

General



For the new Cayenne models, the main development goals in the areas of driving dynamics and performance were as follows:

- Increased driving pleasure and agility
- Improved comfort and day-to-day usability
- Improved driving dynamics

In order to achieve these goals, all chassis variants and the chassis control systems were enhanced. In addition to design modifications on the front and rear axles, new materials are also used for consistent lightweight construction. The measures include the following:

Weight reduction through lightweight construction:

- Wheel carriers, pivot bearings, front wishbones made of aluminum
- Pedal bearing block and torque support made of plastic
- Consistent lightweight construction of rear wishbones, transmission support, tie rods and drive shafts as well as optimized steel springs (High Performance Thermotec Process)

Chassis

4

General information	113	Tire Pressure Monitoring	
Chassis variants	115	Generation 2.5	131
Front axle with steel spring suspension	116	Brakes	133
Front axle with air suspension	117	Electric parking brake	135
Rear axle	120	Porsche Stability Management (PSM)	140
Air suspension	124		
Porsche Dynamic Chassis Control (PDCC)	129		
Wheels and tires	130		

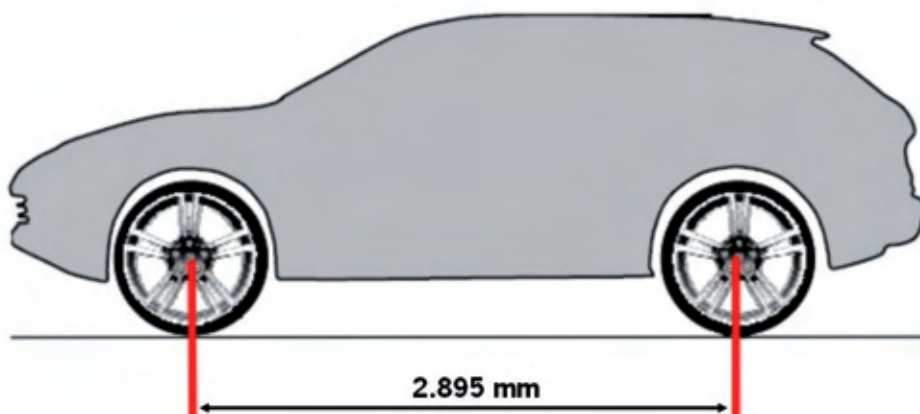
Weight reduction by design measures:

- Closed air-spring system
- Electric parking brake
- Omission of mounting saddle on the front axle

The weight reduction of approx. 139 lbs (63 kg) does not just lead to enhanced driving dynamics with low fuel consumption, but also makes a decisive contribution to improved comfort by reducing the unsprung masses.

Driving dynamics

The all-wheel drive Porsche Traction Management (PTM) was also enhanced to further increase driving dynamics. In addition, two new options are available in the form of Porsche Active Suspension Management (PASM) for the steel spring suspension and Porsche Torque Vectoring Plus (PTV Plus). The wheelbase was also lengthened by 40 mm to 2,895 mm.



Chassis variants

Chassis options ● Standard ○ Option	Cayenne		
	V6	S	Turbo
Steel spring suspension	●	●	-
Steel spring suspension with Porsche Active Suspension Management (PASM)	○	○	-
Adaptive air suspension with levelling system, ride-height adjustment and PASM	○	○	●
Porsche Dynamic Chassis Control (PDCC) in combination with air suspension	○	○	○
Porsche Torque Vectoring Plus (PTV Plus)	○	○	○

Steel spring suspension

The new Cayenne and Cayenne S are equipped with a steel spring suspension as standard. The spring rates vary for the Cayenne and Cayenne S with manual or Tiptronic transmissions according to the different engine and transmission variants.

Steel spring suspension with PASM

For the first time, a steel spring suspension with Porsche Active Suspension Management (PASM) is optionally available for the Cayenne and Cayenne S. As a result, the steel spring suspension is even better equipped to meet the demands for driving comfort and sporty driving dynamics.

Air suspension with levelling system and ride-height adjustment incl. PASM

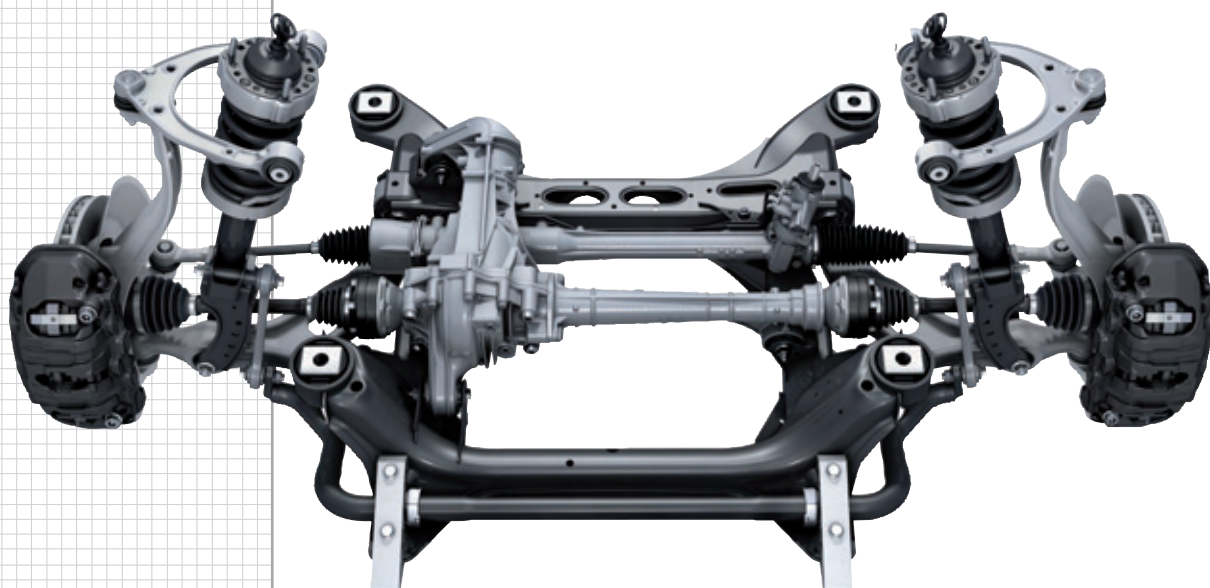
The new Cayenne Turbo features an adaptive air suspension including PASM as standard. The new air suspension is designed as a closed system, where the air is stored temporarily in a pressure accumulator when the height level is changed. The air suspension is optionally available for the Cayenne and Cayenne S.

Porsche Dynamic Chassis Control (PDCC)

The active chassis control system PDCC is optionally available for the Cayenne, Cayenne S and Cayenne Turbo in combination with the air suspension.

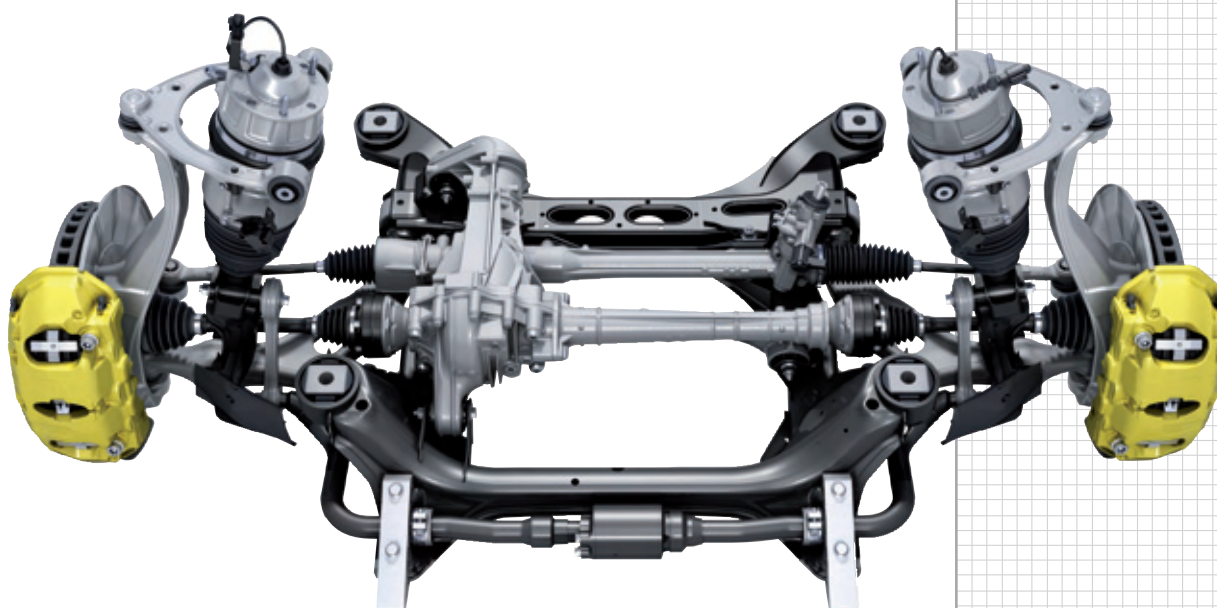
Front axle with steel spring suspension

- Double-wishbone front axle with subframe
- Lower wheel carrier and upper wishbone made of aluminum
- Integrated spring/damper unit screwed directly onto body (omission of mounting saddle)
- Supporting mount with optimized damping characteristics on the front axle (Cellasto inserts)
- Hydraulic mount on the lower rear wishbones (caster eccentric)
- Steering gear with variable steering ratio and regulated power-steering pump (Servotronic option)
- Tube-type anti-roll bar
- PASM optional



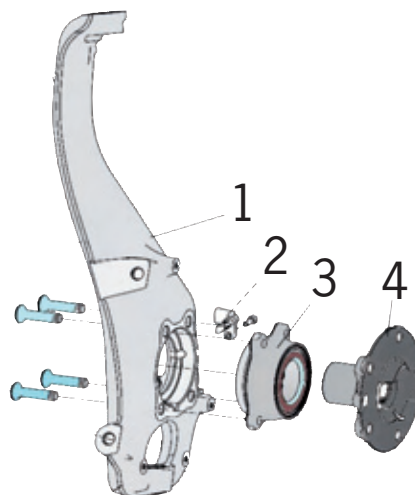
Front axle with air suspension

- Double-wishbone front axle with subframe
- Lower wheel carrier and upper wishbone made of aluminum
- Integrated spring/damper unit screwed directly onto body (omission of mounting saddle)
- Supporting mount with optimized damping characteristics on the front axle (Cellasto inserts)
- Hydraulic mount on the lower rear wishbones
- Steering gear with variable steering ratio and regulated power-steering pump (Servotronic option)
- Tube-type anti-roll bar
- PDCC optional



Wheel bearing housing

The wheel bearing housing (1) is made of aluminum and accommodates the screw-in angular-contact ball bearing (3) and the speed sensor (2). The wheel flange (4) is still pressed into the wheel bearing.



