Reference Manual

G29
COMPLETE VEHICLE

Technical Training

Technical training.
Product information.

G29 Body

Edited for the U.S. market by:
BMW Group University
Technical Training
ST1834 2/1/2019

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: October 2018

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.

The information contained in the training course materials is solely intended for participants in this training course conducted by BMW Group Technical Training Centers, or BMW Group Contract Training Facilities.

This training manual or any attached publication is not intended to be a complete and all inclusive source for repair and maintenance data. It is only part of a training information system designed to assure that uniform procedures and information are presented to all participants.

For changes/additions to the technical data, repair procedures, please refer to the current information issued by BMW of North America, LLC, Technical Service Department.

This information is available by accessing TIS at www.bmwcenternet.com.

Additional sources of information

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

- Owner's Handbook
- Integrated Service Technical Application
- Aftersales Information Research (AIR)

G29 Body

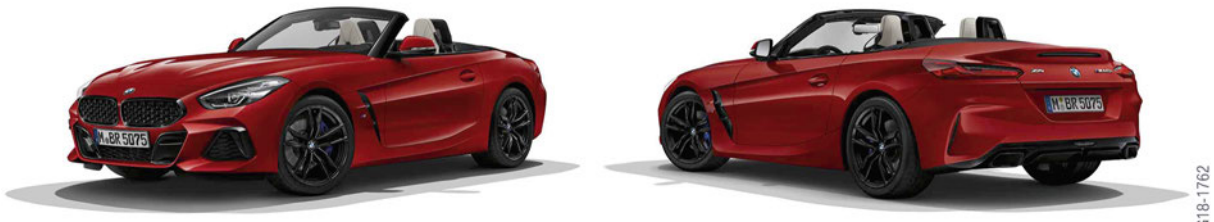
Contents

G29 Body

1. Introduction

1.1. The new BMW Z4

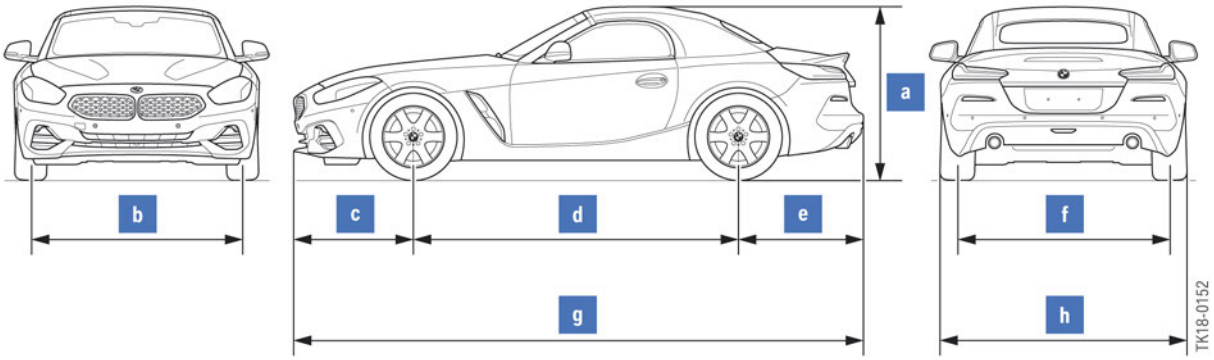
With the G29 BMW presents the 3rd generation of the Z4.



G29 views from front left and rear left

The vertically aligned headlights, the BMW radiator grill in mesh design, the bonnet protruding over the wheels in the classic sports car style, large air breather on the front wheel arches and the distinctive air contour lip integrated in the trunk contribute to the characteristic appearance of the new BMW Z4.

1.2. Outer dimensions



G29 outer dimensions

Index	Explanation	Unit	Z4 sDrive 30i	Z4 M40i
a	Vehicle height	[mm]	1306	1303
b	Front track width, basic wheels	[mm]	1618	1594
c	Front overhang	[mm]	919	920
d	Wheelbase	[mm]	2470	2470
e	Rear overhang	[mm]	947	947
f	Rear track width, basic wheels	[mm]	1612	1589
g	Vehicle length	[mm]	4336	4337
h	Vehicle width excluding/including exterior mirrors	[mm]	1864/2024	1864/2024

G29 Body

1. Introduction

1.3. Weights and payload

You can find the vehicle curb weights and payloads of the G29 in the following table:

Model	Power output [kW (HP)]	Unit	Vehicle curb weight	Payload
Z4 sDrive 30i	190 (255)	lbs	3287	463
Z4 M40i	285 (381)	lbs	3457	551

1.4. History

1.4.1. Overview

BMW Z4 generations

Index	Explanation
A	BMW Z4 E85 (Roadster)
B	BMW Z4 E89
C	BMW Z4 G29

The E85 is the first Roadster of the model range Z4 and was produced from 2002 to 2008. The E85 has a soft top, which has to be manually opened and closed in the basic equipment. Under the development code E86 a Z4 Coupé was also available.

The E89 is the successor to the E85 and the first Z4 with a retractable hardtop.
It was produced from 2008 to 2016.

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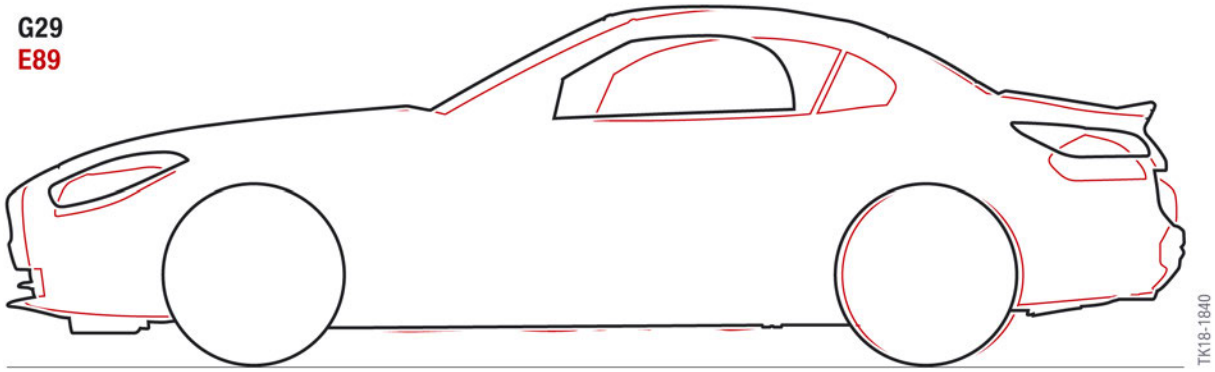
1. Introduction

1.4.2. Silhouette comparison E89/G29



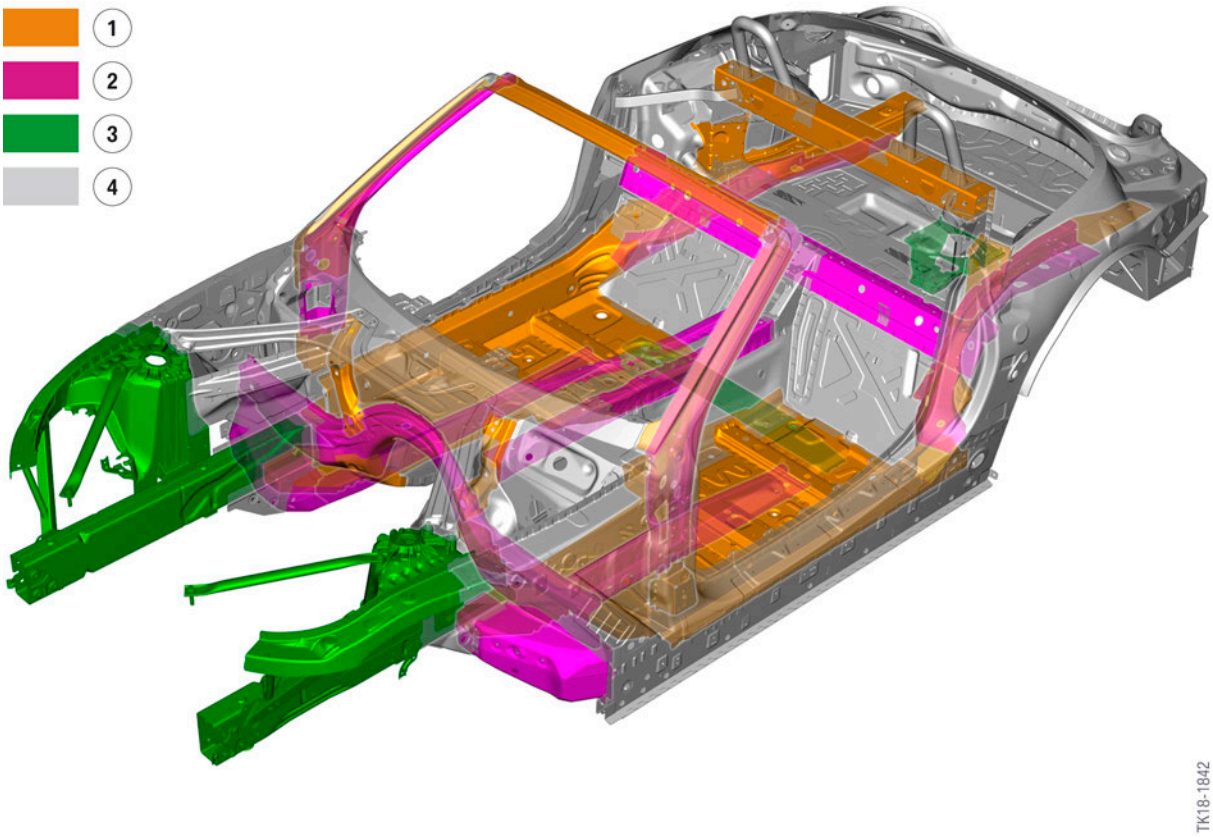
Silhouette comparison of G29 with E89

Explanation	Unit	G29 Z4 sDrive 30i	E89 Z4 sDrive 30i	Difference
Vehicle height	[mm]	1306	1274	+32
Front track width, basic wheels	[mm]	1618	1511	+98
Front overhang	[mm]	919	850	+57
Wheelbase	[mm]	2470	2496	-26
Rear overhang	[mm]	947	893	+54
Rear track width, basic wheels	[mm]	1612	1562	+54
Vehicle length	[mm]	4336	4237	+99
Vehicle width excluding/ including exterior mirrors	[mm]	1864/2024	1790/1951	+74/+73

G29 Body

2. Body Structure

2.1. Materials



G29 body structure materials

Index	Explanation
1	Multiphase steels (high-strength steels > 300 N/mm^2)
2	Hot-worked steels (ultra high-strength steels > 900 N/mm^2)
3	Aluminum
4	Other steels

The engine supports and spring supports of the G29 are made of aluminum. This allows an optimal weight distribution of the body structure.

In the areas of the body structure that are relevant in the event of an accident, mainly high-strength and ultra high-strength steels are used. For example, the A-pillar and the windscreen frame are reinforced with ultra high-strength, hot-worked steels. Thanks to the particularly rigid windscreen frame in conjunction with the rollover protection bars, the survival space of the occupants is guaranteed in the event of a rollover.

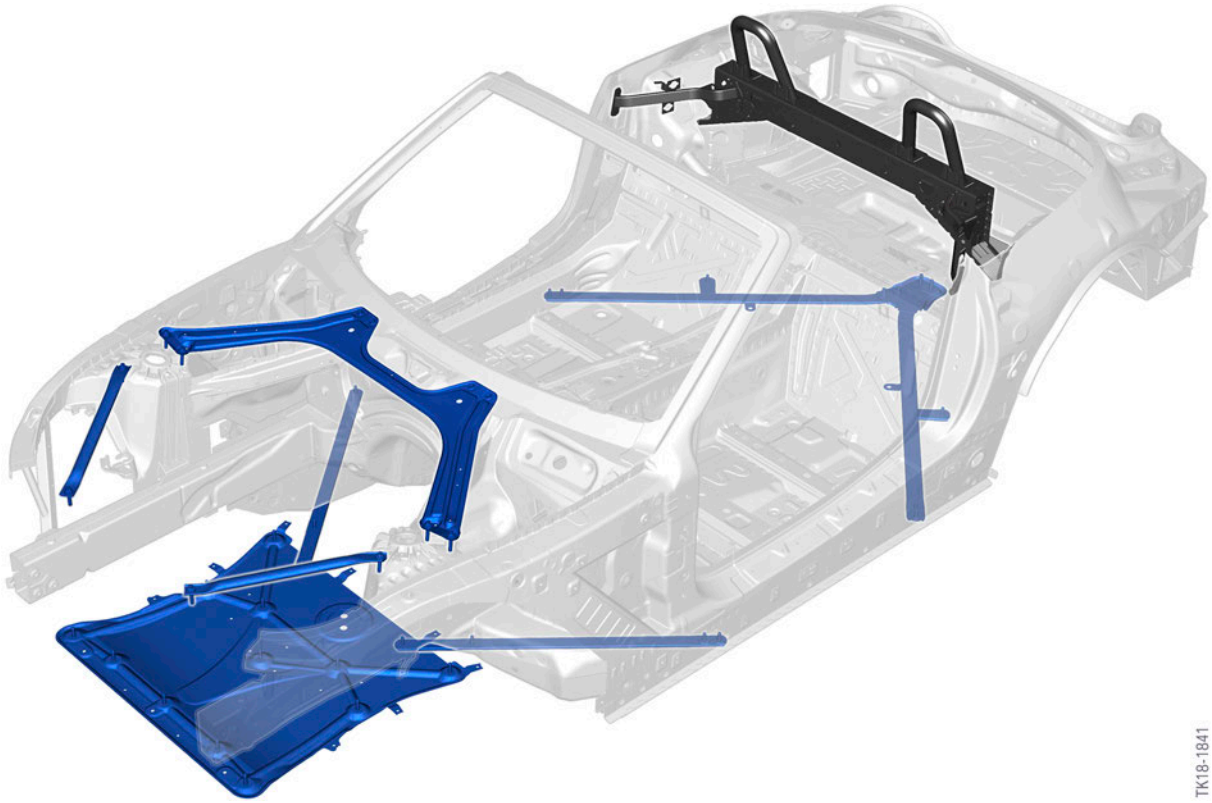
G29 Body

2. Body Structure

2.2. Stiffening measures

The body structure of the G29 is reinforced by numerous struts. A stiffening plate at the front axle provides stability.

The G29 has a fixed rollover protection bar for the driver and front passenger. This also serves to brace the body, thus ensuring high driving dynamics.

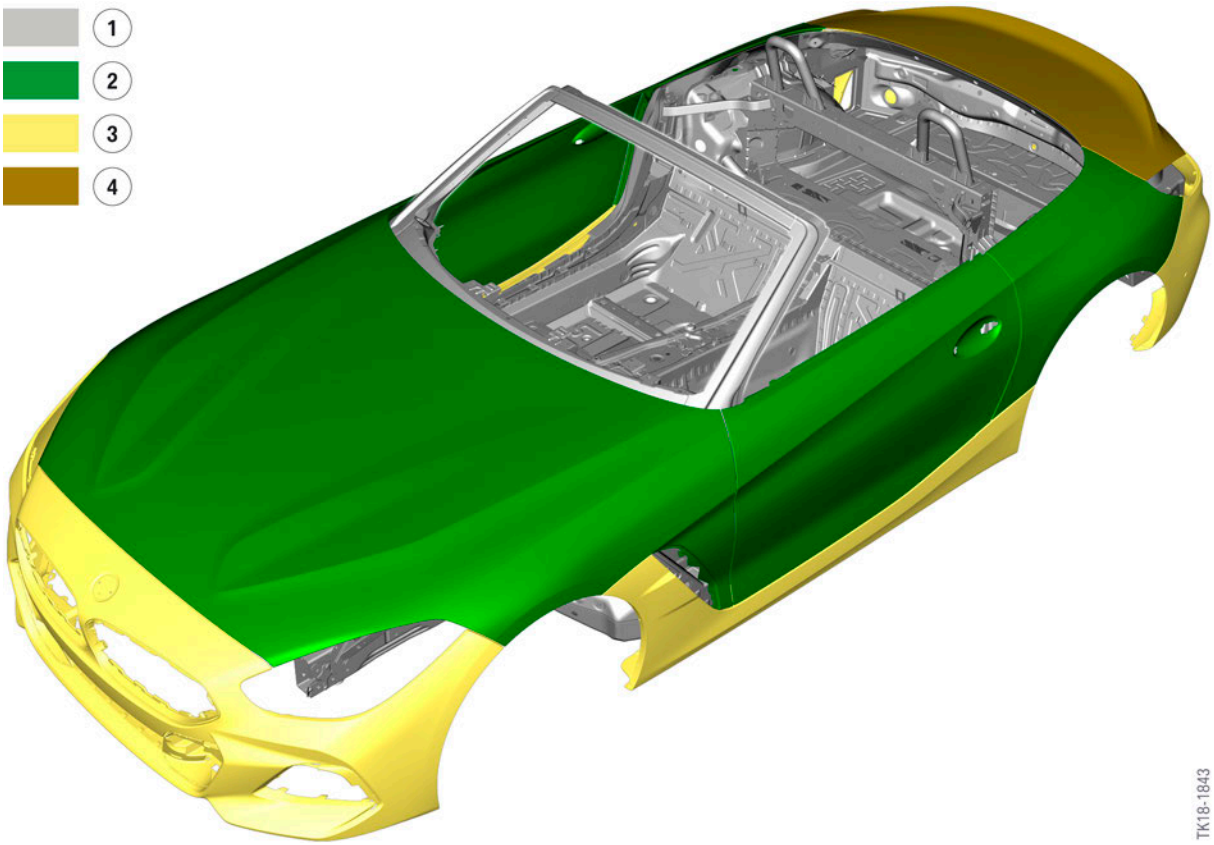


G29 strut concept

G29 Body

3. Outer Body Skin

3.1. Materials



G29 outer body skin materials

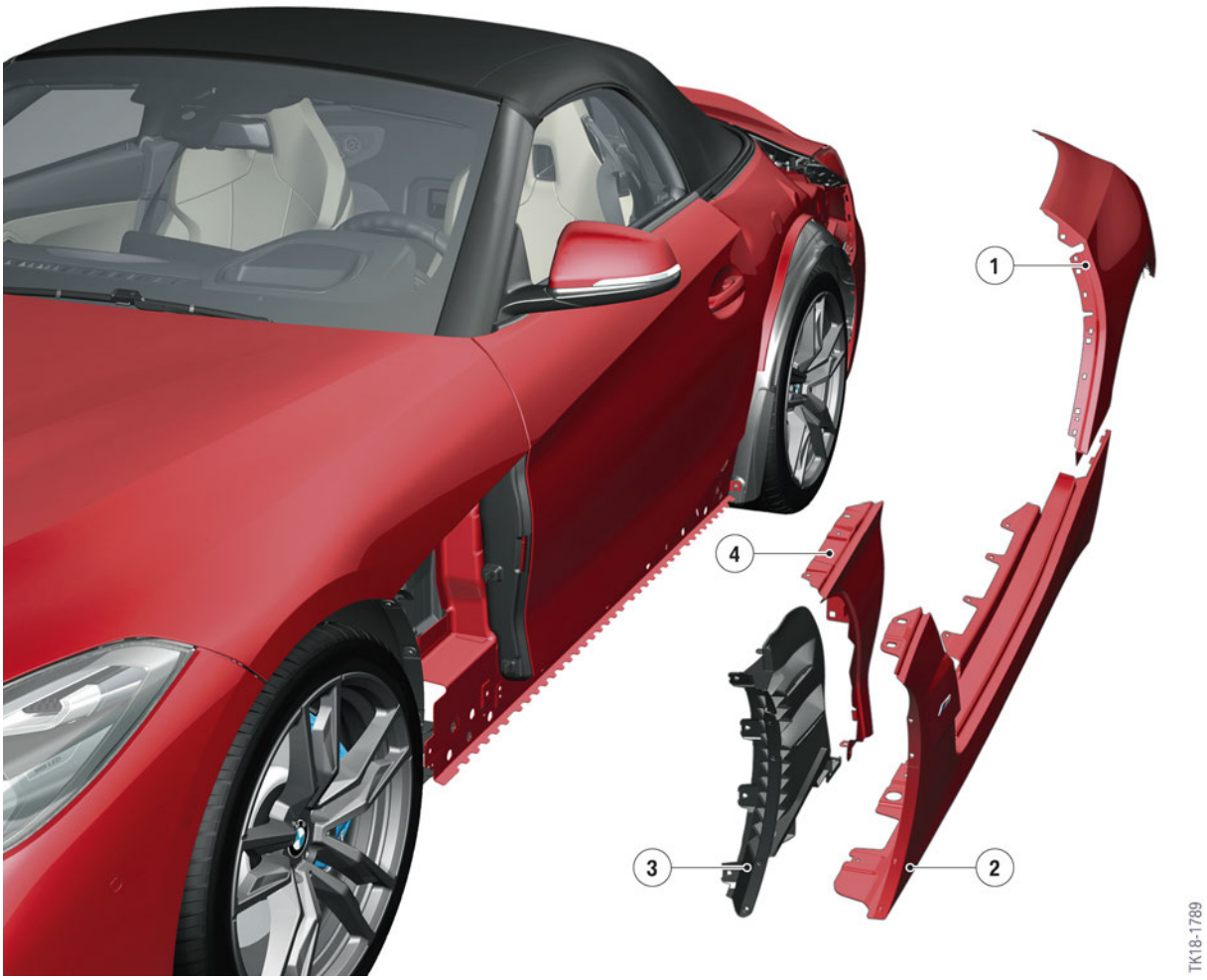
Index	Explanation
1	Steel
2	Aluminum
3	Thermoplastic
4	Sheet Molding Compound (SMC)

G29 Body

3. Outer Body Skin

3.2. Outer skin concept

The body outer skin parts at the side are connected via screw and plug connections. It is possible to adjust the components. However, only small tolerances are permitted.



