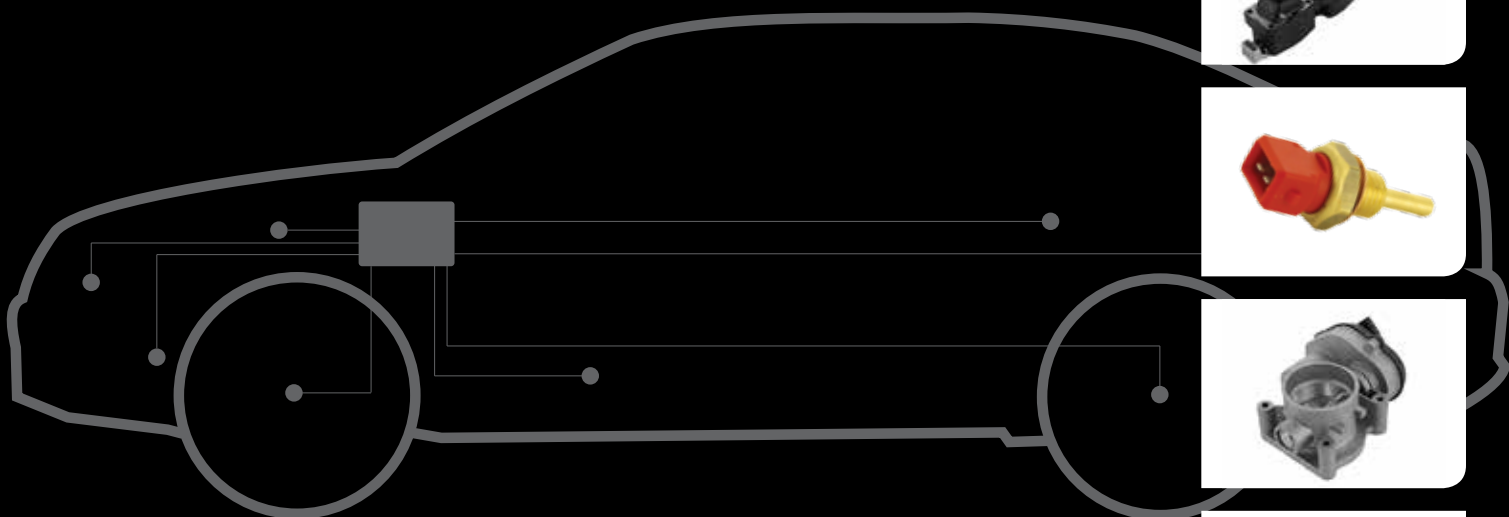


Sensor programme

Get an overview of our steadily growing sensor programme



TRISCAN

TRISCAN smartparts - the smart choice



Triscan supplies spare parts of OE quality to wholesalers of the free aftermarket. We create value through the production of spare parts, the development of new concepts and effective logistics.

Our product range includes more than 55,000 references distributed to 35 countries from our 3 warehouses. We employ more than 100 employees in Denmark, Germany and Sweden.



**Spare parts of
OE-Quality**

This brochure is divided into two parts: The first part contains product information most relevant for sales. The second part provides technical information in the same order.

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Product overview	3
Sensors for the brake system	4
Sensors for engine control	5 - 10
Sensors for body	11
smartrep.info	12
Technical information	13 - 28

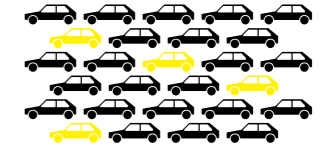
Much more than just a spare part - your advantages



OE-quality approved parts
Triscan products are manufactured according to OE specifications and the IATF 16949 quality standard of the automotive industry.



Effective logistics
We deliver products on time, thanks to our fast and effective logistic setup.



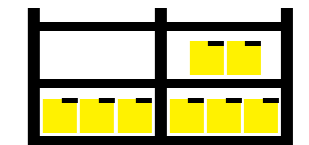
Wide covering product programme
Our product programme covers 97% of the European car park. By choosing a product group from us, you won't need another supplier for that group.



Extensive quality control
Besides the quality control during production, our products are also subject to systematic control upon entering stock.



Complete products
Triscan supplies complete products with all necessary parts for correct mounting. Mounting instructions are always included whenever needed.



Practical stocking systems
For "unhandy" products, we have developed practical storage systems, which secures effective, quick and space saving storage.



Competent support
Our customer center and product department are always ready to supply competent customer service and technical support.



Online catalogue
Our product programme is available online. The programme can be accessed through our own catalogue - TriCat or TecDoc.



Online ordering
Orders are easily placed through the Triscan e-trade system - TriWeb - TecCom or by your own system through our webservice.



Calculation of your economic gain
Our SOLO model facilitates calculation of the economical advantages a distributor will gain from having Triscan as their supplier.

