Self-diagnosis

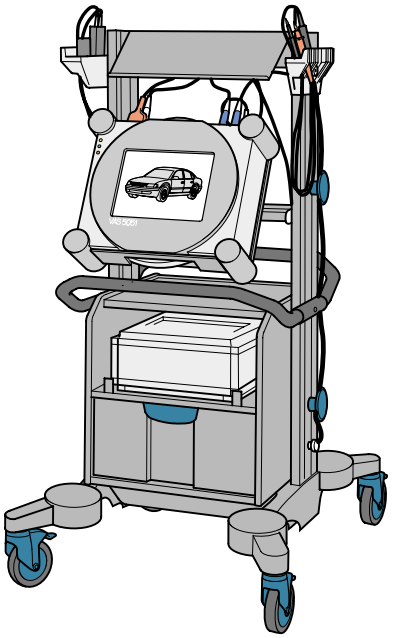
The readiness code

The readiness code is an 8-digit numeric code which indicates the status of the exhaust emission diagnoses. The diagnoses are performed at regular intervals during normal vehicle operation.

The readiness code does **not** indicate whether there are any faults in the system.
It indicates whether certain diagnosis have been terminated -0- or have not been performed yet, or have been cancelled -1-.

If the engine management system has registered a fault and stored this fault in the fault memory, the fault message can only be obtained with a fault reader.

The readiness code can be read out using the Vehicle Diagnostic, Testing and Information System VAS 5051 or the V.A.G Diagnostic Unit using function “15” which can be accessed via address word “01”. The readiness code can also be generated by performing a short test.



202_002

Readiness code

The readiness code for both engines is identical.

Relevance of the 8-digit numeric block to the readiness code								
The readiness code is only generated when all the digit positions on the display are 0.								
1	2	3	4	5	6	7	8	Diagnostic function
							0	Catalytic converter
						0		Catalytic converter heating (diagnosis function currently inactive/always “0”)
					0			Activated charcoal canister system (fuel tank purging system)
				0				Secondary air system
			0					Air conditioning system (diagnosis function currently inactive/always “0”)
		0						Lambda probe
	0							Lambda probe heater (diagnosis function currently inactive/always “0”)
0								Exhaust gas recirculation (not existent/always “0”)

The Motronic 5.9.2 control unit has a fault memory.

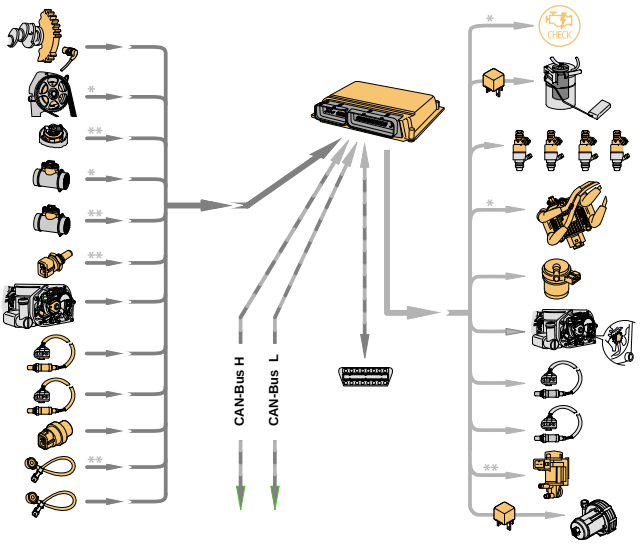
The self-diagnosis function monitors all the colour-coded parts of the system.

The self-diagnosis procedure can be performed using the Vehicle Diagnostic, Testing and Information System VAS 5051 or the V.A.G Diagnostic Unit.

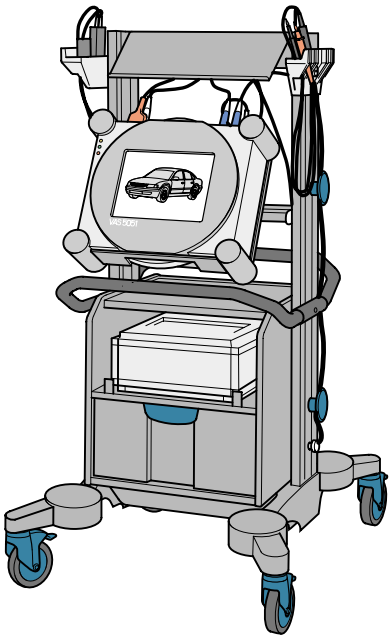
The self-diagnosis procedure is initiated with the address word
01 - Engine electronics.

The following functions are possible:

01 - Interrogate control unit version
02 - Interrogate fault memory
03 - Actuator diagnosis
04 - Basic adjustment
05 - Erase fault memory
06 - End of output
07 - Encode control unit
08 - Read data block
10 - Adaption
11 - Login procedure
15 - Read out readiness code



233_018



202_002

Function 04 - Basic adjustment must be executed after changing the engine control unit, the throttle valve control part or the engine and after disconnecting the battery.
Advise your customers to visit a workshop to have basic adjustment performed after replacing the battery themselves or after disconnecting and connecting the battery.

For the various individual fault codes, please refer to the Workshop Manual for Motronic Injection and Ignition System (2.0-litre engine).

2.0-litre/88 kW engine ATF/ASU

The 2.0-litre/88 kW Flino engine is described below. Flino stands for "flying camshaft". The engine will be used in A-platform vehicles, in which it will be mounted transversely, and in the Passat, in which it will be mounted longitudinally.