Markings are provided on the housing to permit identification of the central steering position.



Steering

Like all Porsche models, the Cayenne models are equipped as standard with a rack-and-pinion steering gear with hydraulic assistance and variable steering ratio. The steering ratio is still variable, but has been designed to be even sportier, i.e. the ratio (i) in the center position is 15.9:1 and becomes more direct as the steering angle increases (up to $i = 12.5:1$). It is now more direct around the center position in particular. The turning circle is approx. 39.04 ft. (11.9 m).

Regulated steering hydraulics

The Cayenne models are equipped with a regulated power-steering pump with variable geometric delivery rate. The demand-controlled delivery rate reduces energy consumption and thus lowers fuel consumption.

Function

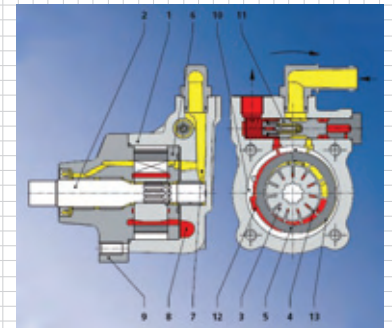
The pump delivers a constant volume flow to the hydraulic power steering when the engine is idling. When the engine speed increases, this causes the internally rising pump pressure to open the control valve (11), apply pressure on the cam ring (5) and reduce eccentricity with respect to the rotor (3). As a result, the pump chambers become smaller and only produce a reduced delivery rate. This restricted pump function prevents overproduction of pressure oil and significantly less energy is required at higher pump speeds due to reduced power consumption. This makes it possible to simplify cooling measures in the steering system. As the engine speed decreases, the pressure differential that exists between the left and right chambers increases the eccentricity between the rotor (3) and the cam ring (5). As a result, the geometric delivery rate increases continuously again.

Servotronic

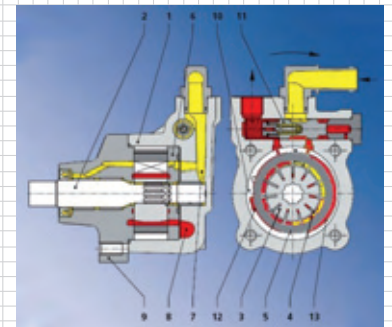
Servotronic, a speed-sensitive power steering system, is optionally available for all Cayenne models. The steering is firm at high speeds and steering maneuvers are extremely precise with excellent steering comfort. At low speeds, on the other hand, Servotronic permits easy maneuvering and parking.

Structure

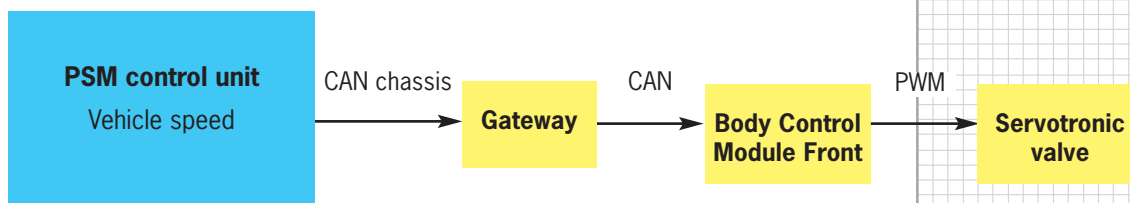
The front-end electronics control unit (VWE) receives information about the vehicle speed and vehicle variant via the gateway. The Servotronic valve is controlled by a corresponding PWM signal from the front-end electronics.



High delivery rate



Low delivery rate



Safety

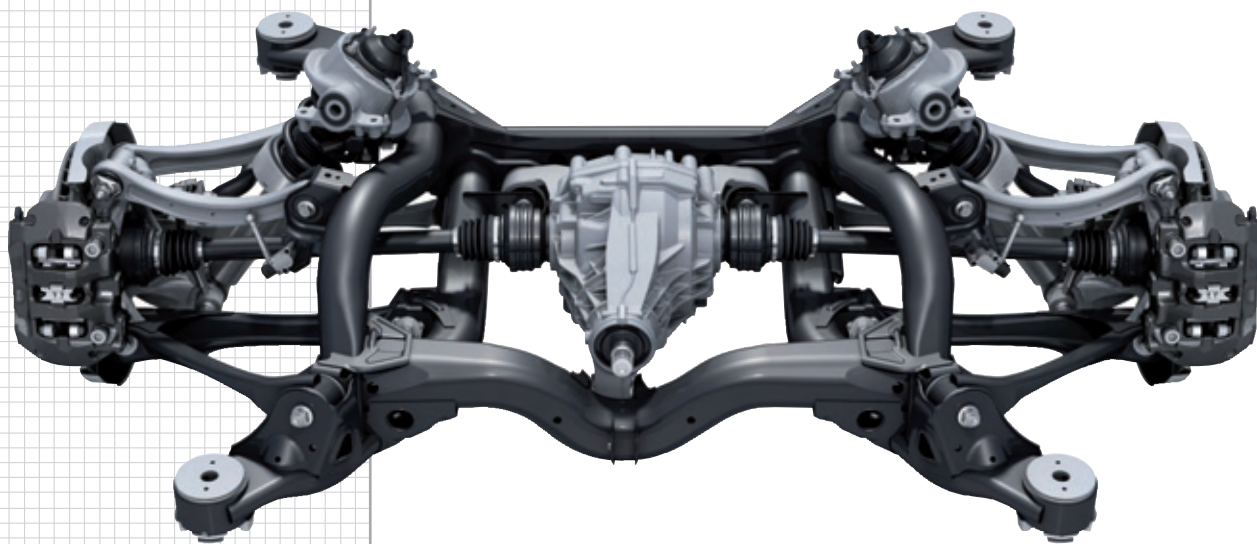
The steering remains fully functional in the event of a malfunction. If the power supply fails, the converter valve opens to its maximum position, i.e. maximum hydraulic feedback or "high-speed characteristic".

Rear axle

The rear axle was enhanced wherever possible with the goal of lightweight construction in order to reduce the axle weight. In addition to changes in the design concept, such as direct connection of the spring struts to the body, this also involved using aluminum components.

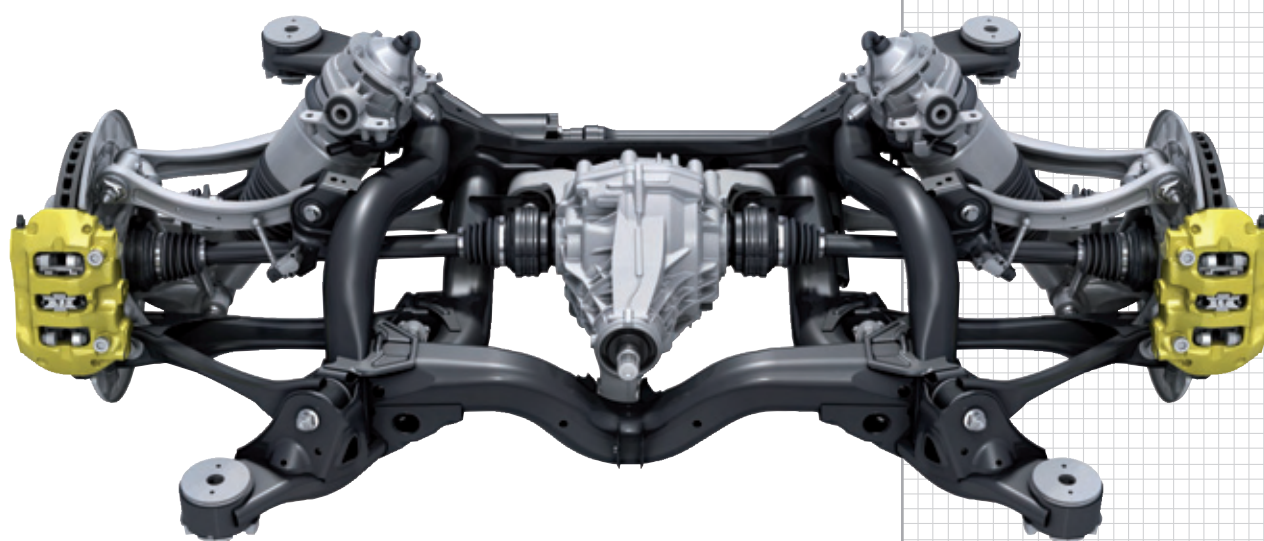
Rear axle with steel spring suspension

- Multi-link rear axle with chassis subframe
- Wheel-bearing housing made of aluminum
- Integrated steel spring/damper unit screwed directly onto the body
- Porsche Active Suspension Management (PASM), optional
- Hydraulically damped chassis subframe bearing
- Tube-type anti-roll bar
- Hollow-bored drive shafts



