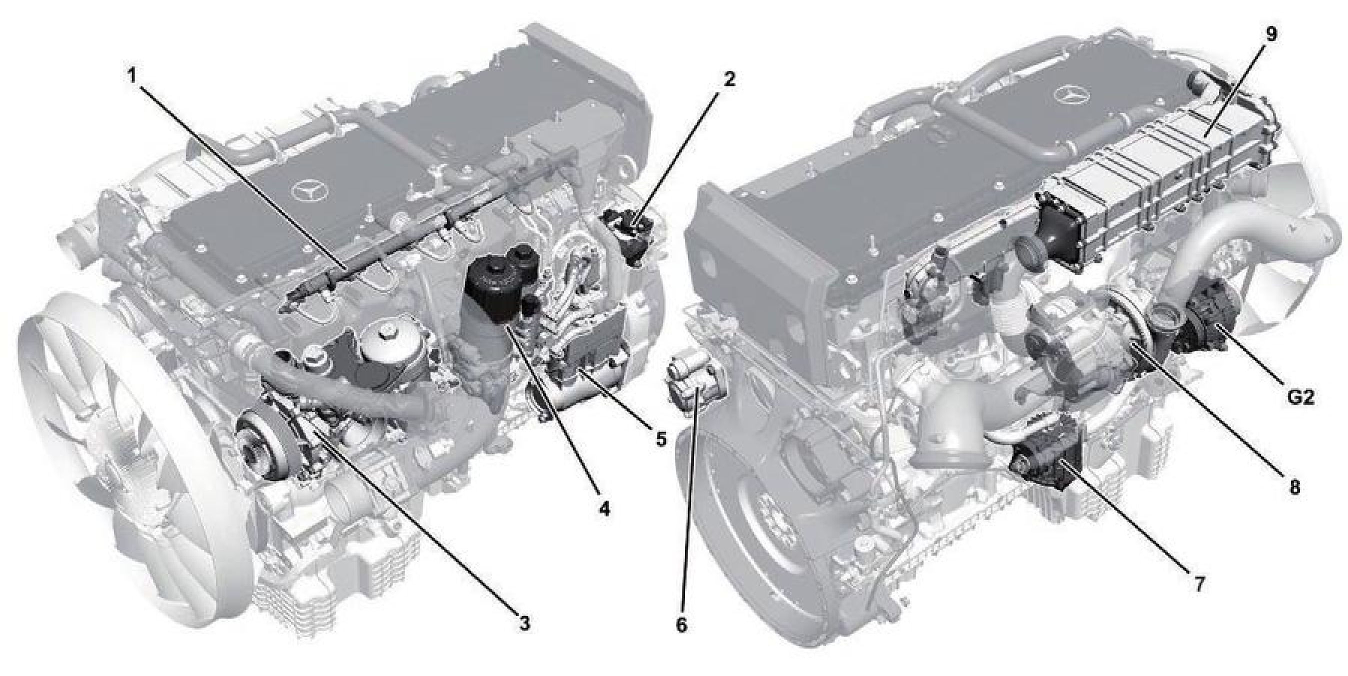
SN00.00-W-0002-04H	Engine OM 471		



W01.10-1090-09

1 *Amplified Pressure Common-Rail System (APCRS)*
2 *Diesel fuel-metering device (for regeneration of diesel particulate filter (DPF))*
3 *Oil/coolant module*
4 *Fuel filter module*
5 *Compressor*
6 *Power steering pump*
7 *Oil separator for crankcase ventilation system*
8 *Turbocharger*
9 *Cooled and regulated exhaust gas recirculation (AGR)*

G2 *Generator*

The engine OM 471 is the first 6-cylinder inline engine with two overhead camshafts to be used in a Mercedes-Benz commercial vehicle.
Both camshafts are driven by a gear drive which is located at the output side of the engine. The position of this drive gear makes a major contribution to reducing noise emission.

The extremely compact design of the engine is based on the optimized cylinder liner concept in which the overhead seat is located at the bottom in the crankcase - this design measure allows the gap between the cylinders to be reduced considerably.

The OM 471 engine is available in four output stages between 310 and 375 kW.
Advantages of new 6-cylinder inline engine:
- Lower fuel consumption in relation to high output
- Smooth running characteristics, whereby only four counterweights are required on the crankshaft
- Excellent application capability for the various emissions standards
- Implementation of particularly high combustion pressures of up to 230 bar

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The positive properties of the new engine have been made possible by a variety of new technical developments:
- The new injection system, the amplified pressure common rail system (APCRS) (1), is the first common rail system to be used in Mercedes-Benz commercial vehicles that minimizes the quantity of fuel required for combustion. The advantage of this system lies in the fact that the rail and high-pressure lines have a relatively low pressure of 900 bar, and the fuel pressure required for injecting into the injector is generated, which has a particularly positive effect on material loads and therefore on component longevity.
- The completely redesigned engine brake system has an even higher braking power.
- The cooled and regulated exhaust gas recirculation (EGR) (9) and the diesel particulate filter (DPF) as well as the modified oil separator of the crankcase ventilation system (7) ensure that tomorrow's emissions regulations can also be met.
- The regulated coolant pump installed in the oil/coolant module (3), which has already been installed in Actros vehicles, also contributes to fuel economy.

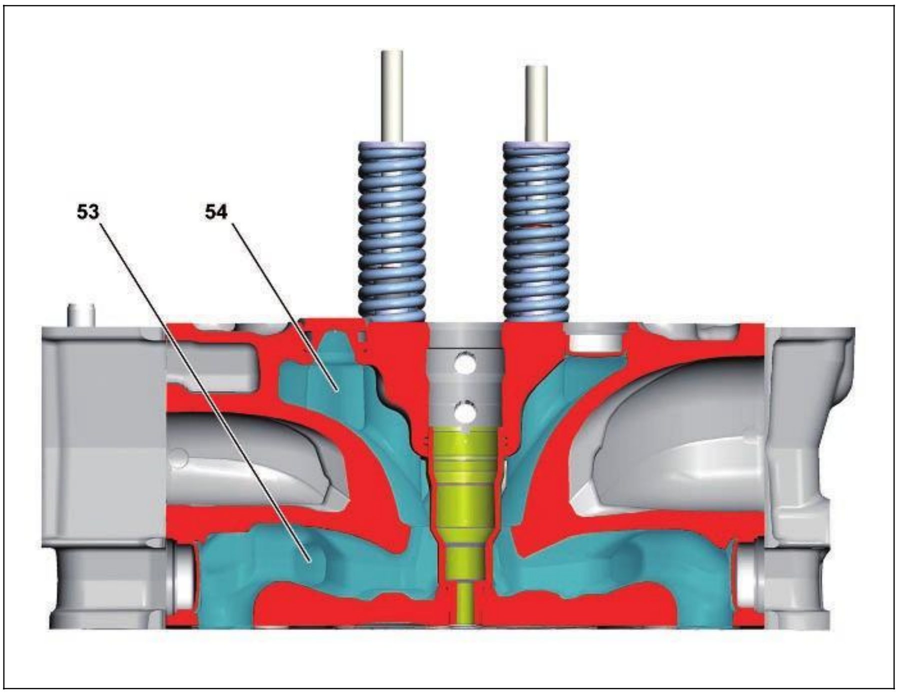
ℹ With each maintenance and repair work to the engine as well as to the ancillary assemblies and detachable parts comes the danger of property damage caused by soiling and foreign bodies. The high pressure diesel injection system, the intake system and the oil circuit, in particular, are at risk here.

To avoid any damage, when conducting repair work not only the specified special tools must be used along with observance of the WIS repair instructions, but in addition to this special care must be given to cleanliness at the workbay.
Additional information is available in the document AH00.00-N-5000-01H.

Cooling levers

53 Lower cooling level

54 Upper cooling level



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Cooling

The cylinder head has a divided coolant jacket. This means that the coolant, after it has flushed around the cylinders, flows into the cylinder head on the inlet side and on the exhaust side. The advantage is that the coolant first flushes around the fuel injectors and valve seat rings in the lower cooling level (53) of the cylinder head.