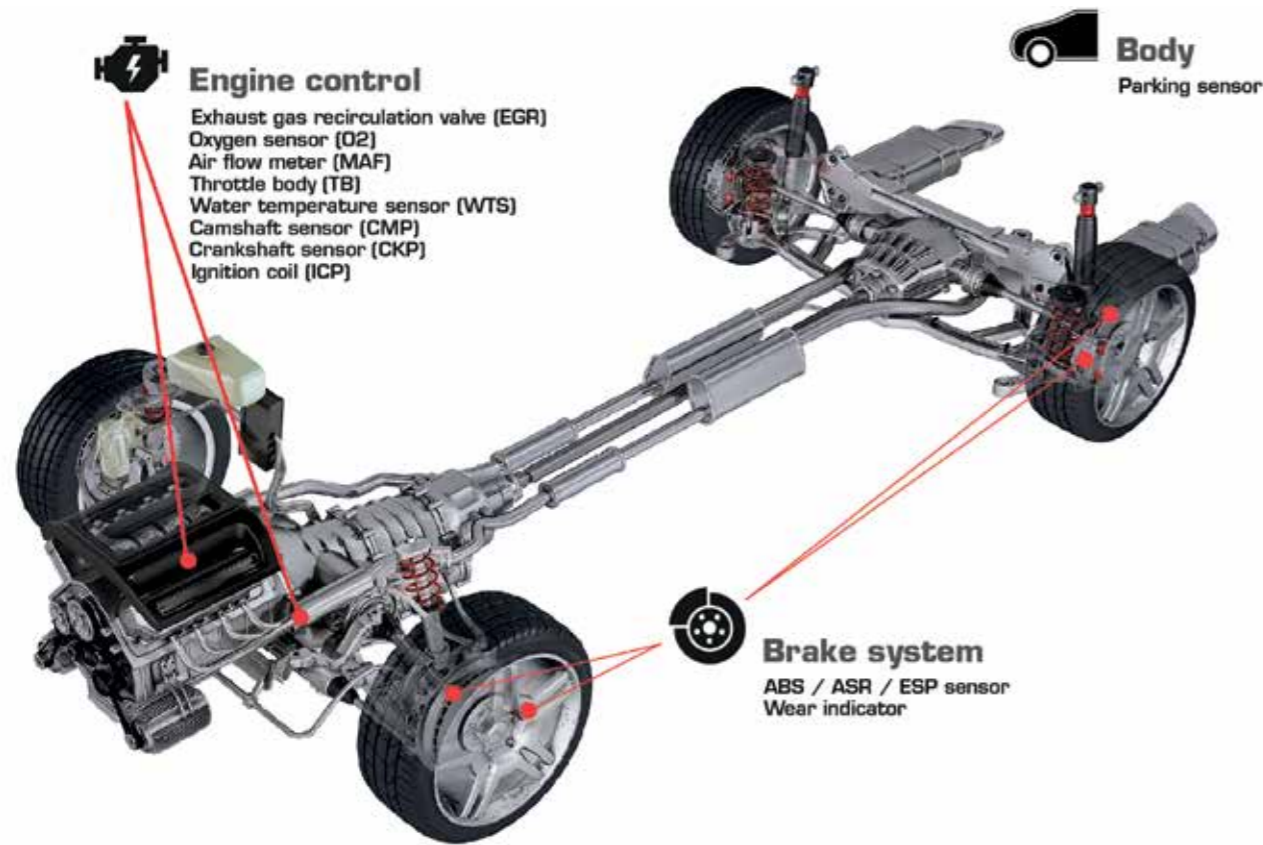


Informative numbering system
Our informative number system provides information as for instance product type, car brand, mount orientation and such.



Triscan Manufacturing
Co-ownership of specific manufacturing companies, enables us contributory influence on development, quality control and pricing of our products.

Product overview



ABS-sensors

ADVANTAGES...



Manufactured according to OE specifications.



Very high coverage of the European vehicle park.

More than 1,300 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



The most comprehensive sensor programme in the aftermarket

The number of different sensors used in motor vehicles has dramatically increased in recent years. Compact vehicle models are currently equipped with more than 50 individual sensors and sensor-based systems.

The majority of sensors are not affected by wear and tear, however, accidents or other influences can cause damage. Of particular importance for the everyday workshop practice are, amongst others, air mass meters, speed, pressure and temperature sensors.

As a spare parts supplier, Triscan offers the most comprehensive aftermarket range in this category. Suitable spare parts can be found for almost all repair applications and practically all car brands.

The Triscan sensors programme is continually expanded and includes sensor types based on ultra-modern microelectromechanical systems (MEMS).

The production is subject to the strict quality standards of the automotive industry IATF 16949 and furthermore often includes a 100% functional test of the individual sensors.



Brake pad wear indicators

ADVANTAGES...



Manufactured according to OE specifications.



Very high coverage of the European vehicle park.

More than 170 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.



Very high delivery capacity and effective logistics.



Engine control

MAP sensors

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 200 references.

Vacuum and electronically controlled valves.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Engine control

Pressure converters

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 90 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Differential pressure sensors

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 60 references.

"Plug & Play" oxygen sensors exclusively.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



EGT-sensors

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 300 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Engine control

EGR-valves

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 300 references.

Vacuum and electronically controlled valves.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Engine control

Air flow meters

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 300 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Oxygen sensors

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 1,000 references.

"Plug & Play" oxygen sensors exclusively.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Throttle bodies

ADVANTAGES...



Manufactured according to OE specifications.

Very high coverage of the European vehicle park.



More than 30 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Engine control

Water temperature sensors

ADVANTAGES...



Manufactured according to OE specifications.



Very high coverage of the European vehicle park.

More than 100 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Engine control

Camshaft sensors

ADVANTAGES...



Manufactured according to OE specifications.



Very high coverage of the European vehicle park.

More than 35 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Ignition coils

ADVANTAGES...



Manufactured according to OE specifications.



Very high coverage of the European vehicle park.

More than 340 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.



Very high delivery capacity and effective logistics.



In line with ignition coils, our product range also includes more than 440 references of **IGNITION CABLES**, in OEM-quality, which are, amongst others, certified with ISO 9001, FORD Q1, DIN72550, 72245 EWG and of course IATF 16949.

Crankshaft sensors

ADVANTAGES...



Manufactured according to OE specifications.



Very high coverage of the European vehicle park.

More than 74 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Body

Parking sensors

ADVANTAGES...



Manufactured according to OE specifications with components from OEM manufacturers



Very high coverage of the European vehicle park.

More than 70 references.



Production is subject to the strict quality control standards within the automobile industry: IATF 16949.

100% function tested.



Very high delivery capacity and effective logistics.



Autospecific ultrasonic parking sensors

Seals are included

Triscan parking sensors are paintable



Tips for a trouble-free installation smartrep.info

we make it easy to get it right



www.smartrep.info

For products with this label we have prepared tips for unusual technical details and information on special tools, if required.
It takes only 2 simple steps ⇨



Simply type www.smartrep.info into your Internet browser or scan the QR code with your smartphone or tablet.



On the smartrep.info website you simply enter the article number and you will get tips in form of text and pictures (see example) or videos.

- Try it out:**
- ☑ 8510 27410 (pictured)
 - ☑ 8140 151072
 - ☑ 8620 39689
 - ☑ 8140 29188



On the following pages you will find technical information about our sensor-programme. It includes, among other things, information on the function, design, installation and troubleshooting of the different types of sensors. For more information about our sensors, please visit our website: triscan.dk/engine-control

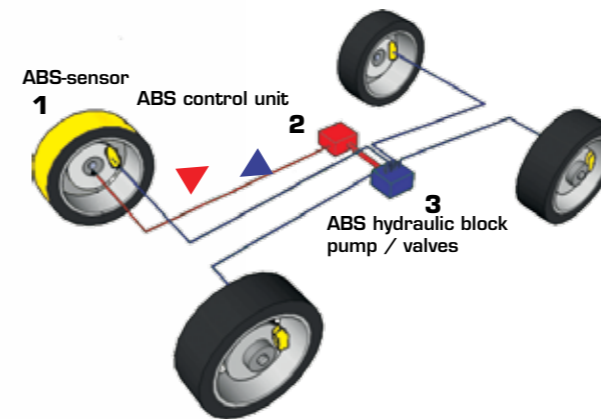


ABS-sensors

Determines the speed of the wheel to be used by the ABS - ASR/TCS - ESC/ESP system. In some cases this information is also used by the vehicle's gearbox and power steering system.

- ABS: Antilock Breaking System.
- ASR/TCS: Engine Slippage Regulation/Traction Control System.
- ESC/ESP: Electronic Stability Control/Electronic Stability Programme.

