

Gasoline Systems (GS)



Automotive Aftermarket

AA/SIA-MA Customer Marketing | 05/2013 | © Robert Bosch Middle East FZE 2013. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.



BOSCH

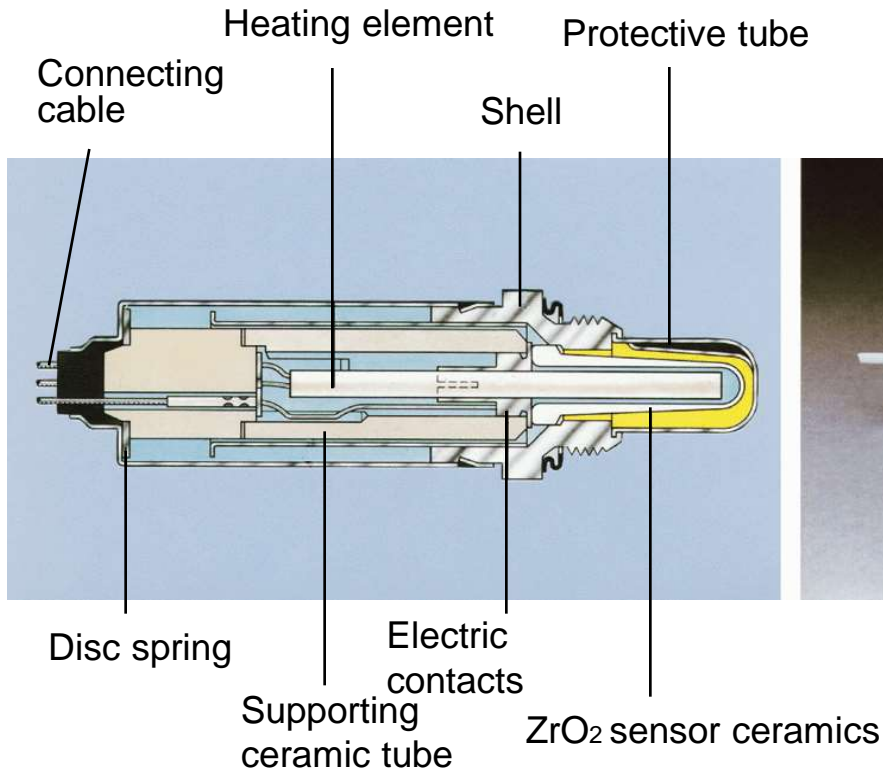
GS - Lambda Sensors



Purpose and Customer Benefits

- Lambda sensors measure the residual oxygen in the exhaust gas
- With the help of lambda sensors the motor management can achieve best operating conditions, as:
 - Minimised exhaust values
 - Minimised fuel consumption
 - Highest motor efficiency
- Target: Lambda 1 (optimum mixture between Air and Fuel)

GS - Lambda Sensors



GS - Ignition Coils Portfolio



Pencil Coils



Compact Coils



**Waste Spark Coils /
Modules**

Single Spark Coils

Bosch Ignition Coils

Ignition Systems from Bosch - Nr. 1 in Europe – Innovative ignition coils in OE quality

- Over 100 years Bosch ignition: In the area of ignition technology the singular projection of Bosch in the experience of development for original equipment offers important advantages. Bosch ignition systems combine the security of fully developed system engineering with the employment of the latest research results.
- Market coverage and programme extensions: The technological development at Bosch runs at full speed. Close to the market and in cooperation with the automotive industry technical innovations are taken over into engine production. Permanent programme extensions and increasing market coverage are the resulting advantages.



