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**MAGNETIC PRECISION. UNDER ANY CONDITION.**  
**MAGNETIC ROTARY ENCODER TECHNOLOGY**



# Automation is our world. Perfect solutions are our goal.

A willingness to take risks, a pioneering spirit, and a firm belief in their own inventive powers – these were the assets that Walter Pepperl and Ludwig Fuchs started out with when they opened their Mannheim radio repair shop in 1945. Their invention of the proximity switch a few years later proved their strength. It was also the starting point in a successful history define by close customer relationships as well as innovative automation technologies and procedures. Then as now, our focus is directed squarely on the

individual requirements of each customer. Whether as a pioneer in electrical explosion protection, or as a leading innovator of highly efficient sensors, close communication with our customers is what allowed us to become the leader in automation technology. Our main objective is combining state-of-the-art technologies and comprehensive services to optimize our customers' processes and applications.

For more information, please visit our website: [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)



application

# Content

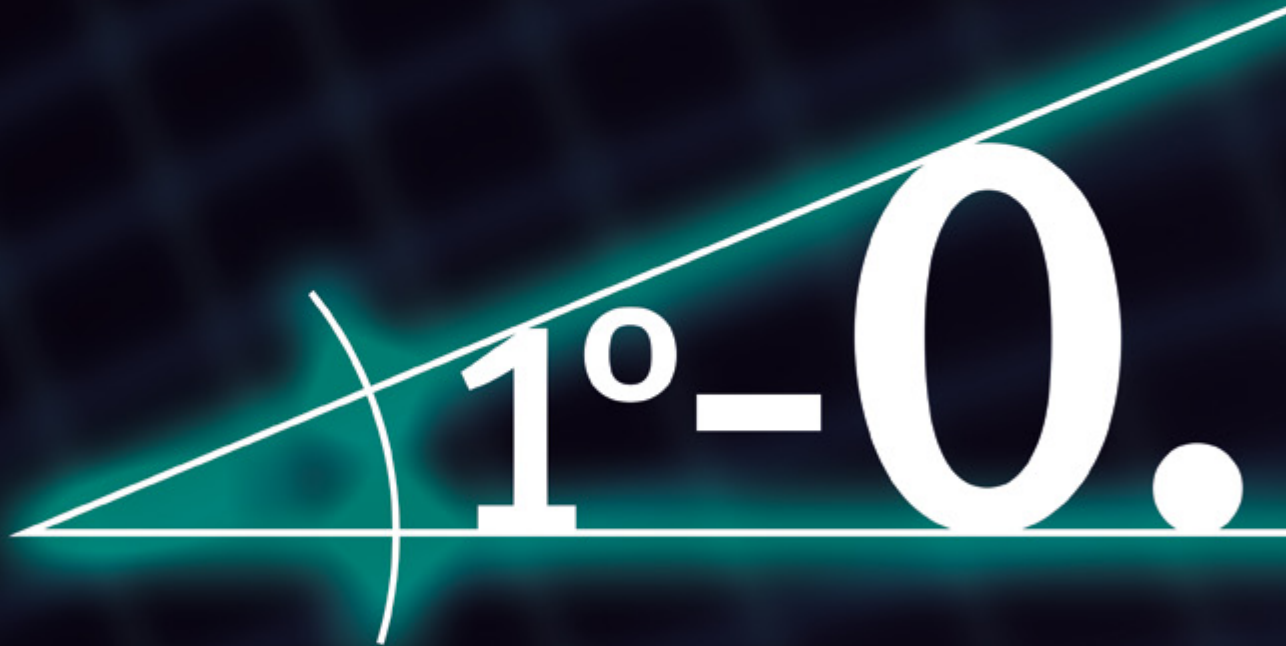
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# Magnetic Precision. Under any C

At Pepperl+Fuchs, technological developments for industrial automation are designed with one goal in mind: to deliver optimum performance with maximum precision. We continuously strive to develop new technologies that will bring our customers' processes closer to error-free production. With advanced research and development, we often discover creative solutions that redefine the limits of what is technically feasible.

One such solution is the development of the magnetic rotary encoder. With accuracies of  $1^\circ$  and  $0.1^\circ$  and a high level of durability, magnetic rotary encoders bring users a new level of flexibility, performance, and reliability.





condition.

## New Technology creates new Prospects

Using technology that has been specifically tailored to an application enables users to gain that all-important competitive advantage. Customized technology provides the ability to perform under the harshest of ambient conditions, keeps processes running smoothly, minimizes downtime, and maximizes efficiency.

