



Self-study Programme 516

**The Golf 2013**  
**Driver Assist Systems**  
Design and Function

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Driver assist systems are electronic aids which make driving much safer and more convenient for the driver. Radar eyes which measure distances, sensors which allow the vehicle to park itself, and cameras which read traffic signs – hightech helpers like these are no longer reserved for the luxury vehicle class. Over the last few years, the development of electronic driver assist systems has made rapid progress, and they have now finally arrived in the compact class.

This Self-study Programme informs the reader about the driver assist systems installed in the Golf 2013 and how they function.

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**The self-study programme presents the design and function of new developments!  
The content will not be updated.**

Current testing, setting and repair instructions can be found in the provided service literature.



**Important  
note**



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# Introduction

## Did you know?

An on-board computer requires 1/4 of a second to react to an impending danger. A person only overcomes their surprise and reacts after a one-second delay.

## The development of the driver assist systems

The increasing density of traffic, higher travel speeds, innumerable alerts issued by the vehicle and mobile communication systems all contribute to placing more and more pressure on the driver. Passive safety systems such as ABS, side impact protection or airbags have all helped in significantly reducing the number of accidents resulting in severe, or even fatal, injuries. These systems cannot, however, alert a driver to impending dangers.

The history of the automobile has always been a history of technical progress. Improving the safety and comfort has always been an important part of this progress. The first steering wheel was introduced in 1900, superseding tiller steering and bell cranks. The very first "seat belt" was patented in 1903. The invention of the anti-lock braking system (ABS) in the sixties provided an important step for increasing safety when driving and reducing the number of accidents. Scientific studies have, however, revealed that over 50% of all collisions are caused by the driver's delayed response, or failure to react, to danger. The weakest link in the chain when reacting to dangerous situations is, and will remain, the driver.

Modern vehicles aim to help the driver to avoid accidents by intervening or providing a danger alert when the driver's reaction is delayed and or when the driver fails to respond. Today's driver assist systems are able to analyse the traffic situation, estimate dangers correctly and take appropriate action. Nevertheless, the driver always retains legal responsibility for his actions and the behaviour of the vehicle in road traffic situations.

No electronic system can relieve the driver of this responsibility. They can merely help them to remain focussed on, and be aware of, their responsibility.



The driver always retains the ability to actively override the driver assist systems or switch them off manually.

# Cruise Control System (CCS)

## The cruise control system with speed limiter

### Function

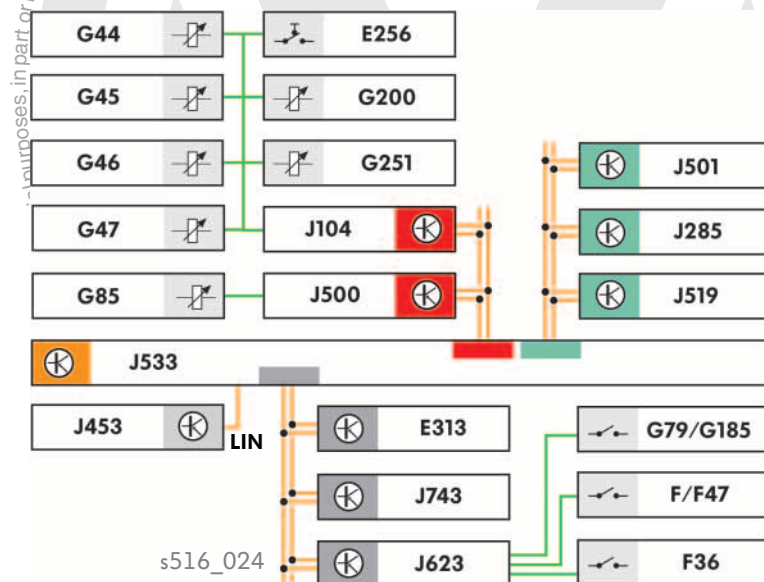
The speed limiter has the task of limiting the speed of the vehicle to a preset maximum speed, even when the driver is trying to travel faster by pushing down on the accelerator.



### System design

The speed limiter requires the Cruise Control System (CCS) or Adaptive Cruise Control (ACC) to function.

### Network



### Legend

E256	TCS and ESC button	G251	Longitudinal acceleration sender
E313	Selector lever	J104	ABS control unit
F	Brake light switch	J285	Control unit in dash panel insert
F36	Clutch pedal switch	J453	Multifunction steering wheel control unit
F47	Brake pedal switch	J500	Power steering control unit
G44	Rear right speed sensor	J501	Multifunction unit control unit
G45	Front right speed sensor	J519	On-board supply control unit
G46	Rear left speed sensor	J533	Data bus diagnostic interface
G47	Front left speed sensor	J743	Mechatronic unit for dual clutch gearbox
G79	Accelerator position sender		Powertrain CAN bus
G85	Steering angle sender		Running gear CAN bus
G185	Accelerator position sender 2		Convenience CAN bus
G200	Lateral acceleration sender		

# Cruise Control System (CCS)

## Function

The speed limiter functions by means of its precise interventions in the engine management system. Automatic braking manoeuvres are not carried out by the speed limiter.

## System and operating conditions

The speed limiter, the CCS and/or the ACC are not able to operate simultaneously. This means that when the speed limiter is activated, the CCS or ACC will be deactivated, and the speed limiter is initially only activated in a passive state, i.e. without the speed limitation function being activated. If, in contrast, the CCS or the ACC is switched on when the speed limiter is active, then the speed limiter switches off automatically and the CCS or the ACC is switched on in a passive state, i.e. without active regulation.

The preferred speed can be set to between 30km/h and the overall maximum speed limit (MSL), and will remain stored even after terminal 15 has been replaced.

## Special features when driving

The preset speed limit can be temporarily suspended using the accelerator pedal, and only when a kick-down has been detected. The overall maximum speed limit (MSL) is then the only one which remains in effect. Only when the kick-down function has been de-activated and the current speed of the vehicle falls back below the preset maximum value will the limit be automatically reactivated.

If a limit is exceeded by using the kick-down function, a visual and acoustic warning will be issued.

The visual warning is issued for as long as the limit is exceeded, while the acoustic warning only sounds once each time the limit is exceeded.

In special cases, e.g. when driving downhill, the preset speed may be temporarily exceeded without any intervention by the driver when the set speed cannot be maintained by the engine management system alone, and instead requires a braking manoeuvre. If the set maximum speed is exceeded by a defined value (currently 3km/h) in a situation like this, then a visual and acoustic warning is issued for as long as the speed limit continues to be exceeded.

### Activation and deactivation conditions

Depending on the type and cause of the incident, the speed limiter can react in one of four different ways:

1. Reaction a
  - The speed limiter is blocked, and can only be switched back on once terminal 15 (T 15) has been reactivated.
  - The memory for the maximum speed is deleted.
  - The speed limiter is irreversibly deactivated.
2. Reaction b
  - The speed limiter is deactivated and the memory for the maximum speed is not deleted (cancel or other reversible means of clearing the memory).
3. Reaction c
  - The limit is switched off without actually deactivating the speed limiter. The limit is automatically reactivated when the deactivation conditions no longer apply.
  - The memory for the maximum speed is not deleted.
4. Reaction d
  - The speed limiter is deactivated. The memory for the maximum speed is deleted.



