

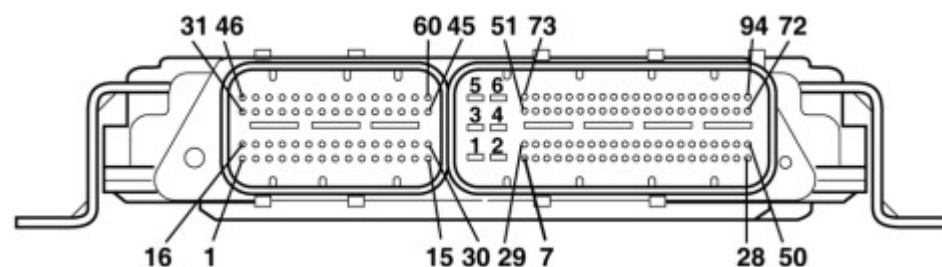
DESCRIPTION OF COMPONENTS

Injection control unit (EDC 16C39 common rail)

This is fitted in the engine compartment on the right side. The control unit is the flash EPROM type, i.e. it can be reprogrammed from the outside without operations to the hardware.

The injection control unit incorporates the absolute pressure sensor.

PIN OUT



Connector A (vehicle wiring)

- 1 - Battery positive from main relay
- 2 - Battery negative
- 3 - N.C.
- 4 - Battery negative
- 5 - Battery positive from main relay
- 6 - Battery negative
- 7 - Turbo pressure actuator
- 8 - Potentiometer 2 on accelerator pedal (-)
- 9 - Potentiometer 1 on accelerator pedal signal
- 10 - Diesel temperature sensor (-)
- 11 - Diesel temperature sensor signal
- 12 - Air conditioning linear pressure sensor (-)
- 13 - Air conditioning linear pressure sensor signal
- 14 - N.C.
- 15 - N.C.
- 16 - Earth for heater plug control unit
- 17 - Signal + contact on brake pedal (NA)
- 18 - N.C.
- 19 - Alternator "L" signal
- 20 - Low pressure pump control relay
- 21 - Turbocharger pressure actuator
- 22 - Air conditioning linear pressure sensor (+)
- 23 - Neutral position sensor supply
- 24 - N.C.
- 25 - N.C.
- 26 - N.C.
- 27 - N.C.
- 28 - Key signal
- 29 - Compressor engagement control relay negative signal
- 30 - Potentiometer 1 on accelerator pedal (-)
- 31 - Potentiometer 2 on accelerator pedal signal
- 32 - Exhaust gas temperature sensor signal 2 (only for versions with DPF)
- 33 - Exhaust gas temperature sensor earth 2 (only for versions with DPF)
- 34 - N.C.
- 35 - N.C.
- 36 - DPF differential pressure sensor signal (only for versions with DPF)
- 37 - DPF differential pressure sensor earth (only for versions with DPF)
- 38 - N.C.
- 39 - N.C.
- 40 - Clutch pedal switch signal
- 41 - N.C.
- 42 - N.C.
- 43 - Wake up signal
- 44 - Differential pressure sensor (DPF) (+) (only for versions with DPF)
- 45 - Potentiometer 1 on accelerator pedal (+)
- 46 - Potentiometer 2 on accelerator pedal (+)
- 47 - N.C.
- 48 - N.C.
- 49 - Chip heating enablement for flow meter
- 50 - N.C.

51 - Lambda sensor heater control (only for versions with Lambda sensor)
52 - Heater plug control unit diagnosis
53 - Battery negative
54 - N.C.
55 - Starter motor relay control
56 - N.C.
57 - Reversing switch signal
58 - Brake servo vacuum digital sensor signal
59 - Neutral position sensor earth
60 - N.C.
61 - N.C.
62 - N.C.
63 - N.C.
64 - Lambda sensor signal (only for versions with Lambda sensor)
65 - Lambda sensor signal (only for versions with Lambda sensor)
66 - Exhaust gas temperature sensor signal upstream of the turbocharger
67 - N.C.
68 - N.C.
69 - Engine cooling fan 2nd level
70 - N.C.
71 - N.C.
72 - Main control relay negative signal
73 - N.C.
74 - Water in diesel filter sensor signal
75 - Neutral position sensor signal
76 - Exhaust gas temperature sensor earth upstream of the turbocharger
77 - N.C.
78 - N.C.
79 - Clutch pedal switch signal
80 - N.C.
81 - N.C.
82 - N.C.
83 - CAN (low channel)
84 - CAN (high channel)
85 - N.C.
86 - Lambda sensor earth (only for versions with Lambda sensor)
87 - Lambda sensor signal (only for versions with Lambda sensor)
88 - E.G.R. heat exchanger actuator
89 - VGT position sensor signal
90 - Engine cooling fan 1st level
91 - N.C.
92 - N.C.
93 - Heater plugs activation
94 - N.C.

