



COBOTS EBOOK

[LEARN MORE](#)



Collaborative Robots Buyer's Guide

robotiq.com

INTRODUCTION

A new kind of robot has made its way into industrial settings, challenging our preconceived notions of robotics. These robots' main feature is the ability to work safely alongside humans, and now it seems human-robot collaboration is the most sought-after characteristic for robots. There's a lot of talk about them on the web, but what are they really?

Until now, robots have always been big, strong, robust devices that work on specific tasks which were designed for them. They've been kept in cages and surrounded by guards for safety purposes. Their bright color was used to warn surrounding workers about the danger they represented. And it took a lot of programming skills just to set up these robots.

Collaborative robots, on the other hand, are designed to work with humans. They're built with safety features such as integrated sensors, passive compliance, or overcurrent detection. The integrated sensors will feel external forces and, if this force is too high, lead the robot to stop its movement. Passive compliance is produced by mechanical components. If an external force acts on a joint, this joint will submit itself to this force. So, in the case of a collision, the joint will move in the opposite direction or stop completely to avoid causing injury.

Most collaborative robots can be easily taught by demonstration, rather than requiring a deep knowledge of programming. Thanks to their ease of implementation and the fact that no additional safety features are required (no fences, switches, etc.), they can be brought on-line much more quickly. The majority of collaborative robots can also be moved around the factory floor in order to perform a different task at another station. Being more dexterous and flexible, they can perform more tasks and even do whatever a human can do.

In short, collaborative robots are the ideal new co-worker. In this eBook, you'll discover all kinds of collaborative robots that are either currently on the market or about to enter it. We've even included a chart comparing their technical features, to help you determine which robot best suits your needs.

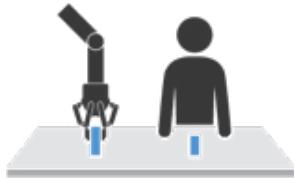
WHAT DOES COLLABORATIVE ROBOTS MEANS?

Before we get into the details about collaborative robots, let's get up to speed on the different terminology used in the robotics world. It can get confusing (even for us) because people sometimes use certain terms interchangeably, such as "force limited robots," "collaborative robots," and "cobots." They may have the same general purpose, but they can be interpreted very differently.

In fact, all these terms mean the same thing: a robotic device that is made to work in collaboration with humans. Or, more specifically, a robot that will help a human worker execute tasks that are too hard on his or her body, such as lifting heavy weights or doing repetitive movements. The number of applications that can be done by robotic co-workers is virtually unlimited.

COLLABORATIVE ROBOTS

The term "collaborative robot" is often a misnomer. In fact, although a collaborative robot is designed to work alongside humans, the device itself is not necessarily force limited. This means that the robotic cell is monitored, is safe for human co-workers, and relies on at least one of the [4 collaborative modes](#). The term "collaborative robot" is unique in that it describes the fact that humans and robots work with each other, not whether the robots are force limited.



You can observe an example of a collaborative robot in this [video](#). These kinds of cells are monitored by lasers, vision systems, or other sensors that enable reduction or elimination of fencing systems so humans can work right beside the robots.

FORCE LIMITED ROBOTS

A force limited robot uses one of the [4 types of collaboration](#) that can be accomplished with robots. In fact, a force limited robot is a robot that's specially designed to work alongside humans. They have [built-in force torque sensors](#) that detect impact and abnormal forces. The sensors stop the robot when overloaded.

This means that if the robot's arm hits something (...like a worker), it automatically stops to protect its human colleagues. These features aren't present on industrial robots, and they're the reason why force limited robots can work alongside humans without any fencing. Regular industrial robots must be isolated because they neither feel nor monitor their environment.

Force limited robots also tend to have rounder shapes than regular industrial robots. This means they cause less harm when they collide with something else. A round shape spreads the force over a bigger surface area and reduces the pressure applied to an external object (or person). Some force limited robots even have cushioned

shells that absorb shocks and reduce the effect of deceleration on a human body part, which results in a less harmful impact.

COBOTS

“Cobot” is a slang term used to describe a collaborative robot. Once again, the term “cobot” is mostly used when talking about force limited robots. So you can basically say that a force limited robot is a cobot.

While an industrial robot can be used for collaborative tasks, it's usually not force limited, and these types of robots tend to need supplementary monitoring devices in order for them to safely execute tasks alongside humans. The misnomer is so widespread that even we sometimes confuse them in our publications! (But not this one, of course.)

DEFINITIONS

In the rest of this eBook, we'll be listing the main specifications of numerous robots. You can find a complete description of the robots on their respective websites. But in this document, just the essential specs are used. In order to make it crystal clear, you'll find our definitions of these specifications below.

PAYLOAD

The payload is the weight that the robot can carry. All robots have a given payload, which is calculated without the weight of the end effector or robot tool. This means that the real payload that can be carried by the robot is the nominal payload minus the weight of the robot's end effector. When going further in the robot analysis you might want to reduce the maximum payload that will be carried by the robot, depending on the acceleration and data such as the friction coefficient.

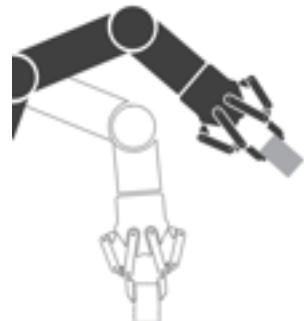


ROBOT WEIGHT

The weight of the robot indicates whether you can relocate the robot easily, or if you will need a forklift to do so. On some shop floors, the robot will be relocated near-constantly to perform different tasks. Keep in mind that if the robot is too heavy, you will need an entire team to bolt/fix it at its new spot.

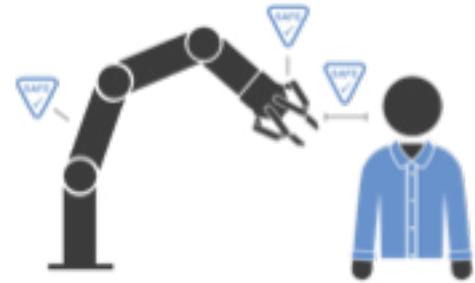
REPEATABILITY

Most of the time people will ask about the accuracy or precision of a robot. But in the collaborative robot world, this specification is quite useless. In fact, what you should most want to know is the repeatability. Since cobots are usually programmed by teaching/hand guiding, the robot's ability to recreate the exact same motion is more valuable than the robot's ability to go at X, Y, Z within half a mm. In any event, most robots' spec sheets list their highest repeatability, so if you test the robot you will probably obtain a lower (and hence better) repeatability than the one specified.



"SAFETY"

Even though safety is a really complex subject when it comes to collaborative robots, certain manufacturers will qualify their robots' safety level. In fact, they normally get a third party to issue a certification of safety. Since the agency with the most stringent approval process is the TUV (German Safety Association), many robots are approved by this third party. But since there are a lot of different variables in the "safety" accreditation of a robot, the only thing you need to know is this: just because your robot is certified safe, doesn't mean your application is. You must always perform a complete risk assessment according to the ISO 10218 (or more recently the ISO/TS 15066).



EASE OF PROGRAMMING

This specification is tough to quantify. In our process of testing most of the robots in this eBook, we attempted to use them as if we were completely new to robots, and then assigned each one a usability score of 1 to 10. That being said, some interfaces and methods are easier for some people and harder for others, so this specification will always be somewhat subjective.



REACH

The robot's reach is the measurement of the distance that can be reached by the robot's wrist. This measurement is taken from the robot's base. There are a lot of different measurements that can be considered in terms of "reach," but we chose to use the greatest distance the robot can reach as our reference here.



ABB - YUMI



Payload

0.5 KG



Price

40.000USD



Ease of Programming





ABB IRB 1400 YUMI

**“YUMI WILL
CHANGE THE WAY WE THINK
ABOUT ASSEMBLY
AUTOMATION.”**

Given that ABB is one of the greatest robot manufacturers, you would expect their collaborative robot to uphold their reputation. Well, you'd be right; and that's what YuMi is all about.

This 2 arm robot is ultra high-tech and uses a wide variety of tools: cameras, a 2 finger parallel gripper, and a suction cup can all be added to enhance the robot's functionality.

This robot is specially designed to assemble small electronic devices, so it has the best repeatability out of all the collaborative robots. But there's a potential tradeoff here: with a small payload of just 0.5 kg per arm, electronic boards are basically the only thing it can handle. To learn more, visit [their website](#).

YUMI

| | |
|---------------------|----------------|
| Degrees of freedom | 7 per arm |
| Payload | 0.5 kg per arm |
| Weight | 38 kg |
| Repeatability | +/- 0.02 mm |
| Reach | 500 mm |
| Safety | PL b Cat B |
| Price | +/- 40,000 USD |
| Ease of programming | 8/10 |

OUR OPINION ABB is an innovation-based intelligent robot maker, with a multidisciplinary team, including machinery, electronics, control, software, and vision. The robot is easy to program and has a very niche market. When you add in the fact that a lot of tools can be used with it, it's a solid choice for those in the electronics industry.

