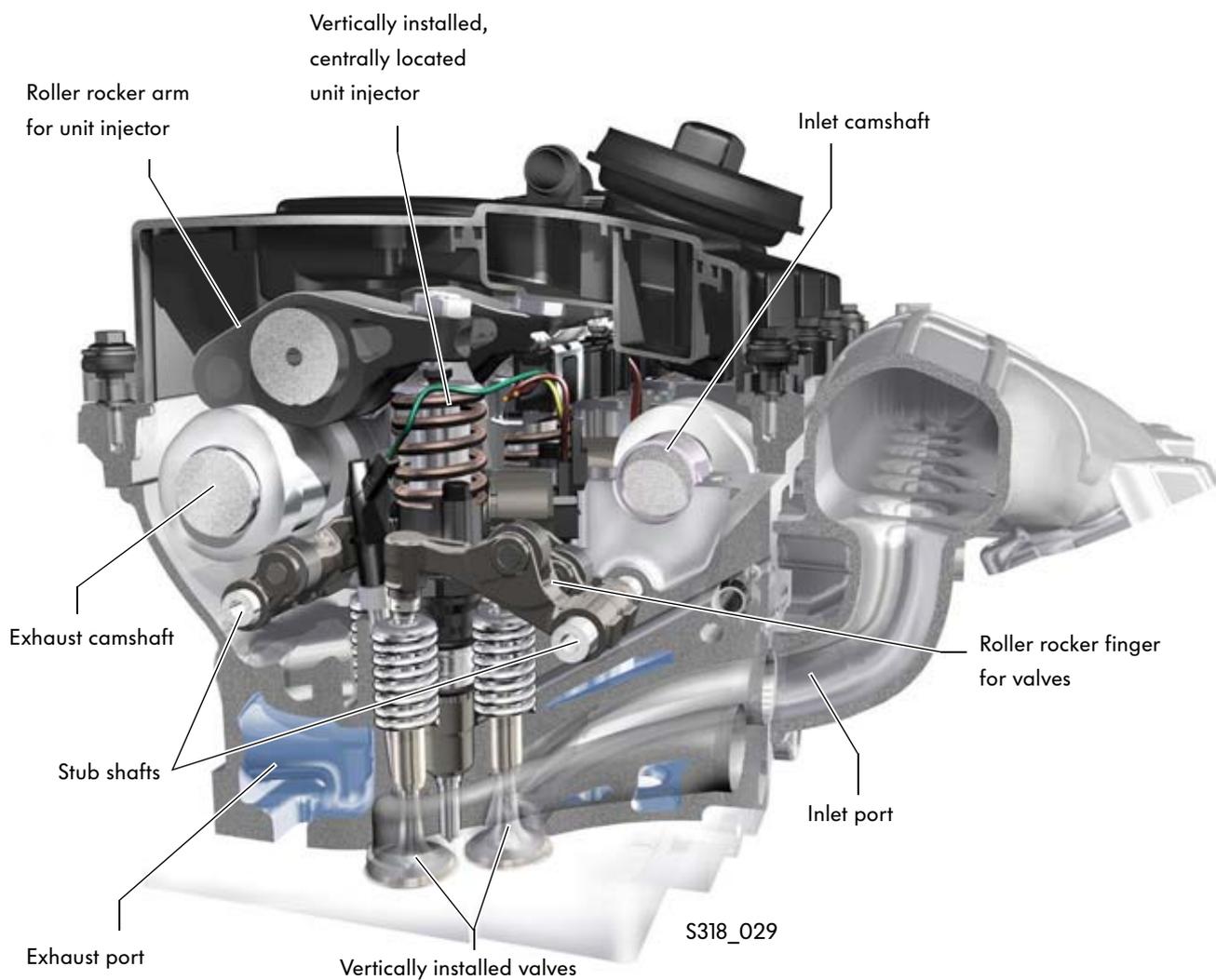


## The advantages of the 4-valve technology

Larger inlet and exhaust cross-sections of the valves provide improved volumetric efficiency, as well as higher power output and torque. Wastage on load change is also reduced.

The symmetrical layout of the valves and the vertical, centrally located unit injectors allow for good mixture formation. This leads to lower fuel consumption and exhaust gas emissions are reduced as a result.

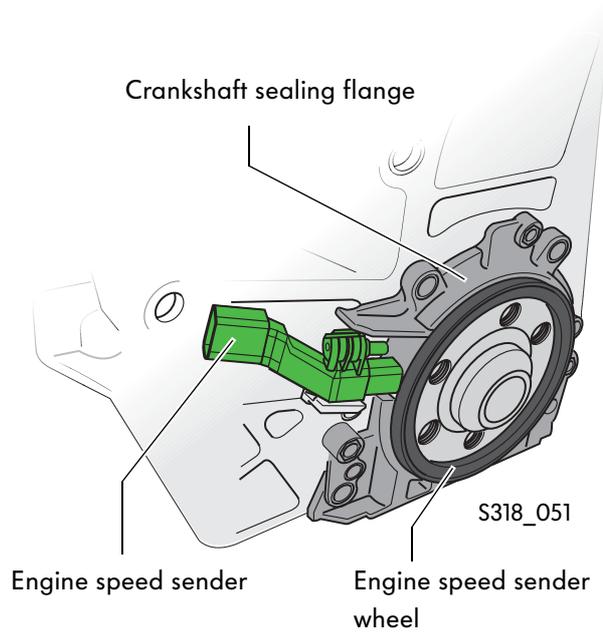


# Power units

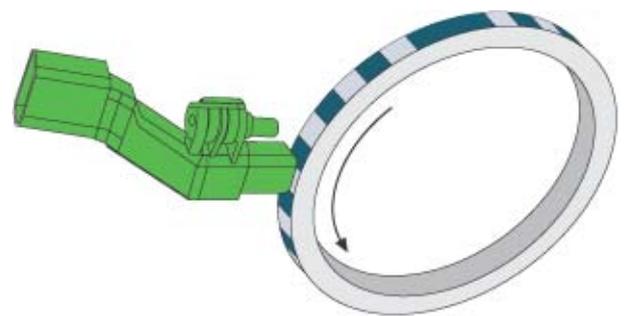
## The crankshaft sealing flange with integrated engine speed sender wheel

A crankshaft sealing flange with an integrated engine speed sender wheel will be used in the diesel engines. This system has already been tried and tested in several petrol engines. The engine speed sender wheel is the only new feature. The crankshaft sealing flange seals off the cylinder block on the flywheel end. The oil seal is made of heat-resistant and nonwearing polytetrafluoroethylene (PTFE) plastic.

The engine speed sender is actually a Hall sender. It is mounted in the crankshaft sealing flange housing.



The engine speed sender wheel consists of a steel ring coated with a rubber compound. This rubber compound contains a large number of metal chips which are alternately magnetised to become north and south pole regions. The diesel engines have two large north poles (60-2-2) and the petrol engines have one large north pole (60-2) on the sender wheel; they serve as reference marks for the engine speed sender. The sender wheel is press-fitted onto the crankshaft flange and exactly positioned.



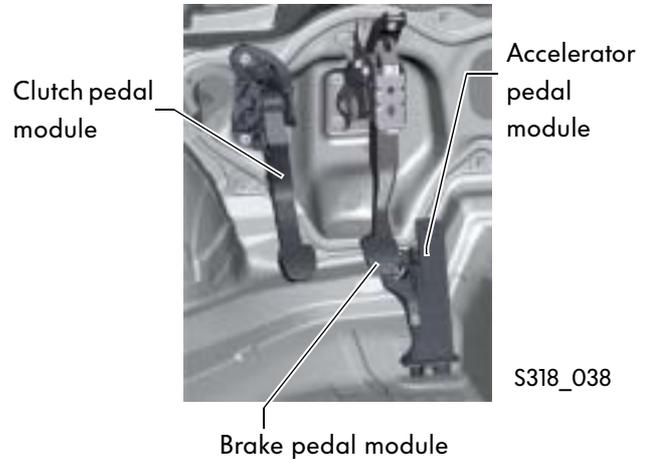
- North pole
- South pole

## The pedal cluster

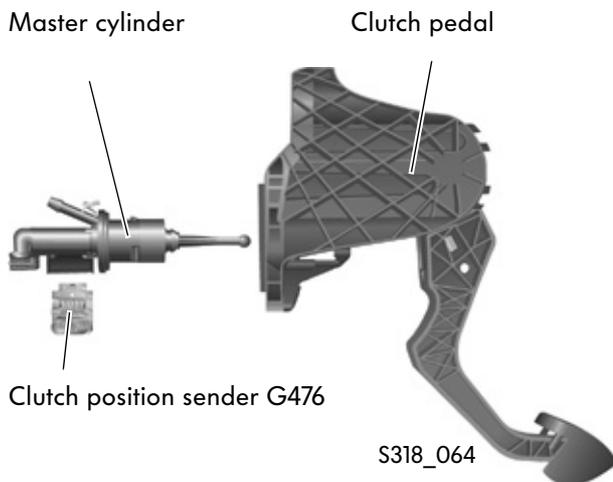
The pedal assembly in the 2004 Golf comprises separately pre-assembled accelerator, brake and clutch control modules.

The brake pedal module is made of aluminium and sheet steel.

The accelerator pedal and the clutch pedal module are made of plastic. Pedal position recognition is by contactless senders.

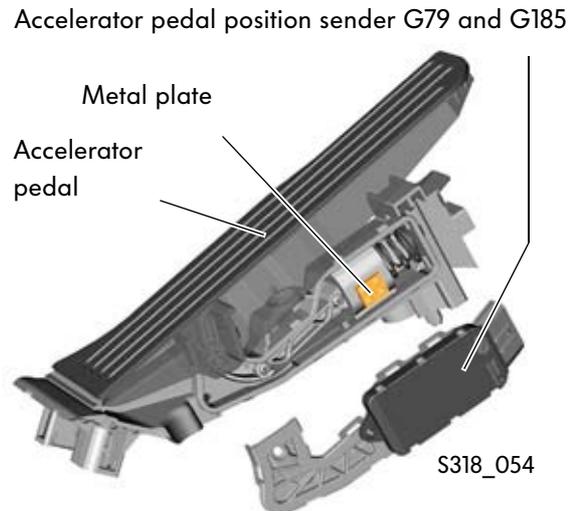


### Clutch position sender G476



The clutch position sender is a Hall sensor, which signals to the engine control unit that the clutch pedal has been operated. The cruise control system will then be deactivated and the injection quantity in the engines will briefly be reduced in order to prevent engine shudder during the gear change.

### Accelerator pedal position sender G79 and G185



The two accelerator position senders G79 and G185 are integrated in the upright accelerator pedal module. They are inductive senders, which indicate the exact position of the accelerator pedal the engine control unit. From this data, the engine control unit computes the required injection quantity.



For further information on the design and function of the contactless senders, please refer to SSP 316 "2.0l TDI engine with 4-valve Technology" and SSP 321 "The 2004 Golf Running Gear".



# Power transmission

## The 6-speed direct shift gearbox 02E

The 6-speed **D**irect **S**hift **G**earbox (DSG) combines the advantages of a manual gearbox:

- high efficiency,
- as well as robustness and sportiness

with those of an automatic gearbox:

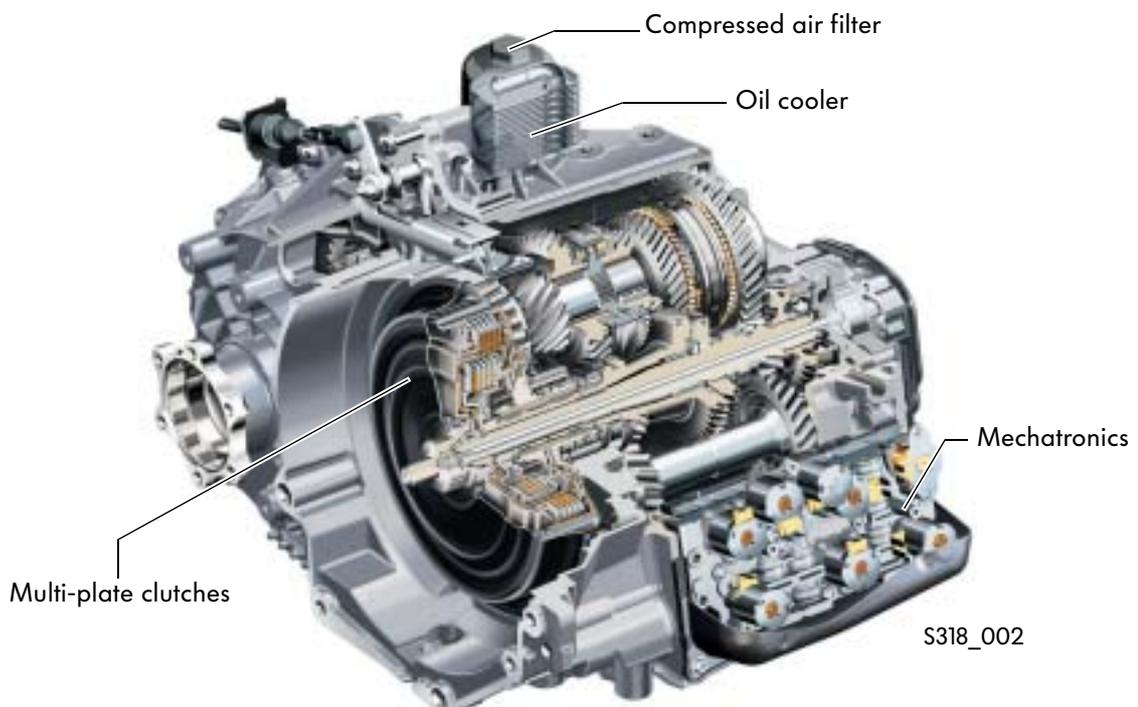
- a high level of comfort, particularly when changing gears.

DSG meets the high standards of comfort expected by automatic gearbox drivers thanks to its design, which comprises two multi-plate clutches and various automatic shift programs.

DSG also provides pure driving enjoyment for manual gearbox drivers by allowing the driver to actively influence the choice of gears and gearshifts and with its lightning-fast, jolt-free gearshifts. At the same time, it surpasses manual gearboxes in terms of fuel economy.

The gearbox is distinguished by:

- Six forward gears and one reverse gear
- Normal gearbox program "D", Sport gearbox program "S" as well as Tiptronic selector lever and steering wheel switches,
- Mechatronics: electronic and hydraulic control units form a single unit and are accommodated in the gearbox,
- Oil cooler and compressed air filter on the gearbox
- Maximum torque 350 Nm.



