

Down to the wire

INNOVATIVE, NEW WIRE-ACTUATED ENCODERS ENABLE VARIABLE POSITION MEASUREMENT IN HYDRAULIC CYLINDERS, PISTON ACCUMULATORS AND, FOR THE FIRST TIME, IN TELESCOPIC CYLINDERS

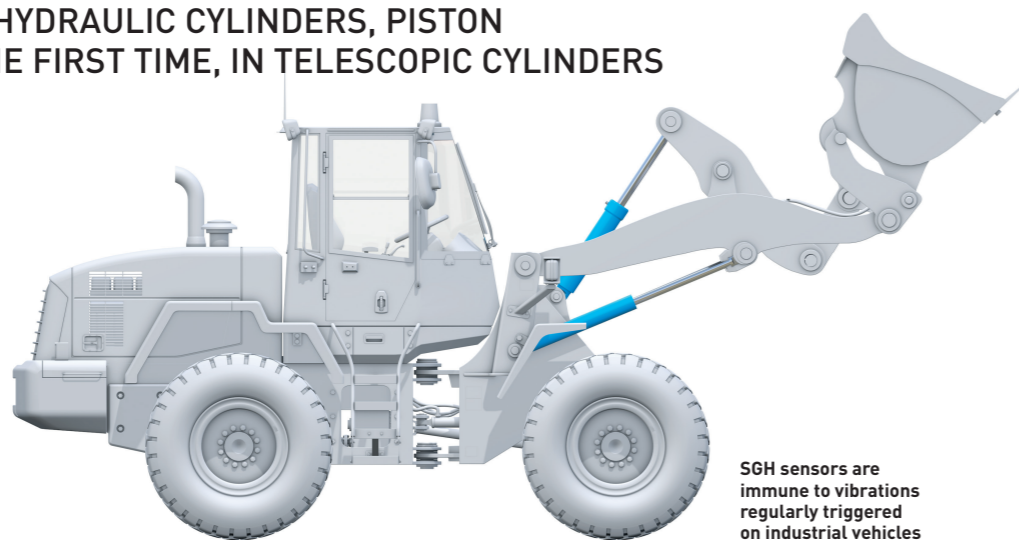
With its new wire-actuated encoders, SGH25 and SGH50, Siko has expanded the measuring spectrum of the SGH series, which can now measure lengths ranging from 0-5m (16.4ft). This is made possible by an innovative, cable-based, functional design concept that fully integrates sensors, electronics and mechanics into the cylinder. The compact design is also suitable for large cylinder strokes found in hydraulic and telescopic cylinders of construction machinery, agricultural machinery or commercial vehicles. The sensors fulfill the requirement that the cylinder length should ideally not increase when a sensor is installed.

While the SGH10 wire-actuated encoder covers 0-1m (3.3ft), the SGH25 and SGH50 now extend to larger ranges. The SGH25 is suitable for medium stroke paths (measurement length 0-2.5m (8.2ft)), while the SGH50 covers stroke lengths of 0-5m. In order to meet OEM requirements for a cylinder design with as little change as possible after sensor integration, the larger drums, on which the cable is wound, have been tilted 90° on the SGH25 and SGH50, so that the installation length of the sensors is identical to the smaller SGH10, despite the different measuring lengths.

Unique sensor technology

With the SGH sensors, which are 100% Siko developed, the company has a unique sensor technology that can even be used in piston accumulators and in telescopic cylinders (a global first). Their compact design can be completely integrated into a cylinder. This unique selling point is accompanied by a number of other advantages.

The SGH50 can be used in telescopic cylinders



The intelligent SGH technology follows an innovative and functional design concept. Instead of using a rod-based measuring principle, SGH sensors are based on a flexible wire-actuator mechanism. If the cylinder is extended, the cable, which is wound up on a cable drum, is pulled out. The rotation of the cable drum thereby created is detected without contact by the sensor electronics and used to calculate the linear travel. This makes it possible to detect the position and speed of the cylinder precisely and completely at all times.

Contactless electronic scanning

The magnets used to detect the rotation are scanned by the electronics without contact through the pressure-resistant base plate of the SGH sensors. The electronics are fully encapsulated on the unpressurized side of the system. This means that the entire measuring system is built into the cylinder and is thus optimally protected from external

environmental conditions. A clear advantage is that in contrast to a measuring system mounted externally on the cylinder, the sensor system cannot be damaged or negatively influenced or even destroyed by environmental influences.

Side attachment for special applications

The cable-based concept enables solutions that were previously unthinkable. Forklift truck designs, for example, may not exceed specified vehicle heights, but nevertheless should have the largest possible stroke. Siko meets these demanding requirements by intelligently delocalizing the SGH sensor in a housing laterally mounted at a 90° angle to the cylinder. As a result, the SGH sensors can measure 'around the curve' and be integrated into almost any cylinder.

Due to the unique lateral installation, SGH sensors can also be used in almost insoluble applications, including in applications with zero stroke loss

tolerance, extremely small piston diameters or cylinders with mechanical cushioning.

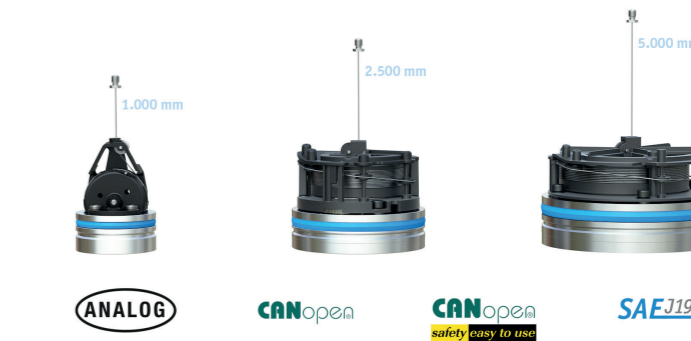
External environmental factors also include shocks or vibrations that regularly occur with excavators or dump trucks, for example. If an excavator bucket collides with hard ground, or the loading area of a dump truck locks in, these abrupt movements trigger vibrations. All SGH sensors are immune to them because the cable absorbs shocks and the entire SGH system can also use the hydraulic medium as a shock absorber.