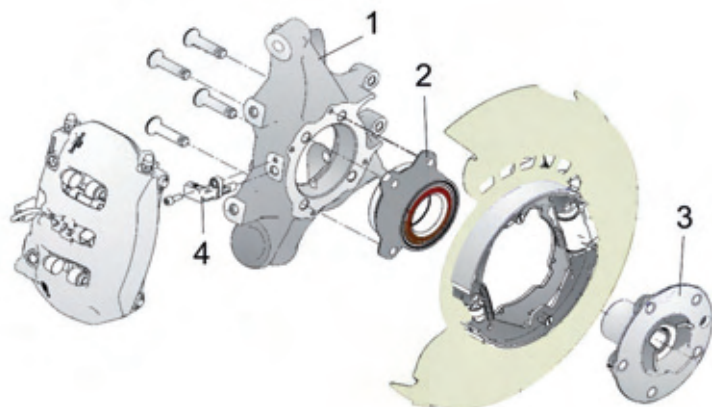
Rear axle with air suspension

- Multi-link rear axle with chassis subframe
- Integrated spring/damper unit screwed directly onto the body
- Wheel-bearing housing made of aluminum
- Porsche Active Suspension Management as standard
- Hydraulically damped chassis subframe bearing
- Tube-type anti-roll bar
- Hollow-bored drive shafts
- PDCC optional



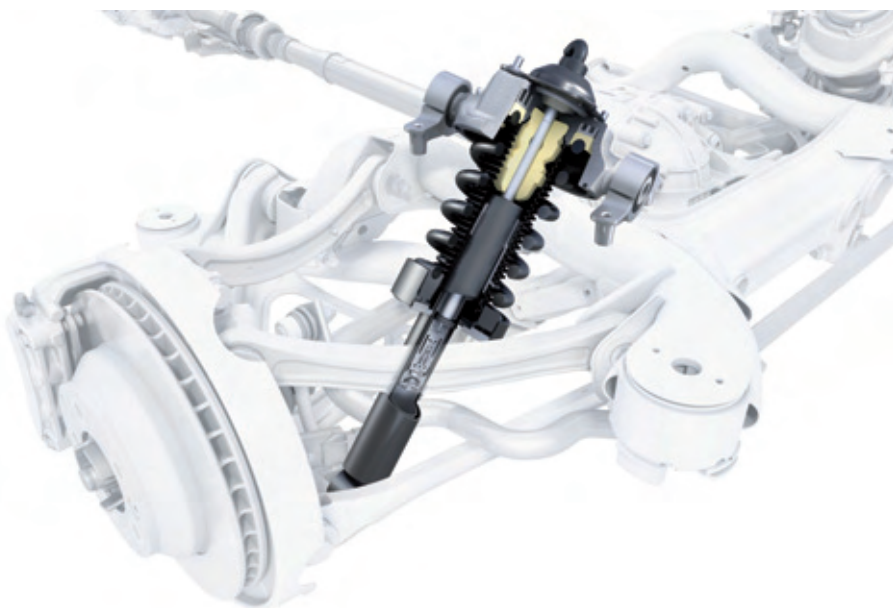
Wheel-bearing housing

The wheel-bearing housing (1) made of aluminum accommodates the wheel bearing (2) as well as the parking brake, speed sensor (4), brake caliper and the screw attachment points for the control arms. The wheel flange (3) is pressed into the wheel bearing.



Steel spring suspension with PASM

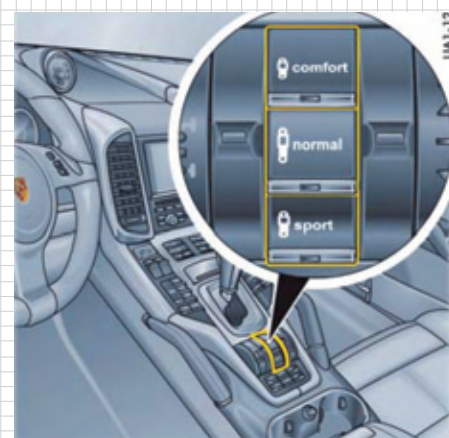
For the first time, the standard steel spring suspension is optionally available with Porsche Active Suspension Management (PASM) for the Cayenne and Cayenne S. This means that the steel spring suspension is even better equipped to meet the high demands for long-distance comfort, performance and agility.



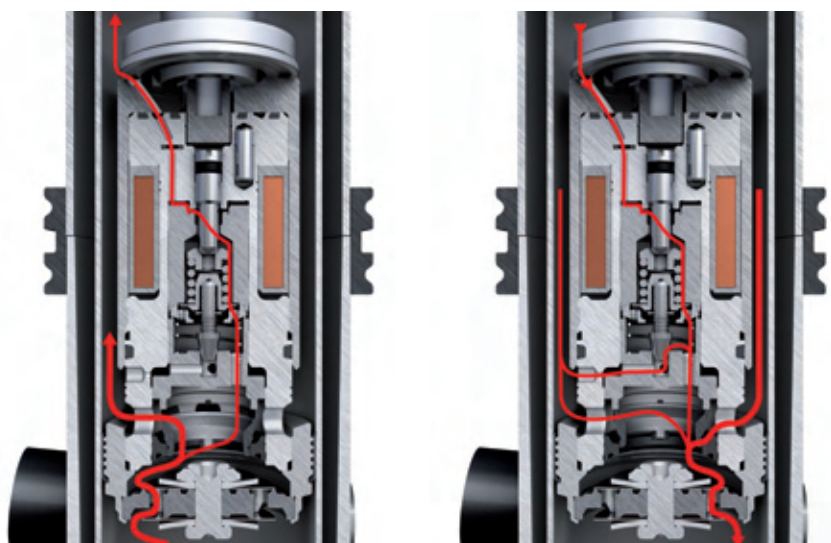
Porsche Active Suspension Management (PASM) is a shock absorber system for active, continuous damper control on front and rear axles. It regulates the damping force for each wheel individually, depending on driving style and driving conditions. Uneven road surfaces act on the chassis via the wheels and cause vertical movements and vertical accelerations of the vehicle body. By actions such as steering, acceleration and braking, etc., the driver also produces pitch, roll and/or yaw reactions of the vehicle. In addition to body movements such as those produced by acceleration, cornering or uneven roads, the sensors also detect signals such as lateral acceleration, steering angle, brake pressure, engine torque and vehicle speed. This information is supplied to the control electronics, which then individually regulates the required damping force for each wheel in just a few milliseconds on the basis of this data. Optimally regulated damping improves the road grip of the vehicle and at the same time ensures increased driving stability, greater comfort, enhanced performance and shorter braking distances.

In the new Cayenne models, the driver can choose between three modes by way of the PASM chassis buttons on the center console: Comfort, Normal and Sport. The required damping force is continuously calculated and applied for each wheel in all three modes, as described above.

PASM is controlled by regulating the oil flow in the dampers. In Comfort mode, for example, the oil can flow freely and damper control is comfort-orientated. Depending on the selected mode, the flow paths close or are narrowed and the oil is prevented from flowing through. This principle allows the damping force for compression and rebound travel to be influenced at the push of a button.

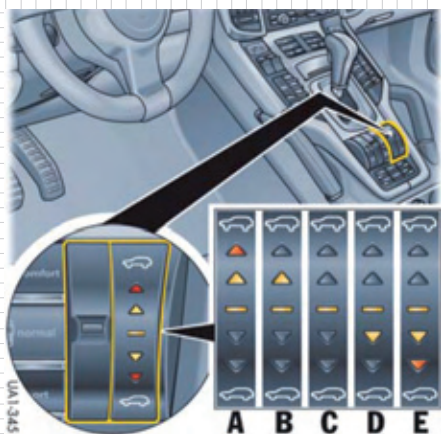
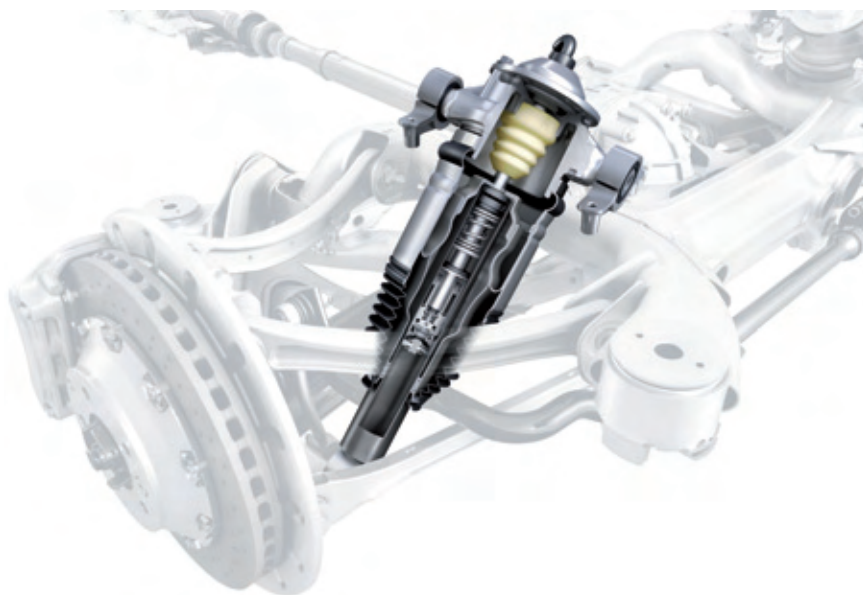


UA1-12



Air suspension

All air-spring struts on the front and rear axles are weight-optimized – the new design for connection to the chassis means that it was possible to omit the mounting saddle on the front axle. On the rear axle, axle mounting parts were integrated rigidly in the body (integrated wishbone) in order to improve torsional rigidity. This contributes to improved handling of the new Cayenne models.



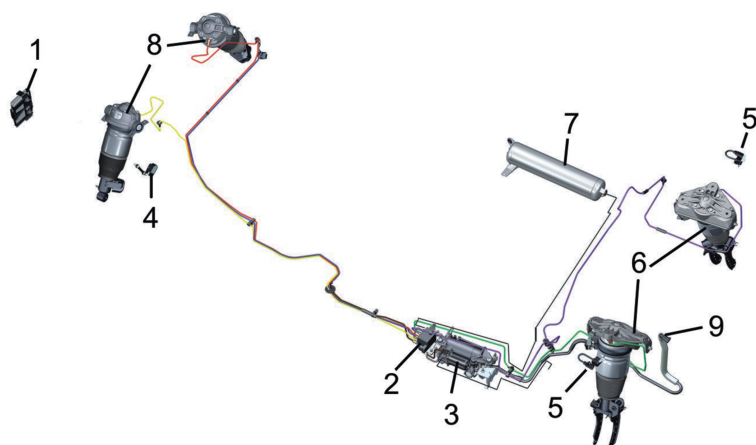
- A High Level II
- B High Level I
- C Normal Level
- D Low Level
- E Loading Level

The new air suspension is also designed as a closed system, where the air is stored temporarily in a pressure accumulator when the height level is changed. Intermediate storage of the air saves energy thanks to the use of a compressor that has been optimized for the new demands. In addition, changes in the height setting are performed more quickly after manual or automatic selection. The new air suspension system with PASM features new software programming to create a wider adjustment range for the three PASM modes Comfort, Normal and Sport.