S318\_002

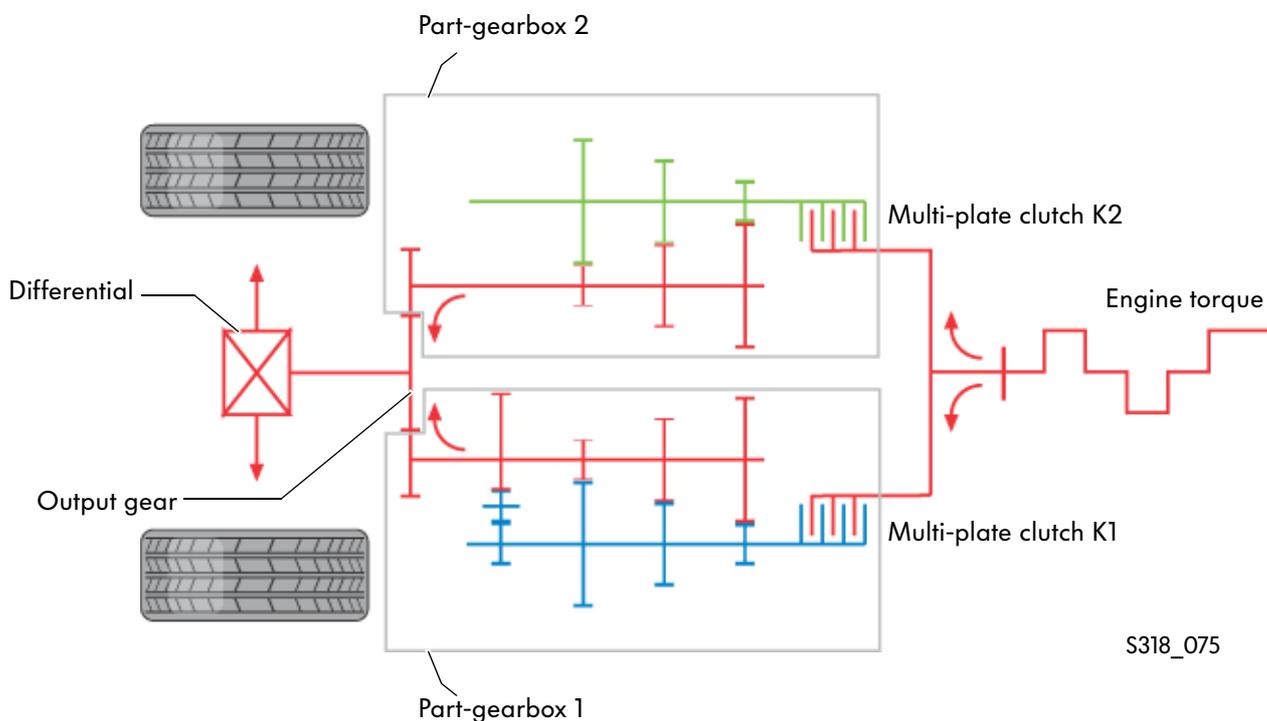
## Design of the gearbox

The direct shift gearbox basically consists of two independent part-gearboxes. Each part-gearbox is built to function like a manual gearbox. Each part-gearbox has a dedicated multi-plate clutch. Both multi-plate clutches run in DSG oil and are controlled, opened and closed by the mechatronics, depending on the gear to be selected.

Gears 1, 3, 5 and reverse are selected via multi-plate clutch K1.

Gears 2, 4 and 6 are selected via multi-plate clutch K2.

The figure below shows the principle of the direct shift gearbox.



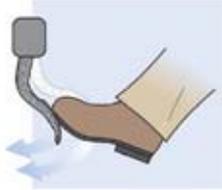
S318\_075

Both part-gearboxes transmit the engine's torque to a common output gear, which in turn transfers the torque to the differential.



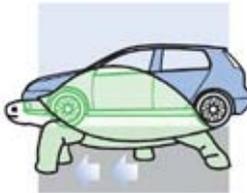
# Power transmission

## Functions of the gearbox



### Kickdown control

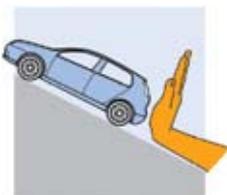
The kickdown function is activated by the fully depressed accelerator pedal. This information is sent via the CAN data bus to the engine control unit and to the mechatronics. The mechatronics then select the "S" programme for maximum acceleration.



### Creep control

The creep control system enables driving manoeuvres to be executed without use of the accelerator pedal (e.g. parking). If the engine is idling and a drive program is selected, the creep control system triggers the production of a defined amount of slip torque at the multi-plate clutch, which causes the vehicle to move very slowly (creep).

A further function of the creep control system is initiated when the vehicle is stationary with the brake applied (e.g. when waiting at a red traffic light). In this case, the multi-plate clutch is opened still further, thus reducing the vehicle's tendency to creep. This has the effect of improving fuel efficiency.



### Hillholder function

If the vehicle rolls back when stationary on a hill with the brake only slightly depressed, the mechatronics increases the pressure in the multi-plate clutch. As a result, the vehicle is held securely in place on the hill.



For further information on the direct shift gearbox O2E, please refer to SSP 308 "The direct shift gearbox O2E".

## The 6-speed automatic gearbox 09G

The 6-speed automatic gearbox 09G is a compact, lightweight, electronically controlled gearbox for transverse installation.

The electro-hydraulic system is based on the 6-speed automatic gearbox 09D.

Features of the gearbox are:

- Max. torque of 310 Nm
- 84 kg in weight
- Approx. 350 mm in length
- Torque converter with torque converter lockup clutch
- Automatic and Tiptronic operation

The six forward gears and the reverse gear have a simple planetary gear set with a double Ravigneaux planetary gear set. The planetary gear sets are arranged according to the Lepelletier principle.



S318\_024

The automatic gearbox control unit controls pressure build-up in the multi-plate clutches and plate brakes via modulating valves. The modulating valves allow a delayed pressure build-up. The result is fast gearbox response and jolt-free gearshifts.



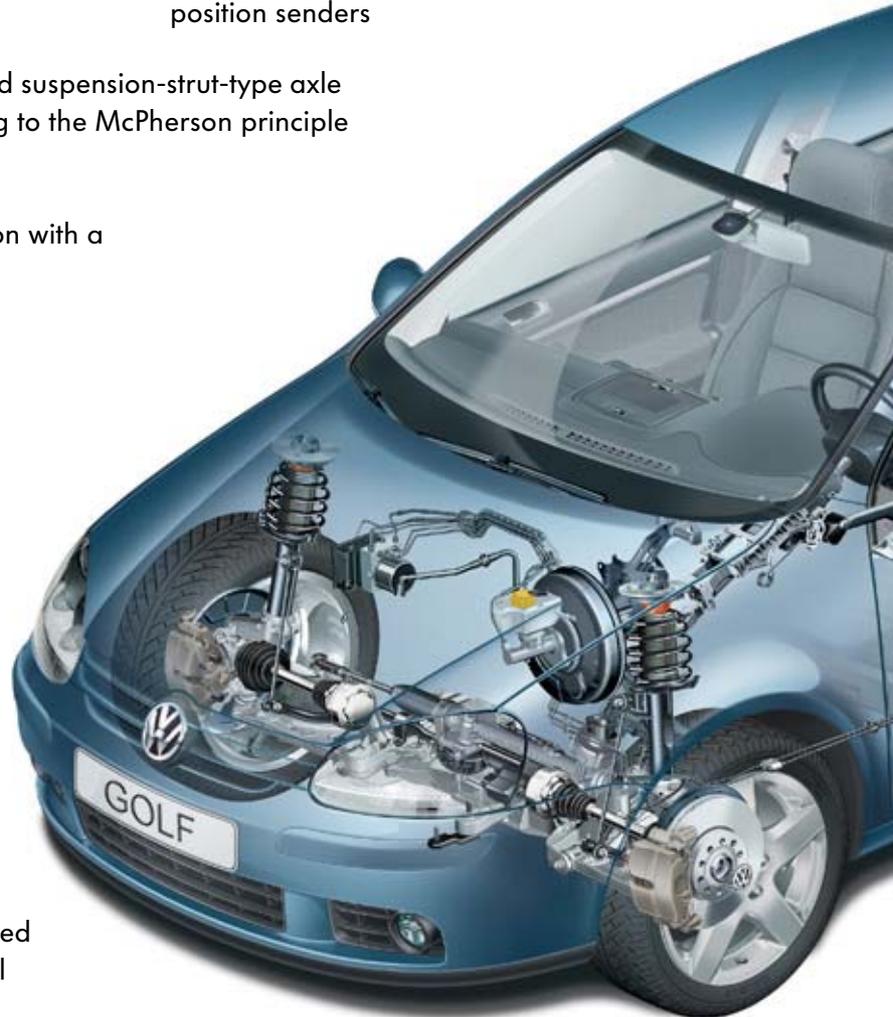
# Running gear

## The running gear

Once again, the running gear of the 2004 Golf sets new standards in its class. Use has been made of a strut front axle which has in many respects been perfectly optimized. In respect of handling dynamics and driving comfort, the perfectly balanced new four link rear axle points the way to the future. The electromechanical power assisted steering in the Golf provides handling assistance par excellence. It conveys a precise steering feel and harmoniously adapts the steering effort with increasing vehicle speed. In addition to the Golf, the Touran and the Audi A3 currently utilise this running gear platform.



- Floor mounted accelerator pedal with contactless accelerator pedal position senders
- Optimised suspension-strut-type axle according to the McPherson principle
- Direct anti-roll bar connection with a ratio of 1:1
- Electromechanical power assisted steering
- Brake servo with dual rate characteristic
- Electronic stabilisation program based on the MK 60 system by Continental Teves



The Golf can be equipped with a standard running gear, sports running gear or heavy-duty running gear. The running gear packages are distinguished in terms of their springs, dampers, anti-roll bars and the bearing elements. The sports running gear has been lowered 15 mm compared to the responsive and yet comfort-oriented standard running gear. The heavy-duty running gear has been lifted 20 mm compared to the standard running gear.

- Four link rear axle

- 4-motion drive, optional

- Tyre pressure monitoring system, optional

- Brake assist system

- Separately adjustable rear suspension toe and camber



S318\_008



For further information on the Running gear, please refer to SSP 321, "The 2004 Golf Running Gear".



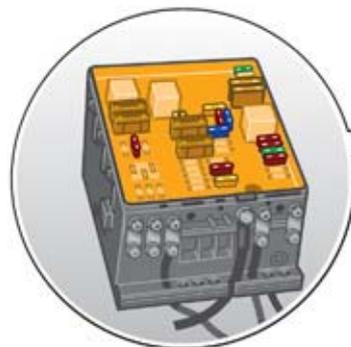
# Electrical system

## Fuse boxes and relay slots in vehicle's electrical system

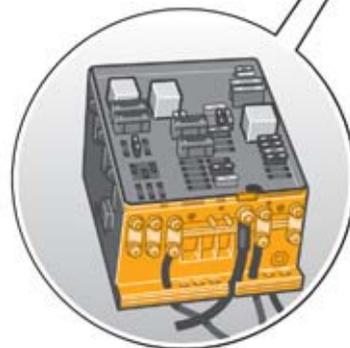
### Fitting locations

The electrical system of the 2004 Golf is configured decentrally and almost identical to that of the Touran, since both vehicles are based on the same platform. Due to different installation conditions, the fuse boxes and the relay slots are at different locations on board the vehicle.

The adjacent diagram shows the various fitting locations.



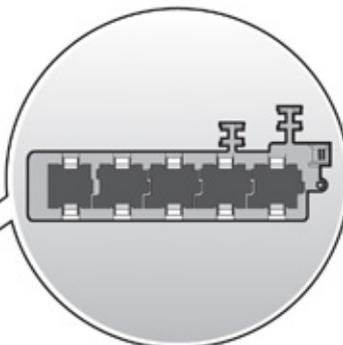
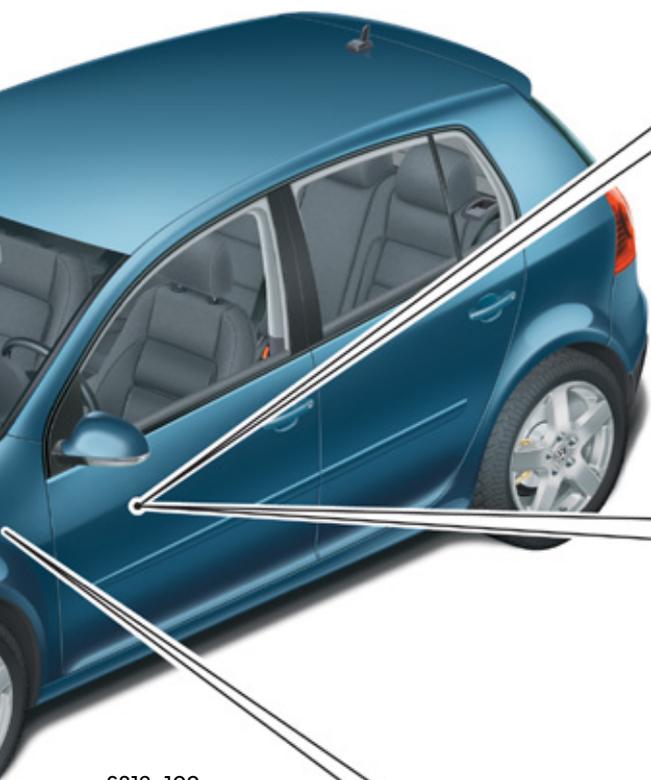
Electrics box on left in engine compartment



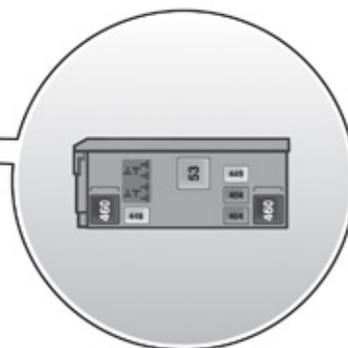
Back-up fuse box in the engine compartment on the left



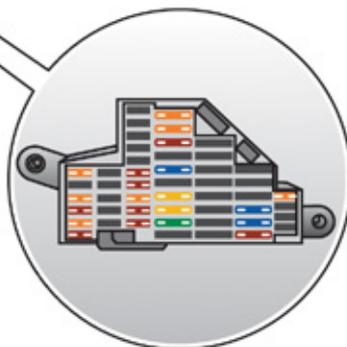
For further information on the electrical system, please refer to SSP 319 "The 2004 Golf Electrical System".



