Technical training.
Product information.

G01 Chassis and Suspension

Edited for the U.S. market by:
BMW Group University
Technical Training
ST1701 9/1/2017

BMW Service

General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:

Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status and national-market versions

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

This document basically relates to the European version of left hand drive vehicles. Some operating elements or components are arranged differently in right-hand drive vehicles than shown in the graphics in this document. Further differences may arise as the result of the equipment specification in specific markets or countries.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application.

Contact: conceptinfo@bmw.de

The information contained in this document forms an integral part of the BMW Group Technical Qualification and is intended for the trainer and participants in the seminar. Refer to the latest relevant information systems of the BMW Group for any changes/additions to the technical data.

Information status: **June 2017**
Technical training.

G01 Chassis and Suspension

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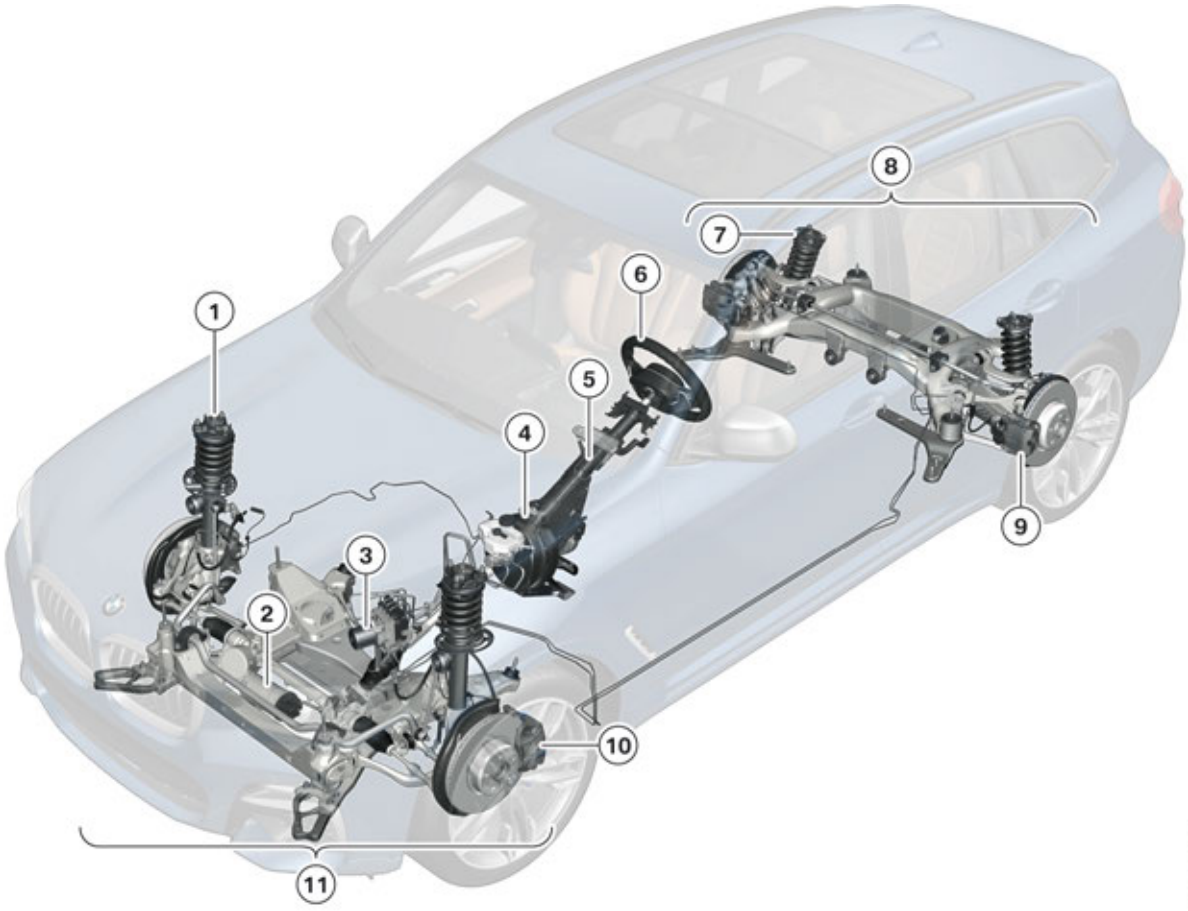
G01 Chassis and Suspension

1. Introduction

The development code for the new 3rd generation BMW X3 is G01. It will be available with the xDrive all-wheel drive for the market launch in November 2017.



G01 Overview of chassis and suspension

Index	Explanation
1	Front axle spring strut
2	Electronic Power Steering (electromechanical power steering) (EPS)
3	Dynamic Stability Control (DSC)
4	Brake servo
5	Steering column
6	Steering wheel
7	Rear axle spring strut
8	Five-link rear suspension
9	Disc brake with electric parking brake on the rear axle
10	Disc brake for front axle
11	Twin-arm McPherson strut front suspension

G01 Chassis and Suspension

1. Introduction

Compared with the predecessor model F25, the G01 is much sportier, while still offering the same level of comfort.

The following optional equipment is available in addition to the basic chassis and suspension:

- Dynamic Damper Control (EDC) (OE 223)
  (only for X3 xDrive 30i)
- Adaptive M sports suspension (OE 2VF)
  (only for X3 M40i Performance models)
- M sports suspension (OE 704)
  (standard on the X3 M40i, not avaiable on the X3 xDrive 30i)

1.1. Overview of system descriptions

Many of the systems used are already known from the current BMW 7 Series G12. The “Comparison of G12 with G01” chapter lists the common elements and the differences.

The explanations of the systems already familiar from the G12 are kept brief. Comprehensive system descriptions can be found in the product information listed below.

Topic	Product information
Service brakes	ST1501 G12 Chassis and Suspension
Parking brake	ST1501 G12 Chassis and Suspension
Run Flat Indicator (RPA)	ST1501 G12 Chassis and Suspension
Tire Pressure Monitor (RDC)	ST1501 G12 Chassis and Suspension/ Tire Pressure Monitor (RDC)
Dynamic Stability Control (DSC)	ST1501 G12 Chassis and Suspension
Steering	ST1501 G12 Chassis and Suspension
Electronic Damper Control (EDC)	ST1501 G12 Chassis and Suspension
Conventional anti-roll bar	ST1501 G12 Chassis and Suspension

1.2. Chassis and suspension comparison

Some of the systems used in the G01 have already been introduced in the G12. The following tables provide an overview of the differences and common features of the G01, its predecessor, the F25, and the G12:

G01 Chassis and Suspension

1. Introduction

Suspension systems	F25	G12	G01
Twin-arm McPherson strut front suspension	•		•
Double-wishbone front axle		•	
Five-link rear suspension	•	•	•
Wheel hub diameter: 72.5 mm (hole pattern 5 x 120 mm)	•		
Wheel hub diameter: 66.5 mm (hole pattern 5 x 112 mm)		•	•

Suspension/dampers	F25	G12	G01
Steel springs	•		•
Air spring		•	
Conventional shock absorbers	•		•
Electronic Damper Control (EDC)	•	•	•
Conventional anti-roll bar	•	•	•
Electric active stabilizer (EARSV)		•	

Brakes	F25	G12	G01
Rear: Combined brake caliper (electric parking brake)	•	•	•
Parking brake control with separate control unit (electromechanical parking brake)	•		
Parking brake control integrated in the DSC control unit		•	•

Tires	F25	G12	G01
Brake pad wear sensor, one-stage	•	•	•
RPA Run Flat Indicator (indirect)	•		
RDCi Tire pressure control (Schrader)		•	•
Tire pressure label on B pillar	•	•	•
Tire pressure label electronic in CID			•

Steering	F25	G12	G01
Electronic Power Steering (EPS)	•	•	•
Reduction gear (“dual pinion”)			•
Variable sport steering	•		•
Integral Active Steering (with variable rack geometry)		•	
Rear axle slip angle control (HSR)		•[1]	

[1] Available only in combination with the optional equipment Integral Active Steering.

G01 Chassis and Suspension

1. Introduction

1.3. BMW M Performance Automobiles

BMW X3 M40i

The M Performance model BMW X3 M40i will already be available on the market at the model launch of the G01. The BMW X3 M40i is available exclusively with the intelligent all-wheel drive BMW xDrive.

1.3.1. Standard equipment

The equipment specification of the BMW X3 M40i includes the following chassis- and suspension-specific equipment:

- 20'' M Double Spoke Wheels style 699M Bi-color with mixed performance run-flat tires.
  - Front: wheel rim 8 J x 20, tires 245/45 R 20
  - Rear: wheel rim 9.5 J x 20, tires 275/44 R 20
- M sports suspension
- Variable sport steering
- Performance Control
- M sport brake
- M leather steering wheel

1.3.2. Optinal equipment

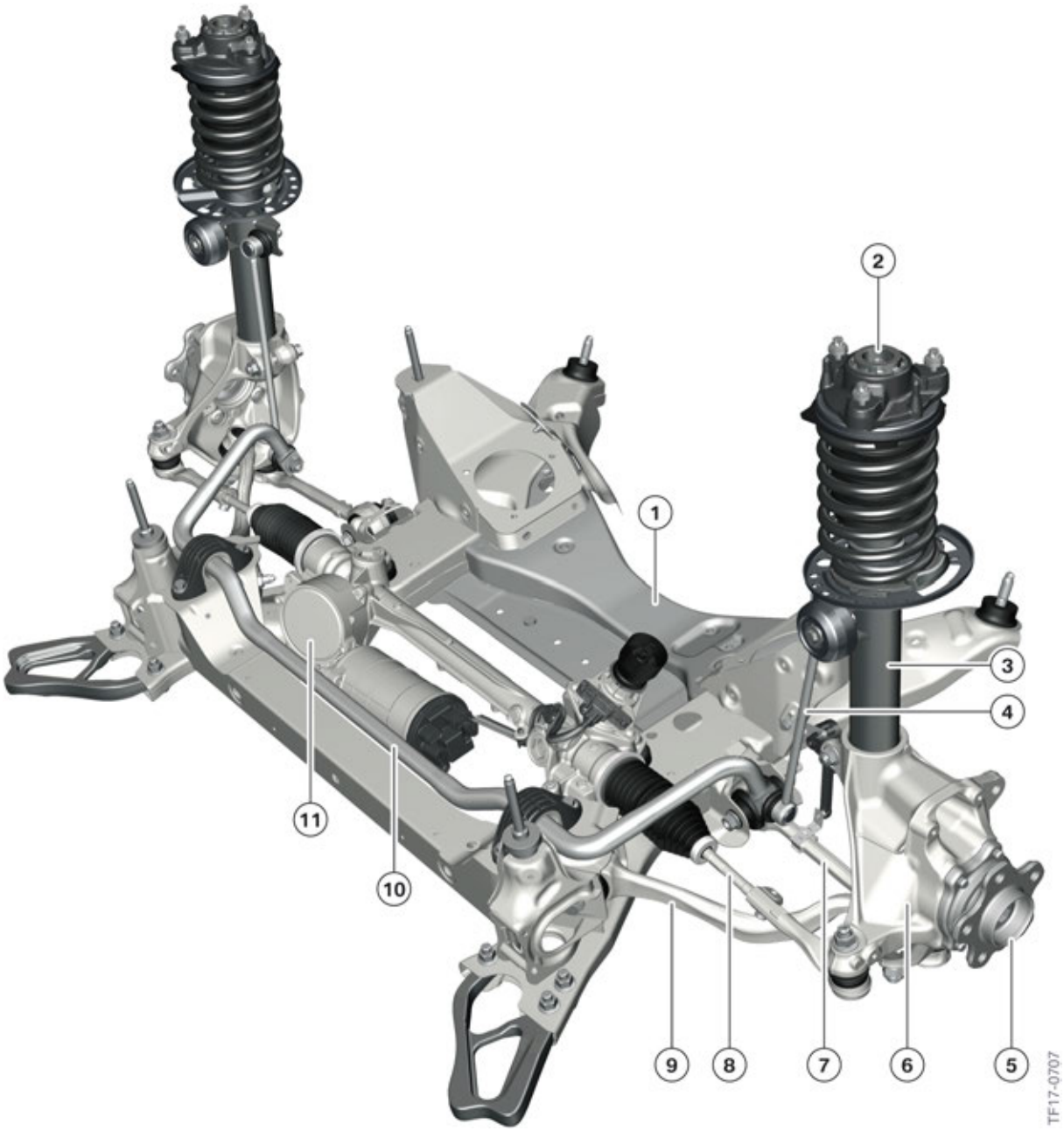
The following chassis- and suspension-specific optional equipment is available specifically for the BMW X3 M40i:

- 21'' M Double Spoke Wheels style 718M Cerium Gray with mixed performance run-flat tires. (OE 22Z)[1]
  - Front: wheel rim 8.5 J x 21, tires 245/40 R 21
  - Rear: wheel rim 9.5 J x 21, tires 275/35 R 21
- M sports suspension (OE 2VF).

