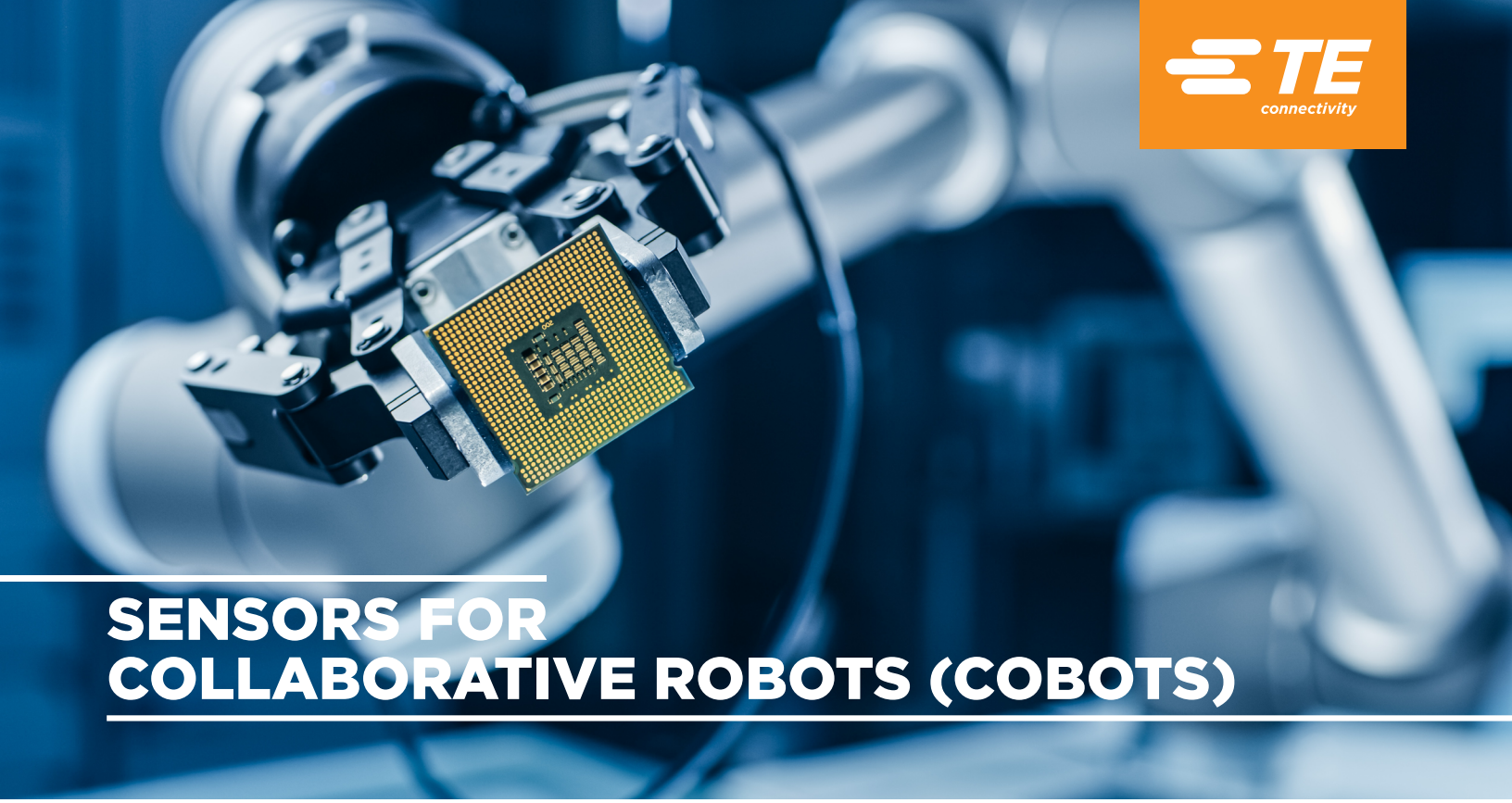


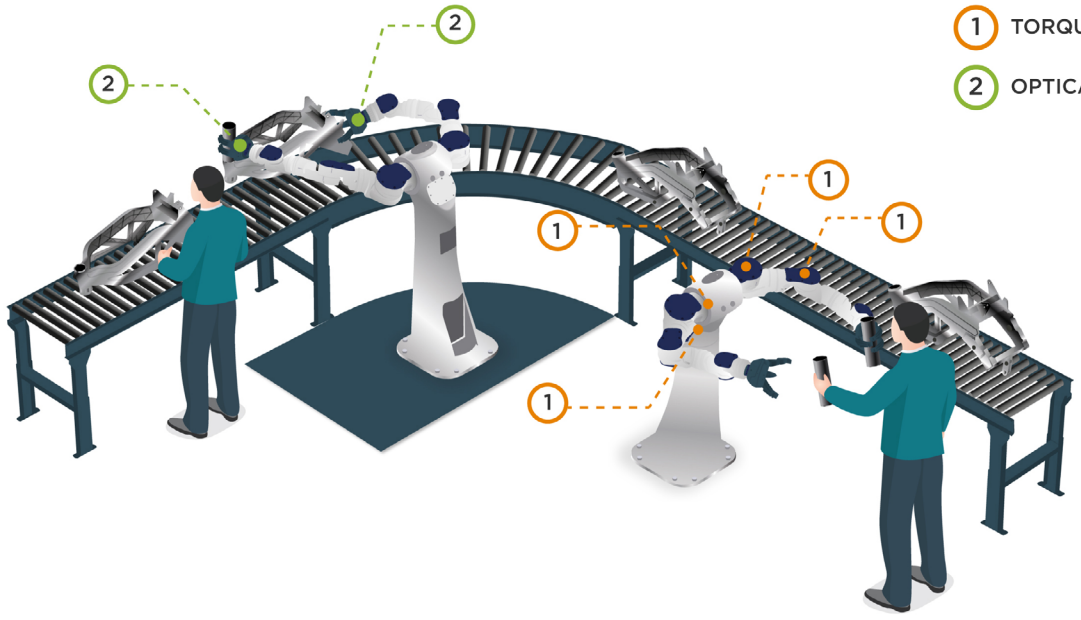
SENSORS FOR COLLABORATIVE ROBOTS (COBOTS)

Sensors are used in robotics for accurate monitoring of a variety of system components to prevent or eliminate down time as well as enabling the safe and efficient operation of robots or cobots. These cobots are intended to interact with and assist human workers as opposed to being standalone automated equipment with little to no human interaction. Cobots in manufacturing environments can also handle complex or dangerous tasks that humans either cannot complete or cannot perform safely. As safety requirements for collaborative robots have been developed and expanded, sensors have been used to help monitor and control these industrial robots and cobots achieve these functional safety requirements. TE Connectivity offers a variety of sensors used in industrial robots and collaborative robots, including position, torque, force, temperature, and optical.

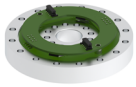
TE CONNECTIVITY ADVANTAGES

- Engineering Expertise
- Industry Experience
- Manufacturing Scale
- Portfolio Breadth
- Customization Capability

COLLABORATIVE ROBOTS



SENSORS FOR COLLABORATIVE ROBOTS

Sensor Technology		Application	Key Product Features	Benefits