The improved version of the 2.0-litre engine includes the following characteristic modifications:

- Adjustment of the intake cam
- The system components for service interval extension (new engine oil, engine oil level sensor and engine oil temperature sensor)
- Twin-path intake manifold
- Electric throttle drive

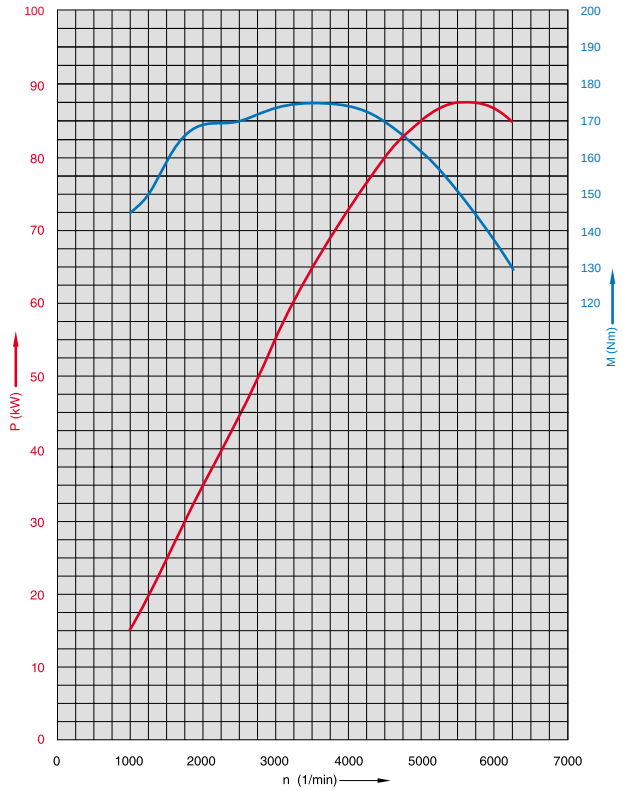
The engine-specific requirements relating to service interval extension and camshaft timing control are described.

Will not be introduced

233_012

Technical features

- Engine management system
  Transversely mounted engine: Bosch Motronic ME 7.5
  Longitudinally mounted engine: Simos 3.2
- Electronically controlled sequential injection and mapped ignition with cylinder-selective knock control
- 2 valves per cylinder
- 2 lambda probes; Syncro: 4 lambda probes
- Secondary air system
- Air-shrouded injectors
- Twin-path intake manifold
- Electrical throttle control
- Exhaust gas monitoring (OBD II)
- EU IV compliant



233_021

Will not be introduced

Specifications

Code:ATF (transversely mounted),
A-platform
ASU (longitudinally mounted)
Passat
Type:4-cylinder in-line engine
Displacement:1984 cm^3
Bore:82.5 mm
Stroke:92.8 mm
Compression
ratio:10 : 1
Firing order:1 - 3 - 4 - 2
Rated output:88 kW (120 bhp)
Torque:175 Nm
Fuel:RON 95 unleaded
RON 91 unleaded
(reduced power and torque)

Overhung-mounted camshaft

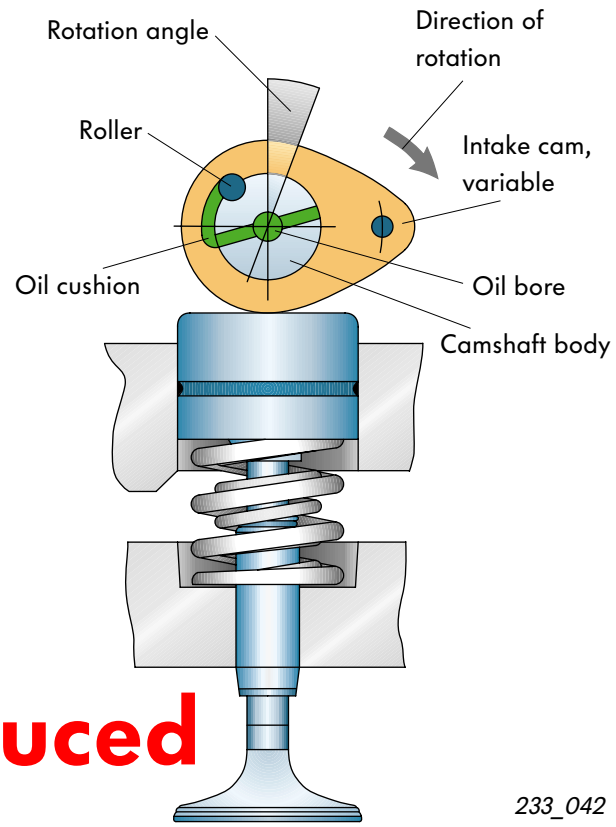
Camshaft timing control

The camshaft timing control operates mechanically with the intake cam overhung mounted.

This camshaft – code designation Flino – allows rpm-dependent intake closure.

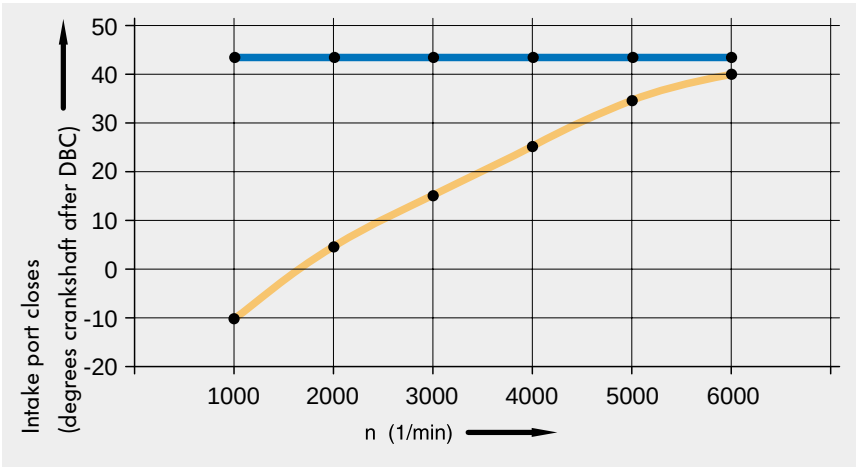
Advantages:

Better torque delivery across the entire rev band, higher fuel economy and improved elasticity.



