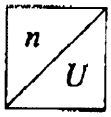
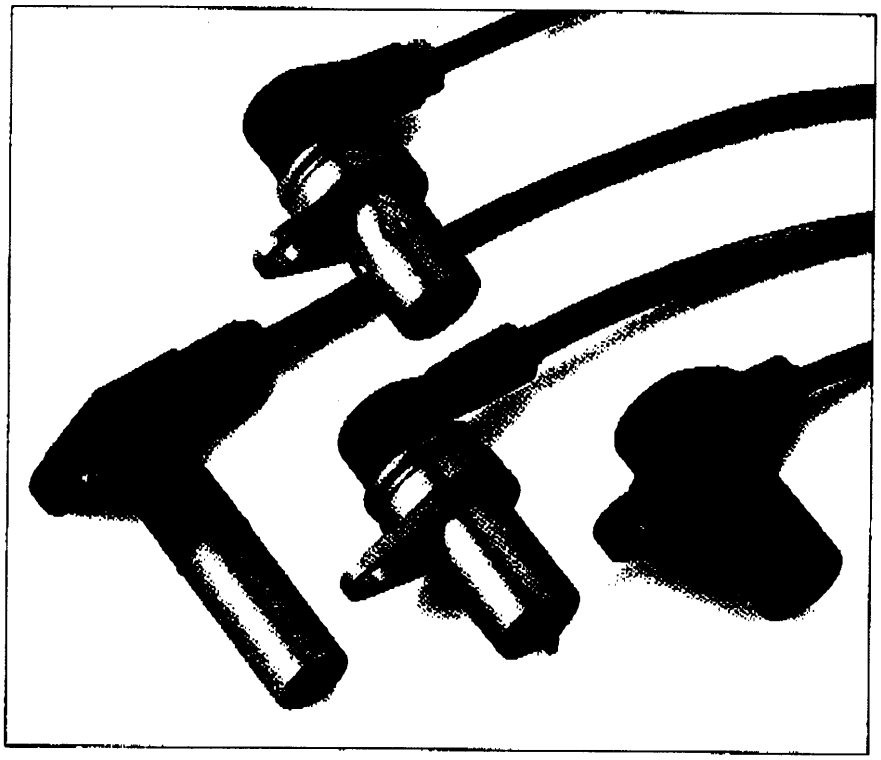
Inductive rotational-speed sensors

Incremental* measurement of angles and rotational speeds



- Non-contacting (proximity) and thus wear-free, rotational-speed measurement
- Sturdy design for exacting demands
- Powerful output signal
- Measurement dependent on direction of rotation



Application
Inductive rotational-speed sensors of this type are suitable for numerous applications involving the registration of rotational speeds. Depending on design, they measure engine speeds and wheel speeds for ABS systems, and convert these speeds into electric signals.

Design and function
The soft-iron core of the sensor is surrounded by a winding, and located directly opposite a rotating toothed pulse ring with only a narrow air gap separating the two. The soft-iron core is connected to a permanent magnet, the magnetic field of which extends into the ferromagnetic pulse ring and is influenced by it. A tooth located directly opposite the sensor concentrates the magnetic field and amplifies the magnetic flux in the coil, whereas the magnetic flux is attenuated by a tooth space. These two conditions constantly follow on from one another due to the pulse ring rotating with the wheel. Changes in magnetic flux are generated at the transitions between the tooth space and tooth (leading tooth edge) and at the transitions between tooth and tooth space (trailing tooth edge). In line with Faraday's Law, these changes in magnetic flux induce an AC voltage in the coil, the frequency of which is suitable for determining the rotational speed.

Wheel-speed sensor (principle)
1 Shielded cable, 2 Permanent magnet, 3 Sensor housing, 4 Housing block, 5 Soft-iron core, 6 Coil, 7 Air gap, 8 Toothed pulse ring with reference mark.

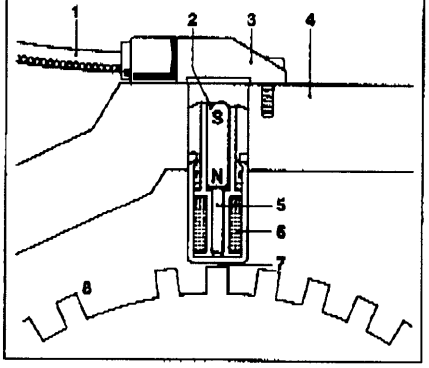
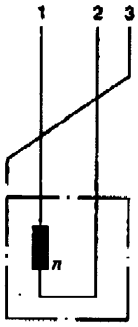


Diagram
(Applies to Part No.: 0 261 210 001/.. 036 and .. 104.)
Connections:
1 Output voltage, 2 Ground, 3 Shield