Relay carrier below the dash panel on the left, above the onboard power supply control unit



Relay carrier in the onboard power supply control unit, below the dash panel on the left



Fuse box in the dash panel on the left

S318\_109



# Electrical system

## The networking concept

### Overview of networked control units

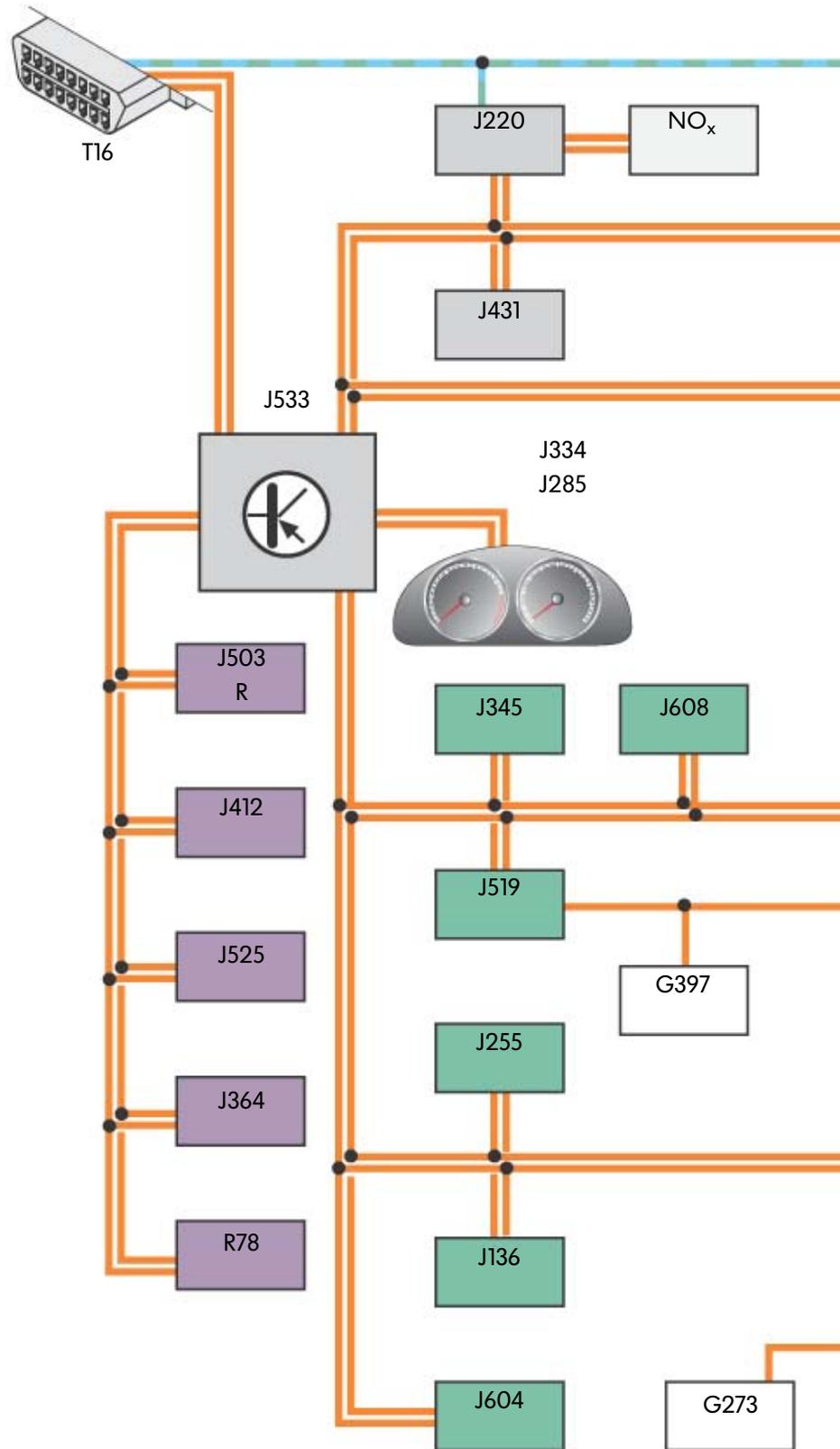
To allow data to be transferred between the control units, the control units are internetworked via various data bus systems.

The data bus diagnostic interface J533 (gateway) forms the interface to the data bus systems:

- Drivetrain CAN data bus
- Convenience CAN data bus
- Infotainment CAN data bus
- Combi CAN data bus
- Diagnosis CAN data bus

#### Control units connected to:

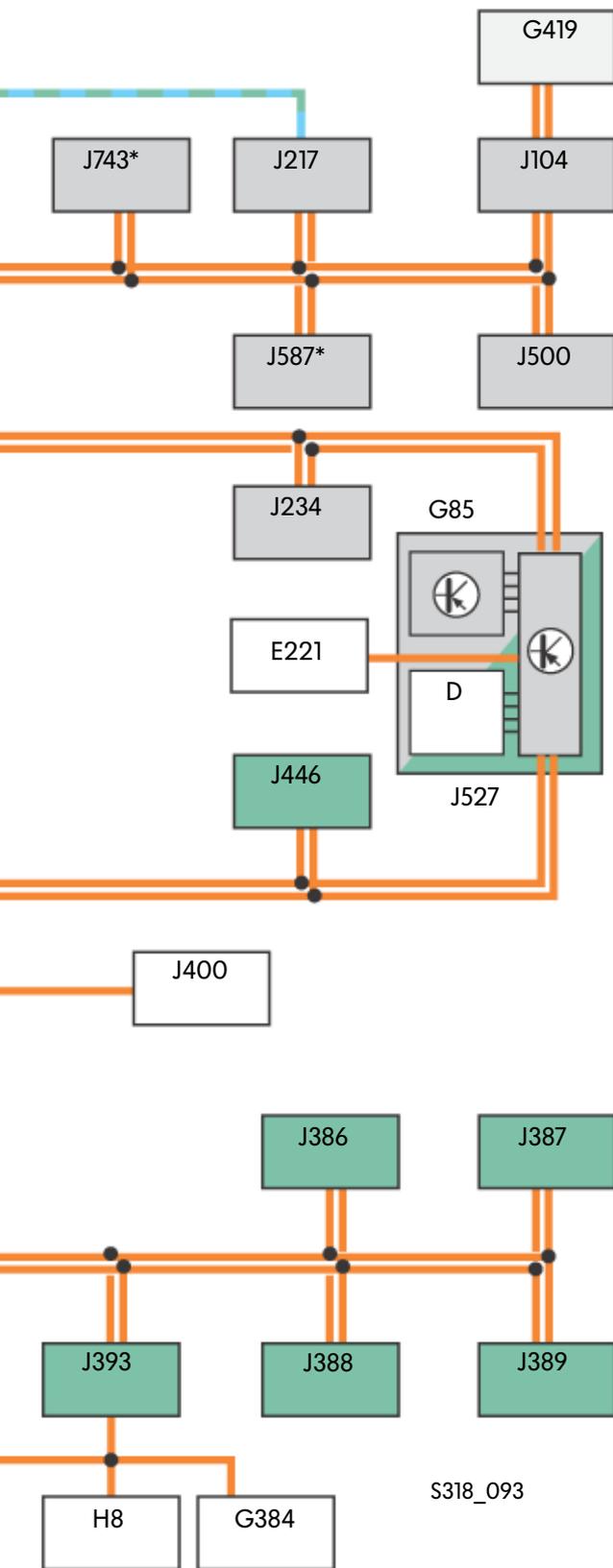
-  Drivetrain CAN data bus
-  Convenience CAN data bus
-  Infotainment CAN data bus
-  CAN data bus sensor
-  LIN data bus
-  CAN data bus line (high speed and low speed)
-  Communications line
-  LIN data bus line



\* only with direct shift gearbox



In addition to the CAN data bus, a number of electric components are networked via the LIN data bus.



**Key:**

- D Ignition/starter switch
- E221 Operating unit in steering wheel (multi-function steering wheel)
- G85 Steering angle sender
- G273 Rear left interior locking switch
- G384 Vehicle inclination sender
- G397 Rain and light detector sensor
- G419 ESP sensor unit
- H8 Anti-theft alarm system horn
- J104 ABS with EDL control unit
- J136 Seat and steering column adjustment control unit with memory
- J217 Automatic gearbox control unit
- J220 Motronic control unit
- J234 Airbag control unit
- J255 Climatronic control unit (and Climatic)
- J285 Control unit with display in dash panel insert
- J334 Immobiliser control unit
- J345 Trailer detection control unit
- J364 Additional heater control unit
- J386 Door control unit, driver side
- J387 Door control unit, front passenger side
- J388 Door control unit, rear left
- J389 Door control unit, rear right
- J393 Convenience system central control unit
- J400 Wiper motor control unit
- J412 Mobile telephone operator electronics control unit
- J431 Headlight range control, control unit
- J446 Parking aid control unit
- J500 Power steering control unit
- J503 Control unit with display for radio and navigation
- J519 Onboard power supply control unit
- J525 Digital sound package control unit
- J527 Steering column electronics control unit
- J533 Data bus diagnosis interface
- J587 Selector lever sensors control unit\*
- J604 Auxiliary air heater control unit
- J608 Special vehicle control unit
- J743\* Mechatronics for direct shift gearbox
- NO<sub>x</sub> NO<sub>x</sub> sensor
- R radio
- R78 TV tuner
- T16 Diagnostic connection

S318\_093



The data protocols have been changed. As a result, the control units cannot be replaced with control units from other vehicle types, e.g. Touareg or Phaeton.



# Heating and air conditioning

## Introduction

The 2004 Golf will be equipped with the heating and air conditioning system concept that has already been introduced to the Touran. It comprises three variants:

- The 2C-Climatronic heating and air conditioning system (2C = "2 Corner" = zones)
- The Climatic heating and air conditioning system
- The manual heating and ventilation system.

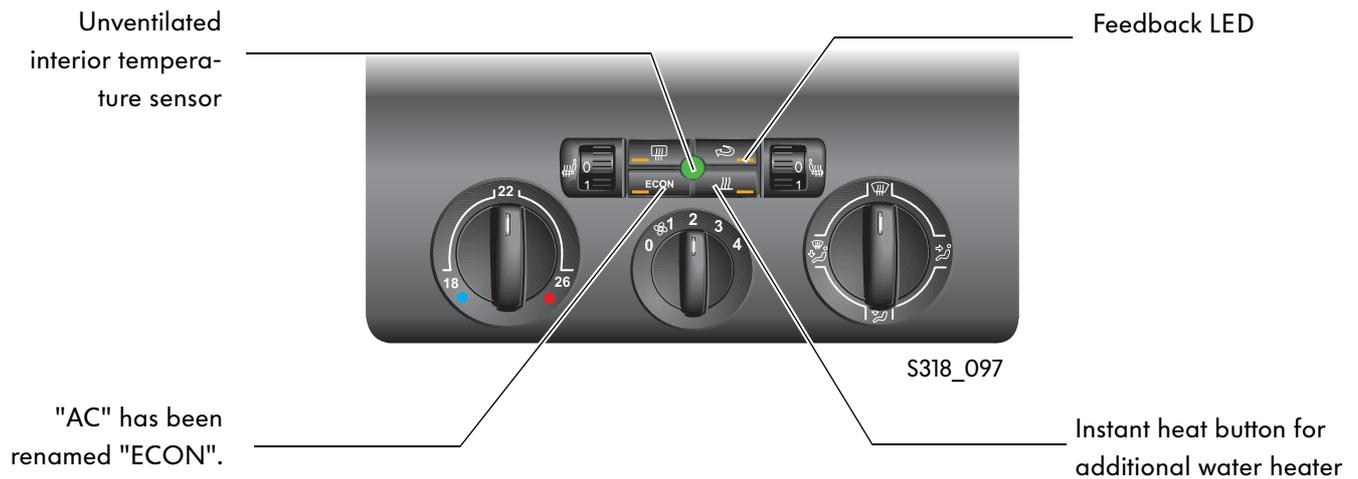
Each variant has a separate operating unit. All operating units are available in four different versions, depending on the vehicle's equipment specification:

- with or without instant heat button for auxiliary water heater,
- with or without seat heating potentiometer.

As usual, all operating elements which are relevant to temperature and ventilation as well as the control unit are combined in the operating units. New are the feedback LEDs on all buttons; they provide the occupants with an overview of all active functions. In the case of the 2C-Climatronic and Climatic systems, an unventilated interior temperature sensor is attached to the operating unit already known from other models. The figure below shows by way of example the operating unit of the 2C-Climatronic system.



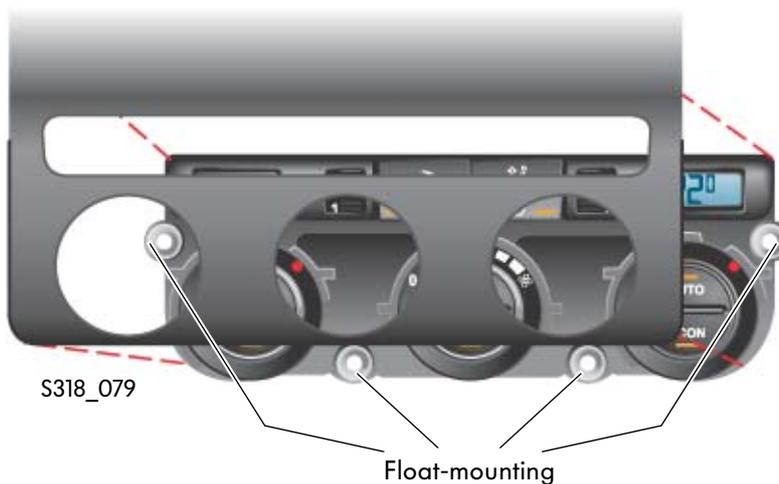
In the case of the Climatic operating unit, the button "AC" has been renamed "ECON".



The cooling function is deactivated by pressing the "ECON" button; on diesel models, the electrical auxiliary air heater is also deactivated this way.

### The floating-mounted operating units

The operating units are floating-mounted, i.e. they are mounted non-rigidly in the instrument panel and are centred automatically by the trim panel when it is fitted. This ensures uniform shut lines.