Function	Controls	Display elements	Activation conditions	Deactivation conditions
Activation of the speed limiter without activating the limit (passive speed limiter)	CCS/ACC steering column switch	Pictogram in the dash panel insert display	T 15 ON <b>and</b> Maximum speed memory empty <b>and</b> The speed limiter main switch signal via the extra signal line concurs with the bit "main switch" in the powertrain CAN bus message  <b>or</b>  T 15 ON <b>and</b> Maximum speed memory contains a valid value <b>and</b> CCS/ACC steering column switch is set to ON <b>and</b> The speed limiter main switch signal via the extra signal line concurs with the bit "main switch" in the powertrain CAN bus message	T 15 OFF (Reaction b)  <b>or</b>  Implausible signal from the CCS/ACC steering column switch (reaction a)  <b>or</b>  The speed limiter main switch signal via the extra signal line does not conform with the bit "main switch" in the powertrain CAN bus message for at least 250 ms (this value can be customised) (reaction a)  <b>or</b>  Steering column switch coding fault (reaction a)  <b>or</b>  CCS/ACC steering column switch set to OFF (reaction d)

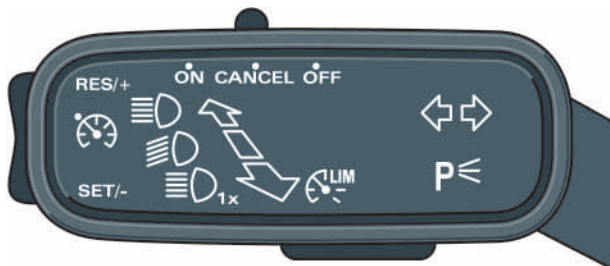
# Cruise Control System (CCS)



Function	Controls	Display elements	Activation conditions	Deactivation conditions
Speed limiter, activate limit (speed limiter active)	CCS/ACC steering column switch  Accelerator (kick-down)	Speed limiter indicator lamp	Speed limiter passive <b>and</b> SET button pressed  <b>or</b> Speed limiter passive <b>and</b> Maximum speed memory contains a valid value <b>and</b> RESUME button pressed	T-15 off (reaction b)  <b>or</b> The speed limiter main switch signal via the extra signal line does not concur with the bit „main switch” in the powertrain CAN bus message for at least 250ms (this value can be customised) (reaction a)  <b>or</b> Implausible signal from the CCS/ACC steering column switch (reaction a)  <b>or</b> Failure of CAN messages relevant for the speed limiter (reaction a)  <b>or</b> Engine emergency mode with limited power (reaction a)  <b>or</b> CCS/ACC steering column switch set to OFF (reaction a)
Speed limiter, override limit using kick-down function (speed limiter remains active, indicator lamp remains lit)	Accelerator (kick-down)	Speed limiter indicator lamp	Speed limiter active <b>and</b> Kick-down (reaction c)	Kick-down no longer applies <b>and</b> Speed back below the maximum speed

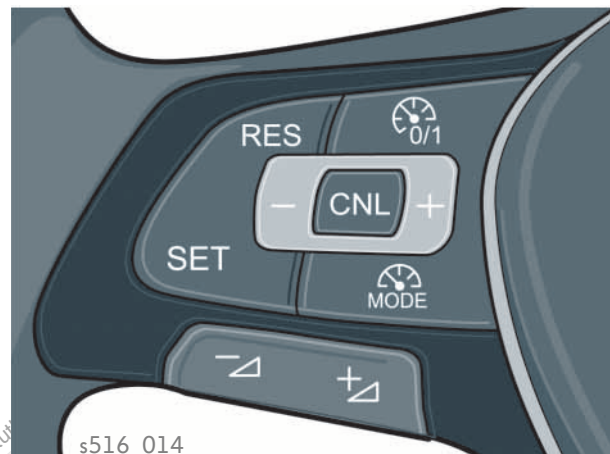
## Operation

The speed limiter can be operated using the left-hand steering column switch on the steering column, or by using the buttons on the multifunction steering wheel.



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On the left of the steering column:  
Switches and buttons for operation of the speed limiter



s516\_014

Left-hand side of the multifunction steering wheel:  
Buttons for operating the speed limiter

Along with the direct effect which the controls on the steering column switch or the multifunction steering wheel (depending on the equipment installed) have on the speed limiter, other factors may have an indirect effect on the speed limiter:

- When the driver kicks down the accelerator
- Effects of the current engine performance
- Undervoltage in the 12-volt onboard supply
- Failure of CAN messages required for the function of the speed limiter
- Implausibility of signals which are used by the speed limiter



Detailed information on operating the speed limiter can be found in the operating instructions for the vehicle.

# Adaptive Cruise Control (ACC)

## Task

The adaptive cruise control (ACC) is a cruise control system featuring intelligent regulation of the vehicle speed. The system makes accelerating and decelerating comfortable.



## Design and function

The radar sensor installed at the front of the vehicle allows the distance to the vehicle driving in front, and its speed, to be constantly monitored. The ACC control unit on the multifunction steering wheel allows the system to be activated and deactivated, as well as the preferred speed and the distance to the vehicle in front. All information relevant to the system, such as the preferred speed and warning messages, is displayed in the dash panel insert (also see page 13 ff “Operation and Display”).

In all driving situations, the responsibility for the vehicle's behaviour lies solely with the driver. The driver can take control of the situation at any time by deactivating the ACC, and by braking or accelerating of their own accord. During vehicle operation, the ACC is subject to system limits. If these limits are reached or exceeded due to the driving situation, the driver will be informed of this and will be visually prompted to take charge of the function.

The ACC driving mode (Normal, Eco, Sport) and the distance to the driver in front when the vehicle is in motion can be configured in the infotainment system. The adaptive cruise control unit J428 transmits the target value required for maintaining the preferred speed, and the distance to the vehicle in front required for vehicle acceleration, to the engine control unit. This, in turn, takes charge of coordinating the acceleration and braking.

## Operating limits

If the ability of the radar sensor to detect objects is impaired by heavy rain, snow or dirt, then the adaptive cruise control and the speed limiter will be deactivated automatically. “ACC – no sensor image” appears in the dash panel insert. As soon as the cause of the impairment has been eliminated, the driver can reactivate the ACC regulation.



You will find further information on the ACC/Front Assist in Self-study Programmes no. 470 “The Touareg 2011 - Electrics/electronics” and no. 488 “The Passat 2011”.

## Adaptive Cruise Control unit J428



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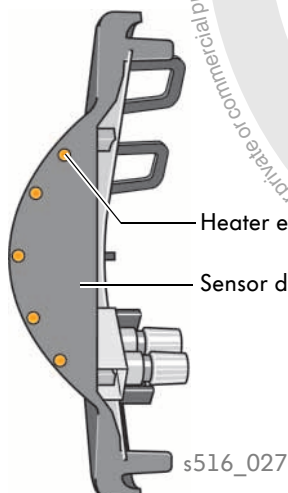
The adaptive cruise control unit J428 has been installed in the front bumper, allowing the traffic situation in front of the vehicle to be monitored. A radar sensor is integrated into the control unit. A heating device integrated into the sensor surface is used to prevent or reduce the formation of ice and snow deposits, and therefore avoid impairing the sensor vision. The heating is a component of the radar sensor and is activated when the temperature falls below +5 °C.



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The radar sensor in the adaptive cruise control unit J428 includes the following features:

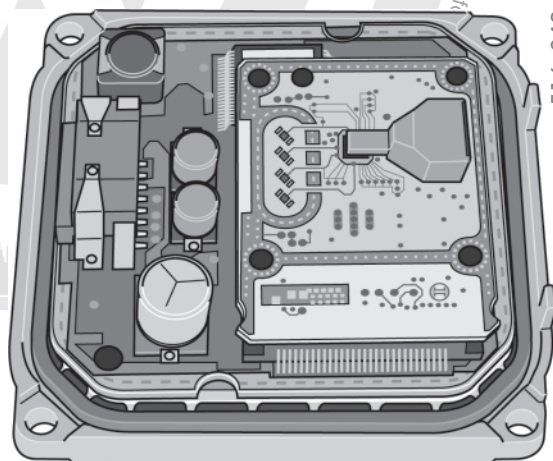
- Transmission frequency 77 Ghz
- Range: 120m
- Speed range  
0 to 160km/h (regulated)  
30 to 160km/h (can be activated)
- Manufactured by Bosch



Heater element  
Sensor dome

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Sensor heating in the sensor dome