System design



Function

Between the brake system's master cylinder and brake calipers, an ABS block (3) and an ABS control unit (2) are placed. Onto the car's drive shafts, wheel hubs, brake discs or drums a toothed rim is mounted, and on the wheel hub a sensor (1) detects if the wheel rotates. The sensors are connected to the ABS control unit, which controls the pump and the valves in the ABS block. If you step so hard on the brake that one or more wheels are blocked, the pressure on the blocked wheel brake calipers is depressurized to the point where the wheels start rotating again.

Types

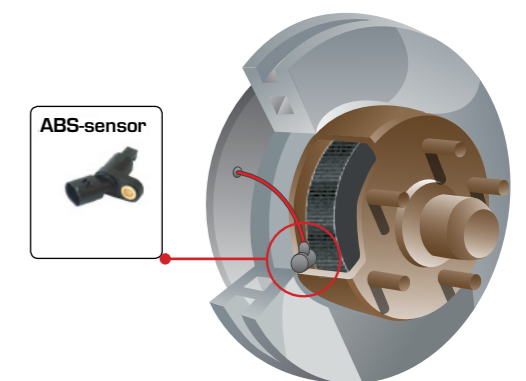
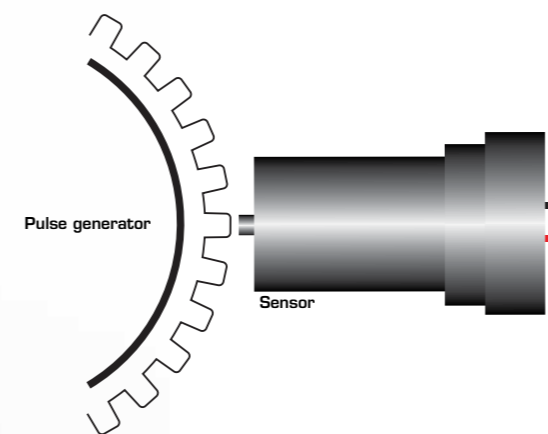
There are three different types of ABS-sensors, which can be categorized in two

- Active
- Passive

Mounting

REMEMBER to reset the ECU.

NOTE: on some car models the ABS-warning light does not turn off until the car has been test driven.



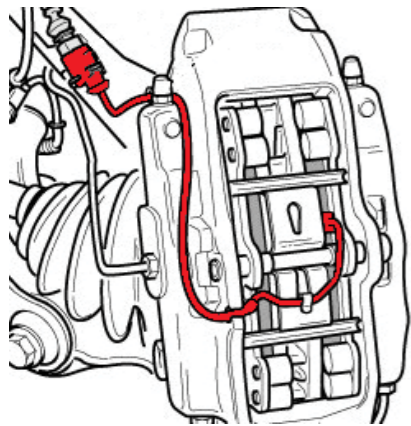
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Brake system

Brake pad wear indicators

When the brake pad lining reaches the minimum limit, the wear indicator activates a warning light in the instrument panel.

System design



Mounting

REMEMBER! All brake pad wear sensors of an axle should be replaced everytime the brake pads are replaced.



1 indicator per axle



2 indicators per axle



4 indicators per axle



Types

Clip-on



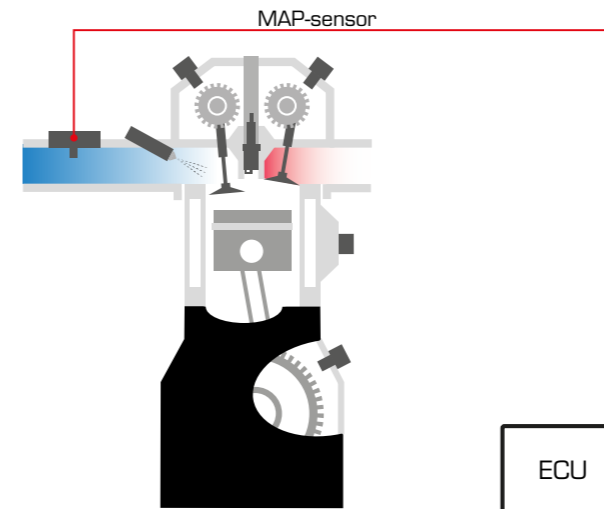
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to get it right
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Engine control

MAP-sensors

The MAP sensor measures the pressure in the intake manifold for use in the vehicle's engine control (ECU). In some cases, the MAP sensor also includes a temperature sensor for measuring air temperature. The information is included in the calculation of the load ratio of the engine used to control the amount of fuel and mixture, as well as the ignition timing.

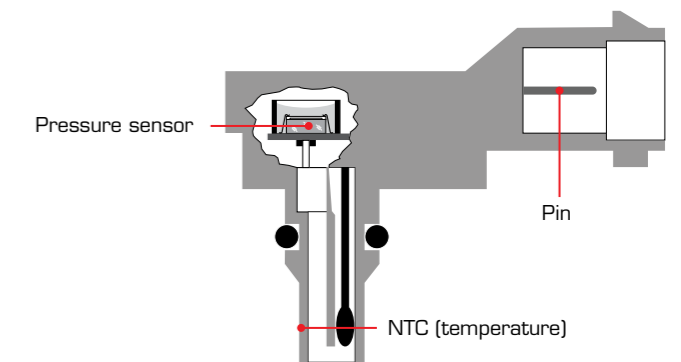
System design



Function

The MAP sensor has a pressure sensor and an electronic circuit that generates a voltage signal that changes with respect to pressure. The voltage signal is typically between 1 and 5 volts. The output voltage is increased when a vacuum drop is detected that occurs when gas is given. At idle, where the largest vacuum is detected - about 20 kPa, the voltage is typically between 1.0 and 2.0 volts. Conversely, it is at full throttle between 4.5 and 5.0 volts - about 80 kPa. The read voltage typically changes by about 1.0 volts when the vacuum is changed by 20 kPa. For versions with a built-in temperature meter, the measuring range is generally between -40 and 120 °C. 65 kOhm at -40 °C and 100 ohms at 120 °C.

Cross section illustration of a MAP sensor

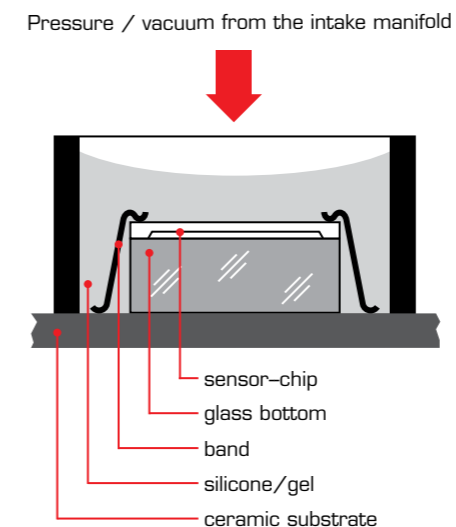


Types

There are mainly two types of MAP sensors:

- 3-poles - **without** integrated temperature sensor
- 4-poles - **with** integrated temperature sensor