233_042

Will not be introduced



233_043

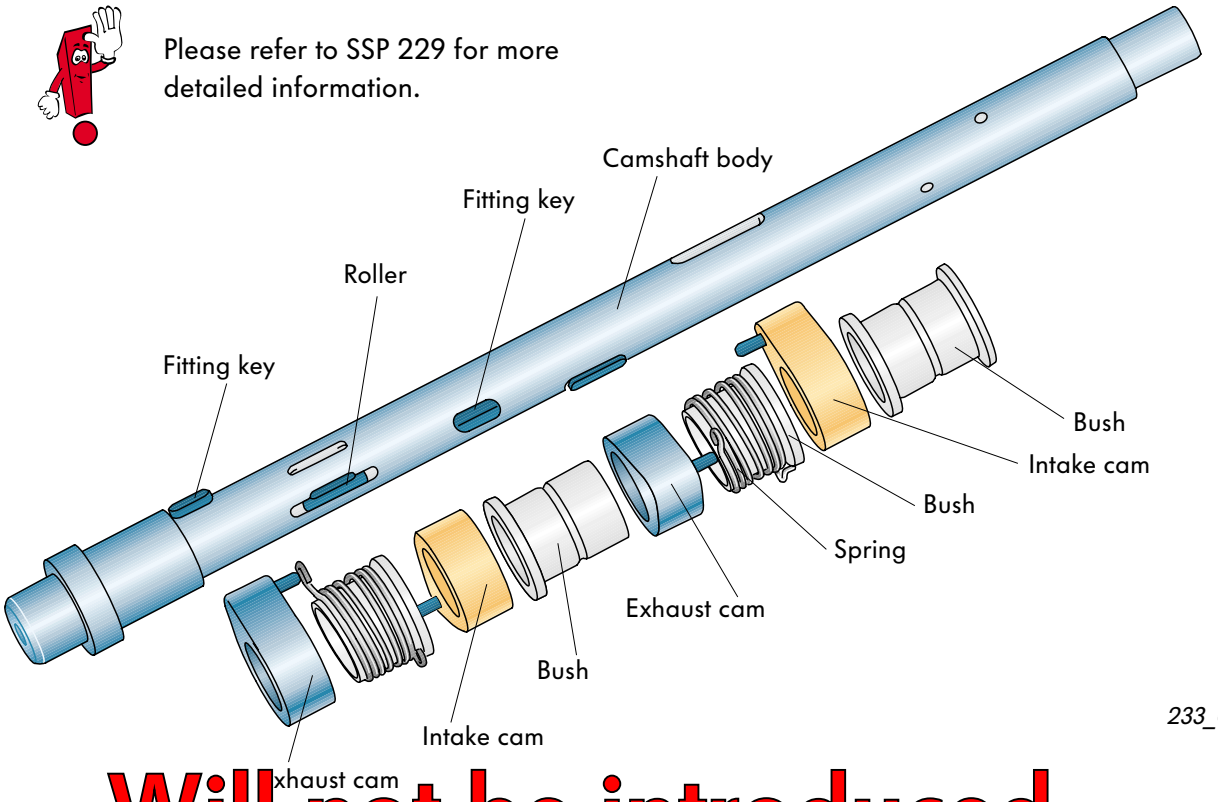
Intake port - closing - position in dependence on engine speed

Function

The opening action at the intake valve is no different to that on a rigid camshaft.
During the closing action, however, the cam becomes twisted under the spring pressure exerted by the valve spring.

The rotation angle of the intake cam is dependent on engine speed.
At low engine speeds, the rotation angle is greater than at high engine speeds.

Please refer to SSP 229 for more detailed information.



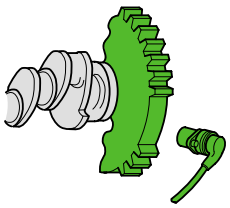
233_044

Will not be introduced

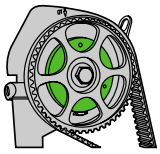
Function	85 kW engine	85 kW engine
Camshaft	The shaft, intake cam and exhaust cam are a single part	A camshaft body with one oil bore aligned longitudinally and transversely in relation to the intake cam. Exhaust cam with fitting key securely connected to the body. Intake cam mounted rotatably on body. An inserted roller drives the cam and limits the angle of rotation. Oil pressure is applied to the empty space in the cam above the camshaft body. The oil cushion dampens the rotary motion and absorbs noise.
Adjustment	none	The intake cam is turned depending on engine speed. It rotates under the force exerted by the valve spring in the direction of rotation of the camshaft, but more quickly than the camshaft itself rotates. The cam "flies" ahead of the camshaft.
Timing	The exhaust port and intake valve have fixed timings	The exhaust valve has a fixed timing The intake valve has a fixed timing for the start of the opening movement and a variable timing for the end of the opening movement.

System overview - ATF/ASU

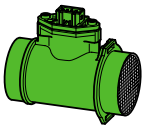
Engine speed sender G28



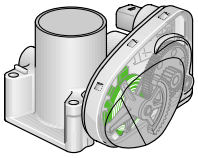
Hall sender G40



Hot film
air mass meter G70 and
intake air temperature sender G42



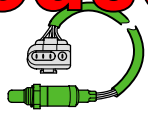
Throttle valve control unit J338
(EPC positioner)
Angle senders for throttle valve
drive G187 and G188



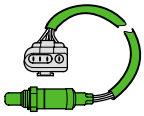
Accelerator position senders G79 and G185

Will not be introduced

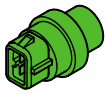
Lambda probe G39



Lambda probe after catalytic converter G130



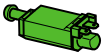
Coolant temperature sender G62



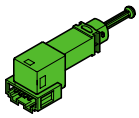
Knock sensor I G61

Knock sensor II G66

Clutch pedal switch F36



Brake light switch F and
brake light switch F47

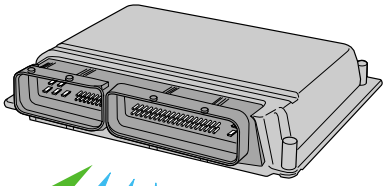


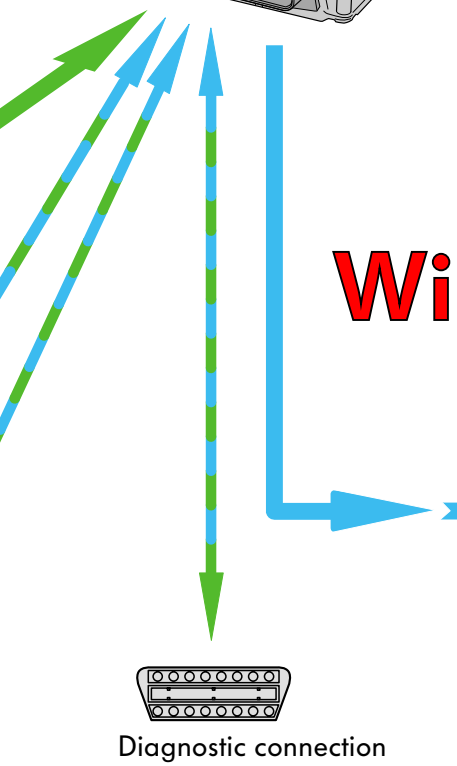
Auxiliary signals:
Air conditioner compressor ON
A/C ready
Road speed signal

CAN-Bus +

CAN-Bus -

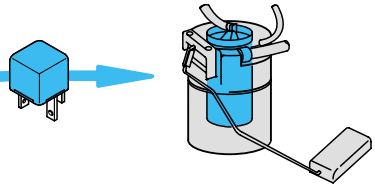
ATF = J220 control unit
Motronic ME 7.5
ASU =J361 control unit
Simos 3.2



