

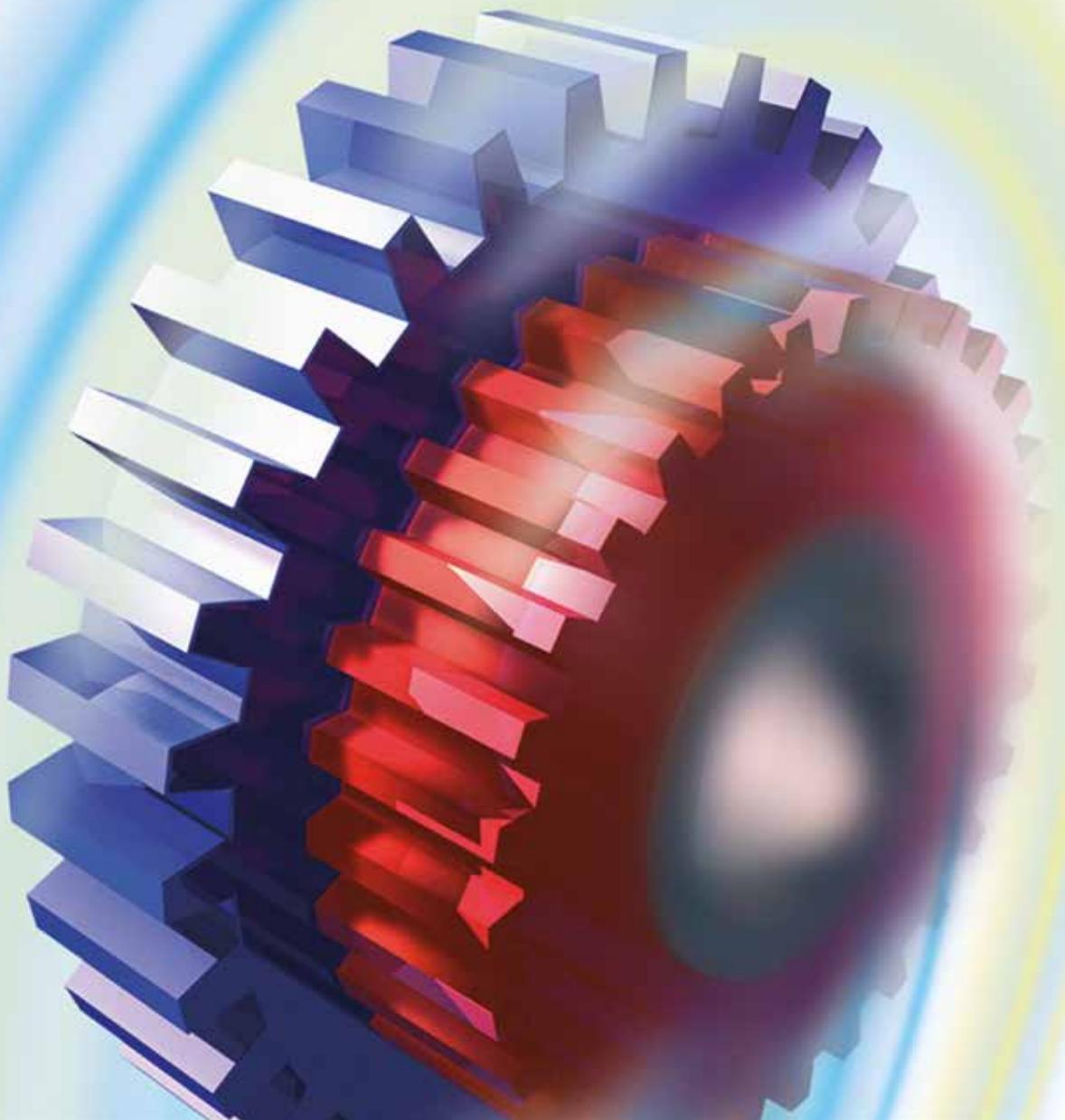
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Safe measurement, indication and control of rotational speed



# Sensor Targets

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# Sensor Targets

## General operating principle

Speed sensors are used in areas where a solution for the contactless measurement of rotational speed and direction is required within inaccessible locations or under special ambient conditions at an affordable price.

The exceptional operability and service life of the sensors reflects their ability to withstand high pressures, temperature fluctuations, electromagnetic disturbances and aggressive media as well as the impact of jets of water or steam.

The vast majority of speed sensors detect the movement of ferromagnetic structures such as gears via the change in the magnetic flux and is biased using a permanent magnet. Meanwhile, the teeth and gaps which traverse the sensor have varying impacts on the magnetic field, which changes the Hall voltage on a hall-effect sensor. These changes to the magnetic field can then be converted to electrical values, filtered and processed. The sensor output signal is a square-wave voltage which reflects the change in the magnetic field.

## Functional performance on gear wheels

The sensor is used for the non-contact rotational speed detection on ferromagnetic machine elements. Normally these are existing or specially mounted gear wheels with modules of 0.5 and higher.

The distance between the scanned object and the surface of the active sensor is described as air gap. The air gap is largely dependent on the geometry of the object, the installation conditions, the ambient conditions and the requirements to the signal.

In general, a coarser structure of the scanned object allows larger distances for speed detection using hall sensors. Reaching the maximum scanning frequency depends on the sensor-gear wheel configuration and the structure of the element to be scanned.

## Material of useable gear wheels

Sensors that operate on the principle of changes to the magnetic flux require a pole wheel out of ferro-magnetic material (iron, steel, castings).

## Target geometry

For optimum signal generation, pole wheels having an involute gear form should ideally be used, or alternatively slotted or holed disks. Stamped sections (pole bands), bolts and screw heads are also possibilities. It must however be ensured, that the air gap between the part and the sensor remains the same.