TARGETED APPLICATION

Electronic assembly

AUBO - i5



Payload
5 KG



Price
18.000USD



Ease of Programming
★★★★★



AUBO

i5

“AUBO ROBOTICS HOLDS SEVERAL CORE PATENTS AND HAS STRATEGIC COOPERATION WITH SEVERAL PUBLIC COMPANIES LEVERAGING THE BEST OF ALL NEW TECHNOLOGY.”

Aubo Robotics (previously Smokie Robotics) is a new company in the collaborative robot world, representing a collaboration between PhD professors from the USA and China. Their platform looks a lot like that of Universal Robots but with a different business mindset.

The i5 is a stand-alone robot; in other words, Aubo does not manufacture end-effectors to fit this robot. So to fit a gripper or a camera on this robot, you will have to do it yourself.

OUR stands for Open Unit Robot. It can be programmed using ROS. There are also apps available for purchase to make the programming easier. The robot can be configured from 3 to 7 joints. To learn more, visit [their website](#).

i5

| | |
|---------------------|----------------|
| Degrees of freedom | 7 per arm |
| Payload | 5 kg |
| Weight | 24 kg |
| Repeatability | +/- 0.05 mm |
| Reach | 880 mm |
| Safety | PL d |
| Price | +/- 18,000 USD |
| Ease of programming | 8/10 |

OUR OPINION The i5 seems to be a very promising robot, especially in the Asian market. With the same bolt pattern and connectivity as the UR, most of the tools compatible with a UR can also be used on the i5.

TARGETED APPLICATION

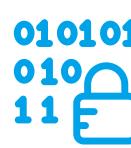
Electronic Assembly, Machine Tending, Entertainment, Research

BOSCH - APAS



 kg
Payload
4 KG

 \$
Price
N/A


Ease of Programming


BOSCH APAS ASSISTANT



The APAS was one of the first collaborative robots to be certified as inherently safe by the German trade association. It is versatile and there's a lot going on under the hood.

The APAS assistant is one of multiple robotic modules. In fact, Bosch have developed a series of workbench and inspection modules that can all be put together and turned into an automated cell that can easily be fitted together.

The APAS assistant is basically a Fanuc lightweight robot covered with a sensitive skin. This means that the robot can instantly feel an abnormal impact and stop itself immediately. In comparison to other robots, it is a lot safer. It can also be bought with attachments, specifically a 2D or 3D camera, or a 3 finger gripper. To learn more, visit [their website](#).

“ORIENTED ON USER’S NEEDS THE FLEXIBLE HELPERS SUPPORT THEIR HUMAN COLLEAGUES IN TASKS THAT ARE [...] SIMPLE AND MONOTONOUS, OR ERGONOMICALLY CHALLENGING.”

APAS ASSISTANT

| | |
|---------------------|---------------------------------------|
| Degrees of freedom | 6 |
| Payload | 4 kg |
| Weight | 230 kg |
| Repeatability | +/- 0.03 mm |
| Reach | 911 mm |
| Safety | Certified by German Trade association |
| Price | n/a |
| Ease of programming | 5/10 |

OUR OPINION This is a safe solution for industrial applications. There is a real integration gain if you are planning to buy the other devices that can be fitted with the APAS. And thanks to its sensitive skin, there is definitely a safety benefit compared to other robots.

TARGETED APPLICATION

Handling, Tooling, Identification, Documentation

COMAU- AURA



Payload
110 KG



Price
80.000USD



Ease of Programming



COMAU AURA



“COMAU’S AURA IS EXTENDING THE FEATURES OF COLLABORATIVE ROBOTS TO MACHINES WITH HIGH PAYLOAD.”

Comau is no different from any other industrial robot manufacturer that's simply added stuff to their actual robot to make it collaborative. Following Fanuc, KUKA and Bosch, Comau came up with an industrial robot covered with a safety skin in order to increase its “collaborative” capabilities.

At a 110 kg payload, the AURA is the cobot with the biggest payload out there. Not only does the robot have a safety skin; it has proximity and tactile sensors embedded in its skin so it can prevent impact and retract depending on the intensity of the impact.

Again, the main advantage of this robot is its huge payload; if you need to lift such heavy loads, this could be the only factor in your decision-making process. A second reason to choose this robot is convenience, but that only applies if you're using the Comau product line. Since this one is not so intuitive to program, you might want to use it only if you're already familiar with Comau robots.

AURA

| | |
|---------------------|-------------------------------|
| Degrees of freedom | 6 |
| Payload | 110 kg |
| Weight | 685 kg |
| Repeatability | +/- 0.07 mm |
| Reach | 2210 mm |
| Safety | Proximity and tactile sensors |
| Price | +/- 80,000 USD |
| Ease of programming | 6/10 |

OUR OPINION Comau has done a great job by ramping up the collaborative level of this robot. With such a big payload, the robot looks safe and ready for workshop integration.

TARGETED APPLICATION

Large pick and place application, automotive industry

FANUC - CR 4IA



 kg
Payload
4 KG

 \$
Price
45.700USD


Ease of Programming
★

FANUC

CR 4iA



This is a smaller version of Fanuc's initial CR 35iA with a larger payload. It's a lightweight robot with all the same safety feature as its predecessor.

The CR 4iA uses all the features of an industrial lightweight robot, but in addition it is safe for its human co-workers. In fact, an external soft skin and a force torque sensor at the base of the robot make it completely safe for collaborative purposes.

With all the usual features that can be added to the Fanuc robots, the CR 4iA is designed to use the iRVision software paired with a wrist camera. This robot will suit companies that are used to Fanuc architecture but would like to introduce a fence-free application. To learn more, visit [their website](#).

“THE EXPANSION OF THE “GREEN ROBOT” LINEUP, WHICH ENABLES WORKING WITH OPERATORS COLLABORATIVELY, IS SURE TO CONTRIBUTE TO NEW AUTOMATIZATION OF MANUFACTURING INDUSTRIES.”

CR 4iA

| | |
|---------------------|--|
| Degrees of freedom | 6 |
| Payload | 4 kg |
| Weight | 48 kg |
| Repeatability | +/- 0.02 mm |
| Reach | 550 mm |
| Safety | Soft external skin, force torque sensor at the base of the robot |
| Price | +/- 45,700 USD |
| Ease of programming | 2/10 |

OUR OPINION These robots are programmed like a traditional industrial robot. There is no teach by demonstration feature. This means that if you're planning for the CR 4iA to be your first robot, there might be a steep learning curve.

TARGETED APPLICATION

Machine Tending, Assembly, Adhesive Application, Product Testing

FANUC - CR 7IA & CR 7IA/L



Payload
7 KG



Price
48.000USD



Ease of Programming



FANUC

CR 7iA & CR 7iA/L



“THE EXPANSION OF THE “GREEN ROBOT” LINEUP, WHICH ENABLES WORKING WITH OPERATORS COLLABORATIVELY, IS SURE TO CONTRIBUTE TO NEW AUTOMATIZATION OF MANUFACTURING INDUSTRIES.”

CR 7iA & CR 7iA/L

| | CR 7iA | CR 7iA/L |
|---------------------|--|-------------|
| Degrees of freedom | 6 | 6 |
| Payload | 7 kg | 7 kg |
| Weight | 53 kg | 55 kg |
| Repeatability | +/- 0.02 mm | +/- 0.03 mm |
| Reach | 717 mm | 911 mm |
| Safety | Soft external skin, force torque sensor at the base of the robot | |
| Price | +/- 48,000 USD | |
| Ease of programming | 2/10 | |

The CR 7iA is Fanuc's mid-range collaborative robot, and it's a robot with a practical range and payload.

The CR 7iA and CR 7iA/L have all the same features as the industrial LR Mate 200iD robot, but in addition they are safe for their human co-workers. In fact, an external soft skin and a force torque sensor make the robots completely safe for collaborative purposes.

With all the usual features that can be added to the Fanuc robots, the CR 7iA and CR 7iA/L are designed to use the iRVision software paired with a wrist camera. These robot will suit companies that are used to Fanuc architecture but would like to introduce a fence-free application. To learn more, visit [their website](#).

OUR OPINION These robots are programmed like a traditional industrial robot. There is no teach by demonstration feature. This means that if you're planning for the CR 7iA to be your first robot, there might be a steep learning curve.

TARGETED APPLICATION

Machine Tending, Assembly, Adhesive Application, Product Testing

FANUC - CR 35IA




Payload
35 KG


Price
87.000USD


Ease of Programming


FANUC

CR 35iA



“[...] DON'T WORRY, MY BUILT-IN ANTI-TRAP PROTECTION AND SOFT RUBBER SKIN WILL KEEP YOU SAFE.”

CR 7iA

The CR 35iA is one of the biggest collaborative robots on the market and it has a 35 kg payload. It's built over a traditional industrial robot, but its safety features make it safer than any other big robot out there.