G29 outer skin concept

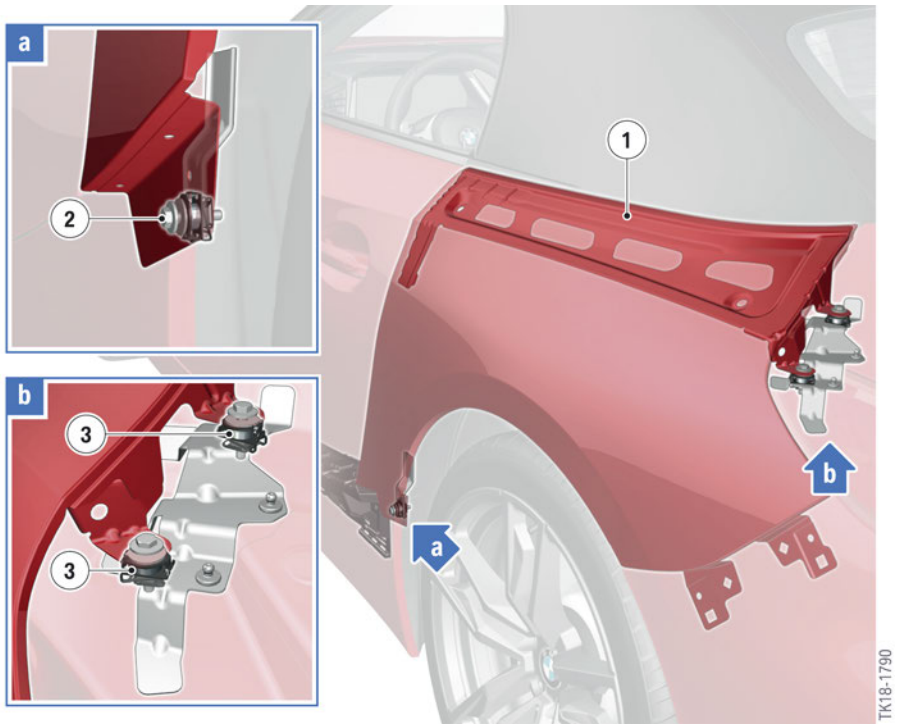
Index	Explanation
1	Rear quarter side panel
2	Side sill trim panel with front side panel section
3	Air breather
4	Front side panel

The air breather and the front side panel are secured at the side frame via screw connections. The side sill is secured via screw and plug connections. There is also a fastening between air breather and side sill using plastic expanding rivets at the front of the wheel arch.

G29 Body

3. Outer Body Skin

The fastening of the rear side panel at the side frame is effected using screw connections. There is an adjusting element at the bottom of the C-pillar for the alignment in y direction. In the upper area the rear side panel is secured via a carrier plate. The carrier plate can be adjusted using two adjusting elements for the trunk in z direction.



G29 adjusting elements, rear side panel

Index	Explanation
1	Carrier plate, rear side panel
2	Adjusting element, y direction
3	Adjusting element, z direction

G29 Body

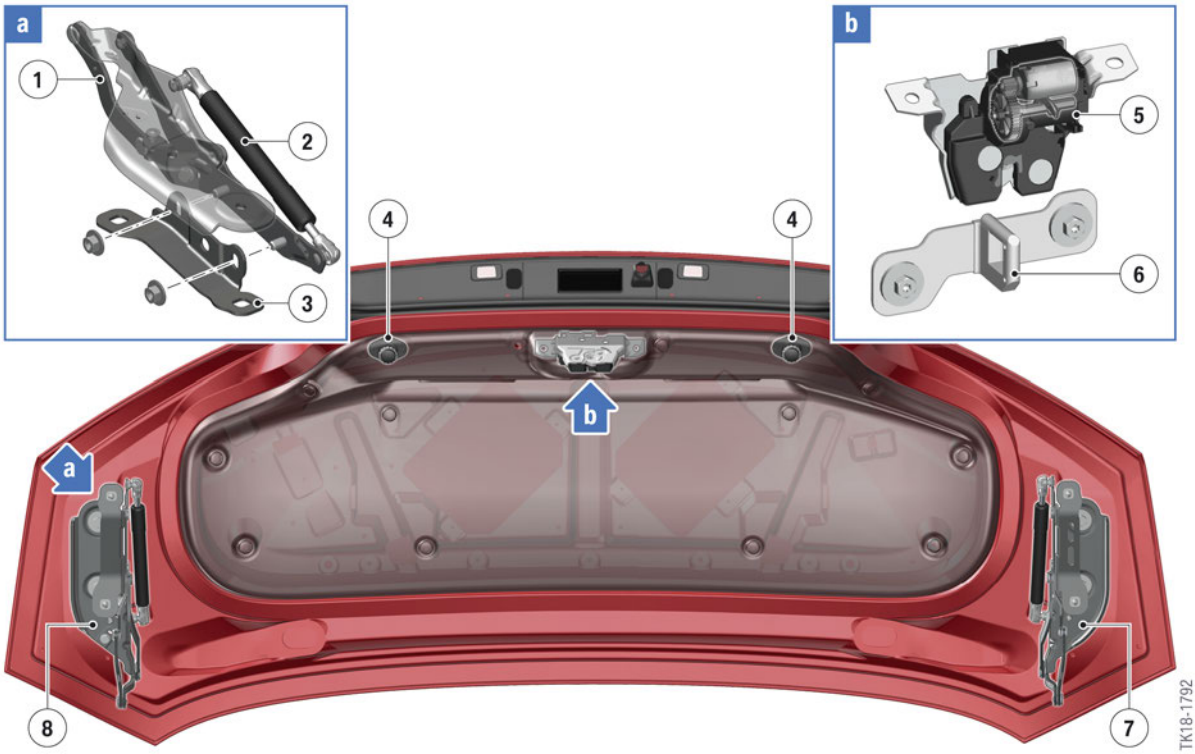
4. Hood, Trunk and Doors

4.1. Hood

The G29 has an aluminum hood. The hood also makes up a large part of the front fenders.

4.2. Trunk

The trunk is made mainly from the thermosetting plastic "Sheet Molding Compound" (SMC). Steel carrier plates are integrated at the fastening areas of the trunk hinges for reinforcement.



G29 overview of trunk

Index	Explanation
1	Hinge part at the trunk
2	Gas pressure spring
3	Hinge part at the body structure
4	Adjusting element
5	Trunk lock including servomotor
6	Lock striker
7	Trunk hinge, left
8	Trunk hinge, right

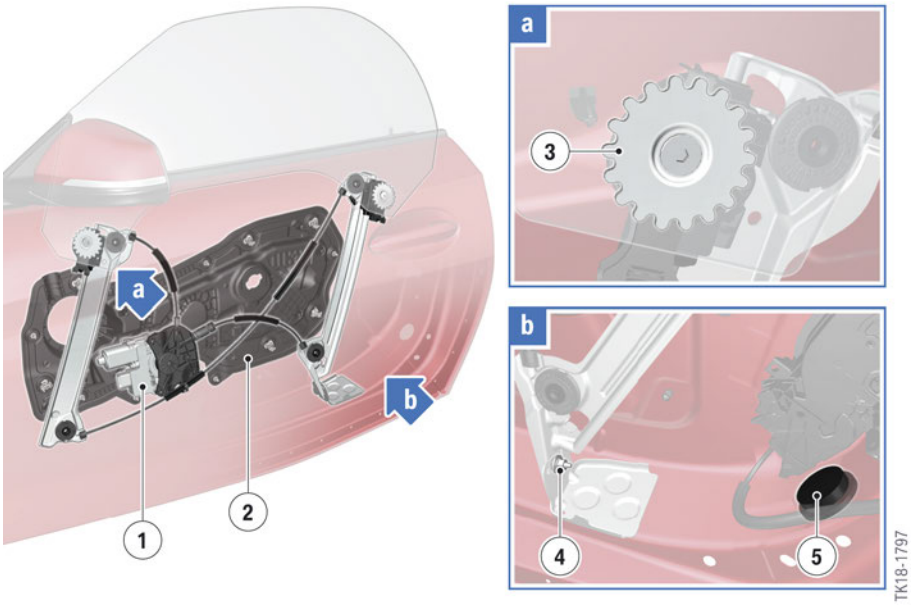
G29 Body

4. Hood, Trunk and Doors

The trunk can be adjusted via the attachment points of the trunk hinges, via the lock striker of the trunk lock, as well as via the adjusting elements in the rear area of the trunk. However, the trunk can also be dismantled without changing its setting. For this, the trunk hinges are disconnected into two parts and joined by screw connections.

4.3. Doors

The doors of the G29 have an aluminum shell design. The plastic module carrier separates the wet side from the dry side. The power window motor and the power window mechanism are positioned on the wet side.



G29 power windows

Index	Explanation
1	Power window motor with transmission
2	Door module carrier
3	Multi-tooth screw (range of adjustment of door window glass in z and x direction)
4	Nut (range of adjustment of door window glass in y direction)
5	Trim (access for range of adjustment, Pos. 4)

The adjusting elements of the side windows in x, y and z direction have no differences compared to those of the current BMW convertibles and Coupés with frameless side windows.

G29 Body

5. Passenger Compartment

5.1. Instrument panel

When designing the interior equipment the focus was on the purist sporting character of the new BMW Z4. The driver-oriented cockpit design is supported by a dynamic forward-directed alignment. The clearly structured arrangement of all operating elements also promotes concentration on the driving experience in the new BMW Z4.

G29 dashboard

5.2. Seats

Power front M sport seats with memory function for driver and passenger are standard on the G29. The following optional equipment both for driver and front passenger:

- Heated seats

G29 Body

5. Passenger Compartment

G29 sports seat

Index	Explanation
1	Drive, backrest
2	Drive, forward/back seat adjustment
3	Drive, seat height adjustment
4	Drive, seat angle adjustment

The memory buttons are located in the door trim panel on the right and left. Two seat positions can be saved using the memory buttons.

G29 Body
6. Soft Top

The high-quality soft top of the G29 can be opened and closed fully automatically by means of electric motors up to a driving speed of 50 km/h (31 mph). A convertible top compartment lid is not used. This means the soft top can be opened or closed in approximately 10 seconds.

6.1. System components

6.1.1. Overview

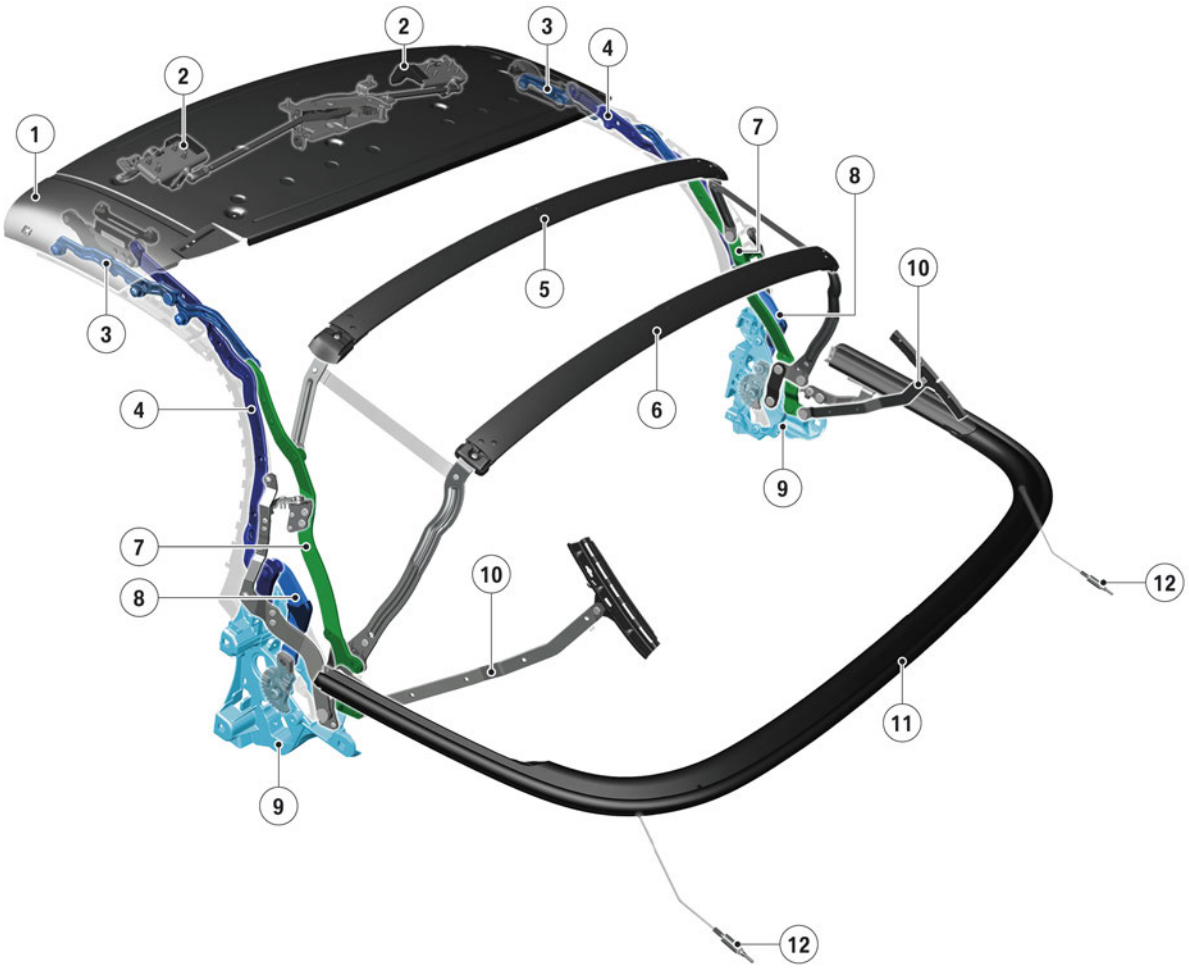
G29 overview of soft top components

G29 Body
6. Soft Top

Index	Explanation
1	Soft top cover with rear window
2	Electric cowl panel lock drive
3	Convertible roof frame
4	Convertible top drive unit
5	Soft top module (CVM)
6	Linkage aperture flap
7	Headlining

6.1.2. Mechanical components

Convertible roof frame



G29 Convertible top frame

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6. Soft Top

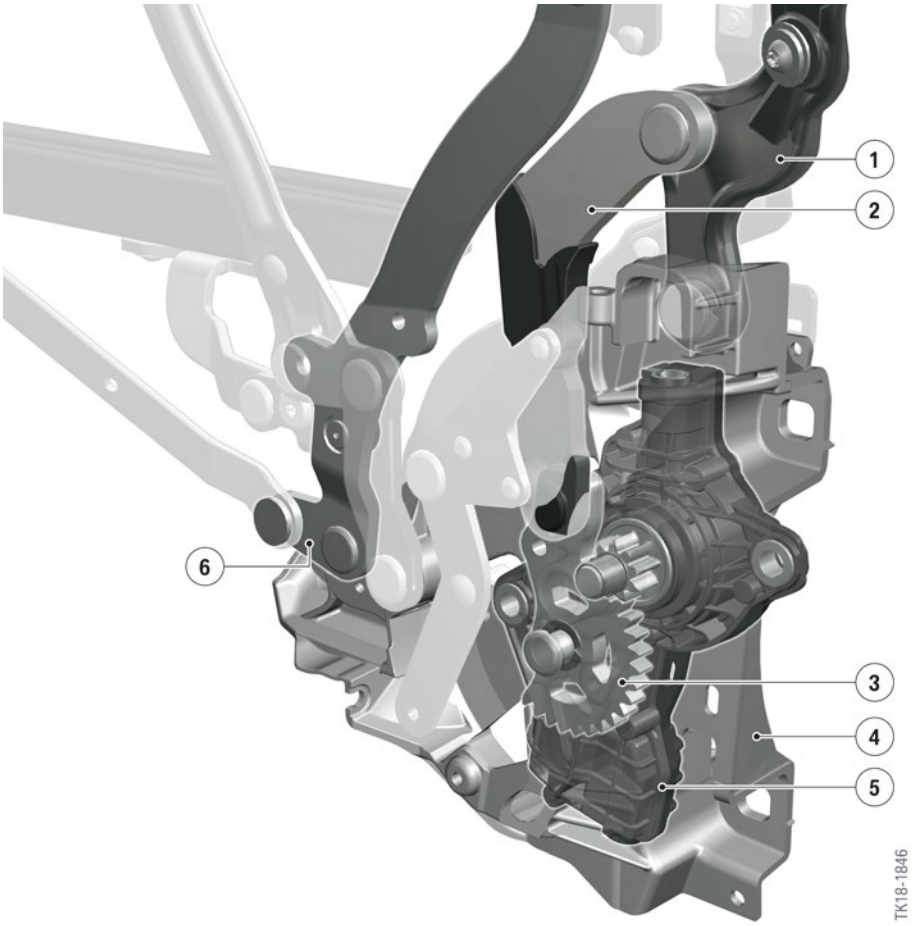
Index	Explanation
1	Front bow
2	Cowl panel lock drive
3	Convertible top roof mechanism guide
4	Main pillar
5	Convertible top bow, centre
6	Soft top bow, rear
7	Main pillar convertible top mechanism guide
8	Drive arm
9	Soft top main bearing
10	Convertible top mechanism guide, rear window
11	Soft top bow
12	Belt tensioner

The soft top bow is held under mechanical tension by a tension cable on the right and left. The tension cables can be detached without changing their setting in an intermediate setting of the soft top. Refer to the repair instructions to find out in which situations a setting is necessary.

Lifting mechanism

Unlike many other BMW convertibles, the two main pillars are not moved by hydraulic cylinders, but rather by an electric motor on each pillar. This requires multi-stage gear transmission.

G29 Body
6. Soft Top



G29 erection mechanism (left)

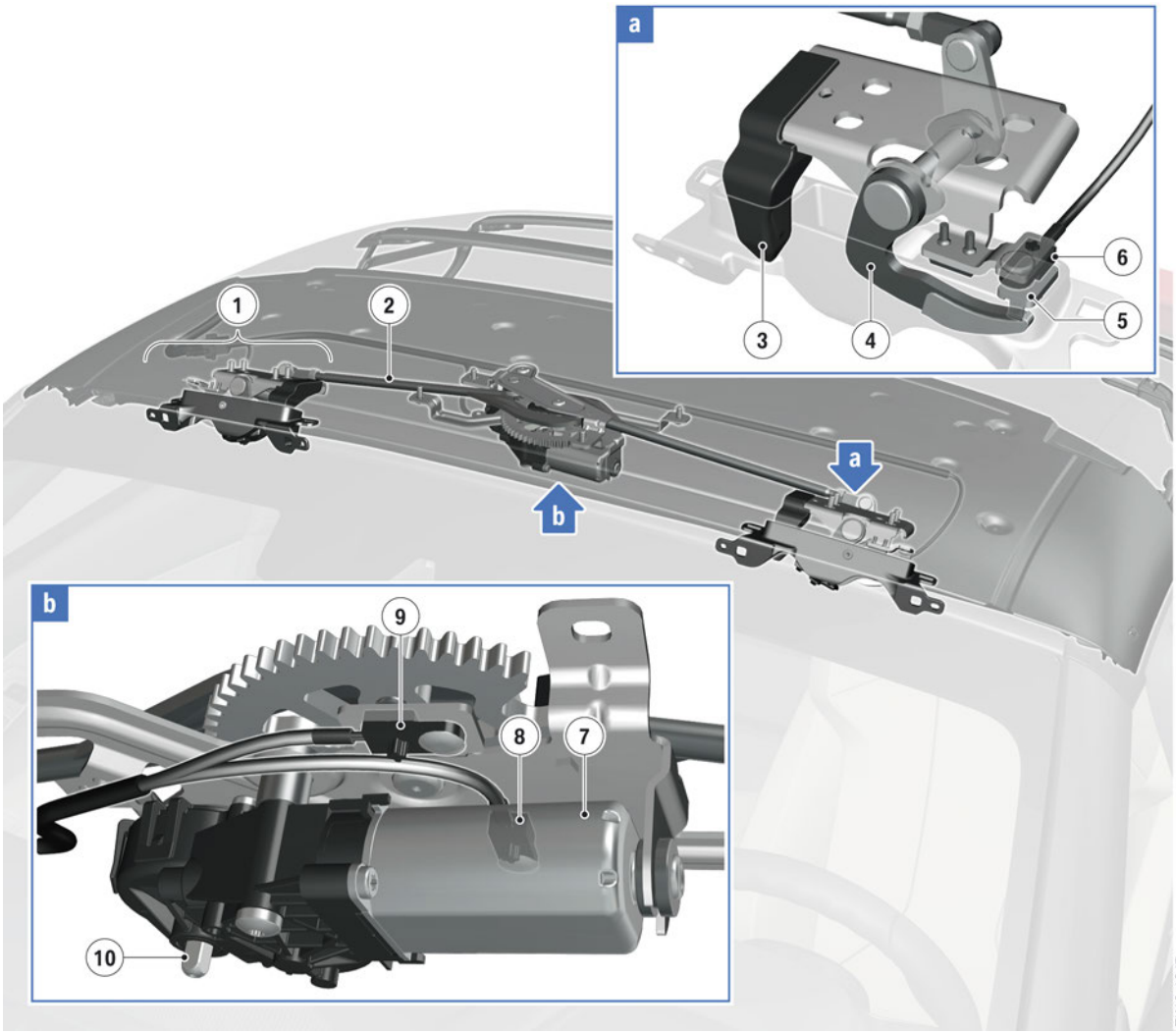
Index	Explanation
1	Main pillar
2	Drive arm
3	Sprocket, main pillar
4	Soft top main bearing
5	Convertible top drive unit (electric motor with transmission and drive pinion)
6	Main pillar convertible top mechanism guide

Cowl panel lock drive

The soft top is locked at the cowl panel in closed state. To lock the front bow to the windscreen frame, the retaining hooks are moved by an electric motor via pushrods and a transmission. The electrical drive of the cowl panel lock drive is located at the front bow.

