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Safe measurement, indication and control of rotational speed



.....**FQ** next generation

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**Multi-function sensor series**





# FQ next generation

## Multi-function sensor series

### Back biased sensor versions

Crankshaft camshaft sensor	details see page 4
Rotational speed sensor, 1 channel / 2 channel	details see page 5
Rotational speed sensor PWM signal, 2 wire / double frequency	
Rotational speed sensor 2 wire / 2 channel current output	details see page 6
Speed sensor with redundant design, 4 channel	details see page 7
Optional: Open-/short diagnose	
Optional: Extended diagnostic for functional safety application	
Optional: Temperature detection	

### Ring-magnet sensor versions

Speed sensors, 2 channel for usage with multipole ring-magnets	details see page 8
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### Position sensor versions

Angular position	details see page 9
Linear position	



# FQ next generation

## Basic mechanical features

### Basic mechanical features

Cable outlet	180° / 105°
Insertion depth	30 mm / 35 mm / 45 mm - others on request
Module	1.25 resp. on request
Cable lengths	500 mm
Connection	Superseal, Deutsch DT04, JuniorTimer - others on request
Temperature	-40 °C ... +140 °C / +150 °C
Protection	IP67, IP69K (sensor, cable outlet)



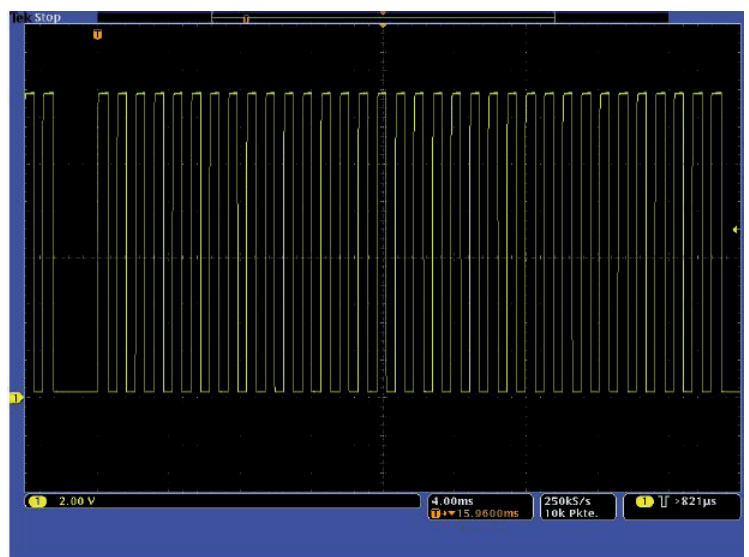


# FQ next generation Crankshaft sensor

Parameters	Prototype sensor
Supply voltage	4.5 V ... 24 V
Current consumption	≤ 30 mA (depending on load)
Operating frequency	0 Hz ... 20 kHz
Current load	≤ 20 mA
Output	Open collector frequency signal with integrated pull-up resistor
Target module	approx. 2.5
Output polarity @ CCW rotation direction	Low over valley
Phase shift	NA
Duty cycle	50 % ±10 %



Typical target with signature area (36-2 teeth)