## Target width and teeth height recommendations

To guarantee good performance over air gap, we recommend

- ♦ a target width of minimum 7 mm
- ♦ and a teeth height above 3 mm

If this is mechanically not possible in the application, contact your local application engineer to evaluate expected performance.

## Simple calculation of a module

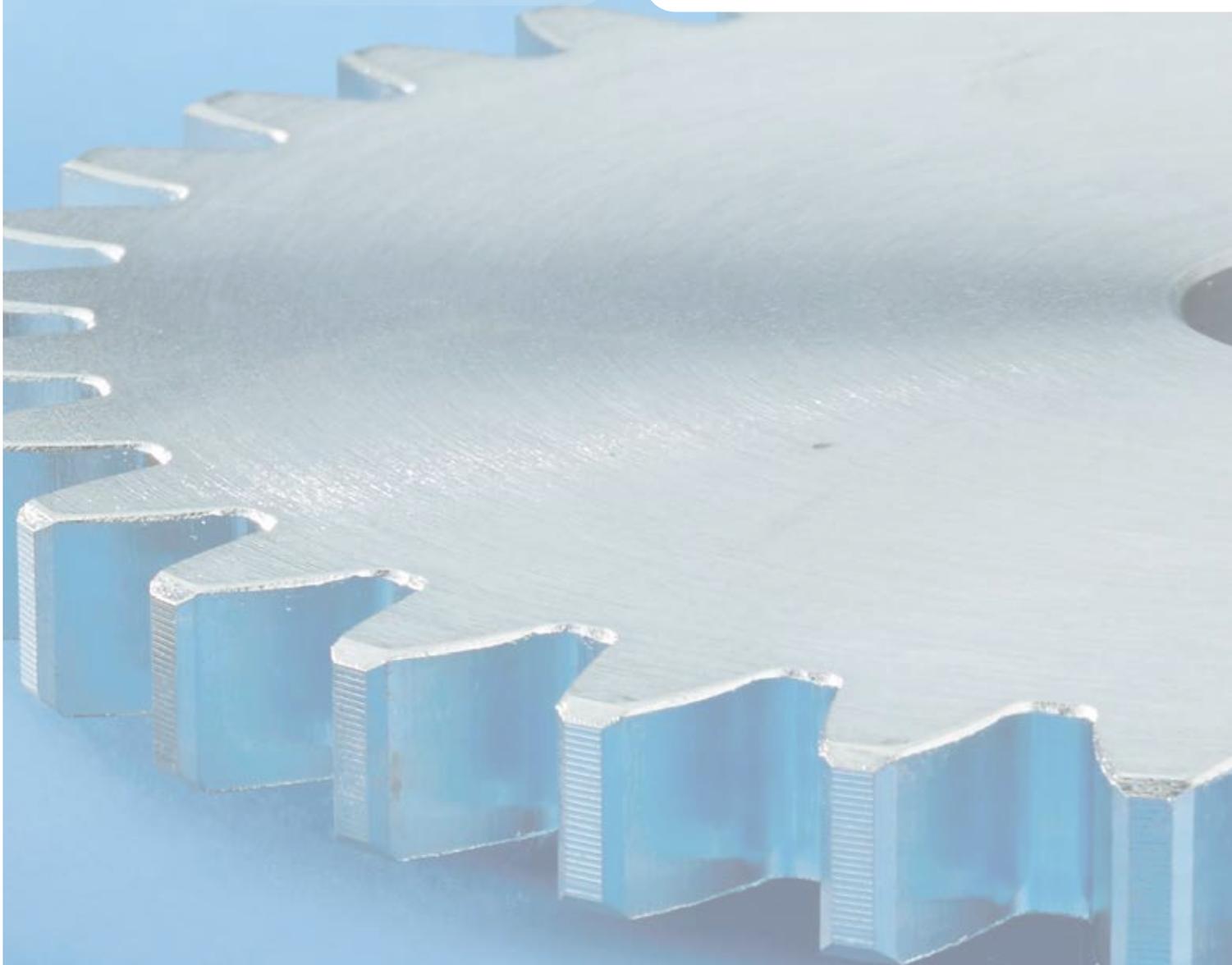
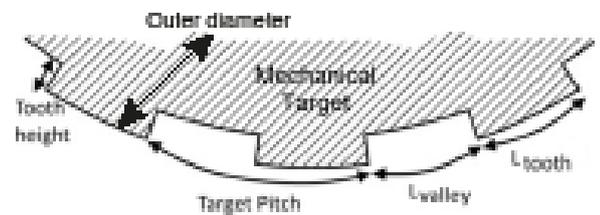
For gears, the tooth geometry is given in „Modules“.  
The finer the tooth geometry, the smaller the value of the module.

There is a simple rough calculation to determine the module.

$m =$	Module	$m = p / \pi$
$\pi$ (Pi) =	3,14	Module = Pitch / 3,14
$p =$	Pitch	

Another possibility is the so-called involute tothing:

$m =$	Module	$m = d_k / Z+2$
$d_k =$	Outer diameter	Module = $\frac{\text{Outer diameter}}{\text{Number of teeth} + 2}$
$Z =$	Number of teeth	





## About us

RHEINTACHO Messtechnik GmbH has been engaged since 1901 in the field of rotational speed, a crucial control quantity for mechanical processes.

The production range incorporates sensors, hand-held measuring devices, rotary encoders and switching devices.

Just over 100 employees are employed at the company's headquarters in Freiburg. In-house product development, production and assembly departments guarantee quick and innovative solutions to customers' individual requirements.

Our products are available worldwide through our subsidiaries and sales partners. With a committed and competent customer service, we ensure first-class application advice around the globe.

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