The retaining hooks of the cowl panel lock drive are closed also when the soft top is opened in order to avoid damaging the convertible top fabric.

G29 Body
6. Soft Top



Cowl panel lock drive

Index	Explanation
1	Soft top latch
2	Pushrod
3	Guide pin
4	Retaining hook
5	Magnet (in base plate at cowl panel)
6	Hall effect sensor, cowl panel locked, left
7	Electric cowl panel lock drive
8	Hall effect sensor, cowl panel lock drive opened
9	Hall effect sensor, cowl panel lock drive closed
10	Square (for manual actuation)

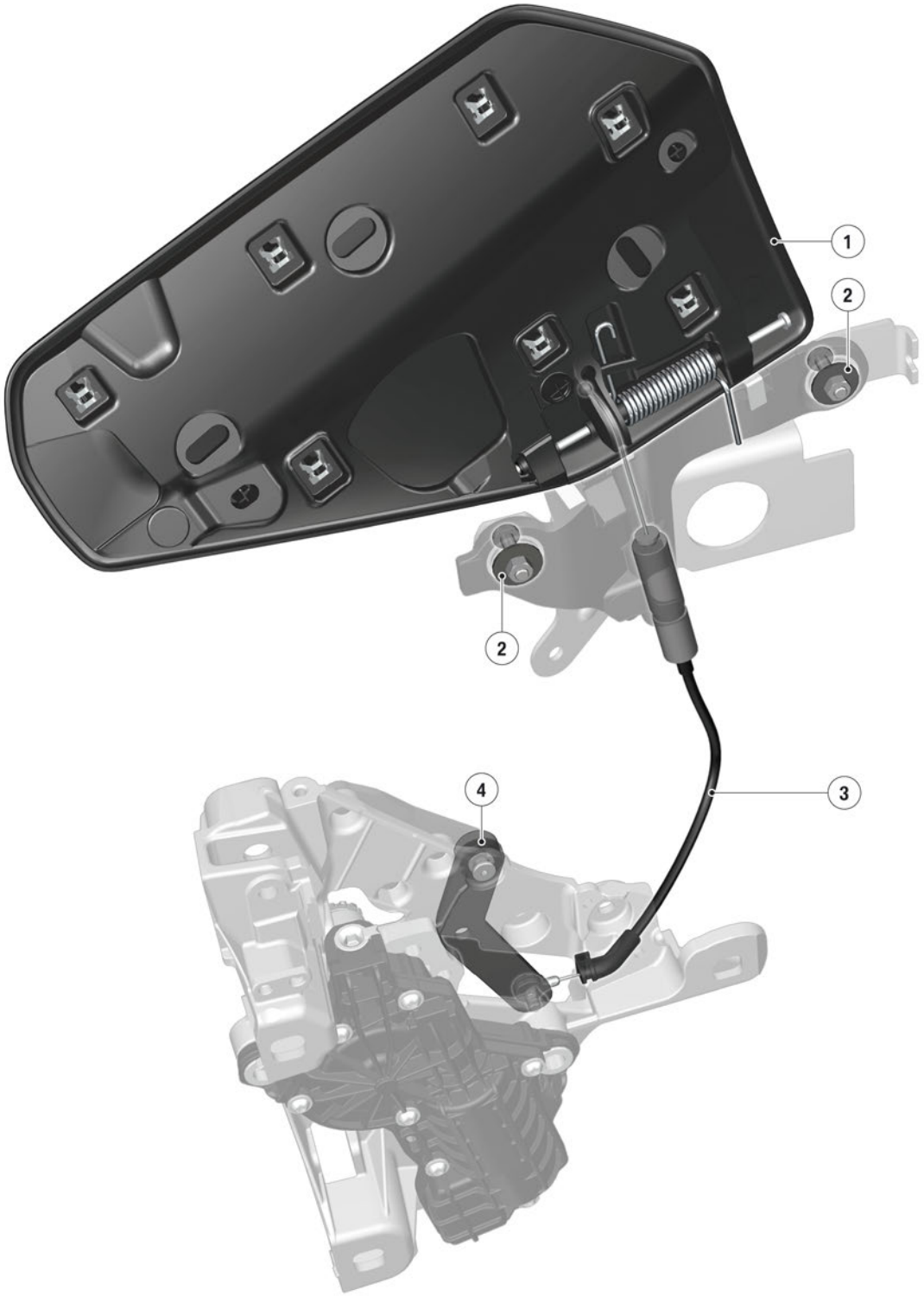
G29 Body
6. Soft Top

Linkage aperture flaps

The linkage aperture flaps are controlled mechanically via a Bowden cable. The Bowden cable is secured at a lever in the area of the main bearing.

When the soft top is closed the linkage aperture flaps are opened by spring force. Only upon opening of the soft top – shortly before it is placed down in the convertible top compartment – are the linkage aperture flaps closed by the Bowden cables.

G29 Body
6. Soft Top



TK18-1794

G29 linkage aperture flap, left

Index	Explanation
1	Linkage aperture flap (trim)
2	Adjusting element
3	Bowden cable
4	Lever, opening mechanism

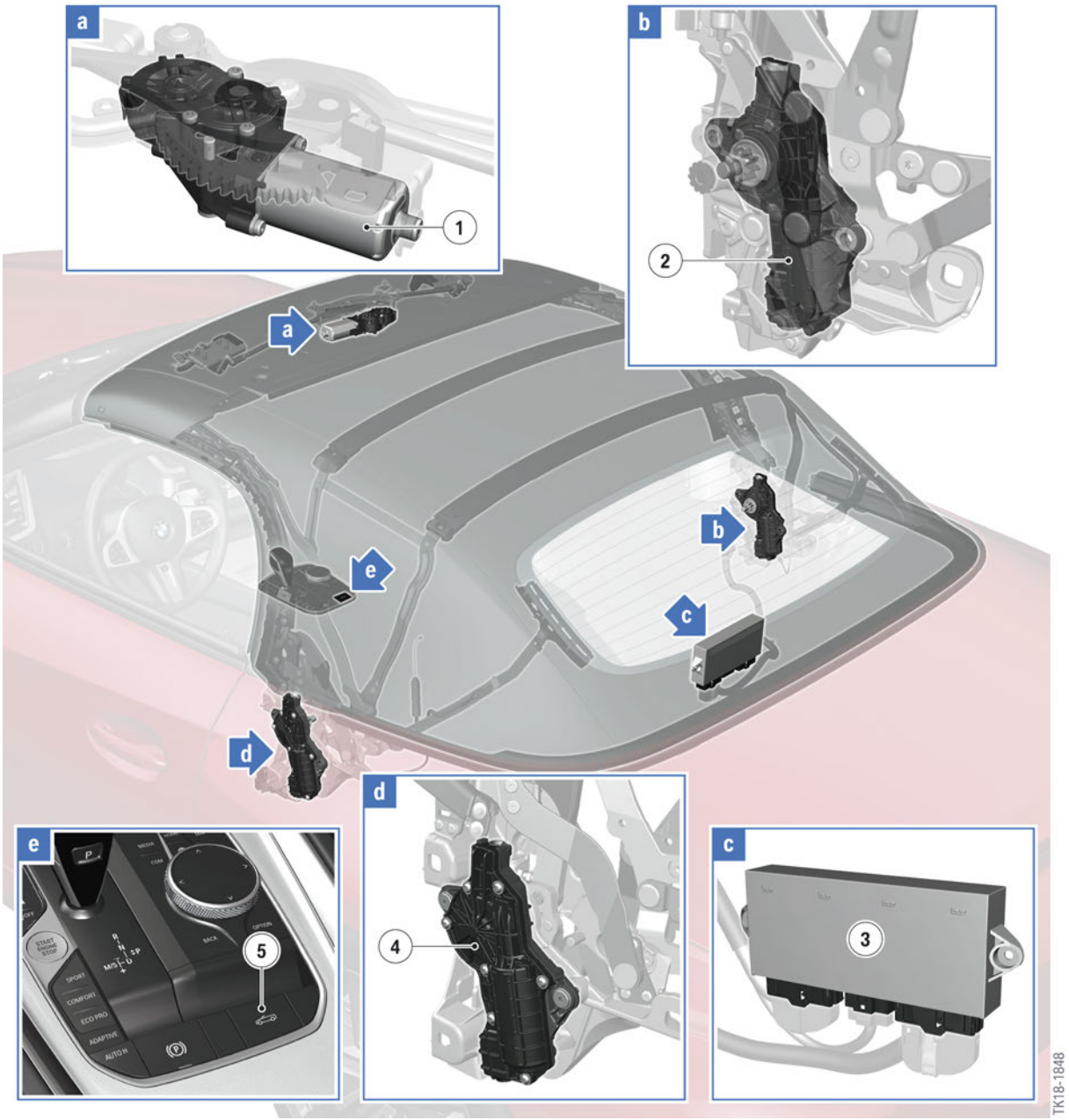
The linkage aperture flaps can be set in x, y and z direction. For this, they are connected to the bodyshell via 2 adjusting elements.

6.1.3. Electrical components

Buttons, control unit and drive

The electrical drives of the soft top (convertible top drive unit and electrical drive for cowl panel lock drive) are controlled by the convertible top module (CVM). It receives the request directly via the convertible top button. Upon actuation via the ID transmitter the convertible top module receives the request via the K-CAN2.

G29 Body
6. Soft Top



Convertible top button, convertible top module (CVM) and soft top drives

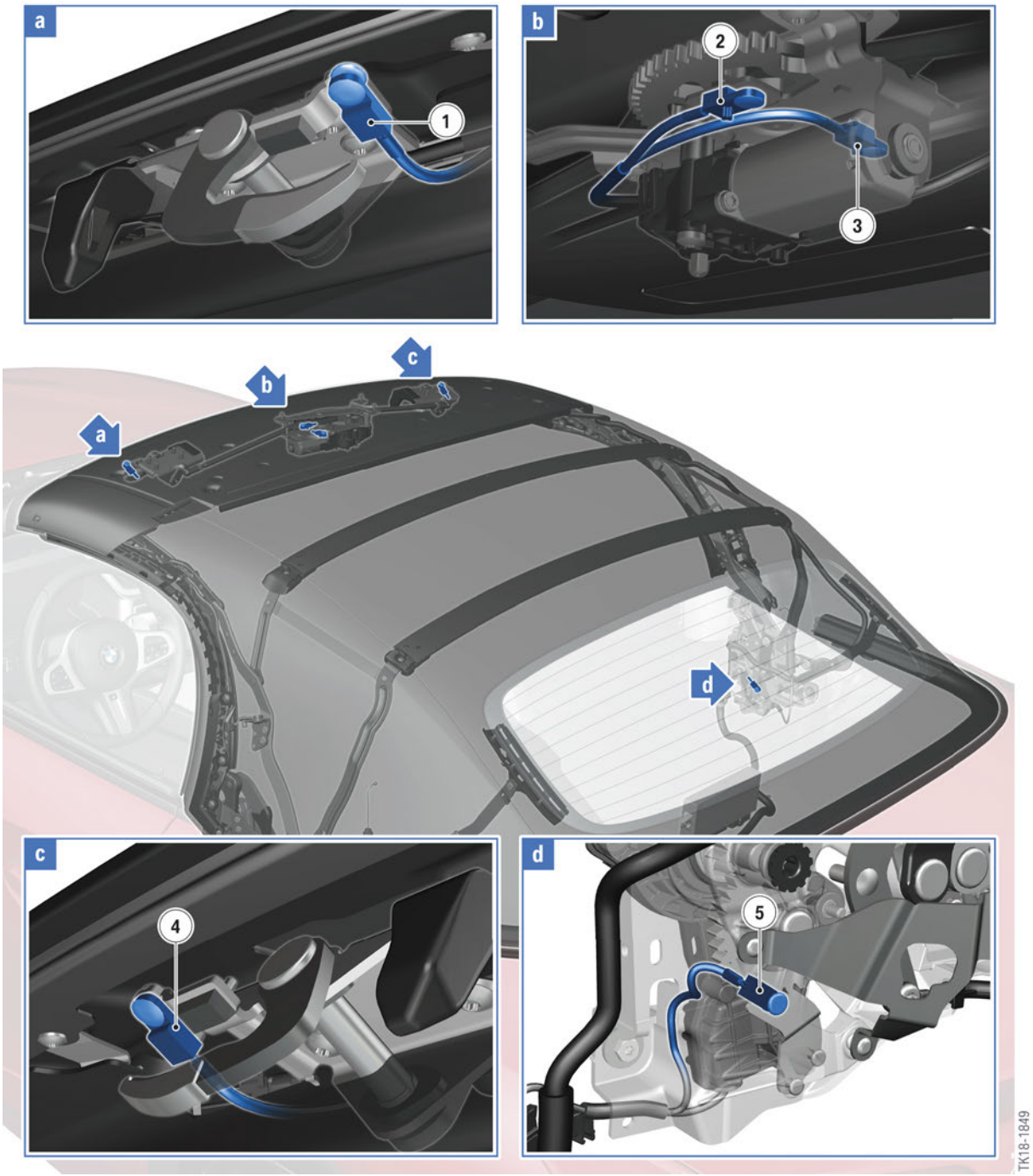
Index	Explanation
1	Electric cowl panel lock drive
2	Convertible top drive unit, right (incl. incremental sensor)
3	Soft top module (CVM)
4	Convertible top drive unit, left (incl. incremental sensor)
5	Soft top button

G29 Body

6. Soft Top

Sensors

The respective position of the soft top, as well as the status of the cowl panel lock drive, is detected via 5 hall effect sensors as well as the incremental sensors integrated in the convertible top drive units. Microswitches – like in other current BMW convertible top systems – are not used.



G29 sensors, convertible top position

G29 Body
6. Soft Top

Index	Explanation
1	Hall effect sensor, cowl panel locked, left
2	Hall effect sensor, cowl panel lock drive closed
3	Hall effect sensor, cowl panel lock drive opened
4	Hall effect sensor, cowl panel locked, right
5	Hall effect sensor, convertible top lowered

- **Hall effect sensor, cowl panel locked, left:**
  The hall effect sensor is located at the front bow on the left and is secured at the convertible top latch. A magnet installed at the cowl panel serves as a counterpart. The hall effect sensor only detects the magnets when the retaining hooks are closed and the cowl panel is locked.
- **Hall effect sensor, cowl panel lock drive closed:**
  The hall effect sensor is located at the front bow in the area of the electrical drive for the cowl panel lock drive. A magnet is installed in the sprocket of the linkage. When the sprocket reaches the end position "Closed", the hall effect sensor detects the magnets.
- **Hall effect sensor, cowl panel lock drive opened:**
  The hall effect sensor is located at the front bow in the area of the electrical drive for the cowl panel lock drive. A magnet is installed in the sprocket of the linkage. When the sprocket reaches the end position "Open", the hall effect sensor detects the magnets.
- **Hall effect sensor, cowl panel locked, right:**
  The hall effect sensor is located at the front bow on the right and is secured at the convertible top latch. A magnet installed at the cowl panel serves as a counterpart. The hall effect sensor only detects the magnets when the retaining hooks are closed and the cowl panel is locked.
- **Hall effect sensor, convertible top lowered:**
  The hall effect sensor is located in the lower area of the right convertible top main bearing. When the soft top is completely stowed, the hall effect sensor detects the corresponding position of the main pillar drive gear. For this, a magnet is installed at the corresponding position of the main pillar drive gear.
- **Incremental sensor:**
  Two incremental sensors are located in both convertible top drive units. The convertible top module (CVM) determines the revolutions and direction of rotation of the convertible top drive units.

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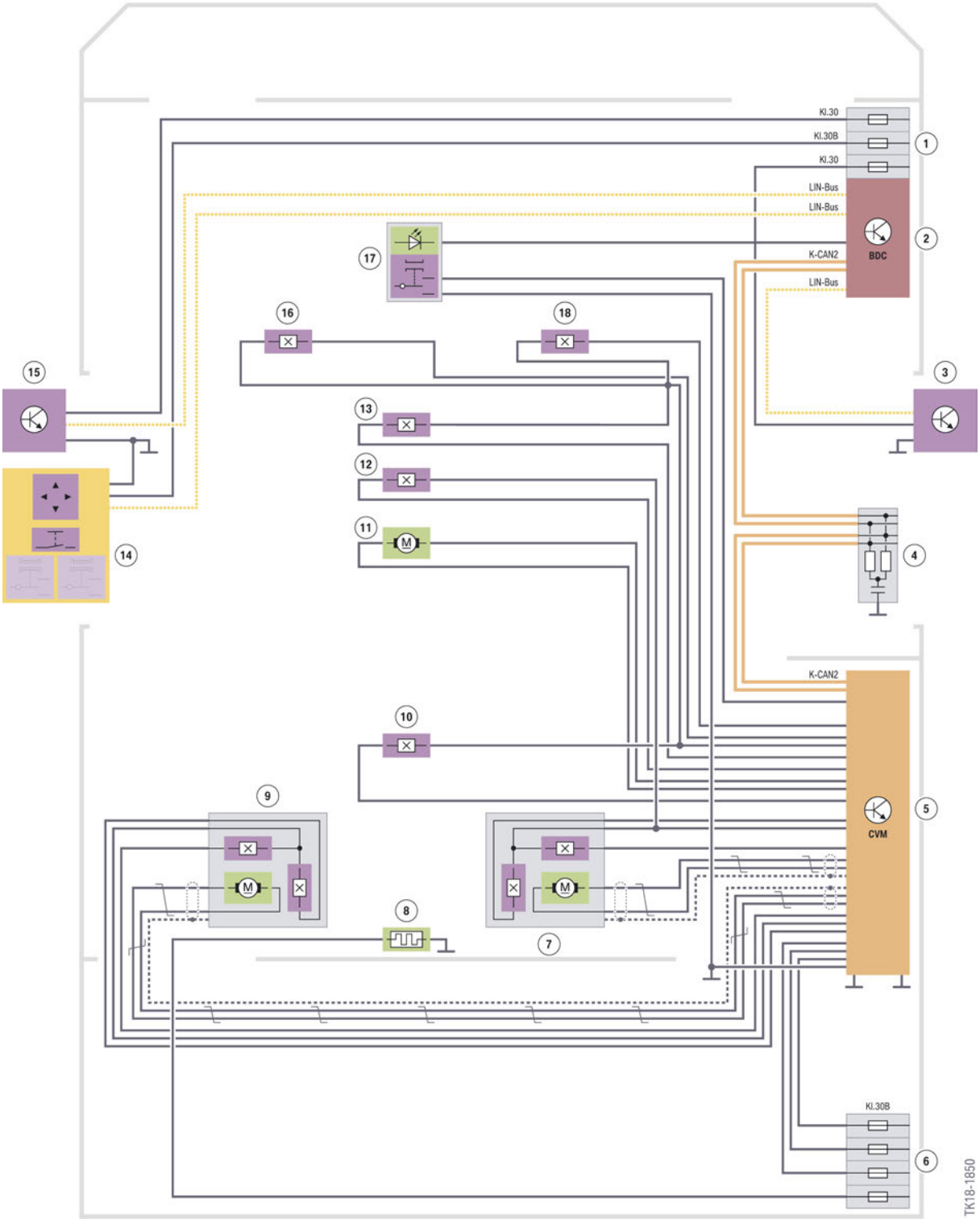
6. Soft Top

