# New motor feedback systems for direct drives in robotics – and more besides

Capacitive hollow shaft encoders with mechanical multiturn function

Waldkirch, June 2018 – Direct drives in robotics applications and handling systems are two of the key applications that are ideal for the new SEM70 and SEM90 motor feedback systems from SICK, featuring HIPERFACE® interfaces. The compact size of these systems saves space, cuts down on weight, and is perfect for moving robot structures. Meanwhile, the two hollow shaft encoders are extremely vibration-resistant and durable thanks to the capacitive measurement principle and the bearing-free sensor element. As well as this, the mechanical multiturn function – available in this kind of design for the very first time – enables operation without external buffer batteries, doing away with the maintenance work associated with battery-assisted encoders. And installation couldn’t be simpler – just attach the system to the motor shaft, turn it, and you’re done. At 25 mm in the SEM70 and 50 mm in the SEM90, the hollow shaft diameters make it possible to guide cables, cooling lines, and other connections directly through the motor shaft. Because of this, they enable efficient integration of electrical drives – particularly into collaborative robots that require internal cable routing. The motor feedback systems are also available in singleturn versions, as both the SES70 and SES90 variants.

Manufacturers of the direct drives used in industrial robots, handling systems, injection molding machines, woodworking centers, and semiconductor technology will also benefit from the ability to read out the rotor position using the PGT11-S programming tool following installation of the motor feedback system, as this provides a reliable means of detecting any mounting errors before the motor is delivered.

**Capacitive measurement principle, fine resolution: Outstanding resilience and control quality for robot applications**

Designed for absolute position and speed monitoring, the motor feedback systems for the SES and SEM product families operate with a capacitive measurement principle that is not sensitive to dust, humidity, or vibrations – making them a superior choice when it comes to reliable optical behavior. A sinusoidal rotor turns along with the motor shaft, then the sensor element detects the changes in the electrical field that are generated as a result and converts them into fine-resolution sine-cosine signals. The SES/SEM70 motor feedback systems provide signals as 32 sine-cosine periods per revolution, while the SES/SEM90 systems feature a resolution of as much as 64 sine-cosine periods – allowing both types to achieve a high level of control quality that enables articulated-arm or SCARA robot kinematics to perform precise motion sequences.

**No special tools, no transmission elements – direct mounting on the drive shaft**

Just attach, turn, and you’re done. With their flat design measuring just 24 mm in height, the new motor feedback systems can be mounted directly on the motor shaft, quickly and easily. No transmission elements like timing belts or couplings are required. This enables the hollow shaft encoders to operate without the need for maintenance – as is the case with the mechanical multiturn function that performs up to 4,096 revolutions without a buffer battery.

**Safety-certified versions in the works**

In the near future, the motor feedback systems in the SES and SEM product families will be available with functional safety approvals that satisfy PL d criteria in accordance with EN ISO 13849 and SIL2 criteria in accordance with EN 61508. The aim of this is to allow humans and robots to work side by side as colleagues in all kinds of collaboration scenarios – with certified safety.

**Collaboration on an equal footing: SICK sensor solutions for robotics**

Industrial robotics holds one of the keys to establishing automation concepts that are fit for the future – and all the more so if they are able to provide an environment in which humans and robots can work increasingly as colleagues in a range of different scenarios. In these applications, it is the sensors that give robots the ability to perceive their environment accurately – and it is this that enables collaboration on an equal footing. SICK provides the right solutions for every challenge presented by robotics.

The optical and image-based systems in the **Robot Vision** portfolio provide the robot’s eyes, allowing it to detect humans and materials. Visual robot guidance in 2D and 3D makes it possible to deliver highly flexible and productive automation solutions in production, mounting, joining, and handling processes – such as those found in automated glue bead application, weld seam inspection, and bin-picking applications.

**Safe Robotics** from SICK provides solutions that are designed to keep humans safe. They include all the measures that turn the sensitive area close to the robot into a safe workspace. Adaptive perception of the environment takes place with the aid of intelligent, rugged, and reliable sensors and safe systems. These enable unimpaired and safe human intervention in the robot’s working range – allowing people to work closely alongside robots and keeping them safe in the process.

With **End-of-Arm Tooling**, SICK offers sophisticated, intelligent sensors for grippers and robotics tools, designed to keep robots as sensitive as possible and enabling them to work with fingertip precision. The portfolio covers all gripper arm applications and the feed systems associated with them.

In **Position Feedback** solutions from SICK, the motor feedback systems integrated into the drives deliver data on speed and position as well as on the status of the drive. As a result, these smart motor sensors create the sensory foundation for all robot movements.



Image: SICK\_SES70\_SEM90

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SICK is one of the world’s leading producers of sensors and sensor solutions for industrial applications. Founded in 1946 by Dr.-Ing. e. h. Erwin Sick, the company with headquarters in Waldkirch im Breisgau near Freiburg ranks among the technological market leaders. With more than 50 subsidiaries and equity investments as well as numerous agencies, SICK maintains a presence around the globe. In the fiscal year 2017, SICK had almost 9,000 employees worldwide and achieved group sales of around EUR 1.5 billion.

Additional information about SICK is available on the Internet at http://www.sick.com or by phone on +49 (0) 7681 202 4183.