Safety Torque Sensor		• Detects unexpected loads and forces during operation	• Two independent channels • Fast time response • Designed with high strength, low mass materials • Digital interface • Proven MEMS microfused technology • Includes stiffener for high cross load applications	• Redundancy, very reliable data • Reduces or eliminates dangerous conditions • Allows robot to operate more efficiently • Easy interface and integration into system • Robust and reliable feedback to system • For use in joint design without cross-roller bearing
APD Optical Sensor Series 8 APD Optical Sensor Series 9		• Navigation and collision prevention	• High accuracy • Multiple pixel active area • Customizable designs	• Increased safety
KMXP AMR Position Sensor		• Monitors position of various components of the robot	• Reliable and accurate position feedback • Designed for harsh environments • Simple and reliable interface	• Provides accurate feedback to systems • Reliable position feedback to system • Simplifies system design
NTC Thermistor		• Monitors temperature of motors and actuators	• Fast and accurate sensing • Designed for harsh environments • Excellent longevity and stability	• Provides fast temperature feedback to the system • Provides years of reliable sensing
FX29 Compact Compression Load Cell		• Monitors gripping force or other robotic forces	• Fast time response • Designed with high strength, low mass materials • Digital interface • Proven MEMS microfused technology	• Reduces or eliminates dangerous conditions • Allows robot to operate more efficiently • Easy interface and integration into system • Robust and reliable feedback to system

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