System wiring diagram



G29 system wiring diagram for the convertible top module (CVM)

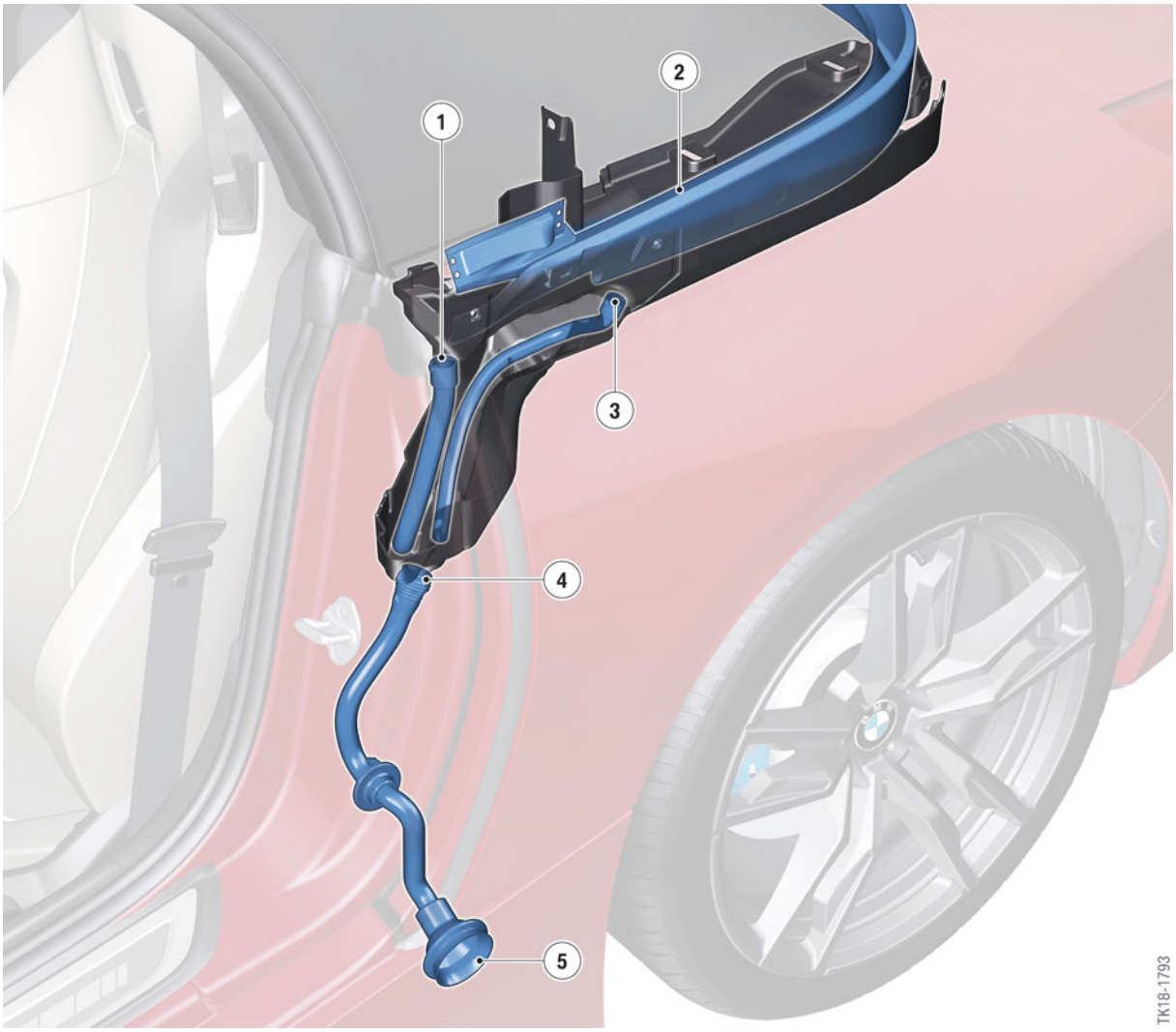
G29 Body
6. Soft Top

Index	Explanation
1	Power distribution box, front right
2	Body Domain Controller (BDC)
3	Power window electronics, front passenger door
4	CAN terminator K-CAN2
5	Soft top module (CVM)
6	Power distribution box, luggage compartment
7	Convertible top drive unit, right (incl. incremental sensor)
8	Heated rear window
9	Convertible top drive unit, left (incl. incremental sensor)
10	Hall effect sensor, convertible top lowered
11	Electric cowl panel lock drive
12	Hall effect sensor, cowl panel lock drive closed
13	Hall effect sensor, cowl panel lock drive opened
14	Switch block, driver's door
15	Power window electronics, driver's door
16	Hall effect sensor, cowl panel locked, left
17	Soft top button
18	Hall effect sensor, cowl panel locked, right

G29 Body
6. Soft Top

6.1.4. Water run-off system

The soft top is sealed across the bodyshell via a water liner in the rear and side area.
From here the water is directed via plastic trays to the funnels of the water drains.



G29 water run-off system

Index	Explanation
1	Water drain below front linkage aperture flap
2	Water liner
3	Water drain below rear linkage aperture flap
4	Water drain, convertible top compartment
5	Water drain outlet

G29 Body
6. Soft Top

6.1.5. Convertible top fabric

For the G29 two different convertible top fabrics are available for the market introduction.

G29 convertible top fabrics

Index	Explanation
A	Moonlight Black
B	Anthracite silver-effect

The soft top must be removed for the removal and installation of the convertible top fabric.

6.1.6. Headlining

The headlining consists of several parts that are connected by a special zip system. The slide for releasing and connecting the separate components is included in the headliner attachment set.

The separate components of the headlining are marked on the upper side with thin lines. They must be aligned with each other when joining the separate components.

The soft top must be removed for the removal and installation of the headlining.

6.1.7. Rear window

The rear window includes rear window heating. The two electrical connections are located in the direction of travel on the left.
The rear window is a fixed component of the convertible top fabric. The rear window therefore cannot be replaced separately.

6.2. Operation and function

6.2.1. Prerequisites

The following conditions must be satisfied before the soft top can be opened or closed:

- Driving speed ≤ 50 km/h (31 mph)
- Ambient temperature > –10 °C (> 14 °F) (closing still possible in lower temperatures)
- Vehicle condition RESIDING or DRIVING is active (upon operation via the convertible top button)
- Vehicle condition PARKING or RESIDING is active (upon operation via the ID transmitter)
- Brake pedal pressed (upon operation via the convertible top button)
- ID transmitter in the vicinity (upon operation via the ID transmitter)
- Power window regulators initialized
- Driver's door closed (upon operation via the ID transmitter)
- Battery voltage (open) > 10.5 V (convertible top movements already started will be completed)
- Temperature of electric motors is not too high (the temperature of the electric motors is not measured. Instead the temperature is calculated by the convertible top module using a computational model)
- Vehicle not in transportation mode
- Confirmation of the correct position of the mechanical components by the sensors.

If one of the preconditions is not fulfilled, the opening or closing action will not start. In addition, a Check Control message is displayed in the instrument cluster.

G29 Body
6. Soft Top

6.2.2. Standard operation

Standard operation of the soft top is performed by means of the convertible top button.
The controller is situated in the Center Operation Unit.

G29 soft top button

Index	Explanation
1	Soft top button

Movement of the soft top is performed as long as the soft top button is operated.

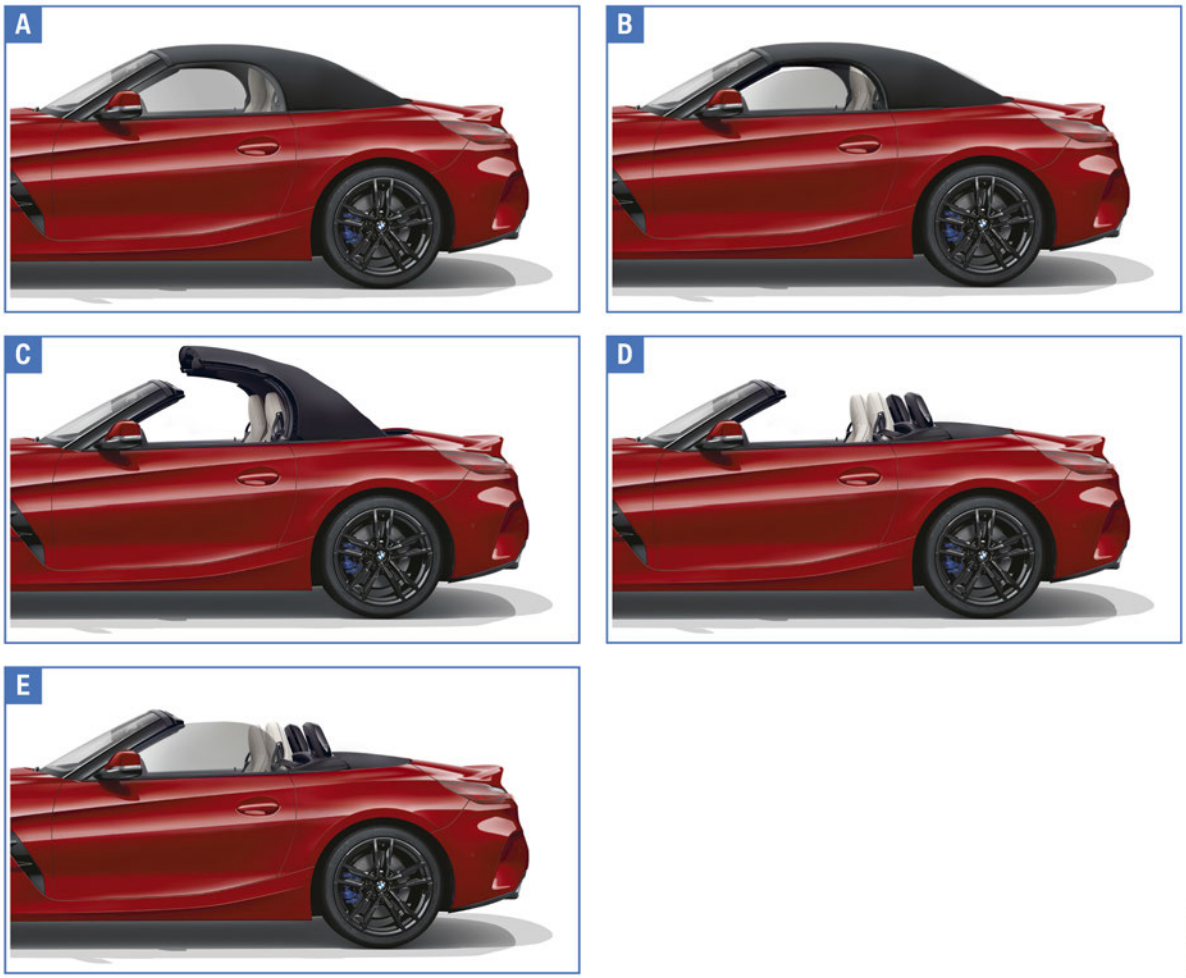
- Press convertible top button: soft top is opened.
- Pull convertible top button: soft top is closed.

If the convertible top button is released during the opening or closing of the soft top, the movements of the soft top or the side windows are interrupted immediately. In addition, a Check Control message is displayed in the instrument cluster. The movements are resumed when the soft top button is operated again.

G29 Body

6. Soft Top

Procedure for opening the soft top

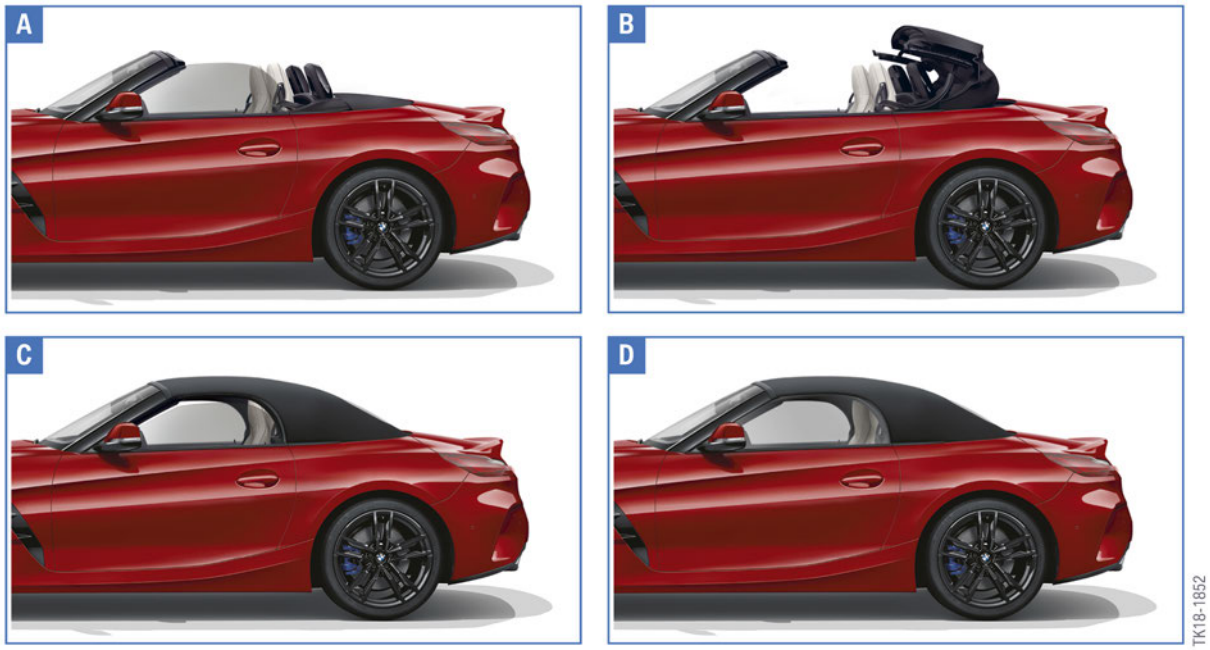


G29 procedure for opening the soft top

Index	Explanation
A	Initial situation: The soft top is locked at the cowl panel and the side windows are fully closed.
B	The side windows are fully lowered. At the same time, the soft top is unlocked at the cowl panel.
C	The soft top is opened via the two convertible top drive units on the right and left.
D	The soft top is fully stowed in the soft top compartment.

G29 Body
6. Soft Top

Procedure for closing the soft top



G29 procedure for closing the soft top

Index	Explanation
A	Initial situation: The soft top is stowed in the convertible top compartment and the side windows are fully closed.
B	The side windows are partially lowered. The soft top is closed via the two convertible top drive units on the right and left.
C	The soft top is set down and locked at the cowl panel.
D	If the convertible top button remains held down, the side windows are fully closed.

6.2.3. Convenience functions

In addition to the standard operation via the convertible top button, the soft top can also be opened and closed via the ID transmitter.

To open or close the soft top with the ID transmitter, the Unlock/Lock button must be pressed and held down. After a short waiting period the soft top is opened or closed. The opening or closing action is immediately interrupted when the Unlock/Lock button is released or the button on a different ID transmitter is pressed or the close-range area is left.

6.3. Notes for Service

6.3.1. Diagnostics

The non-electrical diagnosis (NED) in the ISTA workshop information system should also always be included in all diagnostic work relating to water ingress, wind noises or operating noises. This includes information to assist in determining the causes of interference noises and leaks. In addition, remedial measures in the form of repair instructions, graphics or video sequences are shown.

6.3.2. Close soft top manually

The soft top can be closed manually in an emergency. This chapter describes the manual unlocking of the convertible top drive units as well as the manual locking of the soft top at the cowl panel. If the soft top is closed manually, the steps in the repair instructions must be observed in the prescribed sequence.

Manual unlocking of the convertible top drive units

There is a hex fitting under each of the linkage aperture flaps. The convertible top drives are unlocked via the hex fittings at the respective transmission.

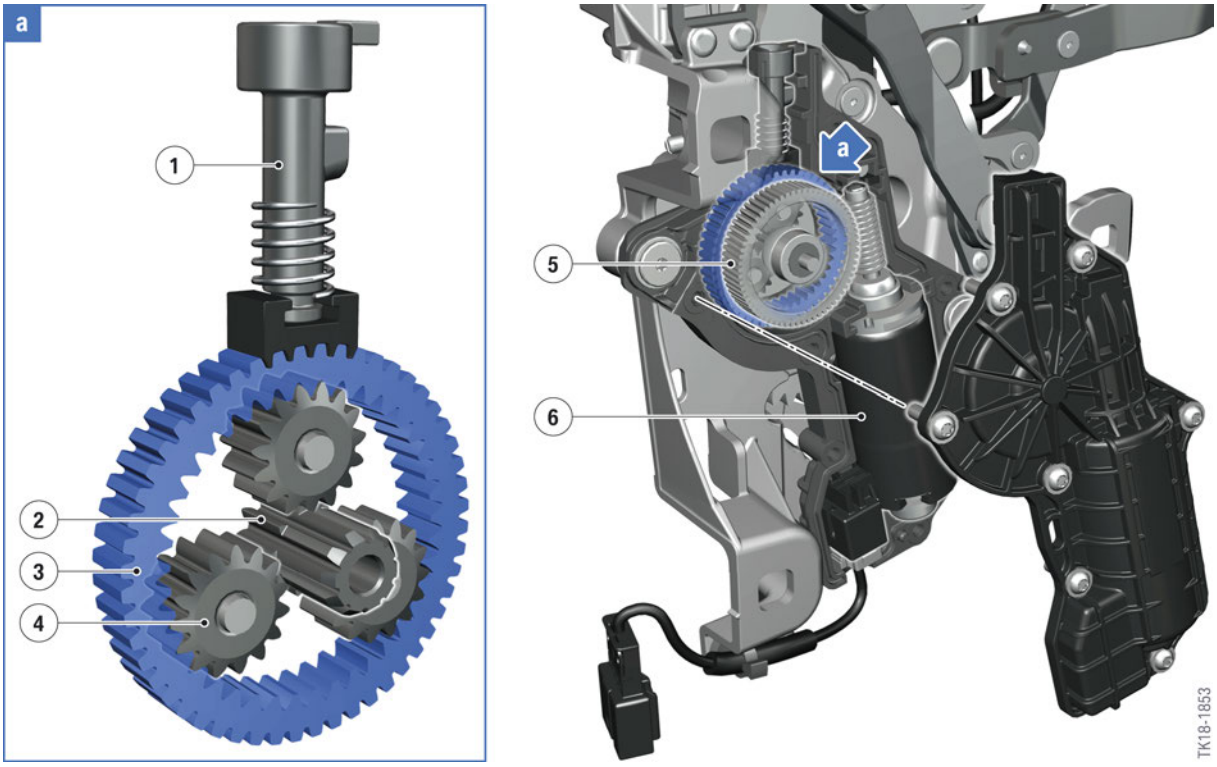
The hex fittings lock in the normal operating condition of the ring gear of the respective planetary gear set. If the ring gear is released, the transmission rotates freely. The soft top can then be closed manually.

There are marks on the upper side of the hex fittings. They show the current operating condition of the convertible top drive units (locked/unlocked).

In order to lock the convertible top drive units again that were previously unlocked manually, the hex fittings must be turned when the soft top is opened. You must rock the front bow slightly in order to move the hex fittings into the correct position. Otherwise, the hex fittings could break.