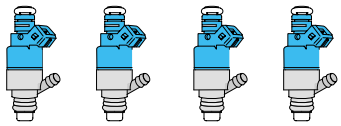


Diagnostic connection

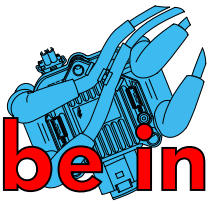
Self-diagnosis of fault warning lamp K83



Fuel pump relay J17
Fuel pump G6

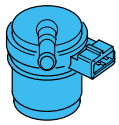


Injectors N30 ... N33

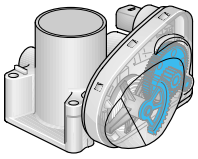


Ignition transformer N152

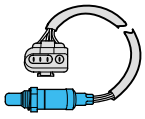
Will not be introduced



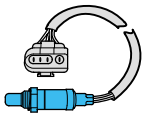
Activated charcoal filter system solenoid valve 1



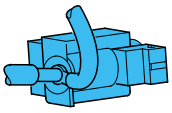
Throttle valve control part J338
with throttle valve drive G186



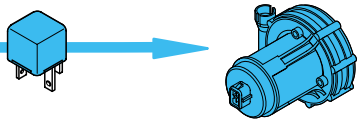
Lambda probe heating Z19



Lambda probe heating 1 after catalytic converter Z29



Intake manifold change-over valve N156

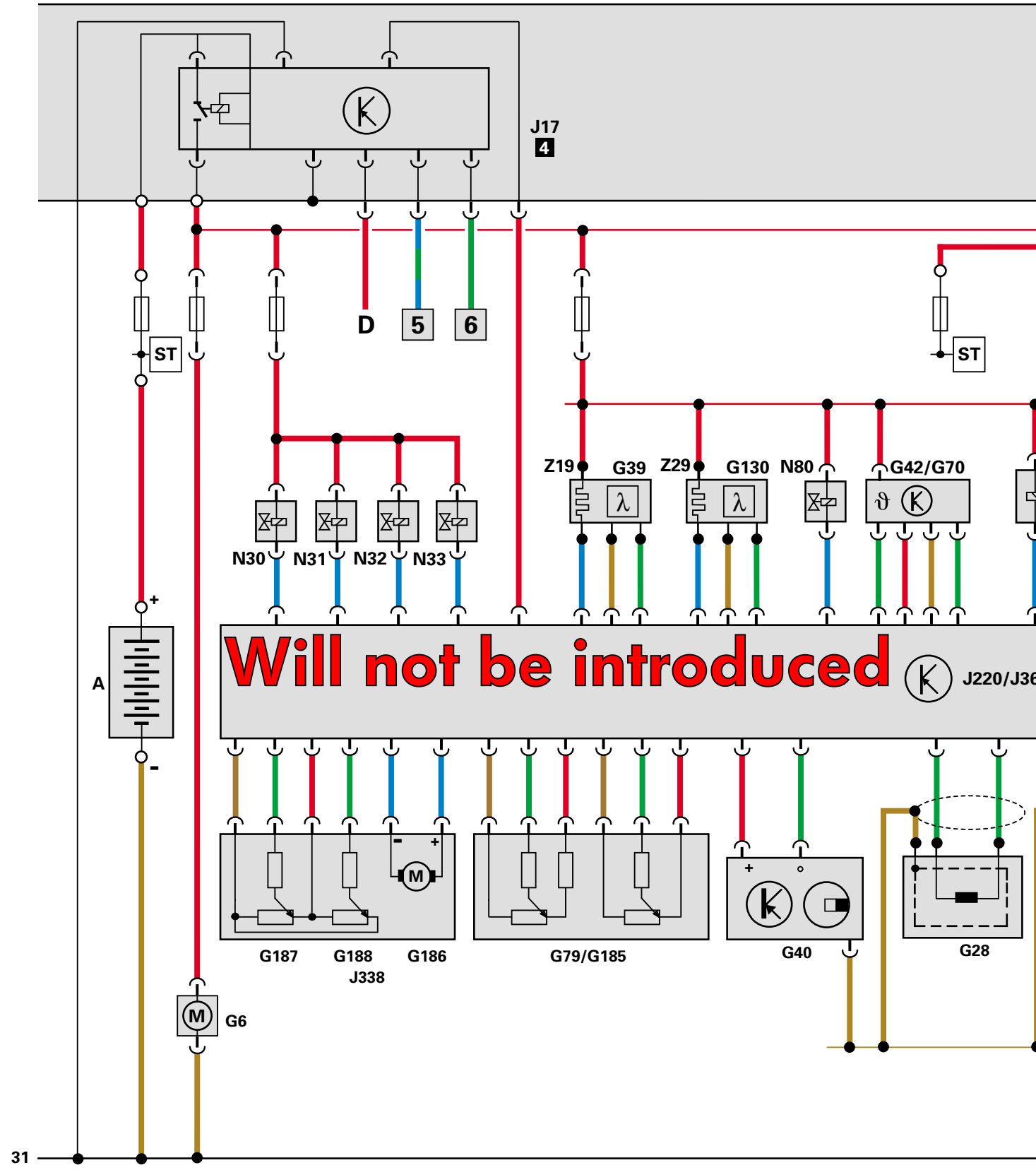