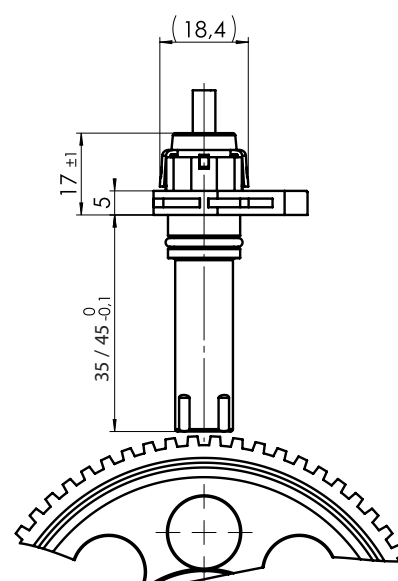


Waveform with 36-2 target



# FQ next generation 2-Channel sensor

Parameters	Prototype sensor
Power supply	7 VDC ... 36 VDC
Frequency range	0 Hz ... 40 kHz
Output	NPN
Operation temperature, max.	-40 °C ... +140 °C / -40 °F ... +284 °F
Degree of protection	IP67 / IP69K
Plug	Open leads, Contact pins, Plugs: AMP SUPER-SEAL, AMP Junior Timer, DEUTSCH DT (others on request)
Insertion depth	35 mm, 45 mm (others on request)
Cable length	500 mm, 1200 mm (others on request)
Cable outlet	90° or 180° angle to sensor housing





# FQ next generation

## Speed sensor

### 2 wire / channel current output

Parameters	Prototype sensor
Supply voltage	4 V ... 24 V
Reverse voltage protection	-18 V
Supply current	ICC (High) 12 mA ... 16 mA ICC (Low) 4 mA ... 8 mA
Operating frequency	0 Hz ... 12 kHz
Output ch A / ch B	Current source frequency signals
Output rise time	5 $\mu$ s (max) from 10 % to 90 % ICC level, $R_{SENSE} = 100 \Omega$
Output fall time	5 $\mu$ s (max) from 90 % to 10 % ICC level, $R_{SENSE} = 100 \Omega$
Cable outlet	180° angle to the sensor housing
Target module	2.0 - other modules possible
Airgap	0.25 mm ... 2.5 mm @ module 2.0
Phase shift	90° $\pm$ 45°
Duty cycle	50 % $\pm$ 10 %
Optional: Safe state output protocol	Integrated sensor diagnosis continuously monitors failures/defects within the device and reports to the ECU with a safe state output protocol

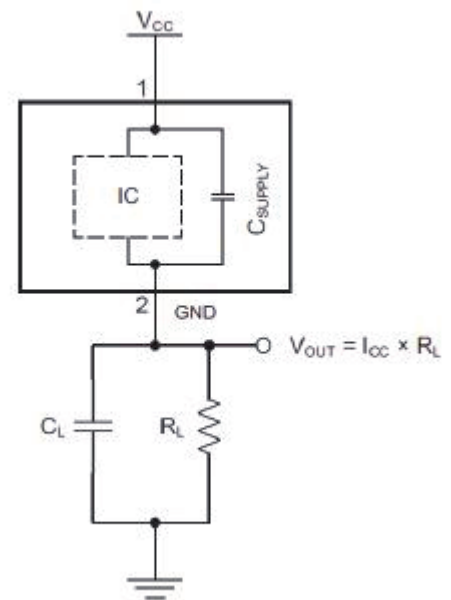
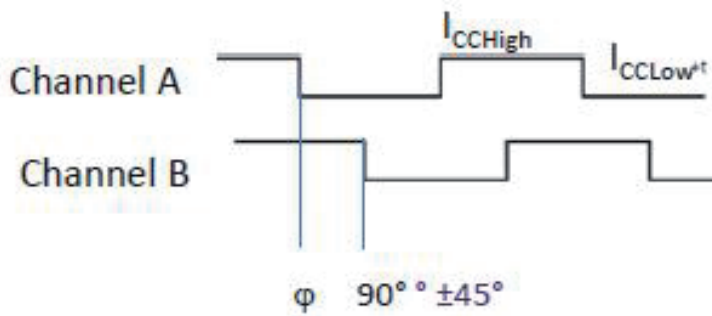