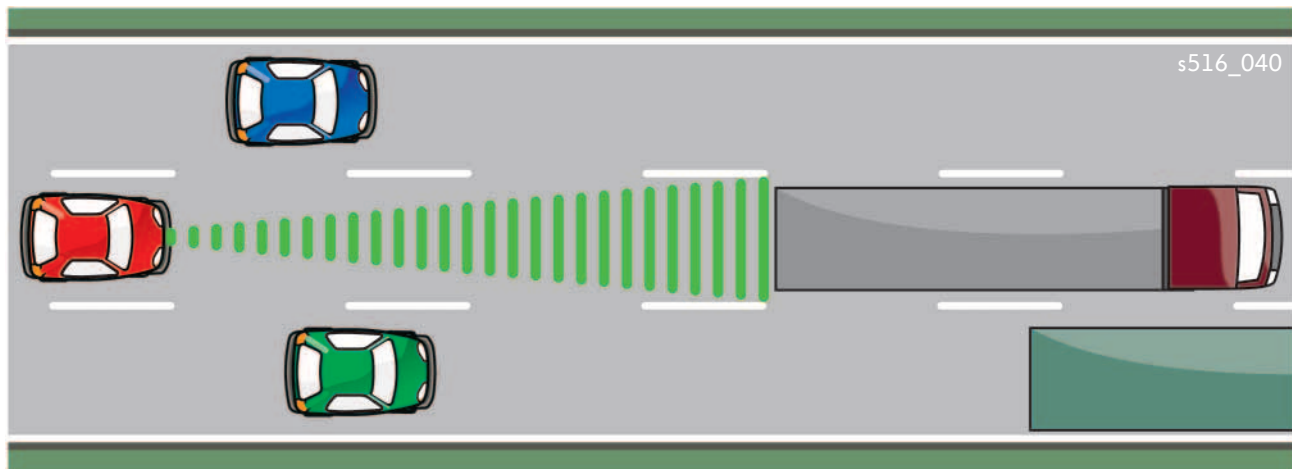
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View of the open sensor housing

# Adaptive Cruise Control (ACC)

## Normal operation

If no other vehicle is driving in front, then ACC operates just like a cruise control system. If the radar sensor detects another vehicle driving in front in the same lane, then ACC will decelerate as required and maintain the preset interval from the vehicle driving in front. In combination with a dual clutch gearbox (DSG), the vehicle can be decelerated automatically until at a standstill and held there.



The ACC sensor system identifies vehicles driving in front

## Other function types

Depending on the vehicle equipment, a distinction is made between two function types:

### ACC Basis

Vehicles with a manual gearbox are automatically accelerated or decelerated to the preferred speed. The system is automatically deactivated at speeds below 20 km/h and the driver is prompted to take charge by visual and acoustic signals.

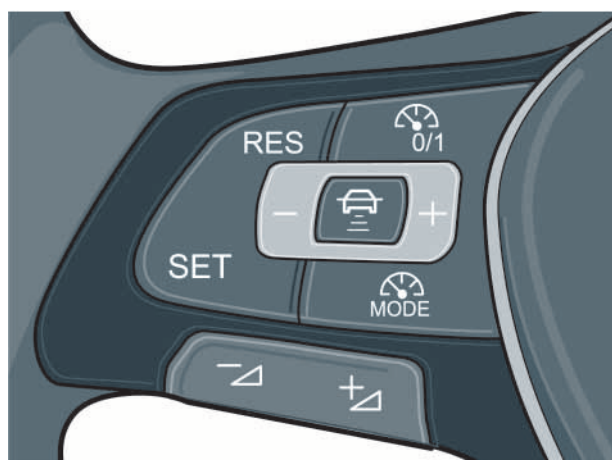
### ACC Stop & Go

Vehicles with a dual clutch gearbox (DSG) can be decelerated down to a standstill, depending on the situation, and started automatically. ACC maintains a preset speed as well as a defined distance, and can accelerate and decelerate automatically. ACC can start up automatically within a 3 second standstill time, or be activated via the RESUME button. The additional sensors, such as RDC and/or the front camera, are not used to monitor free space. This function is therefore an automatic start-up initiated by the driver and **not** a fully automatic restart.





## Operation and display

### Operation

The adaptive cruise control is operated using the multifunction steering wheel.



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Function	Button in the multifunction steering wheel	Action
Activate ACC	 Press	The system is activated. Activation alone will not result in a speed being stored, and no control is exerted.
Changing between ACC and the speed limiter	 Press	A switchover between ACC and the speed limiter occurs.
Activate ACC	 Press	The current speed is stored and speed regulation starts.  <b>If ACC is already activated:</b> “Press briefly”: Decrease preferred speed by 1 km/h and store it. “Press and hold”: The saved speed preference decreases in increments of 1 km/h as long as the button is held. The speed is reduced when the driver stops accelerating or when the brakes are applied automatically.
Switch off ACC temporarily	 Press  or: Apply brake pedal	Speed regulation is temporarily deactivated. The preferred speed remains stored.



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# Adaptive Cruise Control (ACC)



Function	Button in the multifunction steering wheel	Action
Resume ACC	 Press	The stored speed preference is resumed and regulated. If no speed preference has been stored, the ACC will use the speed currently being driven as the basis for speed regulation.  <b>If ACC is already activated:</b> "Press briefly": Increase speed preference by 1 km/h and store it. "Press and hold": The saved speed preference increases in increments of 1 km/h as long as the button is held.
Accelerate (during ACC control)	 Press	"Press briefly": Increase speed preference by 10km/h and store it. "Press and hold": The saved speed preference increases in increments of 10 km/h as long as the button is held.
Slow (during ACC control)	 Press	"Press briefly": Decrease speed preference by 10km/h and store it. "Press and hold": The saved speed preference decreases in increments of 10km/h as long as the button is held. The speed is reduced when the driver stops accelerating or when the brakes are applied automatically.
Deactivate ACC	 Press	"Press briefly": Temporarily switch off ACC during active ACC control. "Press and hold": Switch off ACC during active ACC control. "Press briefly" while ACC is temporarily switched off: Switch off ACC

The time interval to the vehicle driving in front can be set in 5 levels:

- 1.0 seconds
- 1.3 seconds
- 1.8 seconds
- 2.4 seconds
- 3.6 seconds

**Display options**

Depending on the dash panel insert equipment, there are two different display options:  
 A colour display (dash panel insert with multifunction display Premium) and  
 a black and white display (dash panel insert with multifunction display Plus).

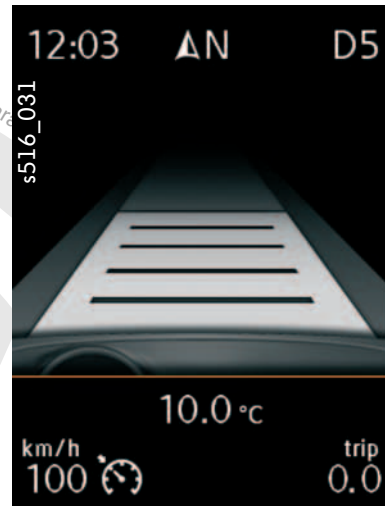
- ACC display in the dash panel insert with multifunction display Premium



Distance control – small actual distance, large target distance



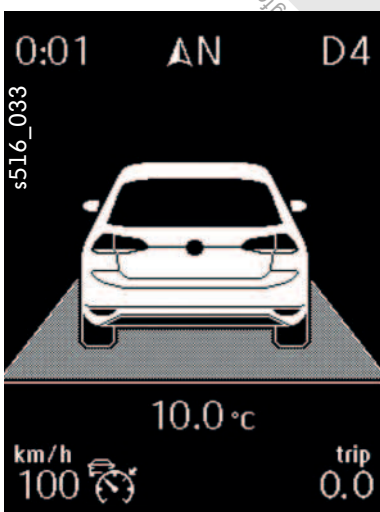
Distance control – large actual distance, large target distance (TI 4)



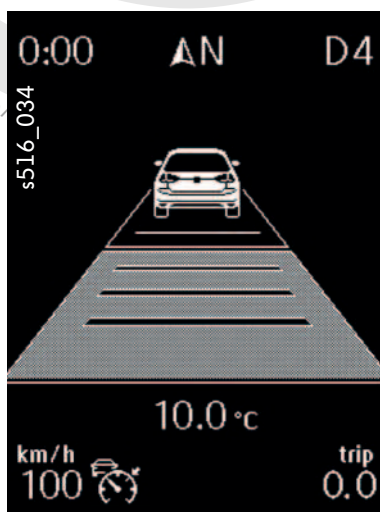
No distance control – no target object, large target distance (TI 5)



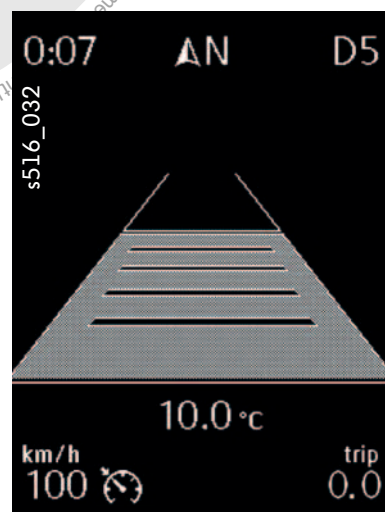
- ACC display in the dash panel insert with multifunction display Plus