### **Maximum Precision in Any Industrial Environment**

Optical and magnetic encoders each have their own capabilities and performance characteristics. Optical encoders were not designed to provide reliable feedback in the most difficult ambient conditions. Because of their sensitive components, performance may deteriorate in applications where dirt, humidity, extreme temperatures, severe shock, and vibrations are present.

The magnetic absolute rotary encoders from Pepperl+Fuchs are designed with precisely these conditions in mind. They are not affected by environmental influences and are able to deliver consistently accurate measured values. The construction is both robust and compact, and has no mechanical gears whatsoever. These design features enable the rotary encoders to deliver a better performance and a longer service life.

### **Zero Tolerance for Error-Free Processes**

Pepperl+Fuchs' magnetic absolute rotary encoders provide an extremely high degree of accuracy that brings your application closer to the goal of creating error-free processes.

[www.pepperl-fuchs.com/magnetic-encoders](http://www.pepperl-fuchs.com/magnetic-encoders)

# Sophisticated Magnetic Field Technology Performance in Every Detail

The engineering expertise behind this technology is obvious in every detail: For the first time, a Hall sensor and a Wiegand sensor are combined in one compact magnetic rotary encoder. The result is optimum precision and reliability for your applications.

## How Does the Magnetic Rotary Encoder Technology Work?

Absolute rotary encoders based on a magnetic detection principle use a two-axis, Hall-effect sensor. A rotating magnetic field generates a sine or cosine signal. This signal is processed via the internal processor, generating an output signal equivalent to the output signals that can be obtained from optical scanning techniques.

## Multiturn Absolute Rotary Encoders with Wiegand Sensors

With the addition of a Wiegand sensor, these single-turn absolute rotary encoders are converted into multiturn absolute rotary encoders. When a permanent magnetic field near the Wiegand sensor is rotated, it generates a change in the direction of the magnetic field in the core of the Wiegand sensor, and in turn, an induction voltage in the coil around the sensor. Energy is transformed during a change in the direction of the magnetic field, twice on each revolution. This is used to electronically count the revolutions and supply power to the electronics.

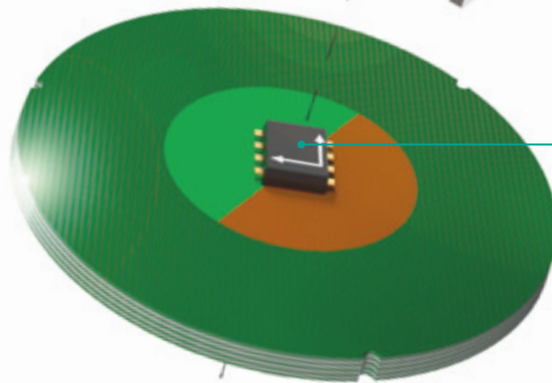


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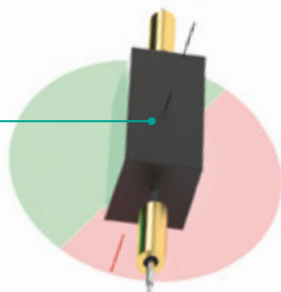
PERMANENT MAGNET



HALL SENSOR



WIEGAND SENSOR



### Wiegand Sensor Ensures Optimum Reliability

With the addition of the Wiegand sensor, an internal battery is no longer required to supply power to the electronics. This means that the rotary encoders are not affected by voltage failures, ensuring that no data is lost. The Wiegand sensor is instrumental in increasing reliability while reducing maintenance and service work.