# Heating and air conditioning

## Functions of the systems in overview

Components	2C-Climatronic	Climatic	Heating/ventilation
Pollen filter	✗	✗	✓
Pollen filter with activated charcoal	✓	✓	✗
Air recirculation flap with control motor	✓	✓	✓
Air flow flap with control motor	✓	✗	✗
Temperature flap	Two flaps actuated by control motors	one flap actuated by control motor	one flap actuated by bowden cable
Central dash panel/footwell flap	actuated by control motor	actuated by flexible shaft	
Defrost flap	actuated by control motor	actuated by flexible shaft	
Left vent temperature sender G150 Right vent temperature sender G151	left and right	left	✗
Vent temperature sender, left footwell G261 Vent temperature sender, right footwell G262	left and right	left	✗
Fresh air intake duct temperature sensor G89	✓	✗	✗
Evaporator out-flow temperature sender G263	✓	✓	✗
High pressure sender G65	✓	✓	✗
Fresh air blower V2	with electronic control	with Series resistor	
Sunlight penetration photo sensor G134	✓	✗	✗
Unventilated interior temperature sensor	✓	✓	✗
Electrical auxiliary air heater*	✓	✓	✓
Air recirculation mode	by pressing the air recirculation button		
	when driving in reverse		✗
	in wipe-wash mode of the windscreen washer system		✗

 = available  
 = not available

\* with all diesel vehicles without additional water heater

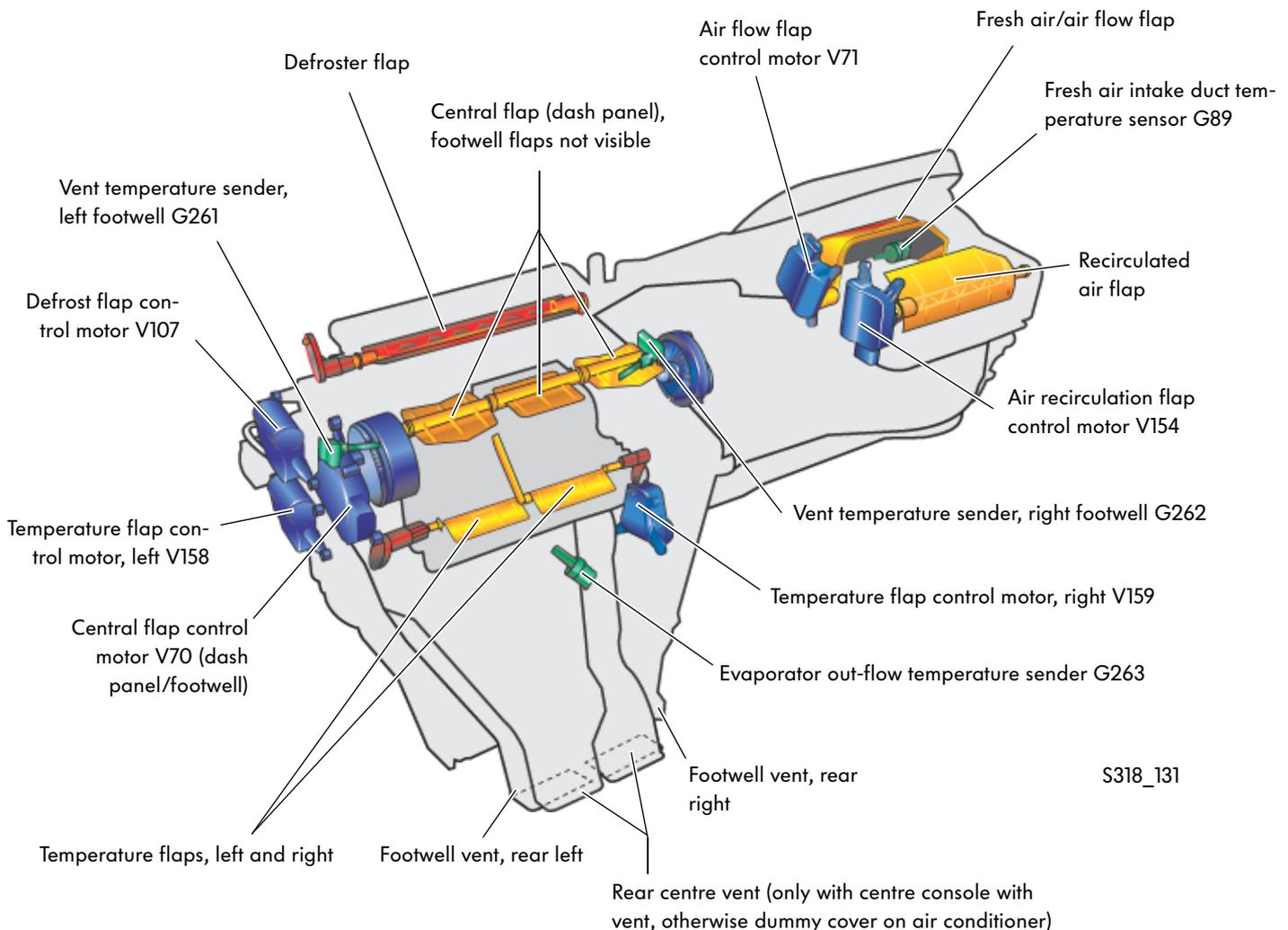
## The air conditioner

All variants are based on the same basic air conditioner. The fundamental difference between the individual systems is the way in which the air distribution flaps are actuated. The 2C-Climatronic has an additional fresh air flow flap, which is closed at increasing speeds in excess of 100 kph. The result is a constant fresh air intake even at different vehicle speeds.

The figure below shows by way of example the air conditioner of the 2C-Climatronic system.



The heating and Climatic systems have a fresh air/air recirculating flap. The 2C-Climatronic has a fresh air/air flow flap as well as a separate air recirculating flap.



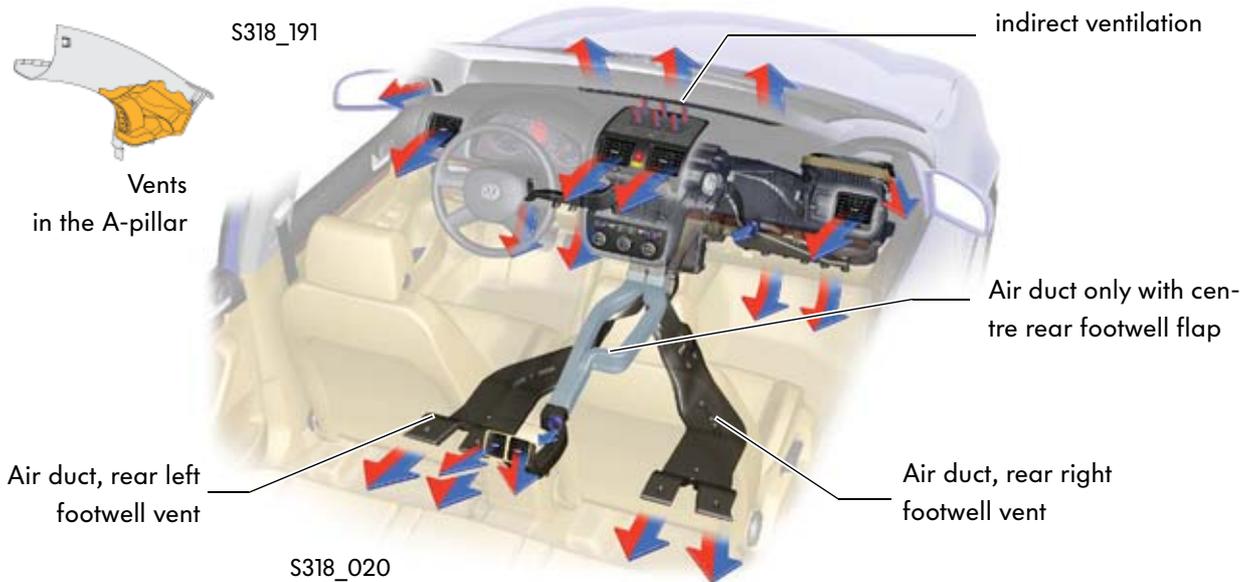
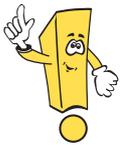
S318\_131

# Heating and air conditioning

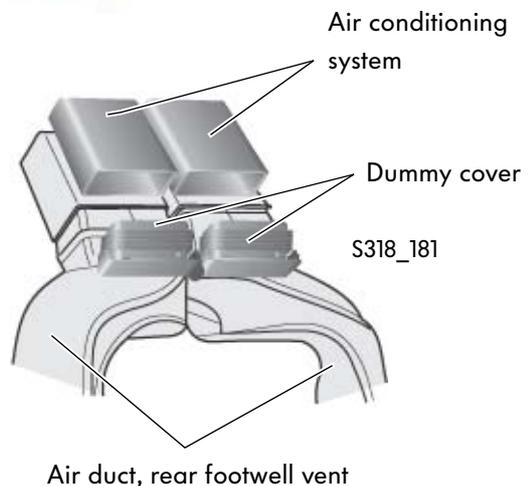
## The air distribution

The air distribution is almost identical in all variants and feature the following modifications:

- All air duct cross-sections have been enlarged compared to the predecessor model.
- The air duct to the defrost and dash panel vents runs through the dash panel.
- The front side windows are ventilated through new vents in the A-pillar.
- For ventilation in the rear passenger compartment, a single air duct leads to each of the left and right footwells.
- In the case of the 2C-Climatronic, air ducts integrated in the dash panel lead to the vents on the upper side of the dash panel to provide indirect ventilation.



A centre console with vent can be ordered as an optional extra for the air conditioning systems and the heating and ventilation system. Air is ducted from the air conditioner to the centre vents along a common air duct. In vehicles without a vent in the centre console, the outlet on the air conditioner is sealed by a dummy cover.



## The refrigerant circuit

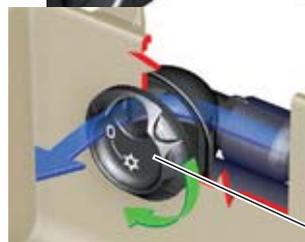
The refrigerant circuit with expansion valve in the 2004 Golf is technically identical to the refrigerant circuit in other vehicles with an externally controlled compressor.

The drier is bolted onto the capacitor, and an externally controlled compressor is used. The electronic high pressure sender G65 and the evaporator out-flow temperature sender G263 are installed for monitoring and control purposes.

Those vehicles which are fitted with an air conditioner have as standard equipment a cooled storage compartment on the front passenger side. The storage compartment is cooled by cold air which is extracted directly at the outlet end of the evaporator and channeled to the storage compartment. Refrigeration output can be adjusted manually using an adjustable outlet.



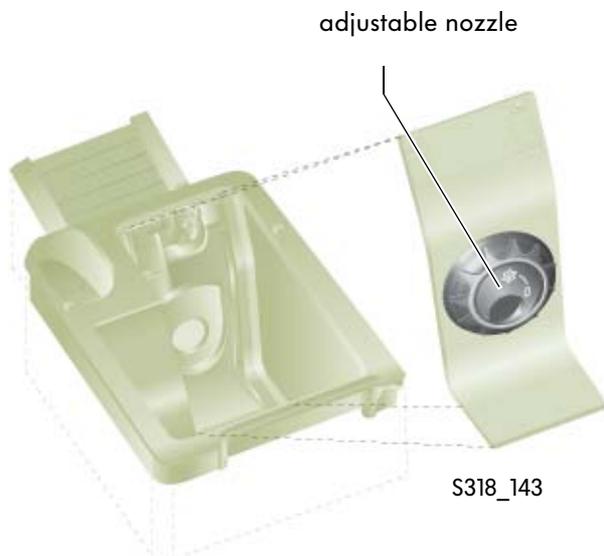
S318\_004



S318\_006

adjustable nozzle

If the vehicle has a centre console with rear vents, the storage compartment in the centre console also has a temperature control function. In this case, the air is extracted from the air duct leading to the centre console vent. Again, the air supply can be set manually with an adjustable nozzle.



S318\_143

adjustable nozzle



# Heating and air conditioning

## Air conditioning systems

### The 2C Climatronic

Following in the footsteps of the Touran, the 2004 Golf will become the second vehicle in this vehicle class to be equipped with a 2-zone air conditioning system. This means that the temperature on the driver's and front passenger's sides can be set separately to between 16 °C and 29.5 °C. If the "Auto" button is pressed for longer than two seconds, the temperatures in both zones can be adjusted simultaneously from the driver's side.

The division into two air-conditioning zones is achieved by using two temperature flaps within the air conditioner. In the case of the 2C-Climatronic, all air conditioner flaps are actuated by six control motors with integrated potentiometer. The 2C-Climatronic can be operated both automatically and manually.



S318\_036

To prevent the windscreen from fogging, the 2C-Climatronic automatically increases the air flow to the windscreen if the compressor is deactivated and the windscreen wipers are activated.

To this effect, the defrost flap is opened wider.

The 2C-Climatronic also has a function which reduces the output of the fresh air blower depending on vehicle speed. To minimise the airflow noise of the air conditioner after wind and tyre noise have been eliminated, the fresh air blower voltage is adjusted as a function of road speed - without this being noticed by the vehicle occupants. Air distribution is thus reduced. When the cooling function is active, the system compensates for the reduction in air distribution by reducing the air outlet temperature and, if heating mode is active, by increasing the ventilation temperature.

## The Climatic system

For climate control, the interior of the vehicle is seen as one climate zone. The Climatic air conditioner has a combined fresh air recirculating flap which, like the temperature flap, is driven by a control motor. In the Climatic system, the air distribution flaps are actuated by a flexible shaft. The temperature request is transferred directly to the control unit by a potentiometer integrated in the rotary switch. The desired temperature is achieved by adjusting the temperature flap.



S318\_034

## Interface to the air conditioner

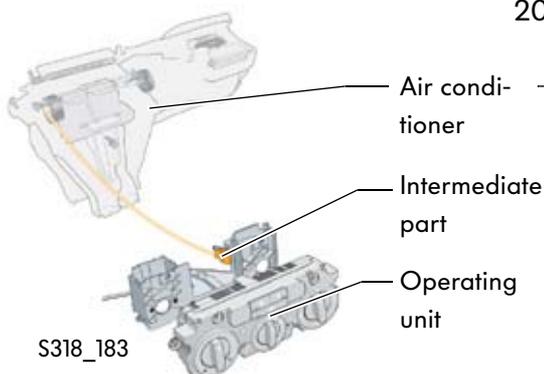
The operating units of the Climatic and the manual heating are divided into a rear mechanical part, which is connected to the flexible shaft, and a front electronic part.

The heater is additionally attached by a bowden cable. The air conditioner is installed and removed according to the same procedure as in the Touran.

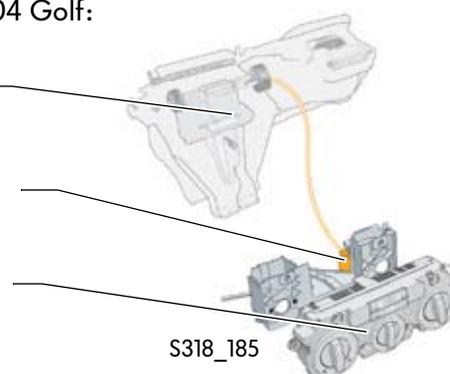
In comparison with the Touran, the connection to the flexible shaft on the air conditioner has, for space reasons, been relocated from the left-hand side of the flaps to the right-hand side of the flaps. As a result, the intermediate part of the operating unit had to be adapted to the modified routing of the flexible shaft.



