

Service information

EGR valves / EGR modules

The EGR valve / EGR module (exhaust gas recirculation) is part of the exhaust gas recirculation system. It doses the amount of exhaust gas to be recirculated into the cylinders and is located either on the exhaust manifold, the intake passage or in a heat-resistant exhaust pipe which connects the exhaust manifold with the intake passage.

The exhaust gas recirculation rate is significantly higher in diesel vehicles than in petrol vehicles. A higher exhaust gas recirculation rate involves a larger volume of contaminant particles in the exhaust gas system and a higher working frequency of the EGR valve. Both of these factors lead to a higher failure rate of the EGR valve in diesel vehicles.

EGR valves are divided into pneumatic and electric EGR valves. On average, these valves have to be replaced once or twice within the life cycle of a diesel vehicle. **On account of the diesel problem and new standards/exhaust gas standards, the replacement rate can be very much higher depending on the vehicles involved.**

Faults in the exhaust gas recirculation system are generally caused by the following:

- Vehicle used mainly for driving short distances
- Outstanding or reduced service intervals
- Unfavorable engine condition or combustion problems
- Leaks/faults in the charging pressure system
- Leaks/faults in the vacuum system
- Malfunctions/faults in the crankcase ventilation
- Too much motor oil
- Insufficient motor oil quality
- Faulty valve stem seals or valve guide
- Faulty pistons, piston rings and/or cylinder head
- Laden state/degree of soiling of the DPF (diesel particulate filter)
- Signal fault of the air flow sensor or other subsidiary sensor signals
- Malfunction/faults in the area of the oil separator/engine ventilation valve

Signs of faults in the exhaust gas recirculation system:

- Loss of vehicle power
- Jerking
- Irregular idling
- Engine control lamp lights up
- Fault code(s) in the engine control unit
- Exhaust gases tend to look dark to black

In the case of EGR valves / EGR modules with cooler, the faults in the exhaust gas system listed can be more pronounced and/or occur more frequently. This is due to the fact that in this case in order to reduce the nitrogen oxides, the exhaust gases are not routed directly through the exhaust gas system to the environment but partly through the EGR cooler. The EGR cooler thus reduces the temperature of the exhaust gases that are returned to the combustion process. This measure achieves a reduction in nitrogen oxides.

Operating principle

In principle, EGR coolers work in the same way as heat exchangers. The internal design and structure is also very similar and comparable. For appropriate cooling of the exhaust gases to be achieved, these are routed through the EGR cooler through numerous channels. The more channels an EGR cooler or heat exchanger has, the larger the surface available to transport the temperature.

The exhaust gas channels in an EGR cooler have a very small diameter, increasing the risk of blockage, sooting, coking and slagging in the EGR cooler. A blocked, sooted, coked and/or slagged EGR cooler is not the result of a product fault, rather it is a structural and physical problem which can occur in diesel engines when there are “faults in the exhaust gas system” (see previous page).

Sooting, coking, fouling by oil and/or slagging which lead to failure and/or impairment of the EGR valve / EGR module or EGR cooler are not a sign of a faulty product and thus do not constitute a warranty case.

Possible fault messages

Following installation or replacement of an EGR valve / EGR module, the following situations or fault messages can occur in the vehicle:

- Engine control lamp lights up
- EGR valve / EGR module is not detected
- EGR valve / EGR module defective
- EGR valve / EGR module without function
- Software deviation (EGR control)

Corresponding OBD fault codes are saved in the control unit for these situations and fault messages. These can be read out with the aid of a suitable diagnosis unit, e.g.:

- P0400 - Exhaust gas recirculation - Flow rate malfunction
- P0401 - Exhaust gas recirculation - Flow rate insufficient
- P0402 - Exhaust gas recirculation - Excessive flow rate
- P0403 - Exhaust gas recirculation - Control circuit malfunction
- P0404 - Exhaust gas recirculation - Control circuit range/performance malfunction
- P0405 - P0408 - Exhaust gas recirculation - Sensor A/B control circuit low/high

These fault codes indicate that the engine control unit has to be taught. They do not mean that the new EGR valve / EGR module is defective!

Teaching process

Every EGR valve / EGR module is subject to mechanical and electrical tolerances (in the case of electrical EGRs) which can be traced back to the manufacturing process. These tolerances exist with all manufacturers! To prevent problems and/or faults in the vehicle, the engine control unit must be informed about these new tolerances/conditions after an EGR valve / EGR module has been replaced.

This procedure is termed the teaching process.

Through the teaching process, corresponding engine management parameters (program map data) are reprogrammed in the control unit and set to the physical conditions of the new EGR valve / EGR module.

If the teaching process is not carried out, the program map data, such as air mass, injection volume, return signal of the EGR etc., no longer match and the problems listed above occur in the vehicle.

Software update



The software status of the control unit must always be aligned with the current specifications of the vehicle manufacturer!

Further essential information

The gaskets and seals must always be replaced. For this purpose, the relevant sealing faces must be cleaned before the new EGR valve / EGR module is installed. The sealing faces must be checked for unevenness - sealing faces must be flat!

Following replacement or installation of the EGR valve / EGR module, the cooling circuit, exhaust gas system and all the relevant and participating engine/vehicle parts must be checked for correct installation and tightness!