In all Cayenne models, the driver can activate the different manually selectable levels by means of the separate rocker switch on the centre console. This makes it possible to further enhance the off-road suitability of the Cayenne by setting a greater fording depth as well as larger approach/departure angles.

Height level	Ground clearance with standard tires		Activation
	Cayenne, Cayenne S,	Cayenne Turbo	
High Level II	268 mm	273 mm	Manual up to 19 mph (30 km/h)
High Level I	238 mm	243 mm	Manual up to 50 mph (80 km/h)
Normal level	210 mm	215 mm	Manual
Low level	188 mm	193 mm	Manual / via Sport button and automatic as from 86 mph (138 km/h)
Low Level II	178 mm	183 mm	Automatic as from 130 mph (210 km/h)
Loading Level	158 mm	163 mm	Manual at standstill

Component overview



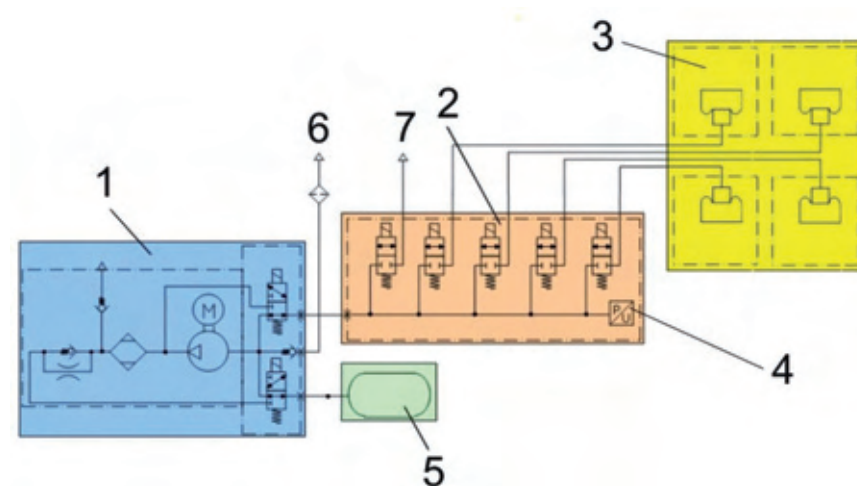
- 1 Control unit
- 2 Valve block
- 3 Compressor
- 4 Level sensor
- 5 Body acceleration sensor
- 6 Air-spring struts, front
- 7 Pressure accumulator (5.2 l)
- 8 Air-spring struts, rear
- 9 Intake line

The Cayenne features a closed air suspension system with a compressor, solenoid block with integrated pressure sensor and a pressure accumulator. To raise the vehicle, air is pumped into the spring units by the electric compressor. When lowering the vehicle, the excess air is not released to the outside, but is fed back into the 5.2-liter pressure accumulator by the compressor. This system makes the Cayenne particularly energy-efficient and also ensures fast suspension control.

The adaptive air suspension system includes the following components:

- Closed air supply system for better energy utilization and faster level adjustment
- Electrically driven compressor with air drier, isolated from the interior
- Solenoid valves for controlling the air-spring volume
- Light-alloy pressure accumulator
- 2 fully load-bearing air springs with outer guide and integrated dampers on the front and rear axles
- 4 level sensors (spring travel sensors) for detecting body movements
- PASM and air control integrated in one control unit

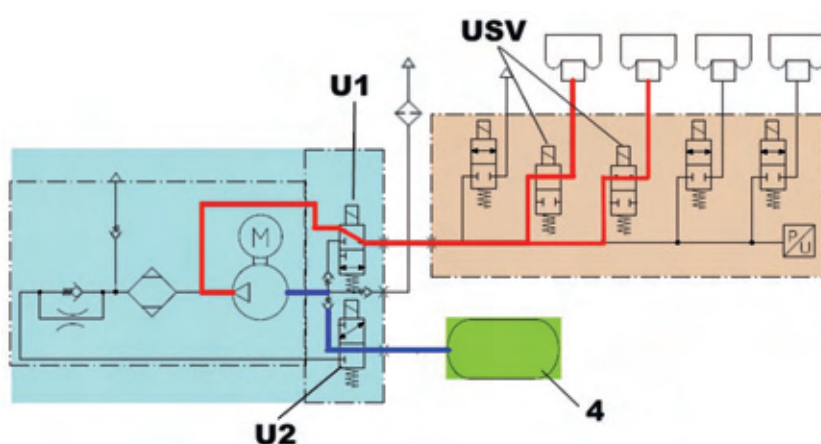
Schematic diagram



Control functions

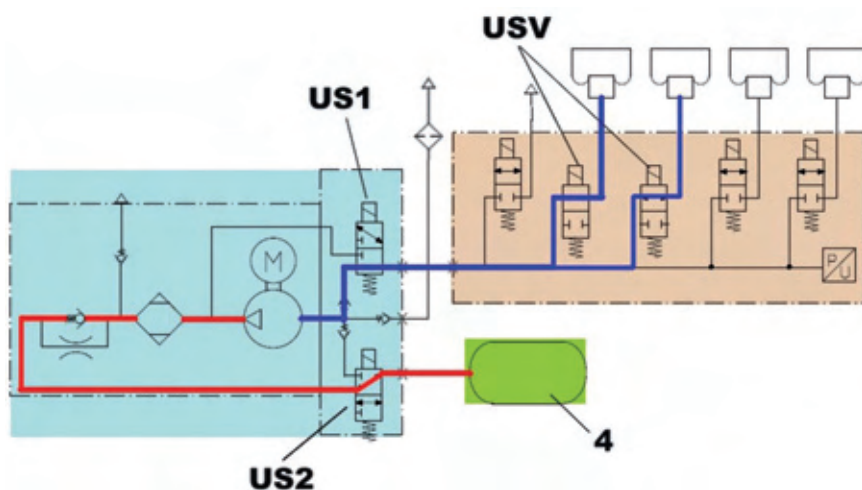
Raising the vehicle

The air springs on the front and rear axles are filled separately in order to raise the vehicle. Air is pumped out of the accumulator by the compressor and is routed to the air springs via pipes and valves. Change-over valve 1 and the corresponding air-spring change-over valves (e.g. USV) are switched for this purpose.

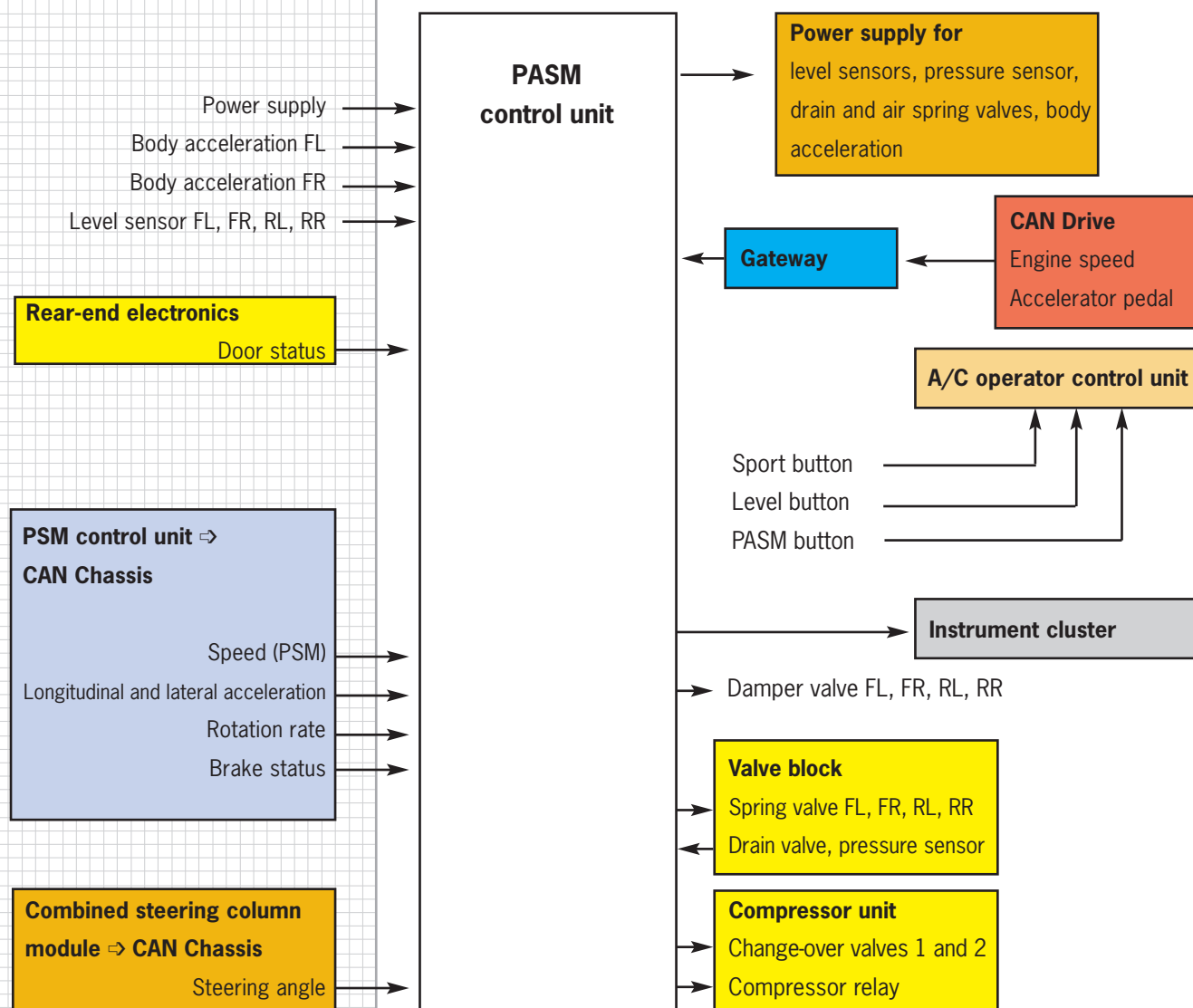


Lowering the vehicle

The air springs on the front and rear axles are switched separately in order to lower the vehicle. Air is pumped out of the air spring by the compressor via change-over valve 1. The air is routed through the air drier and change-over valve 2 into the accumulator. This circuit design means that any moisture is repeatedly eliminated from the system.



