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A step in the right direction

Rotational direction monitor enhances reliability of rotational speed measurement

In many applications involving pumps, fans or conveying systems, not only is the direction of rotation important, but also the rotational speed or frequency. If the application rotates in the incorrect direction as a result of external influences or installation errors, systems may be damaged or safety functions rendered ineffective.

Monitoring rotating or oscillating motions plays an important role in control technology. Rotary motions must be evaluated and monitored just like quantities, rotational speeds or flow rates. In many applications, it is not only the number of revolutions i.e., the rotational speed that is significant but also the direction of rotation. Tunnel ventilation systems or flow meters can generate rotational speeds against the intended direction of rotation owing to air or mass counterblows. This results in incorrect measurements and in the case of faulty ventilation can result in fatal consequences.

The direction of rotation is determined based on two time-staggered, but overlapping binary input signals. These pulse sequences can be generated either by means of a rotary encoder or via two sensors. Both signals are necessary in order to achieve reliable determination of the direction of rotation. Fig. 1 illustrates this principle. The additional benefit of using two sensors is increased reliability of the measurement. If one of the two sensors is defective or incorrectly adjusted, erroneous detection of standstill is prevented because the second sensor continues to deliver signals.

Several DIN-rail mountable pulse evaluation units from the Pepperl+Fuchs K-System are available for the evaluation of binary pulse sequences. The K-Systems product range comprises more than 150 devices for a host of Ex and non-Ex applications. Two devices are available for evaluating direction of rotation:

In addition to detecting direction of rotation, the highly functional KFD2-UFT- ** pulse evaluation unit also detects frequencies, which it converts into a proportional 4...20 mA signal. If a response to under speed or excess speed is additionally required, a trip relay is available. Device settings can be made either via a graphical display and pushbuttons, or conveniently via the PACTware software. On the input side, two NAMUR sensors or any required contacts can be connected. Functions could not be integrated in a more compact manner.

The KFD2-SR2-Ex2.W.SM is a simple device that monitors the direction of rotation and standstill.

For further information on frequency measurement and the associated applications, please refer to the latest edition of the Engineer's Guide to Interface Technology.

About Pepperl+Fuchs

Pepperl+Fuchs is a leading developer and manufacturer of electronic sensors and components for the global automation market. For more than 60 years, our continuous innovation, high quality products, and steady growth has guaranteed us continued success.

One Company – Two Divisions

Pepperl+Fuchs – PROTECTING YOUR PROCESS

The **Process Automation Division** is a market leader in intrinsically safe explosion protection. We offer comprehensive, application-oriented system solutions, including customer-specific control cabinet solutions for the process industry. A large portfolio of components is available from our various product lines: isolated barriers, fieldbus infrastructure solutions, remote I/O systems, HART interface solutions, level measurement devices, purge and pressurization systems, industrial monitors and HMI solutions, power supplies, separator alarm systems for oil and petrol separators, signaling equipment, lighting as well as emergency shutdown equipment and accessories.

Pepperl+Fuchs – SENSING YOUR NEEDS

With the invention of the inductive proximity sensor in 1958, the company set an important milestone in the development of automation technology. Under the motto "Sensing your needs", customers benefit from tailor-made sensor solutions for **factory automation**. The main target markets of the factory automation are machine and plant construction, the automotive industry, storage and material handling, printing and paper industry, packaging

technology, process equipment, door, gate and elevator construction, mobile equipment, renewable energies.

The division offers a wide product range of industrial sensors whether it's inductive, photoelectric or ultrasonic sensors, rotary encoders, identification systems, barcodes, code readers for data-matrix-codes and vision sensors.

Key words: Frequency measurement, direction of rotation, rotational signal, rotational speed, frequency/current conversion

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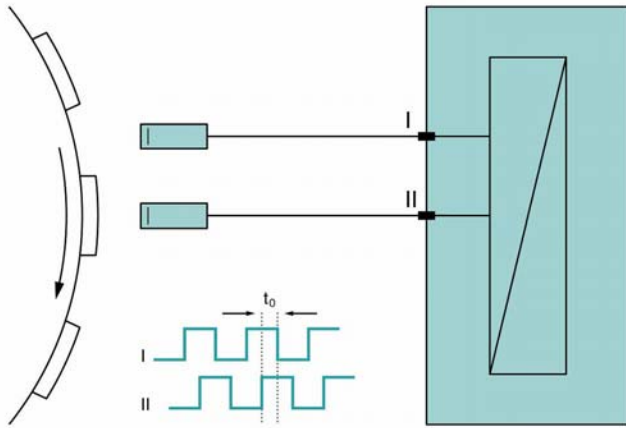


Fig. 1: Determination of direction of rotation with two sensors



Fig. 2: Multi-functional KFD2-UFT-Ex2.D evaluation unit



Fig. 3: KFD2-SR2-Ex2.W.SM standstill monitor with direction of rotation monitoring