G01 Chassis and Suspension

2. Axles

2.1. Front axle



G01 Twin-arm McPherson strut front suspension

Index	Explanation
1	Front axle support
2	Support bearing
3	Spring strut
4	Anti-roll bar link

G01 Chassis and Suspension

2. Axles

Index	Explanation
5	Wheel bearing unit
6	Swivel bearing
7	Wishbone
8	Track rod
9	Trailing link
10	Anti-roll bar
11	Steering gear of EPS

The two-joint spring strut front axle in the G01 offers the following advantages:

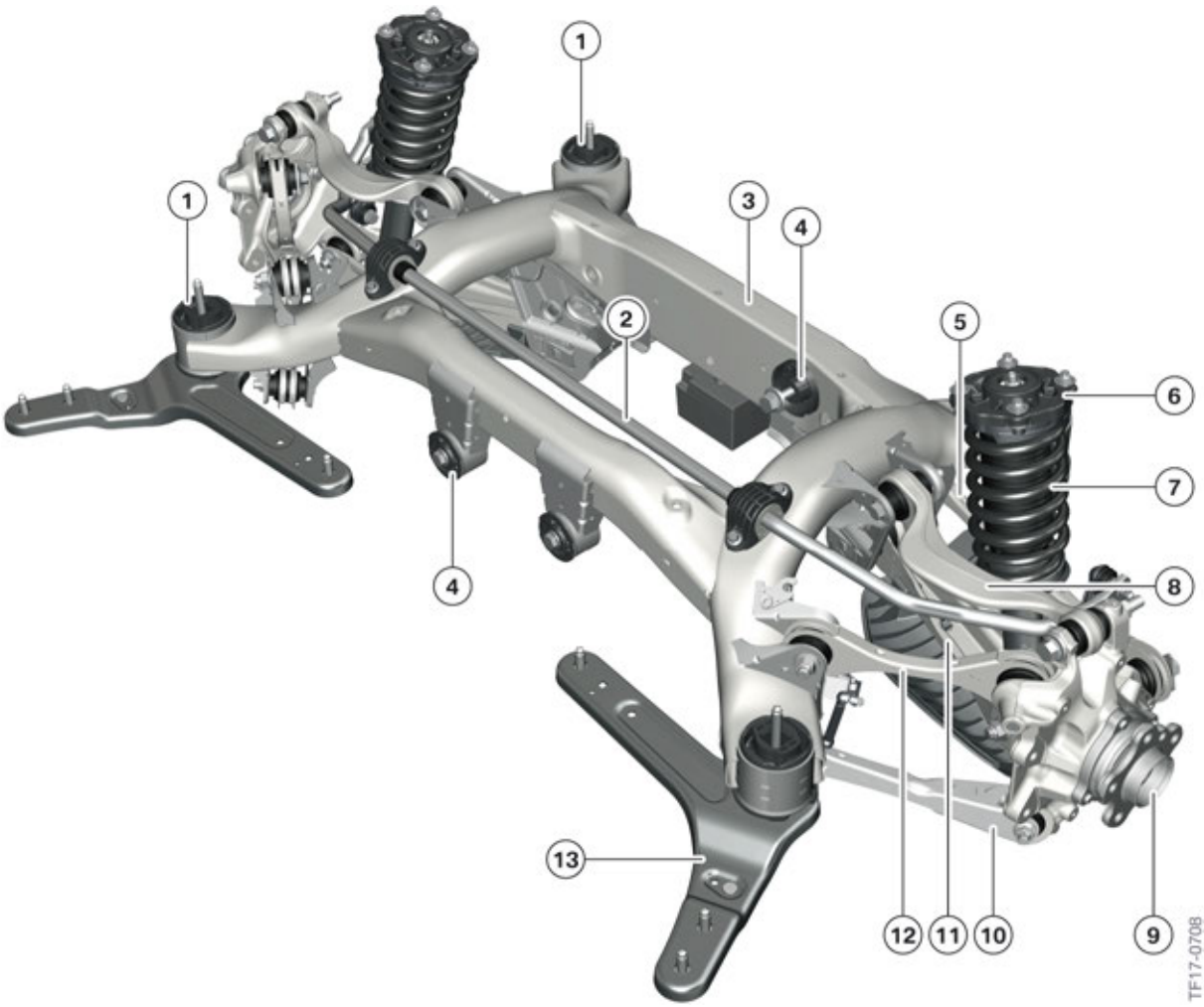
- Optimum combination of driving dynamics and driving comfort.
- Very low unsprung masses due to the use of aluminium swivel bearings and integration of the wheel guide joints in the tension struts.
- Very high rigidity due to the joint support function of the steering gear housing.

The Dynamic Damper Control is available as optional equipment in addition to the conventional dampers.

G01 Chassis and Suspension

2. Axles

2.2. Rear axle



G01 Five-link rear axle

Index	Explanation
1	Rubber mount (rear axle support to body)
2	Anti-roll bar
3	Rear axle support
4	Rubber mount (rear axle support to rear axle differential)
5	Camber link
6	Support bearing
7	Spring strut
8	Wishbone
9	Wheel bearing unit

G01 Chassis and Suspension

2. Axles

Index	Explanation
10	Camber control arm
11	Wishbone
12	Control arm
13	Compression strut

The five-link rear axle is characterized by precise wheel guidance with outstanding driving dynamics. This is particularly noticeable with respect to the following characteristics:

- Directional stability, target precision
- Load transfer characteristics
- Self-steering response
- Lane changing stability
- Transient handling characteristics (cornering/straight-ahead driving).

It has been possible to substantially reduce the conflict between the goals of driving dynamics and comfort by implementing the following measures:

- Double-elastic mounting
  Rubber mount between rear axle support and rear axle differential/body
- Preload-reduced rear axle mounts
  Lower torsion stress on the rear axle bearings thanks to spring struts positioned wide to the outside
- Large support area for the rear axle support
- Low unsprung mass thanks to innovative sheet steel wishbone technology in conjunction with aluminium forged wishbones and aluminium-wheel carriers.

The large support for the rear axle support and the preload-reduced axle construction are of great significance for the outstanding driving dynamics on the one hand and for acoustic decoupling on the other hand. This makes it possible to fit powerful, high-torque engines and to reduce the introduction of road noise into the vehicle.

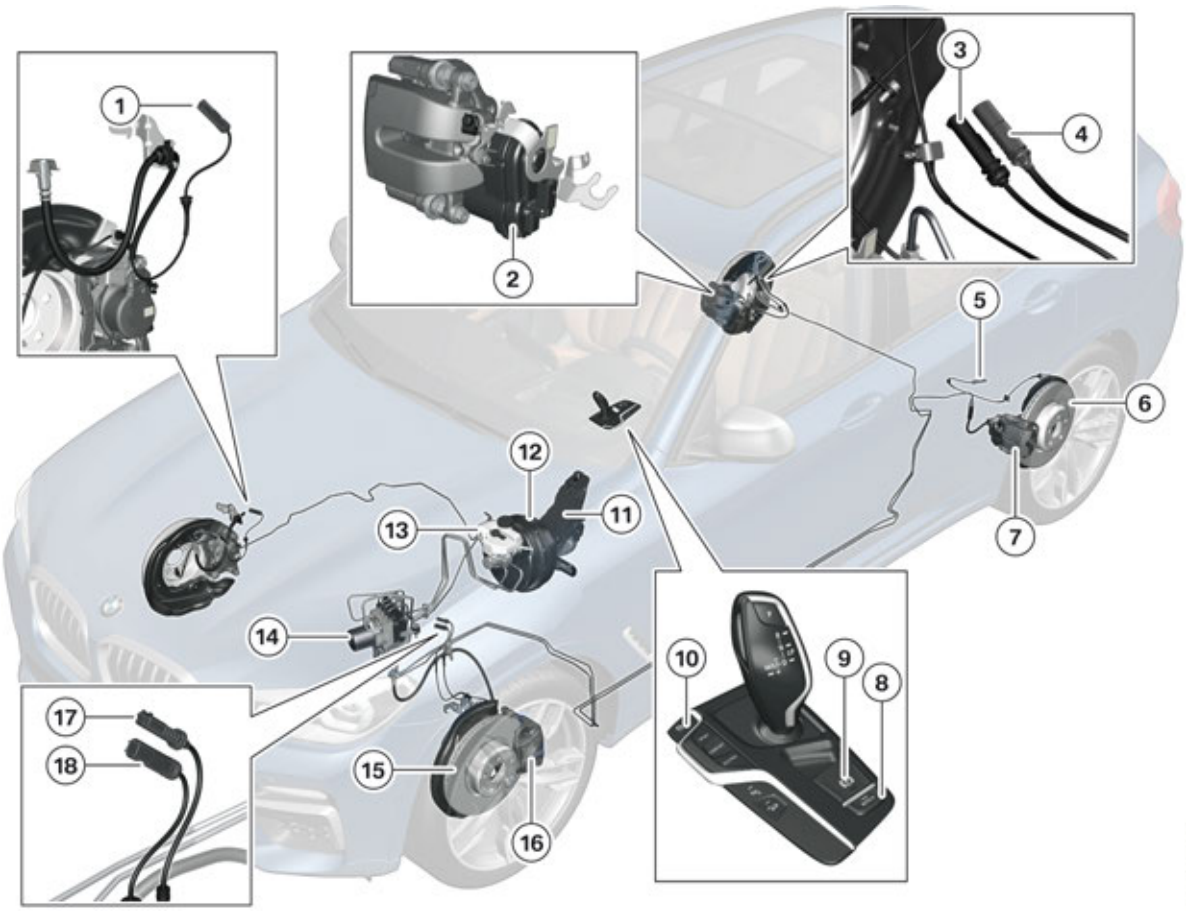
It has been possible to produce the various wishbones, with the exception of the upper wishbone, in a sheet steel design. Sheet steel wishbones offer similar weight advantages to aluminium forged wishbones, but are cheaper to produce. They are always used when a simple mounting geometry is involved (straight wishbones). The top wishbone has been manufactured as an aluminium forged wishbone because of its more complex design.

Replacement of the rubber mounts on sheet steel wishbones as a service operation is not permitted. The entire wishbone must be replaced in the event of wear to a rubber mount.

G01 Chassis and Suspension

3. Brakes

3.1. Overview



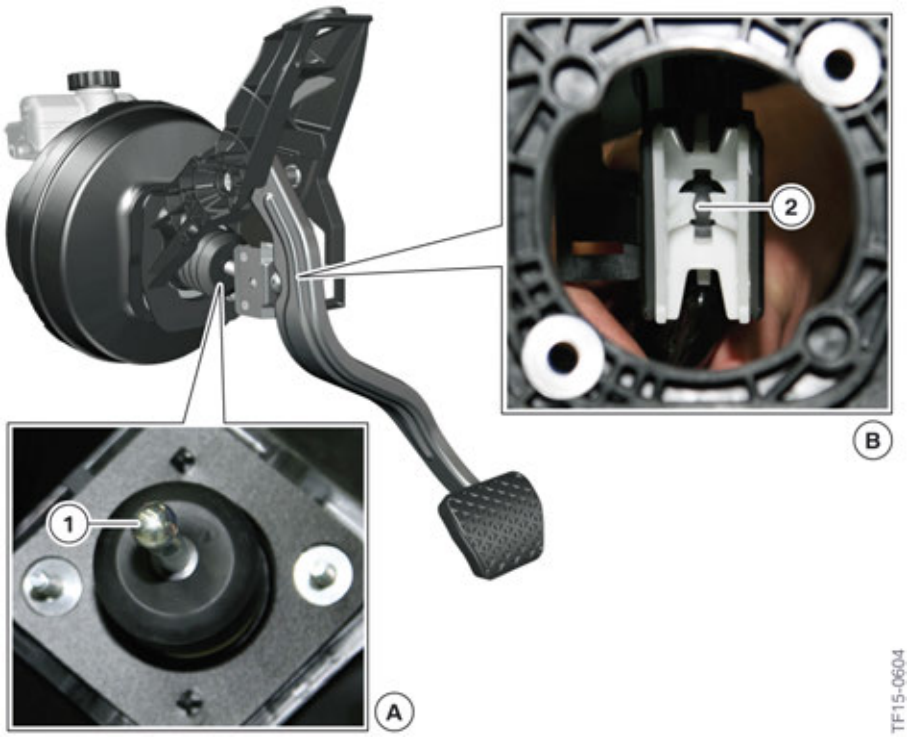
G01 Overview of brake system

Index	Explanation
1	Wheel speed sensor connector, front right
2	Electric parking brake actuator
3	Wheel speed sensor connector, rear right
4	Connector for brake pad wear sensor, rear right
5	Wheel speed sensor connector, rear left
6	Brake disc, rear
7	Brake caliper, rear
8	Automatic-hold button
9	Button for electric parking brake
10	DSC button
11	Pedal mechanism
12	Brake servo

Index	Explanation
13	Expansion tank
14	DSC unit
15	Brake disc, front left
16	Brake caliper, front left
17	Brake pad wear sensor connector, front left
18	Wheel speed sensor connector, front left

3.2. Pedal mechanism mounting

It has been possible to take the pedal mechanism mounting using ball head and plastic clip from the G12.