Connector B (engine wiring)

1 - Cylinder no. 3 injector (+)
2 - Cylinder no. 2 injector (+)
3 - N.C.
4 - N.C.
5 - N.C.
6 - Variable SWIRL active diagnosis earth
7 - N.C.
8 - Fuel pressure sensor (-)
9 - N.C.
10 - N.C.
11 - Timing sensor (+)
12 - Engine rpm sensor (-)
13 - Turbo pressure sensor (+)
14 - N.C.
15 - N.C.
16 - Cylinder no. 1 injector (+)
17 - Cylinder no. 4 injector (+)
18 - N.C.
19 - Fuel pressure regulator (+)
20 - Timing sensor (-)
21 - N.C.
22 - VGT position sensor earth
23 - Turbo pressure sensor (-)
24 - N.C.
25 - Power supply 3 5V sensors
26 - E.G.R. position sensor power supply
27 - Engine rpm sensor (+)
28 - Fuel pressure sensor (+)
29 - VGT position sensor supply
30 - Engine positive E.G.R.
31 - Cylinder no. 2 injector (-)

32 - N.C.
 33 - Cylinder no. 4 injector (-)
 34 - N.C.
 35 - Variable SWIRL actuator power supply
 36 - N.C.
 37 - Air temperature sensor (flow meter)
 38 - N.C.
 39 - Throttle valve diagnostic earth
 40 - Turbo pressure sensor signal
 41 - Engine coolant temperature sensor (-)
 42 - Air flow rate sensor signal
 43 - Rail pressure sensor signal
 44 - Earth (flow meter)
 45 - Variable SWIRL actuator
 46 - Cylinder no. 3 injector (-)
 47 - Cylinder no. 1 injector (-)
 48 - N.C.
 49 - Fuel pressure regulator (-)
 50 - Timing sensor signal
 51 - E.G.R. position sensor earth
 52 - Throttle valve diagnostic signal
 53 - Turbo air temperature sensor signal
 54 - N.C.
 55 - N.C.
 56 - Insufficient engine oil pressure
 57 - E.G.R. position sensor signal
 58 - Engine coolant temperature sensor signal
 59 - Throttle solenoid control
 60 - EGR solenoid

"DNA" DYNAMIC CONTROL OF THE VEHICLE

The Alfa DNA system is a device that acts on the vehicle dynamic control systems and is electrically connected to the Body Computer which notifies the nodes involved of the configuration selected.

Engine management control unit

The accelerator pedal is more or less reactive depending on the Alfa DNA system mode. There is an OVERBOOST effect in Dynamic mode.

Instrument panel

The display shows specific information consistent with the mode selected (e.g.: turbo pressure in dynamic mode).

VDC system

The VDC has three settings for each of the three Alfa DNA system positions (e.g.: in dynamic mode the intervention of the VDC is delayed to allow a more active driving style; in all weather mode braking on surfaces with differentiated grip is improved).

Steering system

The steering is more or less stiff depending on the mode selected via the "DNA".

Suspensions

Where fitted, the active suspension comply with the mode chosen via the DNA selector. For example, in dynamic mode it becomes stiffer, improving handling.

Gearbox

Where an automatic transmission is fitted, the gear change takes place at a higher engine speed and the Alfa DNA system also reduces the change time.

Operation



The "manettino" dial is a lever which always remains in the middle position. The configuration selected is recognized by the corresponding LED being lit up or the display in the control panel as illustrated below:

Dynamic display



All weather display



Normal display

No symbol is shown in the display for this configuration.
To turn the dynamic mode on, move the lever forwards (corresponding to the letter "D"), stay in this position for half a second until the LED lights up or the words "Dynamic on" appear in the control panel.



When the lever is released it will return to its middle position.
To return to Normal mode from Dynamic mode, repeat the same movement for the lever with the same time scales, but in this case the LED for the Normal position will light up and the control panel will show "Normal on" in the display.



To engage the All weather mode, move the lever backwards (to position A), stay in this position for half a second or until the LED lights up and the control panel shows "All weather on" in the display.



The procedure to return to Normal is the same as the one described for Dynamic.

It is not possible to go directly from Dynamic mode to All Weather mode and viceversa. It is always necessary to return to the Normal mode.

If Dynamic mode was on before a key-off, then the configuration will automatically return to Normal mode at the next key-on.

If, on the other hand, the All weather or Normal mode was engaged, the configuration will be maintained at the next key-on.