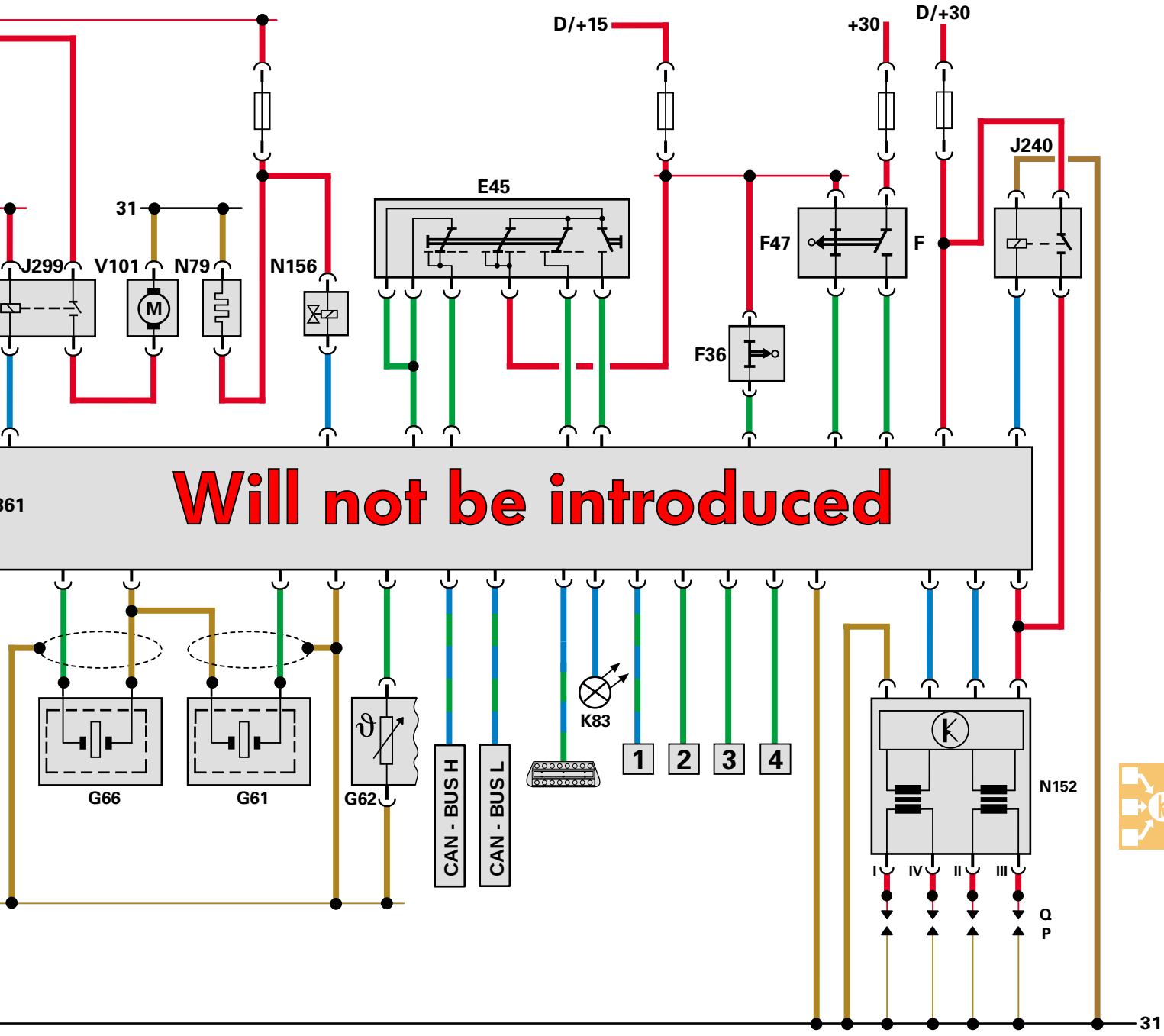
Secondary air pump relay J299 and secondary air pump motor V101

Auxiliary signals:
Air conditioner compressor OFF
EPC fault indicator lamp
Cruise control system
Fuel consumption signal

233_023

Function diagram - ATF/ASU





in out

233_025

Legend for Function Diagrams

The Function Diagram represents a simplified current flow diagram.

It contains information on the links between the Motronic 5.9.2 engine management system for the 2.0 l/85 kW (code AQY or ATU) and 2.0 l/88 kW (code ATF or ASU) engines and the Motronic ME 7.5 or Simos 3.2 engine management system.

Auxiliary signals

1	Air conditioner compressor On/Off
2	A/C ready (in)
3	Road speed signal
4	Fuel consumption signal
5	Rotary latch switch, driver's door
6	Airbag