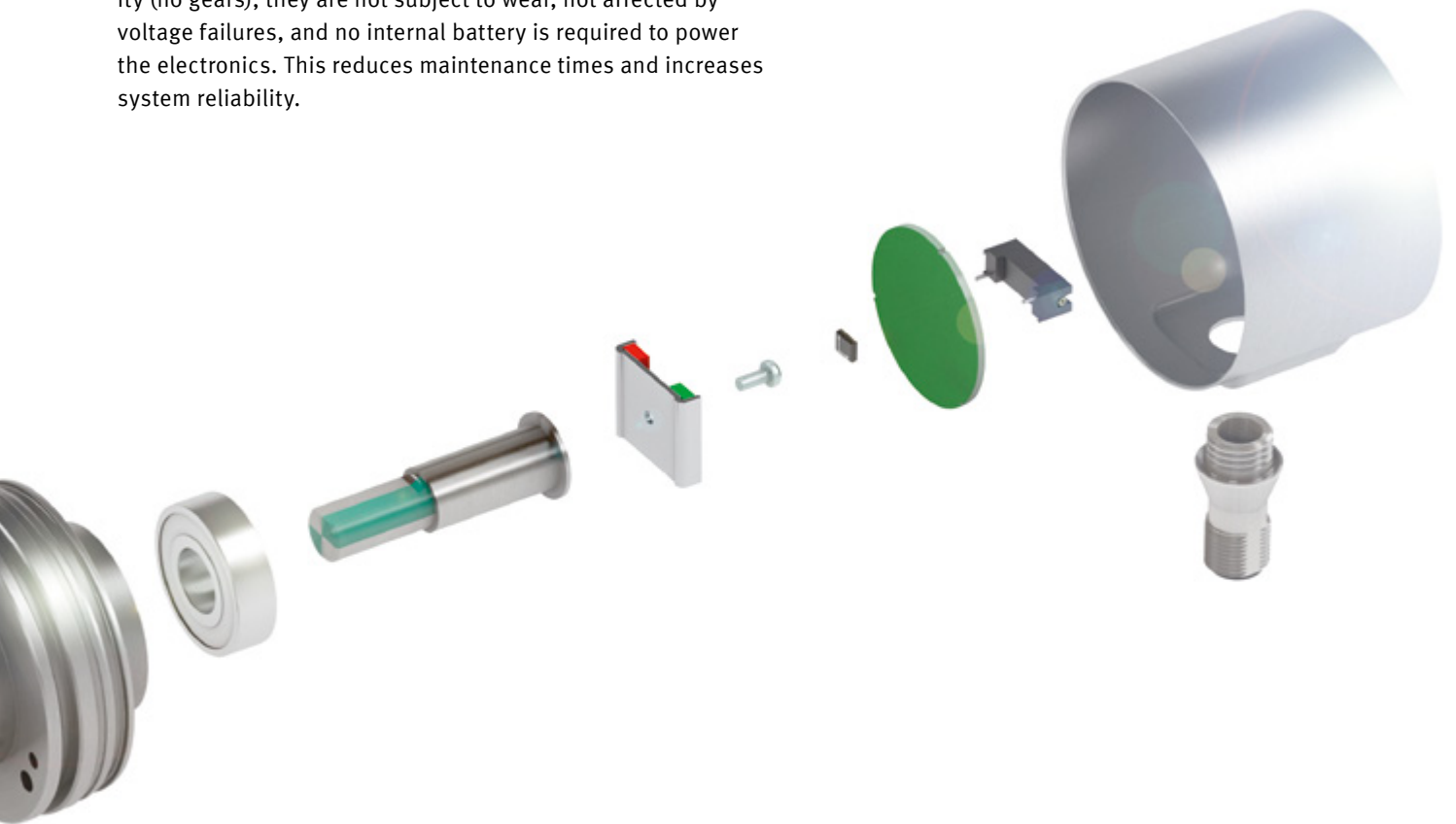
# Evolutionary Technology with Ma The Most Important Factor: Incre

The increase in industrial automation has resulted in an even wider range of demanding ambient conditions with dirt, dust, high humidity, and jolting vibrations. Magnetic rotary encoder technology responds to these changing requirements by offering extremely precise, robust technology in a unique, compact housing. With extensive engineering expertise in encoder technology, Pepperl+Fuchs makes your processes more reliable and efficient.

## Sophisticated Technology in a Compact Housing

The integrated Wiegand sensor replaces the mechanical gear, saving space and creating a unique, compact magnetic rotary encoder.

Advanced magnetic field technology is built into housings with an external diameter of just 36 millimeters. This technology uses a noncontact system to handle multiturn functionality (no gears); they are not subject to wear, not affected by voltage failures, and no internal battery is required to power the electronics. This reduces maintenance times and increases system reliability.





# ny Advantages. ased Production Reliability



## **Production Reliability Thanks to Robust Technology**

Magnetic technology extends the service life of the rotary encoders. The technology can withstand temperatures from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$ , and the encoders are shock and vibration-resistant. The robust design means that the rotary encoders are suitable for use in difficult ambient conditions, providing a long service life even when subjected to dust, dirt, vibrations, or extreme temperatures.