Touran 2003:



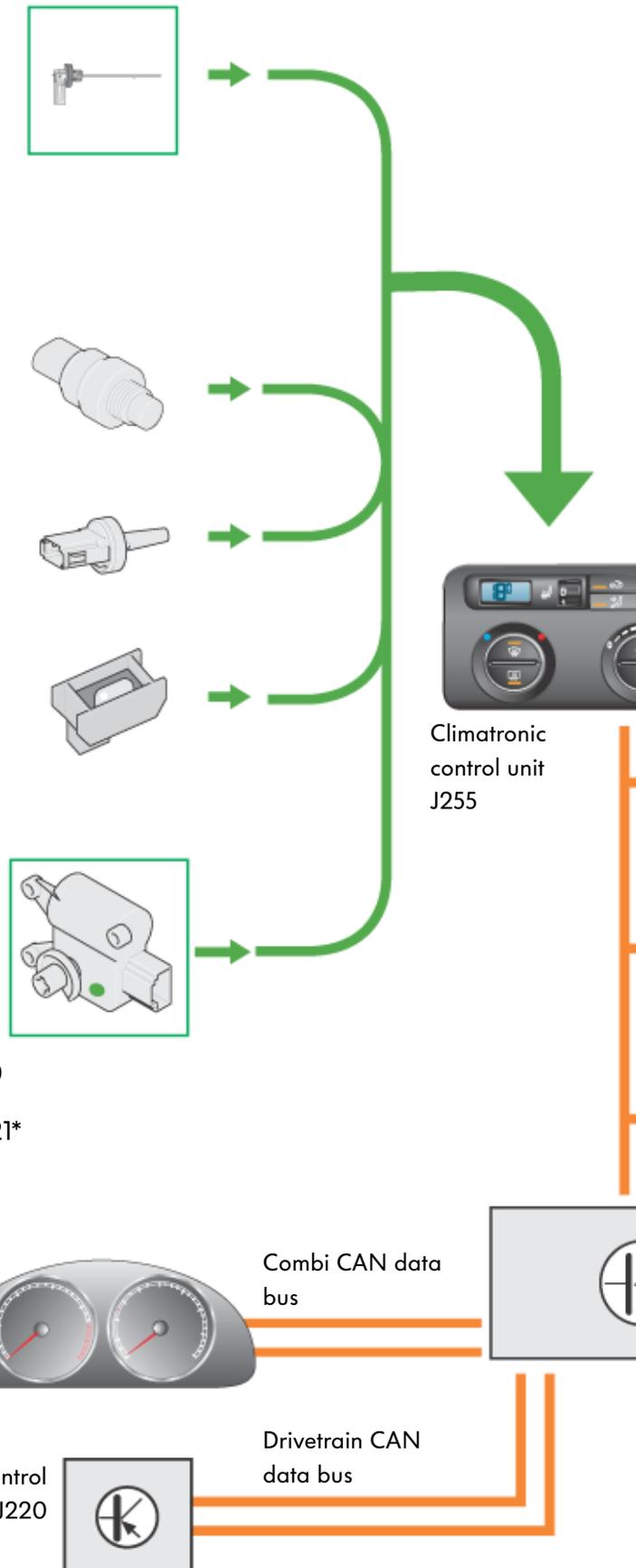
2004 Golf:

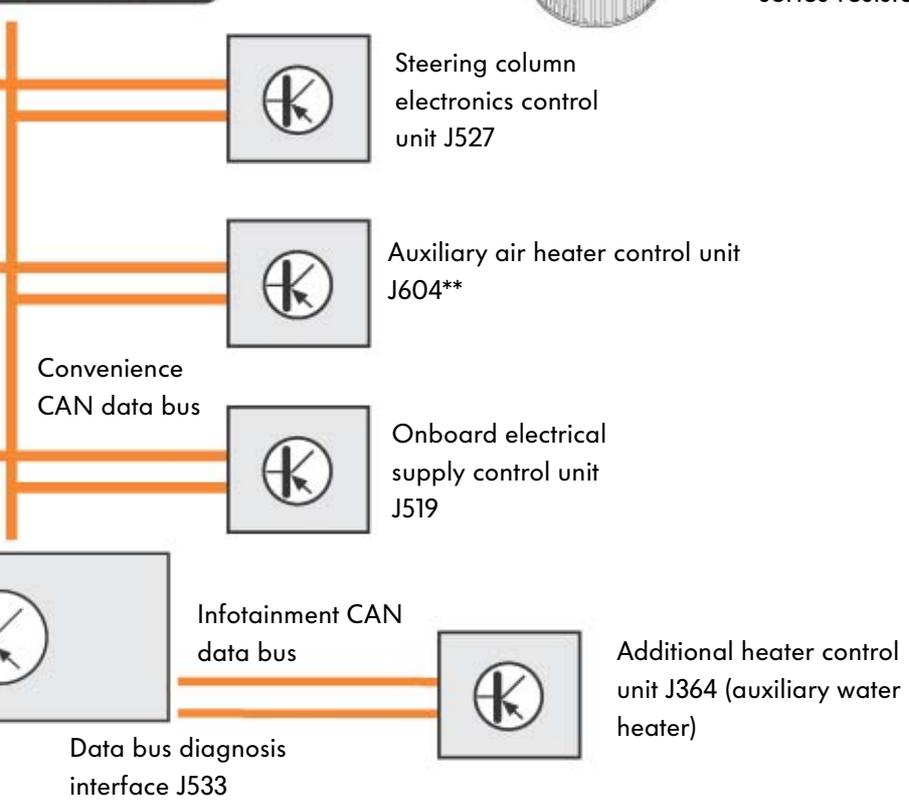
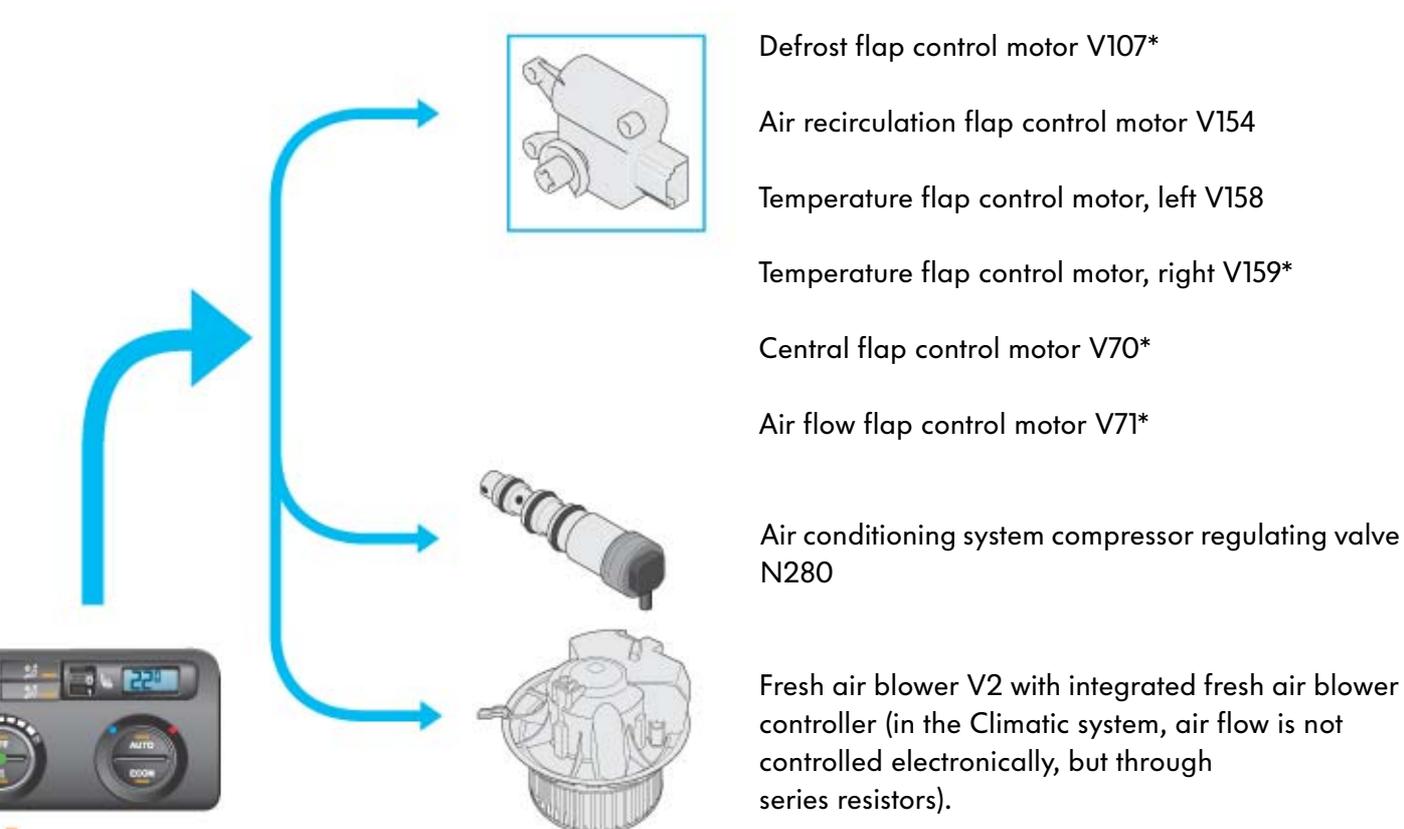


# Heating and air conditioning

## Overview of the 2C-Climatronic/Climatic system

- Fresh air intake duct temperature sensor G89\*
- Vent temperature sender, left footwell G261
- Vent temperature sender, right footwell G262\*
- Left vent temperature sender G150
- Right vent temperature sender G151\*
- High pressure sender G65
- Evaporator out-flow temperature sender G263
- Sunlight penetration photo sensor G134\*
- Defroster flap control motor potentiometer G135\*
- Air recirculation flap control motor potentiometer G143
- Central flap control motor potentiometer G112\*
- Air flow flap control motor potentiometer G113\*
- Left temperature flap control motor potentiometer G220
- Right temperature flap control motor potentiometer G221\*





S318\_083

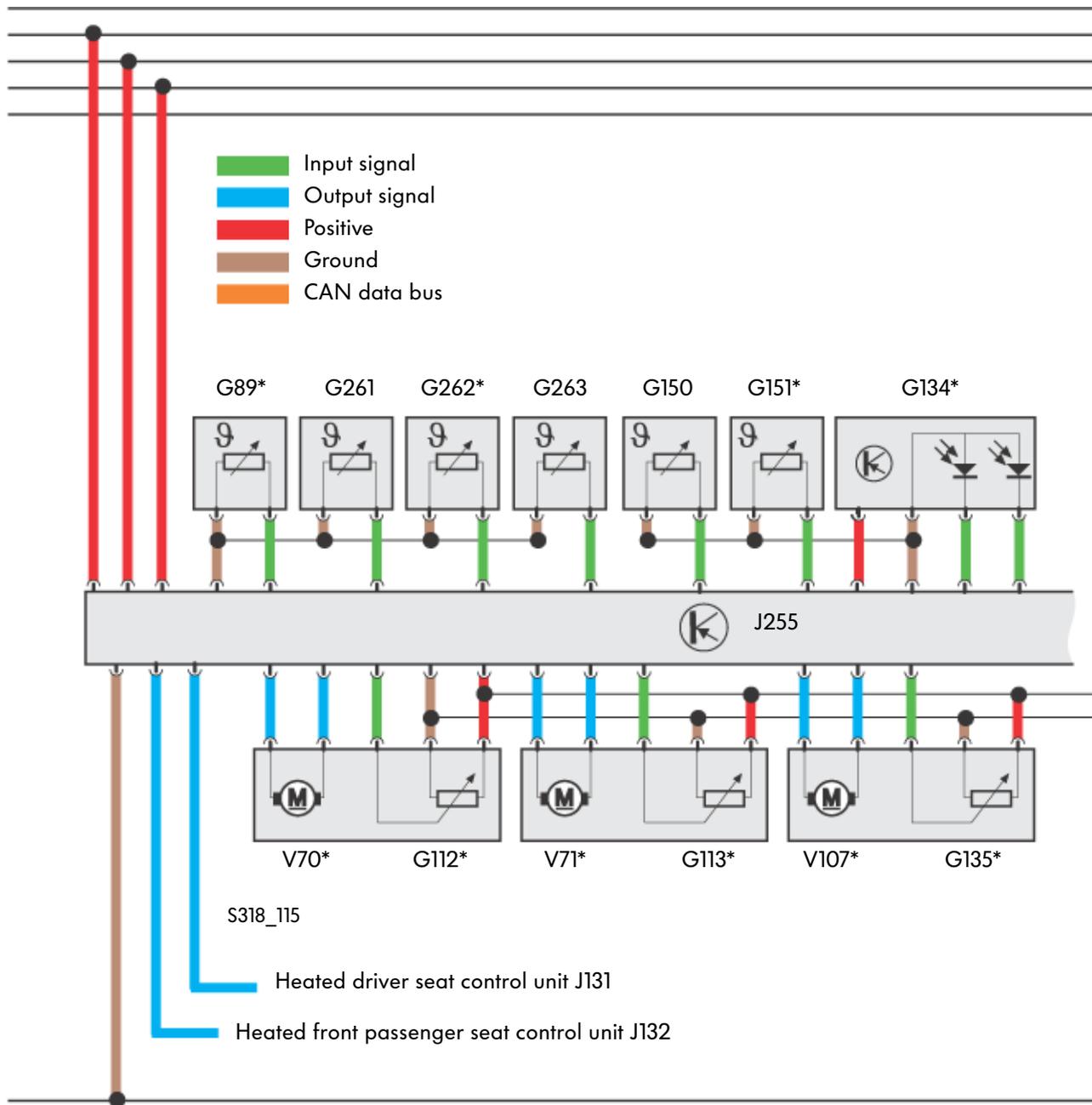
\* only in combination with 2C-Climatronic