G01 Mounting of the pedal mechanism on the brake servo linkage

Index	Explanation
A	Brake servo linkage
B	Pedal mechanism
1	Ball head
2	Plastic clamp

A special tool is needed to undo the connection (part number: 83 30 2 409 646).

Special tool for removing the pedal mechanism

3.3. Overview of the brake calipers

Different brake calipers are used depending on the engine installed and equipment specification. The following tables provide an overview of the various brake calipers for the front axle:

3.3.1. Front axle

Supplier	Brake disc [mm]	Figure	Design/brake pad
TRW	330 x 24		• Floating caliper Single-piston • Aluminium • Greased pad backplate

For consistently lightweight construction, all front brake calipers are made from aluminium.

3.3.2. Rear axle

Supplier	Brake disc [mm]	Figure	Features/brake pad
TRW	330 x 20		• Floating caliper Single-piston • Aluminium • Electric parking brake actuator • Greased pad backplate

The rear brake calipers have an actuator for applying the parking brake.

No bonded brake pads are used on the rear axle.

G01 Chassis and Suspension

3. Brakes

3.3.3. Sport brake

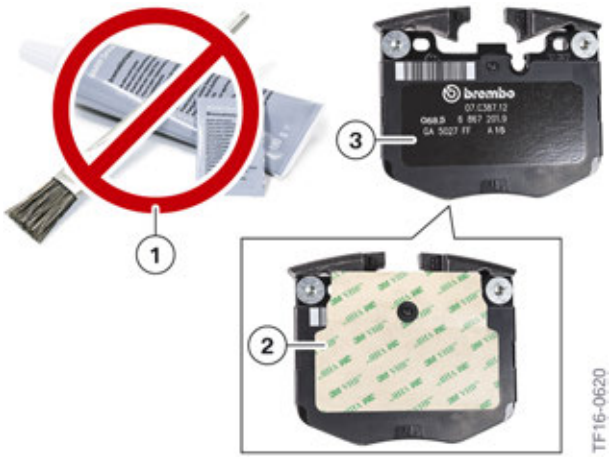
A M Sport Brake is fitted to the G01 as optional equipment on the X3 xDrive 30i. It is standard equipment for the X3 M40i.

Supplier	Brake disc [mm]	Figure	Design/brake pad
Brembo	348 x 36	 TF16-1259	• Fixed caliper 2-part 4-piston • Aluminium • Bonded pad backplate
TRW	345 x 24	 TF16-1260	• Floating caliper Single-piston • Grey cast iron • Electric parking brake actuator • Greased pad backplate

3.4. Bonded brake pads

Bonded brake pads are used in some cases on the front wheel brakes. It has been possible to enhance comfort, as the bonded brake pads are substantially less intrusive with regard to interference noise.

Vibrations which may arise from movement between the brake pad backing plate and brake piston are prevented thanks to the rigid connection of the brake pad to the brake piston.



G01 Bonded brake pad on the front axle

Index	Explanation
1	Brake pad paste
2	Adhesive film
3	Pad backplate

The bonded connection between the brake piston and brake pad backing plate must not be broken with a hammer or screwdriver, but only with a plastic wedge, so as not to damage the brake caliper.

The surface of the brake piston connected to the bonded brake pad backing plate must be cleaned thoroughly before new bonded brake pads are flitted.

The guides on the side must still be greased to ensure ease of movement of the brake pad in the brake caliper slot.

The bonding surface must never be greased with the brake pad paste.

After installing the bonded brake pads, the brake pedal must be operated for approximately 1 minute. This ensures that a reliable bonded connection is achieved between the brake piston and brake pad backing plate.

The brake pads must be completely renewed if the bonded connection does not hold. Reuse is not permitted.

Refer to the latest valid repair instructions for the exact procedure for working on the brake system.

3.5. Parking brake

The parking brake is realized by means of a combined brake caliper on the rear axle, as on the G12/ G30.

The parking brake on the F25 was actuated by a separate EMF control unit. This function has been integrated into the DSC control unit on the G01.

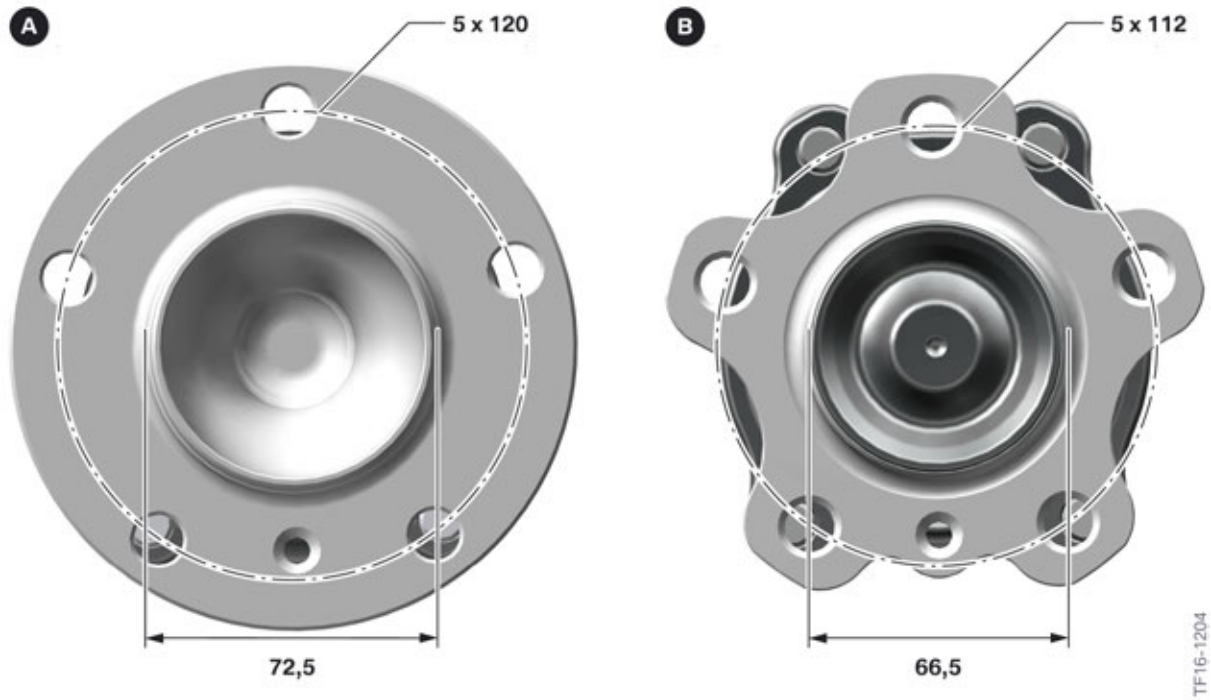
The parking brake has a roller mode in order to permit determination of the brake forces on a brake test stand. This mode is detected automatically on the basis of a plausibility check (wheel speed comparison).

G01 Chassis and Suspension

4. Wheels / Tires

4.1. Wheel hub

Current vehicles of the BMW Group produced since March 2014 have a modified hub and hole circle diameter. The hub diameter was reduced from 72.5 mm (F01/F10/F25) to 66.5 mm (G01/G12/G30). The hole pattern was modified from 5 x 120 mm (F01/F10/F25) to 5 x 112 mm (G01/G12/G30).



G01 Comparison of wheel hub on with that on F25

Index	Explanation
A	F25
B	G01

4.2. Tire pressure control

The G01 is equipped with the already familiar RDCi system. The following immobilization periods are required to teach-in new wheel electronics:

Vehicle condition	5 minutes	17 minutes
Parking	•	
Residing	•	
PAD (testing-analysis-diagnosis)	•	
Steady driving		•

G01 Chassis and Suspension

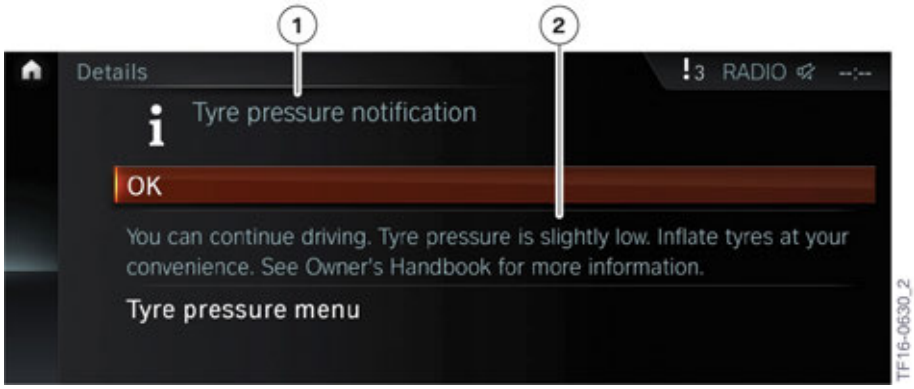
4. Wheels / Tires

4.2.1. Warnings

The warning system for the RDCi tire pressure control has been continually developed and modified to meet customer needs during the various development stages. The warning system provides information promptly in the event of pressure deviations and thus makes an important contribution to avoiding vehicle breakdowns as a result of insufficient tire pressures.

At present it is possible to distinguish between three warning levels.

Warning level 1

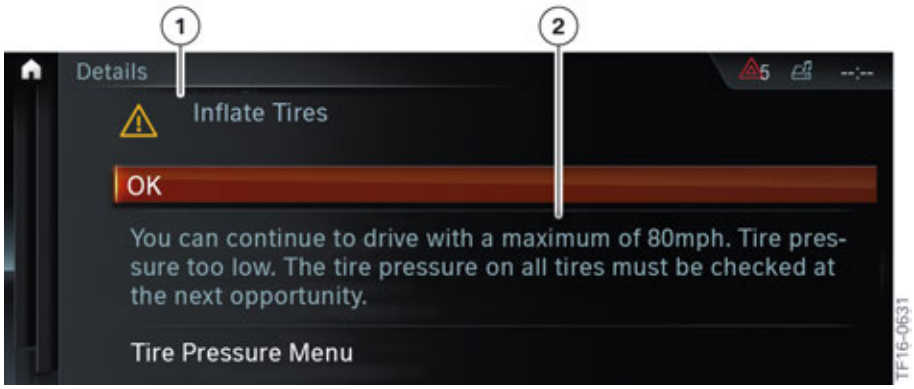


Check Control message with warning level 1

Index	Explanation
1	Tire pressure information
2	Tire pressure slightly below the setpoint value, continued driving permissible

Warning level 1 is a message to the customer that the tire pressure has dropped as a result of natural diffusion (tire pressure loss). There are no technical problems and it is possible to drive on without concern. For this reason, the KOMBI instrument cluster is showing an information symbol only.

Warning level 2



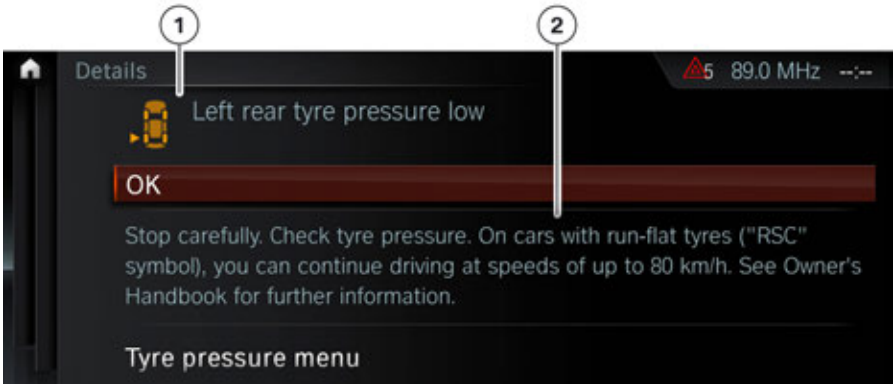
Check Control message with warning level 2

Index	Explanation
1	Inflate tires
2	Tire pressure too low, continued driving at a maximum speed of 130 km/h (80 mph) permitted

The warning level 2 message is shown when the tire pressure has dropped below the legal threshold and the customer's comfort and safety is impaired. A Check Control message and a yellow warning light are displayed accordingly in the KOMBI instrument cluster. It is, however, possible to drive on at moderate speeds. The tire pressure should, however, be corrected as soon as possible.