After this the coolant flows into the upper cooling level (54) of the cylinder head and cools the valve guides. The coolant is collected there and directed outwards.

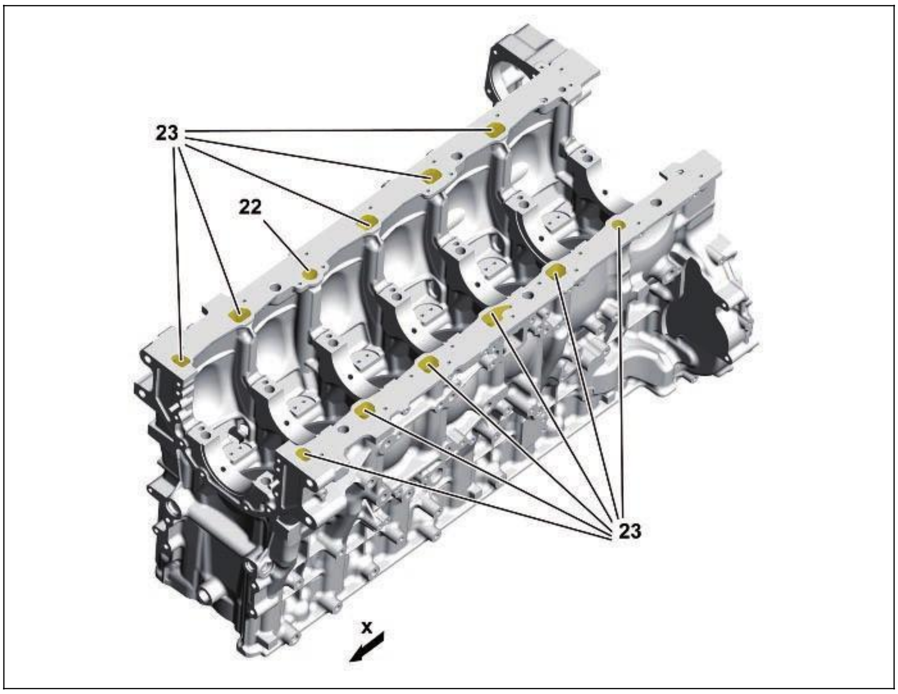
As-built configurations

Crankcase from below, shown with oil ducts

22 Oil return duct to oil/coolant module

23 Oil return ducts to oil pan

x Direction of travel



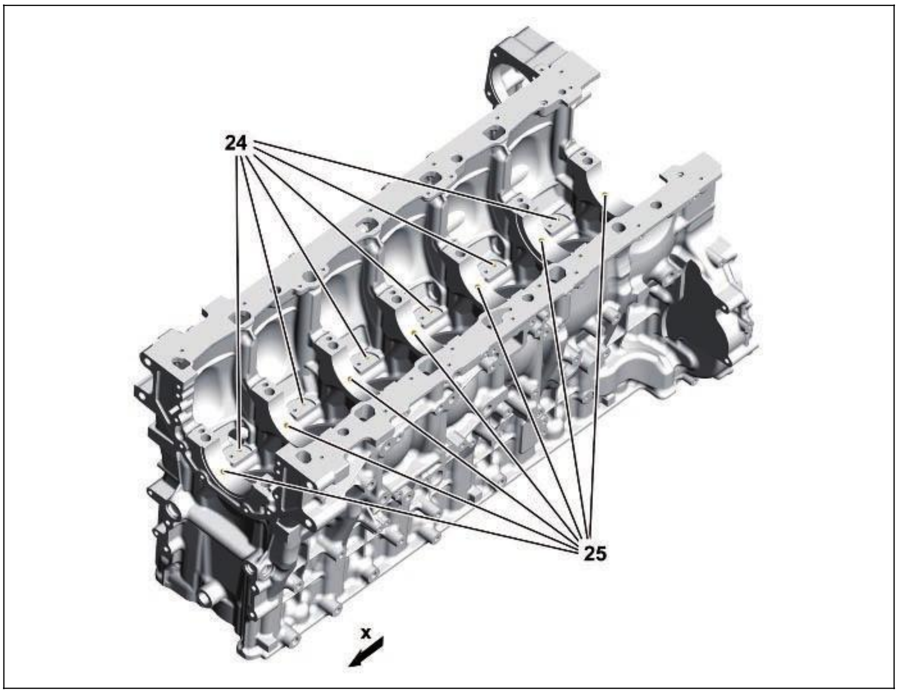
W01.40-1146-76

Crankcase from below, shown with oil ducts

24 Bores for oil supply to the oil spray nozzles

25 Bores for oil supply to the main bearing, crankshaft and connecting rod bearing

x Direction of travel



W01.40-1147-76

The crankcase consists of cast iron and is characterized by the following features:

- a high rigidity and low noise emissions due to the vertical and horizontal reinforcements, as well as due to the design form of the oil return ducts
- a compact design due to the low distance from the cylinder

The crankcase also has 1.5 mm recesses at the sealing surface to the cylinder head for all coolant overflow holes to the cylinder head (6) and for all oil overflow holes to the cylinder head (20). These serve to receive the respective elastomer elements in the cylinder head gasket.

The following major assemblies and components are located on the crankcase:

Right-hand side

- Turbocharger
- Starter
- Oil separator for crankcase ventilation system

Left-hand side

- Oil/coolant module
- Engine management (MCM) control unit
- Fuel filter module
- Fuel high pressure pump
- Compressor, power steering pump

Function

If all requirements are met and if the engine start and engine stop button (S600) is pressed or a corresponding message with the start request is received over the drive train CAN (CAN 4), e.g. when the start-stop button on the electronic ignition lock (EIS) (S1) is pushed to the start position (Stage 2) and held there or the parameterizable special module (PSM) control unit (A22) sends a corresponding message with the start request, the engine management (MCM) control unit (A4) actuates the starter's starter solenoid (M1) through a series relay.
The starter (M1) sets the engine in motion and the engine management (MCM) control unit (A4) checks whether the starter (M1) is turning the engine at the specified minimum speed.
It also waits until it can recognize from crankshaft position sensor signals (B600) when cylinders 1 and 6 are at top dead center (TDC).

Only then can the actuation begin for the fuel injectors for cylinder 1 and 6 (Y608 and Y613), calculated while taking account of the current operating condition of the engine.
At the same time, the engine management (MCM) control unit (A4) calculates the required injection quantity for combustion and initiates the injection of this at the correct point in time into the combustion chambers of cylinders 1 and 6 through appropriate actuation of the quantity control valves (Y642) and fuel injectors for cylinder 1 and 6 (Y608 and Y613).
This so-called double ignition serves to accelerate the starting procedure. It is continued (afterwards follow cylinders 5 and 2, 3 and 4, then further with 1 and 6, etc.), until the ignition TDC of cylinder 1 is recognized with the aid of the camshaft position sensor (B601).

i If the camshaft position sensor (B601) fails to return any pulses, then in each case a portion of the double firing is cutoff, until the dip in speed, which then occurs, when a piston is not in ignition TDC, enables ignition TDC to be recognized. Once ignition TDC is recognized, the engine continues to run in unchanged state. Nevertheless, the maximum torque of the engine will be limited to protect the engine from damage. The engine management (MCM) control unit (A4) can also regulate the limp-home speed.

Determining the injection quantity:
Determination of the injection volume independently of the accelerator pedal position in order to achieve a secure engine start with the lowest possible emission of pollutants.

The injection quantity selected for the starting procedure is primarily geared to the coolant temperature, which is determined by the engine management (MCM) control unit (A4) via the exhaust coolant temperature sensor (B606).
Further influencing factors for the injection quantity during the starting procedure are the current engine speed as well as the geographical altitude at which the vehicle or engine is located.

i There is an atmospheric pressure sensor in the engine management (MCM) control unit (A4) over which the air pressure of the ambient air is determined for determination of the altitude and the current altitude of the vehicle or engine can be deduced.

