Ultrasonic oil level sensor | HELLA

General

This sensor is used to monitor the oil level by continuously measuring the engine oil level in the static and dynamic ranges. The sensor is designed for vertical installation from below in the bottom of the oil pan. Inside the housing there are the level sensor, temperature sensor, and sensor electronics.



Application

Oil sensors in the vehicle ensure that the engine does not run unnoticed with too little oil. The proven technology of ultrasonic sensors utilizes the run-time principle and monitors the level continuously during the travel. When the engine is running (dynamic range), the level is noticeably lower than the level at standstill (static range). A dipstick checks the oil level only in the static range in mobile engines. This oil level sensor is able to measure the oil level continuously, i.e. both in the dynamic and static ranges. It thus provides information about the oil level during the entire engine operation, which, in construction machinery, tractors and forklifts, may often take several hours. As the sensor continuously monitors the oil level throughout the entire engine operation, it prevents the oil level from falling below the minimum oil level during engine operation and hence interruptions in the oil film (which would result in engine failure). Marginal influences such as sloping positions of the vehicle, lateral and longitudinal accelerations are compensated by averaging the measured values in the ECU.

Structure and function

The sensor architecture of the oil level sensor PULS (Packed Ultrasonic Level Sensor) consists of a single multi-chip module on which the ultrasonic and temperature sensors and an ASIC (Application Specific Integrated Circuit) are integrated. This compactness, in comparison to sensors that are equipped with a variety of electronic components, results in higher shock and vibration resistance. The ultrasonic sensor integrated in the multi-chip module emits a signal that is reflected from the oil-to-air boundary surface of the engine. The transit time of the signal is measured, and the level is calculated depending on the speed of sound in the medium. The damping cup attached above the multi-chip module is used to calm the medium (especially) in the dynamic range. The damping cup has openings at its base and tip that allow a permanent oil flow.

Causes of failure of the oil level sensor:

• Internal short-circuits

• Failure of sensing elements

• Failure of the sensor electronics

• Ingress of engine oil through damages to the housing.

• Missing voltage and ground connection

A failure of the oil level sensor is noticeable as follows:

• Oil warning light illuminates

• Warning in the multifunction display

• A fault code is stored

Troubleshooting

• Ingress of engine oil through damages to the housing.

Visual inspection:

If any damage is visible at the housing of the oil level sensor, the wiring or the connector, the sensor should be replaced and/or the wiring should be repaired.

Checking voltage supply and grounding:

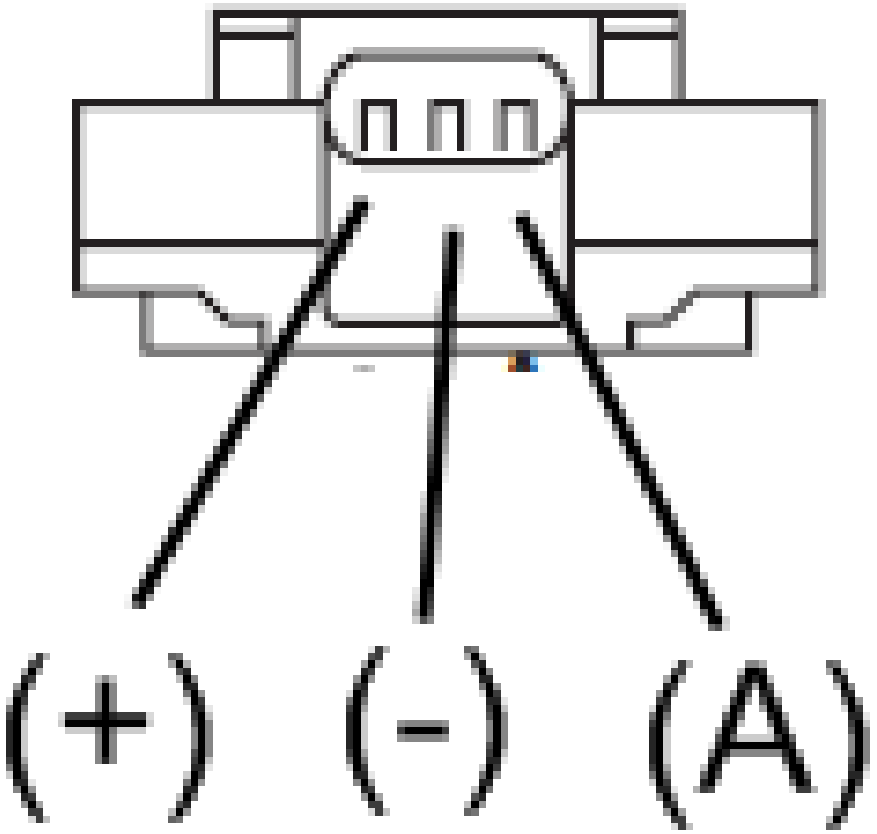
The voltage supply should be checked at the sensor plug (follow the manufacturer's instructions) as well as the ground connection.

Checking with the oscilloscope:

Use the oscilloscope to pick up and display the signal at the signal line (A). Attention: This measurement can only be used to determine whether a signal is transmitted to the control unit. It is not possible to judge the proper function of the sensor on the basis of the displayed signal.

Checking with the diagnostic tool:

The fault memory should be read with a suitable diagnostic tool. Sensor-related faults should be eliminated and the fault memory should be cleared.



Installation note

Always observe the instructions of the vehicle manufacturer here

Important safety note

The following technical information and tips for practical use have been set up by HELLA in order to offer professional support to automotive workshops in their daily work. The information available here on this website is only to be used by appropriately trained specialist staff.

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