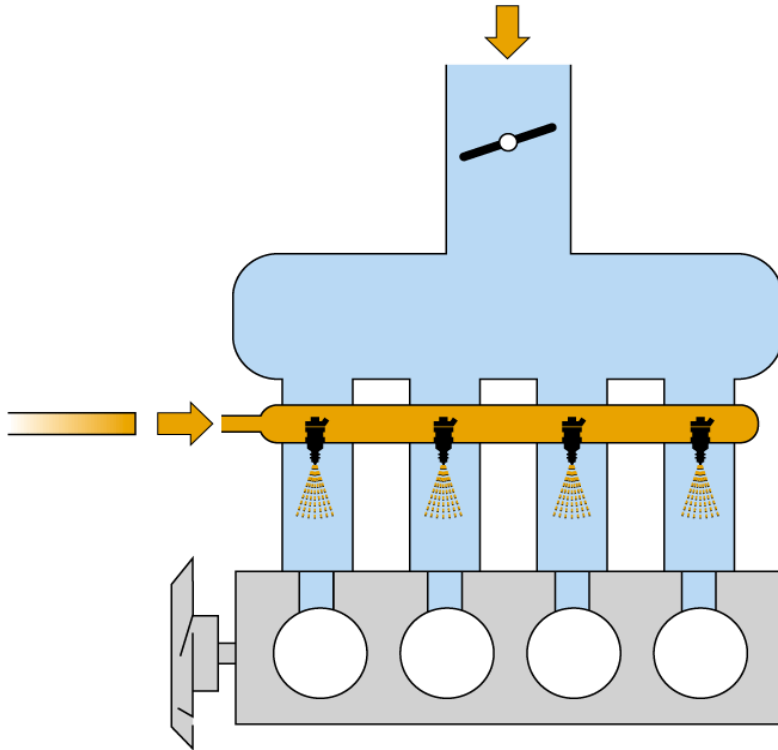
Bosch Ignition Coils

- Highest quality for maximum safe functions have already been realised with the asphalt ignition coil which distinguishes itself through high robustness in the application.
- Advantages of the modern plastic ignition coils are minimization of weight and size with production of higher electrical voltage, temperature and shock resistance.
- Highest expertise in production due to the laser-based optimization of coiling and redundant acquisition of measured data during the encapsulating process. 100% quality end control and regular reliability tests assure the constant adherence to the OEM specifications.

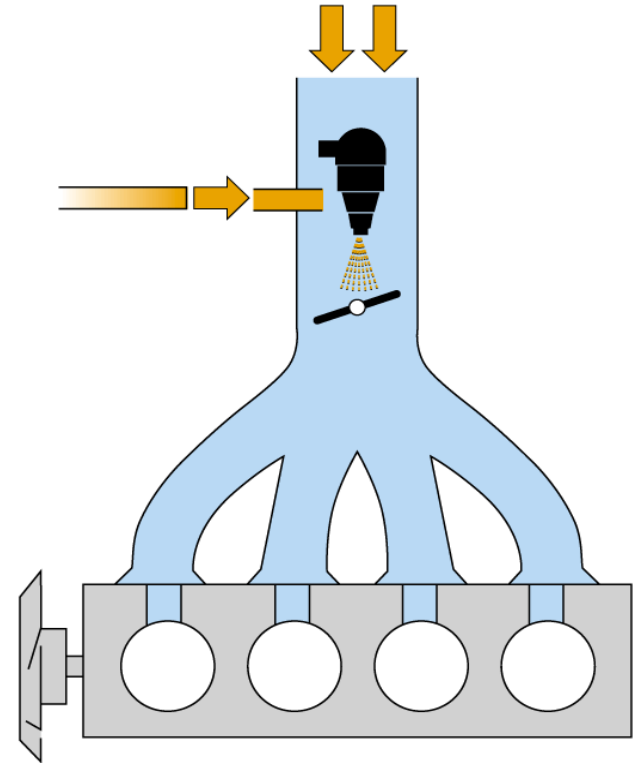


Multi-point and single-point injection

AA/MKK1 | 03.2007 | © Robert Bosch GmbH reserves all rights even in the event of industrial property rights. We reserve all rights of disposal such as copying and passing on to third parties.