Warning level 2	US
21 – 25 % Tire pressure loss (cold pressure)	•

Warning level 3



Check Control message with warning level 3

Index	Explanation
1	Tire pressure loss, rear left
2	Tire pressure loss, stop with care

The yellow warning light is shown if the tire pressure drops suddenly or falls below the threshold of warning level 3 (tire pressure < 1.5 bar). The customer should stop with care and check the tires visually. If possible, the tire pressure should be corrected.

It is possible to drive on at a maximum speed of 80 km/h (50 mph) if you have run-flat tires (RSC).

Warning level 3	Active
Tire pressure less than 1.5 bar / 22 psi	●
Sudden tire pressure loss	●

4.2.2. Notes for Service

All three 3 warnings are an indication of dropped tire pressure. The RDCi system is therefore working correctly and without faults since it performs its task of monitoring the tire pressures. Electrical vehicle diagnosis is not necessary in this case, as no fault memory entry has been stored.

In the case of warning levels 2 and level 3, the tire and tire valve must be additionally checked for tightness and damage.

The manufacturer's information must be observed in the event of any work on the wheels and tires, without fail. Failure to observe these requirements can lead to serious accidents.

4.3. Tire pressures

Optimum adjustment of tire pressure is necessary for the following reasons:

- Best possible driving dynamics
- Maximum utilization of tire service life
- Reduction of the fuel consumption
- Optimum operation of various suspension control systems.

For this, the physical principles should be observed in combination with pressure and temperature. The following rule of thumb applies in this case: A change in the tire air temperature of +/– 10° C (+/– 18° F) corresponds to approximately 0.1 bar (1.4 psi) of tire pressure change.

The tire pressures specified by the manufacturer apply for summer and winter operation, irrespective of the temperature. However, it must be noted that due to the seasonal temperature differences, the tire pressures should be checked frequently.

4.3.1. Cold tire pressure

If the Tire air temperature is the same as the current ambient temperature, this is referred to as cold tire pressure. The tire pressures should only be changed with a cold tire pressure on vehicles without the electronic Tire pressures plate.

4.3.2. Warm tire pressure

During longer journeys at higher driving speeds the tire warms up due to the friction with the road surface and tire creep. The temperature of the tire increases as a result and this is accompanied by an increase in tire pressure.

If there is a significant difference between ambient temperature and tire air temperature this is always referred to as warm tire pressure. Avoid changing the tire pressures when the tire is warm on vehicles without the electronic tire pressures plate.

G01 Chassis and Suspension

4. Wheels / Tires

4.4. Electronic tire pressures plate

4.4.1. Technical functional description

As in the G30, an electronic tire pressure specification is also used in the G01. The adhesive tire pressure label is supplemented here by an additional user menu in the Central Information Display (CID).

Tire pressures are changing constantly depending on tire air temperature. A change in the tire air temperature of +/– 10° C (+/– 18° F) corresponds to approximately 0.1 bar (1.4 psi) of tire pressure change. For this reason, you may see a warning message of insufficient tire pressure if your tires have cooled significantly. In many of these cases, however, there is not technical fault, but insufficient checking of the tire pressures which should be checked at regular intervals.

Unlike the tire pressures plate sticker, the electronic tire pressures plate permanently monitors the nominal pressures taking into consideration the current temperatures. This means that it determines and displays the optimum tire pressure at any temperature.

G01 Electronic tire pressure information

Index	Explanation
A	Electronic tire pressure information in the CID
C	Tire pressures information label on B-pillar

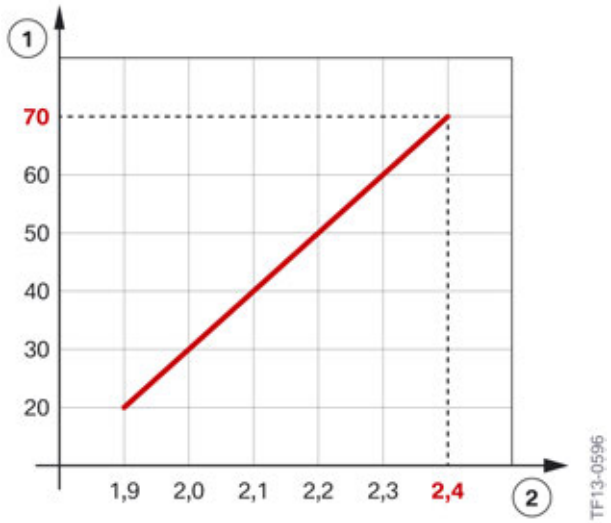
Once you have selected the relevant tire type (summer/winter), the tire size on the rear axle and the max. speed rating, the appropriate tire pressures are output to the CID (nominal pressure). Following the input and before the teach-in drive, these correspond to the tire pressures on the tire pressures label.

The vehicle must then be driven so it can learn the new wheels. Once the teach-in drive has been successfully completed, the current optimum tire pressure taking into consideration the tire air temperatures is always displayed. This can differ from the information on the conventional tire pressures label because it has taken the tire air temperatures into consideration. Correct tire pressures reduce fuel consumption and ensure greater driving safety.

The tire air temperatures are measured by the four wheel electronics units in the various wheels. Since the wheel electronics units do not begin transmitting until driving speed has reached 20 km/h (12 mph), it is not possible to determine this while the vehicle is parked. A substitute value can

be produced using the outside temperature sensor when the vehicle is stationary for wheels that have already been taught-in (see the following section “Measurement of tire air temperatures when stationary”).

When new wheels are fitted, for example during a wheel change in the workshop, the nominal pressure (cold tire pressure) can generally be adopted. When wheels are changed in the winter, however, the great temperature difference between the ambient temperature and the current temperature of the tire (difference between workshop temperature and ambient temperature) must be taken into consideration. Like with the conventional tire pressure label, the tire pressure should be corrected slightly upwards here. A change in the tire air temperature of +/– 10° C corresponds to approximately 0.1 bar tire of pressure change. .

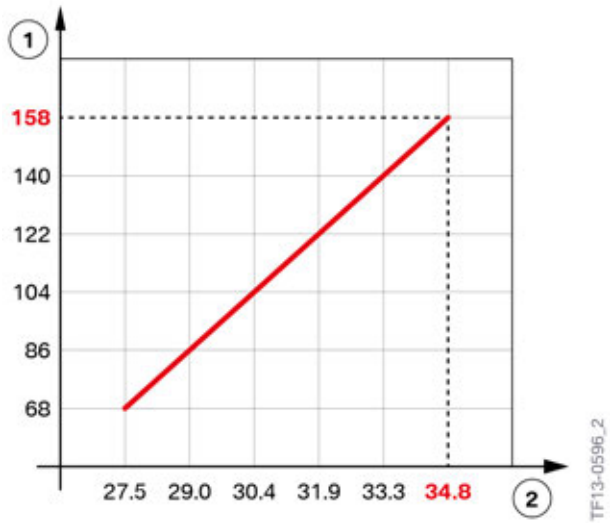


Tire pressure and temperature

Index	Explanation
1	Tire air temperature in °C
2	Pressure in bar

G01 Chassis and Suspension

4. Wheels / Tires



Tire pressure and temperature

Index	Explanation
1	Tire air temperature in °F
2	Pressure in bar

A change in the tire air temperature of +/– 18° F corresponds to approximately 1.4 psi of tire pressure change.

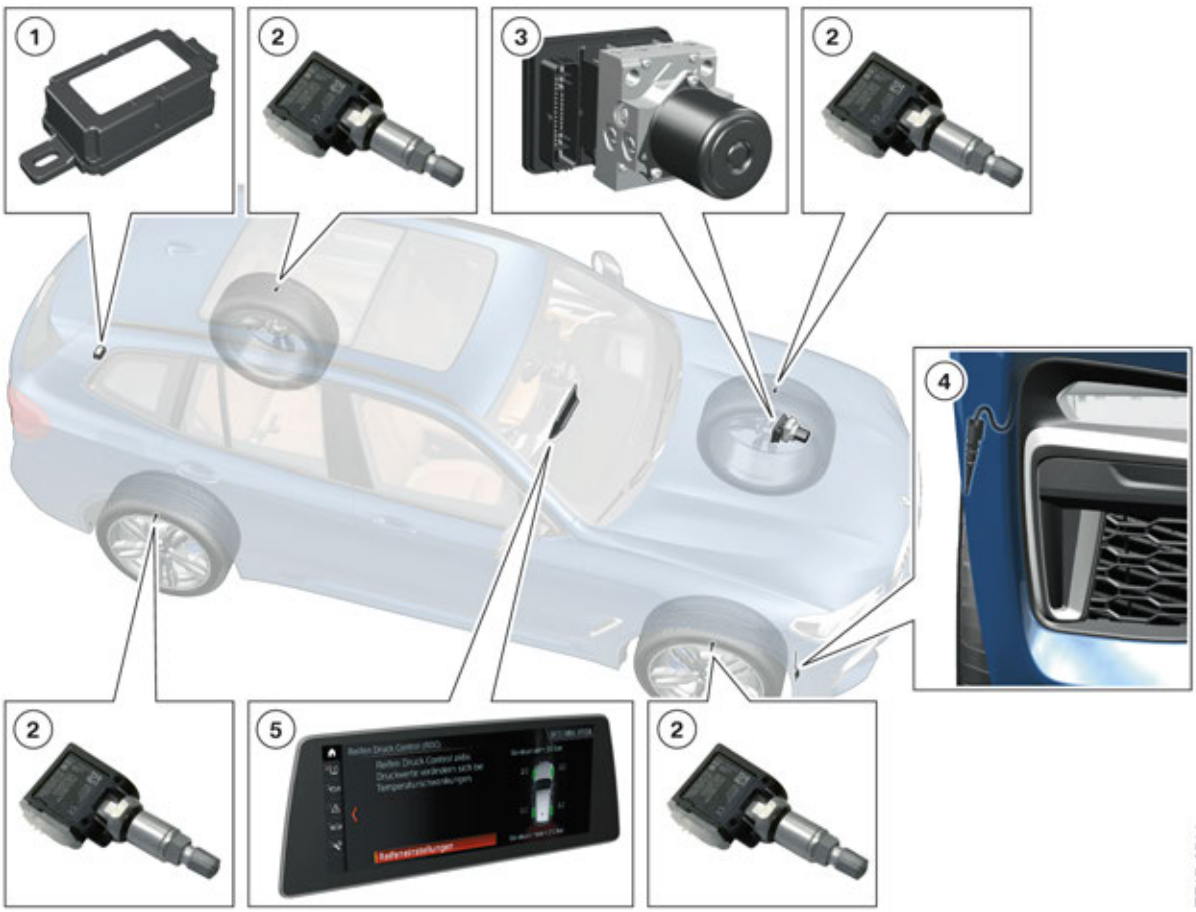
After the wheels have completed their teach-in drive, the nominal pressures can differ from the actual values determined and entered in the workshop. The background reason for this is the incorporation of the temperatures following a completed teach-in drive. The customer should be informed that although the tire pressures have been checked, these can constantly change depending on the temperature. However, the tire pressures should be adjusted again at an early opportunity if the difference is permanently more than 0.2 bar (2.9 psi).

G01 Chassis and Suspension

4. Wheels / Tires

4.4.2. System overview

The electronic tire pressures plate is an extension to the vehicle software. No additional components are required for the integration of this new function. All the information is supplied by sensors that are already built into the vehicle.



G01 System overview of electronic tire pressure specification

Index	Explanation
1	Remote control receiver (FBD)
2	Wheel electronics
3	Dynamic Stability Control (DSC)
4	Outside temperature sensor
5	Central Information Display (CID)

G01 Chassis and Suspension

4. Wheels / Tires

4.4.3. Operation

G01 Menu guidance of electronic tire pressure specification

Index	Explanation
A	My Vehicle
B	Vehicle status
C	Tire settings
D	Tire size

G01 Chassis and Suspension

4. Wheels / Tires

A distinction must be made when using the electronic tire pressures specification in the following three situations:

- Checking the tire pressures
- Checking the tire pressures after a wheel change
- Checking the tire pressures of wheel and tire combinations that have not been saved (special sizes).

The relationships and the special features of operation are described in greater detail below.

