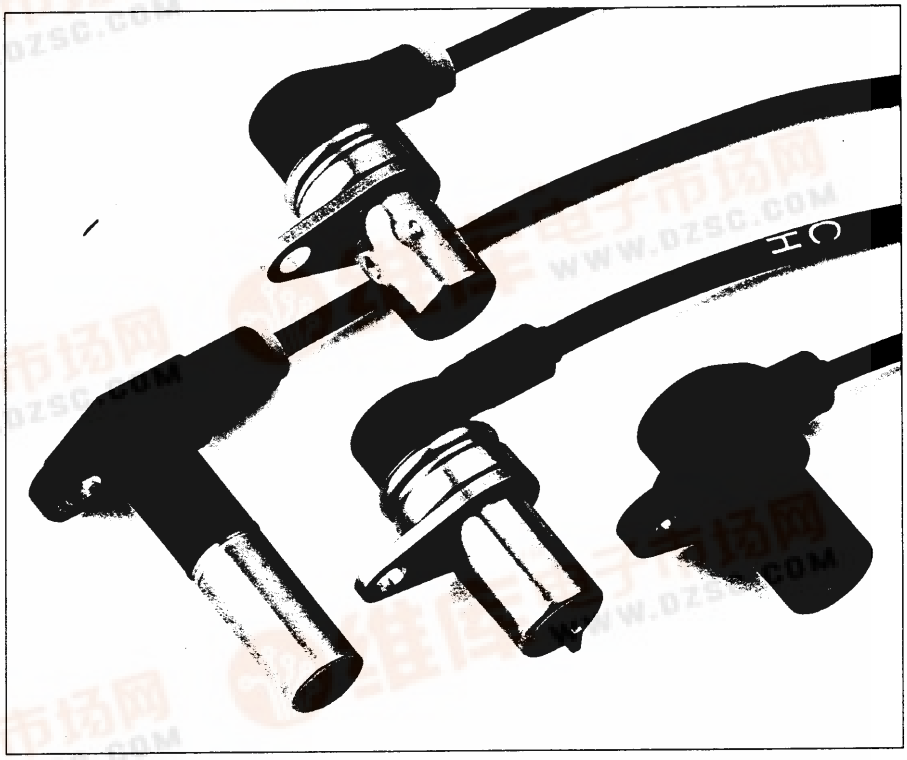
Inductive rotational-speed sensors

Incremental* measurement of rotational speeds and angles

712-0266

n / U

- Non-contacting (proximity), and thus wear-free, rotational-speed measurement
- Sturdy design for exacting demands
- Powerful output signal
- Measurement independent of 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 with absolutely no contact and no wear, and convert these speeds into electric signals.

Design and function

The soft-iron core of the rotational-speed 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 thus amplifies the magnetic flux in the coil. On the other hand, the flux in the coil 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 produced at the transitions between 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 rotational speed.

Wheel-speed sensor (block diagram)
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.

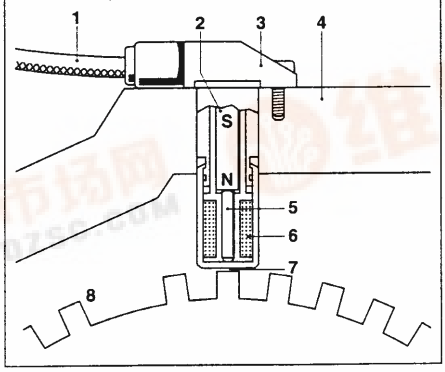
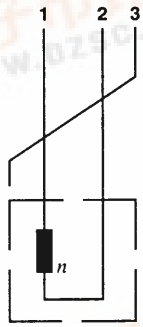


Diagram
(Applies to Part No. 0 261 210 001/ ... 036 and ... 104)
Connections:
1 Output voltage, 2 Ground, 3 Shield.



Technical data / Range

Rotat.-speed measuring range[1] n	Sustained ambient temperature Gable area	Coil area	Vibration stress, max.	Number of turns	Windung resistance (at 20 °C)[2]	Inductance (at 1 kHz)	Degree of protection	Output voltage U_A	Dimension drawing	Part No.
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**

