” corrects the position information to restart the duAro swiftly.

Device selection

According to the type of work and environment, select the combination of “camera”, “lens” and “light” from the choices below. Use the flowchart if you are not clear about selection criteria.

Mounted camera option types

<table>
<thead>
<tr>
<th>Camera</th>
<th>Lens</th>
<th>Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monochrome</td>
<td>View 50 mm</td>
<td>Ring light</td>
</tr>
<tr>
<td>Monochrome</td>
<td>View 50 mm</td>
<td>Bar light</td>
</tr>
<tr>
<td>Color</td>
<td>View 50 mm</td>
<td>Bar light</td>
</tr>
<tr>
<td>Monochrome</td>
<td>View 30 mm</td>
<td>Ring light</td>
</tr>
<tr>
<td>Monochrome</td>
<td>View 30 mm</td>
<td>Ring light</td>
</tr>
<tr>
<td>Monochrome</td>
<td>View 50 mm</td>
<td>Flat dome light</td>
</tr>
</tbody>
</table>

- The view is estimated with a distance of 100 mm from an object.
- A view not less than 80 mm is supported with a fixed camera. In this case, choose a suitable lens and suitable lights according to the view size.

Specifications

<table>
<thead>
<tr>
<th>Camera</th>
<th>Height</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monochrome</td>
<td>66 g</td>
<td>Pixel count: 1.3 million pixels</td>
</tr>
<tr>
<td>Color</td>
<td>54 g</td>
<td>Standard lens (resolution: 0.054 mm/pix)</td>
</tr>
<tr>
<td>View 50 mm</td>
<td>56 g</td>
<td>Lens suitable for a broader range</td>
</tr>
<tr>
<td>View 30 mm</td>
<td>51 g</td>
<td>Lens suitable for a small object</td>
</tr>
<tr>
<td>Ring light</td>
<td>130 g</td>
<td>Standard light that can clearly discover irregular lines</td>
</tr>
<tr>
<td>Bar light</td>
<td>75 g</td>
<td>Small, with configurable position and angle, available even at a position where ring light is unavailable</td>
</tr>
<tr>
<td>Flat dome light</td>
<td>270 g</td>
<td>Provides even illumination, suitable for glossy works</td>
</tr>
</tbody>
</table>

- Lens resolution is estimated with an object distance of 100 mm and a 1.3 million pixel camera.

Examples

Ring light Bar light Flat dome light

Features

- A vision camera directly attached to the duAro’s JT4 axis.
- Camera and fixture brackets set.
- The angle is configurable to ±30° or ±60°.
- Supports ring lights, dome lights and bar lights.
- Depending on the height of 2 axis (JT3), attention should be paid to interference with the second arm.