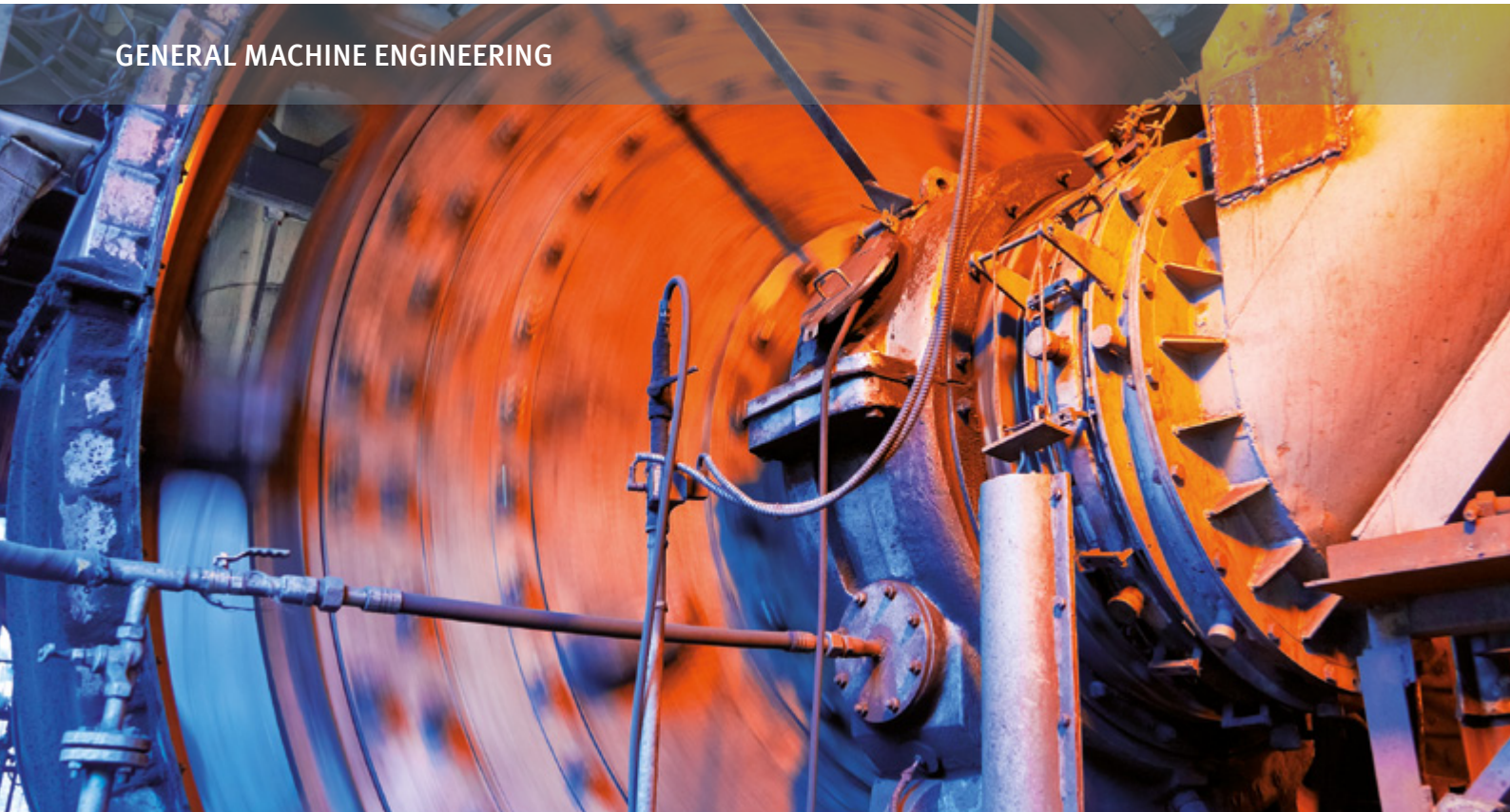
## **Optimum Reliability for Your Production Processes**

Magnetic rotary encoder technology is setting new benchmarks with both precision and performance improvements. Magnetic rotary encoders based on a tried-and-tested design principle achieve measurement accuracies down to  $1^{\circ}$ . The new magnetic technology enables single-turn resolutions up to 16 bits and multiturn resolutions up to 39 bits, with measurement accuracies of down to  $0.1^{\circ}$ . This new level of precision offered by magnetic rotary encoder technology opens up additional applications and guarantees reliable system processes.

# Complex Applications Require Tech Regardless of the Industry

In markets where competition is becoming more fierce and requirements ever more exacting, high-performance technology is an important factor for success. For applications where mounting restrictions and environmental conditions play a role, the compact, robust sensors from Pepperl+Fuchs offer the ideal solution – for a wide range of applications.

