



BRIEF INFORMATION

Oil level sensors

- Continual measurement of the level of motor oil in the static and dynamic range
- Compact sensor architecture with a multi-chip module
- Integrated temperature sensor
- Immediate measurement after switch-on
- Also suitable for transmission and hydraulic oils

PRODUCT FEATURES

Description/advantages for the customer

In vehicles, oil sensors ensure that the engine does not work with too little oil unnoticed. The tried and tested technology of ultrasonic sensors works on the propagation time principle and records the filling level continuously when the vehicle is being driven.

When the engine is running (dynamic measuring range), the filling level is significantly lower than the filling level when the engine is at a standstill (static measuring range). In mobile engines, an oil dipstick only records the oil level in the static range. This oil level sensor can measure the oil level continuously, i.e. both in the dynamic and in the static range. It thus provides information about the oil level throughout the period of time the engine is operated, which can often be a number of hours in the case of construction machinery, tractors, fork lift trucks, etc.

The sensor provides continuous monitoring of the oil level throughout the period of time the engine is operated, thus preventing the oil level falling below the minimum level during operation and interrupting the oil film (which would cause engine damage). Secondary influences such as the slope of the vehicle, lateral and longitudinal accelerations, are compensated by the vehicle control unit calculating a mean value.

DESIGN AND FUNCTION

The sensor architecture of the PULS (Packed Ultrasonic Level Sensor) oil level sensor consists of one single multi-chip module that integrates the ultrasonic sensor, the temperature sensor and an ASIC (Application Specific Integrated Circuit).

This compactness gives the sensors a higher level of impact and vibration resistance than sensors fitted with a large number of electronic components.

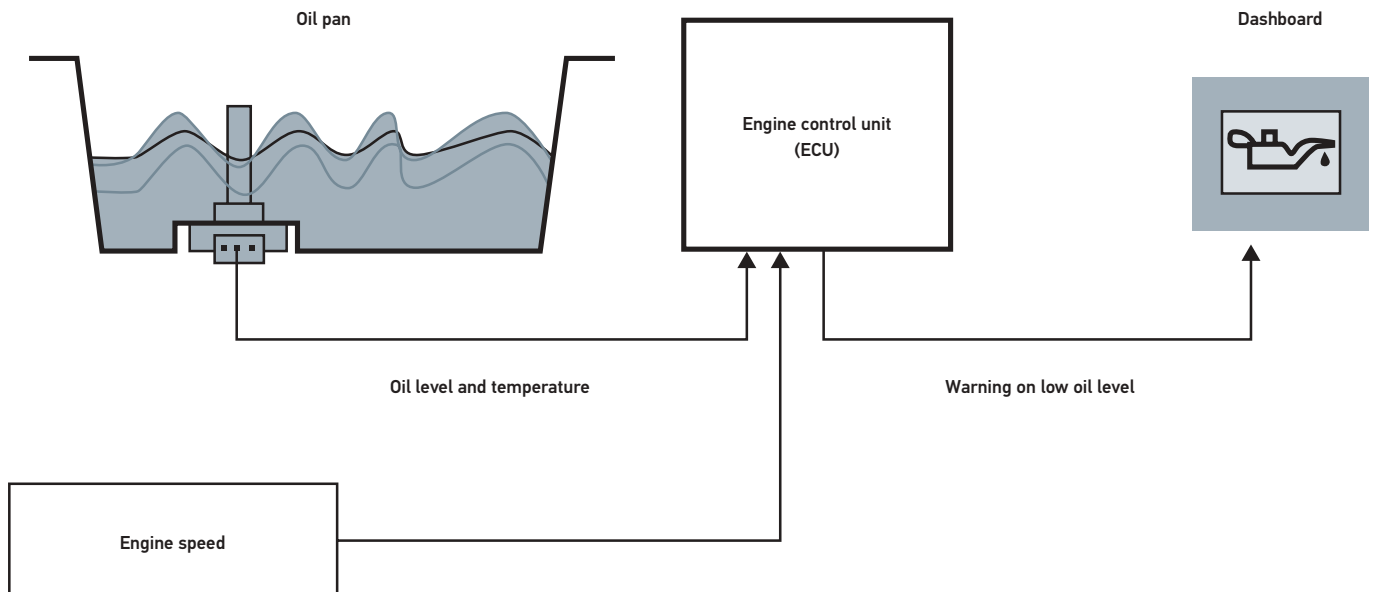
An ultrasonic sensor integrated into the multi-chip module transmits a signal that is reflected from the oil/air interface of the engine oil. The signal delay is measured and the filling level is calculated depending on the speed of sound in the medium.

The damping cup installed above the multi-chip module is designed to calm the medium, in particular in the dynamic measuring range. The damping cup has openings at the base and at the tip, which allow the oil to flow permanently.