G29 Body

6. Soft Top



G29 structure of convertible top drive unit

Index	Explanation
1	Hex fitting
2	Sun gear
3	Ring gear
4	Planet gear
5	Sprocket
6	Electric motor

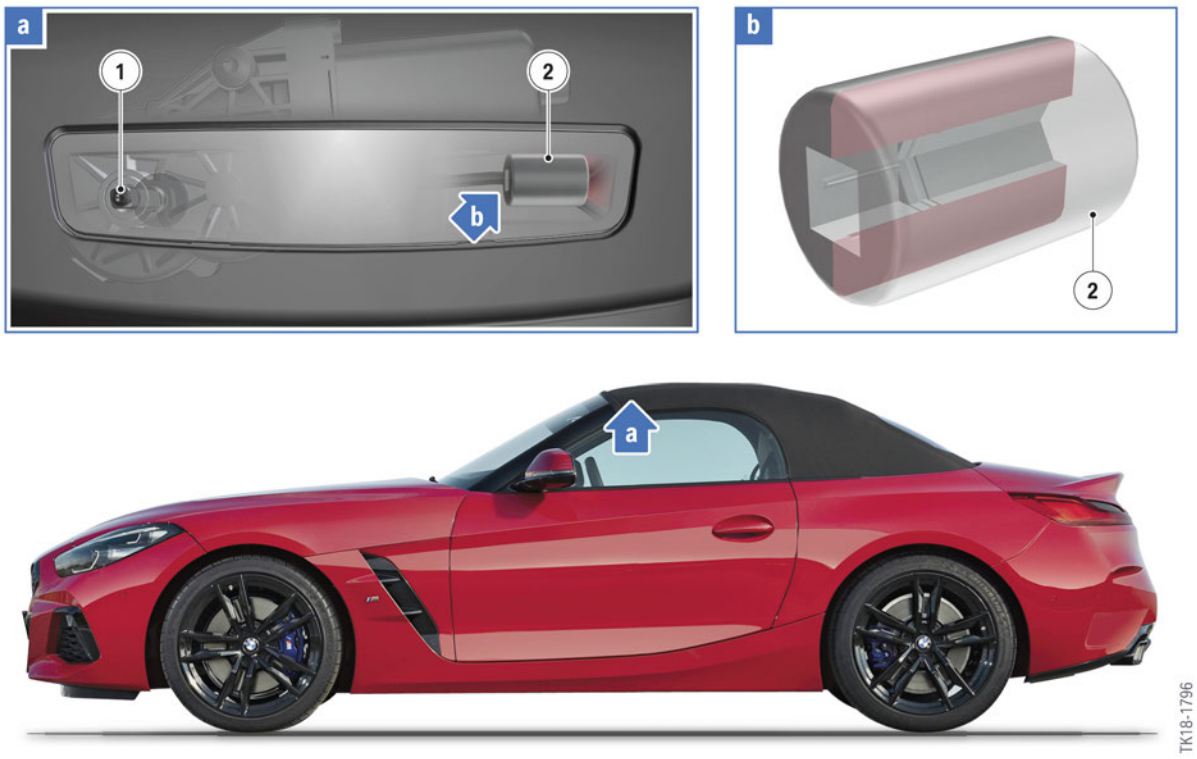
Manual locking at cowl panel

The soft top can be manually locked or unlocked at the cowl panel. The shaft of the drive pinion of the cowl panel lock drive is turned manually.

Two people are required for the manual locking of the soft top at the cowl panel. While one person presses the front bow in the middle down towards closing, the other person actuates the cowl panel lock drive.

A plastic adapter is used in order to connect the hexagon socket wrench in the toolkit with the square bolt of the cowl panel lock drive. It is located behind the trim at the convertible top bow at the front.

G29 Body
6. Soft Top



Manual locking at cowl panel

Index	Explanation
1	Square bolt lock drive (for the manual locking/unlocking of the cowl panel)
2	Adapter, hexagon socket-square (toolkit)

Technical training.
Product information.

G29 Powertrain/Chassis

Edited for the U.S. market by:
BMW Group University
Technical Training
ST1834 2/1/2019

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: October 2018

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.

The information contained in the training course materials is solely intended for participants in this training course conducted by BMW Group Technical Training Centers, or BMW Group Contract Training Facilities.

This training manual or any attached publication is not intended to be a complete and all inclusive source for repair and maintenance data. It is only part of a training information system designed to assure that uniform procedures and information are presented to all participants.

For changes/additions to the technical data, repair procedures, please refer to the current information issued by BMW of North America, LLC, Technical Service Department.

This information is available by accessing TIS at www.bmwcenternet.com.

Additional sources of information

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

- Owner's Handbook
- Integrated Service Technical Application
- Aftersales Information Research (AIR)

G29 Powertrain/Chassis

Contents

G29 Powertrain/Chassis

Contents

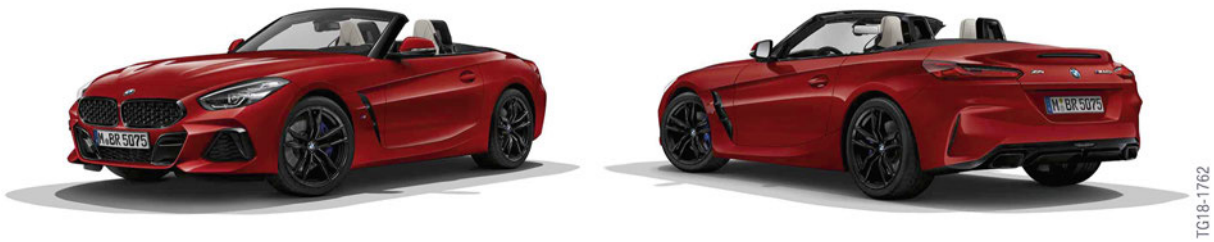
G29 Powertrain/Chassis

1. Introduction

1.1. Overview

The 3rd generation of the BMW Z4 has the development code G29. The market introduction takes place in March 2019.

G29 sDrive 30i



G29 M40i

Both models are equipped with an 8-speed automatic transmission and the variable sport steering for the market introduction. Models with all-wheel drive are not offered for the G29.

1.2. Models

1.2.1. Overview

The following models are available for the market introduction in March 2019:

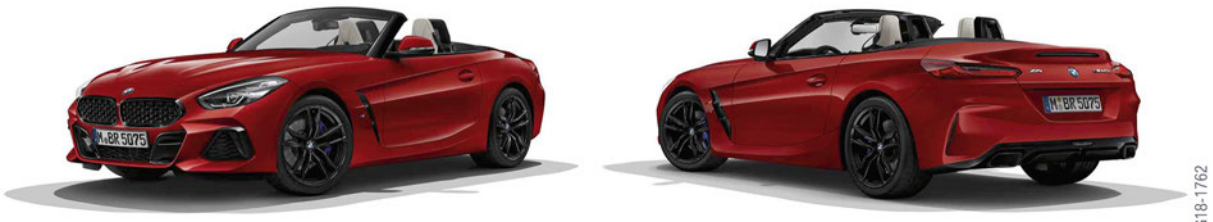
Model	Engine	Automatic transmission	Rear axle final drive
Z4 sDrive 30i	B46B20O1	GA8L51CZ	190AL; optional 215LWS
Z4 M40i	B58B30M1	GA8L51CZ	215LWS

G29 Powertrain/Chassis

1. Introduction

1.2.2. BMW M Performance model

For the market introduction of the G29 the BMW M Performance model Z4 M40i is available.



G29 BMW M Performance model M40i

The M Performance model has specific design and equipment features. In addition to the specific internal and external standard equipment of the vehicles, the BMW Z4 M40i is also equipped with the following technical highlights as standard:

- M sports suspension
- M sport differential
- 17" M sport brake

G29 Powertrain/Chassis

2. Engines

2.1. Overview

The following table provides an overview of the technical data of the engines used:

Parameters	Unit	sDrive 30i	M40i
Engine designation	-	B46B20O1	B58B30O1
Power output	[kW (HP)]	190 (255)	285 (381)
Torque	[Nm] (lb-ft)	400 (295)	500 (368)
Displacement	[cm]	1950	2998

2.2. B46TU engine

2.2.1. Technical data

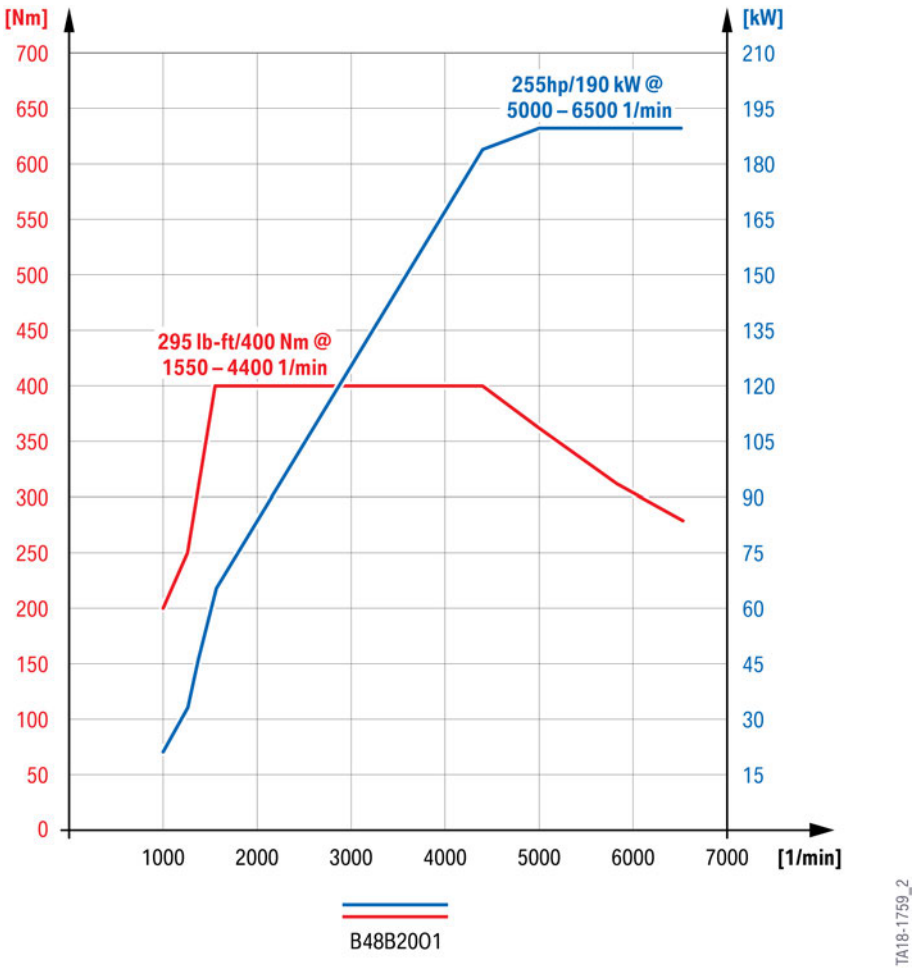
B46TU engine

G29 Powertrain/Chassis

2. Engines

Parameters	Unit	B48B20O1
Displacement	cm^3	1950
Cylinder layout	-	In-line
number of cylinders	-	4
Firing order	-	1–3–4–2
Bore hole	mm	81
Stroke	mm	94.6
Compression ratio	ε	10.2 : 1
Combustion process	-	Turbo-Valvetronic direct injection
Max. output at rotational speed	kW (hp) rpm	190 (255) 5000–6500
Max. torque at rotational speed	Nm (lb-ft) rpm	400 (295) 1550–4400
Oil quantity	l	5.25

2.2.2. Full load diagram



Full-load diagram for B48B20O1

2.2.3. Highlights

- Fuel preparation with 350 bar injection pressure
- Cylinder head with **without** integrated exhaust manifold (exhaust turbocharger housing and exhaust manifold are a single component)
- Indirect charge air cooling
- Adapted exhaust turbocharger made from steel
- Split cooling
- Coolant pump with integrated pressure relief valve
- Heat management module with electric split cooling valve
- Single-part chain drive
- Digital Motor Electronics (DME) of the 8th generation (DME 8.4T.1)

G29 Powertrain/Chassis

2. Engines

2.3. B58TU engine

2.3.1. Technical data

B58TU engine

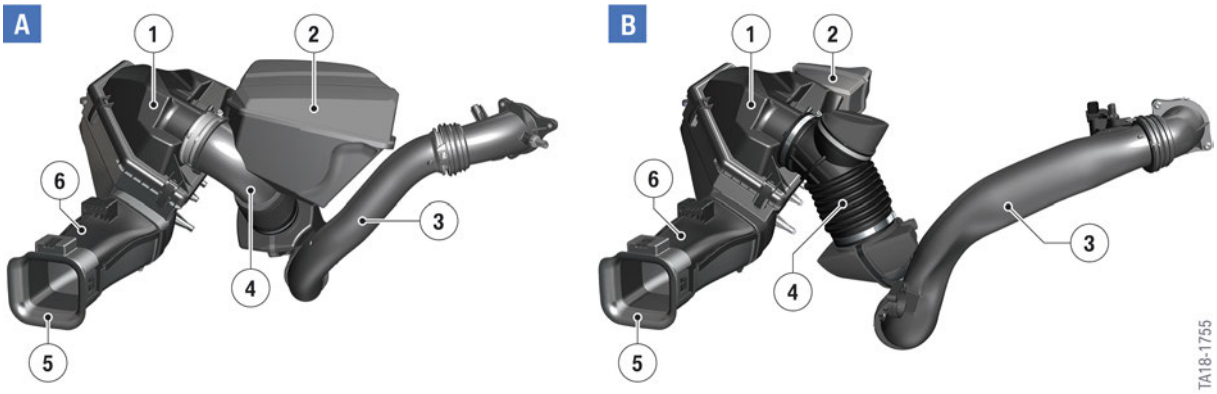
Parameters	Unit	B58B30O1
Displacement	cm^3	2998
Cylinder layout	-	In-line
number of cylinders	-	6
Firing order	-	1–5–3–6–2–4
Bore hole	mm	82
Stroke	mm	94.6
Compression ratio	ε	11.0 : 1
Combustion process	-	Turbo-Valvetronic direct injection

Parameters	Unit	B58B30O1
Max. output at rotational speed	kW (hp) rpm	285 (381) 5000–6500
Max. torque at rotational speed	Nm (lb-ft) rpm	500 (368) 1600–4500
Oil quantity	l	6.5

2.3.2. Highlights

- Fuel preparation with 350 bar injection pressure
- Cylinder head **without** integrated exhaust manifold (exhaust turbocharger housing and exhaust manifold are a single component)
- Adapted exhaust turbocharger made from steel
- Split cooling
- Coolant pump with integrated pressure relief valve
- Heat management module with electric split cooling valve
- Single-part chain drive
- Digital Motor Electronics (DME) of the 8th generation (DME 8.6T.1)

2.4. Air intake system



G29 intake air system

Index	Explanation
A	Air intake system B48B20O1
B	Air intake system B58B30O1
1	Intake silencer
2	Resonator

Index	Explanation
3	Charge air hose from compressor for indirect charge air cooling
4	Clean air pipe
5	Unfiltered air intake
6	Unfiltered-air duct

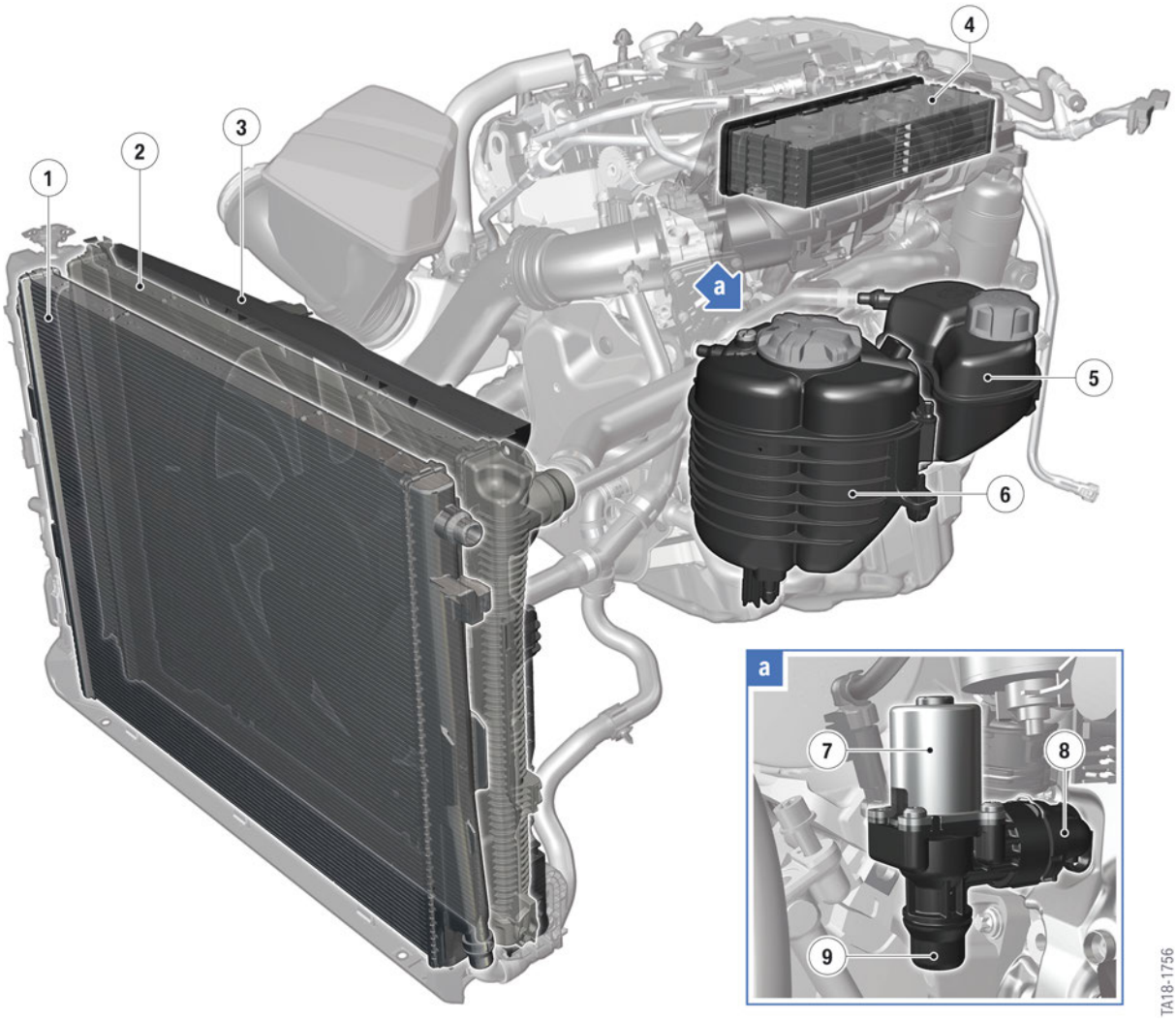
2.5. Cooling

The B46TU engine in the upper power level, as well as the B58TU engine, have 2 separate coolant circuits.

The low-temperature coolant circuit serves for cooling the charge air (indirect charge air cooling) and the high-temperature coolant circuit serves for cooling the engine. The two coolant circuits each have their own expansion tank.

2.5.1. B46TU Engine

The B46TU engine is equipped with an additional coolant shutoff valve. During the engine's warm-up phase it blocks the high-temperature coolant circuit to the expansion tank. As a result, the engine reaches the operating temperature quicker, thus contributing to a reduction in CO2 pollutant emissions. The shutoff value is opened without current.



G29 cooling system for B46TU engine

Index	Explanation
1	Low-temperature radiator
2	High-temperature radiator
3	Electric fan
4	Charge air cooler
5	Expansion tank, low-temperature circuit
6	Expansion tank, high-temperature circuit
7	shutoff valve
8	Intake neck, coolant pump
9	Coolant hose from expansion tank to coolant pump

2.5.2. B58TU engine

In the B58TU engine 2 additional external radiators are used.

G29 cooling system for B58TU engine

Index	Explanation
1	Radiator installed outside
2	Low-temperature radiator
3	High-temperature radiator
4	Electric fan
5	Charge air cooler
6	Expansion tank, low-temperature circuit
7	Expansion tank, high-temperature circuit
8	Radiator installed outside

G29 Powertrain/Chassis

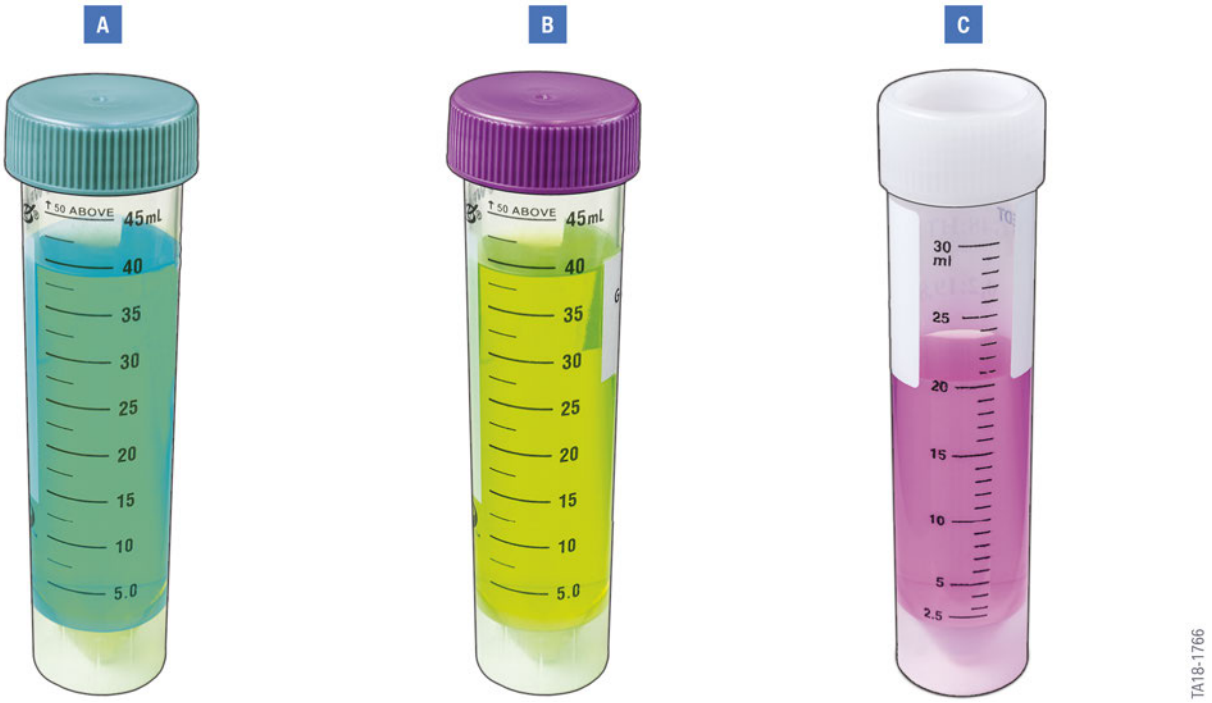
2. Engines

2.5.3. Antifreeze and corrosion inhibitor

The cooling system of the G29 is filled with the new antifreeze and corrosion inhibitor Frostox® HT-12. The new antifreeze and corrosion inhibitor increases the long-term stability and corrosion protection of the components.