The engine starts with this initial, primarily temperature-dependent, start injection quantity.
If the engine does not start with the start injection amount, then the injection quantity will be continuously increased until the engine starts or the limit value for the max. start injection quantity is reached. This is then maintained until the starter (M1) actuation is interrupted either by itself or after a specific time by the engine management (MCM) control unit (A4), to protect the starter (M1) against mechanical or thermal overload (start time limit).
If the engine starts, while the start-stop button on the electronic ignition lock (EIS) (S1) or the engine start and engine stop button (S600) are still being pressed, and if it reaches a specific speed then the actuation of the starter (M1) is interrupted (starter dump speed).

The pinion is pulled back out of the ring gear on the flywheel, while start actuation of the injection quantity changes over to the idle speed control. This changeover is known as starter disengagement which exclusively results in a change of the calculation method. Because the cold start ability of diesel engines at low outside temperatures is restricted by the engine's increasing resistance to rotation, lower combustion chamber temperatures and unfavorable fuel atomization conditions, under certain conditions a pilot injection is conducted.
This contributes significantly to shorter starting times, to faster smooth engine operation, to improved throttle response, to lower white smoke emission, to less pollutant emissions and lower noise emissions.

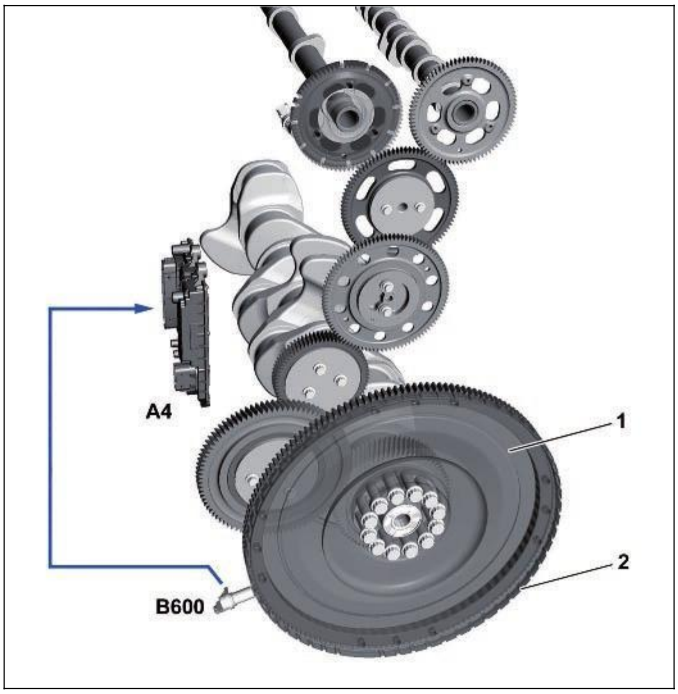
	Determination of the engine speed and crankshaft angle, function		**Page 53**
	Determination of the compression stroke at cylinder 1, function		**Page 54**
	Determination of coolant temperature, function		**Page 55**
	Determination of air mass, function		**Page 56**
	Determination of the fuel temperature, function		**Page 57**
	Fuel supply, function		**Page 91**

GF07.00-W-3001H	Determination of the engine speed and crankshaft angle, function	2.8.11

ENGINE 471.9 in MODEL 963

1 Flywheel
2 Groove

A4 Engine management control unit (MCM)
B600 Crankshaft position sensor



W07.16-1065-82

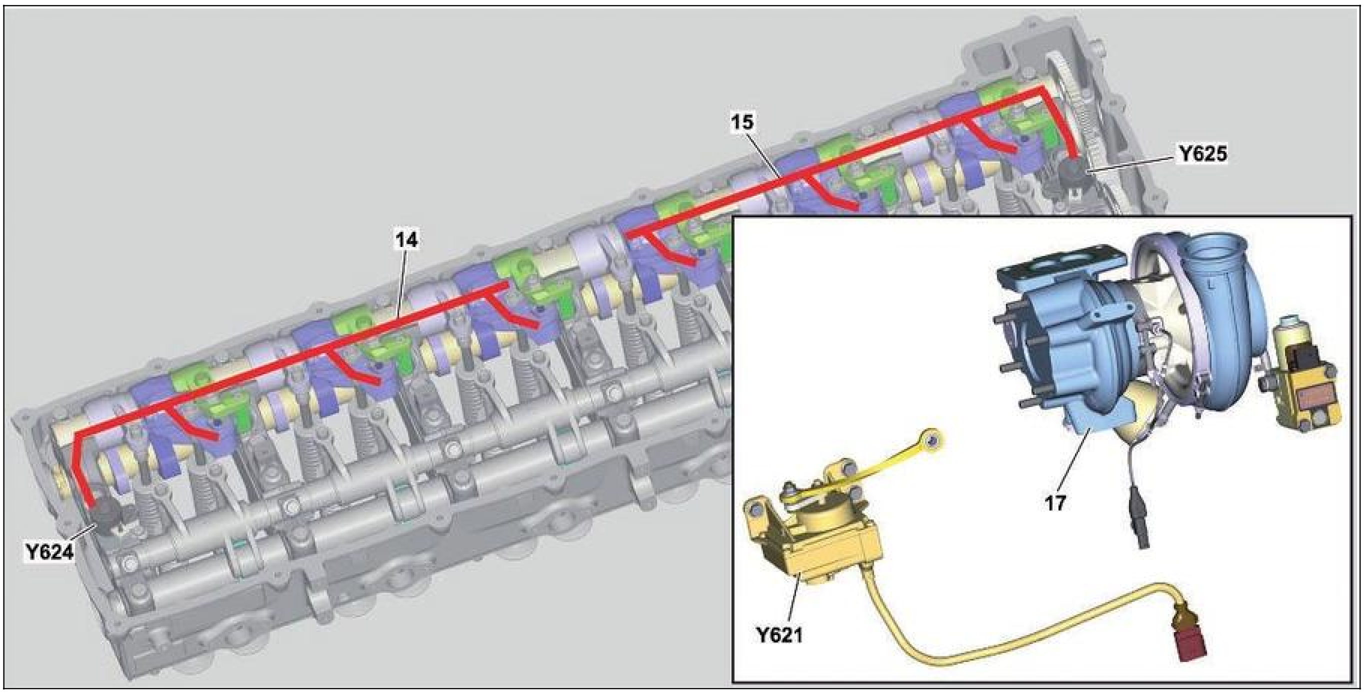
The engine speed and the crankshaft angle are taken at the flywheel (1). To do this there are 58 grooves (2) around the circumference of the flywheel (1) located 6° apart around the circumference, except for a gap of 18°.

ℹ With the aid of the 18° gap which is located between the groove 63° before top dead center (TDC) and the groove 45° before top dead center (TDC) for cylinders 1 and 6, the top dead center of cylinders 1 and 6 or the angular position of the crankshaft can be recognized.

Each groove (2) triggers an impulse in the crankshaft position sensor (B600). As soon as the engine management (MCM) control unit (A4) receives an impulse from the crankshaft position sensor (B600) its starts an internal counter (trigger). Calculations yield the crankshaft position and the engine speed.

Calculation of intermediate values makes it possible for the engine management (MCM) control unit (A4) to accurately determine the start of injection and the period of injection to within a fraction of a degree.

	Component description for engine management (MCM) control unit	A4	**Page 103**
	Component description for crankshaft position sensor	B600	**Page 145**



W14.15-1137-79

Brake stage III

14 Cylinder 1...3 oil duct
15 Cylinder 4...6 oil duct
17 Turbocharger
Y621 Exhaust gas recirculation positioner
Y624 Engine brake solenoid valve, stage 1
Y625 Engine brake solenoid valve, stage 2

In brake stage III the brake power is reached by all cylinders and through an additional increase in the internal pressure of the cylinder.