Distance control – small actual distance, large target distance



Distance control – large actual distance, large target distance (TI 4)

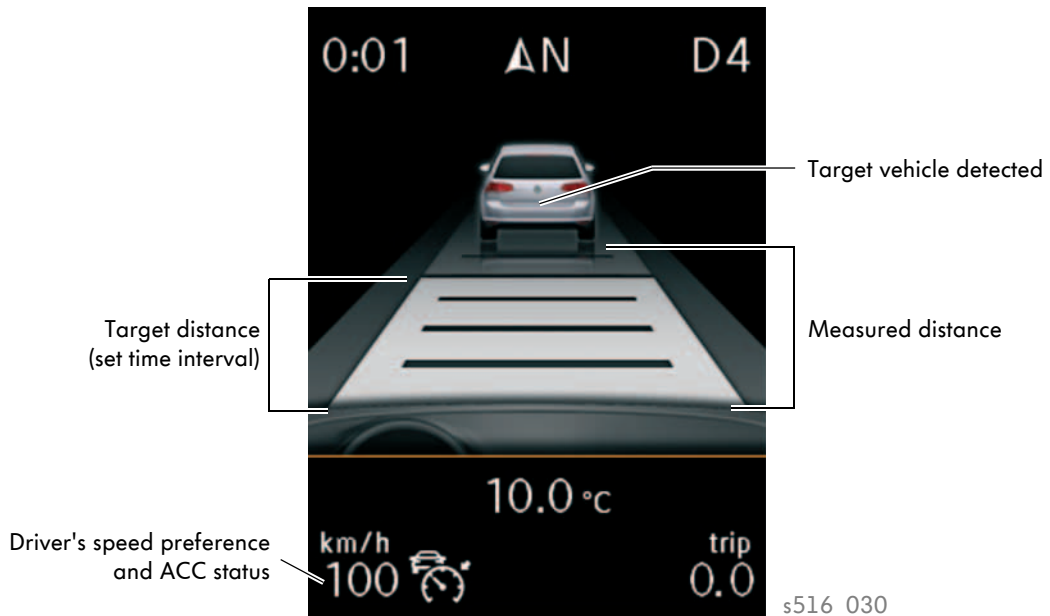


No distance control – no target object, large target distance (TI 5)

# Adaptive Cruise Control (ACC)

## Image layout in display

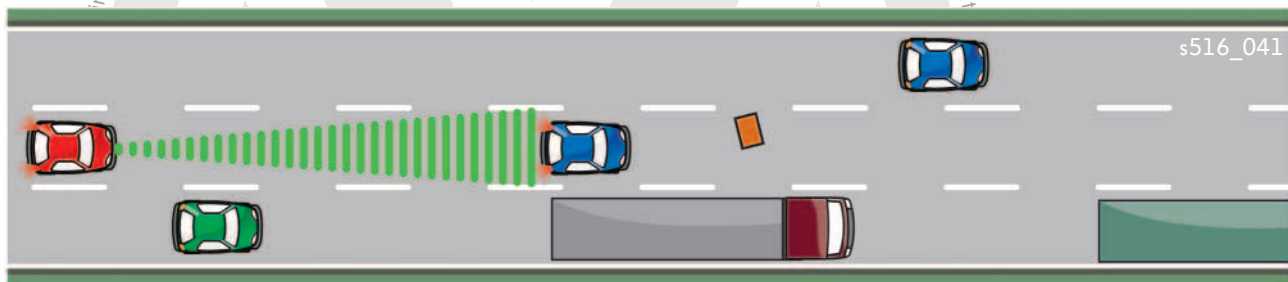
A vehicle driving in front is displayed in the dash panel insert. The set speed preference and current system status is displayed in the lower part of the screen.



## Task

The area monitoring system (Front Assist) is, figuratively speaking, an “attentive passenger with a brake pedal of their own”. Front Assist helps to avoid rear-end collisions. The information provided by the front radar and the front camera (depending on equipment) is used for this. Front Assist uses this information to keep monitoring the traffic situation in front of the vehicle, and alerts the driver to any critical situations.

Front Assist starts making preparations even before the situation becomes dangerous, unnoticed by the driver. The aim of Front Assist is to minimise the stopping distance in critical situations. The system only reacts to vehicles moving in the same direction.



Front Assist registers a decrease in the distance to the vehicle in front at any early stage

## Function

The ACC and Front Assist functions are integrated in the same control unit. However, they operate independently of each other. Front Assist is active even when the ACC is deactivated.

The system operates in a speed range from around 5 km/h to 210 km/h and at a distance of up to 120 meters.

Front Assist is always activated when the ignition is on.

The system can be deactivated using the button for driver assist systems E617 or using the MIB. The City Emergency Brake and distance warning are a component of the Front Assist. Both functions are described later in chapters of their own.



The braking manoeuvres implemented by the Front Assist system will only prevent accidents in exceptional circumstances.

Observe the notes in the operating instructions and in ELSA.



# Front Assist

## Sequence of a critical approach without driver reaction

When the risk of a collision is identified, the brake system is pre-filled. The triggering threshold for the brake assist system is lowered, and the driver is warned visually and acoustically. Furthermore, an automatic jolt of the brakes warns the driver of the danger.

If the driver reacts by braking too gently, the vehicle will automatically generate the brake pressure required for the situation.

At a speed of 30km/h or more, the vehicle can be automatically decelerated by up to  $6\text{ m/s}^2$ . If the driver also fails to react to the warning jolt, Front Assist brakes automatically, helping to avoid a collision in the best case scenario or, at the very least, to reduce the severity of the accident.



### 1. Advance warning

- Brake assist system 1:
  - Brakes are pre-filled
  - Brake assist system threshold switchover to level 1
- Brake assist system 2:
  - Visual and acoustic warning

### 2. Main warning

- Brake assist system 1:
  - Brake assist system threshold switchover to level 3
- Brake assist system 2:
  - Brake jolt

### 3. Automatic partial braking

- Brake assist system 3:
  - Automatic deceleration if the driver fails to react (up to  $6\text{ m/s}^2$ ).
- Brake assist system (less than or equal to 30km/h) 3:
  - Automatic deceleration if the driver fails to react (up to  $8\text{ m/s}^2$ ).

### 4. Target braking

- Brake assist system 3:
  - Enhancement of driver's braking manoeuvre to prevent a collision.



You will find further information on the ACC/Front Assist in Self-study Programmes no. 470 "The Touareg 2011 - Electrics/electronics" and no. 488 "The Passat 2011".

# The City Emergency Brake

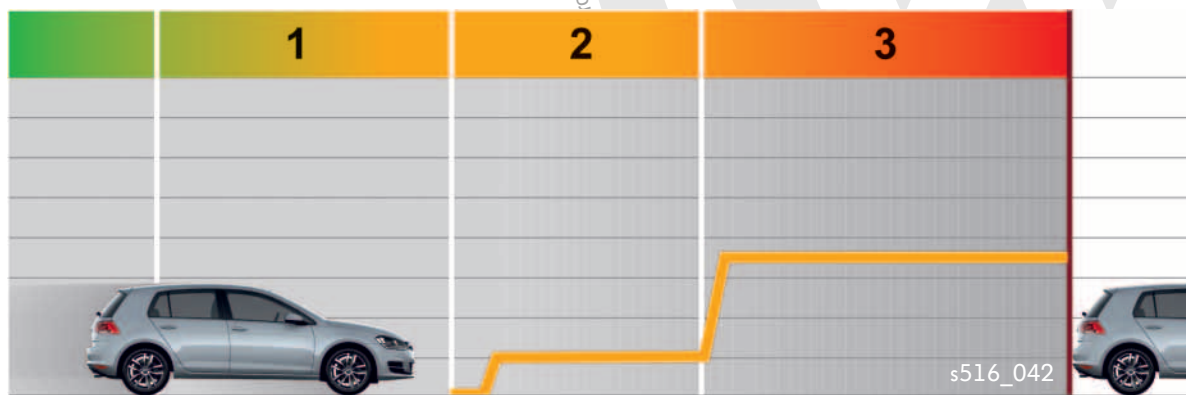
## Task

The City Emergency Brake is an enhancement for the Front Assist system, and uses the radar sensor to monitor the area in front of the vehicle.

