

Vertical dynamics platform

Vertical dynamic platform (VDP)

The vertical dynamic platform (VDP) is the central control unit for the driving dynamics system. The driving dynamics systems may be packetized very differently (depending on the equipment).



Note!

On vehicles with Electronic Height Control (EHC), the two-axle ride level control, including the air supply system, is part of the EHC control unit. The ride height sensors are also connected in this case to the VDP control unit.

The two-axle ride level control is only offered in combination with the Electronic Damper Control.

The following advantages arise from the combination of both systems.

- The two-axle ride level control automatically keeps the height of the vehicle body at a specified level under all load conditions.
- The two-axle ride level control keeps the vehicle at the specified setpoint value even with a high payload. This means that the driving safety and the driving dynamics are increased for every surface.
- The two-axle ride level control adjusts the physical vibration characteristics to the vehicle weight.

- The Electronic Damper Control improves the suitability for long-distance driving and increases the body stability and the agility.
- The Electronic Damper Control improves the driving safety by minimising the wheel load fluctuations and shortening the stopping distance

Brief component description

The following components for the vertical dynamic platform (VDP) are described:

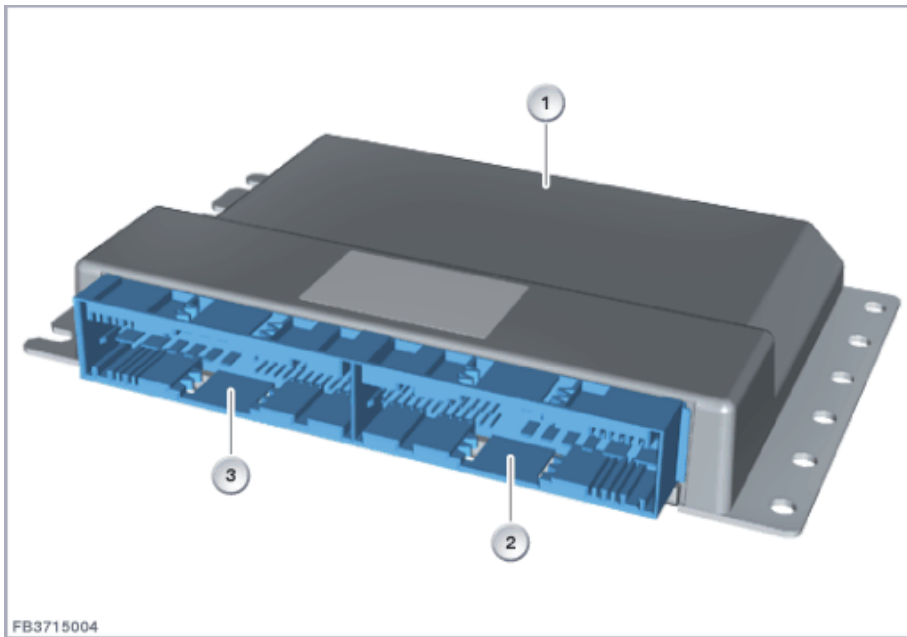
Control unit, vertical dynamic platform (VDP)

The VDP control unit regulates Electronic Damper Control. Additionally, the logic for the electrical Dynamic Drive is integrated in the VDP control unit. For this reason, the four vertical acceleration sensors are also connected to the vertical dynamic platform control unit.

There are three versions of the VDP control unit: High version, mid variant, basic version. The high version is described below.

The VDP control unit is connected to the FlexRay. Two 51-pin plug connections serve as the interface to the wiring harness.

The rear right power distribution box supplies the VDP control unit with terminal 30. The Body Domain Controller (BDC) supplies terminal 30F.



Index	Explanation	Index	Explanation
1	Control unit, vertical dynamic platform (VDP)	2	51-pin plug connection
3	51-pin plug connection		

Electronic Damper Control

The Electronic Damper Control is a variable, electronically regulated system to adjust the shock absorber setting.

Here, the vertical dynamic is adjusted using 2 valve coils per damper. One valve coil operates the compression stage; the other valve coil operates the rebound. The Electronic Damper Control improves the tyre comfort of the vehicle whilst simultaneously increasing the driving dynamics.

The VDP control unit controls the individual valve coils.



Note!

With some derivatives only 1 valve coil is installed. In this case rebound and compression cannot be controlled separately from each other.

The following input variables are evaluated for the Electronic Damper Control.