The CR 35iA is positioned on a highly sensitive force torque sensor that monitors every movement of the robot and can easily detect any abnormal impact. A single tap of a finger can stop the robot, including while it's carrying a large payload. In addition, the soft rubber skin makes it even more safe.

With all the usual features that can be added to Fanuc robots, the CR 35iA is designed to use the iRVision software paired with a wrist camera. This robot will suit companies that are used to Fanuc architecture but would like to introduce a fence-free application. To learn more, [visit their website](#).

| | |
|---------------------|--|
| Degrees of freedom | 6 |
| Payload | 35 kg |
| Weight | 990 kg |
| Repeatability | +/- 0.08 |
| Reach | 1813 mm |
| Safety | Soft external skin, force torque sensor at the base of the robot: PL d Cat 3 |
| Price | +/- USD |
| Ease of programming | 2/10 |

OUR OPINION These robots are programmed like a traditional industrial robot. There is no teach by demonstration feature. This means that if you're planning for the CR 35iA to be your first robot, there might be a steep learning curve.

TARGETED APPLICATION

Heavyweight industrial application, machine tending, automotive

F&P PERSONAL ROBOTICS - PROB 2R



 Payload
3 KG

 Price
27,480 USD

 Ease of Programming
★★★★★

F&P PERSONAL ROBOTICS

PROB 2R



The PRob 2R robots are lightweight robots that were designed for personal robotics but can be used for industrial applications as well.

The main difference between the two PRob 2R models is the current needed to power them. In fact, the 24V version is designed to be inherently safe, which means it can be used in personal robotics applications. The 48V version is built with different actuators that can deliver a bit more power for industrial applications. In both cases, the robots are classified as safe for use alongside humans.

The robots can be fitted with a 2 finger gripper that is also inherently safe. F&P Personal Robotics has a very intuitive way of programming their robots: it can be programmed directly on a PC (using myP software) with a user-friendly interface. To learn more, [visit their website](#).

“THE COMBINATION OF SOFTWARE AND HARDWARE CAPABILITIES ENABLES GREAT FLEXIBILITY AND CUSTOMER-SPECIFIC SOLUTIONS.”

PROB 2R 24V &PROB 2R 48V

| | PRob 2R 24V | PRob 2R 48V |
|---------------------|---------------------------------------|-------------|
| Degrees of freedom | 6 | 6 |
| Payload | 3 kg | 3 kg |
| Weight | 20 kg | 20 kg |
| Repeatability | +/- 0.1 mm | +/- 0.1 mm |
| Reach | 775 mm | 775 mm |
| Safety | Complying to ISO 12100 & ISO/TS 15066 | |
| Price | +/- 27,480 USD | |
| Ease of programming | | 9/10 |

OUR OPINION These robots are fully padded and have very safe grippers, so they're well-suited to collaborative work. And since they were specially designed with “personal robotics” applications in mind, you can bet they’re safe for any task you can think of requiring close proximity to humans. We are looking forward to seeing how these robots evolve as part of the collaborative robots world.

TARGETED APPLICATION

Assembly, electronics, light industrial applications

FRANKA - EMIKA



 Payload
3 KG

 Price
12,000USD

 Ease of Programming
★★★★★

FRANKA

EMIKA



The EMIKA is an all-inclusive collaborative robot. In fact, the robot arm can also be bought with a wrist camera, a 2 finger gripper and an intuitive PC interface. What more could you want?

FRANKA is a new robotics company and seems to have put everything together: now you can buy an easy-to-install and easy-to-program robot for a very low price. In fact, the robot can be purchased directly on their website for +/- 12,000 USD, which is really inexpensive considering the amount of features it has.

One cool feature of the robot is the "Franka Pilot," which is basically a physical interface on a joint of the robot that enables super easy programming. A lot of apps can also be added in the robot routine to do tasks such as screwing or palletizing. To learn more, [visit their website](#).

"FRANKA EMIKA IS DESIGNED FOR HUMAN-ROBOT COLLABORATION, IS EXTREMELY COST-EFFICIENT AND LIVES IN THE CLOUD."

EMIKA

| | |
|---------------------|--------------------------------------|
| Degrees of freedom | 7 |
| Payload | 3 kg |
| Weight | 18.5 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 800 mm |
| Safety | PL d Cat 3. (EN ISO 13849-1:2008) |
| Price | +/- 12,000 USD |
| Ease of programming | 10/10 |

OUR OPINION It seems like this robot is part of the next generation of collaborative robots: all-inclusive devices at a very low price. Keep this name in mind, because it appears promising.

TARGETED APPLICATION
INDUSTRIAL APPLICATIONS

KAWADA INDUSTRIES - NEXTAGE



Payload

1.5 KG



Price

60,000USD



Ease of Programming



KAWADA INDUSTRIES NEXTAGE



“ITS ‘HEAD’ IS EQUIPPED WITH STEREO VISION JUST LIKE A HUMAN. THIS MEANS THAT NEXTAGE CAN ATTAIN 3D COORDINATES WITH HIGH PRECISION.”

The Nextage has been on the market for quite a long time and it seems like it is running well. In fact, this human-like robot, which is mainly sold in Asia, is well suited for fine manipulations.

This robot has 15 degrees of freedom. With 2 arms with 6 axes each, 1 rotating waist, and 2 rotating axes for its neck, it is a very versatile robot that can perform highly complex tasks.

The robot can be bought with a 2 finger parallel gripper, and/or a 2D wrist camera. It comes with a stereo vision system embedded in the “head” of the robot. The robot’s motors are limited to 80W, which makes it very safe; if an impact occurs, it’s basically like nothing has hit you at all.

NEXTAGE

| | |
|---------------------|--|
| Degrees of freedom | 15 |
| Payload | 1.5 kg per arm |
| Weight | 29 kg |
| Repeatability | +/- 0.03 mm |
| Reach | 577 mm |
| Safety | Each motor is limited to 80 W (very low) |
| Price | +/- 60,000 USD |
| Ease of programming | 4/10 |

OUR OPINION Even if the shape of the robot seems promising in terms of collaboration potential, the Nextage is very limited in terms of payload, and the technology is starting to seem a bit outdated relative to its competitors. Also, the fact that the robot is only available on the Asian market makes it tough to acquire.

TARGETED APPLICATION

Machine tending, electronics, pick-and-place

KAWASAKI - DUARO



kg
Payload
2 KG

\$
Price
25,000USD

010101
010
11
Ease of Programming
★ ★

KAWASAKI DUARO1 WD002N



If you're shopping for a collaborative robot, you might imagine that all robots are built on the same concept that mimics a human arm; but when it comes to this robot, you may be surprised by how different it is.

The duAro1 from Kawasaki is a double SCARA robot. It is mostly used in planar applications such as pick-and-place tasks. This specific robot has been designed around electronic assembly applications.

The dual-arm robot is presented on a wheeled pedestal that includes the controller. This pedestal is made to reposition the robot for a different application when it's time to change the production line. The robot has an intuitive programming method that incorporates teaching by demonstration. The robot can also be packaged with a wrist camera and a gripper. Note that the arm can be configured in length and number of axes. To learn more, [visit their website](#).

[...] RESULTING IN A ROBOT THAT'S BOTH EASY TO TEACH AND PRACTICAL. WITH THE INTEGRATION OF THE BODY AND CONTROLLER INTO THE WHEELED BASE, THE ROBOT IS QUITE EASY TO INSTALL AND RELOCATE."

DUARO1

| | |
|---------------------|---|
| Degrees of freedom | 15 |
| Payload | 2 kg per arm |
| Weight | 200 kg |
| Repeatability | +/- 0.05 mm |
| Reach | 760 mm |
| Safety | Impact detection function & surrounding monitoring. |
| Price | +/- 25,000 USD |
| Ease of programming | 4/10 |

OUR OPINION This is one of the only SCARA robots that can be used alongside workers. Since this type is usually quite fast, it is a good addition to the production line for doing repetitive tasks.

TARGETED APPLICATION

Assembly, Material Handling, Machine Tending, Material Removal

KUKA - LBR iiWA



Payload

7 KG



Price

70,000 USD



Ease of Programming



KUKA

LBR IIWA 7 R800 & LBR IIWA 14 R820



“LBR STANDS FOR ‘LEICHTBAUROBOTER’ (GERMAN FOR LIGHTWEIGHT ROBOT), IIWA FOR ‘INTELLIGENT INDUSTRIAL WORK ASSISTANT’. THIS SIGNALS THE BEGINNING OF A NEW ERA IN INDUSTRIAL, SENSITIVE ROBOTICS.”

The LBR iiwa series has been at the top of the list of collaborative robot technology for a couple of years now. They have a lot of embedded hardware, which explains their high price.

With an excellent power to weight ratio, the LBR iiwa are equipped with highly sensitive force torque sensors at each joint. As opposed to other force limited robots that read the current in their motor, the LBR has sensors that detect micro impacts.