## Function

The system operates in the speed range below 30km/h. If the driver fails to react to an imminent rear-end collision with a vehicle travelling in front or with a stationary vehicle, then the brake system is primed to brake, in the same way as Front Assist works. When necessary, the City Emergency Brake then initiates full braking automatically to reduce the severity of an accident.

The system helps a driver who is applying too little braking force by applying the maximum braking force. Just like all the other systems, the City Emergency Brake does not absolve the driver of their responsibility to pay attention and therefore cannot guarantee accident prevention.



### 1. No driver warning

- Brake assist system 1:
  - Brakes are pre-filled
  - Brake assist system threshold switchover to level 1

### 2. Automatic partial braking

- Brake assist system 3 (less than or equal to 30km/h)
  - Automatic deceleration if the driver fails to react (up to  $8\text{ m/s}^2$ ).

### 3. Targeted braking

- Brake assist system 3 (greater than 30km/h):
  - Enhancement of driver's braking manoeuvre to prevent a collision.



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## Distance warning system

### Task

Distance warning system issues a visual alert to the driver when they are following the vehicle driving in front too closely. The interval to a vehicle driving in front should be large enough to allow space to stop behind it without causing a collision, should the vehicle in front brake suddenly.



### Function

Distance warning system also uses the radar sensor in the front end to function, measuring the distance to the vehicle travelling in front. Distance warning system software includes tables of values which determine the critical distance depending on the speed. If the system identifies a safety hazard due to driving too close to the vehicle in front, then the driver is warned by a corresponding display. This advance warning can be switched on or off using the control in the infotainment system.



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## Task

22 percent of collisions in which a person is injured are multicollisions. Multicollisions are multiple collisions in which further collisions, for example with crash barriers or oncoming traffic, follow the initial impact.

## Function

The multicollision brake triggers an automatic braking manoeuvre when it identifies an initial collision. The automatic application of the brakes aims to prevent subsequent collisions, or, at the very least, reduce the kinetic energy of a subsequent collision.

The multicollision brake decelerates the vehicle by a maximum of  $6\text{ m/s}^2$  while activating the high level brake light and the hazard warning lights at the same time.

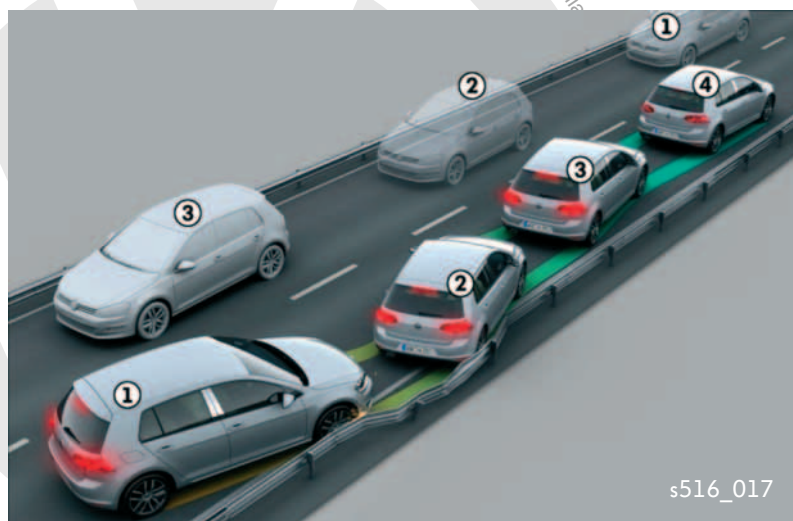
The ESC lamp in the dash panel insert informs the driver about the braking manoeuvre. The multicollision brake will always decelerate the vehicle down to a vehicle speed of  $10\text{ km/h}$ . This allows the driver to maintain control over the vehicle even after a collision, depending on the situation.

The airbag control unit sends the corresponding message to the brake control unit in order to activate the multicollision brake. Only the sensors in the airbag control unit are used to activate the multicollision brake.

The multicollision brake can be overridden by the driver at any time. If the driver accelerates or initiates full braking to decelerate faster, the system will be overridden.



Accident situation without multicollision brake



Accident situation with multicollision brake

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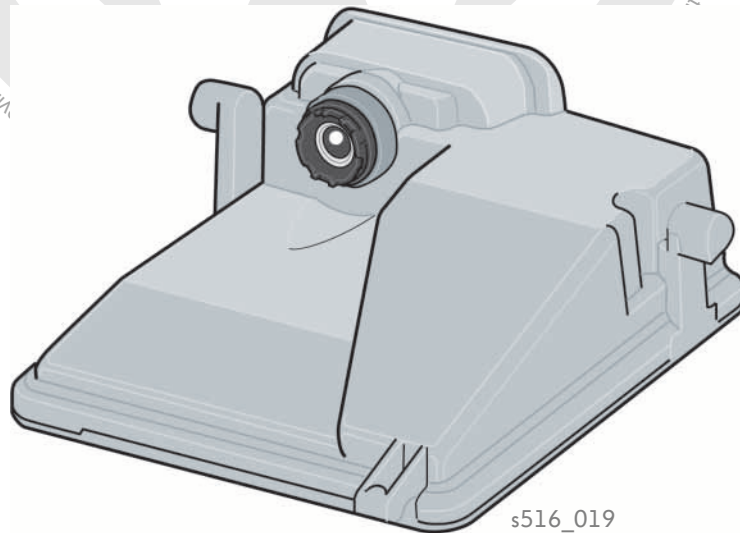
# Front camera-based driver assist systems

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## Front camera for driver assist systems R242

A new front camera is being used in the Golf 2013. It is a grey-scale camera with 12-bit colour depth and an additional red filter. This means it can distinguish between 4096 grey tones. The red filter is used to enhance the contrast and is, among other things, used for traffic sign recognition and the lane assist system.

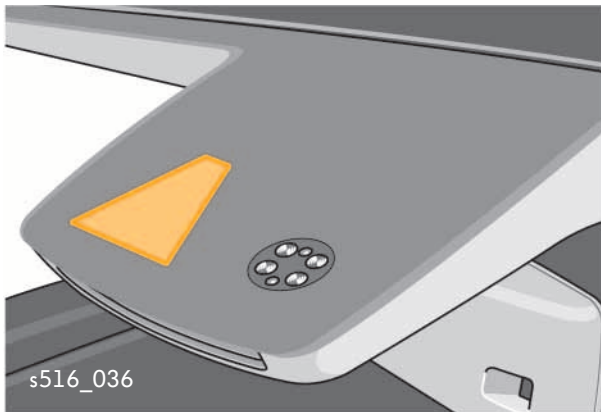
The camera features a 512 x 1024 pixel resolution. The horizontal cone of vision totals +/- 21°, with the vertical cone of vision being +/- 9.5°.



The front camera for driver assist systems R242 is used together with the following driver assist systems:

- Lane departure warning (Lane Assist)
- Traffic sign recognition
- Dynamic Light Assist (DLA)  
(analogue versions – continual adaptation of the headlamp range to prevailing conditions)
- Main Beam Assist (FLA)  
(digital versions – sudden switch between high beam and low beam)
- Adaptive Cruise Control (ACC)

## Windscreen heater for front sensors Z113



### Task

The front camera R242 features a windscreen heater to prevent the camera's field of vision from misting up.

### Design

The heater is a heating resistor bonded to the inside of the windscreen, which surrounds the camera base on the windscreen.

The heating resistor is integrated into the mounting plate bonded to the windscreen and cannot be replaced individually. Should the heating resistor fail, the entire windscreen must be replaced together with the mounting plate.

### Function

When the windscreen mists up, this affects the camera in the same way as a blur filter, reducing the picture contrast. If the contrasts in the picture are too weak, then the lane boundary lines, which are important for a variety of functions, cannot be distinguished from their surroundings. In this case, the system switches to its "not primed" mode and the windscreen heater for front sensors Z113 is activated. Once the condensation has cleared and a sufficient picture contrast has been restored for the lane warning, then the windscreen heating is deactivated again. Should restrictions to the field of vision not be eliminated by the heating (e.g. due to dirt), then this will be indicated to the driver by a text message appearing in the centre display of the dash panel insert.