The Dynamic mode can only be engaged at speeds below 110 km/h and remains on beyond this speed.

If there is a DNA system or selector failure, no configuration can be engaged and the message "mode not available" will be shown in the panel display.

RPM SENSOR

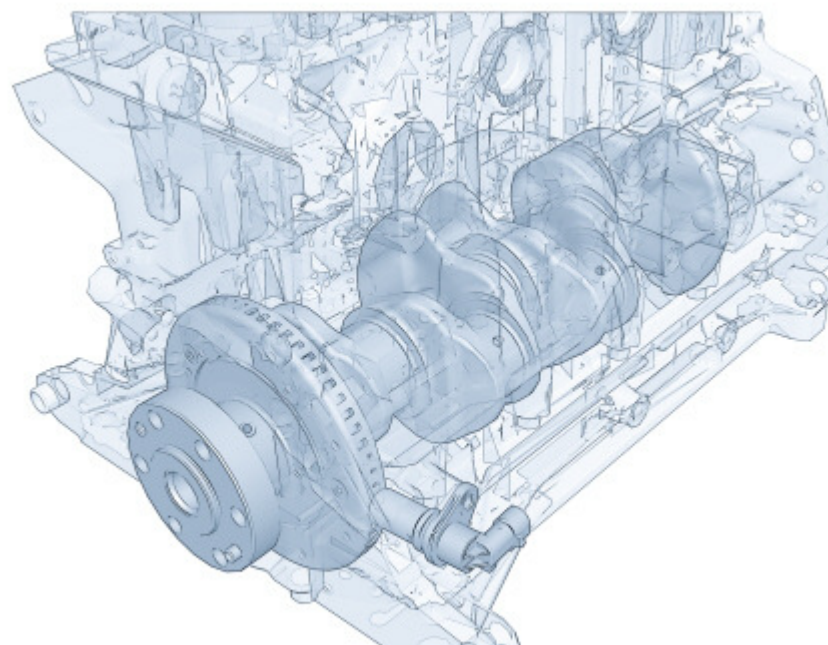
Features

It is fitted on the cylinder block, facing the phonic wheel on the crankshaft.

It is inductive, i.e. its operation is determined by magnetic field changes generated by the teeth passing in front of a phonic wheel (60-2 teeth).

The injection control unit uses the RPM signal to:

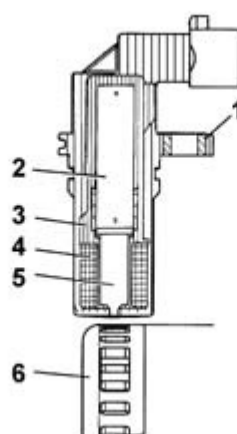
- determining the engine rotation speed
- determining the angular position of the crankshaft.



Operation

The changeover from full to empty determined by the presence or absence of a gap brings about a magnetic flux change sufficient to generate an induced alternating voltage proportional to the number of teeth on the ring (or phonic wheel).

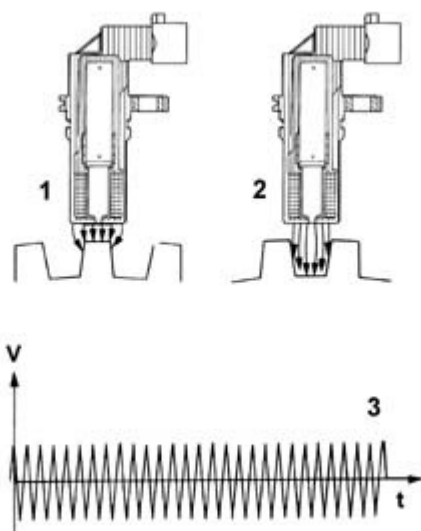
The frequency and amplitude of the voltage sent to the electronic control unit provides it with details of crankshaft angular speed.



- 1 - Brass bush
- 2 - Permanent magnet
- 3 - Plastic sensor casing
- 4 - Coil winding
- 5 - Core
- 6 - Ring gear or phonic wheel
- 7 - Coaxial paired cable or electrical connection

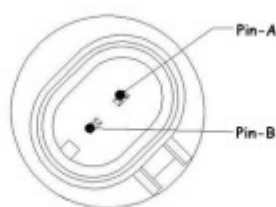
The recommended distance (gap), between the end of the sensor and flywheel, to produce correct signals, should be between 0.8 and 1.5 mm.

This distance is not adjustable. Therefore, if the gap is found to be outside the tolerance limits, check the condition of the sensor and phonic wheel.