- Acceleration of the body via the ride height sensors (bus signal from the Vertical Dynamic Platform VDP)
- Current lateral acceleration and longitudinal acceleration (bus signal from the crash safety module ACSM)
- Driving speed (bus signal from the Dynamic Stability Control DSC)
- Steering angle (bus signal from the Electronic Power Steering EPS)
- Road contour using the optional KAFAS camera (optional equipment)

In this way, a request-based damping force can always be adjusted over a broad range.



Note!

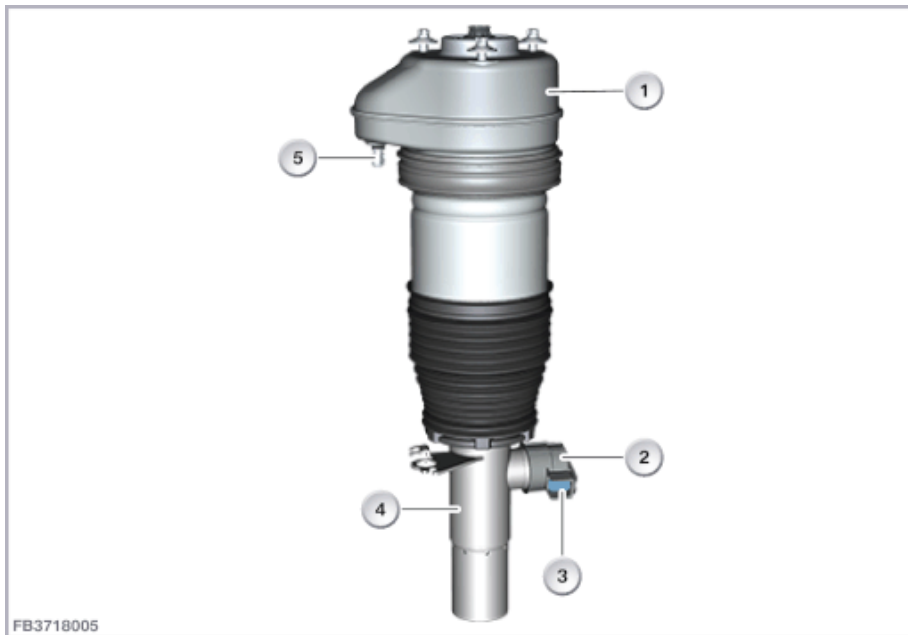
When de-energised, the valve coils remain in the soft setting!

Using the driving experience switch, the adjustment of the Electronic Damper Control can be changed by the customer to be either more sporty or more comfortable.



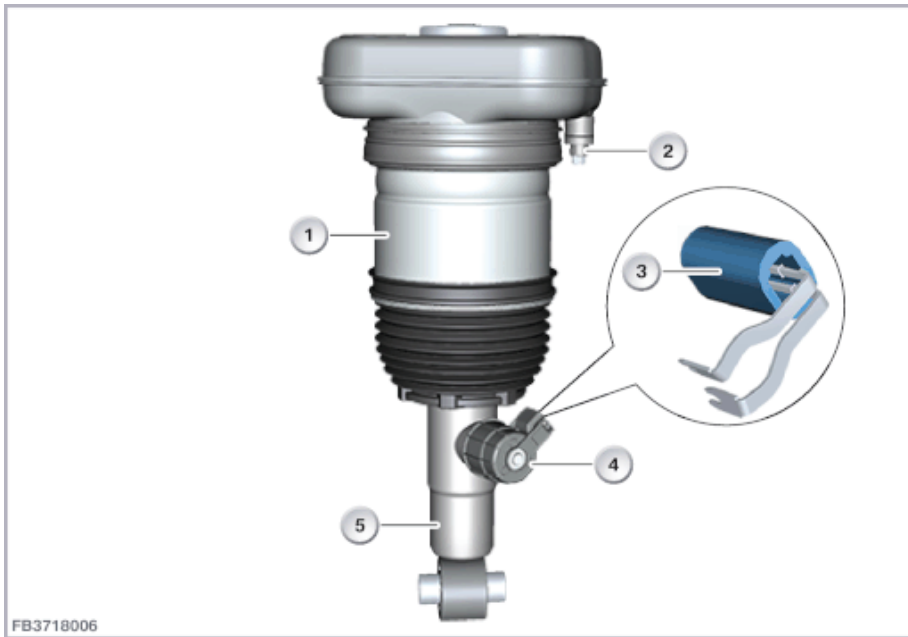
Note!

Support from the optional stereo camera is active up to a speed of 120 km/h. Refer to notes on the system limits in the Owner's Handbook.