Figure: Typical application circuit

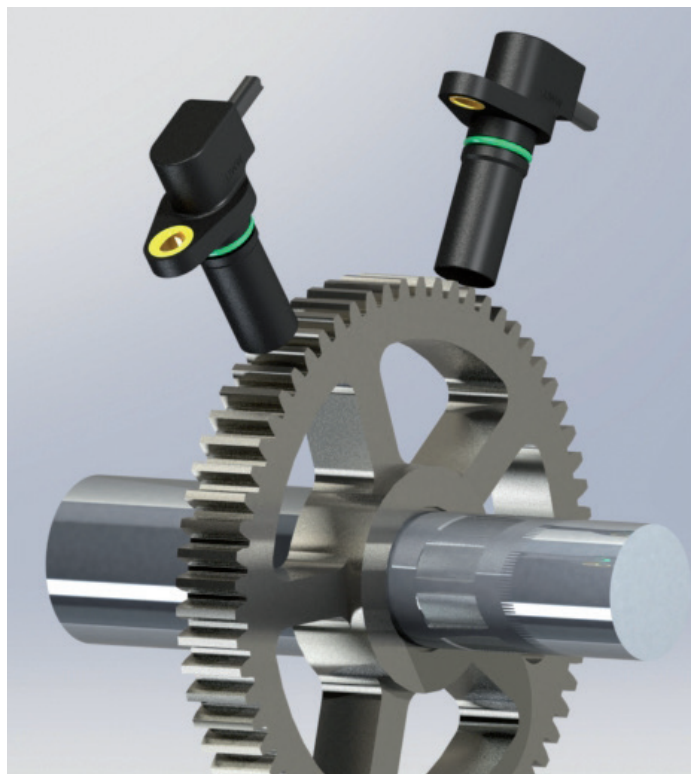




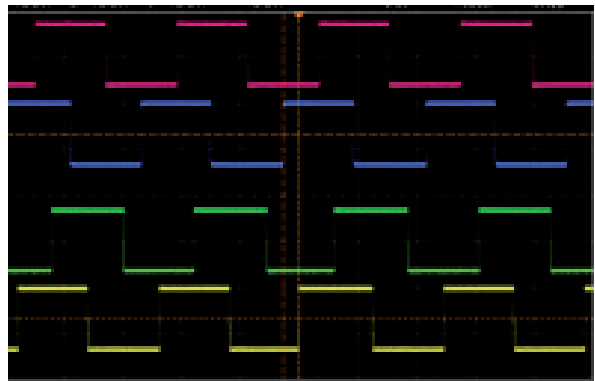
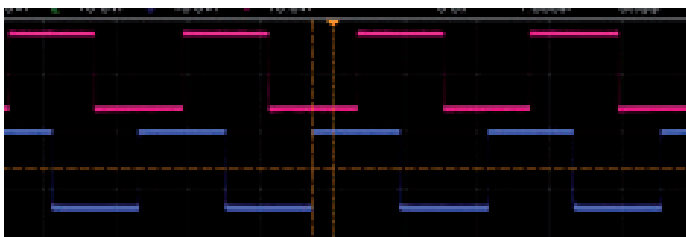
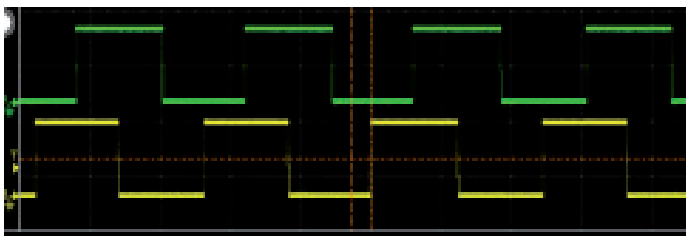
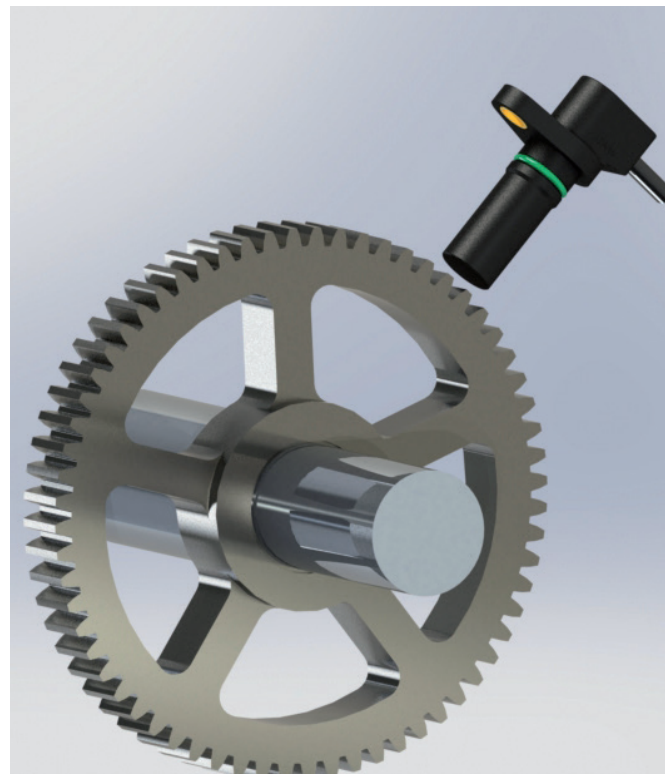
FQ next generation