The LBR iiwa series also have internal routing for pneumatic and electrical devices. In other words, you can fit a device on the robot and connect it in its wrist, and no wires will be visible. These robots are stand-alone; they do not have grippers or other devices that can be fitted directly on them. To learn more, [visit their website.](#)

LBR IIWA 7 R800 & LBR IIWA 14

| | iiwa 7 R800 | PRob 2R 48V |
|---------------------|---|-------------|
| Degrees of freedom | 7 | 7 |
| Payload | 7 kg | 14 kg |
| Weight | 22 kg | 30 kg |
| Repeatability | +/- 0.1 mm | +/- 0.15 mm |
| Reach | 800 mm | 820 mm |
| Safety | Uses SafeOperation software, Complying to ISO 10218; ISO 12100; ISO 13849 | |
| Price | +/- 70,000 USD | |
| Ease of programming | 9/10 | |

OUR OPINION The LBR iiwa robots are extremely high-tech and have some very interesting safety features. However, they are quite expensive, which could reduce the return on investment of a robotic cell.

TARGETED APPLICATION

Machine tending, Product testing, Palletizing, Pick and Place

LIFE ROBOTICS - CORO



 kg
Payload
2 KG

 \$
Price
ONLY AVAILABLE IN ASIA

 010101
010
11
Ease of Programming
N/A

LIFE ROBOTICS CORO



[...] RESULTING IN A ROBOT THAT'S BOTH EASY TO TEACH AND PRACTICAL. WITH THE INTEGRATION OF THE BODY AND CONTROLLER INTO THE WHEELED BASE, THE ROBOT IS QUITE EASY TO INSTALL AND RELOCATE.”

Life Robotics is another new player in the collaborative robot world that is growing fast. The company recently received major investments from several multinationals for their collaborative robot concept. It introduced the CORO in 2016, with its main feature being the telescopic arm.

In order to reach various points in the working area, the telescopic arm allows you to remove one joint while keeping the same versatility. The robot was designed to be inherently safe so it can be introduced right beside workers.

This robot arm has been sold only on the Asian market. It has found a good fit in the electronic assembly line, cosmetics and food industries. The robot can be programmed by demonstration. To learn more, [visit their website](#).

CORO

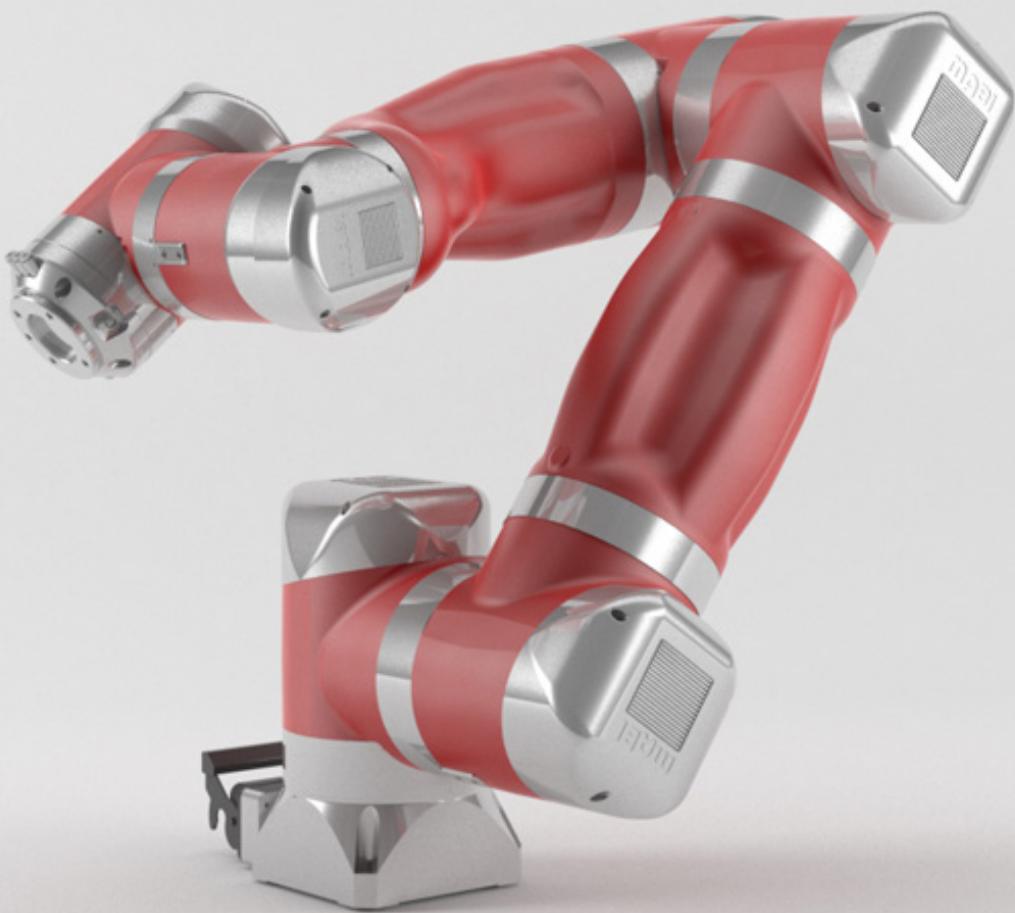
| | |
|---------------------|---------------------------------|
| Degrees of freedom | 6 |
| Payload | 2 kg |
| Weight | 26 kg |
| Repeatability | +/- 1.0 mm |
| Reach | 865 mm |
| Safety | Intresectly safe (ISO/TS 15066) |
| Price | Only available in Asia |
| Ease of programming | n/a |

OUR OPINION The unique design of this robot makes it a leading contender for small spaces. With its very own niche, it seems to have a bright future ahead.

TARGETED APPLICATION

Pick-and-Place, Cosmetics, Logistics, Food Industry

MABI - SPEEDY 6 & 12




 Payload
6 KG


 Price
N/A


Ease of Programming


MABI SPEEDY 6 & SPEEDY 12



“THE SPEEDY 6 BY MABI ROBOTIC IS AN EXTREMELY FLEXIBLE SIX-AXIS ROBOT. FULL ENGINEERING AND INSTALLATION WAS DONE AT THE VELTHEIM FACTORY IN SWITZERLAND – TO THE USUAL SWISS STANDARD OF QUALITY.”

The Swiss-based company MABI now has two collaborative robot models with state-of-the-art internal devices. These robots are designed for high-speed applications that require precision.

The Speedy series features built-in absolute encoders at each joint that achieve a greater accuracy and repeatability along the way. In contrast to other robots that have relative encoders, the Speedy is more accurate.

MABI, which has quite a strong background in machine tending and other industrial applications, is aiming to put the SPEEDY 6 & 12 on the same type of application. The robot can be bought with 3 different packages: Basic, Professional, and Advanced. Depending on the package, these add various features such as integrated force torque sensors or an automatic tool changer to the robot arm.

LBR IIWA 7 R800 & LBR IIWA 14

| | SPEEDY 6 | SPEEDY 12 |
|---------------------|--|------------|
| Degrees of freedom | 6 | 6 |
| Payload | 6 kg | 12 kg |
| Weight | 28 kg | 35 kg |
| Repeatability | +/- 0.1 mm | +/- 0.1 mm |
| Reach | 800 mm | 1250 mm |
| Safety | Soft external skin, force torque sensor at the base of the robot | |
| Price | n/a | n/a |
| Ease of programming | 5/10 | 5/10 |

OUR OPINION The robot is well designed and has a real benefit if you are already running other MABI robots.

TARGETED APPLICATION

Palletizing, pick-and-place, assembly, bin picking

MOTOMAN/ YASKAWA - HC10



 kg
Payload
10 KG

 \$
Price
48,000USD


Ease of Programming


MOTOMAN/YASKAWA

HC10



Motoman/Yaskawa has been in the robotics world for a long time, but they've been one of the most recent companies to come out with a collaborative robot model. The HC10 is the first model of their collaborative platform.

In contrast to other large robot manufacturers, they did not come up with a regular robot with a protective skin. In fact, they built an entirely new robot that is totally safe for human-robot interactions.

The robot has nice features that allow most of the end-effectors to be connected within its hollow wrist. This means no cable management outside the robot. In addition, Yaskawa have put a ton of effort into their programming interface. Unlike the offerings of some other main robot manufacturers, this robot is truly user-friendly. To learn more, [visit their website.](#)

"EASY-TO-USE ROBOT WITH AN INDUSTRIAL PEDIGREE. THE HC10 COLLABORATIVE ROBOT IS AN IDEAL BALANCE OF STRENGTH, FLEXIBILITY AND EFFICIENCY. IT IS EASILY DEPLOYABLE TO OPERATE IN THE SAME SPACE AS YOUR WORKERS, REDUCING THE NEED FOR HARD SAFETY ENCLOSURES. SIMPLIFIED PROGRAMMING AND LOW COST PUT THE BENEFITS OF THE ROBOT WITHIN REACH OF ANY SMALL SIZE ENTERPRISE."