- 1 - Maximum magnetic flux
- 2 - Minimum magnetic flux
- 3 - Induced alternating voltage trend

Pin out



- Pin A - Signal +
- Pin B - Signal -

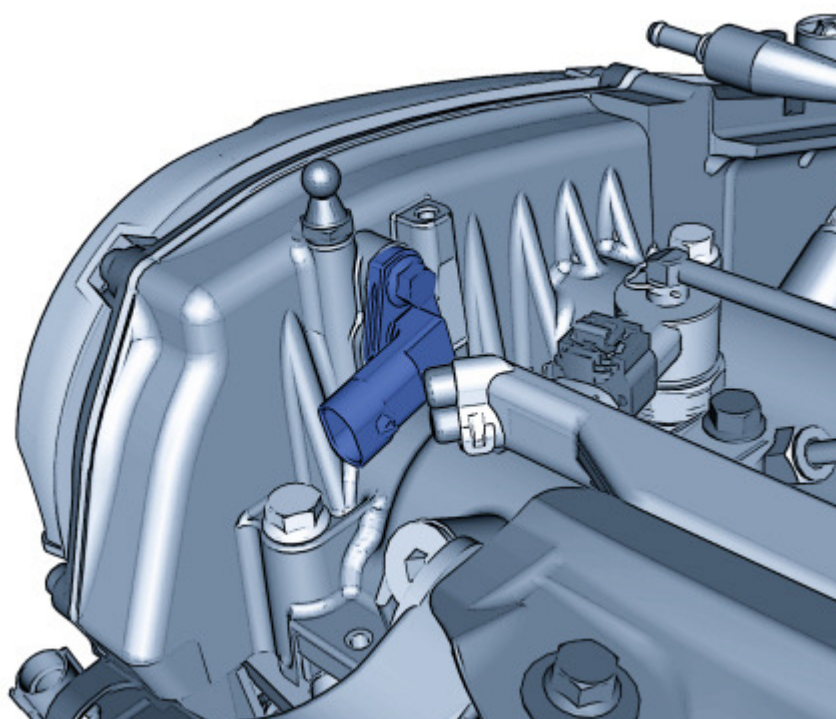
CAM ANGLE SENSOR

Features

This Hall effect sensor is fitted on the cylinder head, facing the camshaft drive pulley.

A tooth on the pulley allows the timing sensor to indicate the engine timing position.

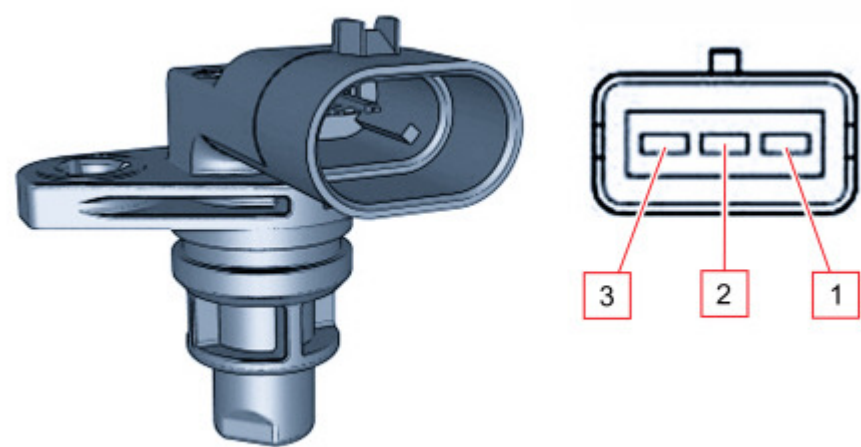
The injection control unit uses the timing sensor signal to identify T.D.C. at the end of compression.



Operation

A current-carrying semiconductor layer immersed in a normal magnetic field (force lines at right angles to current direction) generates a potential

difference known as a Hall voltage at its terminals.
If current intensity remains constant, the generated voltage depends on magnetic field intensity alone.Periodic changes in magnetic field intensity are sufficient to generate a modulated electrical signal with frequency proportional to the speed of magnetic field change. To produce this change, a tooth on the inner part of the pulley periodically moves close to the sensor.