Checking the tire pressures

The tire pressure to be set on wheels that have already been taught-in can be queried from the setting menu as follows:

- My Vehicle
- Vehicle status
- Tire Pressure Control (RDC)

G01 Adjustment of the tire pressures of already taught-in wheels in the CID

If the tire pressures of wheels that have already been taught-in are to be checked, it is only necessary to call up the tire Pressure Control RDC menu and compare the relevant nominal pressures displayed with the actual pressures. It must be noted here that the wheel and tire combinations stored must match the wheel sizes actually fitted to the vehicle. The difference displayed must then be corrected with the help of a tire inflator. It is not necessary to reset the RDCi tire pressure control as it was on previous systems.

A warning issued by the RDCi tire pressure control always relates to the current nominal pressure.

There is no RDC reset provision for the wheel and tire combinations stored (standard sizes). The RDC warnings always relate to the nominal pressure displayed. No nominal pressure is displayed if special sizes have been selected. In this case, it is still necessary to carry out a manual RDC reset (see "tire Selection: Special Sizes" chapter).

G01 Chassis and Suspension

4. Wheels / Tires

Checking the tire pressures after a wheel change

The tire pressure to be set on new wheels can be queried from the setting menu as follows:

- My Vehicle
- Vehicle status
- Tire Pressure Monitor (RDC)
- Tire settings
- Tire type (summer/winter)

Adjustment of the tire sizes to be set on new wheels in the Central Information Display using the example of the G30

The procedure for setting a new tire type is only necessary under the following conditions:

- New wheel set installed
- Change in Max. speed
- The wheel and tire combination stored in the Central Information Display (CID) does not correspond to the actual combination.

The nominal pressures displayed after the input and confirmation of a new tire type always relate to the cold tire pressure. It is not possible to compare actual and nominal pressures through the Central Information Display (CID) as the system assumes that a new set of wheels has been fitted and its wheel electronics do not transmit any tire pressures while the vehicle is stationary.

A warning message may be displayed in the event of incorrect operation of the system. If, for instance, a new tire type is selected and confirmed after a long motorway journey although the wheels currently fitted have not been swapped, there will be considerable pressure deviations between the nominal pressure displayed in the CID (cold tire pressure) and the actual tire pressure on the wheels (warm tire pressure) because of the temperature differences. The pressure deviation described can, however, only be determined using a tire inflator, as the system does not display any actual pressure on the CID after confirmation of the new tire type. There could be a new warning message in the subsequent teach-in drive if the tire pressures (warm tire pressure) in the wheels were now to be adjusted to the nominal pressure displayed on the CID (cold tire pressure) using the tire inflator.

The background reason for this is the incorporation of the tire air temperatures transmitted. When the vehicle is in motion, the wheel electronics are constantly transmitting logs with the following information:

G01 Chassis and Suspension

4. Wheels / Tires

- Identification number ID
- Battery status
- Tire pressure
- Tire air temperature

During the teach-in drive the system detects a warm tire and calculates a higher tire pressure for inflation than the nominal pressure displayed before starting the drive (cold tire pressure). The difference between the nominal pressure and the actual pressure can now be seen in the RDCi tire pressure control menu. The tire pressure must be adjusted again.

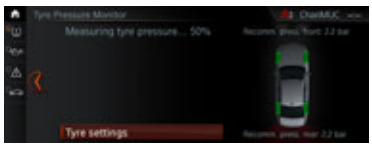
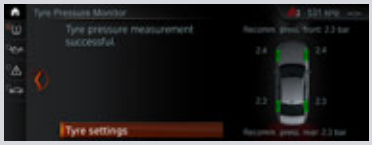
When new wheels are fitted, for example during a wheel change in the workshop, the temperature difference between the ambient temperature and the current temperature of the tire (workshop temperature and ambient temperature) must therefore still be taken into account.

Prompts the Central Information Display (CID)

Correct responses must be given for the following prompts in the menu to enter new wheel and tire combinations.

The illustrations in the table show a G30 by way of example:

Central Information Display	Description
	New wheels can be selected from the tire Settings menu item. **Important note:** The displayed nominal pressure must be set if only the tire pressure is adjusted and no new wheels are fitted. Resetting the RDCi system (RDCi reset) as required on previous vehicles is not necessary. The RDCi warning pressures that are currently valid always relate to the nominal pressure displayed in the CID.
	The tire type (summer/winter) and the tire size can be selected from the tire Settings menu item.
	Various combinations of tire and wheel are stored in the tire Selection menu. Find out the correct size on the rear axle of the vehicle concerned and enter it into the Central Information Display (CID).
	The Special Approval (different tires) menu item can be used in the following situations: • when a tire type not listed (special wheel/tire combination) is being used • if the customer wishes to have a tire pressure other than that stored by the system for his tire type. When this function is used, the RDCi system has to be reset as before (RDCi reset) following a correction of the tire pressures.

Central Information Display	Description
	Once the appropriate wheel and tire combination has been selected, the speed status (Under 100 mph, over 100 mph) must be specified. The preset values should not be changed by the customer.
	Once the modified tire settings have been confirmed, the system loads the new nominal pressures applicable.
	The system then displays the modified tire type and the Max. speed status. The new nominal pressures applicable for the front and rear axle are also displayed. The old actual pressures stored have been deleted.
	When the drive starts > 20 km/h (12 mph), the wheel electronics units transmit their logs. In the first teach-in stage the tire pressures are merely checked for plausibility and displayed in color. Green = tire pressure OK. Yellow = tire pressure not OK.
	In the second teach-in stage, the various wheel electronics are assigned to the particular wheel on which they are fitted. After successful assignment of the wheel electronics, the actual values can be displayed and compared with the nominal pressure. In the event of pressure deviations, it is necessary only to adjust the actual pressure to the nominal pressure. It is not necessary to reset the RDCi system (RDCi reset).

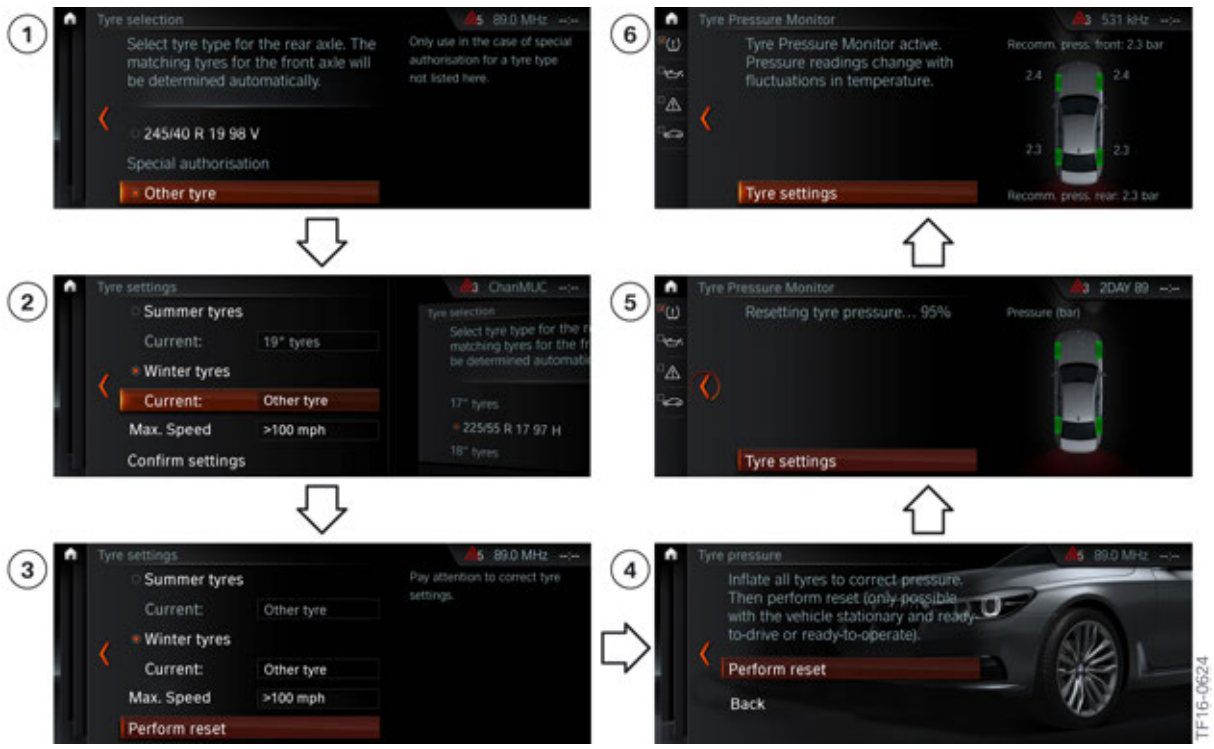
The nominal pressures displayed must be observed without fail. Failure to do so may result in tire pressure warnings from the RDCi tire pressure control system.

4.4.4. Tire selection: special sizes

Special sizes (special approval) which are not listed in the menu must be entered by selecting "Other tires".

G01 Chassis and Suspension

4. Wheels / Tires



Input of special tire sizes in the electronic tire pressure specification using the example of the G30

Index	Explanation
1	Special approval (special sizes)
2	Other tires
3	Perform reset (RDCi reset)
4	Note that RDCi reset possible only when stationary
5	First teach-in stage (wheel electronics IDs known)
6	Second teach-in stage (wheel assignment of the wheel electronics completed)

This function should be used for special sizes only. There is no specification of the tire pressure for this selection. Following confirmation of the special sizes and adjustment of the tire pressure, the RDCi system is taught the tire pressure set after a successful teach-in drive. This means that the warning threshold values are calculated by the RDCi system using the tire pressure currently set. This function in this menu is therefore identical to that of previous RDCi systems. The tire pressures must always be reset in the special sizes menu after any change (RDCi reset). It is not possible to perform a nominal/actual comparison of the various tire pressures (no nominal pressure output).

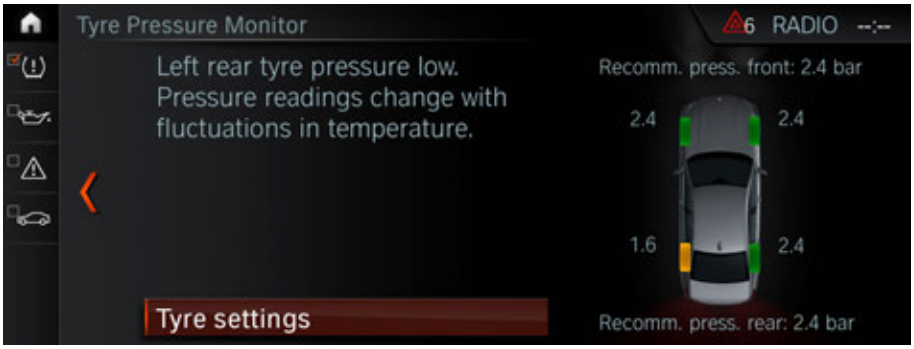
In exceptional cases, this function can also be used to accommodate special customer requirements. The output of the nominal pressure can be disabled by selecting the special sizes (special approval) if a customer does not wish to accept the nominal pressures displayed, even after in-depth advice. This makes it possible to teach-in an individual tire pressure for the RDCi system warning threshold values.

In general, the specified minimum pressures must be observed when teaching-in new tire pressures. For example, it is not possible to teach-in tire pressures < 2.0 bar (< 29.0 psi). In this event, a tire pressure loss warning will be output during the teach-in time.

4.4.5. Tire pressure loss display

Irrespective of whether there is a sudden tire pressure loss or a gradual drop in the tire pressure, the driver is informed on the Central Information Display (CID) as soon as the pressure falls below the defined warning thresholds.

The system only ever warns of inadequate tire pressures. There is no warning for excessive tire pressure.