HC10

| | |
|---------------------|--|
| Degrees of freedom | 6 |
| Payload | 10 kg |
| Weight | 47 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 1200 mm |
| Safety | Pending Approval for TUV certification, Designed to meet EN ISO 10218-1 Cat 3 PL d. EN ISO 13849:2008 Pl d |
| Price | +/- 48,000 USD |
| Ease of programming | 8/10 |

OUR OPINION It's great to see a large robot manufacturer diving head-first into the collaborative world. We've been waiting for a complete collaborative robot from Yaskawa/Motoman, and we are not disappointed.

TARGETED APPLICATION

Material Handling, Machine tending, light assembly tasks

MRK SYSTEM - KR 5 SI



 kg
Payload
5 KG

 \$
Price
16,000

010101
010
11 

Ease of Programming


MRK SYSTEM

KR 5 SI



“[...] AN INDUSTRIAL ROBOT’S HIGH EFFICIENCY CAN BE COMBINED WITH THE SENSORY ABILITIES OF THE HUMAN OPERATOR. ALONGSIDE THE POTENTIAL FOR RATIONALISATION, THE MAIN BENEFIT OF THESE APPLICATIONS IS IMPROVED ERGONOMICS AND/OR EASING OF THE WORKLOAD.”

The KR 5 SI was developed differently from most other collaborative robots. Cobots are usually designed by robot manufacturers. But this time, MRK System acts as a robot integrator. They built their collaborative robot concept over a KUKA industrial robot (KR 5 HW ARC).

As with some other collaborative robots, the KR 5 SI has an industrial robot hardware and is covered with a soft tactile and capacitive skin to sense any abnormal impacts. The robot is monitored by KUKA SafeRobot software.

The robot has the ability to prevent impact because of proximity sensors embedded in the sensitive skin. The end effector can also be covered with a protective skin to enable better protection of the worker. This concept is mainly available in Germany. To learn more, [visit their website](#). Note that the skin is sold uniquely with the robot and it's a \$16,000 USD upgrade.

KR 5 SI

| | |
|---------------------|---|
| Degrees of freedom | 6 |
| Payload | 5 kg |
| Weight | 150 kg |
| Repeatability | +/- 0.04 mm |
| Reach | 1423 mm |
| Safety | Tactile sensors (Cat. 0), Complying to ISO 10218 & ISO/TS 15066 |
| Price | +/- 16,000 USD |
| Ease of programming | 5/10 |

OUR OPINION This concept is quite unique and is very safe for workers. However, a limited number of robots are produced each year and they're sold within a limited region (Germany).

TARGETED APPLICATION

Material handling, machine tending, pick-and-place

PRECISE AUTOMATION - PAVP6



Payload
2.5 KG



Price
N/A



Ease of Programming
N/A

PRECISE AUTOMATION

PAVP6



[...] ALL CONTROL ELECTRONICS AND POWER SUPPLIES ARE BUILT INTO THE ROBOT'S BASE CREATING AN EXTREMELY COMPACT STRUCTURE THAT ELIMINATES EXTRA CONTROLLER CABINETS, EXTERNAL HARNESSING AND COMPLICATED INSTALLATIONS AND INTEGRATIONS.”

The super lightweight robot from Precise Automation is ideal for small applications alongside workers that require flexibility.

All Precise collaborative robots have been measured by TUV and certified to exert forces that fall within the force guidelines for collaborative robots, as defined by the recent ISO/TS 15066 Standard on Collaborative Robots.

The PAVP6 is a Denso robot arm frame that has been modified for collaborative operations. The robot has an integrated controller at its base and also has absolute encoders. The robot can be taught by demonstration using a PC or a tablet. To learn more, [visit their website](#).

PAVP6

| | |
|---------------------|---------------------------------------|
| Degrees of freedom | 6 |
| Payload | 2.5 kg |
| Weight | 28 kg |
| Repeatability | +/- 0.02 mm |
| Reach | 432 mm |
| Safety | TUV certified, ISO/TS 15066 Compliant |
| Price | N/A |
| Ease of programming | UNKNOWN |

OUR OPINION The PAVP6 is a very small cobot with a small payload, but it can be used in a lot of different industries. Precise automation seems to put a strong focus on safety, which has resulted in a versatile robot that's safe to use in confined spaces like research labs.

TARGETED APPLICATION

Industrial applications

PRECISE AUTOMATION - PF400



kg
Payload
1 KG

\$
Price
N/A

010101
010
11
Ease of Programming
N/A

PRECISE AUTOMATION

PF400



“THIS SPACE SAVING DESIGN, TOGETHER WITH A NOVEL GEOMETRY, ALLOWS THE PF400 TO SERVICE MANY STATIONS IN AN EXTREMELY SMALL WORKCELL.”

PF400

The super lightweight SCARA robot from Precise Automation is ideal for small collaborative applications requiring flexibility, such as in the laboratory.

All Precise collaborative robots have been measured by TUV and certified to exert forces that fall within the force guidelines for collaborative robots, as defined by the recent ISO/TS 15066 Standard on Collaborative Robots.

The PF400 is easy to integrate since it has an embedded controller that can simply be plugged directly into an AC power cord. It can be carried by a single person and installed on a table. The SCARA robot can be programmed using a teaching method and has an embedded vision system. To learn more, [visit their website](#).

| | |
|---------------------|---------------------------------------|
| Degrees of freedom | 4 (SCARA) |
| Payload | 1 kg |
| Weight | 20 kg |
| Repeatability | +/- 0.05 mm |
| Reach | 576 mm |
| Safety | TUV certified, ISO/TS 15066 Compliant |
| Price | N/A |
| Ease of programming | UNKNOWN |

OUR OPINION We think the idea of a collaborative cartesian robot is super interesting, especially for applications like those found in laboratories or electronic assembly where the collaboration between robots and workers is quite important.

TARGETED APPLICATION

Lab applications, mixed manufacturing assembly

PRECISE AUTOMATION - PP100



 kg
Payload
2 KG

 \$
Price
N/A


Ease of Programming


PRECISE AUTOMATION

PP100



“SPACE SAVING DESIGN COMBINED WITH A LOW COST, RELIABLE MECHANISM AND EFFICIENT T-BOT DRIVE MAKE THE PP100 AN IDEAL CHOICE FOR APPLICATIONS WHERE SIZE, SAFETY, COST, AND THE COMBINED PRODUCTIVITY OF AUTOMATION AND PERSONNEL ARE CRITICAL.”

PF400

The super lightweight cartesian robot from Precise Automation is ideal for small collaborative applications requiring flexibility, such as in the laboratory.

All Precise collaborative robots have been measured by TUV and certified to exert forces that fall within the force guidelines for collaborative robots, as defined by the recent ISO/TS 15066 Standard on Collaborative Robots.

The PP100 is easy to integrate, since it has an embedded controller that can simply be plugged directly into an AC power cord. It can be carried by a single person and installed on a table. The cartesian robot can be programmed by a teaching method. To learn more, [visit their website](#).

| | |
|---------------------|---------------------------------------|
| Degrees of freedom | 4 (Cartesian) |
| Payload | 2 kg |
| Weight | 20 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 685 or 1270 mm |
| Safety | TUV certified, ISO/TS 15066 Compliant |
| Price | +/- USD |
| Ease of programming | UNKNOWN |

OUR OPINION We think the idea of a collaborative cartesian robot is super interesting, especially for applications like those found in laboratories or electronic assembly where the collaboration between robots and workers is quite important.

TARGETED APPLICATION

Industrial applications

PRODUCTIVE ROBOTICS - OB7



 kg
Payload
5 KG

 \$
Price
20,000 USD


010101
010
11
Ease of Programming


PRODUCTIVE ROBOTICS

OB7



"MOVES SIMILARLY TO THE HUMAN ARM WITH SEVEN JOINTS, ONE METER REACH, AND THE ABILITY TO LIFT 5KG OR 11LBS. OB7 IS ABLE TO MANEUVER INTO TIGHT SPACES AND CAN EASILY ADAPT TO YOUR EXISTING MANUFACTURING ENVIRONMENT."

OB7

Productive Robotics is one of the very few robotics company that is entirely manufacturing out of the United States. Their first robot, the OB7 is a real all inclusive solution.

The robot not only has 7 degrees of freedom but also has a built-in camera, an optional 2-finger gripper and light indicators. The overall solution is made to be integrate fairly easily in terms of programming patterns but also in terms of space and flexibility.

The robot can be programmed using the built-in software and comes with a 1 year hardware warranty and a 1 year software update. All of these features for less than 20,000 USD. To learn more, visit [their web site](#).

| | |
|---------------------|------------------------------------|
| Degrees of freedom | 7 |
| Payload | 5 kg |
| Weight | 24 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 1,000 mm |
| Safety | Power and force limited, compliant |
| Price | +/- 20,000 USD |
| Ease of programming | 9 / 10 |

OUR OPINION We think the OB7 is a very versatile and easy to use robot with a bunch of built-in options. It can definitely be a game changer for SME's that were looking for larger brand robots with less options.