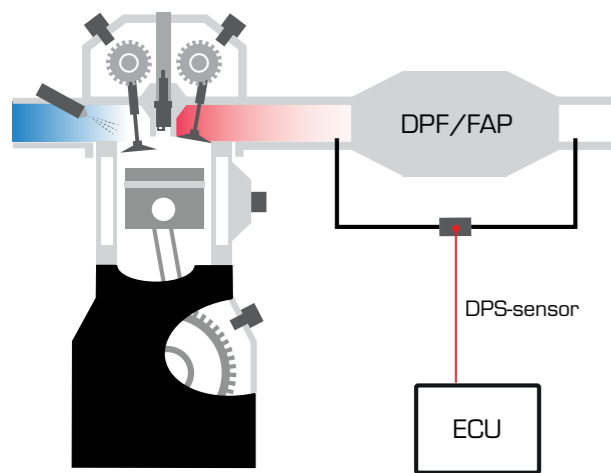
Cross section illustration of a pressure sensor



Differential pressure sensors

The DPS-sensor (Differential Pressure Sensor) is used on diesel engines to determine the pressure difference between the exhaust gas inlet and outlet of the diesel particulate filter (DPF/FAP). Combined with information on i.e. exhaust gas temperature, engine speed and airflow the vehicle's engine control (ECU) determines when to initiate a regenerating process of the filter, where the accumulated soot is burned.

System design

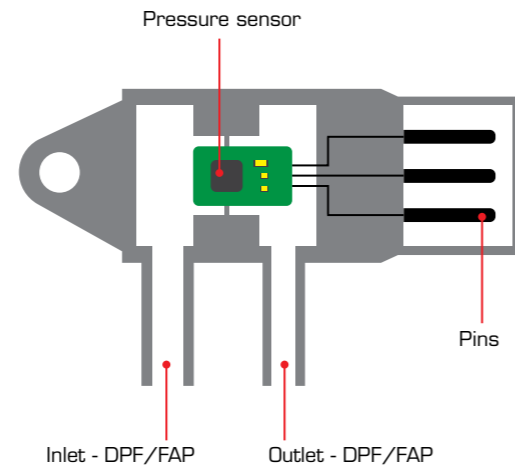


Function

The DPS sensors electronic circuit is fitted with a pressure sensor that separates two chambers inside the DPS-sensors housing. The pressure sensor generates a voltage signal between 0 and 5 volts. The output voltage increases when the pressure difference increases.

On all types of DPS-sensors, the inlet pressure is always measured via a hose that connects the DPS-sensor to the DPF/FAP-filters inlet. The outlet pressure is either measured as the ambient pressure via a hole in the housing of the sensor or via a hose that is connected to the DPF/FAP-filters outlet.

Cross section illustration of a DPS-sensor



Types

- There are mainly two types of DPS-sensors:
- 1-hose - determines the outlet ambient pressure via a hole in the housing of the sensor
 - 2-hose - determines the inlet and outlet pressure via two hoses connected to the DPF/FAP-filter

Numbering system

8823 ZZZZ: 8823=product group, ZZZZ=continuous numbering

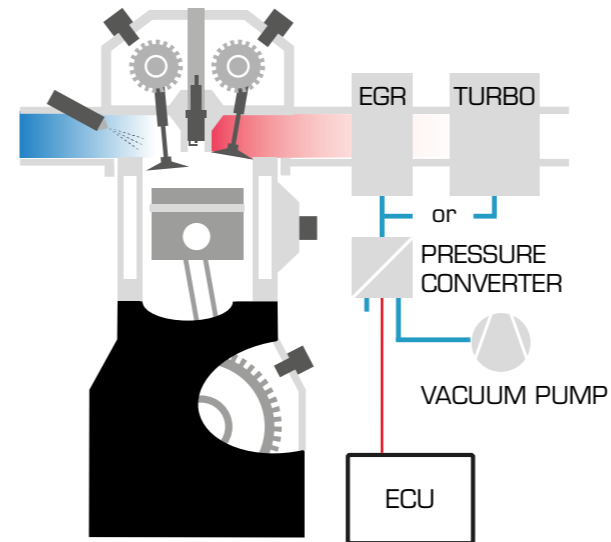


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Pressure converters

Pressure converters are used - depending on the engine type - in several different places for pneumatic control of mechanical parts - including the EGR-valve and the turbocharger wastegate. Based on information from other engine/exhaust system sensors, the position of the valve is controlled via the pressure inverters by the vehicle engine control (ECU).

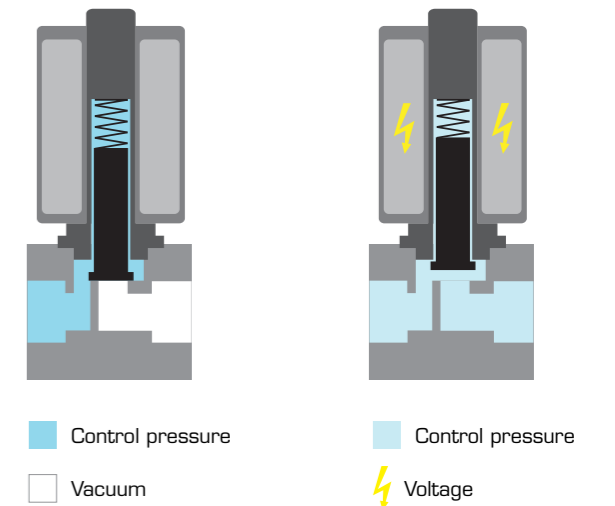
System design



Function

The pressure converter creates a control pressure by mixing atmospheric air with vacuum from the vehicle's vacuum pump. The control pressure depends on the type of pressure converter either stroke or variable controlled. The required control pressure - and thus the mixing ratio - is determined by the vehicle's engine control (ECU), and is regulated by means of an electrically controlled piston in the pressure converter.

Pressure converter - cross section



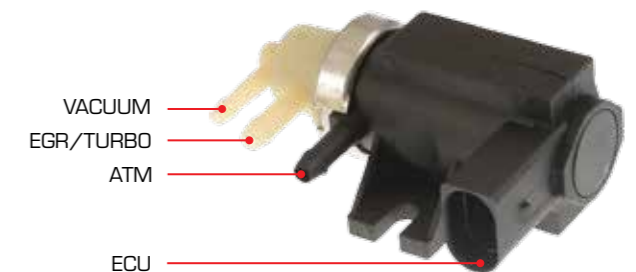
Types

- Pressure converters are available in different types, e.g. differs by whether they are:
- With or without temperature compensation
 - Variable or stroke controlled
 - With or without filter at the connection for atmospheric air