As soon as the brake stage III is activated by the driver over the engine brake switch the initial reaction is for the same processes as for brake stage II to be triggered. In addition to the now fully switched-in decompression brake also the wastegate valve on the turbocharger (17) as well as the exhaust gas recirculation positioner (Y621) are actuated.

In this way a situation is achieved whereby the internal pressure of the cylinder is increased during the compression stroke - which results in a higher braking torque.
The engine management (MCM) control unit (A4) uses the boost pressure and the turborcharger speed as controlled variables.

Additional functions of the engine brake system

Providing support during shift operations
The engine brake is automatically activated for all normal shift operations without the driver having to do anything. Activation of the engine brake significantly lowers the rotational speed between the individual shift operations whereby more rapid synchronization is achieved, which in turn leads to a more rapid acceleration of the vehicle.

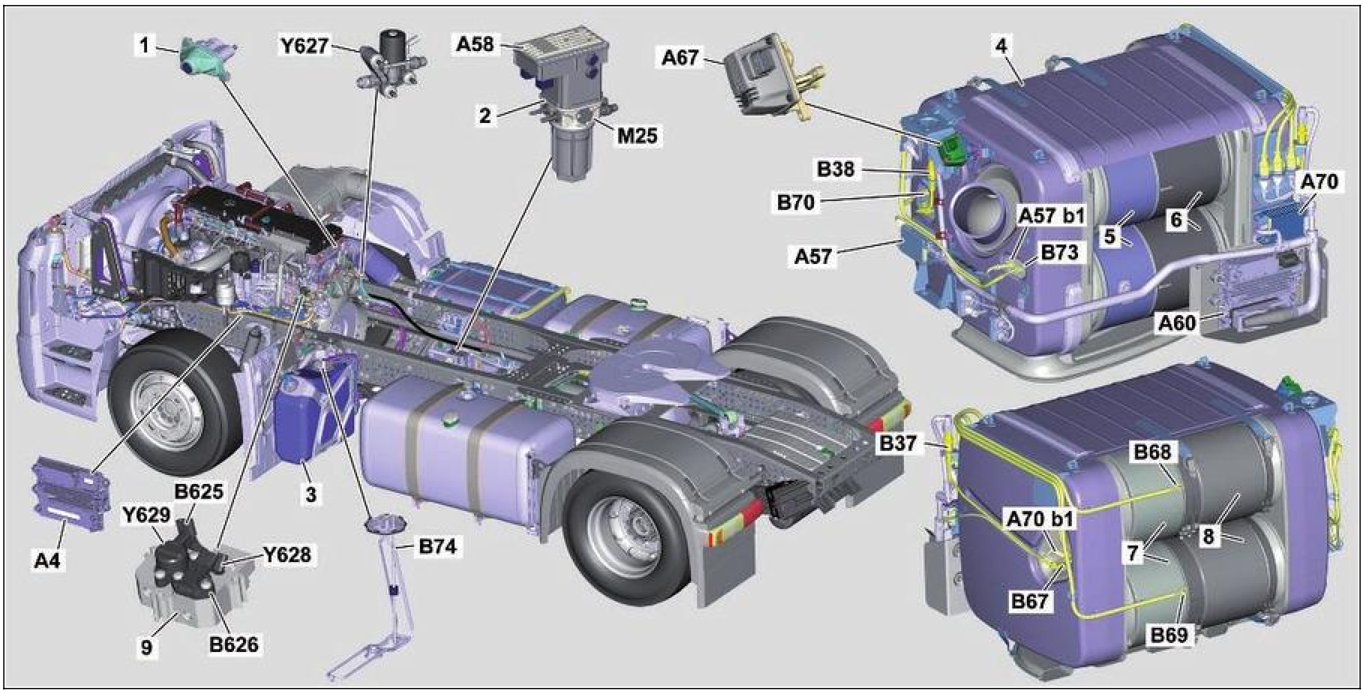
The engine management (MCM) control unit (A4) uses the following parameters as a controlled variable:

- Oil temperature
- Differential speed
- Boost pressure

The brake stages I...III are activated based on these.

Supporting stopping the engine
If the ignition is switched off and the injected fuel quantity = 0, the engine brake is automatically activated without any action on the part of the driver. The compression is strongly reduced through opening the exhaust valve so the engine can "slowly come to a halt" and not be shifted between two ignition TDCs by the compression.

This function is only effective for oil temperatures below about 70°C. In the case of a warm engine it is, therefore, possible that the engine tangibly "shakes" when stopping.



W14.40-1557-79

System overview

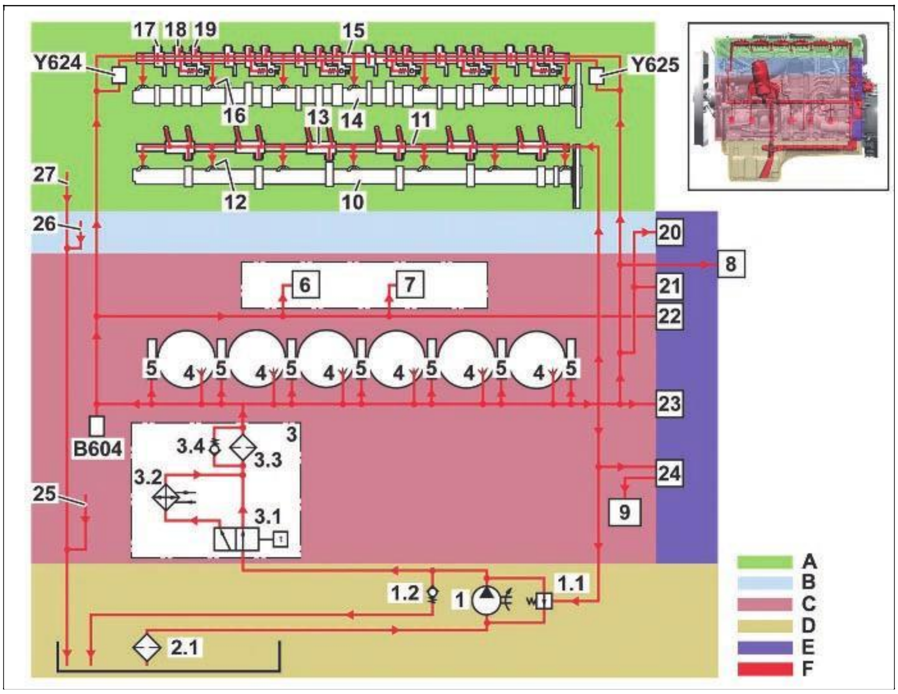
1 *Nozzle unit for DPF regeneration*
2 *Pump module*
3 *AdBlue® tank*
4 *Exhaust aftertreatment unit*
5 *Ammonia blocking CAT*
6 *SCR catalytic converter*
7 *Diesel oxidation catalytic converter (DOC)*
8 *Diesel particulate filter (DPF)*
9 *Diesel fuel metering device (for DPF regeneration)*

A4 *Engine management control unit (MCM)*
A57 *NOx sensor control unit output for exhaust aftertreatment unit*
A57 b1 *NOx sensor output for exhaust aftertreatment unit*
A58 *SCR control unit*
A60 *Exhaust aftertreatment (ACM) control unit*
A67 *AdBlue® metering device*
A70 *NOx sensor control unit input for exhaust aftertreatment unit*
A70 b1 *NOx sensor input for exhaust aftertreatment unit*
B37 *Exhaust pressure sensor upstream of diesel oxidation catalytic converter*
B38 *Exhaust pressure sensor downstream of diesel particulate filter*
B67 *Exhaust temperature sensor upstream of diesel oxidation catalytic converter*
B68 *Exhaust temperature sensor downstream of upper diesel oxidation catalytic converter*
B69 *Exhaust temperature sensor downstream of lower diesel oxidation catalytic converter*
B70 *Exhaust temperature sensor downstream of diesel particulate filter*
B73 *Exhaust temperature sensor downstream of SCR catalytic converter*
B74 *AdBlue® fill level sensor/temperature sensor*
B625 *Fuel pressure sensor (inlet)*
B626 *Fuel pressure sensor (outlet)*
M25 *SCR delivery pump*
Y627 *AdBlue® heater coolant solenoid valve*
Y628 *Fuel metering valve*
Y629 *Fuel shutoff valve*