OPERATING PRINCIPLE

The PULS oil level sensor continuously measures both oil level and temperature (statically and dynamically). The measurement values for oil level and temperature are conveyed via the digital PWM output signal to the engine control unit (ECU). This evaluates the signal and the engine speed and can send a warning to the driver (e.g. on the dashboard) if the oil level is critically low, for example.



TECHNICAL DETAILS

Technical specifications

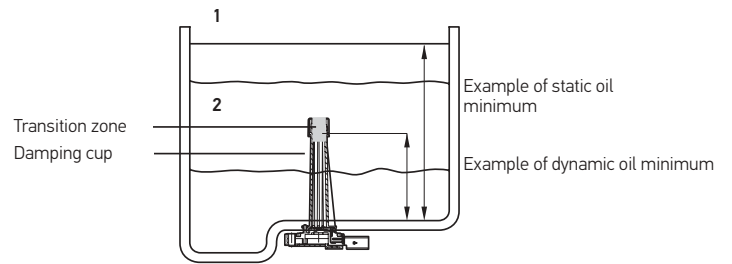
Measurement range (static)	129 mm
Measurement range (dynamic)	96 mm
Accuracy (absolute) ¹⁾	± 3 mm
Rated voltage	12 V
Temperature measuring range	-40°C to +160°C
Accuracy (between 60 °C and 120 °C) ²⁾	± 2 K
Output	PWM (open collector, lowside)
Operating temperature	-40°C to +150°C
Mating connector ³⁾	Kostal no. 09 44 13 82
Protection class	IP 69K

¹⁾ In the temperature range from 0 °C to 150 °C, accurate to ± 2 mm at ≤ 100 mm and 30 °C to 120 °C

²⁾ ± 3K in the temperature range - 40 °C to 60 °C and 120 °C to 160 °C

³⁾ These accessories are not included as part of the sensor. Available from Kostal.

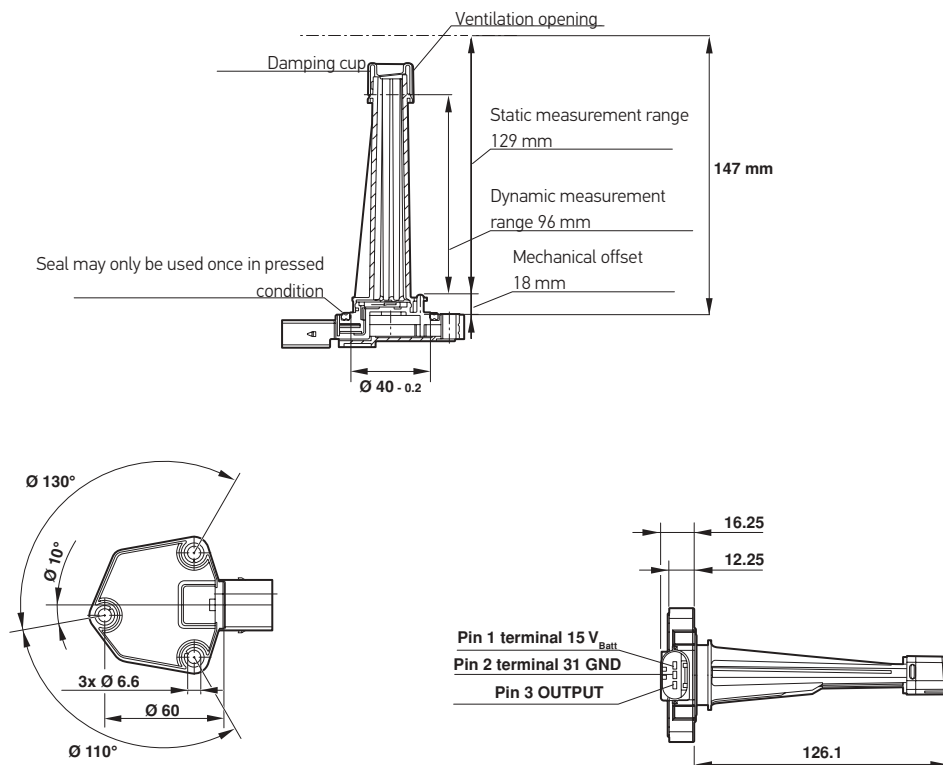
Schematic diagram 12 V



1 Static measurement range 129 mm
2 Dynamic measurement range 96 mm

The sensor is mounted into the oil pan from below (using the screw attachment points provided). It is recommended that the sensor is positioned as centrally as possible, as the changes in fill level become greater under dynamic influence as the distance from the middle point of the oil pan increases.

Dimensional diagram



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SUMMARY OF VERSIONS

Flush-mounting	Supply voltage	Measurement range	Part number
From the bottom	12 V	static 129 mm, dynamic 96 mm	6PR 009 622-051