Colour codes/Legend

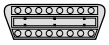
= Input signal

= Output signal

= Battery positive

= GND

= Bidirectional

 = Diagnostic connection

Parts

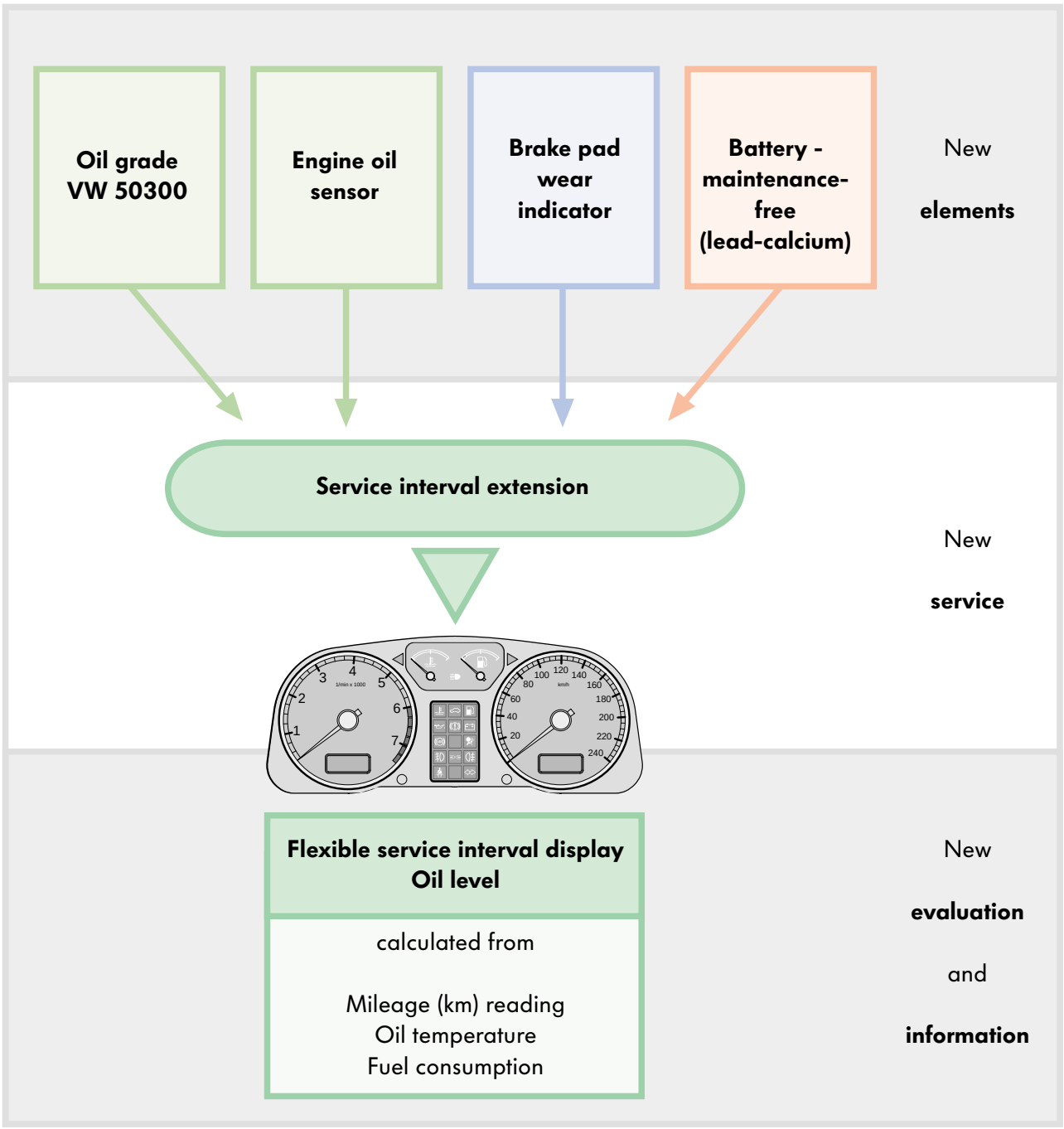
A	Battery
D	Ignition switch
E45	CCS switch
F	Brake light switch
F36	Clutch pedal switch
F47	Brake pedal switch for CCS
F60	Idling speed switch
G6	Fuel pump
G28	Engine speed sender
G39	Lambda probe (upstream of catalytic converter)
G40	Hall sender
G42	Intake air temperature sender
G61	Knock sensor I
G62	Coolant temperature sender
G66	Knock sensor II
G69	Throttle valve potentiometer
G70	Air-mass flow meter
G72	Intake manifold temperature sender
G79	Accelerator pedal position sender
G88	Throttle valve positioner Potentiometer
G108	Lambda probe II
G130	Lambda probe (downstream of catalytic converter)
G185	Accelerator pedal position sender -2-
G186	Throttle valve drive (electric throttle operation)
G187	Throttle valve drive angle sender -1-
G188	Throttle valve drive angle sender -2-
J17	Fuel pump relay
J220	Motronic control unit
J299	Secondary air pump relay
J338	Throttle valve control unit
J361	Simos control unit
K83	Self-diagnosis fault warning lamp
N30...33	Injectors
N79	Heating resistor (crankcase breather)
N80	Activated charcoal filter system solenoid valve 1
N112	Secondary air inlet valve
N122	Output stage
N152	Ignition transformer
N156	Intake manifold change-over valve
N157	Ignition transformer output stage
O	Distributor
P	Spark plug socket
Q	Spark plugs
S	Fuse
ST	Fuse carrier
V60	Throttle valve positioner
V101	Secondary air pump motor
Z19	Heater for lambda probe (upstream of catalytic converter)
Z28	Heater for lambda probe 2
Z29	Heater for lambda probe 1 (downstream of catalytic converter)

Maintenance interval extension

System components for service interval extension

The 88 kW engine has technical features which extend the vehicle's maintenance intervals. This has both economical and ecological benefits. In addition to the new engine production technology (reduced bearing clearance, precision honing), these features include a new type of oil and an engine oil sensor.

Customers can fully utilise the period up to the next service in accordance with their individual driving style and conditions of use.
The oil level and service requirements are indicated to the customer visually.



233_045

The LongLife engine oil

This oil is a specially developed, non-ageing quality multi-purpose oil which conforms to the VW standard.

It can be used as an all-weather oil–except in extremely cold climatic zones–withstands higher loads for longer and is of a higher grade than conventional oil.

First Fill Service:

VW 50300

The oil change interval within the service interval extension service is **2 years or max. 30,000 km**

for the 2.0-litre petrol engine

The exact point in time at which the oil change takes place varies from one vehicle to another. The oil change interval is determined as a factor of fuel consumption, driving style and oil temperature and is indicated on the dash panel insert.

Fuel consumption is reduced by 3%.

- These engine oils are the prerequisites for service interval extension. Only these oils should be used to refill the engine.
- No more than 0.5 litres of a different oil type may be mixed with these engine oils.

233_046

Oil change intervals

See also SSP 224.

Maintenance interval extension

Sender for oil level/temperature G266 (engine oil sensor)

The sender for oil level/temperature is installed at the bottom of the engine oil sump.

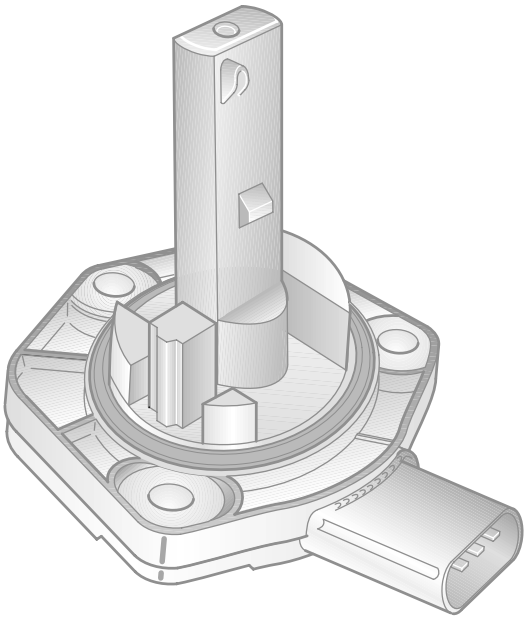
When the ignition is turned on, filling level and temperature data are acquired continuously.

These data are sent to the control unit for the display unit in the dash panel insert in the form of an output signal.

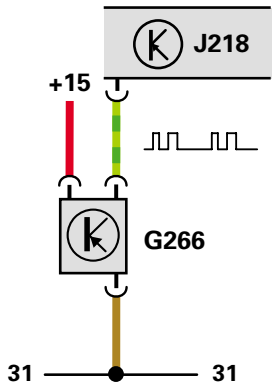
Here, they are processed together with other input variables for the flexible Service Interval Display.

In addition to oil level and oil temperature, fuel consumption in l/h per cylinder, the mileage reading and bonnet opening (via the bonnet contact) - as an attribute of an oil refill - are used for the flexible Service Interval Display.

The present condition of the engine oil in the vehicle is determined in the dash panel insert by evaluating these influencing factors. The upper limit values are variably adapted until the next service.
The system indicates to the driver that the next oil service is due 3,000 km before the next service interval elapses.