# Front camera-based driver assist systems

## Lane departure warning (Lane Assist)

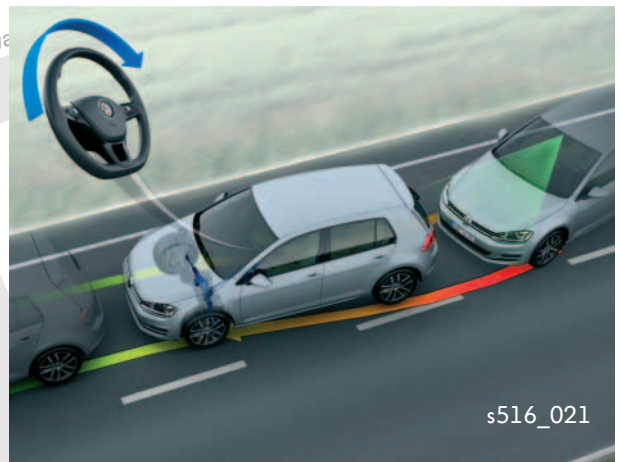
### Task

Thanks to a corrective steering manoeuvre, the lane departure warning helps the vehicle to maintain its lane in many different traffic situations.

### Function

The front camera on the windscreen allows lane departure warning to identify the lane boundary lines.

If the vehicle seems likely to leave the lane without an active steering manoeuvre by the driver, then the system automatically counteracts this. Counter-steering is continual and gentle, it can, however, be overridden by the driver at any time with relative ease.



### Lane guidance

The additional lane guidance function is not just a lane departure warning when the vehicle threatens to veer out of its lane, it instead provides the driver with continual support for the duration of the journey. Prerequisite for lane guidance is that lane markings can be identified on both sides of the vehicle, to the left and right. Within the limitations inherent to the system, the lane departure warning can also help to compensate for roads which slope to one side, as well as crosswinds.



## System and operating conditions

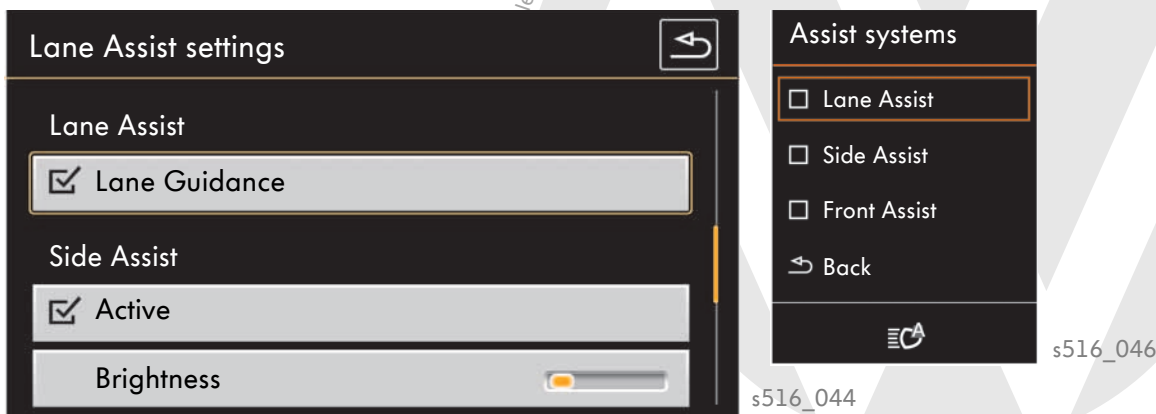
- Lane recognition using the front camera, both double lines and single lines
- Active at speeds of 65 km/h or more
- Warns against driving without support before being deactivated
- Situations which seldom occur cause the steering wheel to vibrate and require the driver assume active control over steering.

### System limitations

The lane departure warning switches to passive mode:

- when the speed falls below 60 km/h.
- when the distance to the next lane marking is too large.
- when no lane markings can be detected.
- when the radius of a bend is too small.
- when the driver overrides the corrective steering moment by the lane departure warning.
- when the driver indicates.
- when the system cannot identify a clear, active steering movement for a longer period.
- when the driving style is highly dynamic.

## Operation



The lane departure warning can be activated using the menu for the multifunction display. The additional lane guidance function is activated using the menu for the lane departure warning in the infotainment system control panel.



More detailed information on the lane departure warning can be found in Self-study Programme no. 418 "The Lane Departure Warning System" and in the information in the vehicle operating instructions.



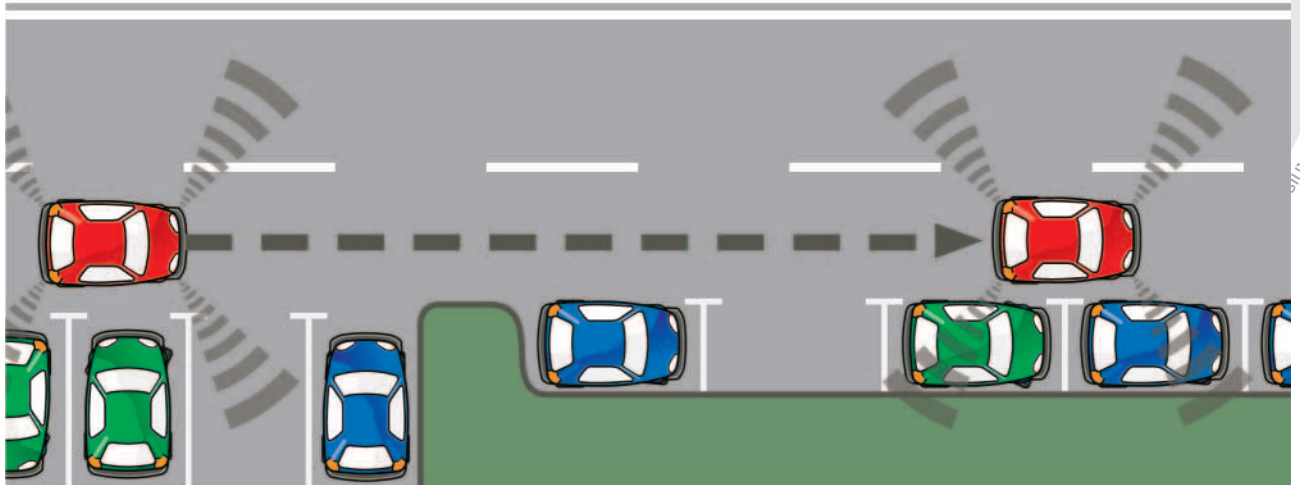
# Parking systems

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## Park assist steering 2.0

### Task

Park assist steering (PLA 2.0) helps the driver when parking the vehicle.



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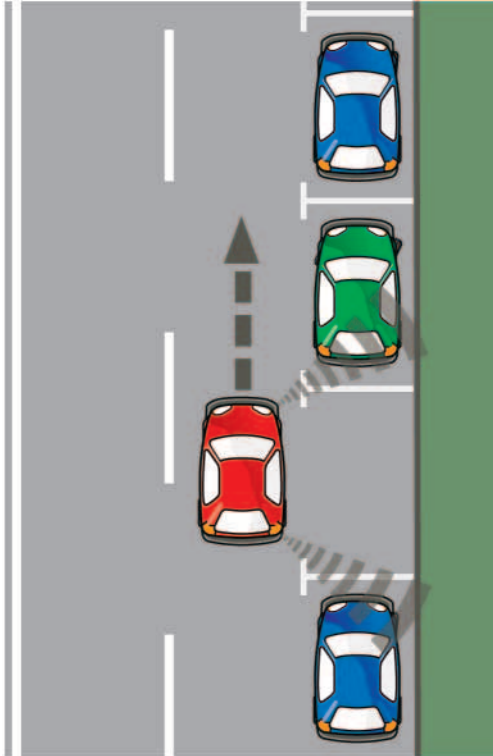
### Function

This semi-automatic parking system allows the driver to park in spaces 90 degrees to the lane (perpendicular parking) and to park in spaces parallel to the lane (parallel parking), as well as parking to the left and right of the lane.

The park assist steering 2.0 actively intervenes by applying the brakes to reduce possible damage caused while parking. Furthermore, manoeuvring out of parallel parking spaces is also possible. The system was used for the first time in the Touran and the Sharan 2011.