Number system

8813 ZZZZ: 8813=product group, ZZZZ=continuous numbering

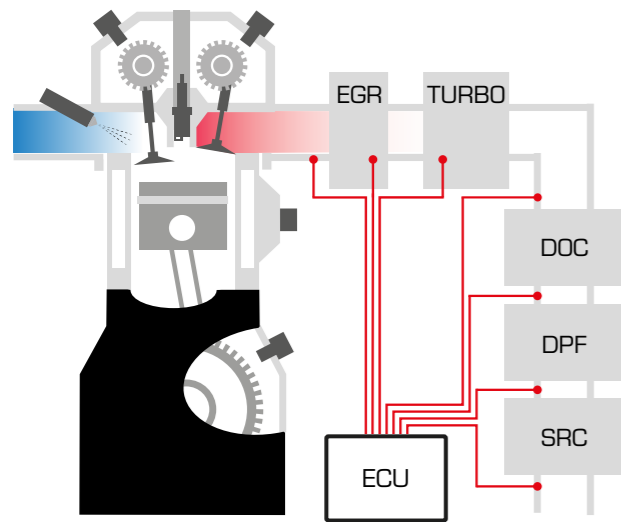
Pressure converter - connection



EGT-sensors

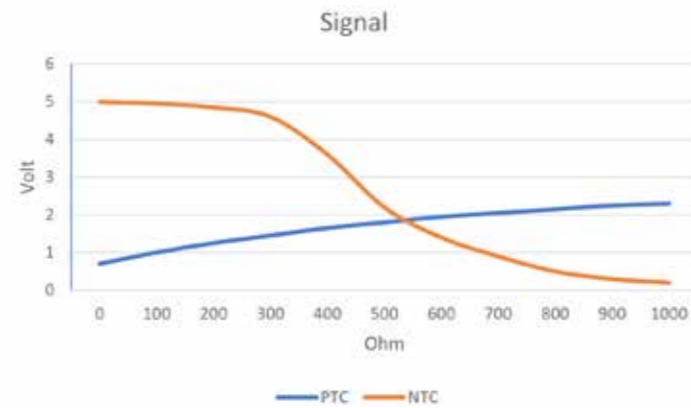
The EGT (Exhaust Gas Temperature Sensor) sensor is used depending on the engine type at up to 7 different positions in the exhaust system - for example the exhaust manifold, EGR cooler, turbocharger, front catalytic converter (DOC), diesel particulate filter (DPF) and rear catalytic converter (SCR). Combined with information from other engine / exhaust system sensors, the vehicle's engine control (ECU) uses the temperature measurements for e.g. to determine when a regeneration process of the diesel particulate filter should be initiated.

System design

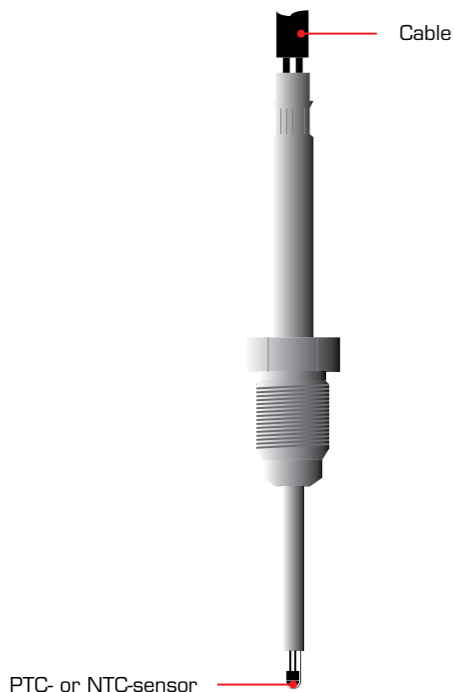


Function

There are two types of exhaust gas temperature sensors - one with PTC sensor element (Positive Temperature Coefficient) and the other NTC sensor element (Negative Temperature Coefficient). In both types, the temperature is measured in relation to the electrical resistance which is measured and registered by the motor control unit (ECU) of the vehicle.



Cross section illustration of a EGT-sensor



Types

- There are two types of EGT sensors:
- PTC - positive temperature coefficient, ie. low resistance at low temperatures
 - NTC - negative temperature coefficient, ie. high resistance at low temperatures

Quality

- OE quality
- Closed stainless steel enclosure
- Mineral insulated cable for heat separation
- Teflon insulated wires which are oil, petrol and water resistant
- Twisted wires for greater flexibility
- 100% functionality test before final approval

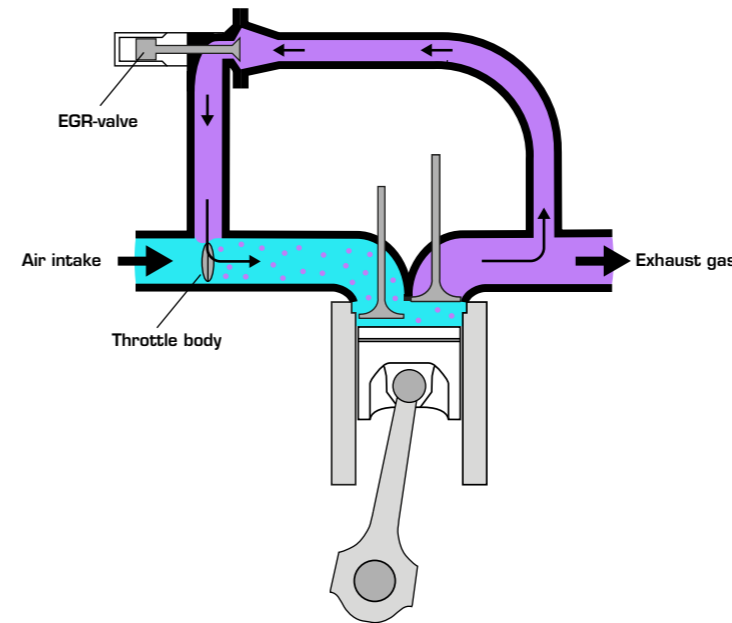


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EGR-valves

EGR is an abbreviation for Exhaust Gas Recirculation. The EGR valves are mounted on both gasoline and diesel engines. The EGR valve is meant to reduce the engine's emissions of NOx particles.

System design



Function

The system works by directing a portion of exhaust gas back into the intake to combusts again. This is done by means of a control valve which is positioned between the exhaust and intake manifold. This results in a reduced pollution effect under almost all driving conditions, however, most significantly at part load.

Error codes

The EGR system is often the cause of a failure. A major reason is that the hot exhaust gas is difficult to handle for components with moving parts. In addition to this come sooting problems. The result of this is often that the EGR valve gets stuck in an random position where it is more or less constantly open.

However, the engine control unit cannot handle the EGR valve being (partly) open at high engine rotations and engine loads, which puts a strain on the engine and causes it to lose be less effective. This is recorded by the engine's control system, which then activates the engine lamp. But also hose leaks at the vacuum-controlled EGR valves and faulty wiring or relays at the electrically controlled EGR valve are frequent sources of errors. If an EGR valve during driving gets stuck in the full open state, it is not possible to start the car.