- 1- Earth
- 2 - Signal
- 3 - Supply

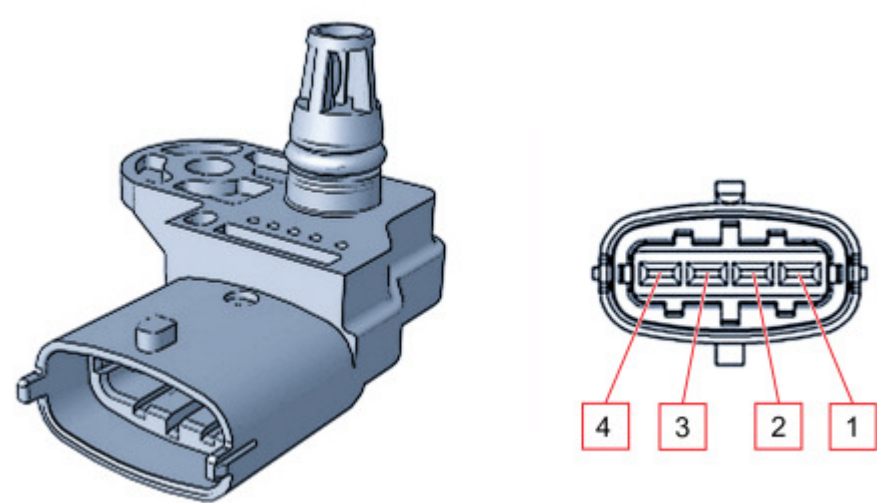
INTAKE AIR TEMPERATURE AND EXCESS PRESSURE SENSOR

Features

The excess pressure and intake air temperature sensor is an integral component designed to measure the pressure and the temperature of the air inside the intake manifold.

It is fitted on the intake manifold and has the task of notifying the injection control unit to:

- regulate the pressure of the variable geometry turbine in order to ensure optimum engine performance in all operating conditions.
- regulate fuel injection duration.

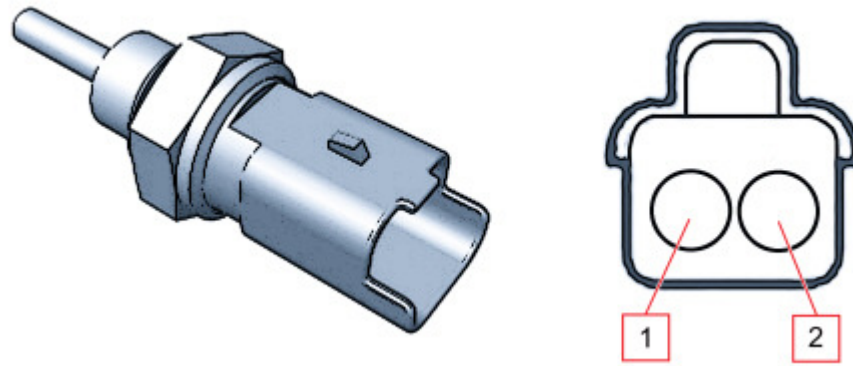


- 1- Earth
- 2 - Air temperature signal
- 3 - 5 Volt (from ECU)
- 4 - Turbocharging pressure output signal

ENGINE COOLANT TEMPERATURE SENSOR

Features

This is fitted on the thermostat and detects coolant temperature by means of a dual NTC thermistor with negative resistance coefficient. One NTC thermistor sends a signal to the injection control unit, whilst the other sends a signal to the temperature gauge and the warning light in the instrument panel.



Pin 1 - Signal

Pin 2 - Earth

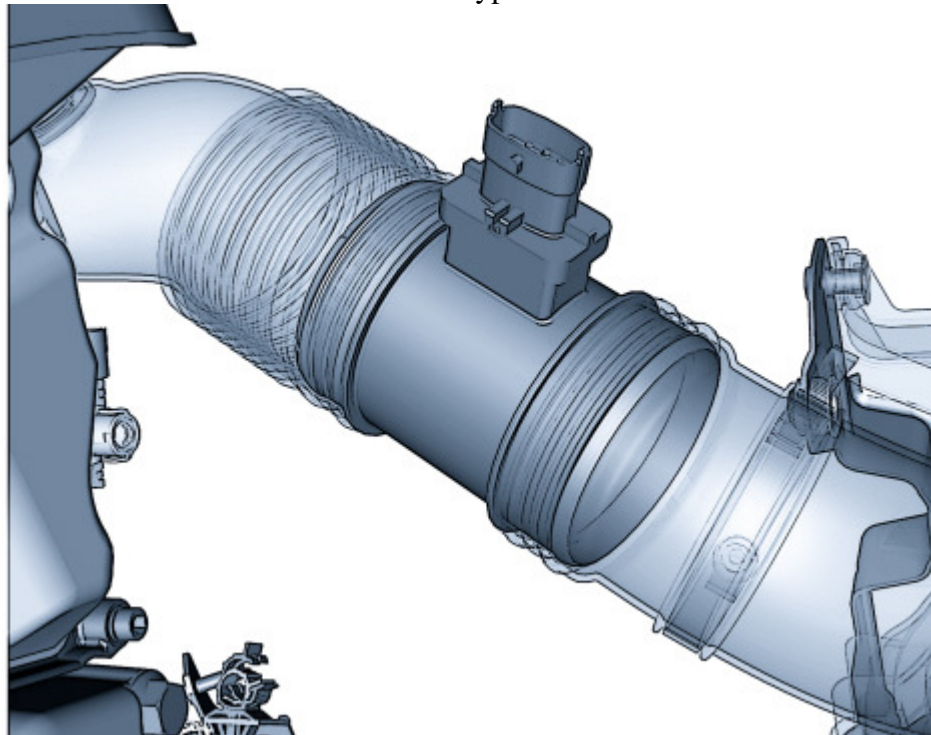
The sensor is designed using semiconductor technology. In other words, the resistance level drops if the sensor element temperature increases as the coolant temperature increases.