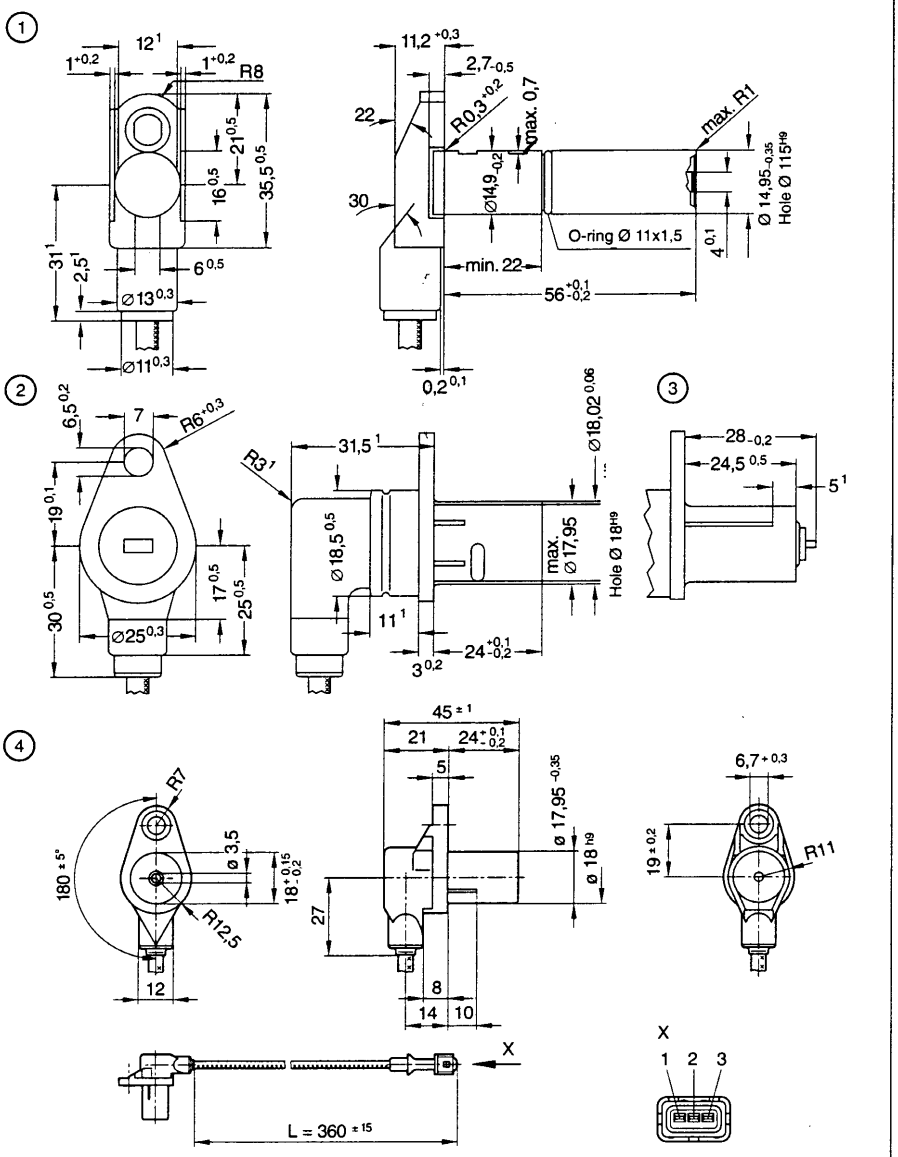
* A continuously changing variable is replaced by a frequency proportional to it.

Accessories

Connector **1 237 000 039** [3]

[1] Referred to corresponding toothed pulse ring.
[2] Change factor $k = 1+0.004\ (\vartheta_w - 20\ °C)$;
ϑ_w Winding temperature
[3] For use with 0 261 210 001 and ... 036, please consult Bosch regarding 0 265 001 134.

Dimension drawings



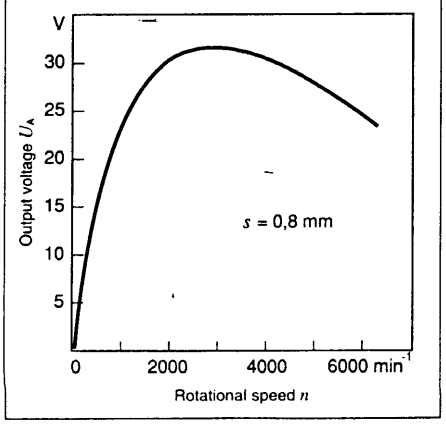
The sensor generates one output pulse per tooth. The amplitude of this pulse is a function of the air gap, together with the toothed ring's rotational speed, the shape of its teeth, and the materials used in its manufacture. Not only the amplitude of the output signal increases with speed, but also its 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 position of the pulse ring. Since the toothed pulse ring is an important component of the rotational-speed measuring system, exacting technical demands are made on it to ensure that reliable, precise information on rotational speed 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