\*\* only in combination with diesel engine with no auxiliary water heater



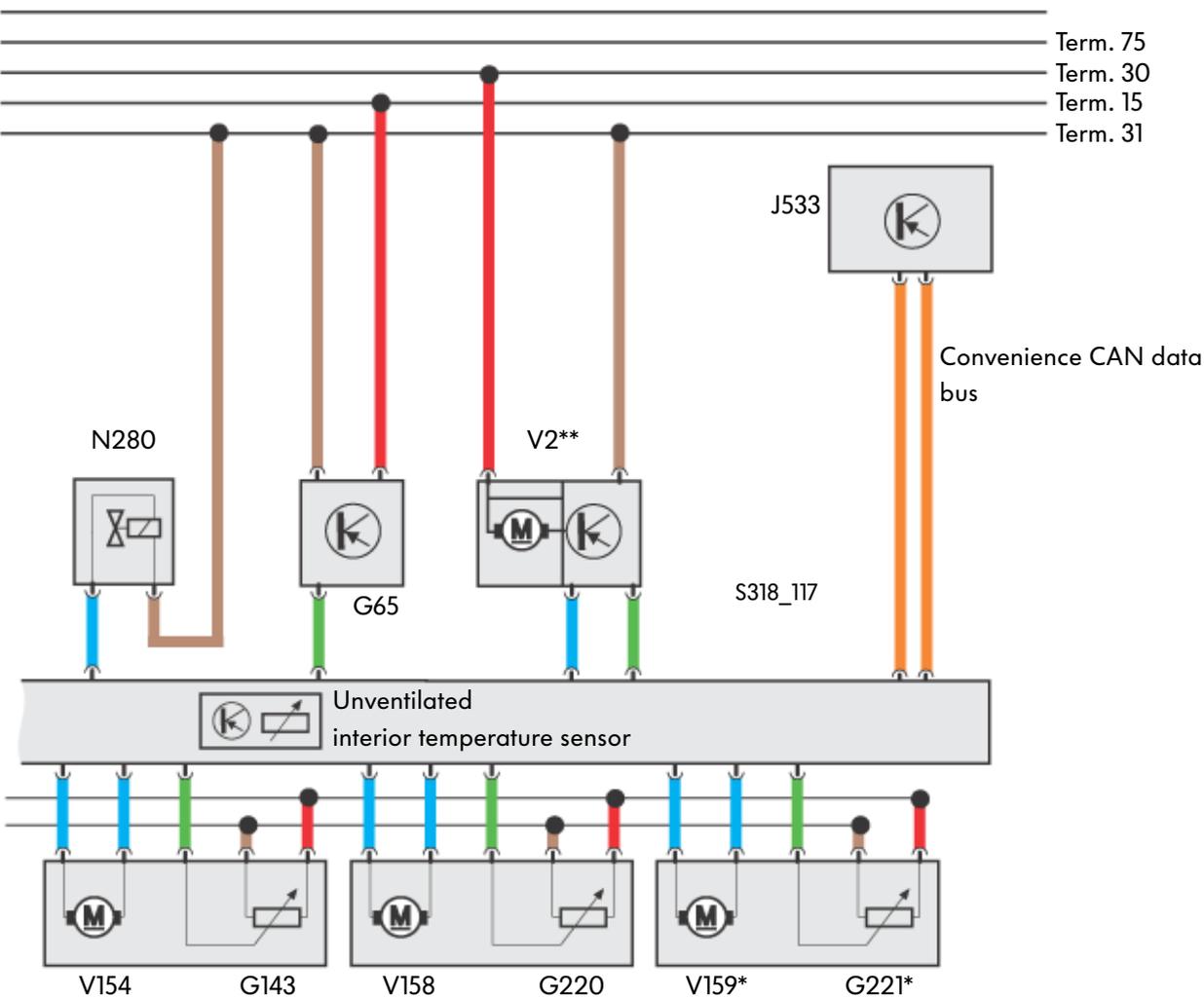
# Heating and air conditioning

Function diagram - air conditioning systems



- G89** Fresh air intake duct temperature sensor
- G261** Vent temperature sender, left footwell
- G262** Vent temperature sender, right footwell
- G263** Evaporator out-flow temperature sender
- G150** Left vent temperature sender
- G151** Right vent temperature sender
- G134** Sunlight penetration photo sensor

- J255** Climatron control unit
- V70** Central flap control motor (dash panel/footwell)
- G112** Central flap control motor potentiometer
- V71** Air flow flap control motor
- G113** Air flow flap control motor potentiometer
- V107** Defroster flap control motor
- G135** Defroster flap control motor potentiometer



\* only in combination with 2C-Climatronic

\*\* The V2 fresh air blower motor with electronic control is only fitted in combination with 2C-Climatronic. Climatic and the heater are controlled through series resistors.

In the case of Climatic, the sensors and actuators have in part different designations. For details, please refer to the latest current flow diagrams.

- N280** Air conditioning system compressor regulating valve
- G65** High pressure sender
- V2** Fresh air blower
- J533** Data bus diagnostic interface
- V154** Air recirculation flap control motor
- G143** Air recirculation flap control motor potentiometer

- V158** Temperature flap control motor, left
- G220** Left temperature flap control motor potentiometer
- V159** Temperature flap control motor, right
- G221** Right temperature flap control motor potentiometer



# Heating and air conditioning

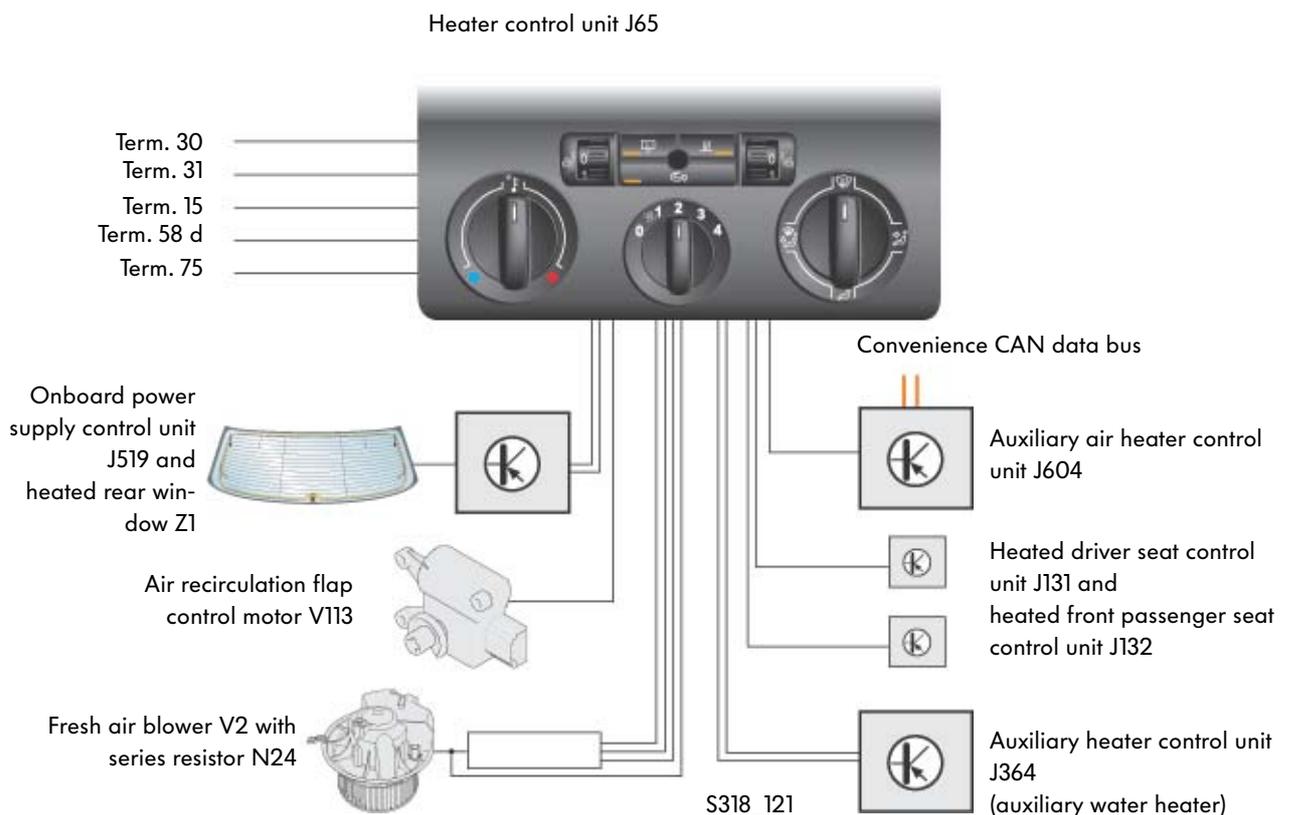
## The heating and ventilation system

In the case of the heating and ventilation system, the temperature is not controlled automatically. The two rotary knobs are only mechanically connected to the air conditioner: The rotary knob for temperature adjustment is connected by a Bowden cable and the rotary knob for air distribution is connected by a flexible shaft, like in the Climatic system. The fresh air recirculating flap is selected manually by a button and actuated by a control motor.

All input and output signals are converted to analog signals. The heated rear window activation command is transmitted to the onboard power supply control unit, which switches the heated rear window on depending on the utilization factor of the vehicle electrical system. The feedback signal for activating the LED in the button is generated simultaneously. The process for the additional water heater is similar. The auxiliary water heater is activated by the instant heat button. When the auxiliary water heater starts to operate, the LED in the instant heat button is activated by the feedback signal.



The heater and ventilation control unit has its own address word (7D), however it is not CAN-networked.



## Sensors

### The unventilated interior temperature sensor

#### Function

The new unventilated interior temperature sensor replaces the dash panel temperature sensor G56 with ventilation motor. It is integrated in the operating unit together with the control unit.

The new sensor measures the following values:

- surface temperature,
- unit temperature and
- sunlight penetration.

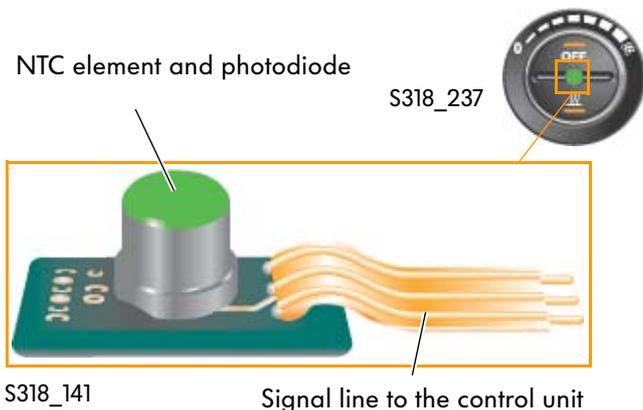
It has the following advantages over its predecessor:

- it is less susceptible to soiling as the sensor housing is protected, so there is less interference with temperature regulation,
- there are no components which rotate mechanically, so the sensor is more wear-resistant,
- there is no ventilation grille in the trim (design advantage),
- lower costs.

#### Construction

The unventilated interior temperature sensor essentially consists of an "integrated thermo-optical sensor" - an NTC element in combination with a photodiode.

This electronic component can measure the temperature and intensity of the solar radiation incident on its surface. As a result, the sensor is able to measure exactly the air temperature in the vehicle interior even if the sensor's surface has heated up considerably. The sensor signals are transmitted via signal lines to the control electronics of the Climatic or 2C-Climatronic. An intelligent software function of the control electronics then evaluates the sensor signals and regulates the temperature of the occupant cell.



Further information:

- SSP 208 "Air Conditioners in the Motor Vehicle",
- SSP 271 "The Phaeton Heating and Air Conditioning System"
- SSP 301 "The Touareg heating/air conditioning system".

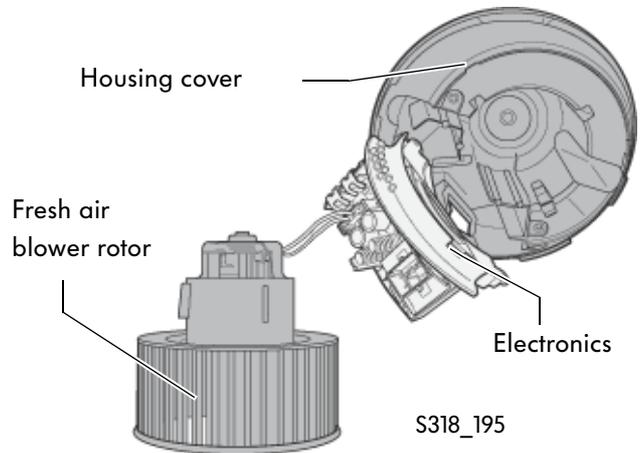


# Heating and air conditioning

## Actuators

### The fresh air blower with integrated fresh air blower controller V2

In the case of the 2C-Climatronic, a fresh air blower with an integrated electronic control is installed. The fresh air blower is accessible from the front passenger footwell.



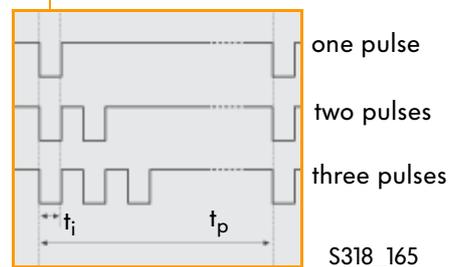
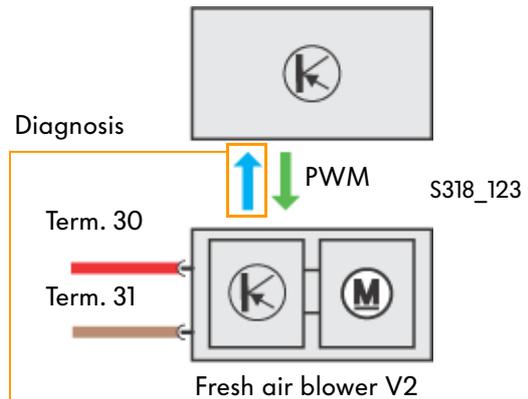
### Activation of the fresh air blower controller

The fresh air blower with integrated electronic fresh air blower controller V2 is addressed by the air conditioner control unit via a pulse-width modulated signal (PWM) and can send back a diagnostic feedback signal.

If, for example, a pulse is transmitted in the diagnostic feedback signal, this indicates to the air conditioner control unit that no fault is present.

Two pulses signal that the current is limited; three pulses signal that the temperature is too high and can lead to a reduction in output or deactivation of the fresh air blower.

Climatronic control unit J255



$t_i$  = time segment of one pulse  
 $t_p$  = time segment of one period



For information on other actuators, please refer to SSP 208 "Air Conditioners in the Motor Vehicle", SSP 271 "The Phaeton Heating and Air Conditioning System" and SSP 301 "The Touareg - Heating/air-conditioning system".

## The electrical auxiliary air heater

An electrical auxiliary air heater is installed in diesel vehicles. The electrical auxiliary air heater is a combination of a PTC heater element with an integrated control unit. It is installed downstream of the heat exchanger and provides additional heating of the vehicle interior after cold-starting the engine. The electrical auxiliary air heater directly heats the air which enters the vehicle interior. It acquires all information needed for operation via the convenience CAN data bus.



In the "Heating" version, the heating request is issued via a separate signal line.



The electrical auxiliary air heater is not installed if the vehicle has an additional water heater, as the latter is used to provide additional heating at low outside temperatures.



### Activation conditions

The electrical auxiliary air heater is activated:

- in the case of the 2C-Climatronic and Climatic: automatically via the CAN data bus; in the case of the heating system: if the occupants set the heating output to over 90% at the operating unit (analog signal),
- if the water temperature is below 75°C,
- if the engine speed is higher than 500 rpm,
- if no load management system is active and
- if the ECON button is not pressed.