Types

- There are two types of EGR valves:
- Vacuum controlled
 - Electrically controlled

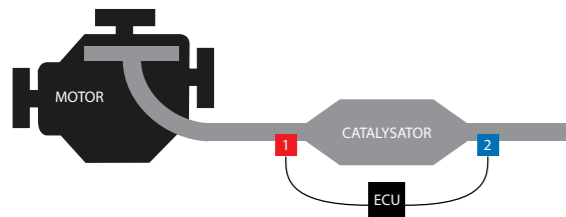
Engine control

Oxygen sensors

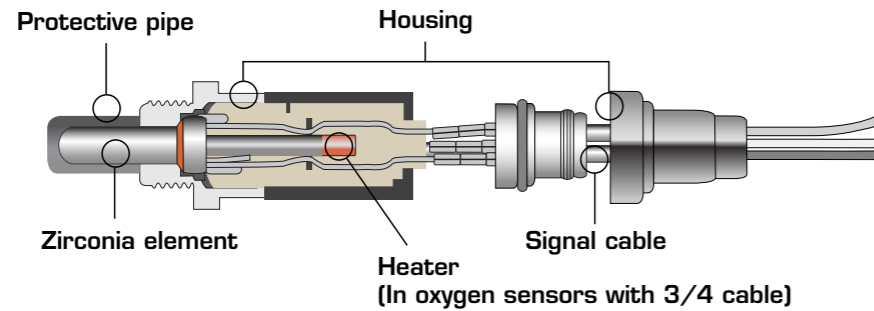
Measures the percentage of O₂ (oxygen) in the exhaust system. The measurement is used to control the mixing ratio of air and fuel.

On the first cars with oxygen sensors, measuring/regulating was solely based on the measurement of a single oxygen sensor, which was located just before catalyst in the exhaust system. Newer car models are also fitted with an oxygen sensor located after the catalyst, whose job is solely to verify that the regulating of the mixing ratio is carried out properly.

System design



Design



Types

Zirconia and Titania (sensor core, where the zirconia type is the most common).
2-, 3-, 4- and 5-conductor (Euro4).

Mounting

MUST be mounted with ceramic grease. Triscan oxygen sensors are either pre-greased or a bag of grease is supplied.
NEVER use pneumatic tools for mounting oxygen sensors.



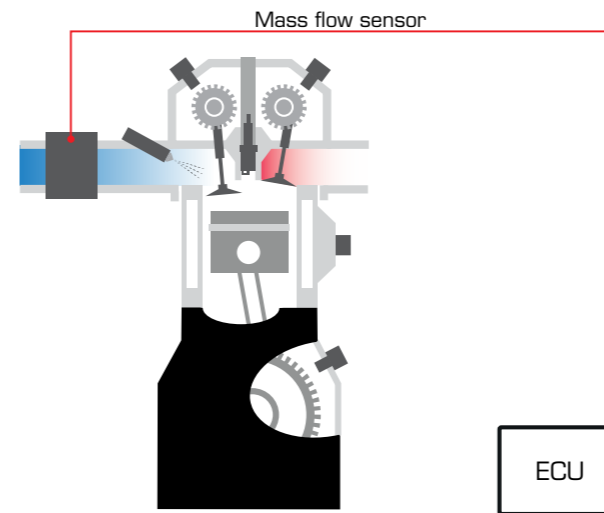
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Engine control

Air flow meters

Air and fuel must be mixed in a precisely defined proportions where the vehicle must comply with the legal requirements for emission to ensure that the vehicle does not use more fuel than necessary. The air flow meter is not able to determine the air mass independently, but by means of input from other engine sensors, the air mass is determined very precisely.

System design



Types

There are three types of air flow meters in our programme:

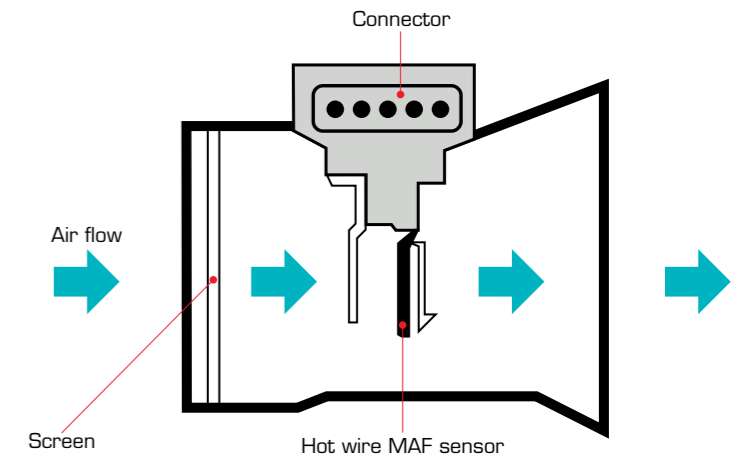
- MAF with warm and/or cold thread
- Kármán Vortex sensor
- Membrane sensor

Installation

Check whether the ECU of the vehicle must be reset after the replacement.

Function

The air flow meter, which is placed on the air inlet side detects the current flow of air into the combustion chamber. The information is transmitted to the vehicle's ECU, which among others uses this information for controlling the mix ratio of air and fuel.

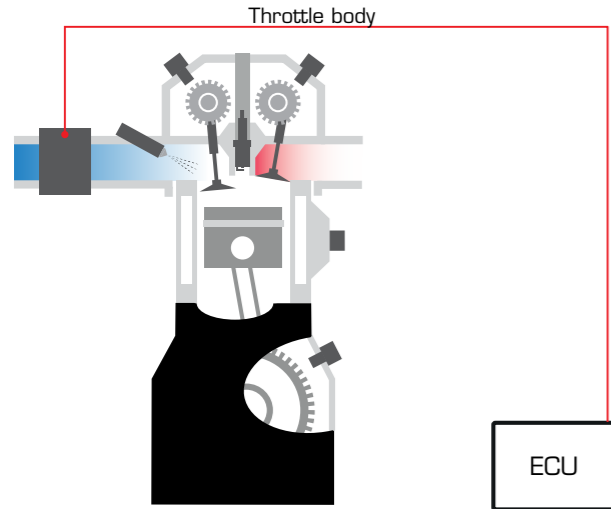


Engine control

Throttle body

In fuel injected engines, the throttle body is the part of the air intake system that controls the amount of air flowing into the engine. The opening is controlled through the accelerator pedal. The throttle body is usually located between the air filter box and the intake manifold. It is usually attached to, or near, the mass airflow sensor.

System design



Mounting

Remember to check the vehicle's ECU must be reset after replacement.