233_047



233_048

G266Sender for oil level/temperature
J218Control unit for display unit in dash panel insert

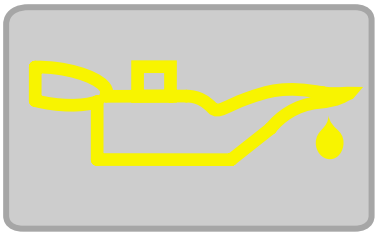
Oil level indicator

The conventional warning lamp for engine oil pressure is also used as an oil level indicator.

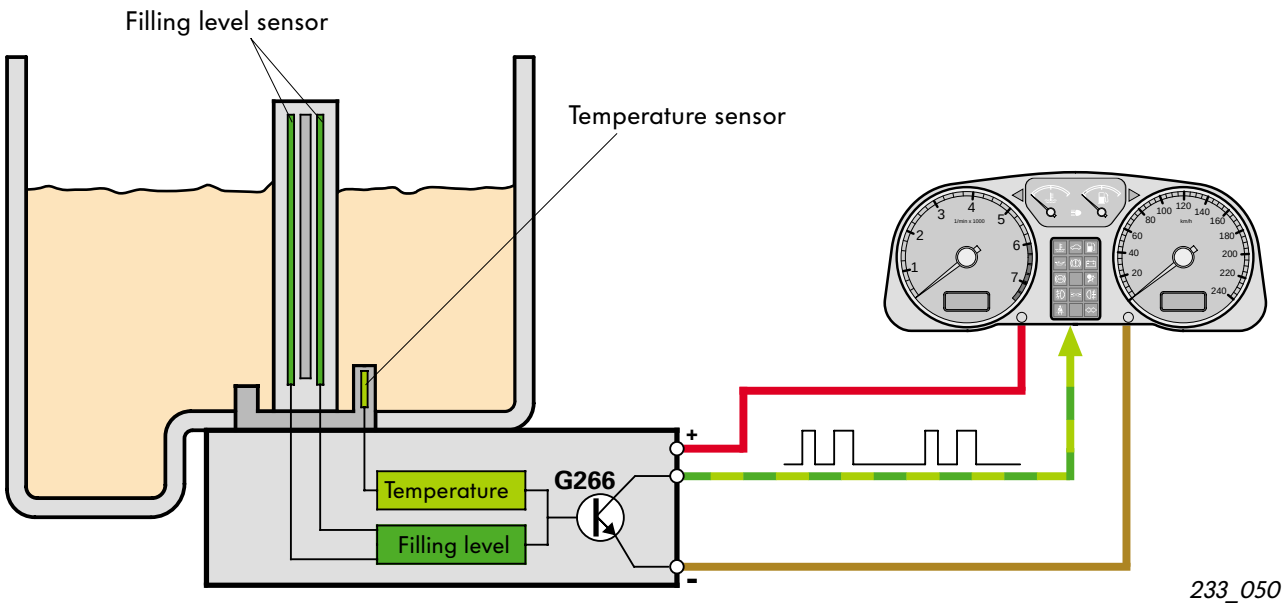
If the yellow LED is continuously on
= oil level too low

If the yellow LED is flashing
= sender for oil level defective

An excessively high oil level is not indicated.



233_049



233_050

Signal waveform and evaluation

The measuring element is briefly heated via the present oil temperature
(output = High) and then cools down again (output = Low).

This procedure is repeated continuously. The High times are dependent on the oil temperature and the Low times are proportional to the filling level.

Oil level

The oil level can be calculated in mm from the cool-down time during the cool-down phase by means of a sensor equation. The calculation is accurate to approx. ± 2 mm.

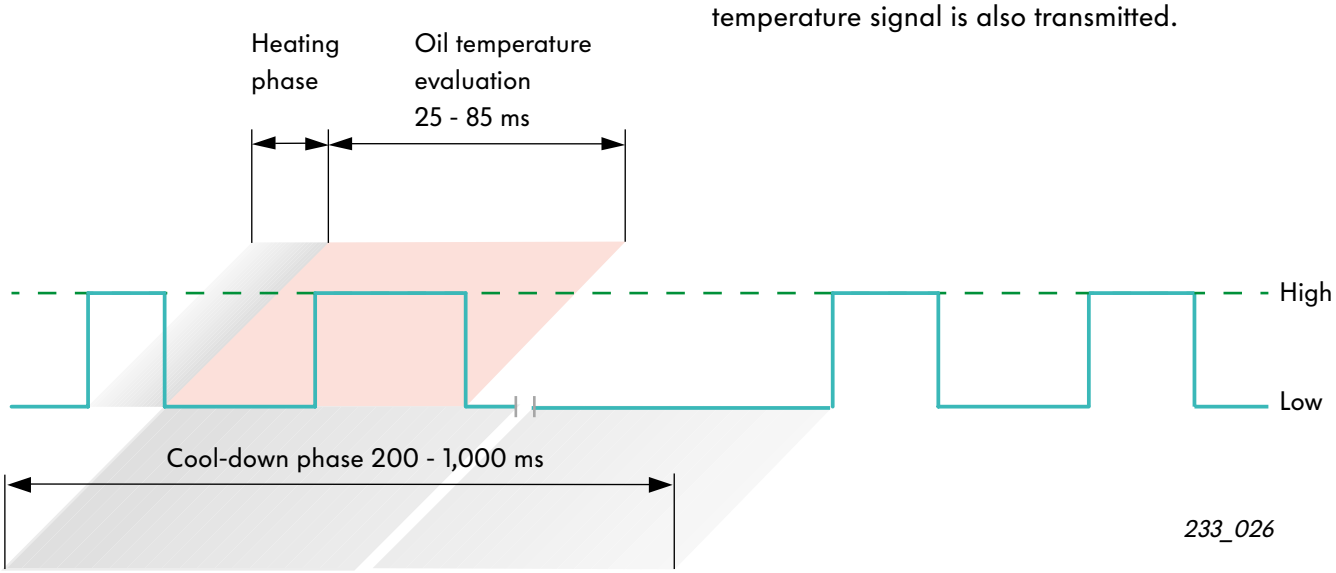
The more oil there is in the oil sump, the quicker the sensor will cool down again.

Long cool-down time = low oil level

Short cool-down time = normal

Oil temperature

During the cool-down phase of the sensor, the oil temperature signal is also transmitted.



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Test your knowledge

Which of these answers is/are correct?
Sometimes only one answer is correct.
However, more than one or all of the answers may be correct.
Please fill in the gaps.