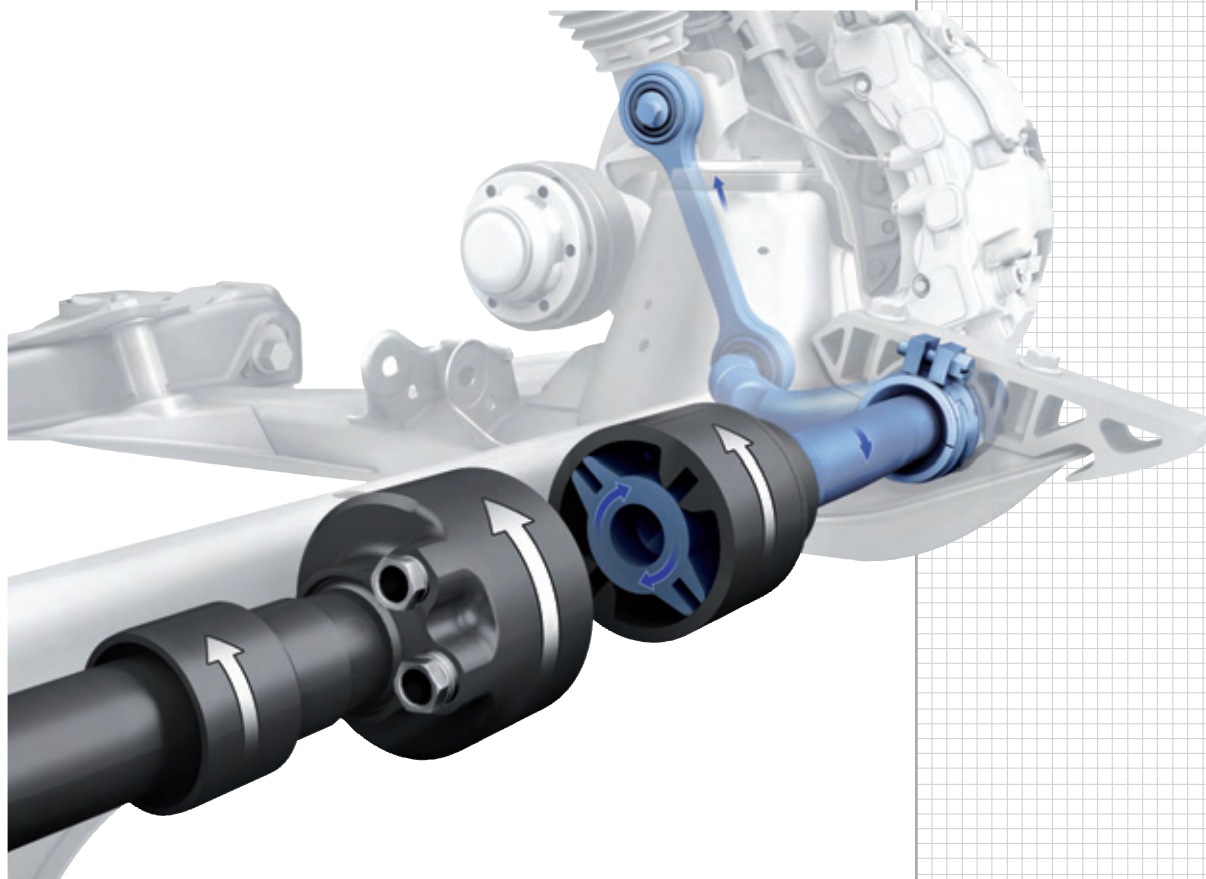
Control unit and sensors



Porsche Dynamic Chassis Control (PDCC)

The active chassis control system PDCC is optionally available for the Cayenne, Cayenne S and Cayenne Turbo in combination with the air suspension with PASM. This is an active system for stabilizing the vehicle body. For the driver, this means enhanced performance and comfort and also maximum agility and vehicle balance thanks to dynamic roll moment distribution.

This is achieved with the aid of hydraulic swivel motors on the active anti-roll bars on the front and rear axles. The system responds to the current steering angle and lateral acceleration by producing a stabilizing force that counteracts the lateral inclination of the body. The result is an extremely comfortable yet highly sporty driving experience, offering maximum agility at every speed with precise steering and stable load transfer characteristics. The rocker switch in the center console allows the driver to also switch PDCC to a traction-orientated mode by activation of Off-road mode 1. The two halves of the active anti-roll bar can then twist even more with respect to each other. This in turn permits greater axle articulation. The wheels remain in contact with the ground longer as a result and can transfer more power. This ensures even better traction on uneven ground.





Wheels and tires

The new Cayenne models feature newly developed wheels in a unique design in sizes from 18 to 21 inches. During the development of each wheel, great emphasis was placed on lightweight construction combined with an attractive and unique design. As a result, the wheels ideally complement the attractive new exterior design of all Cayenne models. The production technologies used (flow forming and forging) contribute to reducing weight and therefore also improve driving comfort by reducing the unsprung masses.

Standard wheels

The Cayenne is equipped with the 18-inch Cayenne wheel.

Size: FA 8Jx18 RO 53 with tire 255/55 R 18
RA 8Jx18 RO 53 with tire 255/55 R 18

The 18-inch Cayenne S III wheels are available as standard for the Cayenne S.

Size: FA 8Jx18 RO 53 with tire 255/55 R 18
RA 8Jx18 RO 53 with tire 255/55 R 18

On the Cayenne Turbo, the 19-inch Cayenne Turbo wheel is standard.

Size: FA 8.5Jx19 RO 59 with tire 265/50 R 19
RA 8.5Jx19 RO 59 with tire 265/50 R 19

Tires

A new generation of tires will also be introduced with the new Cayenne models. These tires offer improved performance, handling, rolling resistance, tire wear and weight. Tires generally offer a high potential for reducing fuel consumption. The three basic components of all tires were optimized: the rubber mixture, tread design and casing architecture. For a tire to obtain Porsche series approval, it must meet all the demanding specifications down to the very last detail. For this reasons, the tires have the familiar N specification.

Run-flat systems

All the Cayenne models come as standard with a space-saving tire repair system comprising tire sealing compound and an electric pneumatic compressor.

Tire Pressure Monitoring Generation 2.5

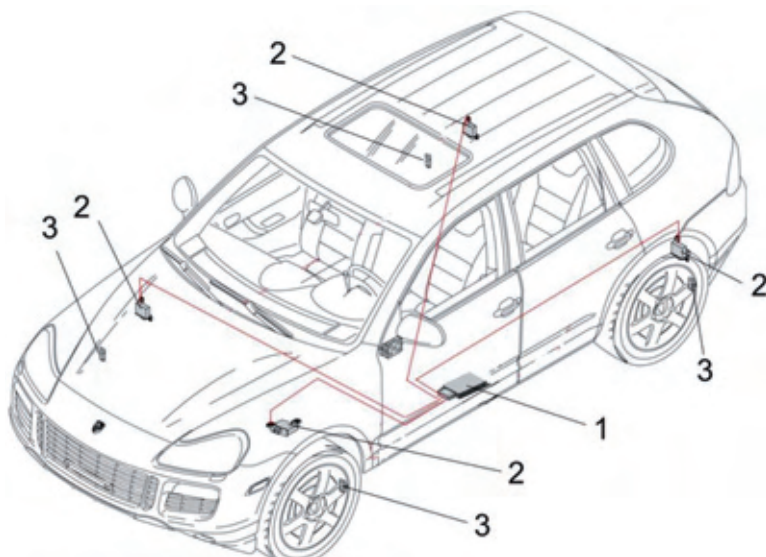
Timely detection of a gradual loss of pressure not only increases driving safety, but can also prevent uneven tire wear and high fuel consumption due to inadequate tire pressure. The correct tire pressure additionally supports safe driving and high driving dynamics.

With the tire Pressure Monitoring system (TPM Generation 2.5) provided as standard equipment on all Cayenne models, the tire pressure of the running tire is monitored permanently and separately for all four wheels.

Compared with the TPM Generation 2.2, which was installed in the Cayenne as from model year 2008, the antenna is now integrated in the control unit in the new TPM Generation 2.5. The functions have not changed.

