Top 15 FAQs for UR Collaborative Robots

We frequently get questions regarding the Universal Robots series of Collaborative Robots (cobots). To help you with your research decisions, we thought it might be helpful to pull together a list of the Top FAQs regarding the Universal Robots that we've received.

Q1. What makes the Universal Robot collaborative (without additional safety equipment or hard guarding)?
In short, the controller will continually monitor and limit the amount of force that the arm is exerting to 150 N. Based on your risk assessment, this may be the only safety precaution necessary. According to ISO safety regulations, a Risk Assessment must be done by the party taking responsibility for the integration of the robot, so you must figure out what is acceptable for you.

Q2. Collaborative and Cage Free mode is interesting. Can any application be collaborative?
No, while collaborative technology is great, it isn't for every application. However, approximately 80% of Universal Robot installations are operating safely without additional guarding. Based on the results of a Risk Assessment, some form of additional safety guarding may be required (this Risk Assessment is the responsibility of the party integrating the robot). But 80% is pretty good and provides a ton of opportunity to save time and money!

Q3. Is the Universal Robots controller compatible with machine vision systems?
Yes, the Universal Robots controller can be configured to talk with almost any industrial device that communicates via Modbus TCP or Ethernet TCP/IP Sockets.

Q4. What motor and reducer technologies are used in the joints?
Each joint contains a Brushless Servo Motor and a Harmonic Drive Reducer.

Q5. How many revolutions are the joints capable of rotating?
All of the joints are capable of +/- 360 degrees of rotation (two full revolutions).

Q6. What type of hardware is the controller based on?
The controller is a compact Industrial PC that runs a Linux based Operating System.

Q7. What is the max speed capability of the Universal Robots 6-Axis arm?
The 6-Axis arms are capable of speeds up to 1 m/s.

Q8. Can I do force control applications without any additional hardware or software?
Yes, the Universal Robots controller can be programmed to do “Force Moves” where the amount of force the arm is producing in a given direction is limited.

Q9. How is the robot programmed?
The Universal Robots solutions are able to be programmed in three modes:

- Simple Teach Mode – this is where the robot is taught ‘waypoints’ by moving the robot into position by the operator – see our video!
- Teach Pendant – via the teach pendant, just about all of the robot’s capabilities are accessible through a well written program in a very intuitive point and click environment
- Scripting Language – for very large or complex programs, it may be more efficient to program via the robots’ full featured scripting language.

Q10. Can I edit a program offline?
Yes, whether a program was developed using the Teach Pendant or written in the scripting language, it can be edited offline via any standard text editor.

Q11. Do UR cobots comply with ISO-10218-1?
You can think of this ISO standard as a ”Best Practice” document that was written for big heavy industrial robots. The UR Robot technology is different. UR robots are lighter, and therefore some parts of the standard did not make sense to follow.

However, UR Robots specifically do comply with the parts related to ”Collaborative operation”, section 5.10.5. This standard is harmonized under the machinery directive and it specifically states that a robot can operate as a collaborative robot (i.e. without safety guards between the robot and the operator) if it is in compliance with the article 5.10.5. The risk assessment still needs to conclude that the overall robot installation is safe enough of course. A copy of the certification report can be

requested from Universal Robots.

While we're discussing ISO-10218, we get questions about the differences between 10218-1 and 10218-2. The first, -1, is for manufacturers of robots and -2 is for integrators that integrate robots in their machines or installations.

Q12. What is TS 15066, Technical Specification on Collaborative Robots?
ISO/TS 15066:2016 specifies safety requirements for collaborative industrial robot systems and the work environment, and supplements the requirements and guidance on collaborative industrial robot operation given in ISO 10218-1 and ISO 10218-2. It defines what is meant by a collaborative and discusses what is necessary in a risk assessment. It's likely that what is learned from TS 15066 will be rolled into the new version of ISO 10218.

Q13. What is ISO 13849?
This is a standard that describes safety related systems. This standard has its background in mechanical and electrical systems. It consists of two parts: ISO 13849-1: provides safety requirements and guidance on the principles for the design and integration of safety-related parts of control systems (SRP/CS), including the design of software. ISO 13849-2: specifies the procedures and conditions to be followed for the validation by analysis and testing of the specified safety functions, the category achieved, and the performance level achieved by the safety-related parts of a control system (SRP/CS) designed in accordance with ISO 13849-1.

Q14. What is a stop category and which stop category is used for an emergency stop in Universal Robots?
A stop category is a standardized description of the process to stop a movement. There are three categories:

Stop Category 0: requires immediate removal of power to the actuators. This is sometimes considered as an uncontrolled stop because, in some circumstances, motion can take some time to cease because the motor may be free to coast to a stop. In this category a robots will not follow a path that is controlled. There is no

control on the joints.
Stop Category 1: requires that power is retained to apply braking until the stop is achieved and then remove power to the actuator.
Stop Category 2: allows that power need not be removed from the actuator. Note that only Stop Categories 0 or 1 can be used as emergency stops (more information can be found ex. in IEC/EN 60204-1)
UR uses Stop Category 1.

Q15. Which stop category is used for safeguard in Universal Robots?
The safeguard stop is used to pause the robot movement in a safe way. The Safeguard Interface on the UR Robot can be used for light guards, door switches, safety PLCs etc. Resuming from a safeguard stop can be automatic or can be controlled by a pushbutton, depending on the safeguard configuration.

No matter what your industrial application is, Cross robotics specialists can help you determine the right robot and accessories to automate it. Contact us today.