Technical data / Range

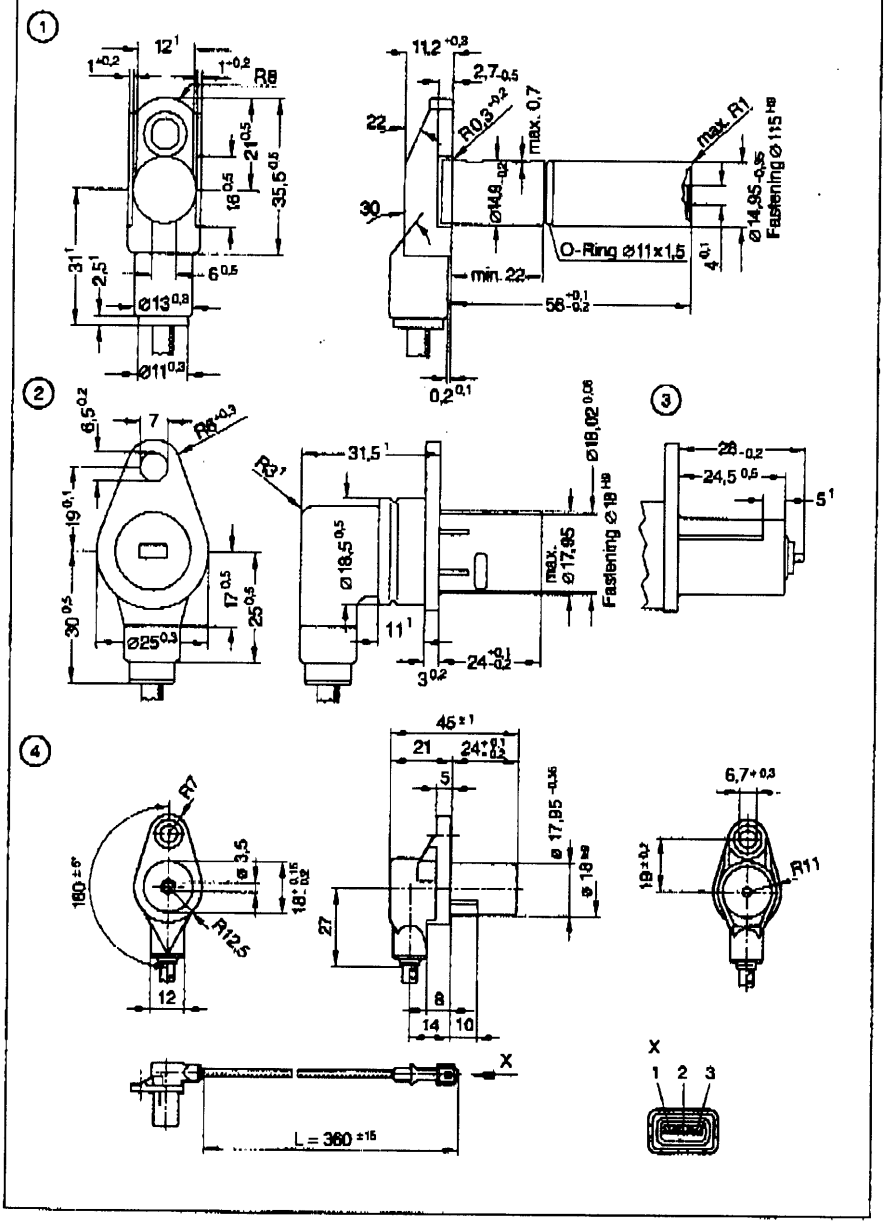
Rotat.-speed measuring range [1] n	Sustained ambient temperature Cable area	Coil area	Vibration stress, max.	Number of turns	Winding resistance (at 20 °C) [2]	Inductance (at 1 kHz)	Degree of protection	Output voltage U_A	Dimension drawing	Part number
min^{-1}	°C	°C	m · s^{-2}		Ω	mH		V		
≈ 20...2500	–40...+115	–40...+150	1000	6000 ±40	1000 ±10%	1050 ±15%	IP 67	0...3.6	3	0 265 001 134
≈ 20...6200	–40...+110	–40...+150	1200	7800 ±40	1020 ±10%	870 ±15%	IP 67	0...31	1	0 261 210 001
≈ 20...7000	–40...+110	–40...+150	1200	3300 ±25	540 ±10%	240 ±15%	IP 67	0...75	2	0 261 210 036
≈ 20...7000	–40...+120	–40...+150	1200	4300 ±10	860 ±10%	370 ±15%	IP 67	0...200	4	0 261 210 104

Accessories

Connector	1 237 000 039 [3]

* A continuously changing variable is replaced by a frequency proportional to it.
[1] Referred to corresponding toothed pulse ring
[2] Change factor $k = 1+0.004\ (\vartheta_w - 20\ °C)$; ($\vartheta_w$ winding temperature)
[3] For use with 0 261 210 001 and .. 036, please consult Bosch regarding 0 265 001 134.

Dimension drawings



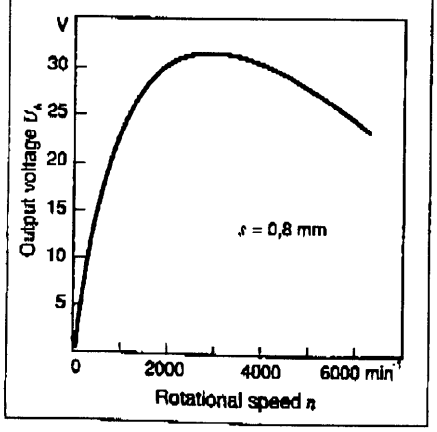
The sensor generates one output pulse per tooth. The pulse amplitude is a function of the air gap, together with the toothed ring's rotational speed, the shape of its teeth, and the materials used in its manufacture. Not only the output-signal amplitude increases with speed, but also its frequency. This means that a minimum rotational speed is required for reliable evaluation of even the smallest voltages.

A reference mark on the pulse ring in the form of a large "tooth space" makes it possible not only to perform rotational-speed measurement, but also to determine the pulse ring's position. Since the toothed pulse ring is an important component of the rotational-speed measuring system, exacting technical demands are made upon it to ensure that reliable, precise information is obtained. Pulse-ring specifications are available on request.

Explanation of symbols

U_A Output voltage
n Rotational speed
s Air gap

Output voltage as a function of rotational speed. Example 0 261 210 001.



Output voltage as a function of air gap. Example 0 261 210 001.