Design

The system comprises the following components

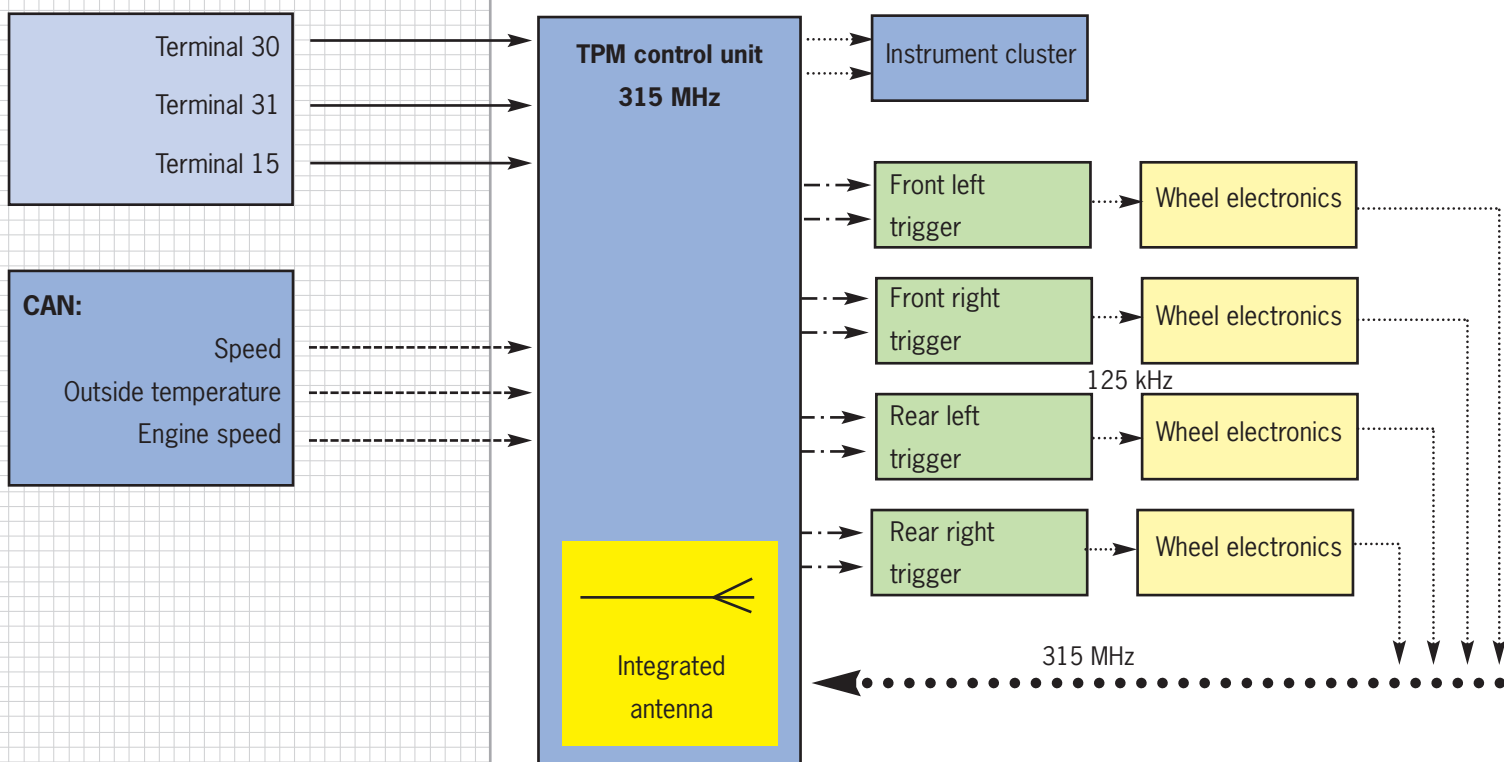


- 1 TPM control unit with integrated antenna
- 2 Trigger transmitters
- 3 Wheel electronics



Control unit

The TPM control unit with integrated antenna is fitted on the outside on the vehicle underbody. The control unit is water-tight. The underbody panelling serves as mechanical protection for the control unit. The location of the control unit on the outside of the vehicle ensures that wheel electronics reception is not subject to interference as a result of various conditions in the passenger or luggage compartment or due to metallized heat-insulating glass.



The control unit requests the four trigger transmitters to transmit in succession by means of a PWM signal. The 125 kHz signal is received by the respective wheel electronics units. The data protocol transmitted by the wheel electronics is received by the antenna integrated in the control unit.

Brakes

To ensure that the high requirements with regard to the braking performance of a Porsche are met even better than before, all new Cayenne models are equipped with an even larger and optimized brake system. The brake systems can be identified visually according to the familiar logic: black brake calipers identify the Cayenne, silver brake calipers the Cayenne S and red brake calipers the Cayenne Turbo. The racing-proven Porsche Ceramic Composite Brake (PCCB) is optionally available for all Cayenne models.

Brake system overview

	Cayenne	Cayenne S	Cayenne Turbo
Service brake	Foot-operated, hydro-mechanical force transmission, dual-circuit brake system with axle-based distribution, 6-piston aluminum monobloc brake calipers on FA and 4-piston aluminum monobloc brake calipers on RA, internally vented brake discs on front and rear axles.	Foot-operated, hydro-mechanical force transmission, dual-circuit brake system with axle-based distribution, 6-piston aluminum monobloc brake calipers on FA and 4-piston aluminum monobloc brake calipers on RA, internally vented brake discs on front and rear axles.	Foot-operated, hydro-mechanical force transmission, dual-circuit brake system with axle-based distribution, 6-piston aluminum monobloc brake calipers on FA and 4-piston aluminum monobloc brake calipers on RA, internally vented brake discs on front and rear axles.
Brake booster	Tandem vacuum brake booster i = 7 Mechanically driven vacuum pump	Tandem vacuum brake booster i = 7 Mechanically driven vacuum pump	Tandem vacuum brake booster i = 8 Mechanically driven vacuum pump
Brake master cylinder ø	28,57 mm	28,57 mm	28,57 mm
Brake discs ø FA/RA	350/330 mm	360/330 mm	390/358 mm
Brake disc thickness, FA/RA	34/28 mm	36/28 mm	38/28 mm
Brake caliper piston ø FA/RA	6x36/4x32 mm	6x36/4x32 mm	6x36/4x32 mm
Parking brake	Duo-servo, electrically operated, acts on the rear axle	Duo-servo, electrically operated, acts on the rear axle	Duo-servo, electrically operated, acts on the rear axle
Brake drum ø	210 mm	210 mm	210 mm
Brake shoe width	30 mm	30 mm	30 mm

Standard brake system

6-piston aluminum monobloc fixed-caliper brakes and integral-type brake discs with a diameter of 350 mm (+20 mm compared with the previous model) are used for the Cayenne.

The Cayenne S is equipped with composite brake discs with a diameter of 390 mm.



4-piston aluminum monobloc fixed-caliper brakes and integral-type brake discs with a diameter of 330 mm are fitted at the rear of the Cayenne and Cayenne S.

Due to its high power, the Cayenne Turbo features composite brake discs on the front axle with an aluminum pot, a grey cast-iron friction ring and a diameter of 390 mm. Larger brake discs are also fitted on the rear axle with a diameter of 358 mm.

Porsche Ceramic Composite Brake (PCCB)

As with all other Porsche models, the especially high-performance ceramic brake system Porsche Ceramic Composite Brake (PCCB) is also optionally available. The PCCB is offered for the first time for the Cayenne. It is available as from a wheel size of 20 inches for the Cayenne Turbo and as from 19 inches for the other Cayenne models. The PCCB has a brake disc diameter of 390 mm at the front and 370 mm at the rear for the Cayenne and Cayenne S. Brake discs with a diameter of 410 mm at the front and 370 mm at the rear are used for the Cayenne Turbo. All Cayenne models have 6-piston aluminum monobloc fixed-caliper brakes on the front axle and 4-piston aluminum monobloc fixed-caliper brakes on the rear axle.

Brake booster

The Cayenne and Cayenne S variants are equipped with a tandem brake booster (9/10-inch diameter) with a transmission ratio of $i=7$. The transmission ratio on the Cayenne Turbo is $i=8$. Compared with the previous model, this is now a normal brake booster, i.e. the brake light switch and booster coil have been omitted.

Vacuum pump

Instead of a conventional sucking jet pump, a mechanical vacuum pump has been installed on the engine to provide the brake booster vacuum. This design permits a high and constant vacuum to be provided so that brake boosting is available under even the most unfavorable conditions.

Brake master cylinder

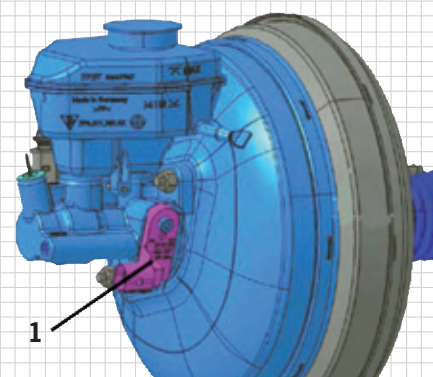
To achieve an optimum pedal feeling with a more precise pressure point, the diameter of the brake master cylinder was increased to 28.57 mm. A brake light sensor (1) is installed directly on the master brake cylinder.

Electric parking brake

All new Cayenne models feature an electrically operated parking brake, which can be controlled conveniently by means of a button at the left of the steering wheel. The electric parking brake can be activated manually using this button and deactivated when the footbrake is pressed. It is also released automatically following manual activation when the driver's intention to drive off is detected via the accelerator pedal. The electric parking brake therefore increases comfort and safety when the vehicle is parked.



Chassis





Functions

Activating when the vehicle is stationary

Conditions:

- Vehicle speed less than 1.4 mph (2.2 km/h)
- At least one valid wheel signal per axle
- Press operating control

Display:

Function light comes on in the instrument cluster and on the operating control

Emergency operation:

If there is not at least one valid wheel signal available on each axle, the electric parking brake can be applied and the vehicle reliably held under the following conditions:

- Ignition off
- Operating control pressed for longer than 10 seconds

Releasing when the vehicle is stationary

Conditions:

- Ignition on
- Brake pedal actuated
- Pull operating control

Display:

Function light goes out (on instrument cluster and operating control)

Automatic electric parking brake release when driver's intention to drive off is detected on the flat (gradient of less than 5°)

Conditions:

- Engine running
- Gear selected (PDK = selector lever in D or R, manual transmission = clutch pressed)
- Accelerator pedal pressed
- Driver's seat belt fastened
- Driver's door closed

Automatic electric parking brake release when driver's intention to drive off is detected on a gradient of more than 5° (Drive-Off Assistant)

Conditions:

- Engine running
- Gear selected (PDK = selector lever in D or R, manual transmission = clutch pressed)
- Accelerator pedal pressed
- Driver's seat belt fastened
- Driver's door closed
- Gradient angle > 5°

The Drive-Off Assistant is activated if a gradient angle of more than 5° is detected. The downgrade force is calculated in the PSM control unit from the gradient angle signal. In communication with the DME control unit, the system calculates at which engine torque the parking brake has to be released. In other words, the parking brake is released slowly only when the driver has pressed the accelerator pedal far enough.

