Absolute Angular Rotor Position Sensor

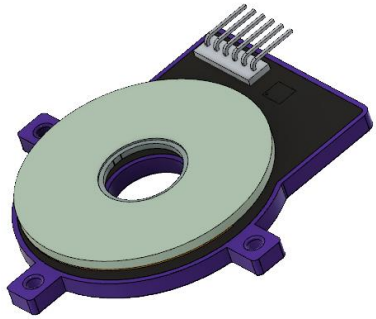

Figure 1: Example of Rotor Position Sensor

General Description

The Absolute Rotor Position Sensor is an angular position sensor measuring rotational angle of any rotary application, such as motor position, steering wheel angle, etc.
The sensor assembly comprises two parts: sensor and target. The sensor is stationary and fixed to the stator of the motor or any appropriate stationary component in other applications. The target is attached to a rotating part of the application, e.g. rotor or shaft. The sensor measures the angular target position and outputs the position signal(s).

Features

- Continuous rotary position detection
- Power on position indication
- Rotation speed and direction detection
- Automotive AEC-Q100 grade 0 certified
- Single and multiple pole pairs (capability to measure angles within 360, 180, 120° ranges).
- Can be a direct resolver replacement where sin/cos signals are necessary.

Benefits

- Contactless measurement – high robustness.
- High accuracy (up to 0.2% full scale).
- Intrinsic immunity to stray fields.
- High tolerance to mechanical displacement and air gap variation.
- High reliability – no contacting parts.
- Suitable for linear, arc and rotational applications.

Applications

- Rotor position sensing of Brushless DC (BLDC) motors
- Rotary position sensing up to 360°, e.g. steering angle sensors
- Small angle sensors; e.g. pedal, vehicle level, valve sensors.
- Off-shaft or on-shaft implementations.

Operation

Basic Principle
The Littelfuse Absolute Rotor Position Sensor operates using the inductive eddy currents principle. The sensor contains at least 3 coils that are printed onto the Printed Circuit Board (PCB), At least one coil is an excitation coil, and at least 2 coils are reception coils that are shifted by 90 degrees with respect to each other. The excitation coil is being fed by an AC voltage (sine shaped) in frequency range of ~1-6 MHz. This voltage creates alternating magnetic fields in the coil which induces alternating currents in the reception coils that have a phase difference of 90°.
A voltage is therefore generated in each of the reception loops, which is dependent on the current direction in each coil. The sum of voltages in each loop is the output signal of the coil.
As the metal target approaches the coils, eddy currents are induced in the target metal layer. This creates opposing magnetic fields to that of the coils, counteracting induced voltages in the respective loops that are adjacent to the target. As the target rotates above the sensor PCB, the amplitude of the voltage output from the receiving coils exhibit sine and cosine profiles, creating a modulated signal.
After demodulation and filtering, the sensor outputs sine and cosine signals that represent the rotary position of the target. This signal can be directly fed to the vehicle ECU. Alternatively, the signal can be processed and outputted digitally.

Packaging Options
Custom packaging can be provided to meet any need, please contact Littelfuse Sales for details.

Main Characteristics

Parameter	Min.	Typ.	Max.	Unit
Rotating speed	0	-	50 000	rpm
Measurement accuracy	-	<1	-	° el
Signal delay	-	<10	-	µs
Operating temperatures	-40	-	+150	°C
Airgap	1	-	4	mm
Power supply	4.5	5	5.5	V
Supply current	-	-	20	mA
Output signal options:	Sin/Cos / Analog Linear / PWM / PSI5 / SENT			

Littelfuse

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ASP-MKT45-0028-A