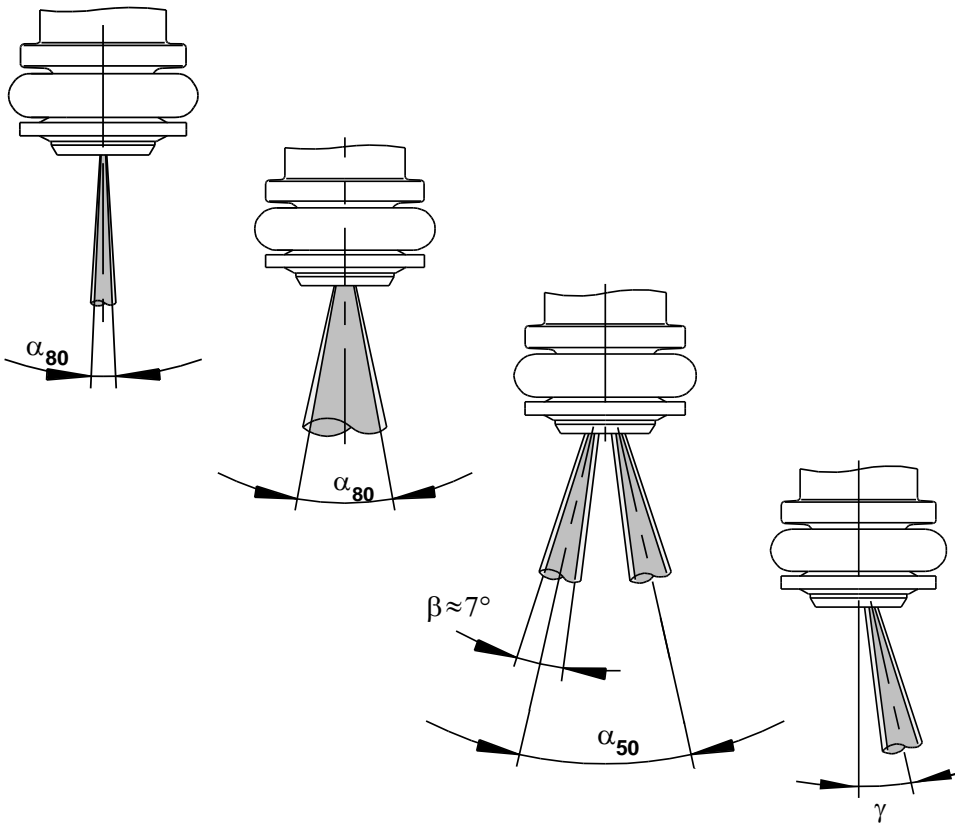


Multi-point fuel injection



Single-point fuel injection

GS - Injection valves



Injectors: Information about valves of the K-Jetronic



part numbers: 0 437 502 xxx

Injection systems:

K-, KE-Jetronic, KE-Motronic

Function: K-Jetronic valves open at an exact defined fuel pressure (normally between 3,5 and 4,1 bar). By this, the valve needle oscillates with a high frequency and even by little injection rates the fuel is well dispersed. Every engine cylinder has an injection valve, which squirts the fuel in front of the induction valve of the engine.

Dispersion, opening pressure and tightness play a decisive role in the effect of the emission performance, the fuel consumption and the starting performance. For an evasion of unmetered air and leakages the O-rings have to be replaced generally.

Injectors: Information about electromagnetic valves for the single point injection

part numbers:

0 280 150 xxx , 0 280 155 xxx, 0 280 156 xxx
0 280 157 xxx , 0 280 158 xxx

injection systems: D-, L-, LH-, Motronic



Function: Every engine cylinder has an injector. These injectors are electronically controlled and squirt the fuel in front of the valve of the engine. As a result the injection-nozzle needle takes off its place for nearly 0.1 mm and so the fuel can escape through a precise circle gap. Already little contaminations in the fuel or settlings can reduce its function. The injectors are installed by special holders in moulded rubber parts. This heat insulation prevents the fuel vaporisation and guarantees a good hot-start performance. In order to avoid unmetered air and leakages the O-rings have to be replaced generally before the reinstallation.

GS – Fuel Supply



Fuel Supply Modules



Electric Fuel Pump In-tank



Pump Kits






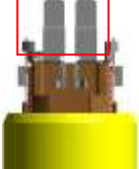


Aftermarket Kits

New Fuel Pump to drive Competitive Coverage!