Functions

GF18.00-W-0001-01H	Engine oil circuit schematic		

1 *Oil pump*
1.1 *Pressure control valve*
1.2 *Safety valve*
2.1 *Oil strainer*
3 *Oil/coolant module*
3.1 *Oil thermostat*
3.2 *Oil/water heat exchanger*
3.3 *Oil filter*
3.4 *Check valve*
4 *Oil spray nozzle*
5 *Crankshaft bearing lubrication point*
6 *Turbocharger*
7 *Crankcase ventilation system oil separator*
8 *Power take-off lubrication point*
9 *Compressor lubrication point*
10 *Intake camshaft*
11 *Intake rocker arm spindle*



W18.00-1066-76

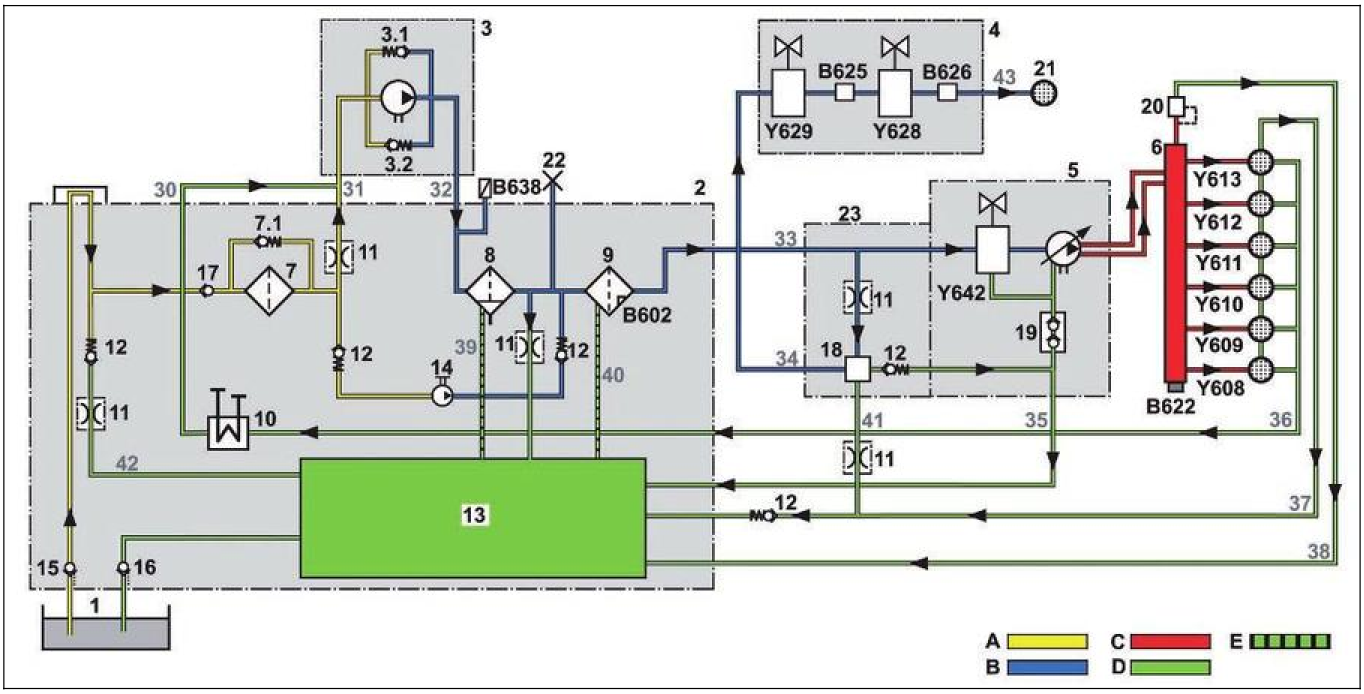
12 *Intake camshaft bearing lubrication point*
13 *Intake rocker arm*
14 *Exhaust camshaft*
15 *Exhaust rocker arm spindle*
16 *Exhaust camshaft bearing lubrication point*
17 *Exhaust rocker arm*
18 *Exhaust rocker arm with hydroelement*
19 *Brake rocker arm*
20 *Intermediate gear lubrication point (to camshafts)*
21 *Double idler gear lubrication point (to next gear level)*
22 *Intermediate gear lubrication point (for power take-off)*
23 *Intermediate gear lubrication point (for fuel system high pressure pump)*
24 *Double idler gear lubrication point (for compressor and next gear level)*
25 *Crankcase return*
26 *Cylinder head return*
27 *Camshaft housing return*

B604 *Oil pressure sensor*
Y624 *Engine brake solenoid valve, stage 1*
Y625 *Engine brake solenoid valve, stage 2*

A *Camshaft housing*
B *Cylinder head*
C *Crankcase*
D *Oil pan*
E *Gearwheel drive*
F *Engine oil*

GF47.00-W-3011HB	Fuel low pressure circuit function	20.7.11

ENGINES 471.9 in MODEL 963 with CODE (M5Z) Engine version Euro VI



W47.00-1038-79

1 *Fuel tank*
2 *Fuel filter module*
3 *Fuel pump*
3.1 *Pressure limiting valve*
3.2 *Bypass valve*
4 *Diesel fuel metering device (for regeneration of diesel particulate filter (DPF))*
5 *Fuel system high pressure pump*
6 *Rail*
7 *Fuel prefilter*
7.1 *Wastegate*
8 *Water separator*
9 *Fuel filter*
10 *Fuel cooler*
11 *Throttle*
12 *Check valve*
13 *Fuel accumulator*
14 *Hand-operated delivery pump*
15 *Shutoff valve in the fuel feed (locked in open position)*
16 *Shutoff valve in the fuel return (locked in open position)*
17 *Shutoff valve (in the form of an elastomer ball, which prevents draining of the intake duct for standstill of the engine)*
18 *Evaporation volume of diesel fuel metering device (for regeneration of the diesel particulate filter (DPF))*
19 *2-stage valve*
20 *Pressure limiting valve*
21 *Injection nozzle (for regeneration of the diesel particulate filter (DPF))*
22 *Filling valve*
23 *Pressure preparation flange for the fuel supply of the diesel fuel metering device*
30 *Fuel return line from fuel cooler to fuel filter module*
31 *Fuel feed line from fuel filter module to fuel pump*
32 *Fuel feed line from fuel pump to fuel filter module*
33 *Fuel feed line from fuel filter module to fuel system high pressure pump*
34 *Fuel feed line from fuel system high pressure pump to diesel fuel metering device*
35 *Fuel return line from 2-stage valve*
36 *Fuel return line of pressure booster*
37 *Fuel return line of nozzle needle valves*
38 *Fuel return line from pressure limiting valve*
39 *Vent line (from water separator)*
40 *Vent line (from fuel filter)*
41 *Fuel return line from pressure preparation flange for the fuel supply of the diesel fuel metering device*
42 *Fuel return bypass*
43 *Fuel feed line from diesel fuel metering device to injection nozzle in the nozzle unit for DPF regeneration*

B602 *Fuel temperature sensor*
B622 *Rail pressure sensor*
B625 *Fuel pressure sensor (inlet)*
B626 *Fuel pressure sensor (outlet)*
B638 *Fuel filter module pressure sensor*
Y608 *Cylinder 1 fuel injector*
Y609 *Cylinder 2 fuel injector*
Y610 *Cylinder 3 fuel injector*
Y611 *Cylinder 4 fuel injector*
Y612 *Cylinder 5 fuel injector*
Y613 *Cylinder 6 fuel injector*
Y628 *Fuel metering valve*
Y629 *Fuel shutoff valve*
Y642 *Quantity control valve*