# Speed sensor with redundant design, 4 channel

**Traditional** solution using 2 independent 2 channel sensors



New 4 channel solution using one sensor with integrated 2 x 2 channel sensor (2 x AB signals)



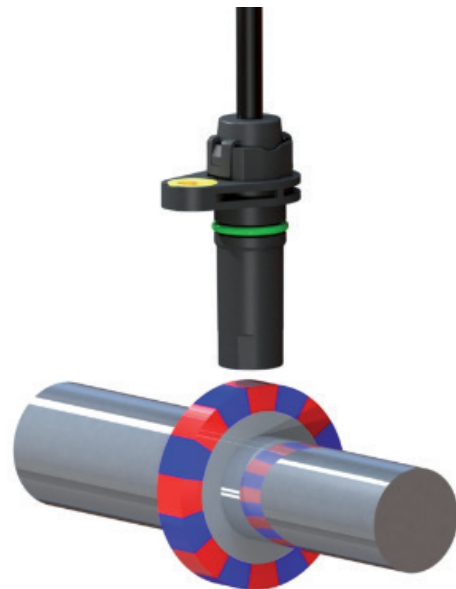




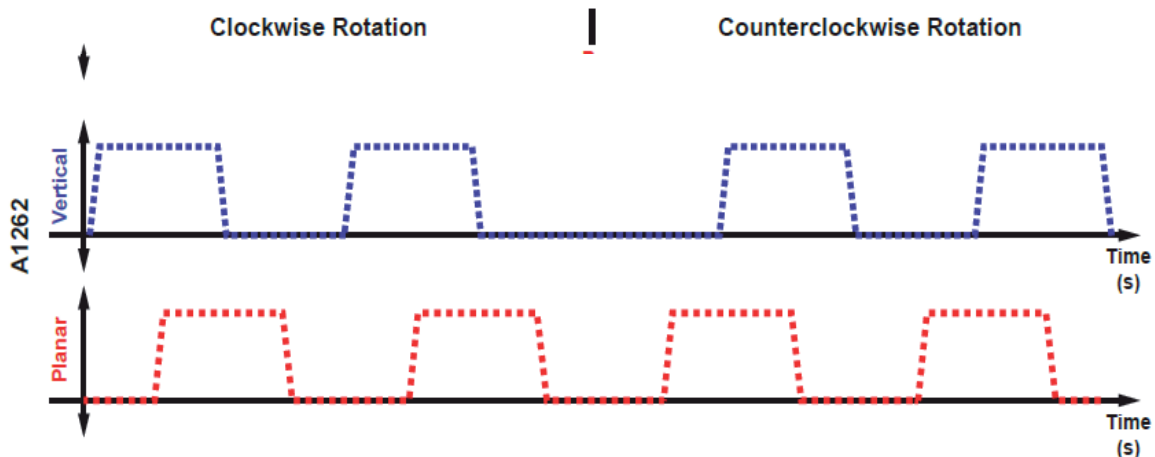
# FQ next generation Ring-magnet version