Display:

Function light goes out (on instrument cluster and operating control)

Emergency braking - vehicle deceleration of 0.8 g

In dangerous situations, it is possible to decelerate very sharply and stop the vehicle using the electric parking brake instead of the footbrake.

Conditions:

- Vehicle speed above 2.2 mph (3.5 km/h)
- A valid wheel signal per axle
- Press operating control continuously

Display:

- Function light flashes (on instrument cluster and operating control)
- Warning tone

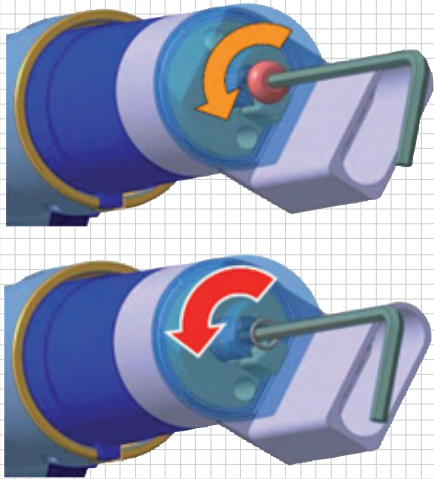
Text message "The emergency brake function is deactivated when switch is released" is displayed on the instrument cluster.

Note:

If the driver's door is not closed or the driver's seat belt is not fastened, the electric parking brake will not be released automatically when the driver attempts to drive off. The message "Release electric parking brake" appears on the multi-function display in the instrument panel. The brake warning light on the instrument panel and the indicator light on the operating control start to flash. The parking brake must be released manually.

Note on emergency braking:

Vehicle deceleration of 0.8 g is requested as long as the operating control is actuated. The PSM control unit implements this request in a controlled braking function. If a speed of below approx. 1.2 mph (2 km/h) is reached, the EPB takes over complete braking and stopping of the vehicle.



Special functions

1. Brake test stand (TÜV (MOT)) mode, automatic activation upon detection of roller operation

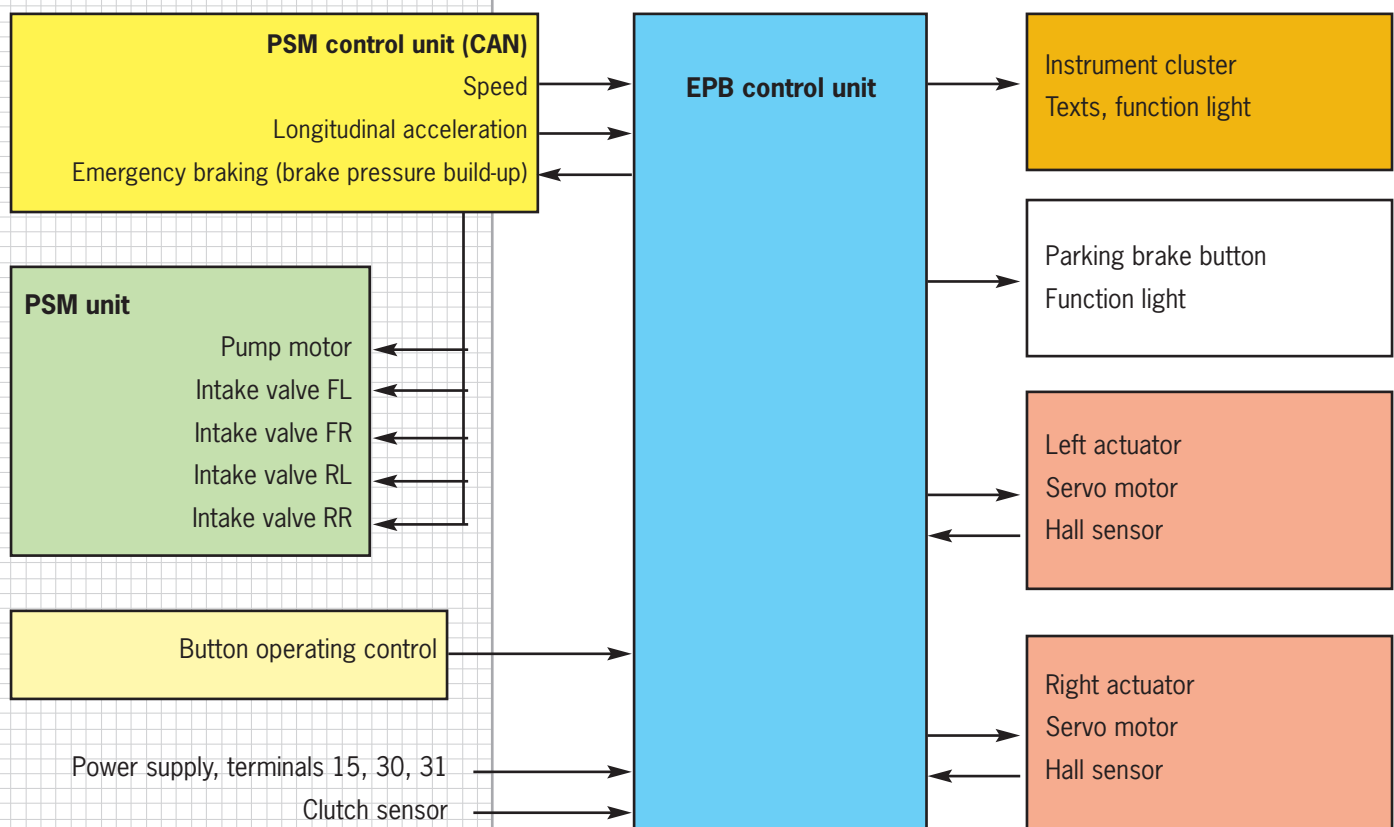
The braking action of the parking brake can be tested at any time on a roller-type test stand. The system automatically switches to test mode as soon as one axle is driven while the other is stationary. The service brakes of the front and rear axle can be tested normally. To test the parking brake, the button must be pressed continuously until the highest braking torque is reached or the vehicle jumps out of the test stand.

2. EPB emergency release

The emergency release function should be used only if the brake can no longer be released electrically (actuating element itself is faulty)

- 1 Undo the oval-head screw on the back of the actuator using an Allen key (a/f 3).
- 2 Access the emergency release screw using an Allen key (a/f 3).
- 3 Turn approx. 300 turns in counter-clockwise direction until there is a noticeable increase in torque. The fully released position of the brake shoes is then reached.

Control unit



Sensors

PSM signals

Speed signal – Wheel speeds are detected in order to execute the various functions depending on vehicle speed.

Longitudinal acceleration – The gradient is detected in order to activate/deactivate the Drive-Off Assistant.

Output signals to the PSM hydraulic unit – Targeted build-up of brake pressure during emergency braking.

Clutch sensor

The clutch sensor is only installed on vehicles with manual transmission. It is located on the clutch master cylinder in order to detect the position of the master piston. The piston contains a permanent magnet for this purpose. The different positions of the magnet generate certain field strengths, which can be used to determine the sensor position. The sensor supplies up to three different signals, which provide information about the position of the piston: clutch pedal actuated, piston travel and clutch fully depressed.



Porsche Stability Management (PSM)

The new Cayenne features enhanced Porsche Stability Management (PSM). This offers superior active driving safety even at the performance limits of extreme longitudinal and lateral acceleration without affecting the typical Porsche agility. The PSM setup was modified and adapted to use of the new Porsche Traction Management (PTM) or new optional Porsche Torque Vectoring Plus (PTV Plus). PSM improves active safety through the following functions/systems:

- ABS (anti-lock brake system)
- MSR (engine drag torque control)
- ASR (anti-slip regulation)
- ABD (automatic brake differential)
- Brake assist
- Improved braking readiness through prefilling of the brake system
- Earlier prefilling of the brake system and readying of brake assist (in conjunction with adaptive cruise control)
- Trailer Stability Management
- Standstill management: Auto-Hold function in conjunction with the electric parking brake
- Longitudinal deceleration control in conjunction with adaptive cruise control

Enhanced braking readiness

The enhanced braking readiness through prefilling of the brake system serves to shorten the stopping distance in emergencies. When the accelerator pedal is released quickly, PSM places the brake system in a state of enhanced braking readiness: The prefilling of the brake system builds up a slight pressure in the system. This causes the brake pads to apply light pressure to the brake discs. If the driver then actually presses the brake, maximum braking power can be achieved more quickly and this results in a shorter stopping distance.

Brake assist

On identifying full braking - i.e. when a defined force is exceeded on the brake pedal - brake assist supplies the required brake pressure for maximum deceleration via the PSM hydraulic unit. With adaptive cruise control, PSM initiates selective braking action to maintain the preselected distance from the vehicle in front. If the environment sensors in the adaptive cruise control system report that the driver is getting closer to a vehicle in front, the brake system is automatically switched to enhanced braking readiness mode. In addition, the brake hydraulic system also supports the driver here in the event of an impending full-braking operation so that the required brake pressure is provided. The driver is first warned visually by a message on the display as well as by an audible signal. If the distance from the vehicle in front continues to decrease, there is a braking jolt as an additional warning.

Standstill management (Auto-Hold functionality)

The standstill management function (Auto-Hold function) prevents the vehicle from rolling back in the opposite direction to the desired driving direction. This assist system is available in the Cayenne without an additional operating control. If the vehicle is braked to a stop on an uphill gradient, the Auto-Hold function is active and the required brake pressure is maintained via PSM. On vehicles with 8-speed Tiptronic S, the Auto-Hold function also holds the vehicle if the driver allows the vehicle to coast to a stop on a gradient. The Auto-Hold function is also activated in the event of automatic distance control by the adaptive cruise control. As soon as the vehicle comes to a stop without any intervention by the driver, the brake pressure is maintained via PSM until the vehicle moves off again. The hold function is transferred to the electric parking brake after 5 minutes or if the system detects that the driver intends to leave the vehicle.