More detailed information on the park assist steering can be found in Self-study Programme no. 494 "Park assist steering 2.0".



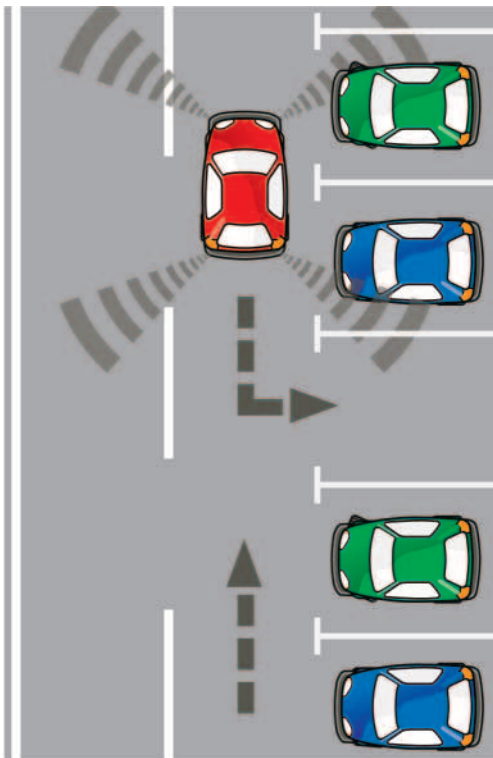
**System and operating conditions**

The minimum size a parking space needs to be before it can be identified as being suitable for parallel parking is calculated using:

- The vehicle length plus
- clearance at the front and rear of at least 0.4 m for manoeuvring and safety.

The maximum speed when driving past is 40 km/h.

The ideal starting position for parking in parallel parking spaces is facing the direction of travel with a distance at the side of 0.5 m to 2.0 m to any vehicles already parked.



The minimum size a parking space needs to be before it can be identified as being suitable for perpendicular parking is calculated using:

- Vehicle width plus
- clearance to the left and right of at least 0.35 m for manoeuvring and safely.

The ideal starting position for parking in perpendicular spaces is facing the direction of travel with a distance at the side of 0.5 m to 2.0 m to any vehicles already parked.



# Tyre Pressure Loss Indicator (TPLI)

## Task

The Tyre Pressure Loss Indicator (TPLI) uses the wheel speed sensors G44, G45, G46 and G47 to compare the rolling circumference and the vibration characteristics of the individual wheels. The vibration characteristics and the rolling circumference of the wheels change when the tyre pressures change.

A change in tyre pressure on one or more wheels is indicated by the Tyre Pressure Loss Indicator in the multifunction display of the dash panel insert. No additional sensors in the tyres are required.

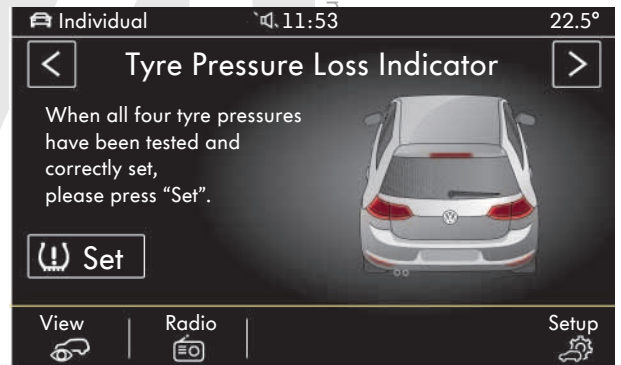
## Function

The Tyre Pressure Loss Indicator is a component of the software in the ABS control unit J104. Tyre Pressure Loss Indicator event entries are stored in the ABS control unit.

The Tyre Pressure Loss Indicator must be learnt again after performing the following tasks:

- Changing the tyre pressure
- Changing one or several wheels
- Swapping the wheels, e.g. from the front to the back

After being learnt, the system also learns the characteristic parameters of the new pressure and tyre conditions at different speed intervals, and stores these.

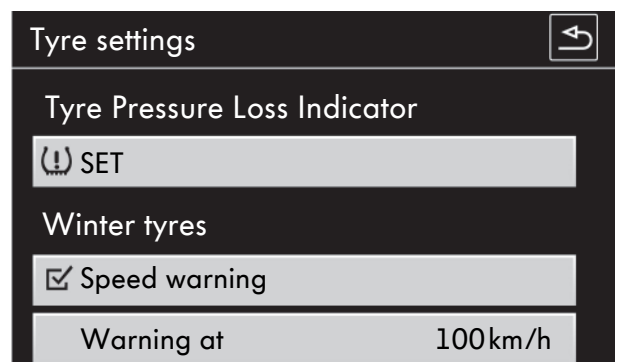


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Changes to the rolling circumference and the vibration characteristics of a wheel are indicated when the tyre pressure monitor warning lamp K220 in the dash panel insert lights up.

The rolling circumference and the vibration characteristics can change due to:

- insufficient tyre pressure
- tyre damage
- loading the vehicle on one side
- using snow chains
- wheel replacement
- more stress on one axle, e.g. in towing mode
- driving with the temporary spare wheel



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# Driver Alert System (DAS)

## Task

Between 5% and 25% of all accidents are due to fatigue. Tiredness at the wheel causes more serious accidents than other causes of accidents.

The Driver Alert System (DAS) is a convenience function which supports the driver by acting as a preventative function for detecting driver fatigue.

## Function

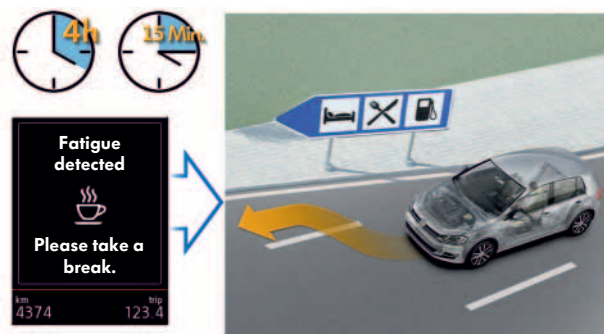
The driver's alertness is identified by analysing the way the driver is steering the vehicle. If the system identifies that the driver is about to fall asleep, then an acoustic warning is issued along with a text prompt in the multifunction display of the dash panel insert, telling the driver to take a break.

Along with the way the vehicle is being steered, data about the driving situation (vehicle speed, accelerator pedal use, indicating, time of day, duration of journey, etc.) and the buttons pushed by the driver on the set-up and convenience functions (air conditioning system, telephone use, etc.) are registered and transmitted via the CAN bus to the diagnostic interface for data bus, where they are analysed. The sensors required for the system are part of the ESC system, with the software integrated in the gateway.

## Operation and display

### Operation

The system is activated and deactivated using the display and operating unit in the infotainment system using the entry "Assistance - Driver Alert System active". The function is available at speeds of 65km/h or more. Following activation, the system requires around 15 minutes to collect enough data for use as a basis for deciding whether the driver is getting tired during the remainder of the journey.



### Display

When driver fatigue is detected, a message appears in the dash panel insert for 5 seconds and a "gong" sounds. If the driver does not take a break within the next 15 minutes, the message and gong are repeated. After this repetition, there is no further message.



# List of abbreviations

## **ABS**

(Anti-lock Braking System)

Traction control system which prevents the wheels from locking when braking.

## **ACC**

(Adaptive Cruise Control)

An initialism for the automatic adaptive cruise control.

## **BAS**

(Brake Assist System)

Traction control system for reducing braking distances.

## **CAN**

(Controller Area Network)

Standardised, digital twin-wire data network used in vehicle electronics.

## **DSG**

(Dual Clutch Gearbox)

A dual clutch gearbox is an automated manual gearbox. It features two gear train halves which allow fully automatic gear changes.

## **ELSA**

Electronic Service Information System.

## **ESC**

(Electronic Stabilisation Control)

Electronic stabilisation program, as in its previous abbreviation, ESP.

## **Front Assist**

Electronic area monitoring system.

## **CCS**

(Cruise Control System)

An initialism for an assist system for fixing or limiting the driving speed.

## **MSL**

(Maximum Speed Limit)

Limit for the maximum vehicle speed.