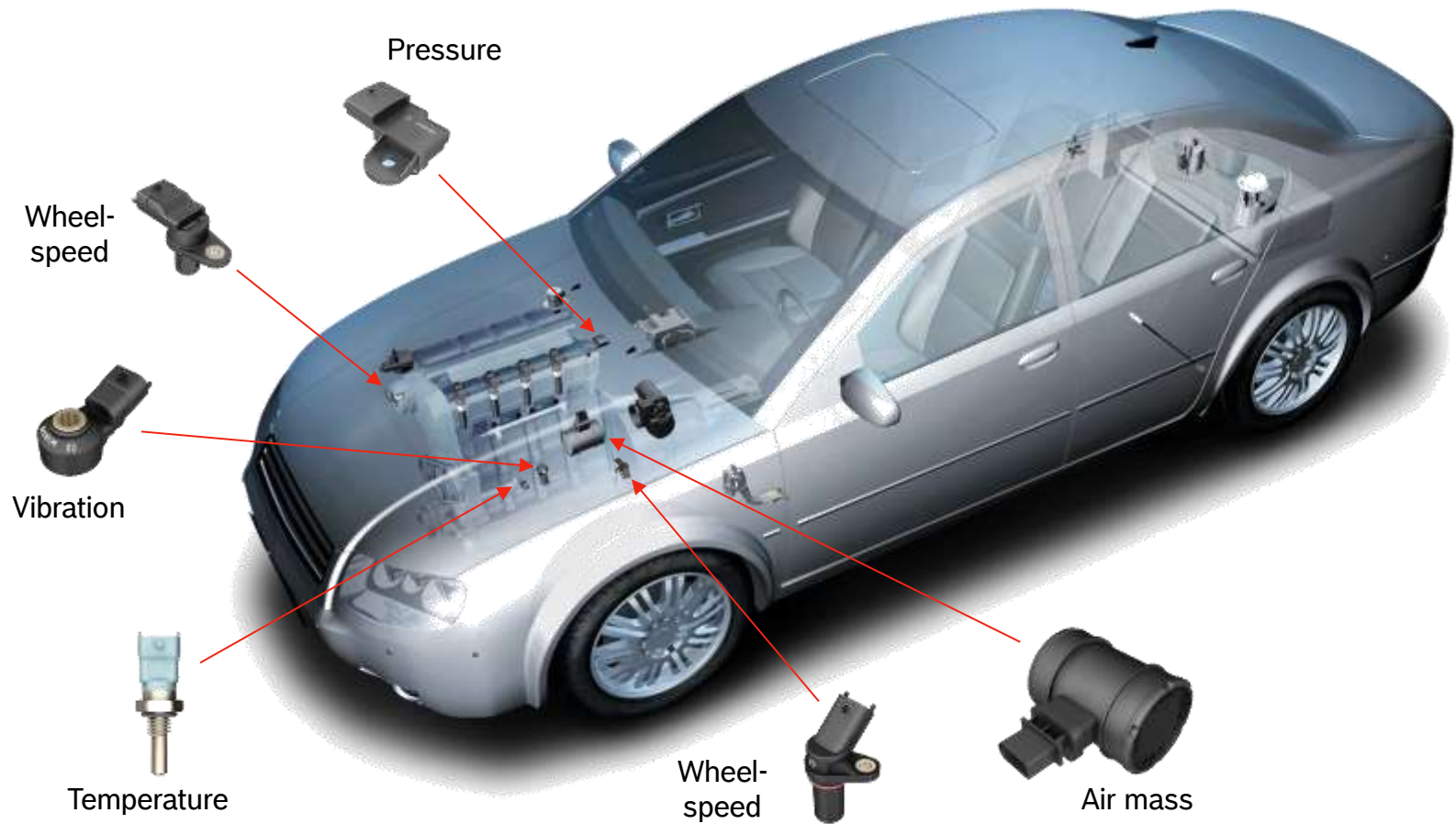


New Fuel Pump to drive Competitive Coverage!

Bosch P/N	Character	Flowrate	Competitors	Application
0 986 AG1 300	Firry Outlet 	$Q \geq 60 \text{ L/h}$ @ 12V / 400 kPa	VDO Airtex	SAC Cherry Proton SGM SVW FIAT etc.
0 986 AG1 302	Wide Pin 	$Q \geq 80 \text{ L/h}$ @ 12V / 400 kPa		
0 986 AG1 301	Bulge Outlet 	$Q \geq 60 \text{ L/h}$ @ 12V / 400 kPa	Denso VDO	Toyota Camry Nissan Honda etc.
0 986 AG1 303	Narrow Pin 	$Q \geq 80 \text{ L/h}$ @ 12V / 400 kPa		
0 986 AG1 304	Bulge Outlet 	$Q \geq 60 \text{ L/h}$ @ 12V / 400 kPa	VDO Denso Delphi Airtex Kafus	Honda Nissan Toyota/Daihatsu Mitsubishi Hyundai/Kia Opel etc.
0 986 AG1 305	Wide Pin 	$Q \geq 80 \text{ L/h}$ @ 12V / 400 kPa		

Covering both Bosch and Competitors, 6 part numbers covering 90% of the market

GS - Sensors



Automotive Aftermarket

Internal | AA/MKG2-Es | 06/03/2009 | © Robert Bosch GmbH 2009. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.