Warning of tire pressure loss using the example of the G30

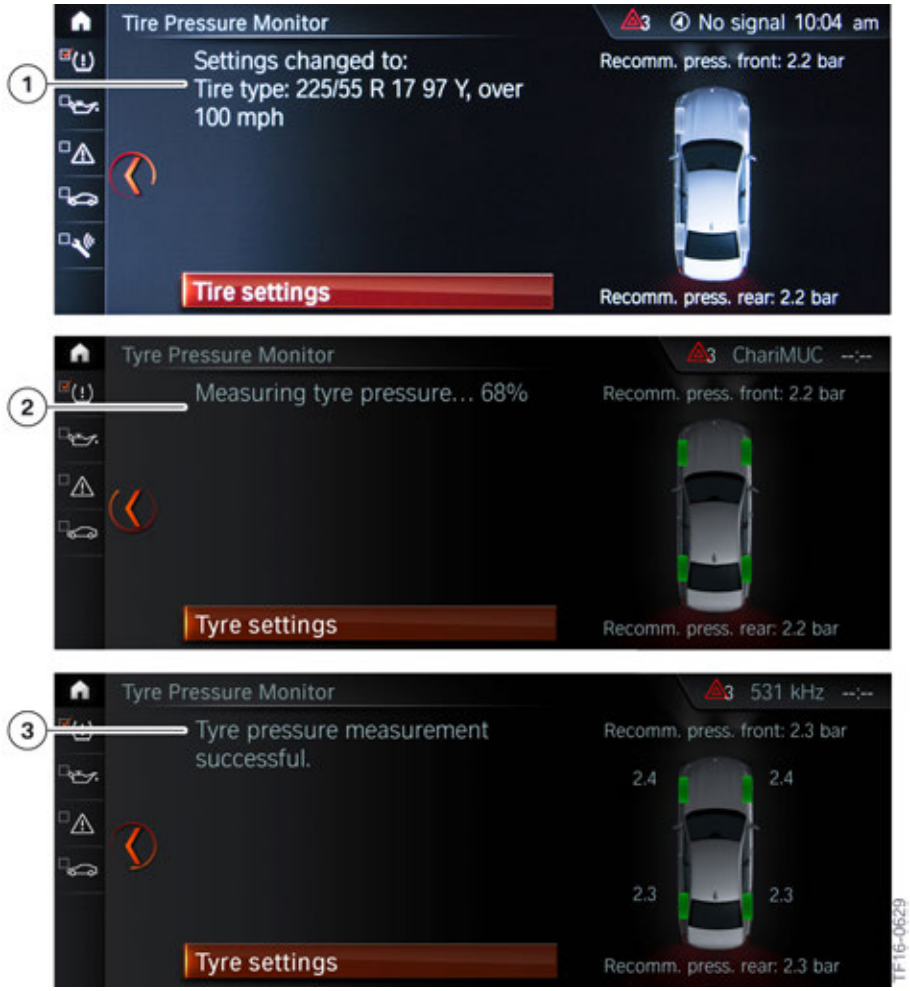
The wheel concerned changes color from green to yellow when the tire pressure is too low.

G01 Chassis and Suspension

4. Wheels / Tires

4.4.6. Teaching-in the tire pressures

The vehicle must be driven at speeds in excess of 20 km/h (12 mph) to teach-in new tire pressures. The current teach-in status (progress) is indicated in the display.



Display of the procedure for teaching-in new tire pressures in the Central Information Display (CID) using the example of the G30

Index	Explanation
1	Message: Settings changed to tire type: 255/55 R 17 97 H, max speed over 100 mph
2	Message: Tire pressure being measured 68%
3	Message: Tire pressure measurement successfully completed

As soon as the system has accepted the ID of the new wheel electronics (first teach-in time) the tires are shown in color in the Central Information Display (CID).

Once the tire pressures also appear on the CID, the system has completed the wheel assignment (second teach-in time).

4.4.7. Measurement of the tire air temperatures when stationary

G01 Input/output diagram of the electronic tire pressure specification

G01 Chassis and Suspension

4. Wheels / Tires

Index	Explanation
A	Input
B	Output
1	Tire air temperature
2	Ambient temperature
3	Dynamic Stability Control (DSC)
4	Tire pressure output
5	Central Information Display (CID)

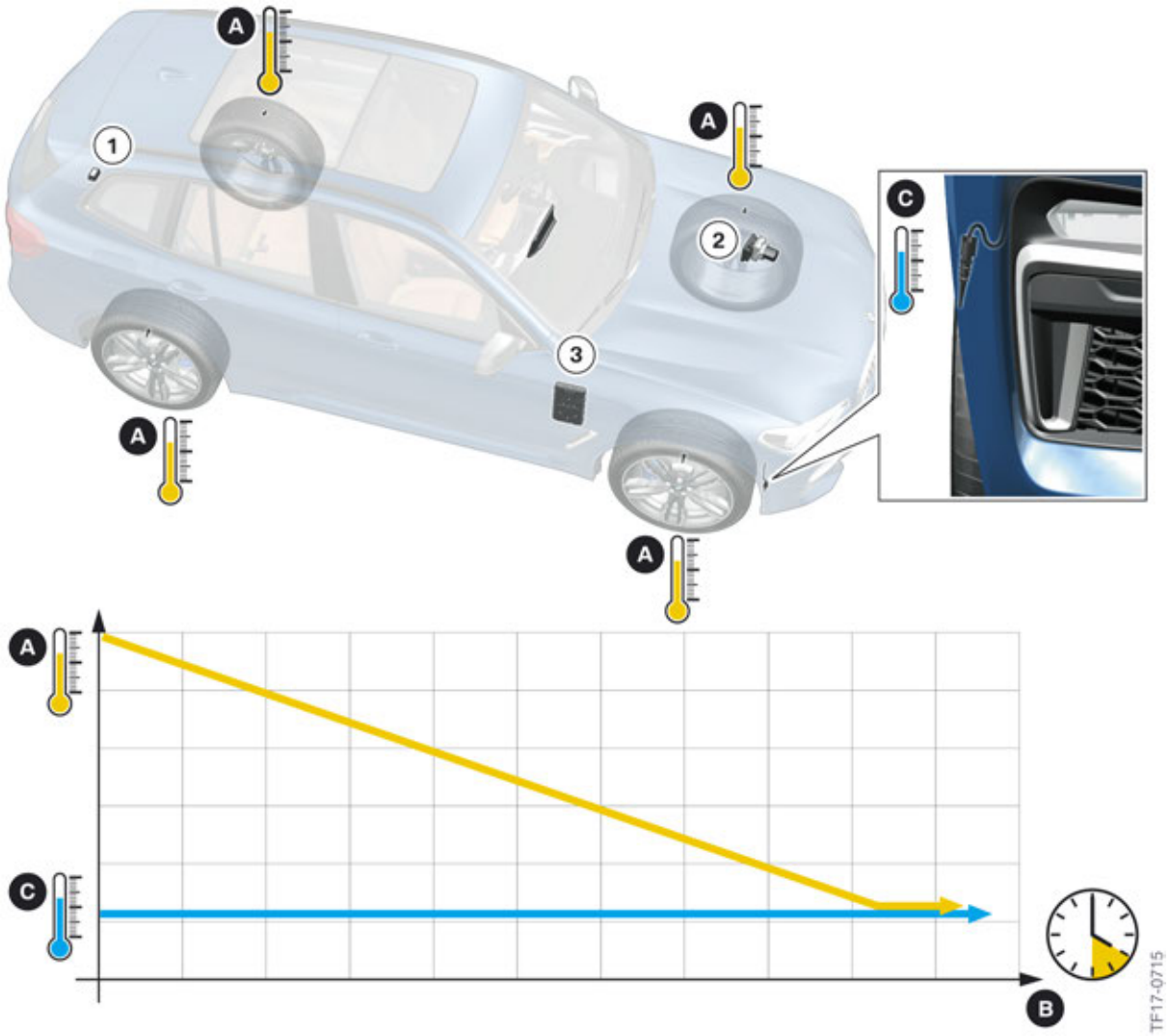
In the case of wheel electronics that have already been taught-in, the current tire pressures are output through the Central Information Display (CID) even if the vehicle is stationary. However, the relevant tire air temperatures are required before the system can display the tire pressures that are currently applicable. These are determined and forwarded by the four wheel electronics units at regular intervals when the vehicle is in motion. Since the wheel electronics do not transmit while the vehicle is stationary, the tire air temperatures can only be retrieved while the vehicle is in motion.

When the vehicle is at a standstill, the tire air temperature is calculated using a special algorithm (calculation model). The information from the outside temperature sensor is required for this.

Once the calculation is complete, the specified tire pressures are output from the DSC to the CID.

G01 Chassis and Suspension

4. Wheels / Tires



G01 Measurement of the tire air temperature when stationary

Index	Explanation
A	Tire air temperature
B	Time
C	Ambient temperature
1	Remote control receiver (FBD)
2	Dynamic Stability Control (DSC)
3	Body Domain Controller (BDC)

The wheel electronics send data protocols to the remote control receiver FBD at driving speeds above 20 km/h (12 mph). The logs are forwarded from there via the Body Domain Controller (BDC) to the Dynamic Stability Control (DSC).

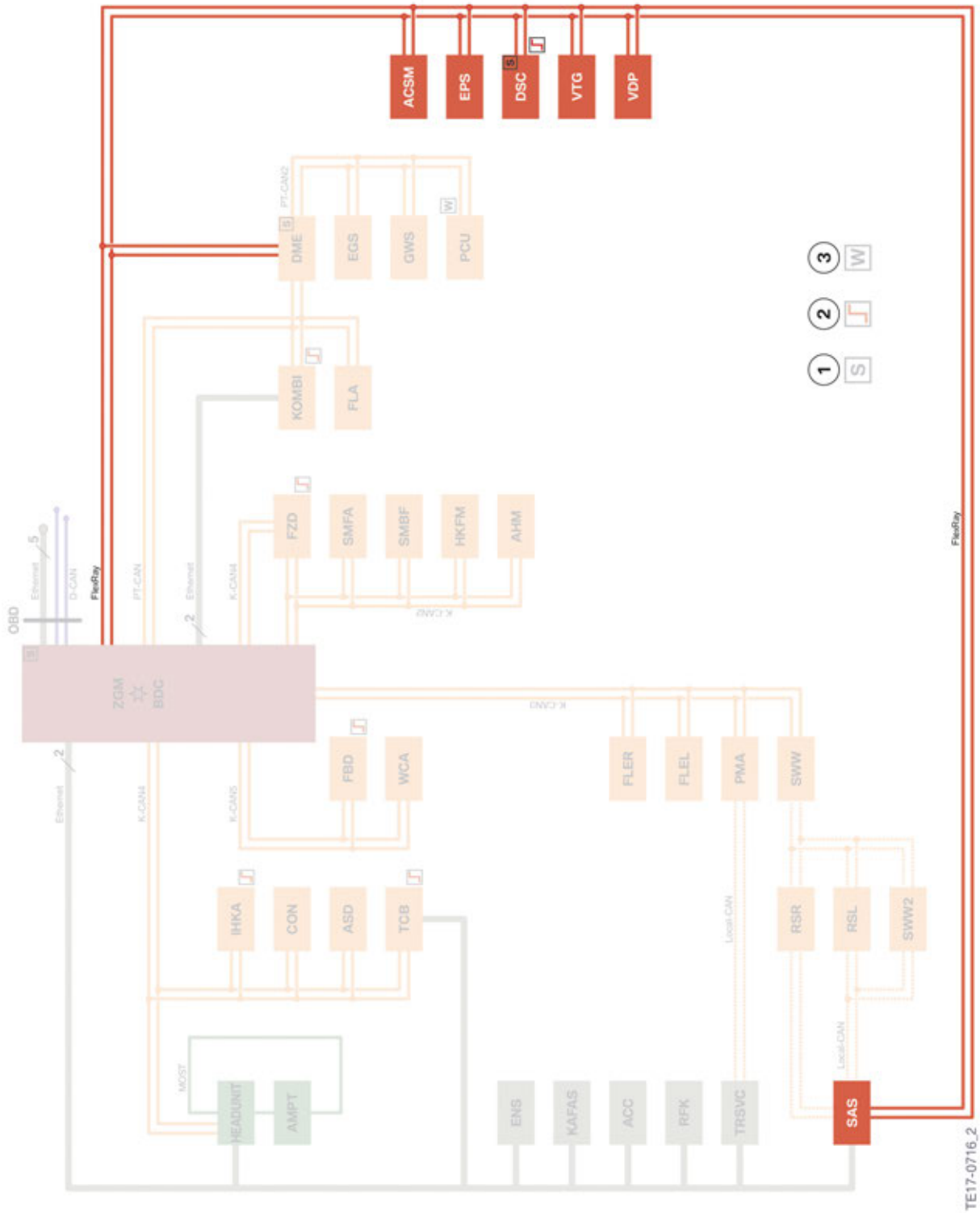
G01 Chassis and Suspension

4. Wheels / Tires

The data log sent last before the vehicle stops is saved with the corresponding tire air temperature. At the same time the ambient temperature is determined from the outside temperature sensor and saved. The tire air temperature currently valid is then calculated using these two values, taking into consideration the time for which the vehicle has been stopped. An algorithm is stored in the DSC for this. After no more than 2 hours the tires will have cooled down so much that the tire air temperature matches the ambient temperature.

G01 Chassis and Suspension

5. Driving Stability Control



G01 Bus overview of driving dynamics systems

G01 Chassis and Suspension

5. Driving Stability Control

Index	Explanation
ACSM	Advanced Crash Safety Module
DSC	Dynamic Stability Control
EPS	Electromechanical Power Steering
SAS	Optional equipment system
VDP	Vertical Dynamic Platform
VTG	Transfer box

As is already familiar from the G12/G30, the G01 does not have Integrated Chassis Management (ICM). Its functions are distributed between the optional equipment system (SAS) and the Dynamic Stability Control (DSC).