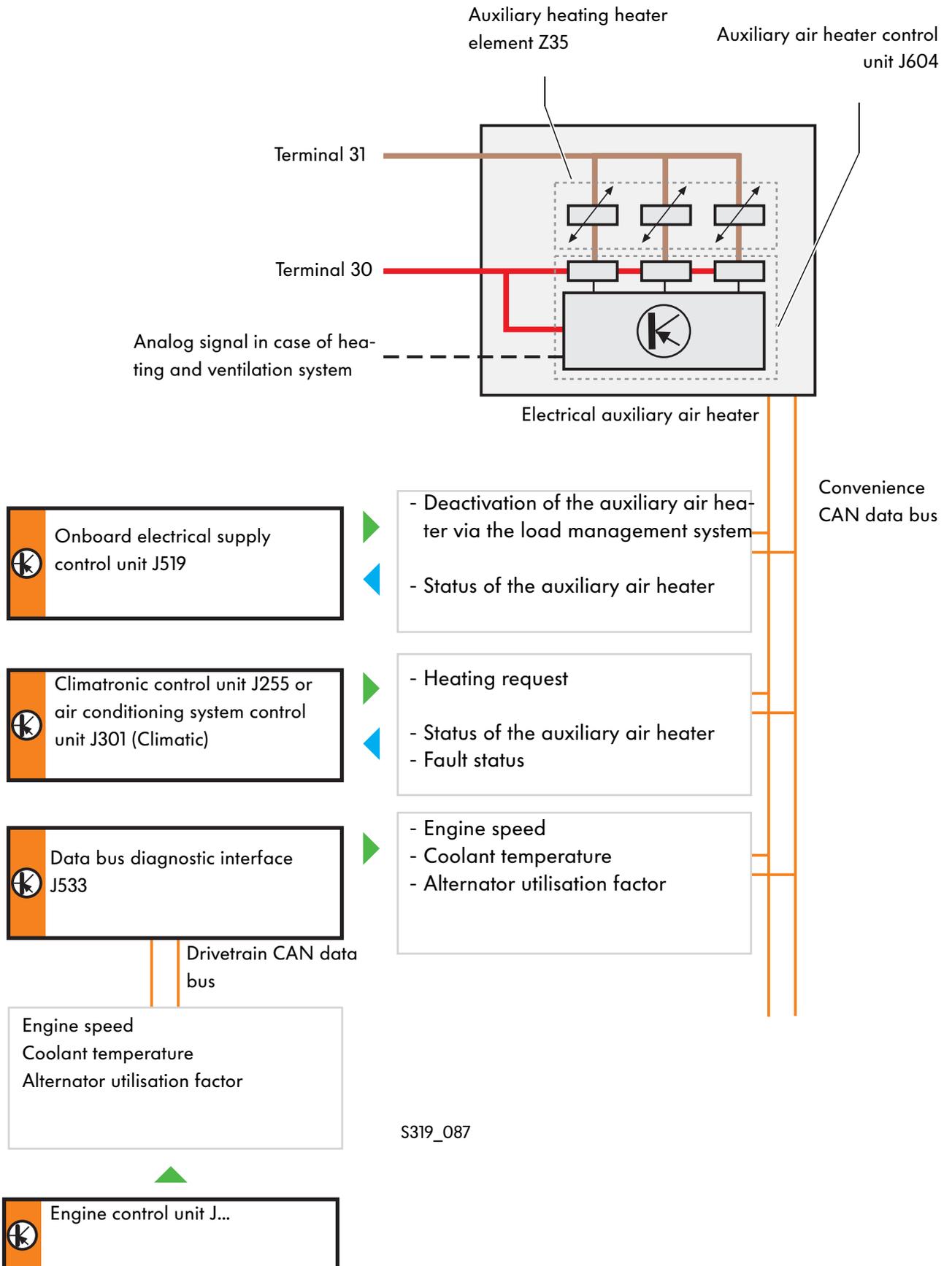
### The importance of the load management system

The onboard power supply control unit controls the load management system, which has a special part to play in operation of the electrical auxiliary air heater. It can deactivate the electrical auxiliary air heater partially or completely. The load management system's status is indicated in the data blocks of the electrical auxiliary air heater. Power output can be reduced in steps of 75%, 50% and 25%.



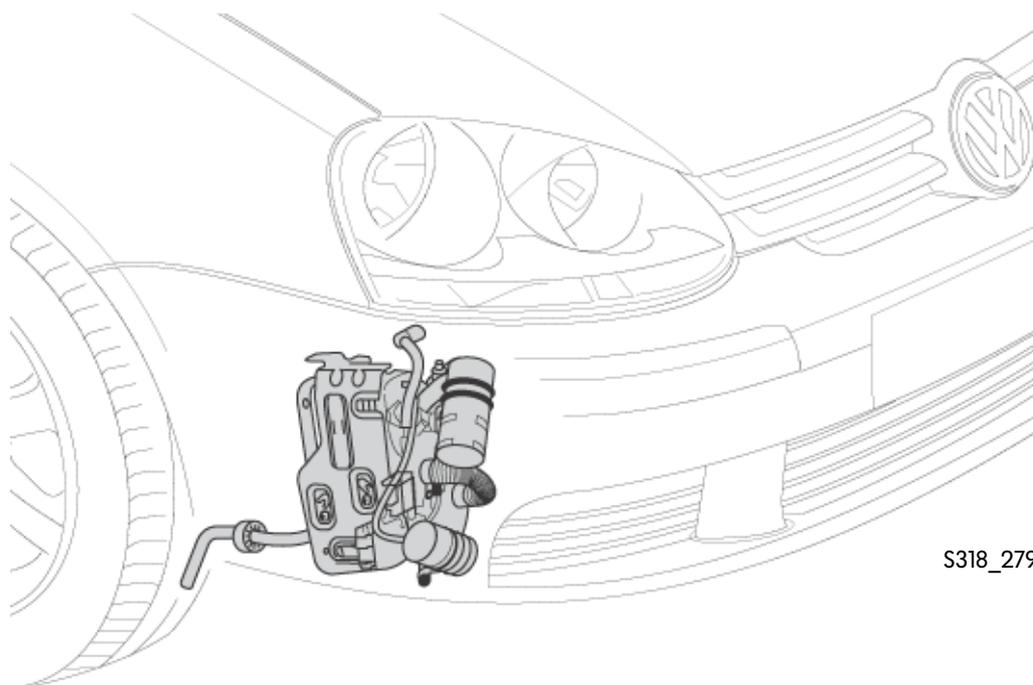
# Heating and air conditioning

Function flowchart of the electrical auxiliary air heater



## The auxiliary water heater

There is a growing demand for engine-independent heaters. Whether in the summer or in the winter, customers seek a pleasant interior climate - without misted-up or iced-up windows. To meet these customer specifications, the Golf can be ordered with the Thermo Top V auxiliary water heater as optional equipment.



S318\_279

### Tasks of the auxiliary water heater

The auxiliary water heater is used for the following tasks:

- as an auxiliary heater for heating the vehicle interior and defrosting the vehicle's windows,
- as an auxiliary ventilation system for lowering the interior temperature when the vehicle is parked in sunlight and
- as an auxiliary heater for petrol and diesel engines. If a diesel vehicle is equipped with an auxiliary water heater, the electrical auxiliary air heater is not required; in this case, the auxiliary water heater automatically provides an additional heating function at outside temperature of below 5°C.



For further information on additional water heaters, please refer to the SSP 280 "The Phaeton - Thermo TOP C Additional Water Heater and Thermo TOP Z Additional Heater".

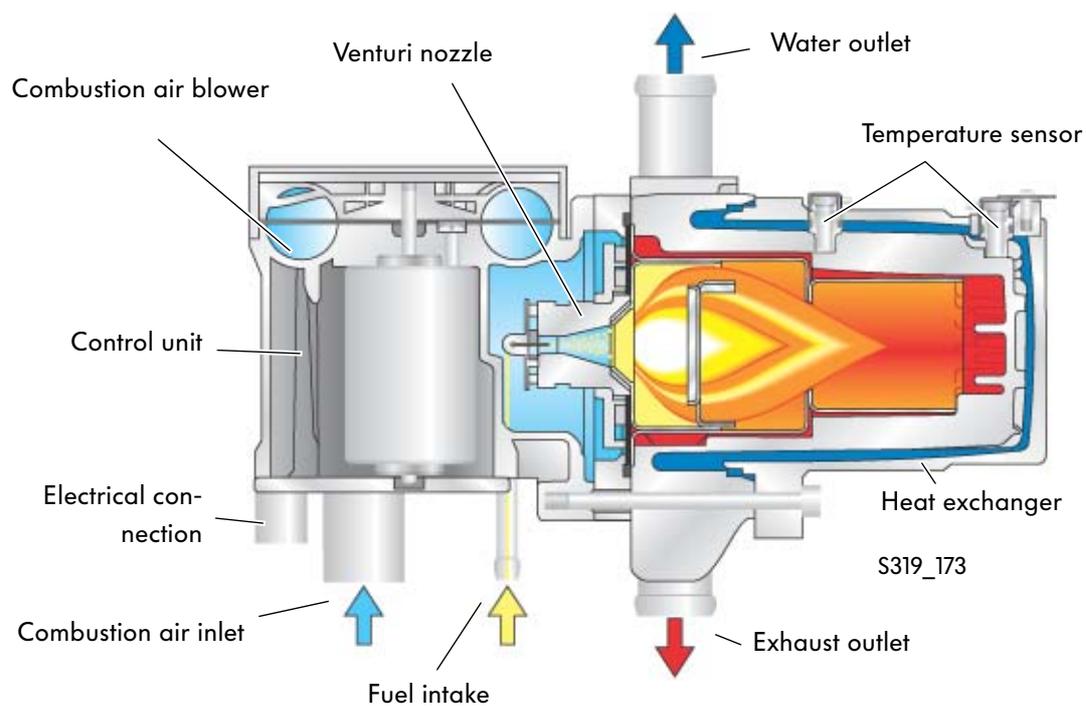
# Heating and air conditioning

## New features of the Thermo Top V

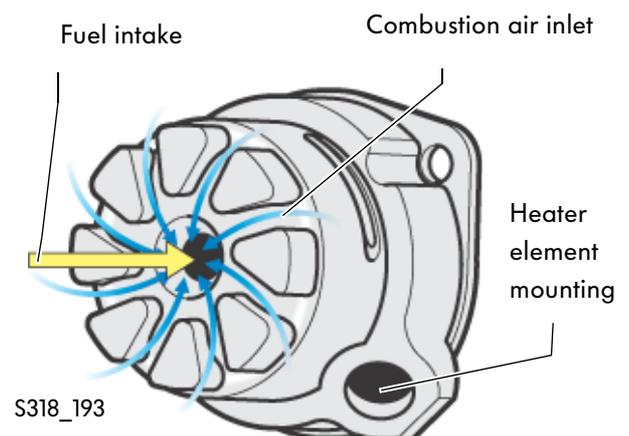
The auxiliary water heater control unit is also integrated in the heater, but its design has been modified. The electrical contacts of the combustion air blower are fastened directly to the control unit.

In addition, the new auxiliary water heater has a second NTC temperature sensor in the heater. This provides for improved water temperature monitoring and regulation.

Another new feature is the fuel injection system: the fuel is no longer mixed with the combustion air in a fuel evaporator (non-woven material). A Venturi nozzle is used in place of the non-woven material.



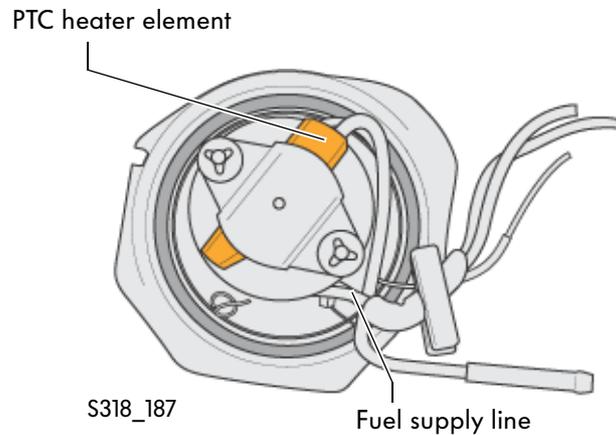
The Intake air is ducted through a ceramic housing which is shaped to form a Venturi nozzle. Fuel injection is assisted by the suction effect.



## The fuel preheater

The Thermo Top V is also suitable for RME fuels (biodiesel). This is made possible by a fuel preheater. The fuel is preheated by a PTC heater element directly before the commencement of injection into the combustion chamber. In addition, this avoids heavy smoke formation during the start phase.

To achieve this, the PTC heater element is switched on for approx. one minute when the additional water heater is operated at outside temperatures of below 5°C.



## Activation of Thermo Top V

There are three ways to activate the Thermo Top V auxiliary water heater.

The "Heat" and "Ventilate" functions can be set on the display on the dash panel insert.

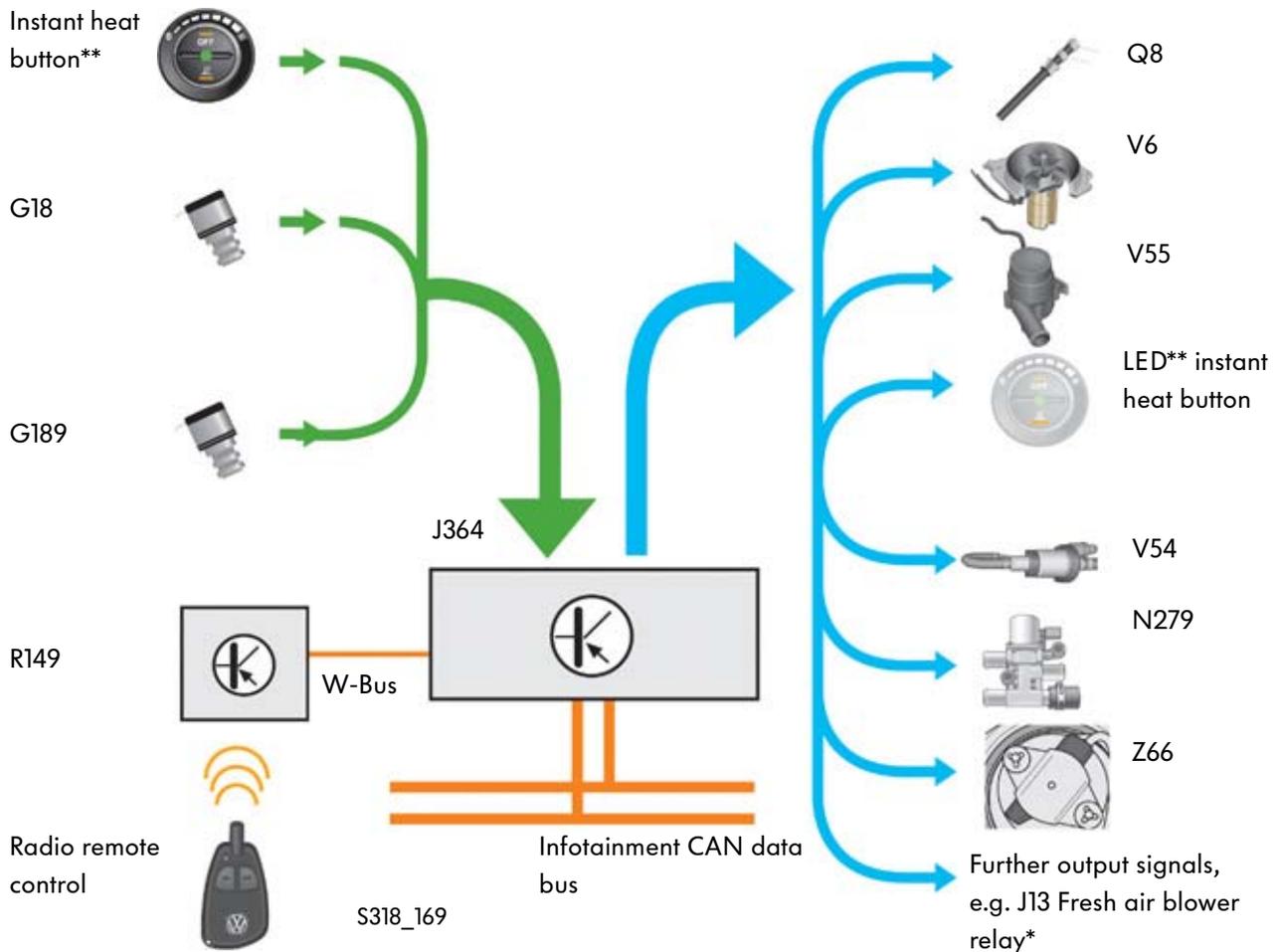
1. Activation of the auxiliary water heater with the instant heat button on the operating unit.
2. Programming of the auxiliary water heater via the multi-function display (MFA) with Data Display Protocol (DDP). Thermo Top V can be programmed via the display on the dash panel insert under the menu item "Auxiliary heater" (personalisation).
3. With the separate radio remote control for the additional water heater, Thermo Top V is switched on and off via the remote control.

