

Tips & Technology

For Bosch business partners

Current topics for successful workshops No. 35/2011



BOSCH
Invented for life

Gasoline injection

Lambda sensor

Know-how from the market leader

Bosch, innovative company and world's largest manufacturer, produces more than 33 million lambda sensors every year. Almost all vehicle manufacturers use Bosch original lambda sensors, even diesel vehicles have been equipped with lambda sensors as standard since 2002. This know-how is fully transferred to Aftermarket, offering workshops

- the highest of production quality,
- reliable application data,
- the latest technology for all sensor types,
- a workshop-oriented replacement parts program with quick availability.

Ideal for the workshop

Bosch lambda sensors are reliable and boast a long service life. However, they include parts that are subject to wear and these need to be regularly checked and, if necessary, replaced. We recommend an inspection every 30,000 km. To ensure a problem-free replacement, Bosch lambda sensors have

- a **pre-lubricated thread** for a quick and simple swap,
- **tailored connection cable** for every type of vehicle.

Test and replace lambda sensors easily

1. Step: Perform visual inspection and read out fault memory

a) Check faulty lamp:

A faulty lambda sensor will cause the OBD lamp to light up (on-board diagnosis). When checking the lamp, make sure the engine has been warmed up.

b) Read out fault memory:

Use a tester here (e.g. Bosch KTS 570).

c) Carry out visual inspection (when installed):

Connectors, wiring and lambda sensor are affected.

d) Perform leak test on intake and exhaust system:

In particular, check the area between engine and lambda sensor. The ingress of additional air will bias the Lambda sensor signals.

2. Step: Check lambda sensor systematically

Lambda sensors may be faulty for several reasons, e.g. electrical fault, mechanical damage, contamination, thermal overloading. By carrying out the following test steps, it will be possible to determine the fault. Important is that the engine mechanical system and the ignition system are in good working order. Detailed test steps and test values are contained in ESI[tronic].

Check lambda sensor heater

a) Check the power supply for the lambda sensor heating. The power supply must remain between 10.5 V – 13.5 V. Is the power supply OK?

⇒ If **not**:

Possible causes include:

- Relay not switching through "continuous positive"
- No ground actuation by control unit
- Wire break, short to ground or to positive

⇒ If **yes**:

b) Check heating resistance at ambient temperature. The higher the temperature of the lambda sensor, the higher the heating resistance and vice versa. Are the test data OK?

⇒ If **not**:

Lambda sensor faulty

⇒ If **yes**:

c) Allow engine to warm up and measure heating current. To ensure the lambda sensor is quickly ready for operation, it is initially energized stronger and gradually less by switching the ground supply on and off. Does the heating current reduce with increasing temperature?

⇒ If **not**:

Lambda sensor faulty

⇒ If **yes**:

d) Check vehicle wiring harness for

- damage
- corrosion damage

- contacting faults on the connectors
- open circuit, short to ground, short to positive and transfer resistances

Is the wiring harness OK between lambda sensor and control unit?

⇒ If **not**:

Repair/replace wiring harness

⇒ If **yes**:

e) Check control unit

- Check multi-point connector for damage, corrosion and contact faults

Is the control unit OK?

⇒ If **not**:

Control unit defective, replace it.

⇒ If **yes**:

Lambda sensor heater is OK.

- Erase fault memory
- Run a test drive
- Check fault memory

Check lambda sensor signal

a) Test requirements:

- Fuel injection system, ignition and engine mechanical system OK
- Intake system and exhaust tract leak-tight
- Engine at operating temperature and idling

b) Check signal profile – step change sensor:

- Signal swings between approx. 0.1...0.9 V
- The greater the voltage excursion, the better the signal
- Frequency between 0.5 ..3 Hz
- Voltage below 0.4 V lean mixture
- Voltage above 0.5 V rich mixture

Or:

c) Check signal profile - broad-band sensor:

- At lambda = 1 => pump current 0 mA
- Pump current below 0 mA => rich mixture
- Pump current above 0 mA => lean mixture

Is the signal profile OK?

⇒ If **not**:

Lambda sensor faulty

⇒ If **yes**:

d) Check vehicle wiring harness for:

- damage
- corrosion damage
- contacting faults on the connectors
- open circuit, short to ground, short to positive and transfer resistances

Is the wiring harness OK between lambda sensor and control unit?

⇒ If **not**:

Repair/replace wiring harness

⇒ If **yes**:

e) Check control unit

- Is the reference 450 MV?
- Check multi-point connector for damage, corrosion and contact faults

Is the control unit OK?

⇒ If **not**:

Control unit defective.

⇒ If **yes**:

Lambda sensor heater is OK.

- Erase fault memory
- Run a test drive
- Check fault memory

3. Step: Removal and installation

Tasks:

- a) Select assembly tool: Use a 22 mm open box wrench or tool adapter.
- b) Set tightening torque: Monitor 40..60 Nm using torque wrench.
- c) Renewed installation of sensor: **Attention:** Make sure the assembly paste does not come into contact with the guard tube.
- d) Fitting new sensor: Bosch Lambda sensors are supplied with a ready-greased thread and a protective cap. Only remove the protective cap immediately prior to installation.

Fitting instructions:

- Take care not to twist the wiring harness on fitting/screwing in the sensor. Avoid pulling heavily on the cable or the connector.

- Sensors are not to be used if the connector is dirty or damaged.
- For the Lambda sensor to function properly, it is important to keep the inside of the connector clean. For this purpose, protect the connector from any kind of soiling.
- Use cable ties to take up any excess length of connecting cable into a loop.

Regular checks help prevent costly subsequent damage

Inform your customers that sound lambda sensors

- save up to 15% fuel
- adhere to the strictest exhaust-gas values
- prevent damage to the catalytic converter

Your customers should be made aware of the following in order to avoid as much costly repairs as possible:

- Only use unleaded fuel without additives.
- Have the vehicle serviced at regular intervals.
- Only jump start the car with jump leads where necessary, as push starting can cause unburned fuel to enter the exhaust system.
- Do not fill the engine with oil beyond the max. mark on the dipstick.
- Observe checking and replacement intervals: Regularly check and, if necessary, replace the lambda sensor every 30,000 km.