TARGETED APPLICATION

Machine Tending, product assembly, applying adhesive, installing screws.

RETHINK ROBOTICS - SAWYER



 Payload
4 KG

 Price
37,000 USD


010101
010
11

Ease of Programming


RETHINK ROBOTICS

SAWYER



“SAWYER IS MORE PRECISE THAN BAXTER AND ALSO HAS BETTER REPEATABILITY, WHICH IS PARTLY DUE TO THE NEW ZERO BACKLASH GEAR BOXES AND HARMONIC DRIVE MOTORS BEING USED.”

SAWYER was designed around the Baxter platform, but this version is better suited to the industrial world. The single-armed robot now has less backlash, a larger payload and much better repeatability.

Because of its internal design, both Sawyer and Baxter are highly safe to use alongside humans. In addition to the peripheral vision system placed on its “head” and the screen that lets you know the state of the robot, there are very few risks to working around this robot. It’s fun, goofy, and—dare we say—loveable.

The Sawyer robot has an embedded wrist camera and can be fitted with suction cups and a parallel gripper. The robot is really compliant and adapts itself to the environment due to its high-resolution force sensing at each joint. To learn more, [visit their website](#).

SAWYER

| | |
|---------------------|-----------------------|
| Degrees of freedom | 7 |
| Payload | 4 kg |
| Weight | 19 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 1260 mm |
| Safety | ISO 10218-1 Compliant |
| Price | +/- 37,000 USD |
| Ease of programming | 9/10 |

OUR OPINION Sawyer has an excellent safety concept and a lot of different features. But since it's still some tweaks in the programming, you won't be able to get it to do whatever you want immediately. Also, there can be some slightly shaky movements every now and then during its operation.

TARGETED APPLICATION

Machine tending, pick-and-place, palletizing, inspection

RETHINK ROBOTICS - BAXTER



 kg
Payload
4 KG

 Price
37,000 USD

010101
010
11


Ease of Programming


RETHINK ROBOTICS

BAXTER



BAXTER was one of the first collaborative robots on the market. It was designed to be inherently safe using harmonic drive and elastic power transmission.

The concept was quite simple: 2 arms, a head, a torso and a rolling base. Basically a robotic assistant! The bulky robot is entirely able to work alongside humans without hurting them; with its slow moves, padded arms and smiley face, it wouldn't hurt a fly.

BAXTER is now a bit outdated compared to the later, smaller version, SAWYER. In fact, the latest robot from Rethink Robotics is less shaky and more precise, giving it better consistency. To learn more about the BAXTER and SAWYER robotic platforms, [visit their website](#).

"FINDING LABOR IN THIS INDUSTRY IS EXTREMELY CHALLENGING, AND WE SAW AN OPPORTUNITY WITH BAXTER TO BUILD TRULY AUTONOMOUS SEWING SYSTEMS THAT WOULD HELP OUR CUSTOMERS ADDRESS THAT ISSUE WHILE MAINTAINING, AND EVEN IMPROVING, PRODUCTIVITY."

- FRANK HENDERSON, HENDERSON SEWING MACHINE CO.

BAXTER

| | |
|---------------------|-----------------------|
| Degrees of freedom | 7 |
| Payload | 4 kg |
| Weight | 19 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 1260 mm |
| Safety | ISO 10218-1 Compliant |
| Price | +/- 37,000 USD |
| Ease of programming | 9/10 |

OUR OPINION Baxter has strong potential in the research world because of all its features. The industrial world might be too much to handle for Baxter, however. Its lack of good precision and occasionally irregular motions make it a better candidate for the lab than the machine shop.

TARGETED APPLICATION

Machine tending, assembly, packaging, pick-and-place

STÄUBLI - TX2-60 & TX2-60L



Payload

3.5 KG



Price

40,000 USD



Ease of Programming



STÄUBLI

TX2-60 & TX2-60L



STÄUBLI is a large industrial robot manufacturer based in Germany. They just released a new collaborative robot with a small payload.

The TX2 series is designed to do fast and precise automation tasks while working beside humans. Being that it's made by a German company, you can be sure you're getting a very safe robot. In contrast to other collaborative robots that have a bulky look, this one has a sleek industrial appearance and seems to deliver the same safety features as the other robots.

The robots are stand-alone, meaning they don't have optional end-effectors. The two robots are basically the same, except the TX2-60L has a bigger reach and a slightly smaller payload. To learn more, [visit their website](#).

"[...] THE NEXT GENERATION OF FAST AND PRECISE 6-AXIS ROBOTS. THIS NEW ROBOT RANGE IS REDEFINING PERFORMANCE WITH THE OPTIMUM BALANCE OF SPEED, RIGIDITY, SIZE AND ENVELOPE."

TX2-60 & TX2-60L

| | TX2-60 | TX2-60L |
|---------------------|--|---------------|
| Degrees of freedom | 6 | 6 |
| Payload | 3.5 kg | 2 kg |
| Weight | 51.4 kg | 52.5 kg |
| Repeatability | +/- 0.02 mm | +/- 0.03 mm |
| Reach | 670 mm | 920 mm |
| Safety | PL e Cat. 3 (According to ISO 10218-1) | |
| Price | +/-40,000 USD | +/-40,000 USD |
| Ease of programming | 2/10 | 2/10 |

OUR OPINION Since the programming of these robots is not so intuitive, the real advantage of using them is if you are already used to STÄUBLI robots and would like to introduce a fenceless light-weight application within your production line.

TARGETED APPLICATION

Assembly, inspection, measurement, glueing, machine tending

STÄUBLI - TX2-90, TX2-90L & TX2-90XL



Payload

9-20 KG



Price

N/A



Ease of Programming





STÄUBLI

TX2-90, TX2-90L & TX2-90XL

[...] THE NEXT GENERATION OF FAST AND PRECISE 6-AXIS ROBOTS. THIS NEW ROBOT RANGE IS REDEFINING PERFORMANCE WITH THE OPTIMUM BALANCE OF SPEED, RIGIDITY, SIZE AND ENVELOPE.”

STÄUBLI is a large industrial robot manufacturer based in Switzerland. They just released a new collaborative robot series with a medium payload, the TX2-90.

The TX2 series is designed to carry a large payload without compromising the collaborative work that can be done with human co-workers. Being that it's made by a Swiss company, you expect a good quality product that is precise and safe at the same time. In contrast to other collaborative robots that have a bulky look, this one has a sleek industrial appearance and seems to deliver the same safety features as the other force-limited cobots.

The robots are stand-alone, meaning they don't have optional end-effectors. The robot is built around the principle that an industrial robot can work in collaboration with workers. To learn more, [visit their website.](#)

TX2-90, TX2-90L & TX2-90XL

| | TX2-90 | TX2-90L | TX2-90XL |
|---------------------|--|-------------|-------------|
| Degrees of freedom | 6 | 6 | 6 |
| Payload | 7 kg | 6 kg | 5 kg |
| Weight | 114 kg | 117 kg | 119 kg |
| Repeatability | +/- 0.02 mm | +/- 0.02 mm | +/- 0.02 mm |
| Reach | 1,000 mm | 1,200 mm | 1,450 mm |
| Safety | PL e Cat. 3 (According to ISO 10218-1) | | |
| Price | N/A | N/A | N/A |
| Ease of programming | 2/10 | 2/10 | 2/10 |

OUR OPINION Since the programming of these robots is not so intuitive, the real advantage of using them is if you are already used to STÄUBLI robots and would like to introduce a fenceless light-weight application within your production line.

TARGETED APPLICATION

Assembly, inspection, measurement, glueing, machine tending

TECHMAN - TM5-700 & TM5-900



Payload

4-6 KG



Price

40,000 USD



Ease of Programming



TECHMAN

TM5-700 & TM5-900



"YOU DON'T NEED TO WORRY ABOUT HOW TO INTEGRATE THESE COMPLICATED VISION COMPONENTS BY YOURSELF."

To make your mark in the collaborative robot market, you need to come up with something that's new, easy, and works well. That's exactly what Techman's done.

Indeed, Techman's first collaborative robots, the TM5-700 and TM5-900, have an embedded camera at their wrists, a compatible 2 finger parallel gripper, an intuitive programming method, are inherently safe, and can be programmed directly from your smartphone.

Even though all these features are present on some other robots, this time it is an all-inclusive process. No need to buy extra devices that need to be installed by an external integrator. It's pretty much like plugging a dongle on your smartphone. You just add a couple of components here and there and the robot is ready to use them within 5 minutes. For more details, [visit their website](#).

TM5-700 & TM5-900

| | TM5-700 | TM5-900 |
|---------------------|---|-------------|
| Degrees of freedom | 6 | 6 |
| Payload | 6 kg | 4 kg |
| Weight | 22 kg | 22.2 kg |
| Repeatability | +/- 0.05 mm | +/- 0.05 mm |
| Reach | 700 mm | 920 mm |
| Safety | 150N max. Force (ISO/TS 15066 Compliant) | |
| Price | | |
| Ease of programming | | |

OUR OPINION Techman is an innovation-based intelligent robot maker, with a multidisciplinary team, including machinery, electronics, control, software, and vision. It is an all-inclusive solution and we like it!