The non-linear change in resistance is greater for changes at low temperatures and lesser for changes at high temperatures.

AIR FLOW METER WITH BUILT IN AIR TEMPERATURE SENSOR

Features

The digital air flow meter is located on the air intake hose and is a hot film type meter.



Pin out

1 - 12 V power supply

2 - Earth

3 - Air temperature output signal

4 - Air flow rate output signal

The NTC intake air temperature sensor is built into the air flow meter.

 The air flow meter cannot be disassembled.

Operation

The operating principle is based on a heated diaphragm placed in a measuring duct through which the inlet air entering the engine flows.

The hot film diaphragm is kept at a constant temperature (about 120°C higher than the temperature of the incoming air) by the heating resistance.

The air mass that flows through the measurement channel tends to remove heat from the membrane. A certain amount of current must therefore flow through the heater coil in order to maintain the membrane at a constant temperature.

This current is measured by the electronic circuit in the plug-in and is proportional to the mass of air flowing through.

This leads to the following advantages:

- lower response time
- improved measurement precision.

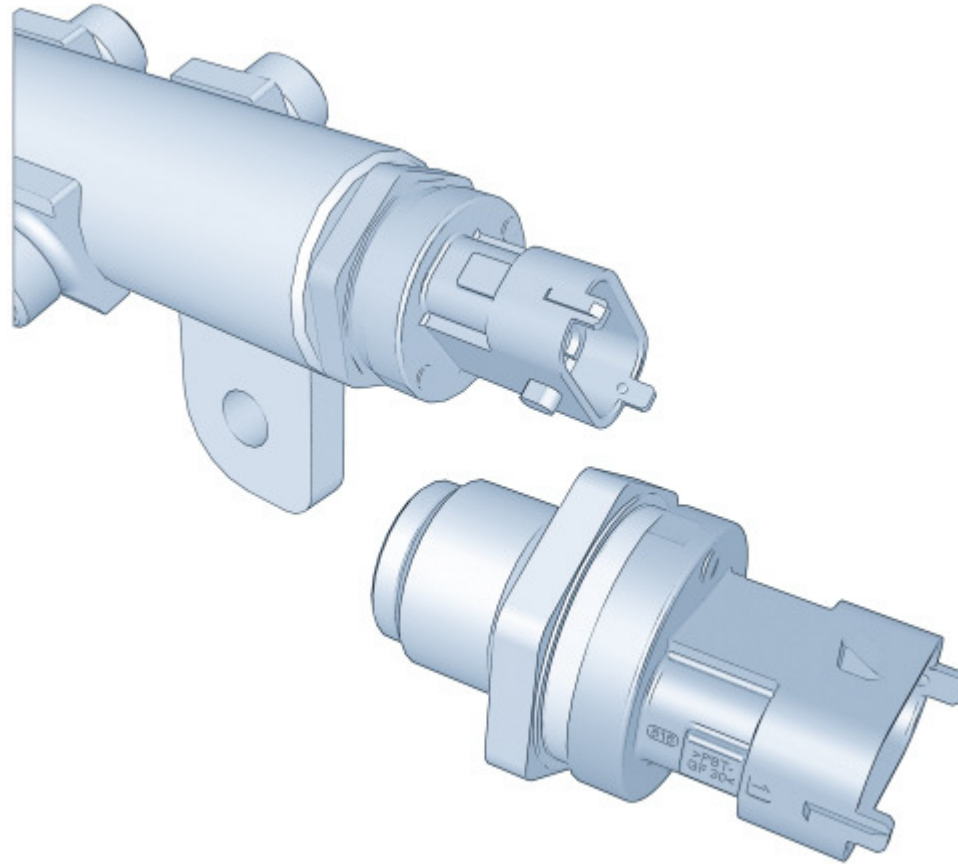
The presence of a quartz oscillator on the printed circuit allows the flow meter to measure the air flow rate directly.