It replaces the well-known antifreeze and corrosion inhibitor Glysantin® G48. The two can be distinguished by their color. The G48 can be recognized by the blue color.

The HT-12 comes in **green** and **magenta**. For the initial filling at the factory the **green** BMW antifreeze and corrosion inhibitor HT-12 is used. For service in the Retailer Organization the HT-12 in **magenta** is used for the time being up to 11/2018. The supply of the Retailer Organization with HT-12 in **green** is available as of 11/2018.



Antifreeze and corrosion inhibitor

Index	Explanation
A	Antifreeze and corrosion inhibitor Glysantin® G48
B	Antifreeze and corrosion inhibitor Frostox® HT-12 (color for initial filling in the factory)
C	Antifreeze and corrosion inhibitor Frostox® HT-12 (color in service up to 11/2018)

G29 Powertrain/Chassis

2. Engines

The following table provides an overview of the antifreeze and corrosion inhibitors used within the BMW Group:

	Color	Use	Initial filling in the factory	Filling in service
G30	Magenta	R55, R56 with W16 engine	●	●
i3 coolant	Blue	I01 heater circuit	●	●
G48	Blue	BMW Group vehicles up to production June/July 2018	●	●
HT-12	Green	BMW Group vehicles from production July/August 2018	●	
HT-12	Magenta	BMW Group vehicles from production up to 11/2018		●

Since the beginning of July/August 2018 all cooling systems in new vehicle models (depending on the production date and production plant) are supplied with the antifreeze and corrosion inhibitor HT-12.

Like the G48, the HT-12 contains silicate and forms a silicate layer on metallic component surfaces.

The silicate-free antifreeze and corrosion inhibitors (G30, i3 coolant), which are used in the cooling systems of the BMW i3, are the exception. Here organic salts are solely responsible for the corrosion protection. The coolant of the i3 (i3 coolant) can be recognized by the blue color.

Antifreeze and corrosion inhibitors cannot be mixed with each other in any manner. In the case of unauthorized mixing, the antifreeze and corrosion inhibitor may turn into a gel or cause engine damage.

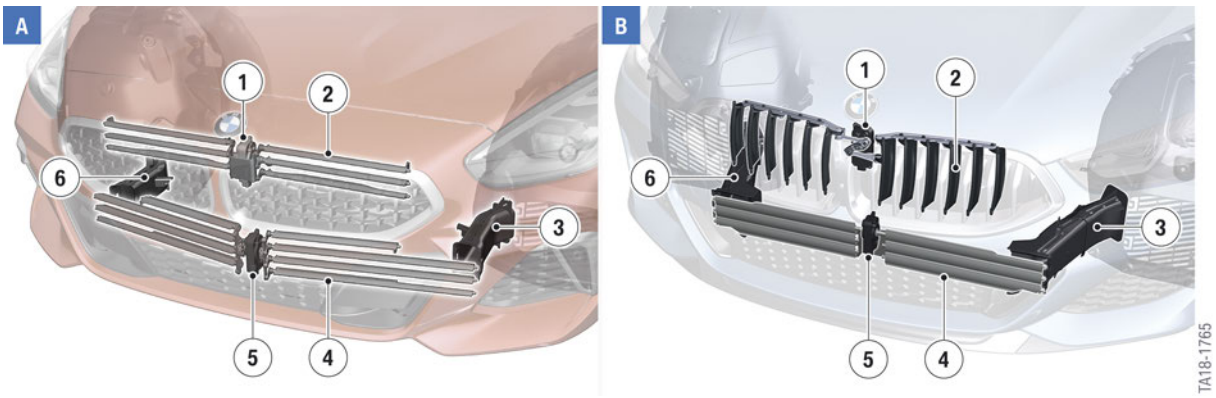
The following table shows the harmless miscibility of the antifreeze and corrosion inhibitors from a technical perspective:

	G30	i3 coolant	G48	HT-12 (green)	HT-12 (magenta) up to 11/2018
G30	●				
i3 coolant		●			
G48			●	●	●
HT-12 (green)			●	●	●
HT-12 (magenta)			●	●	●

The selection of the correct antifreeze and corrosion inhibitor is only possible using the BMW part number. In the event of an incorrect selection of the antifreeze and corrosion inhibitor there is a risk of component damage or failure.

2.5.4. Active air flap control

In the G29 a 2nd generation active air-flap control (used in F15, F16, F4x and F39) is used. It differs from the 3rd generation (used in G3x, G11, G01, G2x, G05 and G15) to the extent that it is **not** in the immediate field of view in the upper cooling air inlet.



Overview of generations of the active air-flap control

Index	Explanation
A	2nd generation active air-flap control in the G29
B	3rd generation active air-flap control in the G15
1	Actuator for air flaps at top
2	Air flaps at top
3	Brake air duct left
4	Air flaps at bottom
5	Actuator for air flaps at bottom
6	Brake air duct right

However, the function and control match that of the 3rd generation:

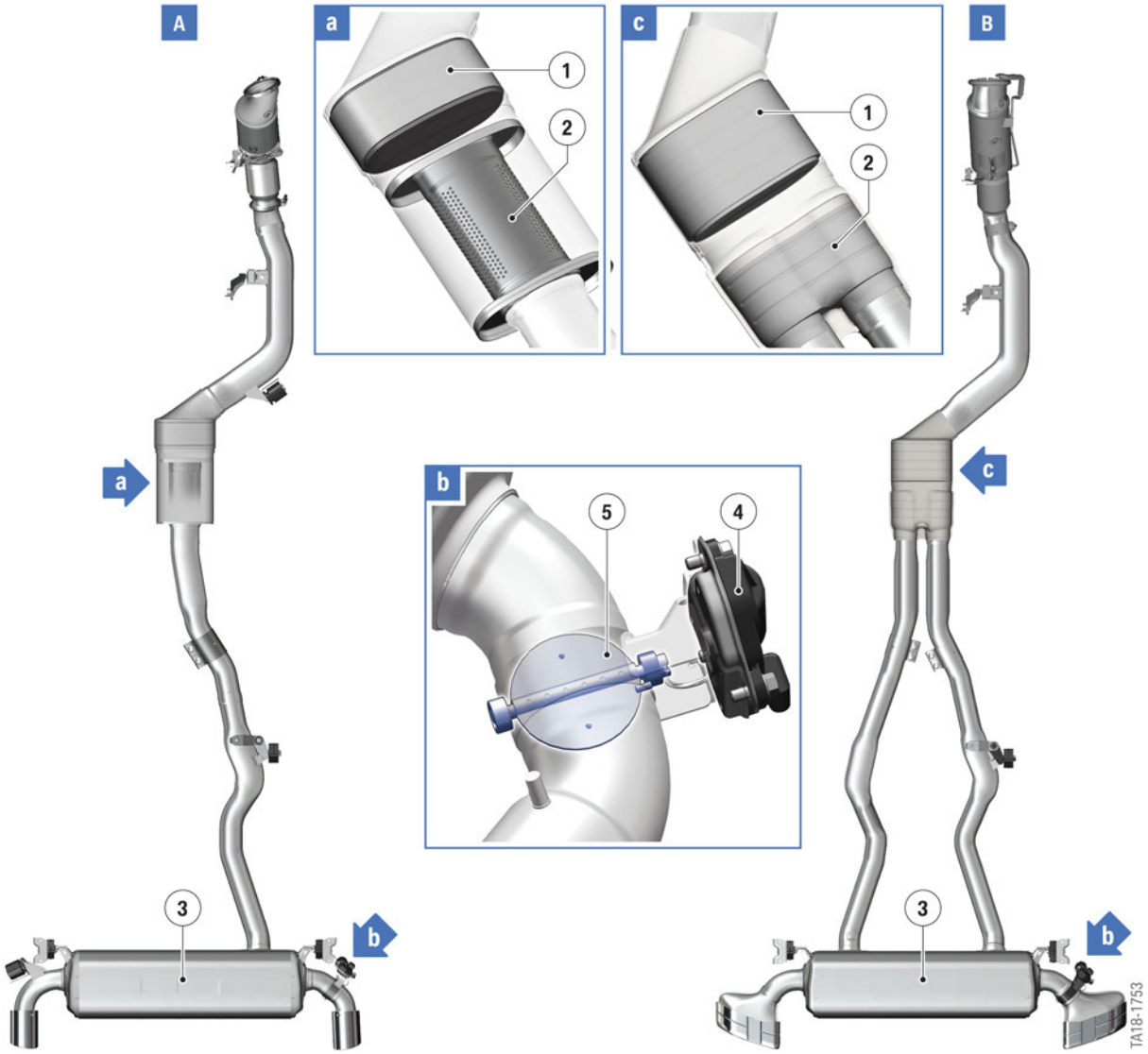
- 2 separate actuators for upper and lower air flaps.
- Basic logic of operating strategy: First open the lower air flap, then the upper air flap.
- Air flaps can move to several intermediate settings.
- Brake air duct is operated or supplied via the lower flap system.

G29 Powertrain/Chassis

2. Engines

In the predecessor model E89 a 1st generation air flap control was used. This has an actuator for the upper air flap. A lower air flap is only used when a naturally aspirated engine is used. The lower air flap, if present, is passive, i.e. without actuator. Like the 2nd generation, the 1st generation is also not fitted in the immediate field of view.

2.6. Exhaust emission system



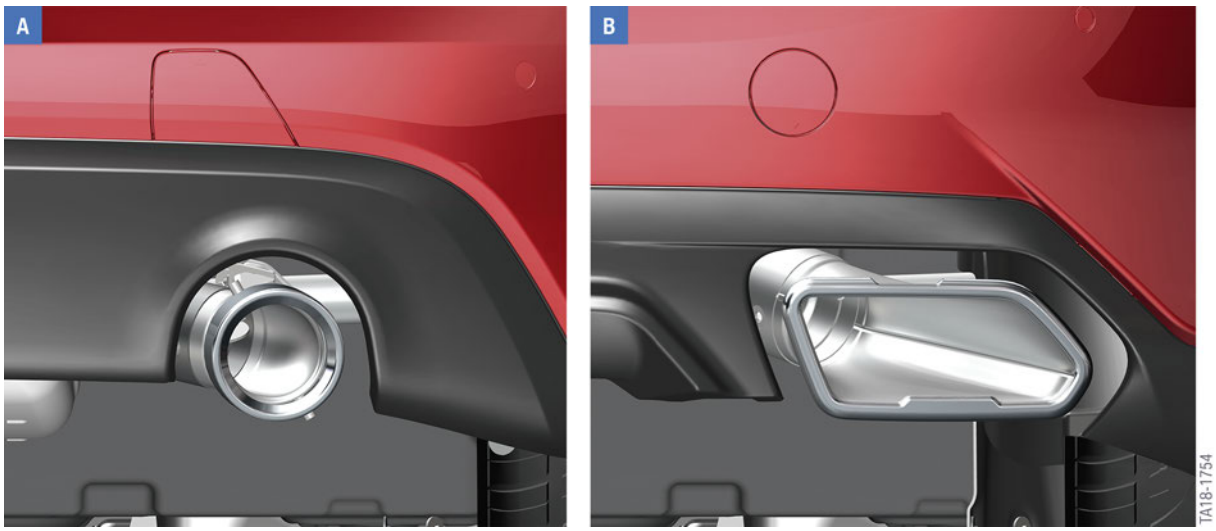
G29 exhaust emission system variants

G29 Powertrain/Chassis

2. Engines

Index	Explanation
A	B46TU engine (single-branch)
B	B58TU engine (two-branch)
1	Petrol particulate filter (Not for the US)
2	Center silencer
3	Rear silencer
4	E-motor exhaust flap
5	Exhaust flap

Different tailpipe trims are used for the two engines:



G29 exhaust tailpipe variants

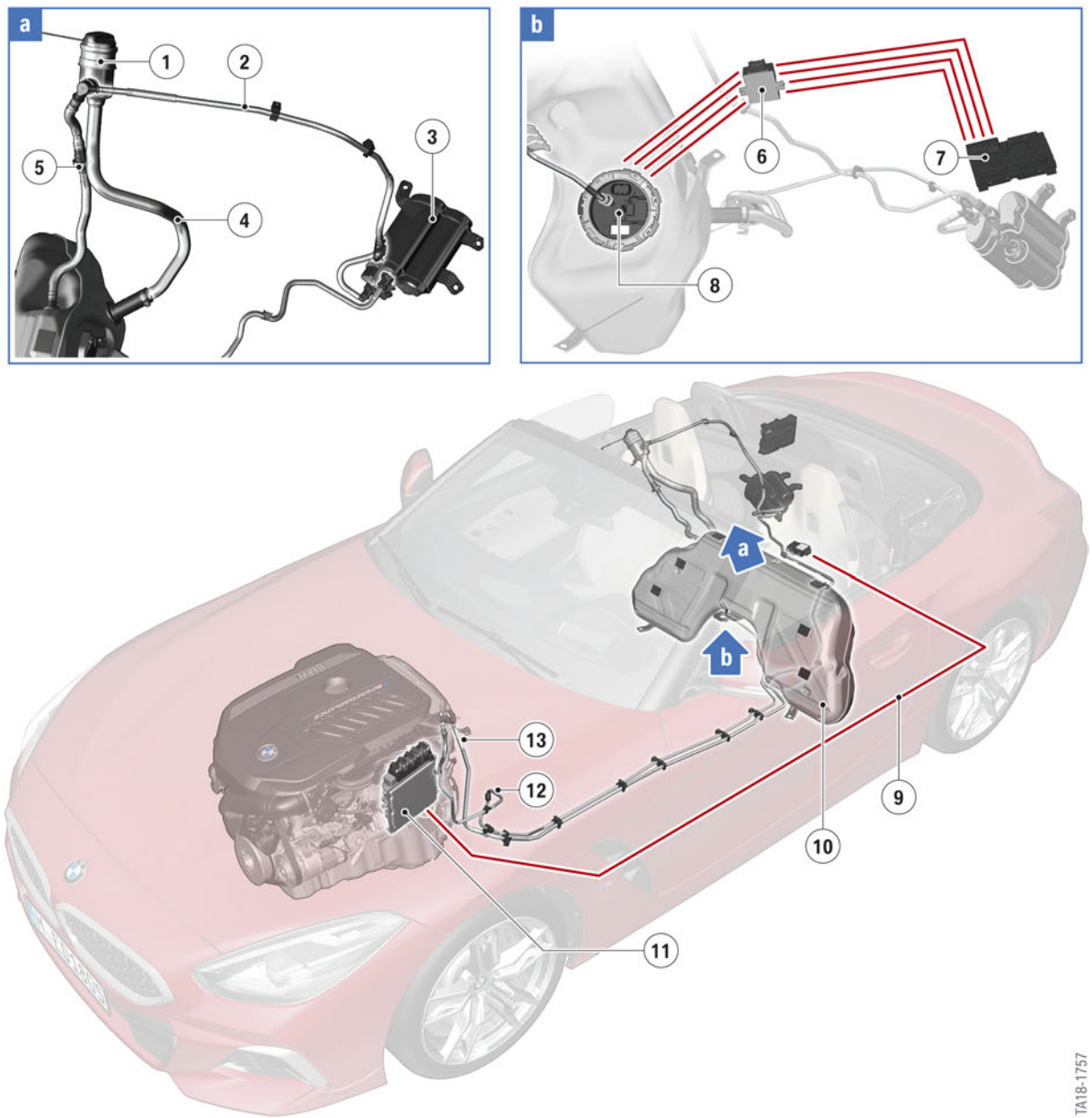
Index	Explanation
A	Tailpipe trim, B46TU engine
B	Tailpipe trim, B58TU engine

G29 Powertrain/Chassis

2. Engines

2.7. Fuel supply

In the G29 a fuel tank with 52 liter filling capacity is used.



G29 system overview of fuel supply

Index	Explanation
1	Fluid filler cap
2	Ventilation line, carbon canister
3	Carbon canister
4	Fuel filler neck

Index	Explanation
5	Tank ventilation line
6	Fuel pump control (FPC)
7	Power distribution box, rear right
8	Delivery unit
9	Data line to fuel pump control module
10	Fuel tank
11	Digital Motor Electronics (DME)
12	Fuel feed (from the fuel tank)
13	Purge air line, carbon canister

2.8. Engine electrical system

2.8.1. Engine control

In the G29 the well-known engine control unit generation (8th generation) from Bosch is used.

The integrated supply module is also located in the area of the engine control unit. It supplies the engine control unit and various sensors and actuators at the engine with the required supply voltage.

Control unit code for gasoline engines

The control unit code (DME 8.xT.y) can be broken down as follows:

Abbreviation	Meaning
DME	Digital Motor Electronics
8	Control unit generation
x	Number of cylinders as a hexadecimal figure 4 = 4-cylinder engine 6 = 6-cylinder engine
T	Technical update of engine
y	Vehicle electrical system architecture 0 = BN2020 Service Pack 2015 (introduced with the G12 BMW 7 Series) 1 = BN2020 Service Pack 2018 (introduced with the G05 BMW X5)

- DME 8.4T.1 = B46TU engine
- DME 8.6T.1 = B58TU engine

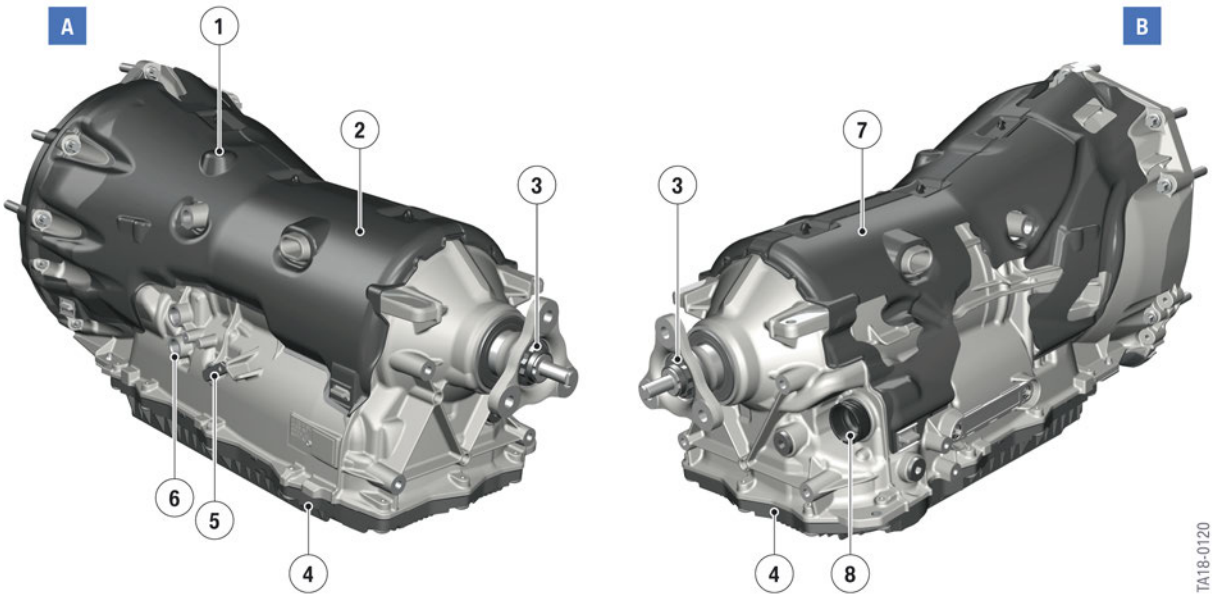
G29 Powertrain/Chassis

3. Automatic Transmission

3.1. Automatic transmission

3.1.1. Overview

In the G29 the 8HPTU2 automatic transmission, which is familiar from other vehicles, such as G05, G15 and G20, is used. It replaces the 8HPTU automatic transmission.