BOSCH

Wheel Speed Sensor (PG-3-8)



Application

- Precise, reliable digital measurement of rotational speed, angles and distances

Features

- Single Hall / single-track target wheel
- True-power-on
- Twist insensitive mounting (TIM)
- Wide temperature range

Customer Benefits

- High accuracy
- Flexible modular concept
- Reduced packaging
- Lower emissions
- Reduced fuel consumption



BOSCH

Fuel Pressure Sensor DS-K(-TF)



Application

- Measurement of absolute pressure, motor oil, fuel, CNG or LPG

Features

- Micromechanical 1 chip concept
- Bosch Compact Connector 1.1, tin-plated contacts with integrated temperature sensor
- Pressure on the chip backside
- Media resistant design (liquid and gaseous media)
- Pressure range 1000 kPa (absolute)

Customer Benefits

- Characteristic line, high accuracy of pressure and temperature
- Installation position: temperature, medium, EMC; diagnosis
- Option TF, quick response time
- Customized solutions (flexibility) for different application positions
- Cost optimized solution (1 component for p, T with direct mounting)
- Robust design, e.g. against mediums
- Many years of experience with excellent quality: 0-km and field (< 10 ppm)



BOSCH

Knock Sensor



Application

- Reliable detection of structure-borne sound to protect machines and motors

Features

- Broadband type, 5 to 22 kHz
- Linear characteristics over large frequency range
- 30mV/g at 5 kHz, active output
- Standard version: -40 ... 130°C
- Extended heat version: -40 ... 150°C

Customer Benefits

- Fuel consumption reduction up to 9%
- Torque increase up to 5%
- Engine protection
- Enables use of multiple quality fuels with various anti-knock properties
- No audible knocking



BOSCH

Air Pressure Sensors DS-S3(-TF)



Application

- Measurement of absolute air pressure

Features

- Pressure range 115, 250, 300 and 400 kPa
- Silicon micromechanics, 1-chip-concept
- Cost reduced design (pre-mold module)
- New chip technology PorSi (CMD221) with improved EMC/ESD characteristics

Customer Benefits

- Improved media resistance
- High accuracy, long term stability and EMC
- Short response time
- Diagnostics for short-circuit and wire breaks
- Optional integrable temperature sensor reduces wiring requirements
- Customer specific modifications easy to realize



BOSCH

Wheel Speed Sensor DG-6P



Application

- Non-contacting and thus wear-free rotational-speed measurement

Features

- Temperature range -40 ... 150°C
- Typical application: Crankshaft sensor with 60-2 teeth target
- Rotation speed range 20.....7000 min-1
- Output voltage > 1650 mV (@416 rpm)
- Well-proven production processes

Customer Benefits

- Robust design:
 - improved temperature shock stability
 - enlarged temperature range
 - reduced drift during life time
- Long life time → 300 Tkm
- All known requirements of new engine projects met
- Independent on installation position
- Contactless
- High resistance against external fields



BOSCH

Water/Oil Temperature Sensor



Application

- Wide range of liquid temperature measurements with temperature-sensitive resistors.

Features

- Temperature range: $-40^{\circ}\text{C} \leftrightarrow +130^{\circ}\text{C}$ (+150°C)
- Supply voltage: 5V (only with series resistance)
- Response time ($\tau(63)$): 20 ...80°C): 10 ...15sec.
- Vibration proof: Max. $a(\sin) = 300 \text{ m/s}^2$
- Isolation: 500V for 1 ...3sec.
- Durability against operating materials (fuel, oil, battery acid, ...)
- Durability against water according DIN 40 050, IPX4K 9K

Customer Benefits

- Engine coolant water / oil temperature
- Can be mounted on engine block for air cooled engines
- Modifications with small complexity: NTC (accuracy), screw thread (M12x1,5 or M14x1,5), length of shaft, connector (compact or jetronic), flat connector (stannous or gold), captive sealing-ring (cooper or aluminium)



