Bosch tips

Correct assessment and handling of lambda sensors

The most effective exhaust treatment method for gasoline engines.

Layout

On newer engines, lambda sensors are located in the exhaust system upstream and downstream of the catalytic converter. One side of the sensor element electrode is exposed to the exhaust gas, whereas the other is in contact with the surrounding air (Fig. 1), which is used as the reference air for measurement of the residual oxygen.

Lambda control loop
- Fuel
- Injector
- Control sensor (upstream of catalytic converter)
- Catalytic converter
- Exhaust gas
- Diagnostic sensor (downstream of catalytic converter)

Operation

The lambda sensor:
- measures the residual oxygen content of the exhaust gas.
- at operating temperature (350 °C) generates a voltage of about 0.45 V, which is used to control the fuel injection system.

Referring to the self-diagnosis function of the engine control unit (ECU), the mixture ratio (λ) can be calculated from the residual oxygen content of the exhaust gas.

With new systems, the most important values can be recorded with the Bosch testers KTS 520, 540, and FSA 740 employing the self-diagnosis function.

Use suitable measuring instruments, such as a multimeter (A, V, O instrument) or an engine analyzer.

Testing (for 3 and 4-wire lambda sensors)

When using Bosch testers KTS 520, 540, and FSA 740, employing the self-diagnosis function:
- To check ECU/electrics: Connect up diagnostic tester, such as lambda control tester or OBD tester.
- To check sensor signals: Pay particular attention to the area between the engine and the sensor, in which the sensor signals are handled by ECU/electrics.

Injection system

Notes on handling of lambda sensors

- For the lambda sensor to function properly, it is important to keep the inside of the connector clean. It is therefore essential to keep the sensor clean at all times.
- Sensors are not to be used if the connector is dirty or damaged.
- Do not apply thread grease to protective tube.
- Do not use leaded fuels.
- Never apply contact spray to the exhaust system.
- It is advisable to refer to the vehicle-specific trouble-shooting instructions when working with lambda sensors.

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Removal and installation

It is advisable to refer to the vehicle-specific trouble-shooting instructions when working with lambda sensors.

Assembly tool:
- Use a 20 mm open box wrench or tool adapter.

Tightening torque:
- 40–60 Nm (use torque wrench).

Reinstalling the sensor:
- Grease the thread with suitable assembly paste.

Fitting new sensor:
- Do not tug on the cable and connector.

Fitting instructions:
- Use a 22 mm open box wrench or tool adapter.

Incorrect:
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