The instant heat button in the operating unit indicates the status of the auxiliary water heater: if it is active, the feedback LED is lit yellow. If a programmed on-time is active for the auxiliary water heater, the feedback LED comes on for approx. 10 seconds after the ignition is turned on.



# Heating and air conditioning

## Overview of the auxiliary water heating system



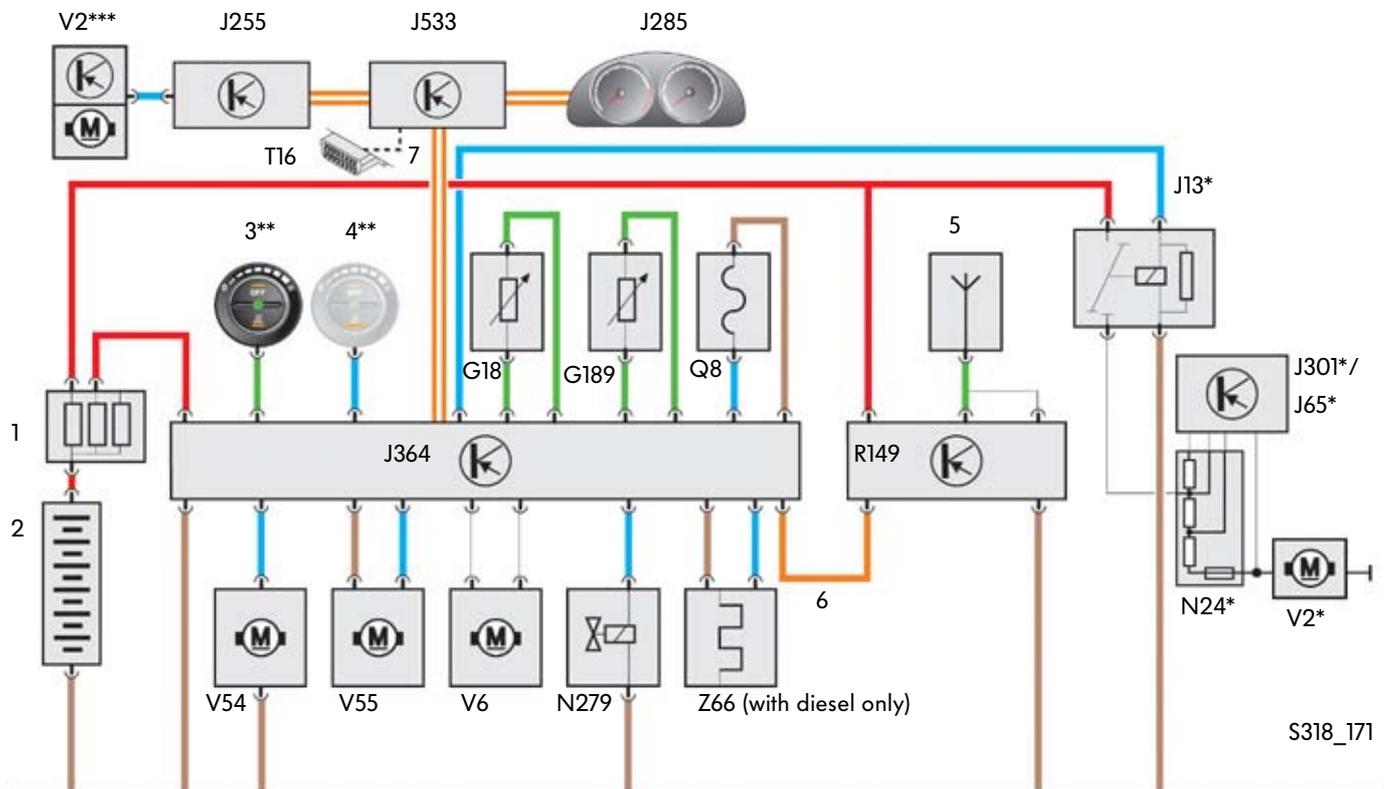
\* only in combination with Climatic and heating

\*\* as analog signal only in combination with heating, otherwise via CAN data line

- G18** Temperature sensor
- G189** Overheating sensor
- R149** Auxiliary coolant heater radio receiver
- Q8** Glow plug with flame monitor
- V6** Combustion air blower
- V55** Recirculation pump

- W-Bus** Special data line of the manufacturer Webasto
- J364** Additional heater control unit (additional water heater)
- V54** Metering pump
- N279** Heater coolant shut-off valve
- Z66** Fuel pre-heating heater element (with diesel only)

## Function diagram of the additional water heater



\* only in combination with Climatic and heating

\*\* as analog signal only with heating, otherwise via CAN data line

\*\*\* In the case of 2C-Climatronic, fresh air blower V2 is used with an electronic control and is activated directly.

<b>1</b>	Fuse	<b>R149</b>	Auxiliary coolant heater radio receiver
<b>2</b>	Battery	<b>V54</b>	Metering pump
<b>3</b>	Instant heat button	<b>V55</b>	Recirculation pump
<b>4</b>	Instant heat button LED	<b>V6</b>	Combustion air blower
<b>5</b>	Aerial	<b>N279</b>	Heater coolant shut-off valve
<b>6</b>	W-Bus, special data line of the manufacturer Webasto	<b>J13</b>	Fresh air blower relay
<b>7</b>	Infotainment CAN data bus	<b>Z66</b>	Fuel pre-heating heater element (with diesel only)
<b>V2</b>	Fresh air blower	<b>J301</b>	Air conditioning system control unit
<b>J255</b>	Climatronic control unit	<b>J65</b>	Heater control unit
<b>J533</b>	Data bus diagnostic interface	<b>N24</b>	Fresh air blower series resistor with overheating fuse
<b>J285</b>	Control unit with display in dash panel insert		
<b>T16</b>	Diagnosis plug		
<b>G18</b>	Temperature sensor		
<b>G189</b>	Overheating sensor		
<b>Q8</b>	Glow plug with flame monitor		
<b>J364</b>	Additional heater control unit (additional water heater)		
			Input signal
			output signal
			Positive
			Ground
			CAN data bus



# Radio and navigation

## The radio systems in the 2004 Golf

### The R100 radio

The R100 radio is available to large customers, e.g. fleet operators. It is a radio system with the following functions:

- two loudspeaker channels (front only, each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- without integrated drive,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- speed-dependent volume control (GALA),
- self-diagnosis incl. loudspeaker diagnosis,
- Transport Mode (power demand reduction while in transportation and idle).



S318\_175

### The RCD 300 radio

The RCD 300 radio is available to private customers as a standard radio system. It has the following functions:

- two or four loudspeaker channels (each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- display of stored stations together with RDS names,
- Diversity FM-2 tuner,
- control via multi-function steering wheel (MFS) and multi-function display (MFD),
- integrated single CD drive,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- GALA,
- self-diagnosis incl. loudspeaker diagnosis,
- Transport Mode.



S318\_177



## The RCD 500 radio

The flagship radio in the 2004 Golf is the RCD 500 with the following functions:

- four loudspeaker channels (each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- display of stored stations together with RDS names,
- Diversity FM-2 tuner,
- control via MFS and MFD,
- integrated 6 disc CD changer,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- GALA,
- Traffic Information Memory (TIM),
- model-specific sound adaptation,



S318\_179

- self-diagnosis incl. loudspeaker diagnosis,
- Transport Mode,
- optional external sound amplifier can be connected.

## The MFD 2 radio navigation system

A radio system with an integrated navigation system is also available for the Golf. It is operated in much the same way as the radio navigation system from the Touareg. Features include:

- multi-colour display (MCD),
- dynamic traffic guidance,
- four loudspeaker channels (each 20 W),
- RDS FM/AM Europe Radio (AM without LW),
- display of stored stations together with RDS names,
- external Diversity switching box,
- control via MFS and MFD,
- controls for external 6 disc CD changer,
- telephone control (hands-free operation),
- GALA,
- TIM,
- self-diagnosis incl. loudspeaker diagnosis.



S318\_287



To remove and install a radio, the cover frame must be removed to obtain access to the screwed connection behind it.



## The Euro On-Board Diagnostic System (EOBD)

The 2004 Golf meets the European EU 4 exhaust emission standard and has the Euro On-Board Diagnostic System (EOBD).

An EOBD system has been compulsory for new cars with petrol engines since the year 2000 and for diesel vehicles since 2003.

EOBD monitors continuously the components, subsystems and electrical components of the vehicle which are relevant to exhaust emissions and affect emission values in case of failure or malfunction.

The system is distinguished by:

- a standardised exhaust emissions warning lamp (MIL),
- a standardised diagnosis interface and
- a standardised data profile through the use of standardised fault codes.

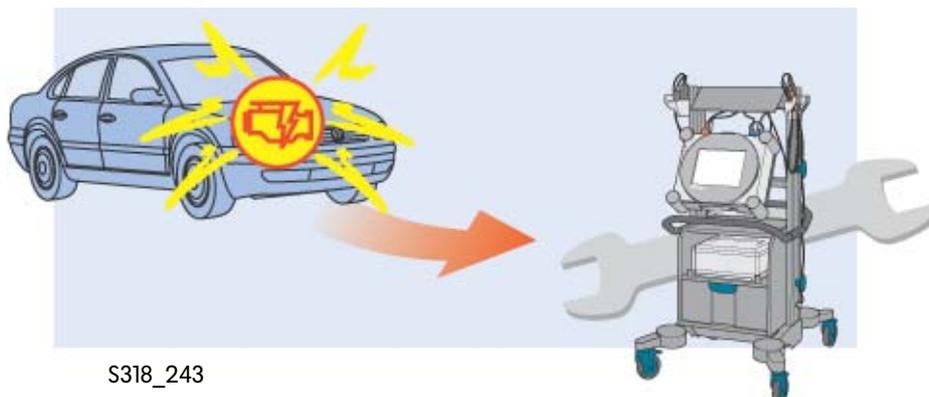
A fault relevant to exhaust emissions is signaled to the driver by the MIL.

In this case, the owner must have the vehicle checked immediately at a workshop.

The fault memory is read out and existing faults are remedied via the standardised diagnosis interface using the VAS 5051 or VAS 5052. Faults relevant to exhaust emissions can also be read out with any OBD display unit (Generic Scan Tool).



For further information on EOBD, please refer to the SSP 231 "Euro On-board Diagnostic System for petrol engines" and the SSP 315 "European On-board Diagnosis for diesel engines".



S318\_243



## New workshop equipment

The alignment bracket set VAS 6240 can be used together with supplementary set VAS 6240/2 for the 2004 Golf.

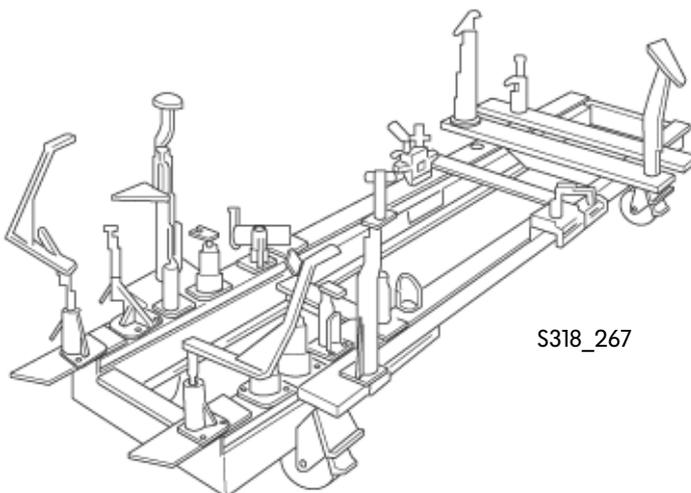
New workshop equipment

- Alignment bracket set VAS 6240,
- Supplementary set VAS 6240/2,
- Portal gauge supplement VAS 5007/18.



S318\_052

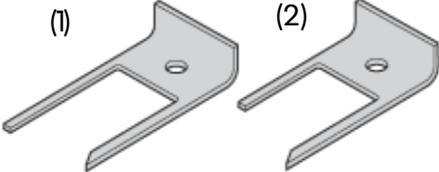
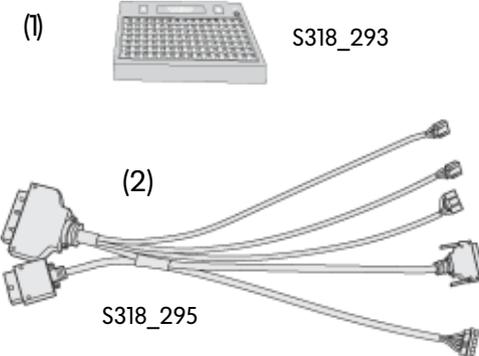
Straightening bracket set VAS 6240



S318\_267



## New special tools

Tool no.	Diagram	Application
T10237	 <p style="text-align: center;">S318_269</p>	Door setting tool
T10236	 <p style="text-align: center;">S318_265</p>	Removing tool for rear door
T10238 (1) T10240 (2)	 <p style="text-align: center;">S318_291</p>	Releasing tool for accelerator pedal module Left-hand drive (1) and right-hand drive (2)
V.A.G. 1598/42 (1) V.A.G. 1598/47 (2)	 <p style="text-align: center;">S318_295</p>	Test box (1) and test adapter (2) for checking and troubleshooting the 2C-Climatronic and Climatic systems as well as the heating and ventilation system in the 2004 Golf and in the Touran







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