## Features

- ◆ Speed sensor works with various multipole magnets
- ◆ 2 channel open drain quadrature output
  - » 90° phase shift with various magnet sizes
- ◆ Available in various housing options up to IP67/IP69k
- ◆ Large airgap range capability
- ◆ Position tolerant system
- ◆ Optional:
  - » Fully redundant 4 channel sensor system
  - » Open/Short diagnostic
- ◆ Extended temperature range: -40 °C ... +150 °C



Output Response to a  
Speed and Direction Part





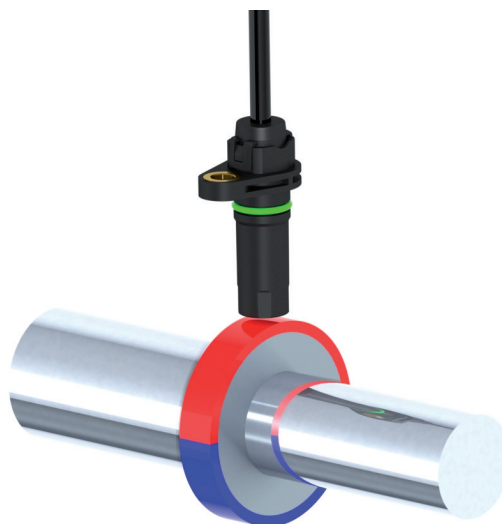


# FQ next generation

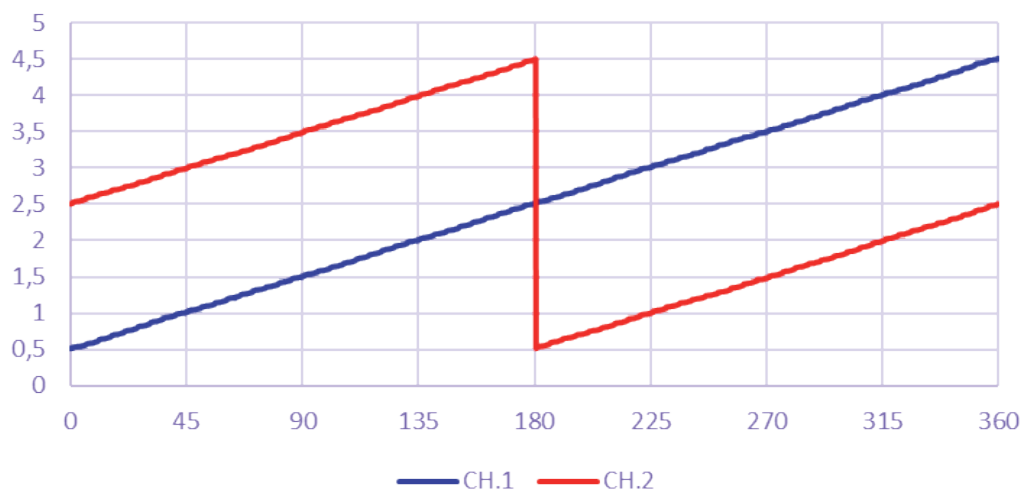
## Angular position sensor

### Features

- ◆ Angle sensor with radial detection capability of ring magnets
- ◆ Absolute angle position with ratiometric analog voltage output (0.5 V ... 4.5 V) or with PWM output
- ◆ Available in various housing options up to IP67/IP69k
- ◆ Large airgap range capability
- ◆ Position tolerant system:
  - » Axial position tolerance  $\pm 1.0$  mm
  - » Airgap variation up to 2 mm
- ◆ Optional:
  - » Fully redundant 2 channel sensor system
  - » Phase shifted signals for additional plausibility
- ◆ Typical angle error  $< \pm 2.0^\circ$
- ◆ Extended temperature range:  $-40$  °C ...  $+150$  °C



Output signals two channel version





## 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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