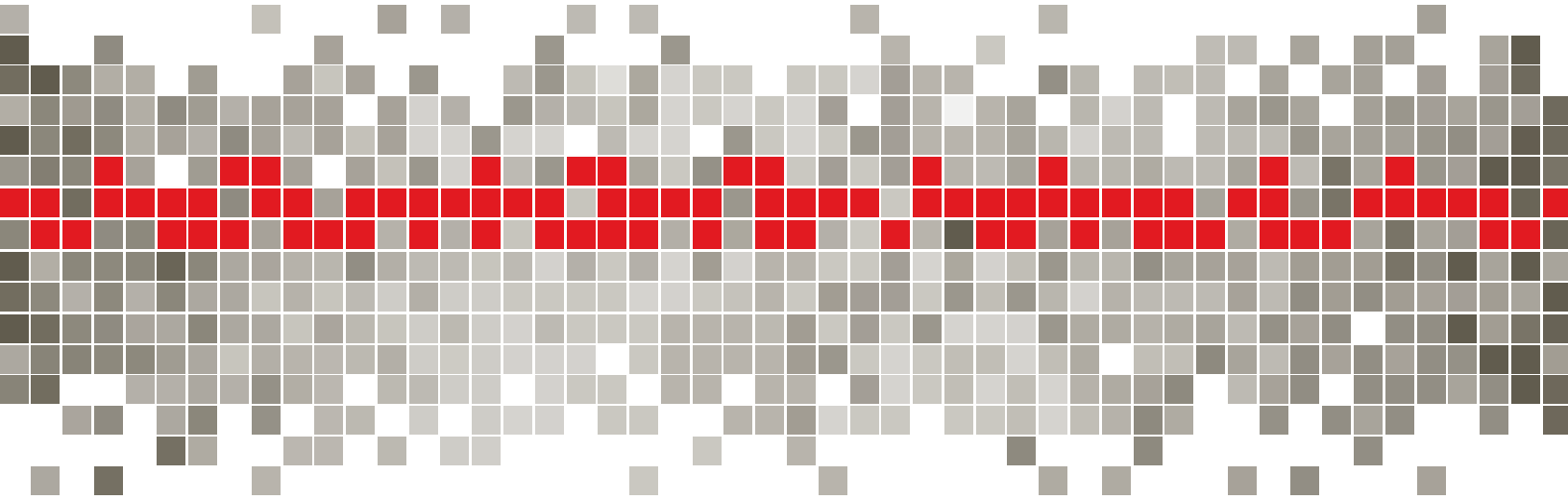
for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

Mitsubishi Electric: Out in Front in the Push to Collaborative Robotics

White Paper



There is a lot of buzz around collaborative robotics today. Not all collaborative solutions need to be the same. Read on to discover Mitsubishi Electric's take on high speed collaborative robots in assembly.

WP-VH-00104
F72-155-SLSMKTG-001-C

The newest category of robotic automation involves more than servo motors, manipulators, control systems and sensors. It includes a human partner working safely alongside the robot in an uncaged environment. The concept of human-robot collaboration, the hottest topic in robotics today, promises to open up new opportunities for industry, allowing robots to be utilized in manual production processes that historically have been out of bounds to traditional robotic systems.

It's easy to see why: robotic arms are fast, powerful, and dangerous. In the past if a human came into their workspace the robot, in the course of performing its task, could easily and inadvertently inflict great injury to the human interloper. To prevent this, engineers built fences around robots. When someone did walk through the gate, intentionally or accidentally, he or she would step on a pressure mat or break a beam of laser light triggering the robot to stop.

But now the fences are coming down and the days of robots working side-by-side with humans are a reality. Today, among the common uses for collaborative robots include bolting, gluing or welding pieces together, picking parts from a line or cart and preparing them for further processing and packing or palletizing final products for shipping.

A cage-free robot that uses a shared area with human workers does so by means of sensors connected to a safety controller. When a body gets into the robot's work zone, the robot slows down, when it gets even closer the robot stops.

Torque Sensing and Monitoring. When this safety function recognizes an increase in torque or force required for movement, such as may occur in a collision, the robot arm safely stops without causing harm. The system's Safe Torque Range function calculates a presumed torque based on the robot movement, defining an allowable torque width around the presumed torque, and then monitors whether the actual torque is within the allowable width.

If the torque feedback exceeds the allowable torque width, an error message is generated and the robot's servo OFF is turned to the stop position. Actual torque in the joints of the robot is continually monitored and the robot is immediately stopped if torque exceeds the pre-set level. This ensures that the robot will stop safely in the event of a collision with an operator and also protects the equipment.