Air suspension strut, front axle, with one valve coil

Index	Explanation	Index	Explanation
1	Air spring	2	Valve coil for the rebound stage
3	two-pin plug connection	4	Spring strut shock absorber
5	Compressed air line connection		



Air suspension strut, rear axle, with one valve coil

Index	Explanation	Index	Explanation
1	Air spring	2	Compressed air line connection
3	two-pin plug connection	4	Valve coil for rebound stage
5	Spring strut shock absorber		

Compression stage

The wheel moves upwards (compression) and compresses the shock absorber telescopically. The compression stage dampens the air suspension strut in the process.

Rebound stage

The wheel moves downwards (rebound) and pulls the shock absorber apart telescopically. The rebound stage dampens the air suspension strut in the process.

Ride height sensor

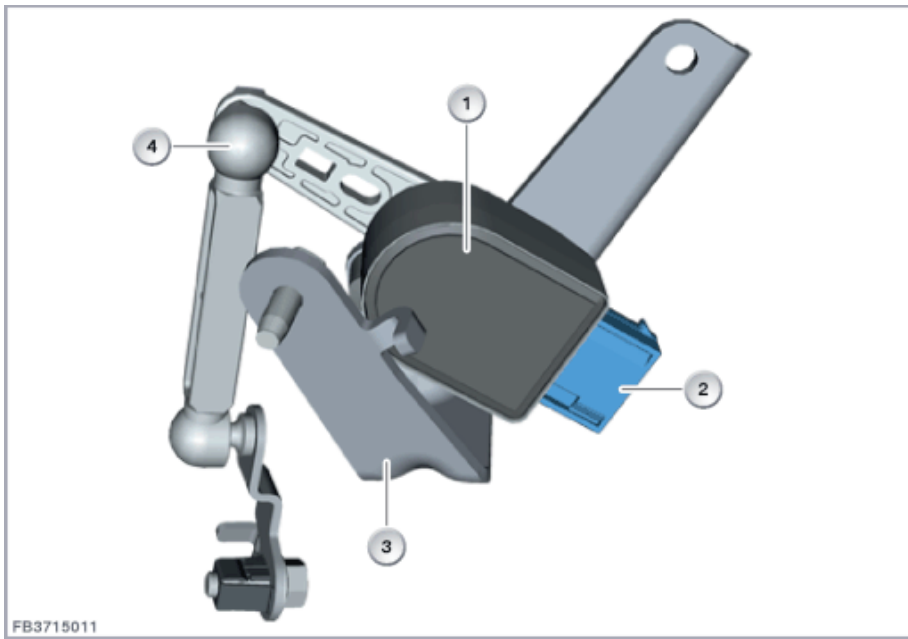
The ride height sensor is a non-contact sensor. The ride height sensor proportionally converts distances into an analogue voltage signal using an angle of rotation. The sensor can be rotated by 360°.

The ride height sensor with sawtooth characteristic curve is characterised by a wide application range and a nearly independent installation position.

The signals are output as analogue electrical voltages.

For vehicles with the VDP control unit: Up to 4 ride height sensors are connected to the VDP control unit.

For vehicles without the VDP control unit: Up to 2 ride height sensors are connected to the BDC control unit.