FUEL PRESSURE SENSOR

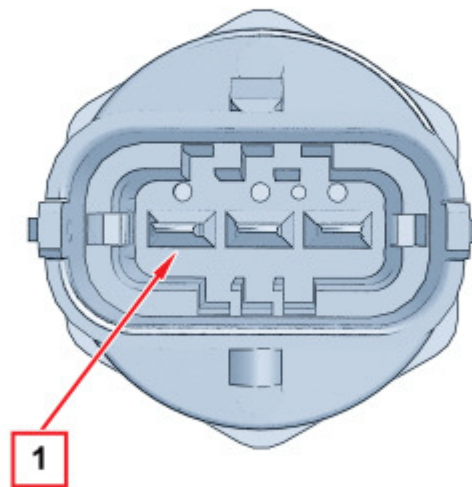
Features

It is fitted at the end of the common rail and its function is to provide the injection control unit with a feedback signal to enable it to:

- modulate injection pressure;
- regulate fuel injection duration.



Pin out



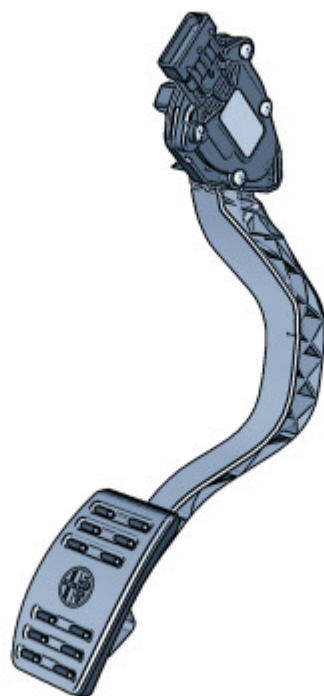
- 1- Earth
- 2 - Output signal
- 3 - Supply

ACCELERATOR PEDAL POTENTIOMETER

Construction specifications

The sensor consists of a case secured to the accelerator pedal; the case contains an axially-located shaft connected to two potentiometers: a main one and a safety one.

A coil spring on the shaft guarantees the correct resistance to pressure whilst a second spring ensures the return on release.

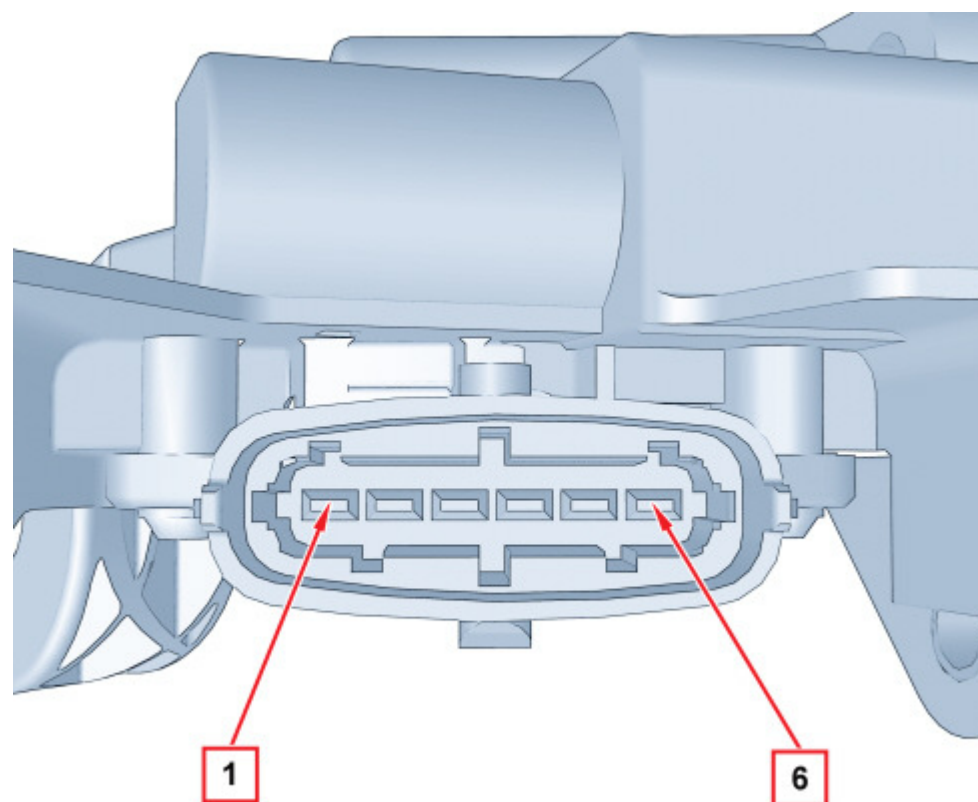


Operation

The accelerator pedal position is transformed into an electrical voltage signal and is sent to the injection control unit from the potentiometer connected to the associated pedal.