A *Fuel feed/suction side*
B *Fuel feed (thrust side)*
C *Fuel high pressure*
D *Fuel return*
E *Bleeding*

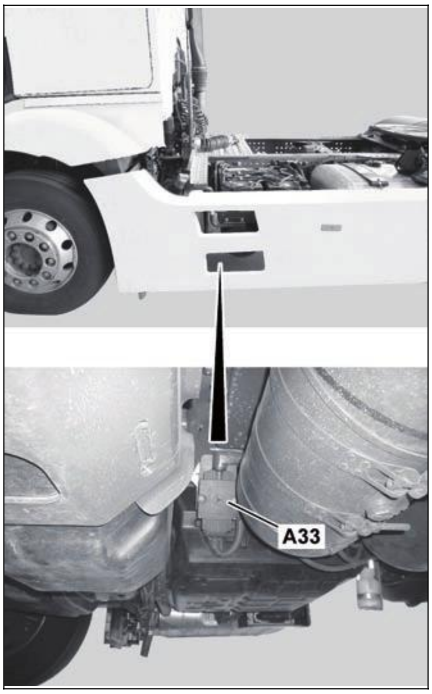
GF54.25-W-6000H	Battery disconnect switch control unit, component description	2.8.11

MODEL 963 with CODE (E5T) ADR model class EX/II, including AT
MODEL 963 with CODE (E5U) ADR model class EX/III, including EX/II and AT
MODEL 963 with CODE (E5V) ADR model class FL including EX/II, EX/III and AT
MODEL 963 with CODE (E5X) ADR model class AT
MODEL 963 with CODE (E5Z) Accessories, ADR
MODEL 963 with CODE (E9D) Preinstallation, double-pole battery disconnect switch
MODEL 963 with CODE (E9E)

Location

In vehicles without code (C7T) Integral rear end
A33 Battery disconnect switch control unit (BESO)

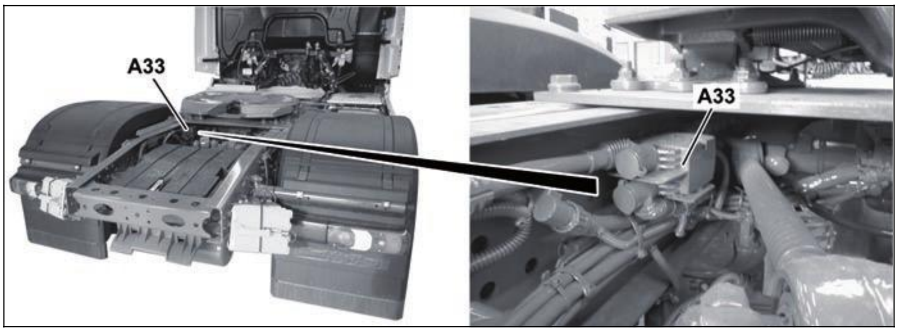
In vehicles with standard rear end, the battery disconnect switch (BESO) control unit (A33) is installed below the vehicle battery in the direction of travel in front of the compressed air reservoirs of the brake system.



W54.21-1431-03

In vehicles with code (C7T) Integral rear end
A33 Battery disconnect switch control unit (BESO)

In vehicles with integral rear end, the battery disconnect switch (BESO) control unit (A33) is installed on the inside of the left longitudinal frame member above the rear axle.



W54.21-1430-04

GF49.20-W-3008HA	EATU input NOx sensor, component description	2.8.11

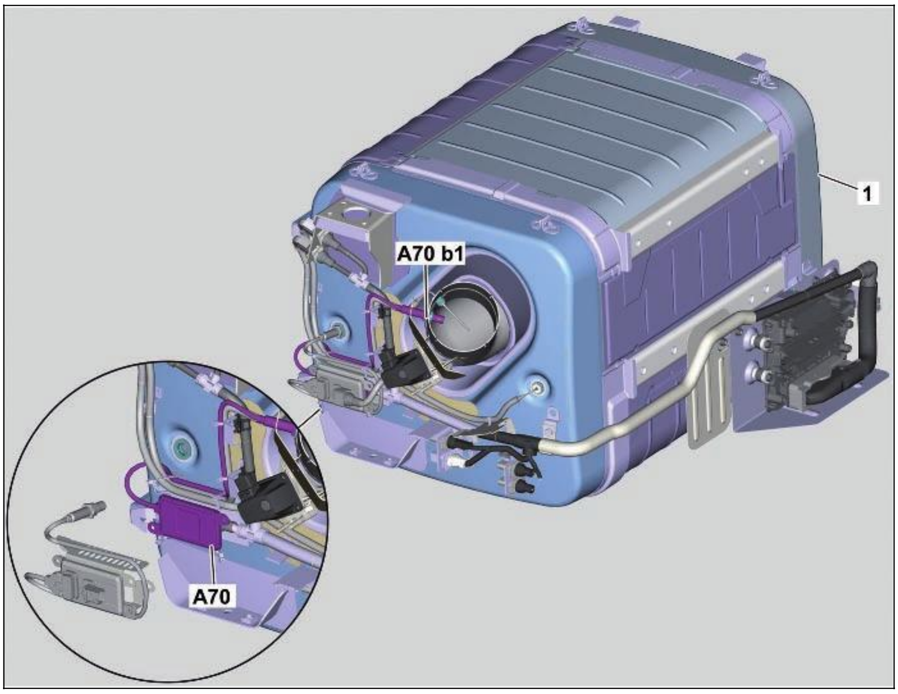
ENGINES 471.9 in MODEL 963, 964 with CODE (M5Y) Engine version Euro V
ENGINES 471.9 in MODEL 963, 964 with CODE (M5R) Engine version EEV

Location

1 Exhaust aftertreatment unit

A70 EATU input NOx sensor control unit
A70 b1 EATU input NOx sensor

The EATU input NOx sensor (A70 b1) is screwed into the chamber downstream of the SCR catalytic converter and ammonia slip catalytic converter from the outside and forms one unit together with the EATU input NOx sensor control unit (A70).



W14.40-1596-76

Task

The EATU input NOx sensor (A70 b1) represents the actual measurement sensor, whereas the EATU input NOx sensor electronic control unit (A70) is used to compute the NOx concentration in the exhaust after exhaust aftertreatment by the SCR catalytic converter and ammonia slip catalytic converter.

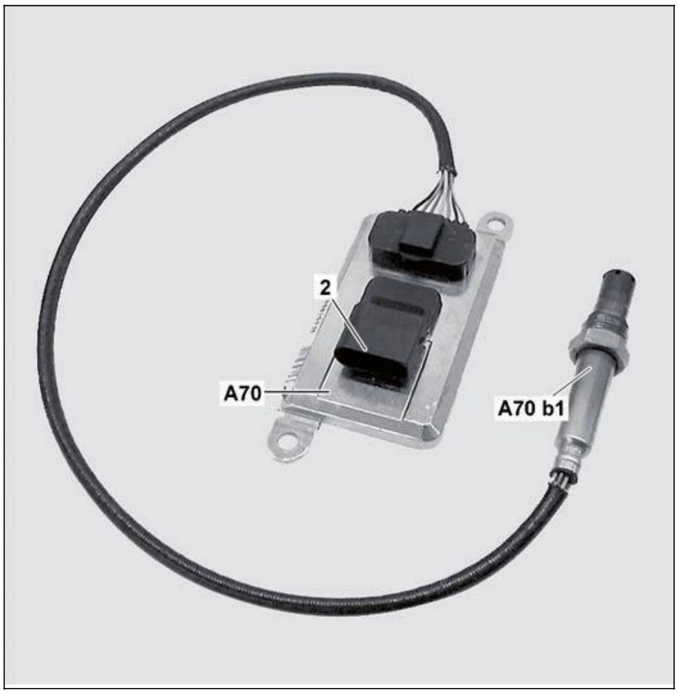
Design

2 Electrical connection

A70 EATU input NOx sensor control unit
A70 b1 EATU input NOx sensor

The EATU input NOx sensor control unit (A70) and the EATU input NOx sensor (A70 b1) are connected to each other via a non-separable electrical line and form one unit.

