NRF TECHNICAL ARTICLE

COOLANT TEMPERATURE SENSORS

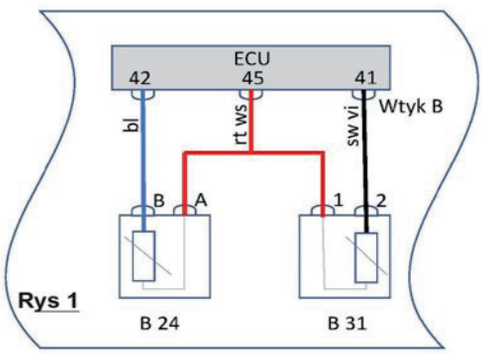
*by Dave Talbot technicl specialist

SYMPTOMS OF TEMPERATURE SENSOR FAILURE

›The radiator fan starts a few seconds after the switch-on of the ignition.
› The Check Engine Light is on.
› Possible faults in the ECU memory: P0115, P0116, P0117, P0118, P0119
› The ECU turns off the EGR.
› The ECU turns off the the A/C compressor.
› The coolant temperature warning light goes on.

THE PRINCIPLE OF WORKING ON THE EXAMPLE OF OPEL ASTRA G 1.7DTI ENGINE

Along with the engine coolant temperature changes, the resistance of the B24 temperature sensor changes too. As a result, the voltage in the temperature measuring system changes.
› NTC resistor supplied with 5V, pin 42, plug B of the engine control unit.



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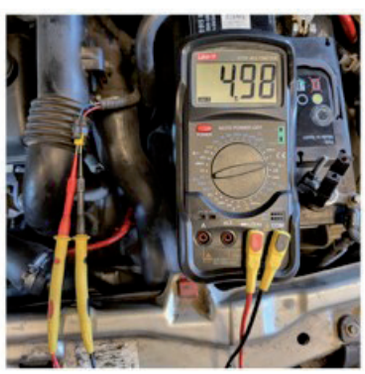
Exemplary values of the most commonly installed coolant temperature sensors	
Engine coolant temperature (oC)	Nominal resistance in ohms
0	9600
20	3700
40	1600
60	760
90	300

NOTE! Depending on the fault code, we perform appropriate measurements with a multimeter. For example, if the ECU's memory is a fault P0119, indicative of "the break in the measuring circuit, " it means a circuit break between the engine control unit and the temperature sensor. To determine the cause of the failure, we need to make several measurements.

MEASUREMENTS

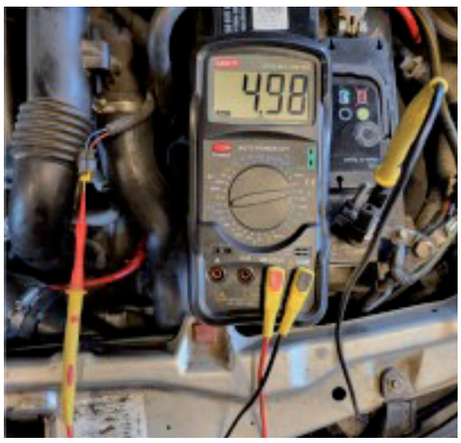
1. Battery OK, charging device connected.
2. After removing the plug from the temperature sensor, turn on the ignition and start measuring.
3. In the sensor plug, between pins A-B (Fig. 1), should be a voltage of about 5V.
4. If the voltage occurs, it means, we have a broken sensor or no connection on the pins of the sensor or plug. In this case, clean the pins or replace the B24 sensor.

Note: Use only dedicated leads terminated with a needle.

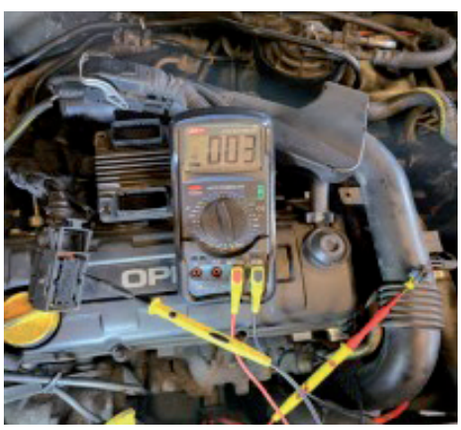


5. If you will not receive the voltage approx. 5V, between the pins in the plug, you should verify whether it is due to a lack of power or ground.

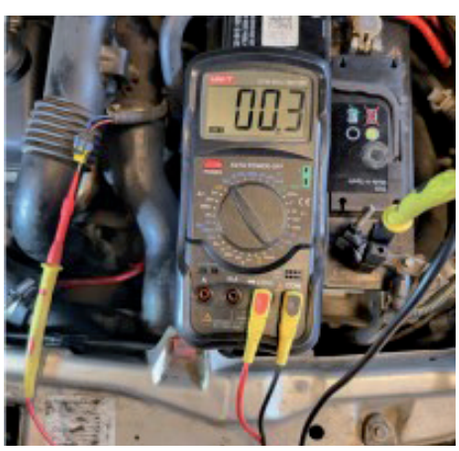
6. Measure the point B (blue wire) of the sensor plug to the ground. The multimeter should show a voltage of approx. 5V (ignition - switched on).



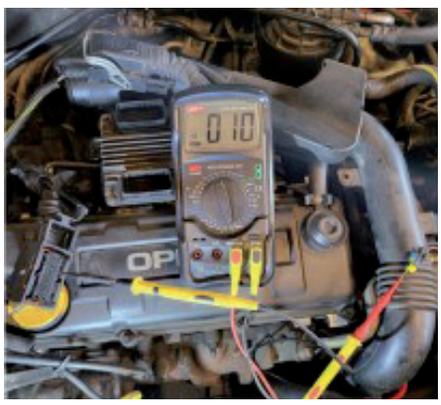
In the case of a lack of voltage, check the continuity of the power wire between points: No. 42 (of the ECU's B connector) and pin B of the sensor plug. For this purpose, remove plug B from the ECU (ignition off). The engine control unit is located, above the valve cover on the rear. Following the marks on the ECU's socket, locate pin no. 42. If the wire is broken, locate the damage and repair the wiring harness according to the manufacturer's technology.



7. Measure Point A for connection to ground - the multimeter should show connection (ignition switch off).



In the case of no connection, check the continuity of the red-white wire between points: pin no. 45 (of the ECU's B connector) and pin A of the sensor's plug. The engine control unit is located above the valve cover on the rear. Following the marks on the ECU's socket, locate pin 45. If the wire is broken, locate the damage and repair the wiring harness according to the manufacturer's technology.



DIAGNOSIS

› In the described case, we struggled with mechanical damage of the engine wiring harness.

› After the repair of the wiring harness, re-measure all points, if all measurements are correct, connect the plugs. The last step is to clear all faults from the ECU's memory and control the working of the measuring system.