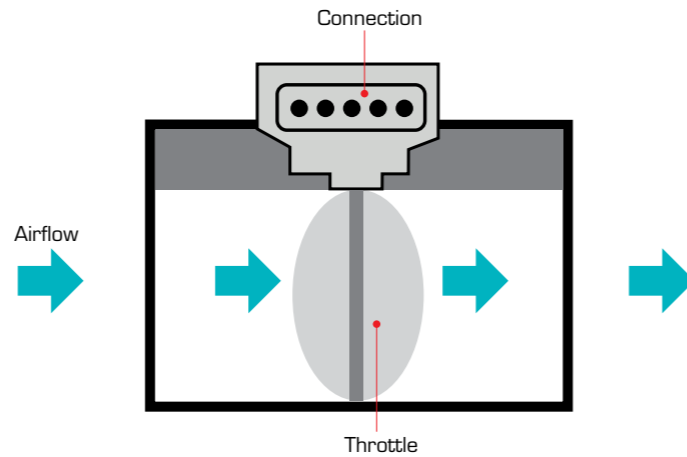
Function

Electronically controlled throttle bodies work as follows: The ECU detects the accelerator's position and gives a message to the throttle body to open the valve. A throttle position sensor communicates the position of the valve to the ECU. The airflow meter recognizes the increased volume of air and gives a message to the injection system to inject more fuel. Throttle bodies may also contain valves and adjustments to control the minimum airflow during idle. There is often a question of an electrically controlled (solenoid) valve IACV (Idle Air Control Valve) that the ECU uses to control the amount of air that can bypass the main throttle opening to allow the engine to idle when the throttle is closed.

Types

There are three types of throttle bodies:

- Electronically controlled
- Electronically/mechanically controlled
- Mechanically controlled



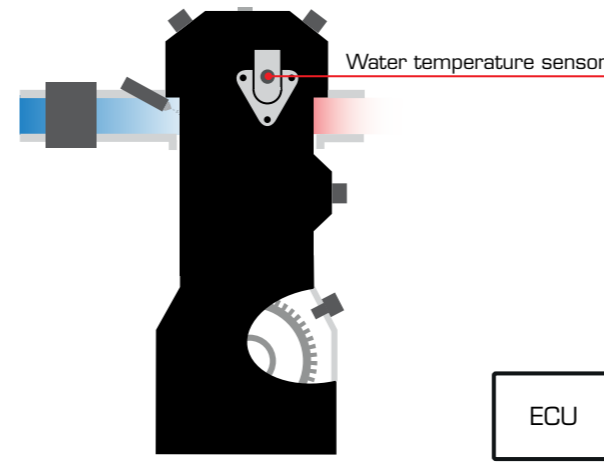
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Engine control

Water temperature sensors

The water temperature sensor measures the cooling water temperature which is used for the vehicle's engine management (ECU). The information is used to control the mixing ratio of air and fuel, to control the ignition timing, and for controlling the electric radiator fan(s).

System design



Installation

PLEASE NOTE: The cooler system must be vented after replacement.

Function

The water temperature sensor is typically either placed on the thermostat housing or the engine block. The temperature measurement is performed using an NTC (Negative Temperature Coefficient) or PTC (Positive Temperature Coefficient) thermistor - a resistor in which resistance changes with temperature. The NTC type is the most common. In both types the thermistor is protected behind the sensor's metal chassing as it is not in direct contact with the coolant.

NTC: The resistance is reduced when the temperature increases and increases as the temperature decreases.

PTC: The resistance increases when the temperature rises and is reduced when the temperature drops.

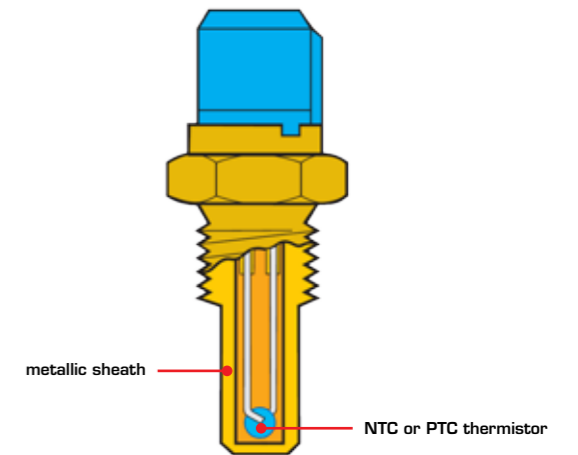
Types

There are two types of sensors for measuring coolant temperatures:

- NTC - Negative Temperature Coefficient
- PTC - Positive Temperature Coefficient

Possible errors

- The sensor sends incorrect values, but within the measuring range.
- The sensor sends entirely incorrect values.
- The sensor sends incorrect values at specific temperatures - intermittent fault.



Technical information
Engine control

Ignition coils

Except for the distributor ignition coils, the different types of ignition coils are exclusively used in ignition systems WITHOUT a traditional distributor.

Types

Pencil/Plug Top Coils



Spark plug cap, coil and in some cases ignition module in one unit (one per cylinder). For vehicles without distributor.

Rails



Spark plug caps, coil and ignition module in one unit. For vehicles without distributor.

Distributor Ignition Coils



Coil - with or without the ignition module in one unit. For vehicles without distributor.

Distributor Ignition Coils



Ignition coil and ignition module in one unit. For vehicles with distributor with electronic ignition.

Quality

Quality management according to IATF 16949.
 100% functional test of every coil.

Mounting

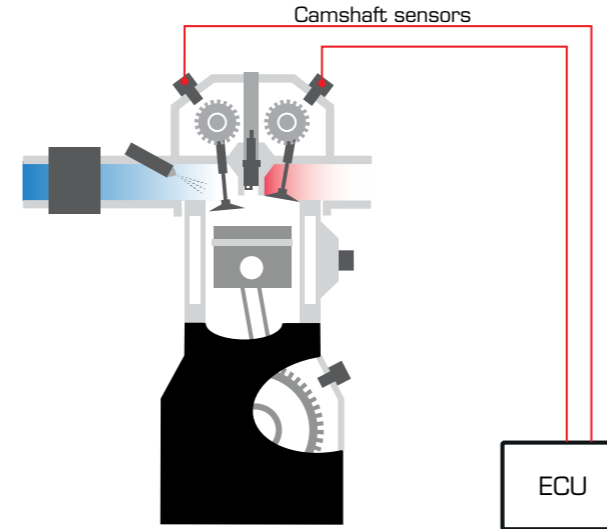
Spark plugs must ALWAYS be replaced when replacing ignition coils.

Technical information
Engine control

Camshaft sensors

The camshaft sensor detects the camshaft rotational speed and position and transmits this information to the engine control (ECU).

System design



Mounting

Remember to check if the vehicle's ECU must be reset after replacement.