8HP51 automatic transmission with acoustic cover

Index	Explanation
A	8HP51 view, left
B	8HP51 view, right
1	Transmission breather
2	Two-part acoustic cover (6-cylinder engine)
3	Output shaft
4	Transmission oil sump
5	Mechanism for emergency release
6	Transmission oil output to transmission oil cooler
7	Three-part acoustic cover (4-cylinder engine)
8	Electrical connection (mechatronics to vehicle electrical system)

G29 Powertrain/Chassis

3. Automatic Transmission

The following further developments made it possible to increase the comfort, dynamics and efficiency of the revamped 8-speed automatic transmission in the G29:

- Higher steering axis inclination of the automatic transmission due to larger gear steps.
- Improved dynamic gearshifts thanks to new development of the mechatronics and the electronic transmission control EGS.
- Improved ride comfort through hot-end decoupling of the rotational imbalance of the engine by means of a further developed centrifugal pendulum.
- Reduction of vehicle-specific insulation measures with an acoustic cover (SynTAK) at the transmission.
- Enhanced customer experience due to new operating possibilities with the driving experience switch or shift paddles.

3.1.2. Designation

The designation for the 8HPTU2 automatic transmission has been changed. The designation for the 8HP and the 8HPTU remains the same. The following table provides an overview of the composition of the different transmission codes for the 8HPTU2 automatic transmission.

Position	Meaning	Index	Explanation
1	Designation	G	Transmission
2	Type of transmission	A	Automatic transmission
3	Number of gears	8	8 forward gears
4	Drive type	L X	Rear-wheel drive Four-wheel drive
5 + 6	Transmittable torque	51 76	500 Nm 750 Nm
7	Steering axis inclination	C D	8,2 8.6
8	Manufacturer	Z	ZF

3.1.3. Sport automatic transmission

In each model of the G29 a Steptronic Sport transmission (SA 2TB) is used as standard. The customer has 2 shift paddles on the steering wheel and additional functions such as:

- Launch Control
- Manual activation of coasting
- Driving into the speed limiter.

3.1.4. ConnectedShift

Use of the navigation data

ConnectedShift uses the navigation data for a forward-thinking shift strategy of the automatic transmission. If, for example, a sharp bend is detected, the automatic transmission shifts down early and the gear is retained in the bend.

The route guidance of the navigation system does not need to be activated for the function. However, the detection of a turn request leads to more precise control of the system. Up-to-date navigation map data also influences the control accuracy.

Use of the radar

A prerequisite for use of this function is the optional equipment "Active cruise control with Stop&Go function" (SA 5DF).

If the vehicle detects rapid approach to an obstacle via the front radar, the electronic transmission control EGS automatically shifts down to a lower gear.

This means that in a situation where the driver does not want to overtake, the higher engine braking torque is used and the driving speed is reduced. In addition, for an imminent overtaking manoeuvre there is increased tensile force reserve available for possible overtaking.

3.1.5. Configuration options

Influence of the driving experience switch

Many drive variants have a SPORT PLUS mode in order to support sporty driving with more powerful engines. The shift characteristics are adapted as follows in the SPORT PLUS mode:

- Sharper design of downshifts on braking
- Further increase of the engine speed in the direction of maximum power.

3.1.6. Extension of the coasting function

During coasting in certain conditions the engine is disconnected from the transmission in drive position D. The kinetic energy of the vehicle is used and the vehicle continues to roll at idle speed with reduced consumption.

Up to now the coasting function was only available in "ECO PRO" mode and can now also be used in the G29 in "COMFORT" mode.

With "ECO PRO" mode there is an attempt to achieve maximum efficiency/fuel economy. For this navigation data is considered in the decision whether coasting is currently useful from an efficiency perspective (proactive driving assistant).

Coasting in "COMFORT" mode is currently not used with the following equipment specifications:

- BMW M Performance Automobile

The extended operating strategy guarantees that the coasting function is only activated when the driving situation permits an energy-related advantage to the coasting overrun. Apart from the navigation data (proactive driving assistant), the accelerator pedal position and the situation in front of the vehicle are also evaluated by means of radar (leading vehicle detection). The leading vehicle detection analyses the distance and the differential speed to the leading vehicle and decides whether coasting is useful in terms of comfort.

With the accelerator pedal position the customer also has the option to specifically activate coasting mode.

- When the accelerator pedal is released slowly, coasting can be manually activated.
- There is no activation with a dynamic driving style and rapid change of the accelerator pedal position.

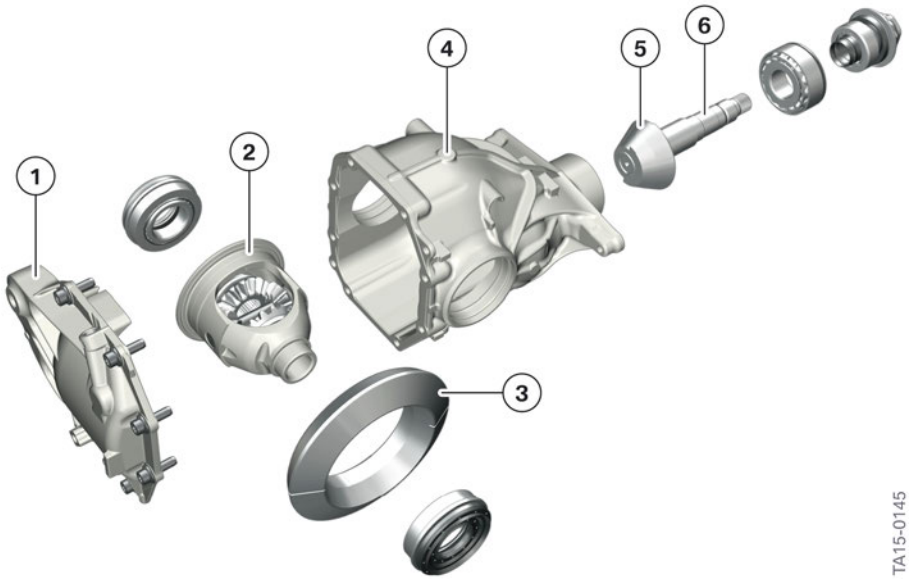
With the new 8HPTU2 automatic transmissions the comfort when deactivating the coasting function was enhanced. As a result, a simultaneous downshift upon deactivation of the coasting function is possible.

3.2. Rear axle final drive

For the G29 two rear axle differentials are available depending on the model and equipment:

- 190AL
- 215LWS

In the sDrive 30i the rear axle differential 190AL is used.



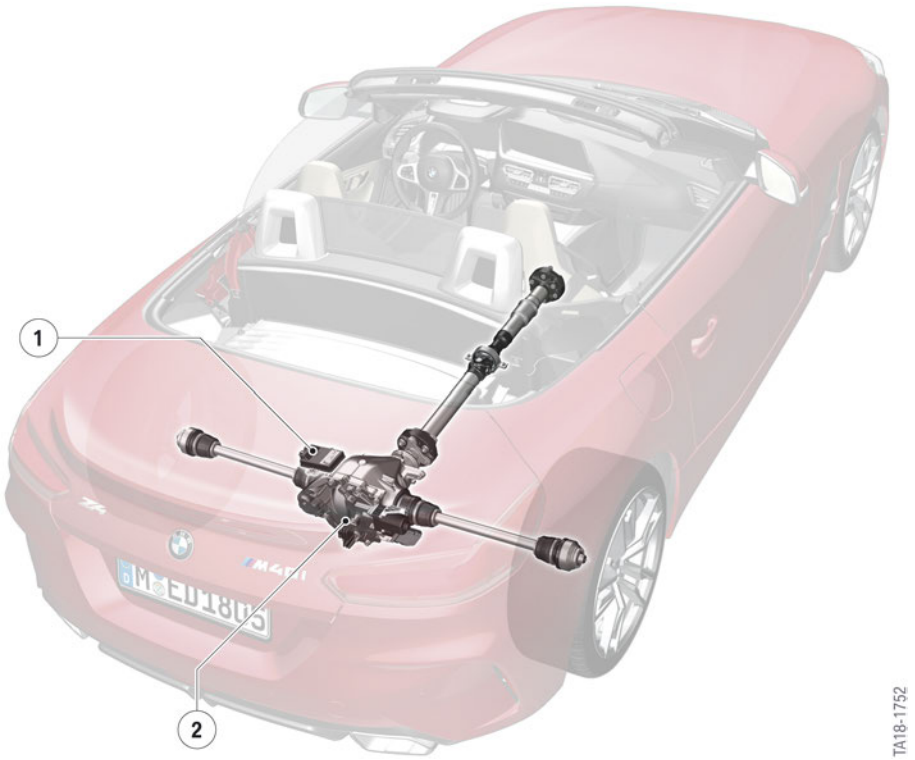
Rear axle differential 190AL

Index	Explanation
1	Housing cover
2	Differential
3	Crown wheel
4	Housing
5	Pinion
6	Transmission input shaft

A regulated rear axle differential lock (HAG 215LWS) can be optionally installed in the sDrive 30i and standard in the M40i.

3.3. Regulated rear axle differential lock

In the G29 the regulated rear axle differential lock, which is already known from other vehicles, is used.



G29 overview of the regulated rear axle differential lock

Index	Explanation
1	Control unit for regulated rear axle differential lock (GHAS)
2	Regulated rear axle differential lock

The regulated rear axle differential lock makes possible the reduction of the slip between right and left rear wheel. A maximum lock-up torque of 1500 Nm can be applied.

G29 Powertrain/Chassis

3. Automatic Transmission

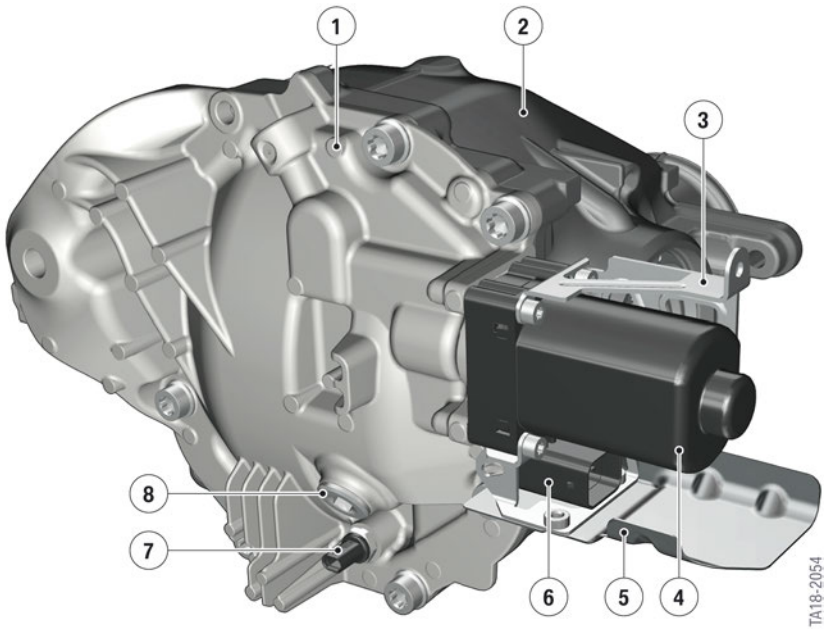
The advantages of the controlled rear axle differential lock are:

- Improved handling
- Optimal traction
- Greater driving stability

The following table provides an overview of the driving situations in which the regulated rear axle differential lock is active:

Driving situation	Regulated rear axle differential lock action
Pullaway	Generation of lock-up torque.
Road with different coefficient of friction on right and left	In the case of an emerging difference in speed at the rear axle, the drive torque is transmitted to the wheel that can transmit more driving power.
Accelerated cornering	The drive torque is transmitted to the outer cornering wheel via the wheel slip of the inner cornering wheel.
Load reversal upon cornering or lane change	A stabilizing torque is generated from the yaw-rate signal if oversteering is detected.
Oversteering	In the case of deliberate oversteering the lock is closed from the yaw-rate signal and the signal of the accelerator pedal position.

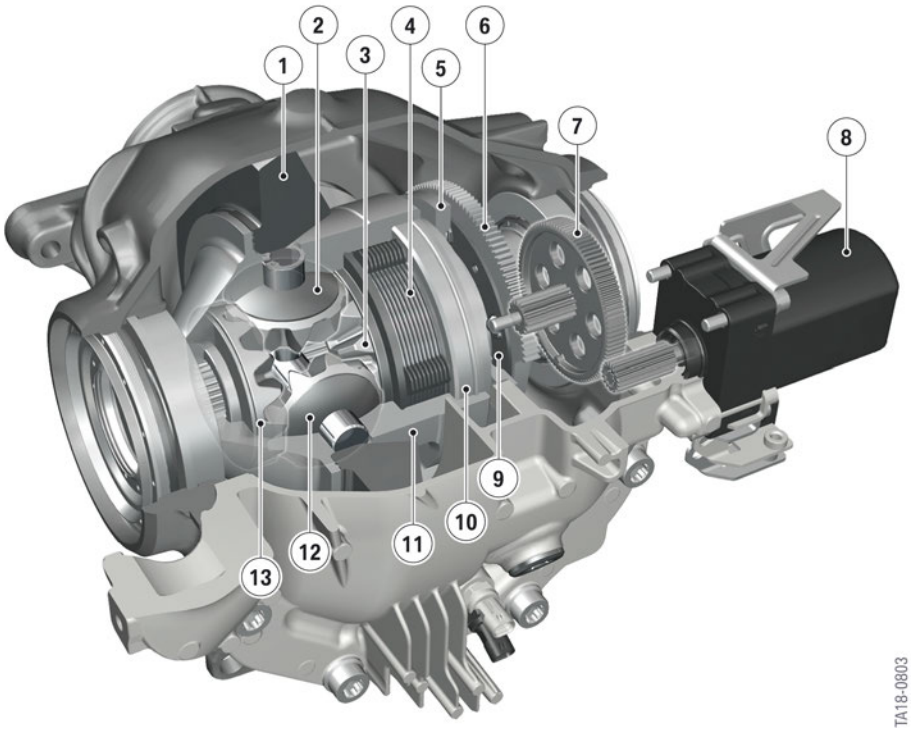
3.3.1. Structure and function



External design of regulated rear axle differential lock

Index	Explanation
1	Housing cover
2	Housing
3	Holder for heat shield
4	Electric motor
5	Heat shield
6	Electrical connection, electric motor
7	Transmission oil temperature sensor
8	Fluid filler plug

The lock-up torque is generated by a multidisc clutch. The necessary axial pressure is applied to the multidisc clutch by the electric motor by means of gears and a ball ramp mechanism. The clutch package operates between the expansion tank housing (steel outer discs) and the right output (steel inner discs with carbon friction lining).



Internal design of regulated rear axle differential lock

Index	Explanation
1	Crown wheel
2	Differential bevel gear
3	Output bevel gear
4	Multidisc clutch

Index	Explanation
5	Fixed pressure disc with second half of ball ramp
6	Ball ramp consisting of geared mobile adjusting disc and first half of ball ramp
7	Transfer box
8	Electric motor
9	Ball and spherical washer
10	Differential lid (connected to differential housing, cannot rotate)
11	Differential housing (connected to outer discs)
12	Differential bevel gear
13	Output bevel gear

The central control unit for the calculation of all driving dynamic functions is the Dynamic Stability Control (DSC). It evaluates the driving dynamic parameters provided by other sensors and control units and forwards the calculated lock-up torque to be adjusted to the control unit for the regulated rear axle differential lock (GHAS). This value is transferred on the FlexRay bus to the GHAS control unit.

The GHAS control unit calculates an angle to be adjusted at the ball ramp from the requested lock-up torque of the DSC control unit. The adjusting torque required for control is generated by an electric motor. The electric motor is activated directly by the power electronics of the GHAS control unit with vehicle voltage via a pulse-width-modulated signal. To determine the position and the direction of rotation of the direct current motor it is equipped with 2 hall effect sensors.

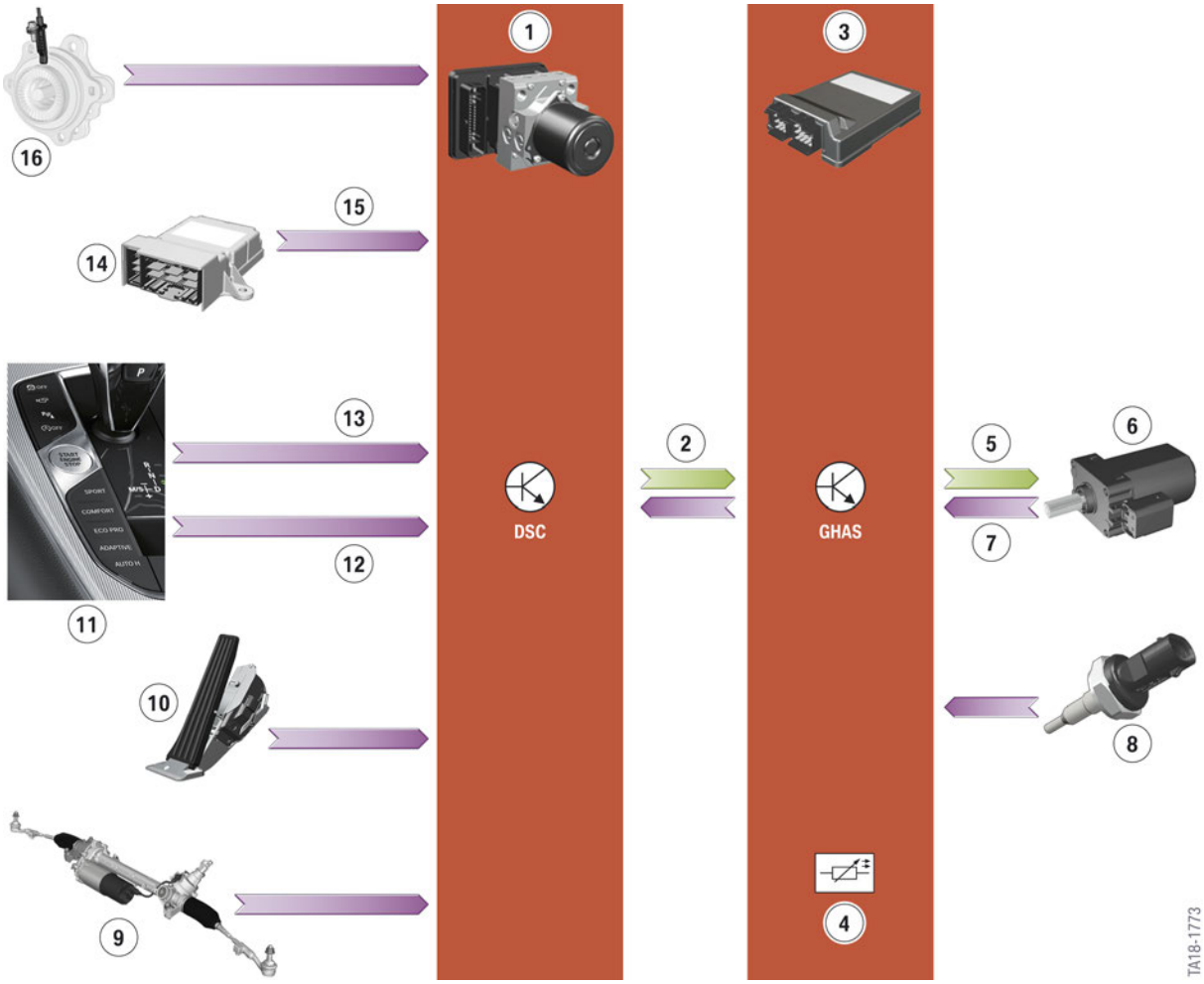
The DSC control unit can also request separate and higher-level locking interventions to stabilize the vehicle both when the DSC control system is activated and deactivated.

Adaptation of multidisc clutch

A calibration is carried out regularly in order to compensate for wear of the clutch. During this calibration a predefined position profile is shut down and by means of the current course of the servomotor the adaptation point (clutch slipping point) of the multidisc clutch is determined. This clutch slipping point adaptation is repeated every time the combustion engine is switched off and compensates the wear during the journey. The clutch slipping point corresponds to the clutch position, at which no torque is transferred by the multidisc clutch, which equals a lock-up torque of 0 Nm.