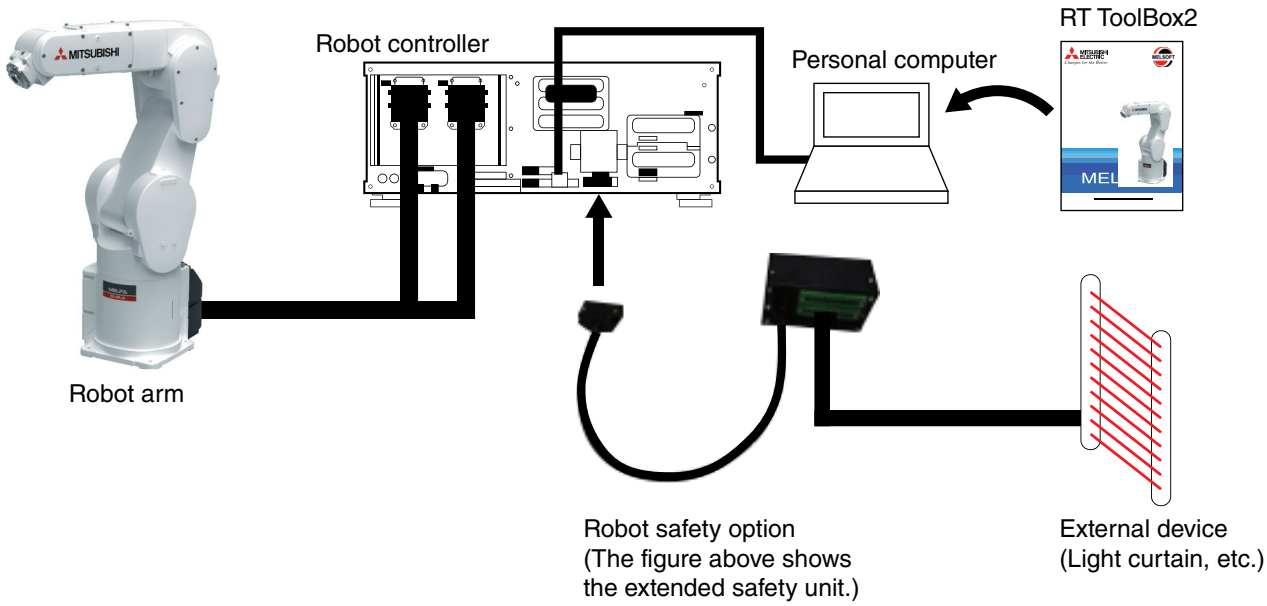


Fig. 1, 4F-SF001-01 system configuration. The safety option can be used with safety switches, light curtains, etc. connected.

Mitsubishi Electric: Out in Front in the push to Collaborative Robotics

The RV-4FL robot used in the demonstration is part of the company's F series, which combines a wide area of coverage with the industry's fastest cycle times, and provides a cost-effective means of boosting productivity on critical production lines. The RV-4FL is a 6-axis industrial robot with 4kg payload, 649mm reach, a maximum speed of 9,048 mm/sec, a 0.36sec cycle time and a repeatability of +/- 0.02mm. It can be mounted on a floor, ceiling or wall.

Mitsubishi Electric's new Safety Solution for F Series hardware and software is developed and certified to a full range of relevant safety standards, including EN ISO 10218-1 (Industrial robots), EN ISO 13849-1 (Safety of machinery), EN62061 / IEC61508 (Functional safety) and EN61800-5-2 (Safety function drive).

What's next in collaborative robotics? It's something that researchers are calling "true collaboration" where robots monitor workers and can anticipate their needs, understanding where the worker is in the assembly process, adjusting to what their human co-workers need and bringing tools and parts to the human in just the right place and at just the right time.

But that's still in the lab. In the meantime you can learn more about Mitsubishi Electric Factory Automation here **https://us.mitsubishielectric.com/fa/en** and MELFA industrial robots here **https://us.mitsubishielectric.com/fa/en/products/industrial-robots-melfa/vertical-type-robot/overview.**

MITSUBISHI ELECTRIC AUTOMATION, INC.
500 Corporate Woods Parkway, Vernon Hills, IL 60061
Ph 847.478.2100 • Fx 847.478.2253
us.MitsubishiElectric.com/fa/en

June, 2016 • ©2016, Mitsubishi Electric Automation, Inc. • Specifications subject to change without notice. • All rights reserved

WP-VH-00104
F72-155-SLSMKTG-001-C