TARGETED APPLICATION

Assembly, electronics, pick-and-place

UNIVERSAL ROBOTS - UR3



Payload
3 KG



Price
28,000 USD



Ease of Programming
★★★★★

UNIVERSAL ROBOTS

UR3



“UNIVERSAL ROBOTS ARMS ARE ADVANCED TOOLS THAT CAN BE USED BY ALL LEVELS OF PRODUCTION STAFF TO HELP INCREASE PRODUCTIVITY, REDUCE INJURY AND BOOST MORALE.”

Universal Robots is a leader in the collaborative robot world. The small company is growing from the inside and is now the largest collaborative robot manufacturer worldwide.

The UR3 is the smallest platform of the company. Since the robot is quite small and has a light payload it is perfectly suited for lightweight assembly or dispensing applications. Notice that the UR3 is the only robot arm of the Universal Robots product line to have infinite wrist rotation.

UR (Universal Robots) is starting to have a large ‘app store’ ([UR+](#)) that includes hardware and software solutions. Their easy solutions will shorten the integration process of most automation projects and will most likely reduce the cost of integration.

These robots are easy to program, especially with the [path recording](#) features available with Robotiq Force Torque Sensors. To learn more, visit their [website](#).

UR3

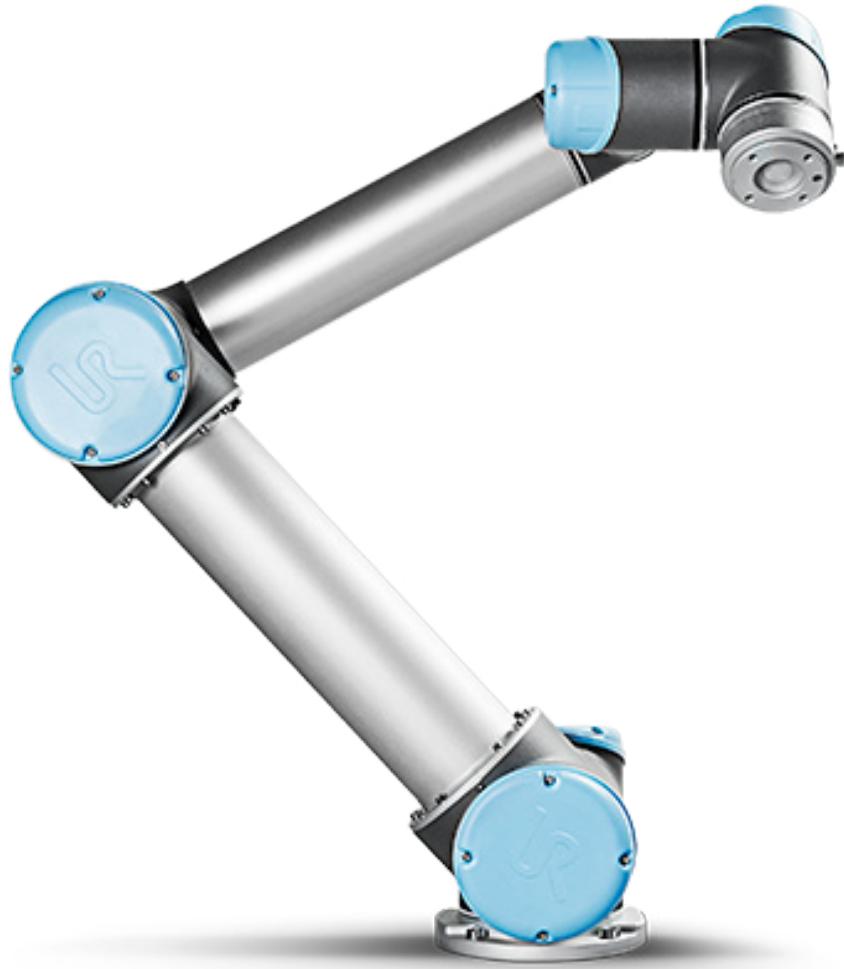
| | |
|---------------------|----------------|
| Degrees of freedom | 6 |
| Payload | 3 kg |
| Weight | 11 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 500 mm |
| Safety | TUV approved |
| Price | +/- 28,000 USD |
| Ease of programming | 8/10 |

OUR OPINION Universal Robots are probably the collaborative robot manufacturer with the most industrial experience. This robot has proven itself time and time again, and is suitable for many different applications.

TARGETED APPLICATION

Assembly, Dispensing, pick-and-place

UNIVERSAL ROBOTS - UR5



Payload

5 KG



Price

35,000 USD



Ease of Programming



UNIVERSAL ROBOTS

UR5



THE LIGHTWEIGHT, FLEXIBLE AND COLLABORATIVE INDUSTRIAL ROBOT - UR5 - FROM UNIVERSAL ROBOTS LETS YOU AUTOMATE REPETITIVE AND DANGEROUS TASKS WITH PAYLOADS OF UP TO 5 KG."

Universal Robots is a leader in the collaborative robot world. The small company is growing from the inside and is now the largest collaborative robot manufacturer worldwide.

The UR5 is the intermediate platform of Universal Robots, and to date has been the company's best seller. This arm is made for all types of applications. In fact, with such a great payload and reach the robot can suit a lot of different 'human-like' applications.

The UR5 has made its mark in machine tending and other industrial applications where reliability and return on investment are important. The robot also benefits from the UR+ solution. To learn more about this versatile robot or about how you can easily integrate it in your shop floor, visit the [UR website](#).

UR5

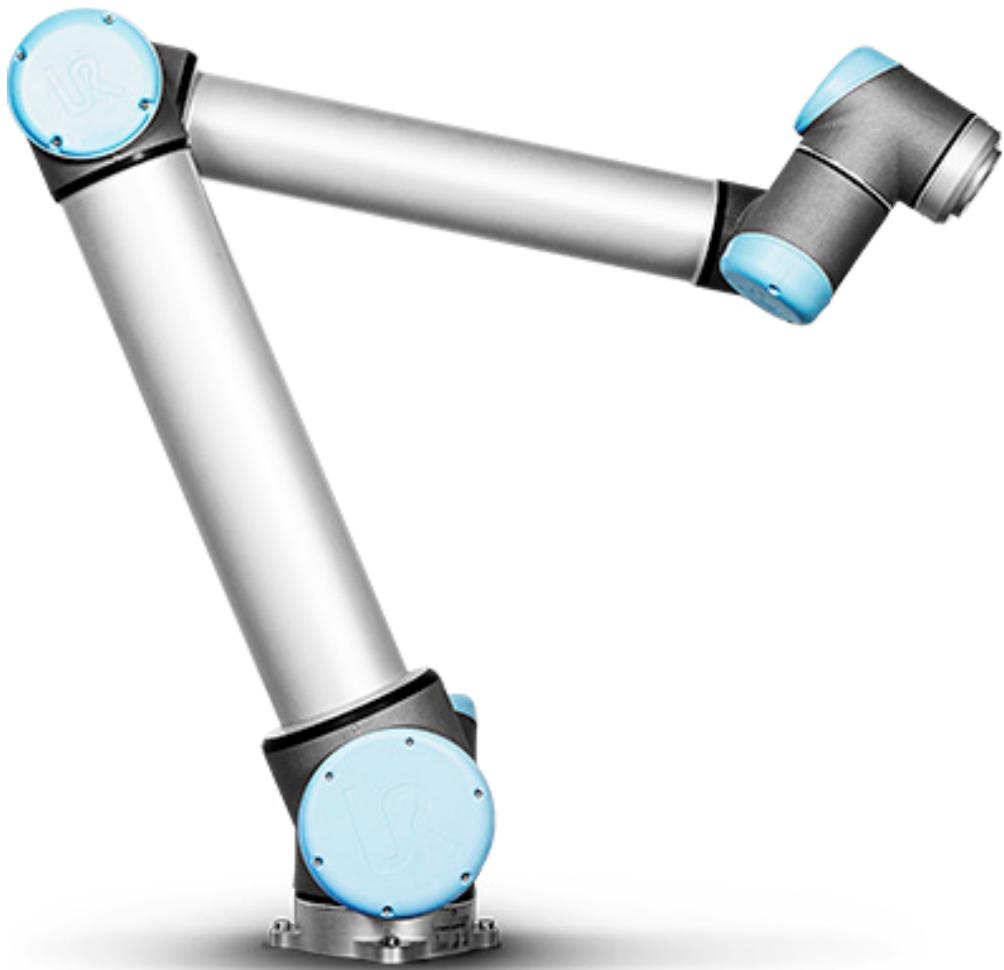
| | |
|---------------------|----------------|
| Degrees of freedom | 6 |
| Payload | 5 kg |
| Weight | 18.4 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 850 mm |
| Safety | TUV approved |
| Price | +/- 35,000 USD |
| Ease of programming | 8/10 |

OUR OPINION The UR5 has been designed to perform industrial applications that are scaled to human size. Since this arm suits most of the applications out there that need to be automated, it's easy for us to recommend it.