## GENERAL MACHINE ENGINEERING



### **The Added-Value Factor: Tailored Solutions**

The range of solutions is determined by the range of applications: Our engineers can tailor any encoder to your individual requirements. You will receive your own custom-made solution, designed to provide optimum support for your application. Fast, tailored, and cost effective.

### **Highly Precise and Reliable: The Technology of Choice for Machine Engineering**

Above all, the positioning tasks associated with general machine engineering require a high degree of precision, resolution, and durability. Rotary encoders are a key technology in this area, guaranteeing reliable production processes. Applications for these devices include automated production lines and assembly robots.

With flexible mechanical and electrical interfaces, rotary encoders can be easily integrated into almost any environment, offering maximum performance in an extremely compact housing.

# Technology that Breaks Boundaries –

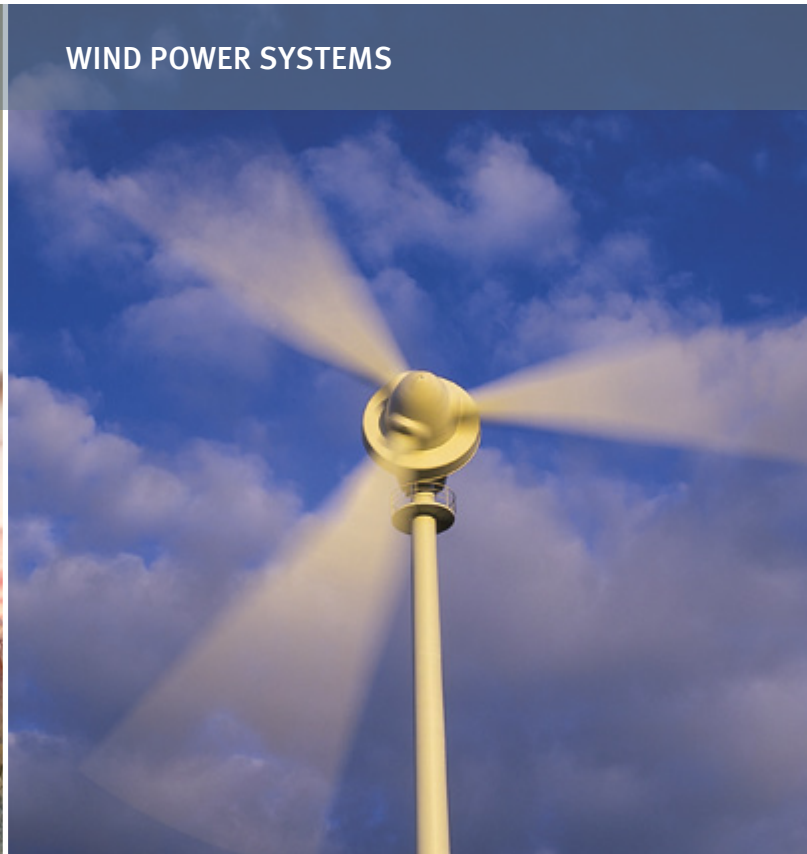
## MOBILE EQUIPMENT INDUSTRY



### **Compact and IP69k: Perfect for Mobile Equipment**

Rotary encoders that are used in mobile equipment are very often subjected to higher levels of dirt/dust, liquid exposure, vibrations, and shocks. The high degree of protection offered by the IP69k rating, and a high level of durability are some of the key advantages offered by magnetic rotary encoders in this segment.

## WIND POWER SYSTEMS



### **Robust and Durable: Ideal Features for Wind Power Applications**

Ready for any challenge, rotary encoders used in wind power system are subjected to particularly adverse ambient conditions. Temperatures ranging from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and severe vibrations present some of the most exacting requirements for systems such as controlling the pitch angle of the rotor blades (pitch control) or monitoring the position of the nacelle (azimuth angle).

The magnetic detection principle and the robust technology can withstand even these conditions.

# YOUR APPLICATION. OUR CHALLENGE.

## PROCESS INTERFACES

- Intrinsically safe barriers
- Signal conditioners
- Fieldbus infrastructure
- Remote I/O systems
- HART interface solutions
- Wireless solutions
- Level measurement
- Purge and pressurization systems
- Industrial monitors and HMI solutions
- Explosion protection equipment
- Solutions with process interfaces

## INDUSTRIAL SENSORS

- Proximity sensors
- Photoelectric sensors
- Industrial vision
- Ultrasonic sensors
- Rotary encoders
- Positioning systems
- Inclination and acceleration sensors
- AS-Interface
- Identification systems
- Logic control units



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