BOSCH

Hot-film Mass Air Flow Sensors



History of BOSCH Air-Mass Sensors

LMM1

Hot-film air mass sensor ceramic measuring element, plastic housing

LMM2

Air flow sensor pressure flap with potentiometer, metal Al-housing

HLM3

Hot-wire air mass sensor, plug-in type, platinum hot-wire, plastic housing

1972

1981

1985

1986

1987

HLM1

Hot-wire air mass sensor platinum hot-wire, metal Zn housing

HLM2

Hot-wire air mass sensor, plug-in type platinum hot-wire, plastic housing



BOSCH

History of Hot-Film Air Mass Sensors

HFM2



6.7 mio pcs. sold

HFM5



63.6 mio pcs. sold

HFM6



5.5 mio pcs. sold

HFM7



2007

1990

1996

2002

Hot-film air mass sensor, ceramic measuring element, plastic housing

Analog, hot-film air mass sensor micro-mechanical measuring element, backflow detection, NTC optional, plastic housing

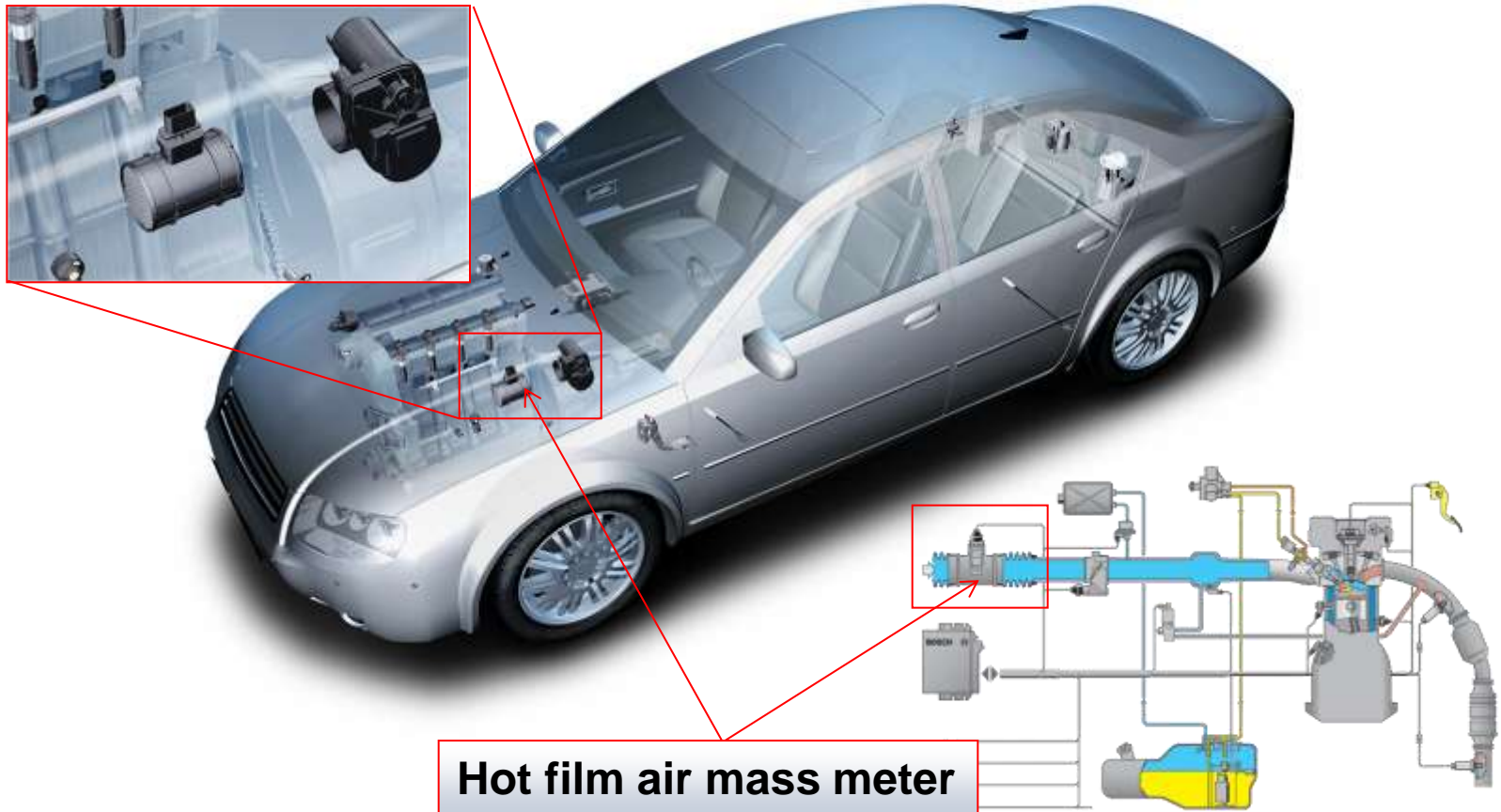
Digital, hot-film air mass sensor micro-mechanical measuring element, backflow detection, digital signal processing, frequency output, plastic housing