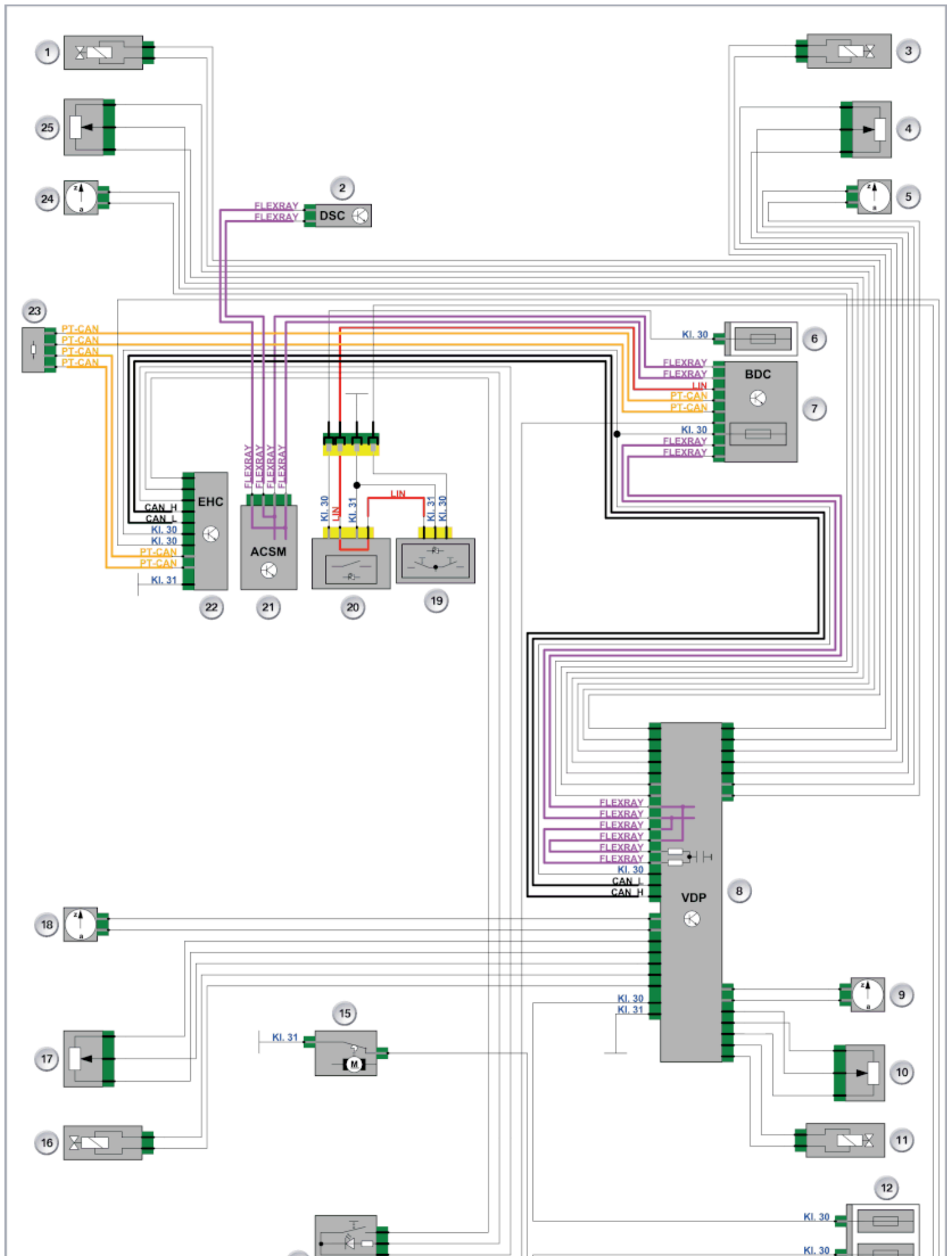


Example, ride height sensor

Index	Explanation	Index	Explanation
1	Ride height sensor	2	six-pin plug connection
3	Holder	4	Coupling bar

Functional networking

For implementation of the vertical dynamic platform (VDP), a complex system network with distributed functions in further control units is necessary.





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Index	Explanation	Index	Explanation
1	Valve coil of air suspension strut, front left	2	Dynamic stability control (DSC)
3	Valve coil of air suspension strut, front right	4	Ride height sensor, front right
5	Front right vertical acceleration sensor (only for electric active roll stabilisation)	6	Front right power distribution box
7	Body Domain Controller (BDC)	8	Vertical dynamic platform (VDP)
9	Rear right vertical acceleration sensor (only for electric active roll stabilisation)	10	Ride height sensor, rear right
11	Valve coil of air suspension strut, rear right	12	Power distribution box, right rear
13	Fuse box	14	Tailgate button for lower tailgate
15	Tailgate lock	16	Valve coil of air suspension strut, rear left
17	Rear left ride height sensor	18	Rear left vertical acceleration sensor (only for electric active roll stabilisation)
19	Self-levelling suspension button	20	Centre console control panel
21	Crash Safety Module (ACSM)	22	Air supply system with EHC control unit
23	CAN terminator	24	Front left vertical acceleration sensor (only for electric active roll stabilisation)
25	Front left ride height sensor		

Notes for Service department

Diagnosis instructions



Note!

There are several service functions for the vertical dynamic platform (VDP) and electronic ride height control in the diagnosis.

The following service functions are available:

- Pressure sensor
Function check of the pressure sensor.
- Pressure accumulator
Filling and draining of the pressure accumulator.
- Vehicle level

The following levels can be set: low, normal, high.

- Ride height adjustment

Start-up of the ride height sensors.

- Ride height sensors

Function check of the ride height sensors.

- Compressor cycle

Function check of the compressor.

- Air spring

Filling and draining of the individual air suspension struts.

- Status values

Output of all system-related status values such as pressures and ride height.

- Delete transport mode

Reset the transport mode.

- Vertical-acceleration sensors

Function check of the vertical acceleration sensors.

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