SGH sensors are robust and resistant. In order to consistently maintain this level of quality, Siko attaches great importance to carrying out the product-specific trim of all mechanical and electronic sensor components itself and therefore designs power ratios, spring characteristics or drum speed itself. In addition, a special housing plastic has been developed for the SGH sensors, which achieves top performance even under the most extreme conditions and protects the entire system. One of these quality assurance measures is that SGH sensors are designed and tested for the service life of a cylinder. Thus, the SGH wire-actuated sensors fulfill the quality requirements of renowned cylinder manufacturers and OEMs.

Goodbye to piston drilling!

The innovative, cable-based design and functional concept of SGH technology ensure a big reduction in system integration costs. Comparing SGH sensors with the construction of magnetorestrictive sensors, it becomes clear: for the use of magnetorestrictive sensors, which requires a different length of the sensor rod for each cylinder corresponding exactly to the measuring length, a hole of at least that same length must be drilled in the piston. This hole is not required for SGH technology.

Ultimately, the elimination of this manufacturing step has a positive effect on the cylinder costs, as production times are shortened and the costs for piston drilling and assembly of the position magnet are removed. With SGH sensors there is instead just



the cable, which is fixed by a small thread on the piston head. Thus the SGH50, for example, with a maximum stroke of 5m, offers the maximum potential for savings. A hollow bore required in rod-based sensors generally affects the structure and stability of the piston and thus the function of the entire cylinder. With SGH technology, cylinder manufacturers do not experience this problem.

Learning and communicating

Where SGH sensors really show their strengths is in terms of variant diversity. The practical teach-in function is a valuable tool. It is standard in all SGH versions and offers a high level of functional and operating convenience.

An SGH sensor can be programmed for any measuring length. Within the measuring range of 0-1m, 0-2.5m or 0-5m, this intelligent function maps all lengths with a single SGH sensor and thus significantly reduces the number of variations for the cylinder manufacturer.

To ensure the transmission of position information to machine controllers of as broad as possible a range of machines, SGH sensors are characterized by a high variety of interfaces. Thus, the SGH technology can either be obtained with an analog interface for measured value transmission, or alternatively with the digital interfaces CANopen or SAE J1939. Even safety-critical applications can be operated with CAT3 or PLD-compliant versions

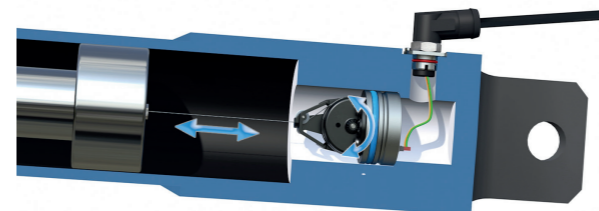
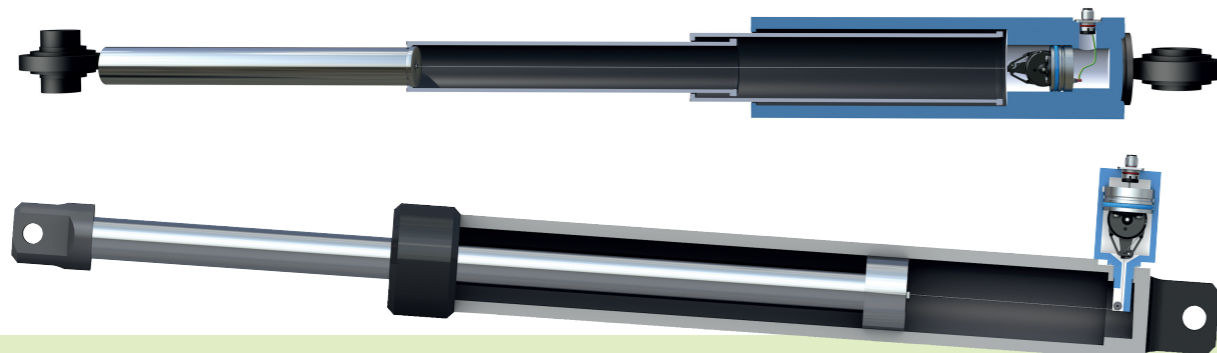
(according to EN 13849) and redundant analog interfaces, redundant CANopen, redundant SAE J1939 or CANopen Safety.

Due to the complete SGH system integration in the cylinder, SGH sensors provide maximum protection against environmental influences such as dirt, dust and water. Protection class IP69K guarantees this. That's why the SGH position sensors are equipped with IP69K-compliant KV1H connector systems. The modular nature of the universally applied KV1H connections reduces effort and costs in manufacturing, service, design and logistics, as the KV1H connector system is extendable. Thus, the sensor always remains the same for different cable lengths or connection types.

A complete solution

Overall, the use of this variable function and design principle contributes considerably to minimizing the number of variations, as SGH sensors cover entire measuring ranges and do not require a separate sensor-per-measurement-length as is the case with conventional sensor solutions. Therefore, for cylinder manufacturers, the use of SGH technology optimizes both the entire development and production process, as well as downstream services such as logistics, with huge flexibility. **IVT**

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The cable drum rotates via the cable pullout, making it possible to measure the distance