### **Lane Assist**

(Lane departure warning)

Electronic driver assist system which draws the driver's attention to any departure from a lane and which compensates for minor deviations within the scope of the system limits.

### **MFD**

(Multifunction Display)

Short designation for the display in the dash panel insert.

### **MIB**

(Modular Infotainment System)

Designation for a multi-brand and multi-model modular system for the infotainment components in a vehicle.

### **DAS**

(Driver Alert System)

Electronic driver assist system which alerts the driver to decreasing attentiveness.

### **MQB**

(Modular Transverse Matrix)

Designation for a multi-brand and multi-model modular system in vehicle development and production.

### **PLA**

(Park Assist System)

Driver assist system which actively supports the driver when parking or leaving a parking space, depending on the system version.

### **PDC**

(Park Distance Control)

Parking aid which monitors the area around the vehicle for potential obstacles using ultrasonic sensors.

### **TPLI**

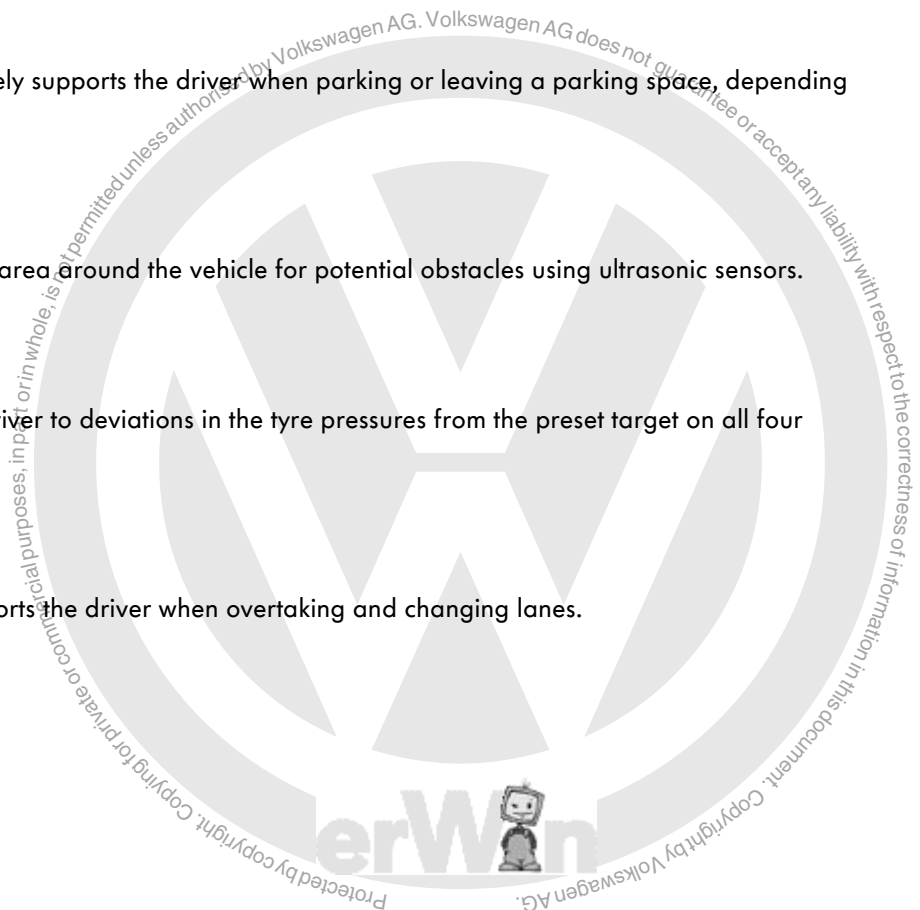
(Tyre Pressure Loss Indicator)

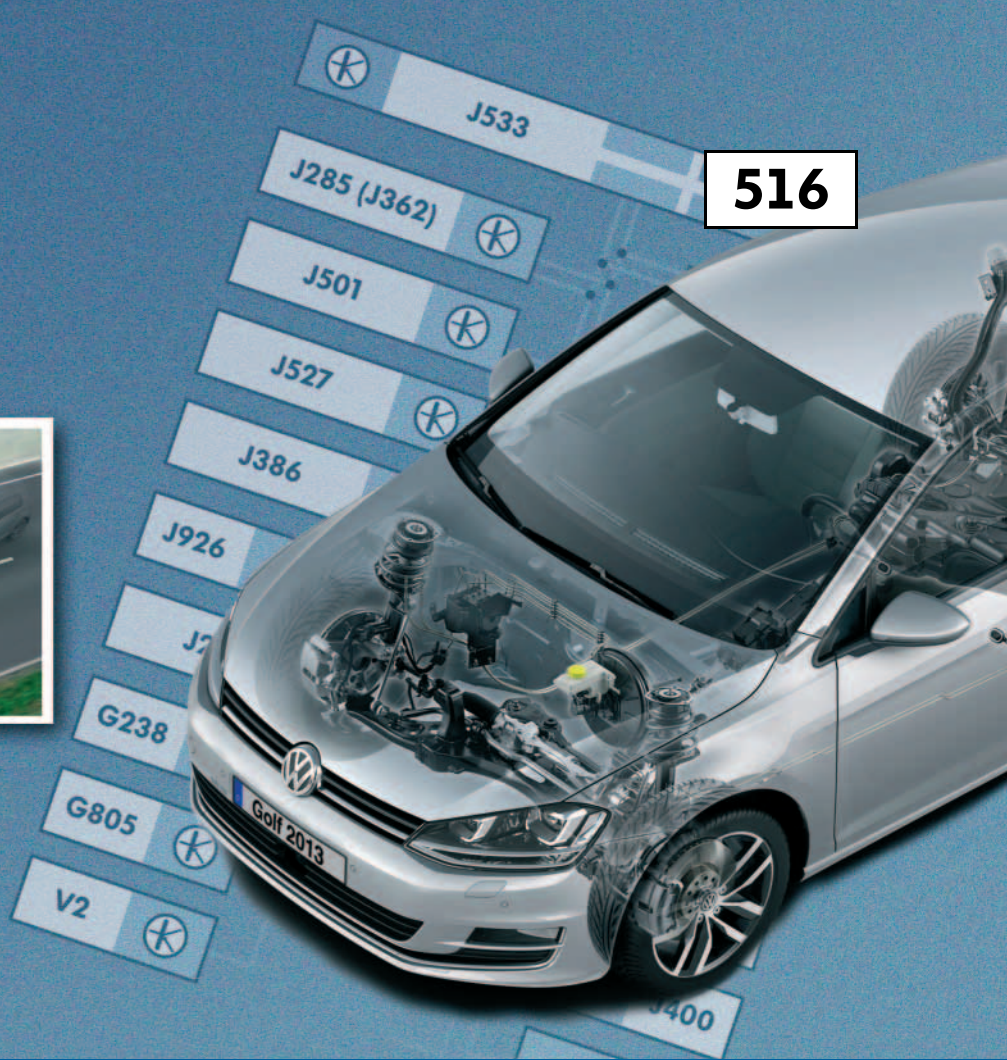
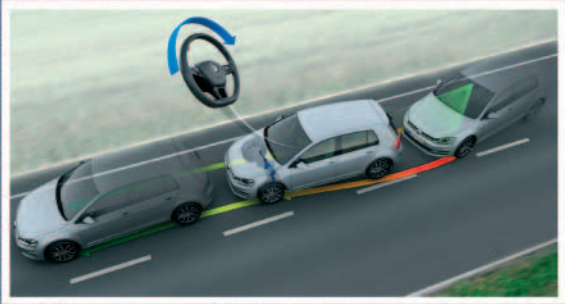
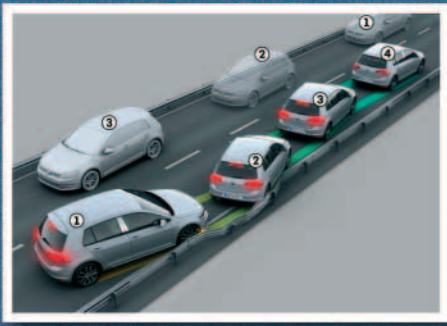
Assist system which alerts the driver to deviations in the tyre pressures from the preset target on all four wheels.

### **Side Assist**

(Lane Change Assist)

Driver assist system which supports the driver when overtaking and changing lanes.





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