Porsche Torque Vectoring Plus (PTV Plus)

PTV Plus is a new system to enhance driving dynamics and stability. It functions with variable torque distribution at the rear wheels and an electronically regulated rear differential lock. PTV Plus improves the steering behaviour and steering precision as a function of the steering angle and steering speed, accelerator pedal position as well as yaw rate and speed through selective braking interventions on the rear wheel on the inside of a bend. As a result, the rear wheel on the outside of the bend receives a higher drive force and permits additional angular momentum in the steering direction. The result is direct and dynamic steering into the bend. This reduces the need for PSM control intervention.





Porsche Hill Control (PHC)

A further new sub-function of PSM is Porsche Hill Control (PHC), which is standard for all new Cayenne models. PHC assists the driver when driving slowly downhill at speeds between approx. 2 mph (3 km/h) and approx. 19 mph (30 km/h), e.g. on steep slopes or wintery mountain roads. The function is active both when driving forwards and when reversing. The system limits the vehicle speed by selective braking intervention on all four wheels. ABS remains active in order to prevent the wheels from locking. PHC is activated for all models by way of the separate switch on the center console. In the Cayenne, Cayenne S and Cayenne Turbo, it is also activated by selection of Off-road mode 1 with the central off-road rocker switch.

Preconditions:

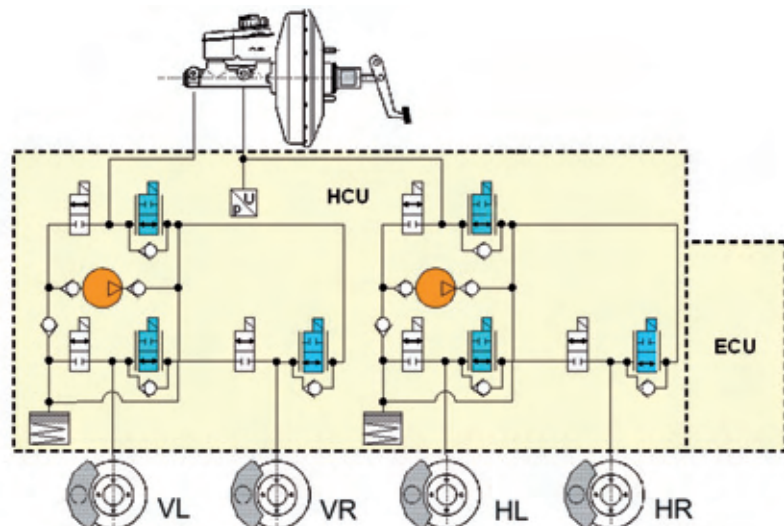
- PHC is switched on.
- The vehicle speed must not exceed approx. 19 mph (30 km/h).
- The downhill gradient must be at least approx. 12 %.
- The driver does not press the accelerator or brake.

Changing speed

- Brake or accelerate (the new desired speed is stored after the brake pedal or accelerator is released)
- With the cruise control or adaptive cruise control stalk

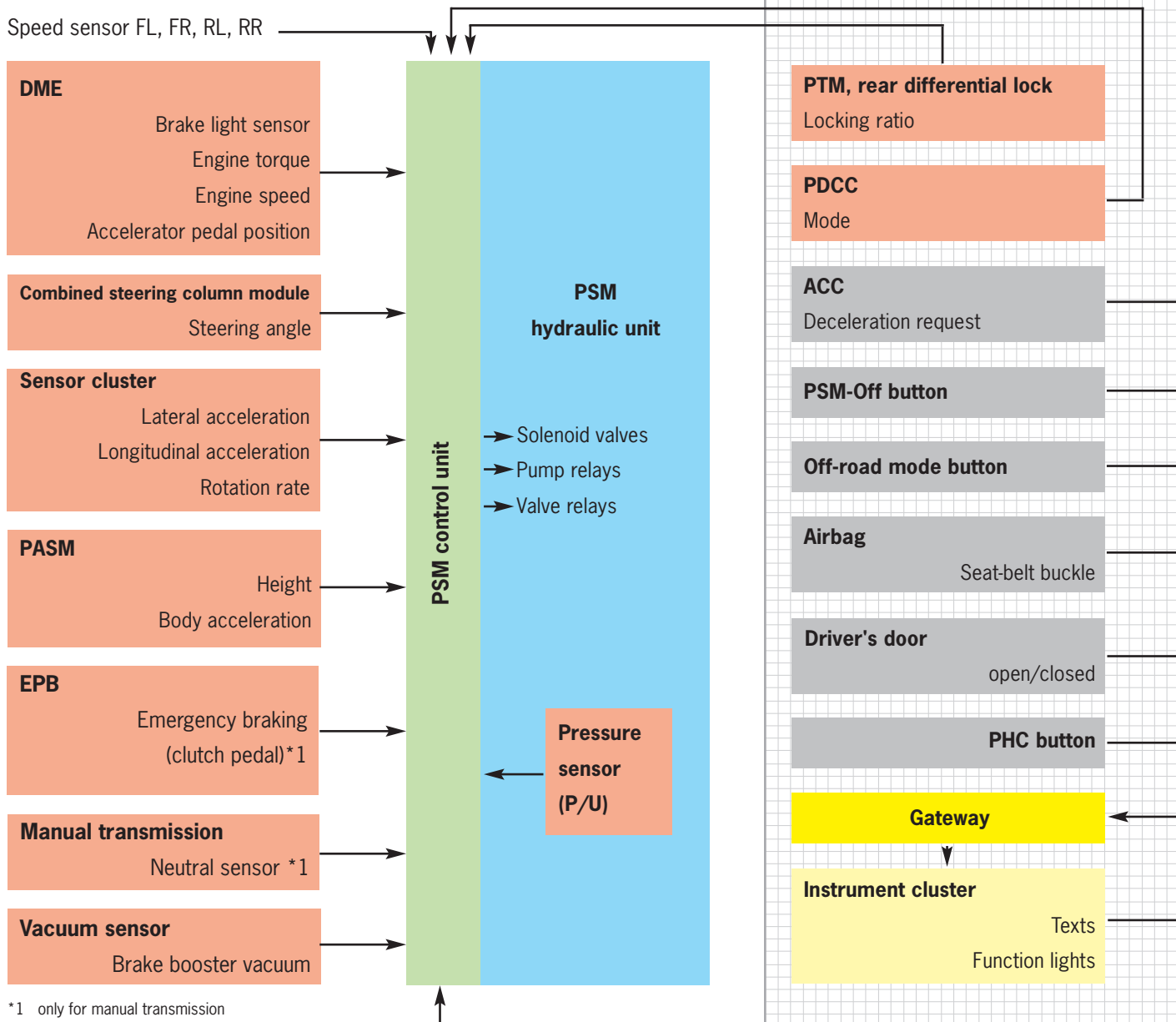
PSM hydraulic unit

The hydraulic unit is installed on the right of the engine compartment for noise reasons. The dual-circuit brake system is divided up between the front and rear axles (black/white distribution). There are no longer any markings on the hydraulic connections. The connections have different thread diameters in order to prevent the lines from being mixed up.



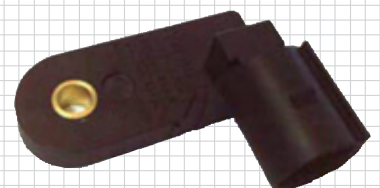
- HCU Hydraulic unit
- ECU Control unit
- P/U Pressure sensor
- VL Front left
- VR Front right
- HL Rear left
- HR Rear right

PSM control unit



Brake light sensor

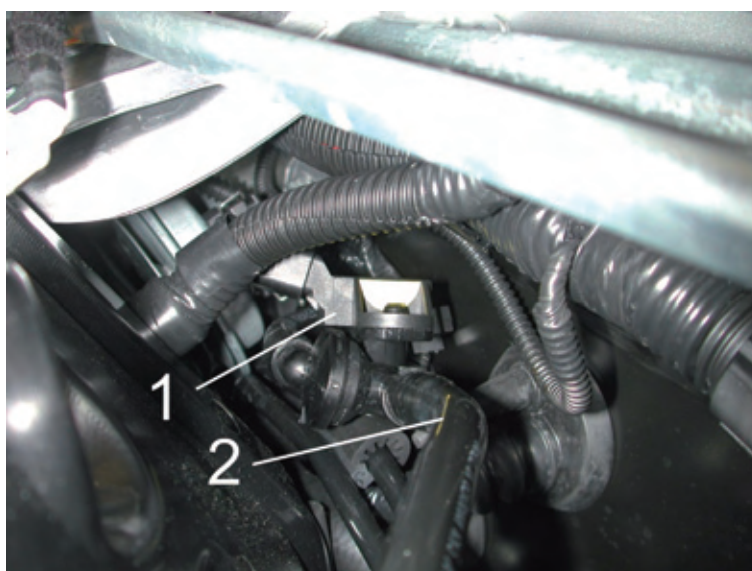
Instead of a conventional brake light switch, a brake light sensor transmits the position of the brake pedal. The brake light sensor has a Hall sensor and is mounted directly on the brake master cylinder. The brake piston contains a permanent magnet, which generates a certain field strength depending on its position. This is evaluated by the Hall sensor.



- 1 Vacuum sensor
- 2 Vacuum line from brake booster

Vacuum sensor

A vacuum sensor is installed in the vacuum line between the vacuum pump and brake booster. The Start Stop function is deactivated if the vacuum in the brake booster is insufficient. The engine is switched off if the requirements for the Start Stop function are met by the vacuum present in the brake booster. The engine is started again if the driver then moves the brake pedal.



Interaction with other chassis control systems

Depending on which other chassis control systems are available, e.g. EPB, PDCC, PASM and air suspension, PSM uses the sensor information provided by these chassis systems to optimally match PSM control in all sub-functions with the behavior of the other control systems. For example, the “clutch pedal position” signal sent by the EPB control unit is used for the Drive-Off Assistant. In addition, the self-steering properties of the vehicle are determined based on PDCC activity and the PSM intervention thresholds are optimally adapted to suit these properties. PASM supplies information about road contact forces and any uneven road surfaces. This information is read in by PSM and is used for optimal, situation-based fine-tuning of the ABS system in order to optimize the braking distance in emergency braking situations, even with different road conditions.