It has been possible to further improve the driving dynamics in the G01 by selective use of various control functions. This is particularly noticeable in the steering behaviour, traction and vehicle stabilization.

The control units necessary to meet the requirements on driving dynamics are located on the FlexRay bus. This allows them to quickly exchange their information with each other and react to events.

The following actuators are activated as needed:

- Electronic Power Steering (EPS)
- DME engine control unit
- VTG transfer box
- Dynamic Damper Control

The tables below provide an overview of the various control functions and their effects on the drivability:

Steering function	Description	control units
Limit range response	The limit range response influences the steering torques to be applied by the driver so that the transition from stable driving to oversteer or understeer situations is better perceived.	• DSC • EPS

Traction	Description	control units
Driving dynamic intervention in drive torques	Regulating the drive torque within limits on the basis of the calculated coefficient of friction to avoid excessive jumps in ASC control. A more comfortable design is achieved by reducing the interventions felt.	• DSC • DME
Efficiency Mode	Efficiency Mode allows a reduction in consumption thanks to activation of AWD functionality when it is needed. The torque distribution towards the front wheels can be completely cut-off in driving situations where all-wheel drive is not needed. Smart control allows the torque distribution to be reactivated again proactively to control traction.	• DSC • VTG

G01 Chassis and Suspension

5. Driving Stability Control

Stabilization	Description	control units
Yaw moment compensation	Targeted steering moment interventions by the Electronic Power Steering EPS in the event of heavy braking with different coefficients of friction between the left and right vehicle sides provide the driver with information about the steering input required to compensate for developing yaw movement of the vehicle.	• DSC • EPS
Performance Control	Enhances driving safety and driving dynamics when cornering by selective distribution of the drive and brake forces to the individual wheels. The tendency of the vehicle to oversteer or understeer is reduced by brake interventions on individual wheels. At the same time, the driving power is passed to the outside wheels which have to cover a greater distance. The deceleration caused by the brake intervention is furthermore compensated for by increasing the engine torque.	• DSC • DME

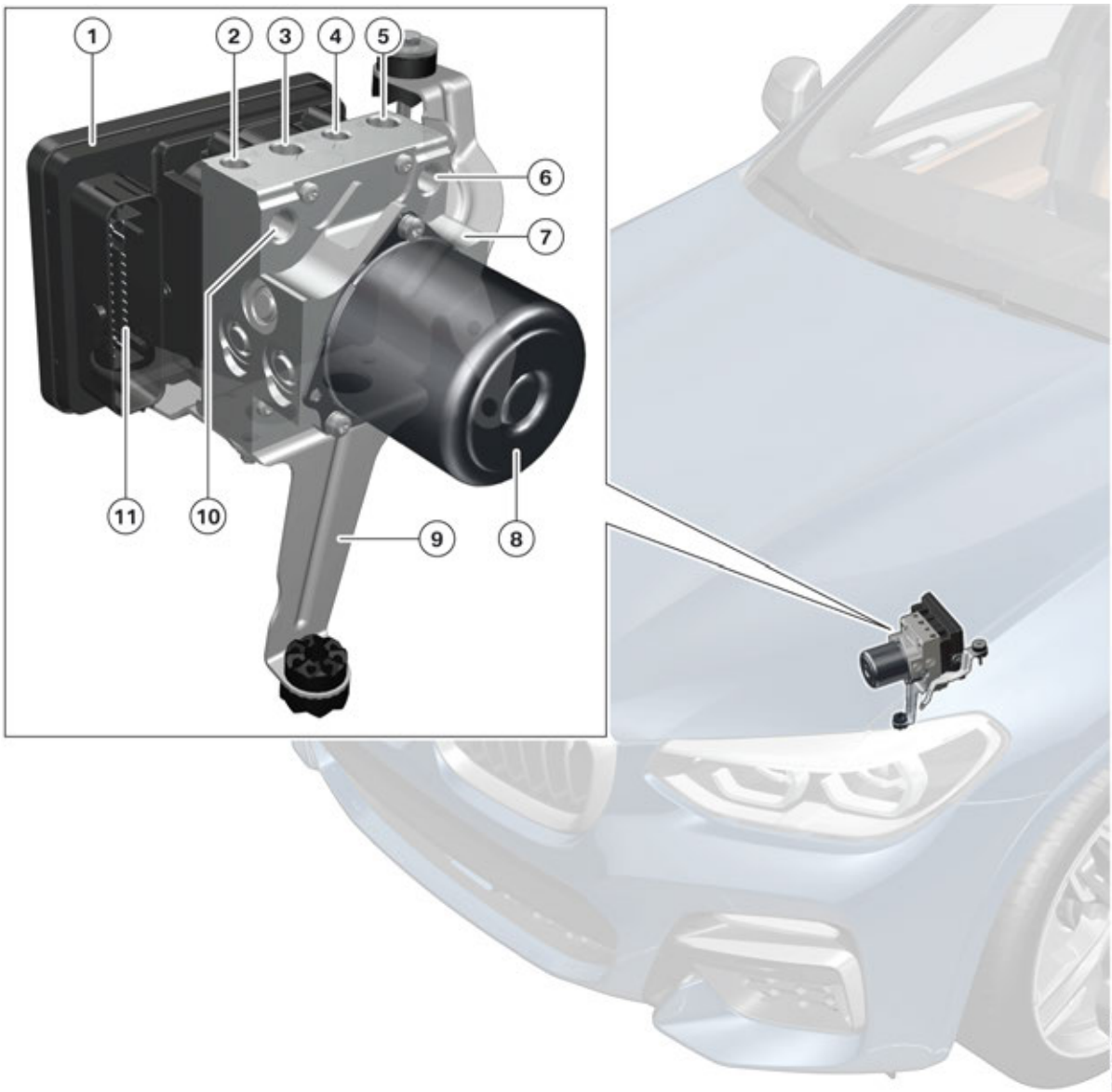
5.1. Dynamic Stability Control (DSC)

Alongside the Vertical Dynamics Platform VDP control unit, the Dynamic Stability Control DSC represents the core element of the driving dynamics control systems used to increase active safety. It optimizes driving stability in all driving conditions and also traction when driving off and accelerating.

Furthermore, it identifies unstable driving conditions such as understeering or oversteering and helps maintain the vehicle on a steady course.

G01 Chassis and Suspension

5. Driving Stability Control



G01 Dynamic Stability Control (DSC)

Index	Explanation
1	DSC control unit
2	Rear left wheel brake connection
3	Rear right wheel brake connection
4	Front right wheel brake connection
5	Front left wheel brake connection
6	Tandem master brake cylinder for brake circuit 1 connection
7	Hydraulic units

Index	Explanation
8	Electric motor
9	Holder
10	Tandem master brake cylinder for brake circuit 2 connection
11	DSC control unit connector strip

The connections have differing thread diameters to prevent confusion of the brake lines on the DSC.

5.1.1. Functions

Modern DSC units have a large number of different functions for supporting the driver in hazardous situations and in sporty driving.

Function	Description
ABS Antilock Brake System	Prevents the wheels from locking when braking.
EBV Electronic brake force distribution	Regulates distribution of the brake force to the front and rear axles depending on the load status of the vehicle.
CBC Cornering Brake Control	Regulates brake pressure under braking when cornering.
Dynamic Brake Control	Applies maximum brake pressure in the event of panic braking and thus shortens the stopping distance.
ASC Automatic Stability Control	Prevents the drive wheels spinning when driving off by engine and brake interventions.
MSR Engine drag torque control	Prevents the drive wheels locking up because of braking by the engine when there is a low coefficient of friction with the road surface.
DSC Dynamic Stability Control	Counteracts understeer or oversteer by targeted, wheel-specific braking and engine management interventions.
DTC Dynamic traction control	Reduces DSC interventions and thus enhances propulsion on loose surfaces.
DBC Dynamic Brake Control	Detects panic braking and supports the driver through immediate application of maximum brake pressure.
ADB Automatic differential brake	Replicates the function of a differential lock. If a wheel displays a tendency to spin, this wheel is automatically braked so that propulsion can still be achieved via the other wheel of the driven axle.
Trailer stabilization logic	Detects when the vehicle towing a trailer begins to fishtail and stabilizes the outfit through selective brake interventions. The vehicle will be deliberately decelerated until it has reached a speed which is not critical in respect of the fishtailing.
Hydraulic brake-servo assistance	Increases the brake pressure applied hydraulically in the event of failure of the brake servo or vacuum supply.

G01 Chassis and Suspension

5. Driving Stability Control

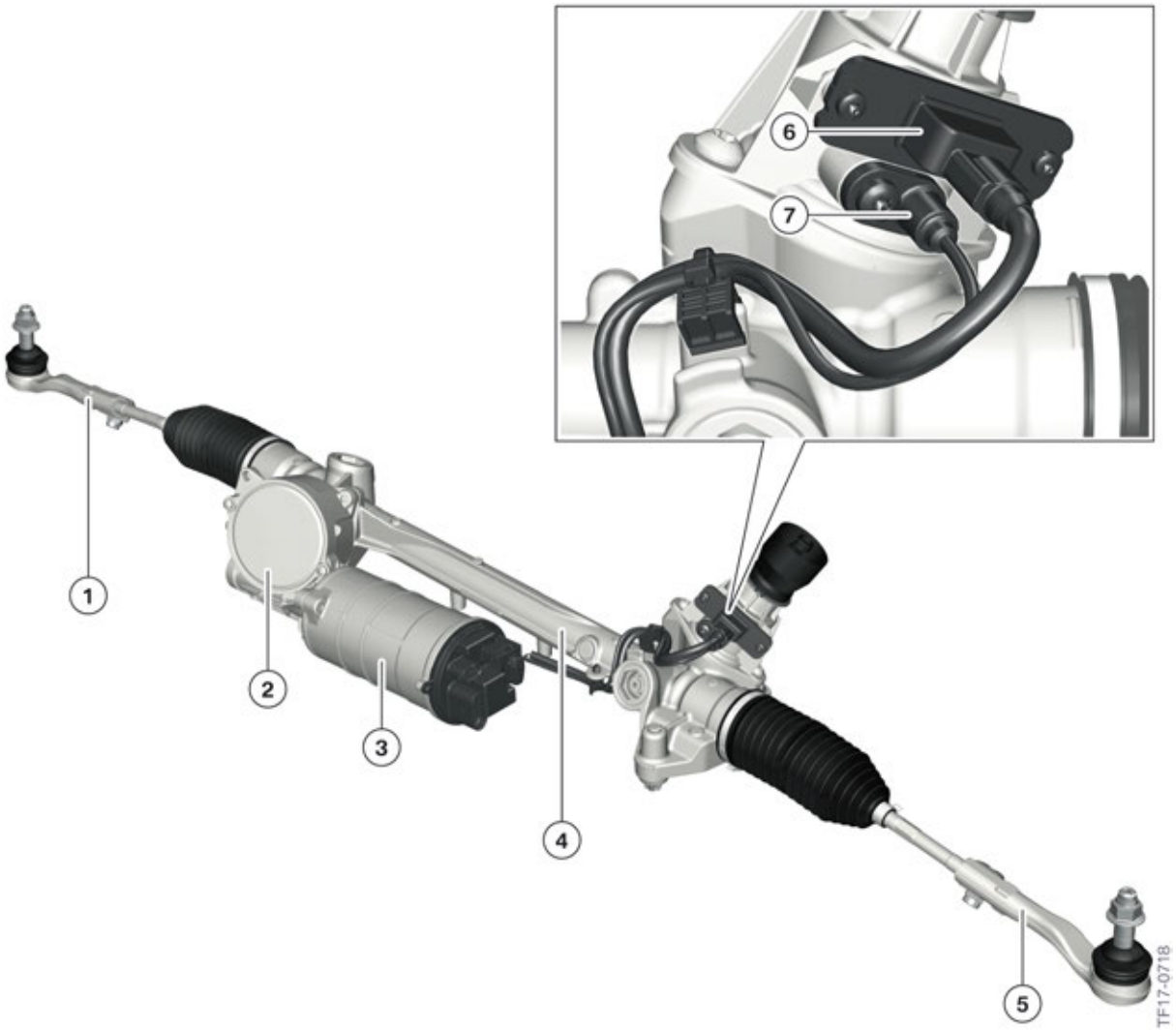
Function	Description
Dry by applying brake	Dries the friction surface of the brake disc by cyclically applying the brake pads in rain (no braking perceptible).
Brake standby	Builds up a moderate brake pressure when the driver takes his foot off the accelerator pedal very quickly. This means that the braking effect will begin sooner in the event of subsequent panic braking.
Fading Brake Support	Supports the driver when braking if the brake temperature has become very high due to an extreme driving style and the desired deceleration can be achieved only by applying a higher brake force.
Drive-off assistant	Holds the vehicle for approximately 1.5 seconds on uphill gradients although the driver has already released the brake. This means that the driver can drive off comfortably, without the vehicle rolling back down the hill unintentionally.
Automatic Hold	Automatically holds the vehicle after it has come to a standstill without it being necessary to still press the brake when the drive position is selected. The brake is automatically released again on subsequent acceleration. There is a button to enable and disable the function manually.
Electric parking brake	When the parking brake button is pressed the DSC control unit controls the two actuators on the rear axle brake caliper. The two electric motors in the actuators operate a spindle drive which uses the brake pistons to press the brake pads against the brake discs with a high preload force.
Brake pad wear detection	Monitors the front left and rear right brake pads for wear and reports a corresponding service requirement through the KOMBI instrument cluster or the Central Information Display (CID).
RDCi tire pressure control	Monitors the current tire pressures on all wheels and provides information when pressures fall below stored warning threshold values by issuing corresponding instructions.
Hill Descent Control HDC	Automatically regulates the preset driving speed on steep downhill gradients by means of wheel-selective brake interventions. If the driver applies the brakes, the HDC distributes the brake force to all four wheels in the most effective manner.