TARGETED APPLICATION

Machine tending, assembly, packaging, pick-and-place

UNIVERSAL ROBOTS - UR10



 kg
Payload
10 KG

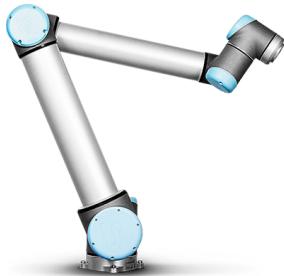
 \$
Price
40,000 USD

010101
010
11


Ease of Programming


UNIVERSAL ROBOTS

UR10



Universal Robots is a leader in the collaborative robot world. The small company is growing fast and is now the largest collaborative robot manufacturer worldwide.

The UR10, which is the largest platform made by the company, is largely used in heavier applications or applications that require a greater reach. The UR10 has the same characteristics as its lighter brothers regarding programming. For controlling such a large robot, it's a really easy-to-use interface.

UR10 users can also benefit from the UR+ platform for accelerating the programming method or to finding a tool that would easily suit this robot. Since there are no embedded sensors or tools that come with this robot, it's nice to have a universal platform to use the tool you need for your application.

"THE UR10 INDUSTRIAL ROBOT IS DESIGNED TO BE MORE EFFECTIVE AT TASKS ACROSS A LARGER AREA. YOU CAN THEREFORE SAVE TIME ON PRODUCTION LINES WHERE DISTANCE CAN BE A FACTOR."

UR10

| | |
|---------------------|----------------|
| Degrees of freedom | 6 |
| Payload | 10 k |
| Weight | 28.9 kg |
| Repeatability | +/- 0.1 mm |
| Reach | 1300 mm |
| Safety | TUV approved |
| Price | +/- 45,000 USD |
| Ease of programming | 8/10 |

OUR OPINION A lot of applications have been done with the UR10. Its reliability and ease of operation have been proven for the last couple of years. With the fastest return on investment in the industry and an industrial appearance, it is one of our favorites

TARGETED APPLICATION

Machine tending, pick-and-place, product testing, assembly, packaging, dispensing

WHAT'S COMING NEXT?

ABB - WILL ROBERTA FINALLY COME OUT?

The company Gomtec (manufacturer of Roberta) [was bought in 2015 by ABB](#). Since the Roberta concept was super promising, we thought the robot would have been released a couple of months after the acquisition. But it seems like the release of the robot is starting to get delayed. And as the Roberta robot has not yet been seen at various trade shows under the ABB cover, we're assuming the project will come on the market anytime now. Let's all remember that ABB took a long time to release the now well-known [YuMi](#).

BRABO - 3 NEW MODELS COMING UP

The first “built in India” robot is about to be put on the market. [TATA motors](#) has not yet confirmed its final specs or any date for release, but it seems like the company will be offering 3 sizes of collaborative robots for the industrial world.

CARBON ROBOTICS - KATIA

Carbon Robotics haven't updated their website for quite some time, but they're promising a new robot to be released soon. Not much information has been leaked about this robot, but it seems like it will be a very futuristic, easy-to-use cobot. To learn more, [visit their website](#).

DENSO WAVE - COBOTTA

The lightweight robot Coboatta from Denso Wave looks like it's going to be a super-safe lightweight (0.5 kg) table top robot for applications such as laboratory use. In fact, this company, which is under the giant robot manufacturer DENSO, seems to have taken a turn toward focusing on collaborative robots. To stay up to date, visit their [website](#).

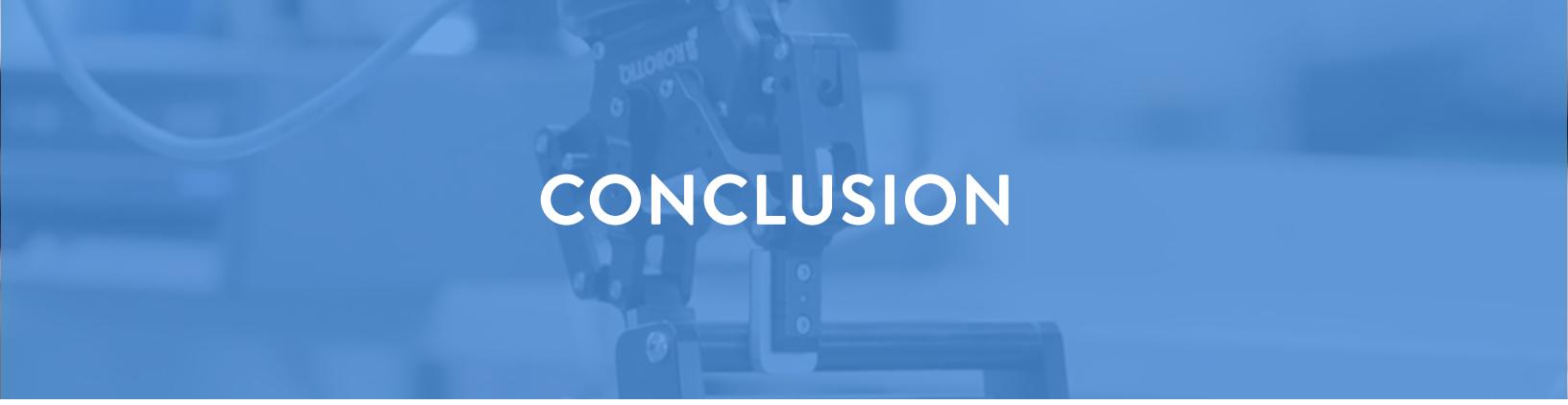
WHAT'S COMING NEXT?

HANWHA TECHWIN - HCR-5

Hanwha Techwin a leader in robotics technologies have recently announced their first collaborative robot. The HCR-5 is a 5 kg payload collaborative robot and they claim it to have the farthest reach among the robots of the same class. The robot seems really promising with a good power to weight ratio and nice safety features. We are looking forward to see how it will evolve in the cobots market. To learn more [visit their website](#).

HAN'S MOTOR - ELFIN 5KG

The Chinese company Han's Motor has recently launch a 5kg collaborative robot. With nothing too impressive in terms of specs, the Chinese robots made us think that it is time for cheaper cobots. As the price are still speculation we are expecting a low price that can be competitive in a lot of market, especially in China where the price is important due to major robot deployment. To learn more, [visit their website](#).



CONCLUSION

Introducing a robot in your enterprise is certainly a big step for your business. It will help boost your output, increase your productivity, prevent injuries and bring many more advantages. However, the process of getting there might be a long and exhaustive one. Shopping for your robot is just one part of the robotic integration; figuring out the right applications, the right person to do it, and how to introduce it in your enterprise are also a huge part of the implementation.

Once all these tasks have been accomplished, you must make sure to choose a robot that suits your needs. Having a robot with the right reach, degrees of freedom, and payload is integral to the success of your application.

The next step in your integration process will be to choose the different tools to be fitted on your robot so it will work properly. Some of the robots in this eBook already include a bunch of tools and accessories, so the part selection for them will be quite easy. If you choose a robot that does not include tooling, however, you will want to select robotic tools that are relatively easy to integrate to your robot (plug-and-play).

To help you choose your robotic tool, or if you need more information on how to integrate your robot in your company, you could take a look at our eBooks on these topics. Go to our Resource Center to learn more.

BROWSE OTHER EBOOKS

The key aspect in a pick-and-place application—the one that's most likely to influence your choice between using a vision system or another option—is usually the part presentation. You have to locate the parts in order to let the robot know where to pick them up.

Below are several eBooks that discuss part localization for pick-and-place applications. Note that here we are talking about the pick position, but the same factors apply to the place position. Depending on what you need to do when placing your part, you may also require a vision system to determine the proper place position. One example of this might be locating the box in which the part is to be placed.



[Collaborative Robots in Global Companies](#)



[Grippers for Cobots](#)



[Getting Started With Collaborative Robots](#)



ABOUT ROBOTIQ

At Robotiq, we free human hands from repetitive tasks.

We help manufacturers overcome their workforce challenges by enabling them to install robots on their own. They succeed with our robotic plug + play tools and the support of our automation experts community.

Robotiq is the humans behind the robots: an employee-owned business with a passionate team and an international partner network.



LET'S KEEP IN TOUCH

For any questions concerning robotic and automated handling or if you want to learn more about the advantages of using flexible electric handling tools, contact us.

Join us on social media:



[Robotiq's Blog](#)



[Twitter](#)



[Linkedin](#)



[Facebook](#)



[Youtube](#)



[Google+](#)



Robotiq's community where industrial **automation Pros**
share their **know-how** and **get answers**

Ask Your Question