1. The position of the camshaft in the AQY engine is indicated by Hall sender G40.
   It has

   A. a measurement window with the same width for each cylinder,
   B. four different measurement windows,
   C. two narrow measurement windows and two wide measurement windows

   which generate a characteristic signal for each 90° crankshaft rotation .

2. The injectors of the AQY engine are

   A. identical to those used in the 1.6-litre and 1.8-litre engines.
   B. also fitted with an air shroud.
   C. of the so-called “top feed” type.

3. The crankcase has a breather to compensate for pressure differences.
   The mixture of gas and oil vapour is ..... recirculated.
   To prevent the mixture condensing on entry, the inlet is heated. This process takes place

   A. throughout winter operation.
   B. continuously when the ignition is "on".
   C. during the starting cycle (much like a diesel glow plug).

4. By injecting additional air (secondary air) into the exhaust gas,the pollutants in the exhaust gas are recombusted.
   As a result,

   A. the catalytic converter reaches its operating temperature quickly.
   B. the pollutant components CO and HC are reduced.
   C. the engine runs with an air surplus.

5. The secondary air system is

   A. continuously active.
   B. only active during the cold start phase.
   C. active during the cold start phase and in the idling phase after a warm start.
   D. featured in both engines.

6. The combination valve in the secondary air system on the ATU engine

   A. is activated electro-pneumatically by the engine control unit.
   B. is a vacuum controlled pneumatic valve.
   C. is a pneumatic valve which is activated by a separate electro-pneumatic valve.

7. The advantages of the twin-probe lambda control are:

   A. Quick and precise lambda control.
   B. The conversion efficiency of the catalytic converter is checked.
   C. Malfunctioning of the catalytic converter
      is detected by comparing the probe voltages with a setpoint.

8. The readiness code

   A. indicates that diagnoses are in progress to ensure vehicle operation in
      conformity with the prescribed emission limits.
   B. indicates faults in the exhaust emission control system.
   C. can be generated and read out.

9. The new Motronic 5.9.2 is a generation of engine control units featuring

   A. technical improvements for starting the engine,
      low fuel consumption and reduced exhaust emission.
   B. technical control systems for intake air temperature stabilisation.
   C. meeting the requirements for OBD II.

10 . The ATU and AQY engines have different

   A. distributors.
   B. engine mounts.
   C. numbers of knock sensors.

Solutions

1. C.; 2. B., C.; 3. in the intake manifold, B.; 4. A., B.; 5. C., D.; 6. C.; 7. A., B., C.; 8. A., C.; 9. A., C.
10. A., B., C.

Service.

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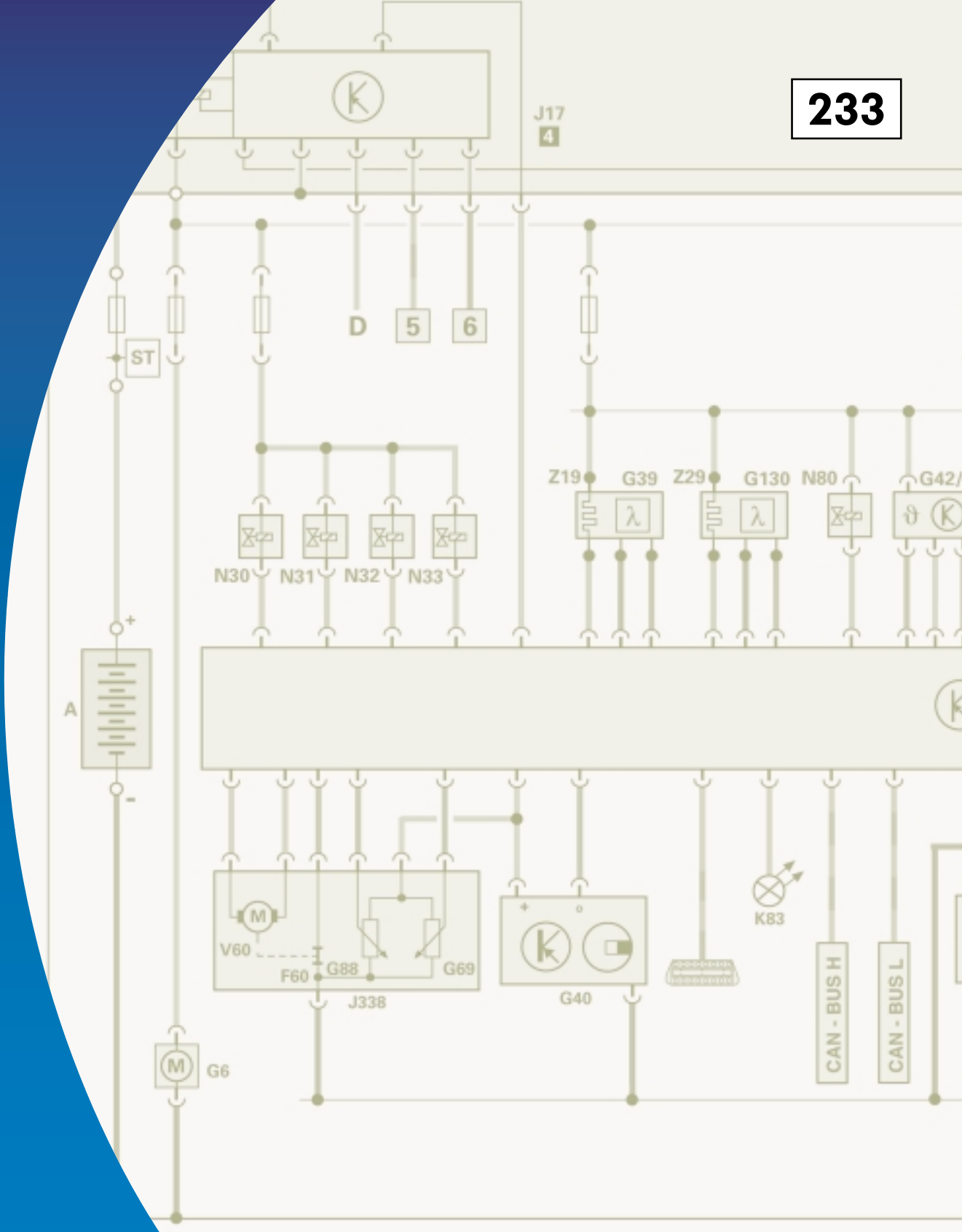

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