Analog/digital, robustness improvement, corrosion resistant temperature sensor (optional)



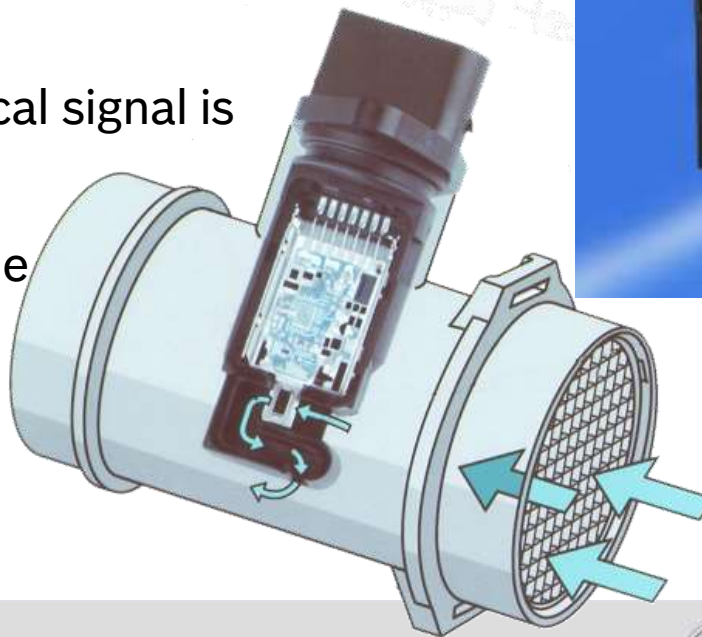
BOSCH

Location on vehicle



Basic function

- It accurately registers the air flow drawn in by the engine
- Air mass is measured using thick film technology
- Intake air temperature has no effect on measuring accuracy
- A corresponding electrical signal is sent to the engine ECU
- Together with the throttle valve position, the ECU calculates the engine's required fuel mass



BOSCH

A complete assembly!

- Bosch only supply sensor and housing as one unit. Why?
- Air flow is measured to very fine tolerances
- Essential for efficient and correct engine performance
- Accuracy is achieved by calibration after assembly of element to housing
- This allows for irregularities in housing dimensions
- The reason for tamper proof screws
- Once element is removed or altered calibration is lost
- Copy and fake parts neither function correctly nor are manufactured to high tolerance levels



HMF6 has sensor element bonded to housing



BOSCH

Benefits of Bosch product

- All original equipment parts developed in conjunction with the vehicle manufacturers
- Guaranteed to match vehicles requirements (performance, driveability, economy, emissions)
- Reliable operation
- Quality component to last for full service life
- Fit and forget
- Retain vehicle type approval
- Reduced warranty issues and costs
- Real value for money



BOSCH

Summary

Bosch develops the engine management systems to which the Bosch hot film air mass meter is fitted.

Unrivalled and Continuous R and D programme with vehicle manufacturer.

Not all hot film air mass meters share the same technology- eg, HMF2, HMF5, HMF6. None are automatically interchangeable.

Superior manufacturing quality with rigorous testing and calibration.

Hot film air mass sensor is calibrated using the trimming pins next to the connector **after** fitment to the housing. Without this, the units functional accuracy can never be assured.

The HFM must be supplied as a complete assembly with the housing guarantee adherence to the vehicle manufacturers specification.

The only solution is to replace with a genuine Bosch part



BOSCH