The EATU input NOx sensor (A70 b1) is similar in design to a wide-band oxygen sensor. It is fitted with its basic elements such as the so-called Nernst cell and the oxygen pump cell.
Its front part in the measuring probe which projects out into the exhaust consists of a metal housing with openings and a gas-permeable ceramic body inside made out of zirconium dioxide.



W14.40-1587-12

GF49.20-W-3001H	Exhaust pressure sensor upstream of diesel oxidation catalytic converter, component description	20.7.11

ENGINES 471.9 in MODEL 963, 964 with CODE (M5Z) Engine version Euro VI

Location

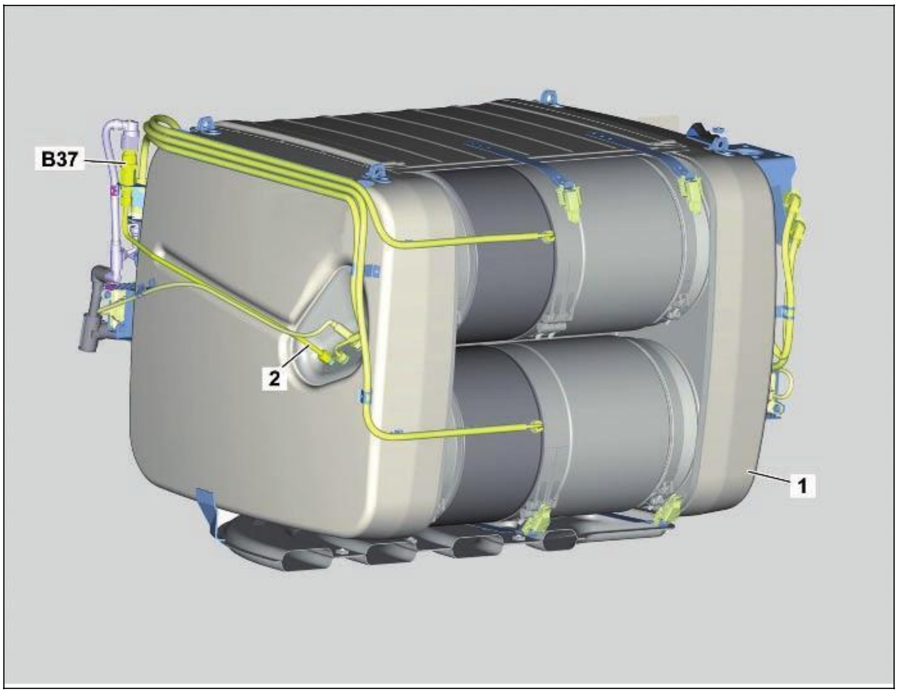
1 Exhaust aftertreatment unit:
2 Pressure line

B37 Exhaust pressure sensor, upstream of diesel oxidation catalytic converter

The exhaust pressure sensor upstream of the diesel oxidation catalytic converter (B37) is screwed into the deflection chamber from the outside, upstream of the diesel oxidation catalytic converter (DOC).

Task

The exhaust pressure sensor upstream of the diesel oxidation catalytic converter (B37) records the pressure at the defined measuring point in the deflection chamber.



W14.40-1577-76

Design

Inside the stainless steel sensor housing there is a basic unit to which two electrodes are attached.
The inner electrode is the measuring electrode, and the outer electrode is the reference electrode. Above this, exposed to the exhaust pressure, there is a pressure-sensitive ceramic membrane - the shared counter-electrode.
Together, this configuration constitutes a plate capacitor. Since the measuring principle is based on the capacity change, which is extremely small, the sensor has processing electronics that are extremely sensitive.

Function

The exhaust flowing past the probe deforms the membrane because of its pressure. The deformation changes the distance between the capacitor plates and therefore the capacity of the capacitor. The integrated circuit converts the capacity change signal into a defined voltage, from which the exhaust aftertreatment control unit (ACM) (A60) calculates the exhaust pressure level.

GF20.30-W-1002H	Coolant pressure control sensor, component description	20.7.11

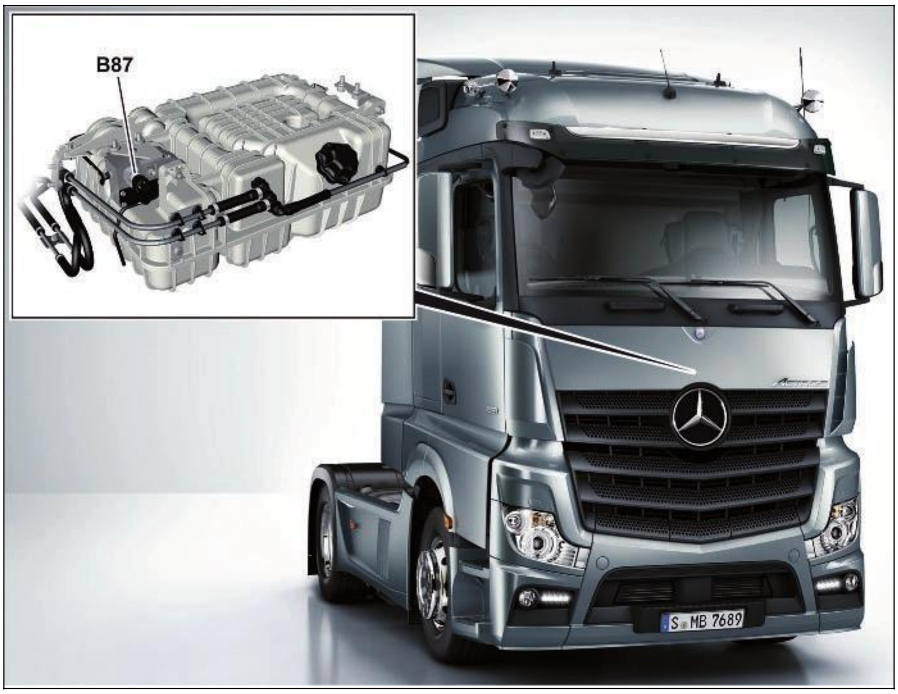
MODEL 963, 964 with CODE (B3H) Secondary water retarder

Location

Shown on model 963, front coolant expansion reservoir

B87 Coolant pressure control sensor

The coolant pressure control sensor (B87) is located on the coolant expansion reservoir.



W20.30-1027-76

Task

The coolant pressure control sensor (B87) monitors the pressure in the coolant circuit. The signals from the coolant pressure control sensor (B87) are read in directly by the drive control (CPC) control unit (A3). The drive control (CPC) control unit (A3) uses them to calculate the set values for the coolant pressure control solenoid valve (Y57).

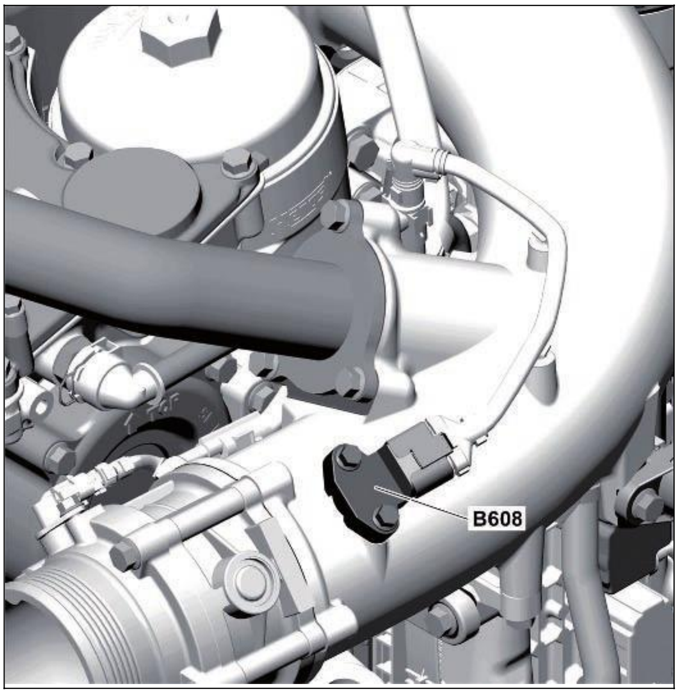
GF09.41-W-4130H	Charge air pressure and temperature sensor in charge air pipe, component description	20.7.11

ENGINE 471.9 in MODEL 963

Location

B608 Charge air pressure and temperature sensor in charge air pipe

The charge air pressure and temperature sensor in the charge air pipe (B608) is located on the charge air pipe on the left side of the engine.