The accelerator pedal position signal is processed together with the information relating to the engine rpm in order to obtain the injection times and the pressure.

Pin out



Pin 1, 5V power supply potentiometer 2

Pin 2, 5V power supply potentiometer 1

Pin 3, Potentiometer earth 1

Pin 4, Potentiometer signal 1

Pin 5, Potentiometer earth 2

Pin 6, Potentiometer signal 2

MOTORIZED THROTTLE BODY

The electrical throttle body is a system that includes both the control logics and the activation logics of the electric motor for moving the throttle valve. The system is operated by means of a PWM type signal, which is processed by the electronics of the actual component. The position of the throttle valve is controlled as a result.

The motorized throttle body carries out the following two functions:

- management of the shut-off stage
- control the exhaust gas temperature by reducing the intake duct section.

Operating specifications

Temperature interval: from -40 °C to +140 °C

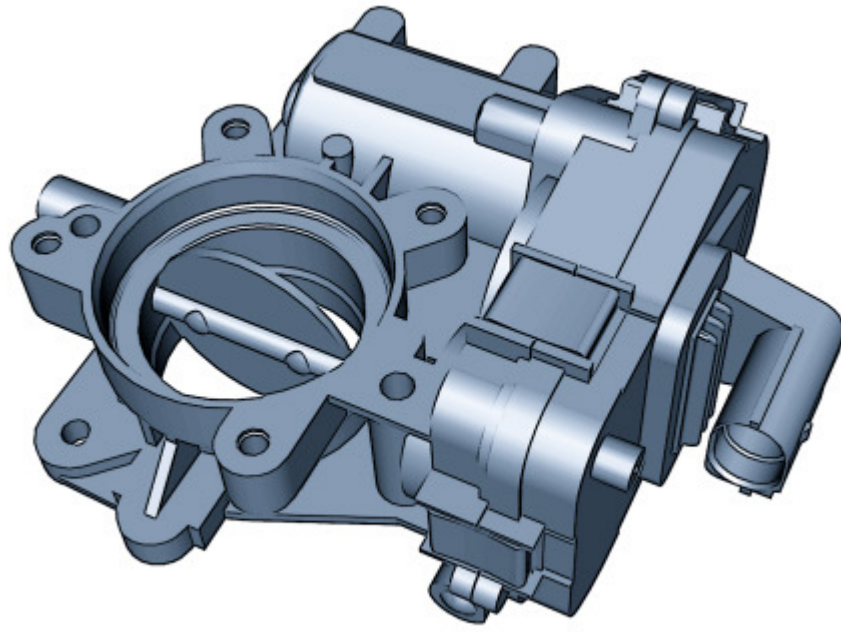
Input signal: PWM

Input signal frequency: 262.2 Hz +/- 3%

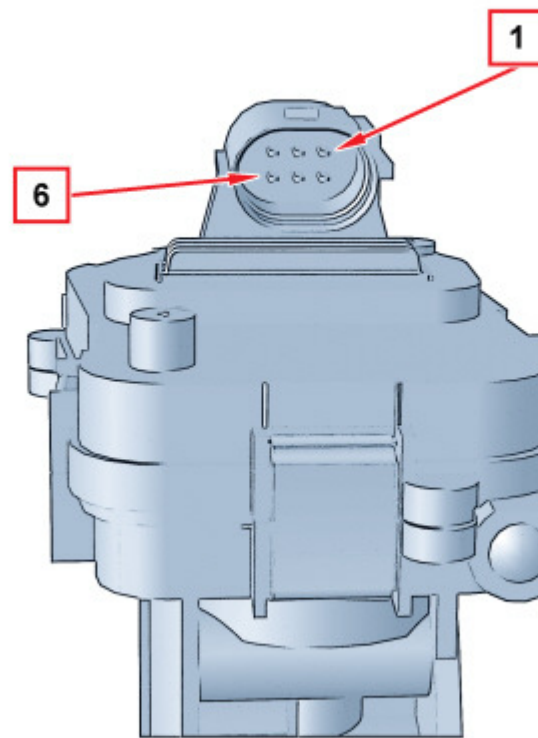
Signal for diagnosis: PWM

Frequency of signal for diagnosis: from 20 to 90 Hz +/- 5%

Supply voltage: 14 V



Pin out



- Pin 1 - Throttle opening motor earth
- Pin 2 - TPS1 and TPS2 potentiometer earth
- Pin 3 - TPS1 and TPS2 potentiometer 5V positive
- Pin 4 - Throttle opening motor positive
- Pin 5 - TPS2 potentiometer signal
- Pin 6 - TPS1 potentiometer signal