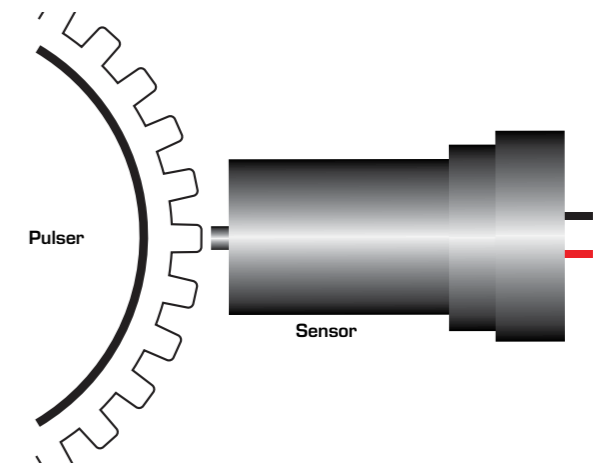
Function

The engine control unit uses the camshaft sensor information to derive the current combustion cycle and to control the timing of fuel injection and ignition. Camshaft sensors are often exposed to extreme heat and can burn off, but can also be worn out. A faulty camshaft sensor can result in an uneven idle, misfire and poor acceleration. In worst case, the engine can not be started. A very common sign of a faulty camshaft sensor is that the engine will not start when it is hot, but starts fine after it has cooled down.

Types

Camshaft sensors are classified into two main categories:

- Active
- Passive

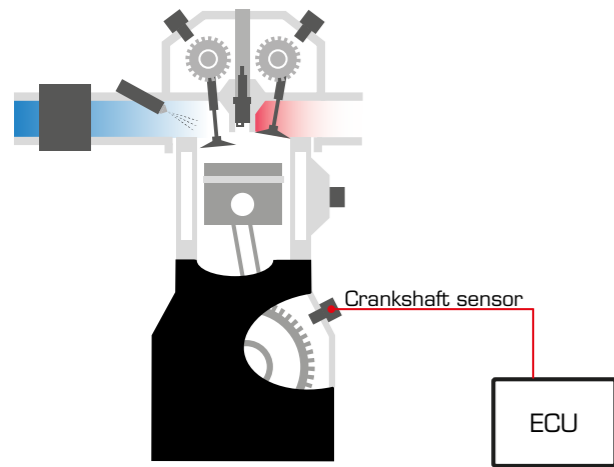


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Crankshaft sensors

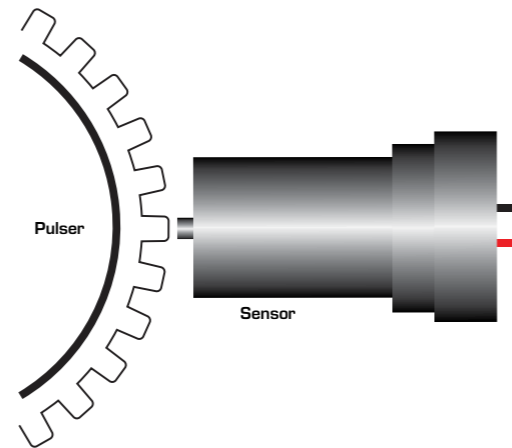
The crankshaft sensor measures the crankshaft's rotational speed and/or position to be used by the vehicle's engine control unit (ECU), which uses the information to control the ignition system.

System design



Function

The engine control unit uses the crank sensor information to derive the current combustion cycle and to control the timing of fuel injection and ignition. The crankshaft sensor is often subjected to excessive heat and can therefore be burnt off as well as worn out. A faulty crank sensor can result in uneven idle, faulty ignition and poor acceleration. In worst cases, the engine can not be started. A very common sign of a faulty crank sensor is that the engine will not start when it is hot, but starts fine after it has cooled down.



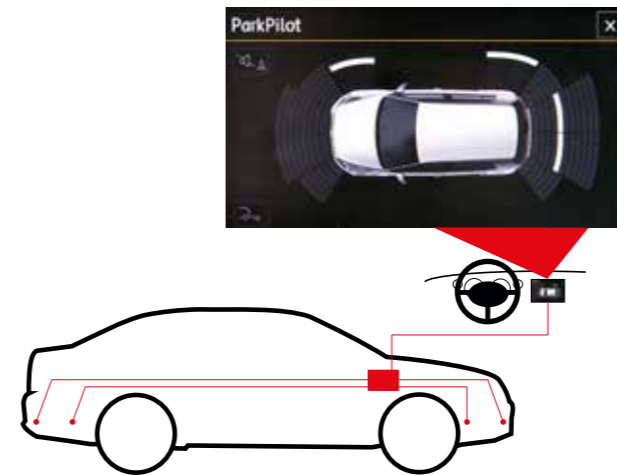
Mounting

Remember to check if the vehicle's ECU must be reset after replacement.

Parking sensors

Parking sensors are used in systems that, during parking or maneuvering of a vehicle, assist the driver by identifying and indicating the distance to any obstacles so that collisions can be avoided. The distance to an obstacle is indicated either visually, by means of sound or a combination of both. Triscan's programme of car specific parking sensors comprises exclusively ultrasonic parking sensors.

System design



Function

An ultrasonic sensor is capable of both transmitting and capturing high frequency sound waves. The sensor can partly convert electrical current to sound waves and convert sound waves to electrical energy. The sensor uses a piezoelectric transducer whose crystals change the size and shape when current is applied and thereby generating sound waves. The crystals can generate electrical current if force is applied to them as well, which also enables them to capture sound waves. The sensor can transmit and capture ultrasonic sound waves in the range of 60-800KHz. By generating an analog output, the sensor can measure the distance to a given object.

Types

- There are primarily two types of sensors:
- Ultrasonic sensors (Triscan)
 - Electromagnetic sensors

Quality

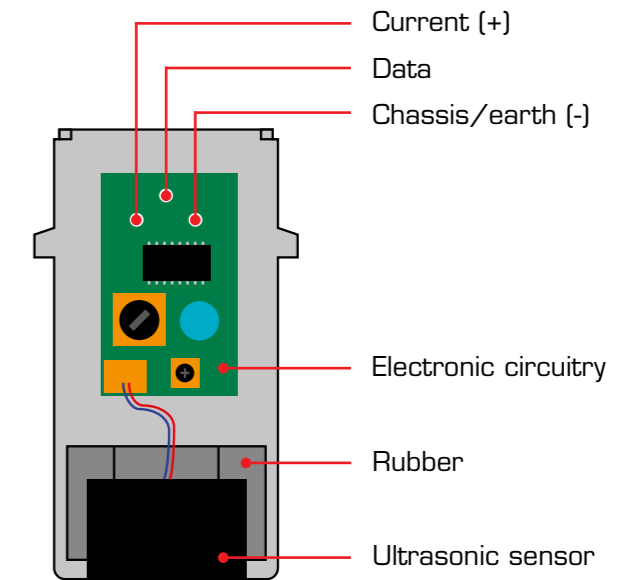
- OE-quality
- Ultrasonic sensor and microchip from OEM manufacturer
- In addition, a 100% functional test is performed

Mounting

Most of Triscan's parking sensors are made of black plastic. The sensors can be painted, but a plastic primer must be applied first.

Numbering system

8815 ZZZZZ: 8815=product group, ZZZZZ=Consecutive numbers



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