W07.04-1072-12

Task

The charge air pressure and temperature sensor in the charge air pipe (B608) enables the engine management (MCM) control unit (A4) to determine the air pressure and the air temperature of the aspirated or supercharged combustion air.
These two values and the values of the differential pressure sensor exhaust gas recirculation (EGR) (B621), the charge air temperature sensor in the charge air housing (B617), as well as the values of the temperature sensor downstream of the air filter (B611) with code (M5Z) Euro VI engine version, are used to deduce the air mass that is routed to the engine for combustion.

Design

The charge air pressure and temperature sensor (B608) consists of two electrically separate components for measuring the boost pressure and the charge air temperature.

Pressure sensor for determining the charge air temperature
The pressure sensor is a so-called semiconductor pressure sensor which detects the air pressure in the charge air pipe by means of the piezoelectric principle. This consists of four pressure-dependent resistors (strain measuring resistors) which are arranged in a silicon membrane as well as an electronic analysis system which is supplied with a 5 V DC voltage via the engine management (MCM) control unit (A4).

Temperature sensor for measurement of the charge air temperature
There is an NTC resistor at the cone point of the charge air pressure and temperature sensor in the charge air pipe (B608). NTC stands for "Negative Temperature Coefficient", which means that electrical resistance falls as temperature rises.

Function

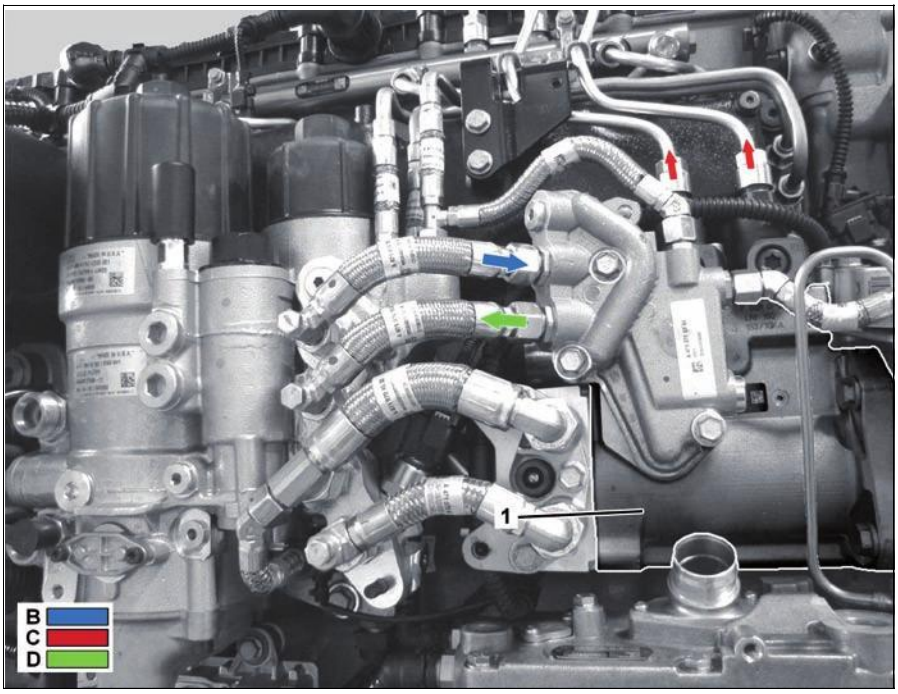
Determining the boost pressure
The intake air or supercharged combustion air in the charge air housing passes over a bore in the silicon diaphragm with the four pressure-dependent resistors and distorts it.
The resistors in the silicon membrane are arranged in such a way that, on deformation of the membrane, the transverse stress of the resistance bridge is altered.
The electronic analysis system amplifies this transverse stress and compensates in this way for possible temperature fluctuations or compensates for any manufacturing tolerances of the resistors. It subsequently routes the filtered measurement voltage to the engine management (MCM) control unit (A4) which then deduces the air pressure in the charge air housing.

Measuring the charge air temperature
Depending on its temperature, the air flowing by influences the temperature of the measuring element on the tip of the sensor and therefore the electrical resistance value. The engine management (MCM) control unit (A4) deduces the associated temperature from the electrical resistance.

GF07.02-W-3012H	Component description for fuel system high pressure pump	20.7.11

ENGINES 471.9 in MODEL 963

Location



W47.20-1084-76

1 Fuel system high pressure pump

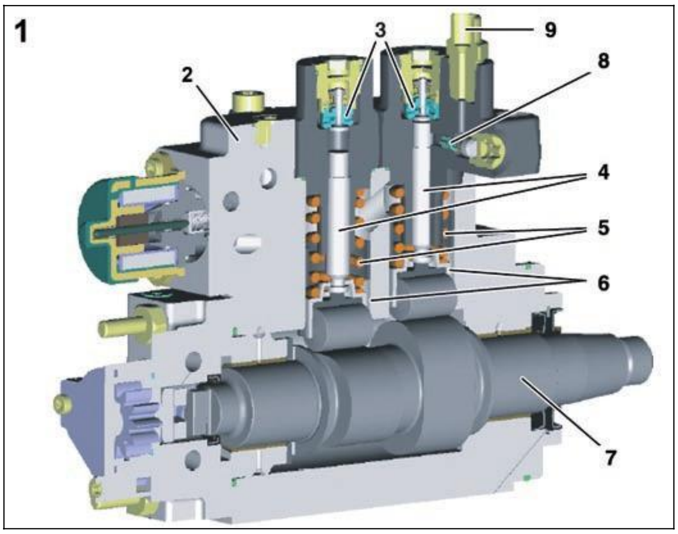
B Fuel feed (thrust side)
C Fuel high pressure
D Fuel return

The fuel high pressure pump (1) is located at the rear on the left side of the crankcase and is driven via the pinion gear drive.

Task

The fuel high-pressure pump (1) supplies the fuel high-pressure circuit with fuel and ensures that the fuel required for combustion is available in sufficient quantity and at the required pressure at the fuel injectors, under all operating conditions.

Design



W07.20-1000-81

1 Fuel system high pressure pump
2 Fuel high pressure pump housing
3 Suction valves
4 High pressure piston
5 Compression springs
6 Roller tappet
7 Camshaft
8 High pressure valve
9 High pressure connection

Function

The camshaft (7) for the fuel high pressure pump (1) is driven by the pinion gear drive.
The fuel is compressed by two high-pressure pistons (4) and led via the respective high-pressure connection (9) and corresponding high-pressure lines to the rail.
Both roller tappets (6) on the double cams of the camshaft (7) are pressed together by the two push springs (5) which are offset by 90°. Thus two power strokes occur for one camshaft revolution per high-pressure piston (4).
If the high pressure piston (4) is in a downward movement, the fuel can flow over the corresponding intake valve (3) into the clearance volume via the high pressure piston (4).
If the high pressure piston (4) now changes to an upward movement, the corresponding intake valve (3) is closed by the compression pressure arising and the fuel in compressed until the high pressure valve (8) opens a transfer duct between the high pressure compartment and the corresponding high pressure connection (9). The highly compressed fuel can now flow into the rail.
If the high pressure piston (4) again changes to a downward movement, the transfer duct is closed by the spring-loaded high pressure valve (8) and new fuel can flow through the now opened intake valve (3) into the clearance volume.