G01 Chassis and Suspension

5. Driving Stability Control

5.2. Steering

5.2.1. Electromechanical power steering



G01 Electronic Power Steering (EPS)

Index	Explanation
1	Track rod, right
2	Reduction gear
3	EPS unit (EPS control unit and electric motor)
4	Steering box
5	Track rod, left
6	Steering-torque sensor
7	Angle-of-rotation sensor

G01 Chassis and Suspension
5. Driving Stability Control

Unlike in the G12 and G30, the Electronic Power Steering EPS of the G01 is equipped with a reduction gear. This transmits the power of the EPS unit to the steering rod via a second pinion (“dual pinion”).

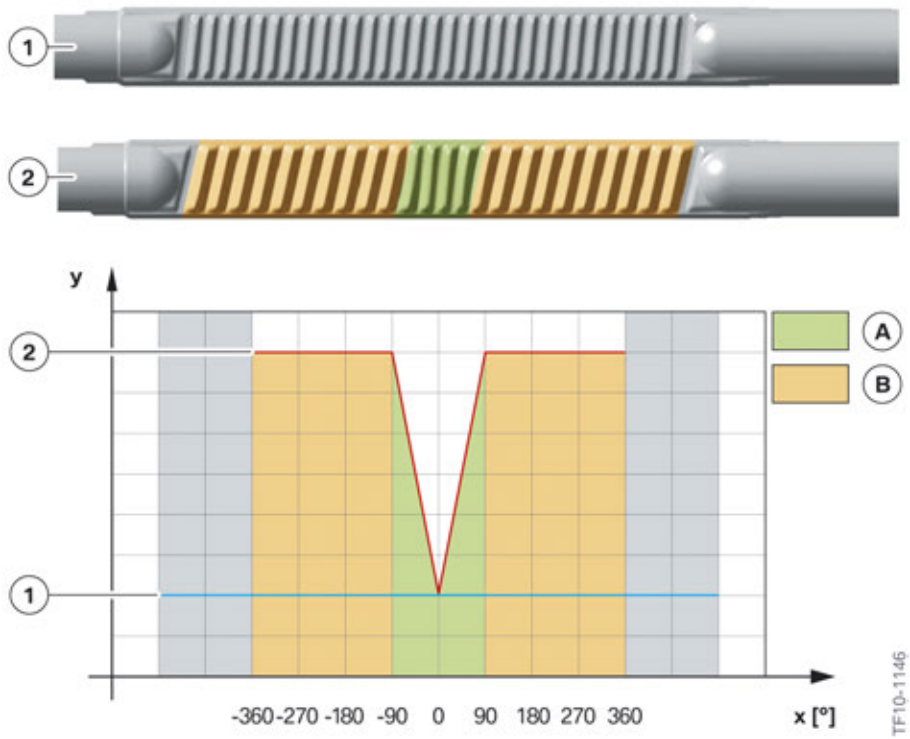
The current generation of the electromechanical power steering offers the following advantages:

- Integrated, driving speed-dependent steering assistance (Servotronic)
- Improved comfort for steering
- Lower noise generation
- Lower wear

5.2.2. Variable sport steering

As already in the predecessor, variable sport steering (OE 2VL) is standard on the M40i and optional on the xDrive 30i.

The more direct steering gear ratio when compared to the basic version of the EPS and the resultant reduced steering angle achieve more direct vehicle response and higher agility. This comes in handy during avoidance manoeuvres for example.

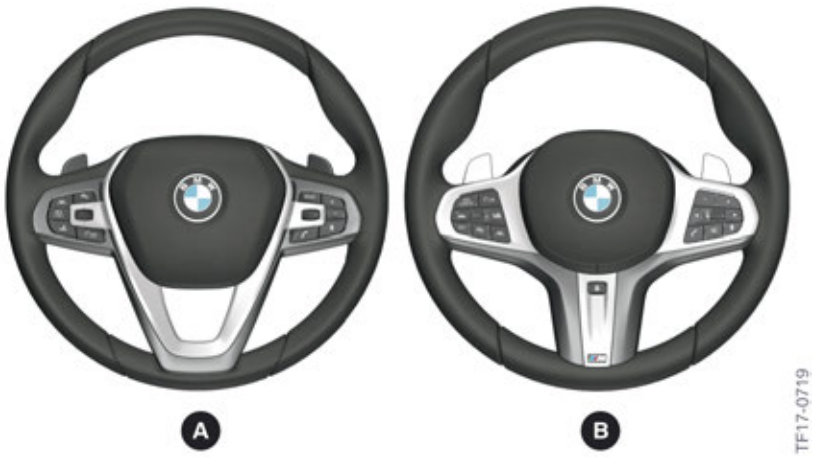


G01 Comparison between steering gear ratio of basic version and variable sport steering

Index	Explanation
1	Rack in basic version of EPS (constant gear geometry)
2	Variable sport steering rack (variable gear geometry)
A	More indirect steering gear ratio (variable sport steering)
B	More direct steering gear ratio (variable sport steering)
x	Steering angle
y	Steering gear ratio

The variable steering gear ratio is implemented through the stroke-dependent gear geometry of the rack. Around the centerposition of the steering gear, the steering system behaves accurately with steady directional stability. As the steering angle moves away from the centerposition, the ratio becomes increasingly more direct.

5.2.3. Steering wheel variants



G01 Overview of steering wheel variants

Index	Explanation
A	Leather sports steering wheel with shift paddles (X3 xDrive 30i)
B	M leather steering wheel (X3 M40i)

The steering wheels can be optionally equipped with the following additional functions:

- Steering wheel heating (OE 248)
- Steering wheel vibration for assistance systems such as lane departure and side collision warning
- Touch detection for the traffic jam assistant function
- Shift paddles (standard)

G01 Chassis and Suspension

5. Driving Stability Control

5.3. Dynamic Damper Control

The optional Dynamic Damper Control (OE 223) is a variable, electronically controlled shock absorber adjustment system that controls the vertical dynamics. It improves the tire comfort of the vehicle while at the same time increasing the driving dynamics. The driver can choose between the more comfortable or more sporty sides of the vehicle's character by means of the drive dynamic control switch.

Like the F25, the G01 is also equipped with vertical acceleration sensors at the front. The body movements (pitching, rolling and lifting) are now detected by the Advanced Crash Safety Module (ACSM) instead of by the Integrated Chassis Management (ICM).

For this purpose, an enhanced Crash Safety Module (ACSM) High is installed in the G01 in combination with the Electronic Damper Control. This detects the body movements by means of additional sensors and makes this information available to the Vertical Dynamic Platform (VDP) control unit.

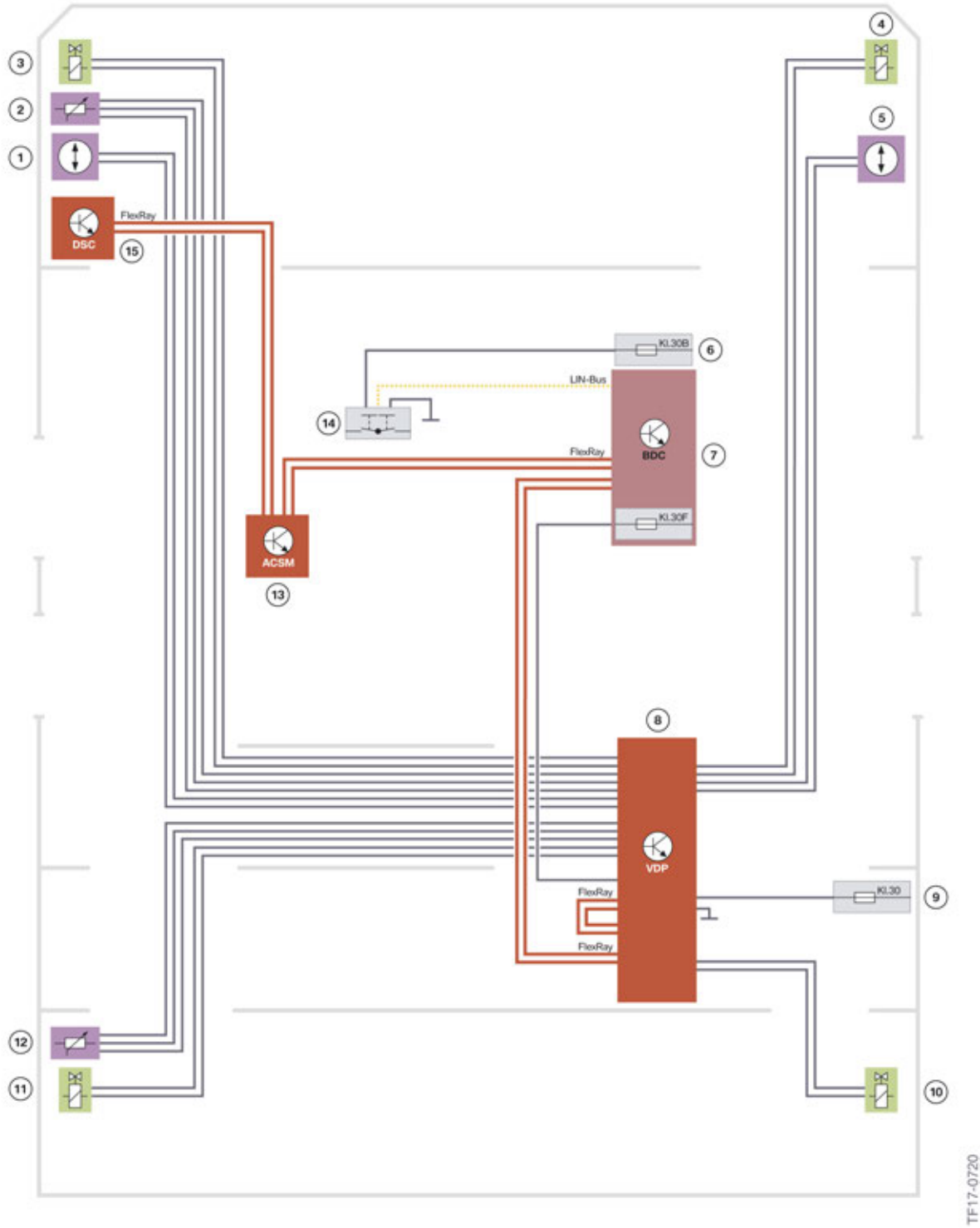
	ACSM-Low	ACSM-High
Basic chassis and suspension	•	–
Dynamic Damper Control	–	•

A ride height sensor is used additionally on the left side of the front and rear axles. Like the vertical acceleration sensors, these are also read out by the Vertical Dynamic Platform (VDP) control unit.

G01 Chassis and Suspension

5. Driving Stability Control

5.3.1. System wiring diagram



G01 System wiring diagram for Electronic Damper Control (EDC)

G01 Chassis and Suspension

5. Driving Stability Control

Index	Explanation
1	Vertical acceleration sensor, front left
2	Ride height sensor, front left
3	EDC valve, front left
4	EDC valve, front right
5	Front right vertical acceleration sensor
6	Power distribution box, front
7	Body Domain Controller (BDC)
8	Vertical Dynamics Platform (VDP)
9	Power distribution box, luggage compartment
10	EDC valve, rear right
11	EDC valve, rear left
12	Ride-height sensor, rear left
13	Crash Safety Module (ACSM)
14	Driving experience switch
15	Dynamic Stability Control (DSC)

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