

Individual and Simple:

Inexpensive Angle Sensors with a Broad Range of Uses

Short version:

In order to prove itself in everyday industrial use, an angle sensor should fulfil at least four criteria: It must be mechanically rugged, offer sufficient protection from environmental influences and be easy to connect both electrically and mechanically. With the SP 2800 (potentiometric) and RSC 2800 (contactless) sensor lines, Novotechnik has achieved an almost exemplary solution here. The housing, with a diameter of 28 mm and a depth of approx. only 17 and 23 mm respectively, meets all requirements of industrial practice. The company offers both inexpensive conductive plastic potentiometers and contactless angle sensors that operate on the Hall principle. The sturdy plastic housing meets the requirements of protection class IP65 and can be supplied with either a shaft or a push-on coupling. Fastening lugs with oblong holes make mounting easy. The cast-in connection leads of the potentiometric version leave sufficient space for any industry-grade connection technology. (electrical connection of the contactless RSC line is made with cables). All applicable EMC regulations are complied with.

Development in angle measuring technology has been fast-paced over the past few years. In many areas, contactless processes based on greatly differing physical principles are beginning to supplement the proven but principle-dependent wear-prone conductive plastic potentiometers. However, interesting new measuring principles often remain nothing more than a theory, as it's still a long way from the idea to a functional and affordable product. As a result, technological competition alone is of little benefit to the user. Today manufacturers must primarily concentrate on "packaging" their innovative ideas in a practice-oriented manner and then offering them at interesting prices.

The housing in turn plays an important role in every sensor. It protects the measuring system and enables it to be installed. It's the sum of a measuring principle's properties that decides whether it can be used successfully in practice.

No successful application without need-oriented "packaging"

In order to prove itself in everyday industrial use, an angle sensor should fulfil at least four important criteria - regardless of which operating principle it employs: It must be mechanically rugged, offer sufficient protection from environmental influences and be easy to connect both electrically and mechanically. With the SP 2800 (potentiometric) and RSC 2800 (contactless) sensor lines, Novotechnik has achieved a virtually exemplary solution in this sector.

The housing, with a diameter of 28 mm and a depth of approx. only 17 and 23 mm respectively, meets all requirements of industrial practice. At the same time, angle sensors with a broad range of operating principles are offered in the same design. This enables the advantages of the well thought-out housing and connection technology to be used in a wide variety of different applications. For example, both inexpensive conductive plastic potentiometers and contactless angle sensors that operate based on the Hall principle are available.

User-friendly installation and connection technology are a must

Just how rugged the sensor's design is also becomes apparent during installation. For example, sturdy fastening lugs with oblong holes make mounting easy. The installer can fasten the angle sensor quite simply with two cheese head screws (M4) and the matching washers. The housing with fastening lugs consists of a durable, temperature-resistant plastic material with an elasticity that prevents the lugs from shearing off, avoiding damage to the sensor even when extreme forces are at work during installation. The mounting of the rotating shaft consists of a

sturdy, maintenance-free sintered bronze bushing. Durability is also a major factor in the mechanical connection between the sensor and the application.

When making the electrical connection, it also becomes apparent exactly how practice-oriented the sensor's design is. Every electrician knows what a thankless job it is to work with connection wires that are either too thin or too short - or both. That's why particular attention was paid to the corresponding details when developing the sensor described here. As a result, the individual, cast-in connection leads leave sufficient space for any installation technology suitable for industrial use. With a cross-section of approx. 1 mm² and a length of 300 mm, they are ideal both for soldering and for connection with screw terminals. In addition, the sensors are also offered with a shielded round cable and industrial-grade connectors that meet the requirements of the protection class IP65.

Protection against environmental influences is obligatory

Of course, the housing must protect the sensor against various environmental influences. Here the protection class IP65 provides sufficient protection against liquids and dust. The sensors are completely dust-tight and hose-proof in accordance with IEC 529. And of course, the temperature-resistance of the sensors is an important criterion for practical use. The conductive plastic potentiometers can withstand ambient temperatures between -40 and +150 °C, and contactless angle sensors are designed for ambient temperatures from - 40 °C to + 125 °C.

And the insensitivity to electromagnetic interference is just as important in the industrial environment. To ensure the greatest possible protection here, the RSC-2800 housing is electrically conductive, i.e. the sensor mechanism is provided with the best possible protection against

electromagnetic interference.

One industrial-grade housing for different measuring principles

Depending on the application and requirements, the user can choose between different measuring principles with the same housing design. Conventional conductive plastic potentiometers are still viable in many applications due to the attractive value for the money they offer.

The sensors with a conductive plastic resistance and collector track convert the angle of rotation into a proportional voltage. Here the independently spring-loaded, precious metal multi-finger wiper provides for reliable contact. The SP 2800 potentiometer offers unrestricted continuous rotation with a maximum electrical range of 340°. Even under the harshest operating conditions, the life expectancy is approximately 50 million rotations.

Contactless, magnetic process

However, with high-frequency or continuous unrestricted rotation, the user is usually better advised to use contactless measuring methods, as here the principle-dependent wearing of the potentiometer technology could have a negative effect. The RSC 2800 angle sensor in the single and the redundant form is positively predestined for angles of rotation between 30 and 360 degrees. The principle mode of operation is easy to understand:

A magnet is mounted on the shaft. Depending on the angle of rotation, the orientation of the magnetic field changes, and with it the signals of the sensor element mounted opposite. This signal change is then already converted into an analogue signal proportional to the angle of rotation within the sensor IC. The sensor has an internal resolution of 0.1° and an typical independent linearity of +/- 0.3 %.