3.3.2. System overview

The following diagram shows the information required for the functioning of the regulated rear axle differential lock:



System overview of regulated rear axle differential lock

Index	Explanation
1	Dynamic Stability Control (DSC) control unit
2	FlexRay bus
3	Control unit for regulated rear axle differential lock (GHAS)
4	Temperature sensor (control unit)
5	Electric motor actuation
6	Electric motor
7	Position and temperature of electric motor
8	Oil temperature
9	Electromechanical power steering (EPS) control unit

Index	Explanation
10	Accelerator pedal module
11	DSC/DTC switch, driving experience switch
12	Active driving program (SPORT, COMFORT, ECO PRO)
13	DSC/DTC status (DSC/DTC activated/deactivated)
14	Advanced Crash Safety Module (ACSM) control unit
15	Yaw rate, longitudinal and lateral acceleration
16	Wheel speed sensor

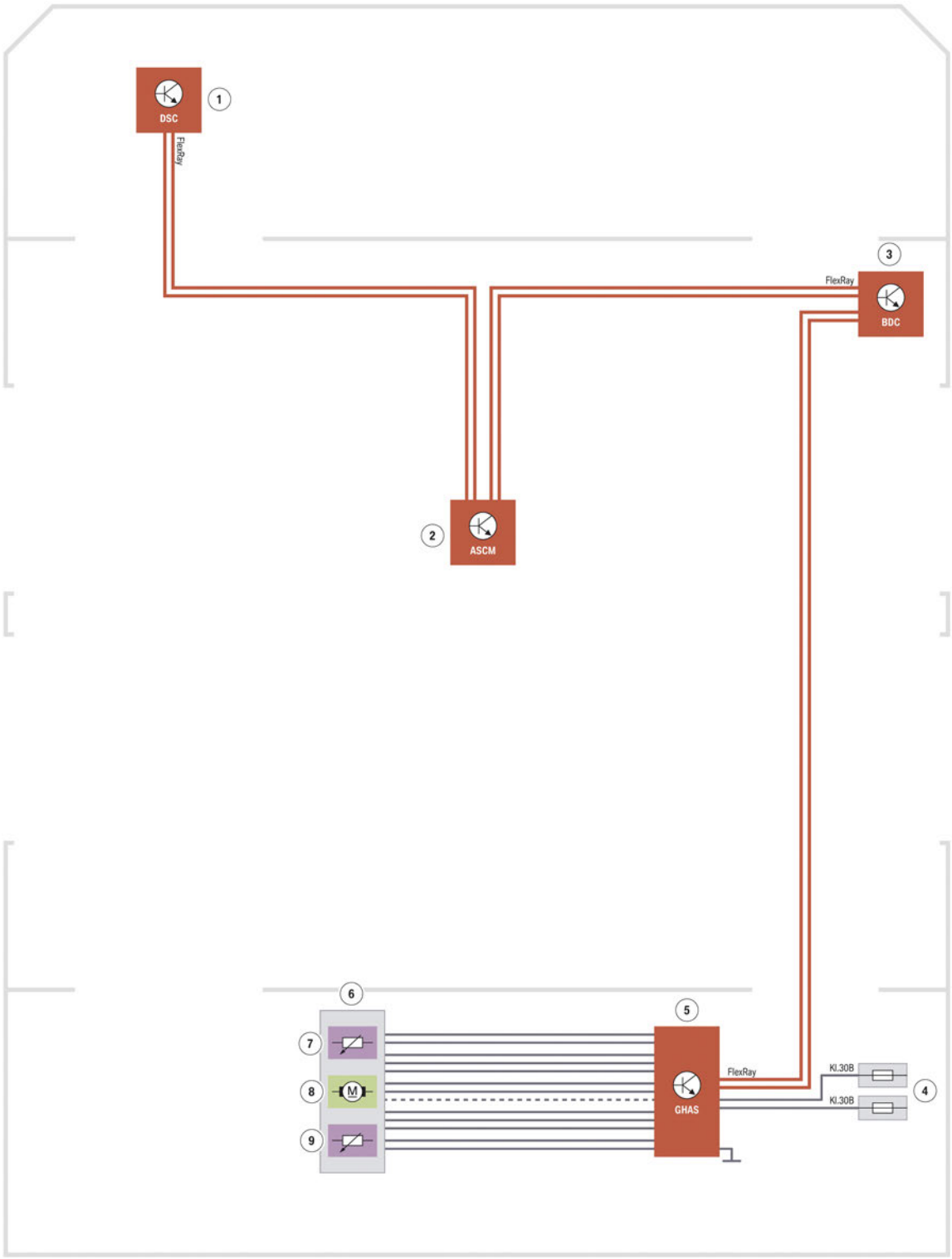
The GHAS considers the following measured values to protect the components and to allow more precise control:

- Rear axle differential oil temperature
- Temperature of GHAS control unit
- Temperature of electric motor

G29 Powertrain/Chassis

3. Automatic Transmission

3.3.3. System wiring diagram



System wiring diagram for regulated rear axle differential lock

Index	Explanation
1	Dynamic Stability Control (DSC)
2	Crash Safety Module (ACSM)
3	Body Domain Controller (BDC)
4	Power distribution box, rear right
5	Regulated rear axle differential lock (GHAS)
6	Electric motor housing
7	Electric motor temperature sensor
8	Electric motor
9	Transmission oil temperature sensor

3.3.4. Note for Service

Oil change

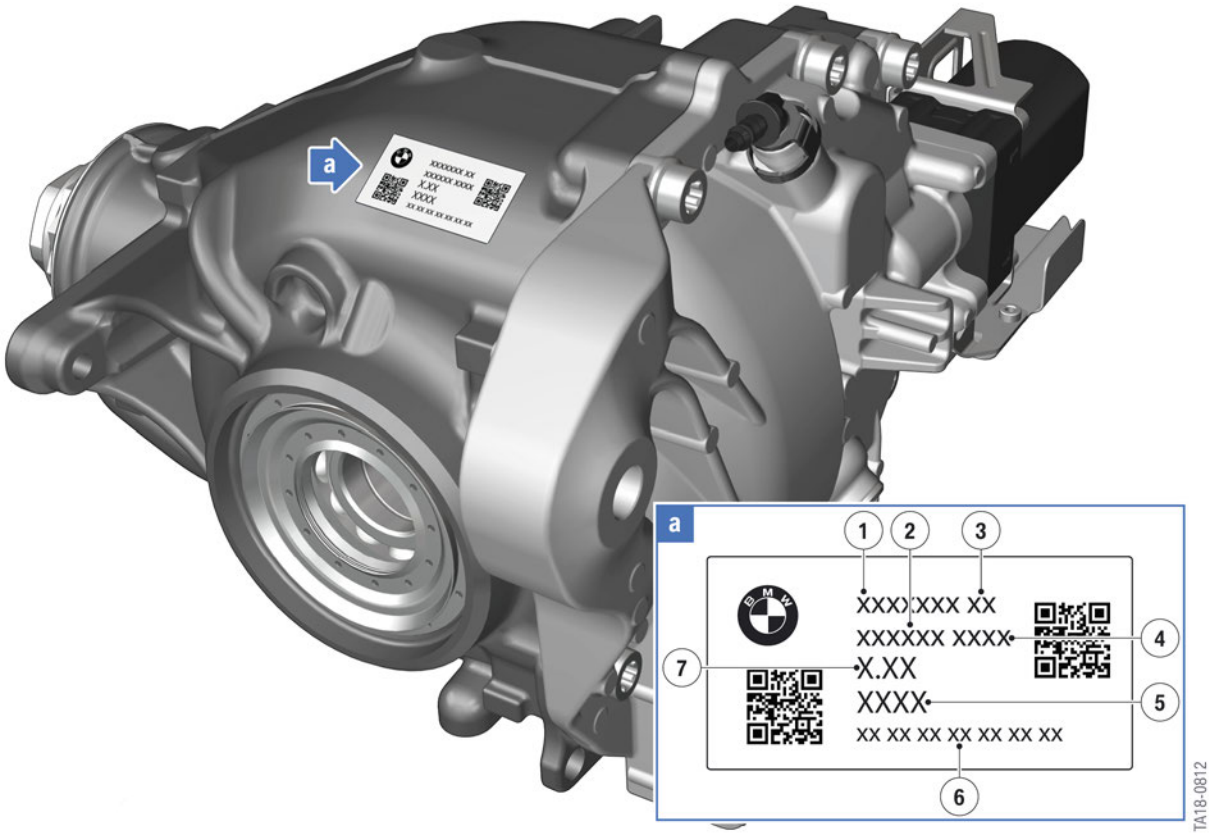
The oil filling of the rear axle differential lock is designed for the entire service life of the assembly.

Vehicles with regulated rear axle differential lock are not designed for use on racing tracks. In the case of use on racing tracks very high temperatures may arise in the rear axle differential which may lead to premature wear of the rear axle differential oil. In the case of a customer complaint "Noises from the rear axle differential", an oil change may be useful before an entire component is replaced.

Classification

Due to the component tolerances of the different components of the regulated rear axle differential lock, the stroke of the ball ramp for closing the multidisc clutch may differ in each case. However, these tolerances can be compensated by adapted control of the electric motor for closing the multidisc clutch.

The respective tolerance or the classification code is determined during production and shown on a type plate of the regulated rear axle differential lock. This type plate is located on the top of the regulated rear axle differential lock.



Classification of regulated rear axle differential lock

Index	Explanation
1	Part number
2	Production date
3	Revision index
4	Production counter
5	Route identification
6	Classification code
7	Ratio

The tolerance can be determined as follows in Service:

- Read out of the classification code via the ISTA diagnosis system.
- Read the classification code off the type plate of the rear axle differential (rear axle differential needs to be lowered).

The 16-digit classification code can be entered in the control unit for the regulated rear axle differential lock (GHAS) using the service function "Correction value of characteristic curve" in the ISTA diagnosis system.

After the following servicing work has been carried out, the classification code must be manually entered in the GHAS control unit:

- Rear axle differential was renewed.
- If the data of the old GHAS control unit can no longer be read out when renewing the GHAS control unit.
- For fault elimination, if invalid or missing correction values were identified in the control unit.

Only the data printed on the type plate can be entered. Incorrectly entered data lead to a decline of the traction or increased wear.

Service functions

Three service functions are currently available for the regulated rear axle differential lock:

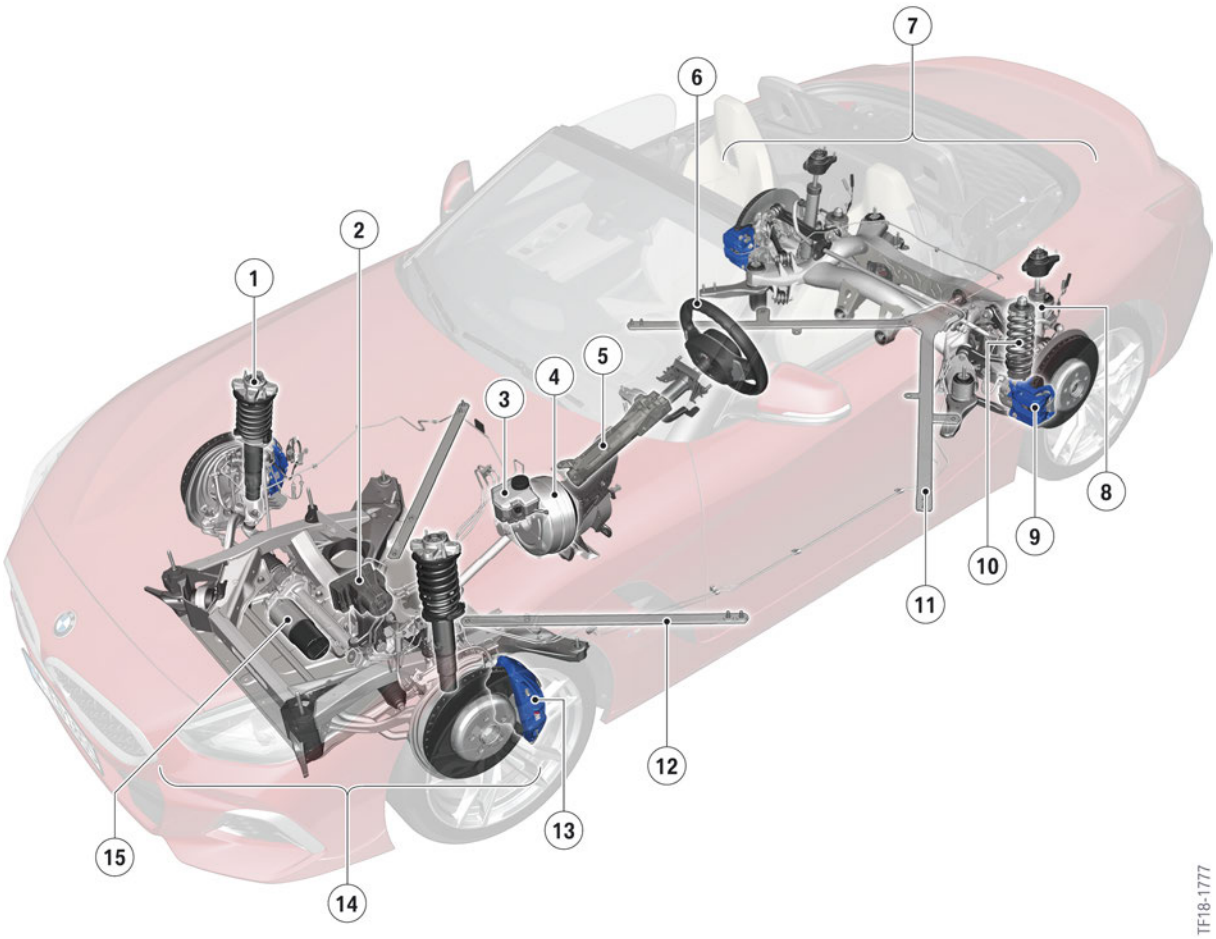
- Delete wear data: This service function must be carried out after the renewal of the electric motor or the entire rear axle differential.
- Renew GHAS control unit: This service function must be carried out after the renewal of the GHAS control unit. This service function is also performed automatically as a post-programming follow-up operation.
- Correction values of characteristic curve: This service function must be carried out after the renewal of the rear axle differential or if the individual data recovery for the GHAS control unit failed. In the second case the rear axle differential must be lowered.

G29 Powertrain/Chassis

4. Chassis and Suspension

4.1. Overview

The chassis and suspension of the G29 were improved compared to its predecessor, the E89, in terms of dynamics while the comfort remains the same. The body structure was geared for rigidity with maximum driving dynamics and stability. An axle layout (50:50) specific to sports cars increases both the driving dynamics and the optional driving dynamics system Electronic Damper Control (EDC).
In the basic version and in the M sports suspension the driving dynamics and the ride comfort were further improved by equipping the shock absorbers at the front with a hydraulic rebound stop (HRS).



G29 chassis and suspension overview

Index	Explanation
1	Front spring strut
2	Dynamic Stability Control (DSC)
3	Brake fluid expansion tank
4	Brake servo
5	Steering column
6	Steering wheel
7	Five-link rear suspension

Index	Explanation
8	Shock absorbers at the rear with EDC valve
9	Brake with electromechanical holding brake of rear axle
10	Rear spring
11	Rear torsion strut
12	Front torsion strut
13	Brake of front axle
14	Twin-arm McPherson strut front suspension
15	Electronic Power Steering (electromechanical power steering) (EPS)

4.1.1. Compared to the predecessor

The following was changed in the G29 in the area of the driving dynamics compared to the E89:

- Shorter wheelbase
- Longer overhangs
- Wider track width (front: +97 mm, rear: +55 mm)
- Larger and wider tires

The following table provides an overview of the chassis and suspension systems used in the G29 compared to the predecessor model E89:

Component	E89	G29
Front axle	Twin-arm McPherson strut front suspension	Twin-arm McPherson strut front suspension
Front suspension	Steel	Steel
Front damping	Conventional or Electronic Damper Control (EDC)	Conventional with Hydraulic Rebound Stop (HRS) or Electronic Damper Control (EDC)
Anti-roll bar, front	Conventional	Conventional
Rear axle	Central link rear axle	Five-link rear suspension
Rear suspension	Steel	Steel
Rear damping	Conventional or Electronic Damper Control (EDC)	Conventional or Electronic Damper Control (EDC)
Rear anti-roll bar	Conventional	Conventional
Front brake	Brake discs up to dia. 348 mm	Brake discs up to dia. 348 mm

Component	E89	G29
Rear brakes	Brake discs up to dia. 324 mm	Brake discs up to dia. 345 mm
Parking brake	Electromechanical holding brake (actuation via EMF control unit)	Electromechanical holding brake (actuation via DSC control unit)
Tire pressure	RDC	RDCi
Front steering	Electronic Power Steering (EPS)	Electronic Power Steering (EPS)

4.1.2. Overview of system descriptions

The systems already familiar from other vehicles will not be examined in any further detail in this document. If required, the detailed system descriptions can be found in the product information listed below.

Topic	Product information
RDCi tire pressure control	G12 Chassis and Suspension
Parking brake	G12 Chassis and Suspension
Electronic Damper Control (EDC)	G12 Chassis and Suspension
Steering	G12 Chassis and Suspension
Electronic tire pressures plate	G30 Chassis and suspension

4.1.3. Chassis and suspension packages

The following chassis and suspension packages are offered in the G29:

- **Basic chassis and suspension**
  The G29 is equipped with steel springs at the front and rear axles. The damping action is effected as standard with conventional shock absorbers. The front shock absorbers are equipped with Hydraulic Rebound Stops (HRS). The springs/dampers on the rear axle are in separate locations.
- **Sports suspension (SA 704)**
  The sports suspension available as optional equipment on the sDrive 30i and features a tauter spring/damper design. In this design, the chassis has been lowered by 10 mm.
- **Adaptive M sports suspension (SA 2VF optional for sDrive 30i, standard M40i)**
  The Electronic Damper Control (EDC) comes with the optional equipment "M sports suspension". Four continuously adjustable shock absorbers with coupled rebound/ compression stage adjustment produce damping forces according to requirements. The shock absorbers can automatically assume a harder setting (more dynamic/sporty) or softer (more comfortable) setting, depending on the driving manoeuvre.
  For more information on the EDC refer to the chapter "Electronic Damper Control (EDC)".

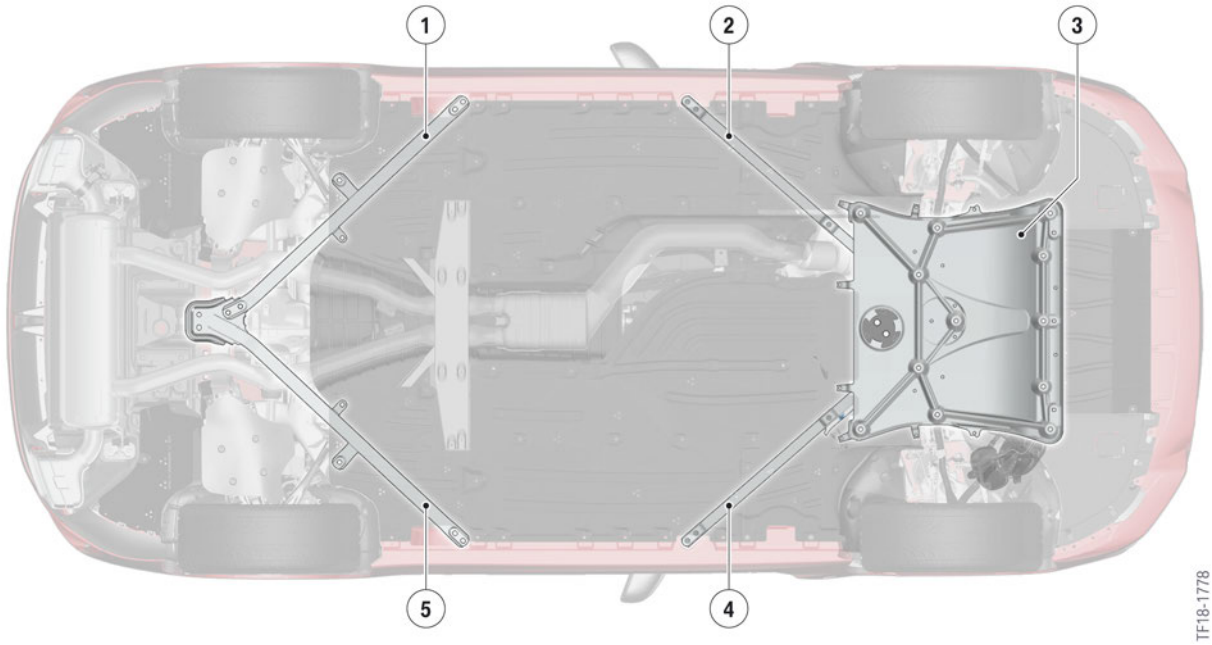
The following table shows the different equipment specifications and scopes in the area of the chassis and suspension for the G29:

System	Basic chassis and suspension	Sports suspension (SA 704)	Adaptive M sports suspension (optional equipment 2VF)
Electronic Power Steering (EPS)	●	●	●
EPS with variable rack geometry	●	●	●
Front shock absorbers with Hydraulic Rebound Stops (HRS)	●	●	-
Electronic Damper Control (EDC)	-	-	●
10 mm lowering	-	●	●

4.2. Stiffening measures

4.2.1. Underbody

Like in the E89, specific torsion struts are used on the front and rear axles to increase the rigidity of the body. They are secured at the body, compression strut and strut mounting. A stiffening plate is also used on the front axle.

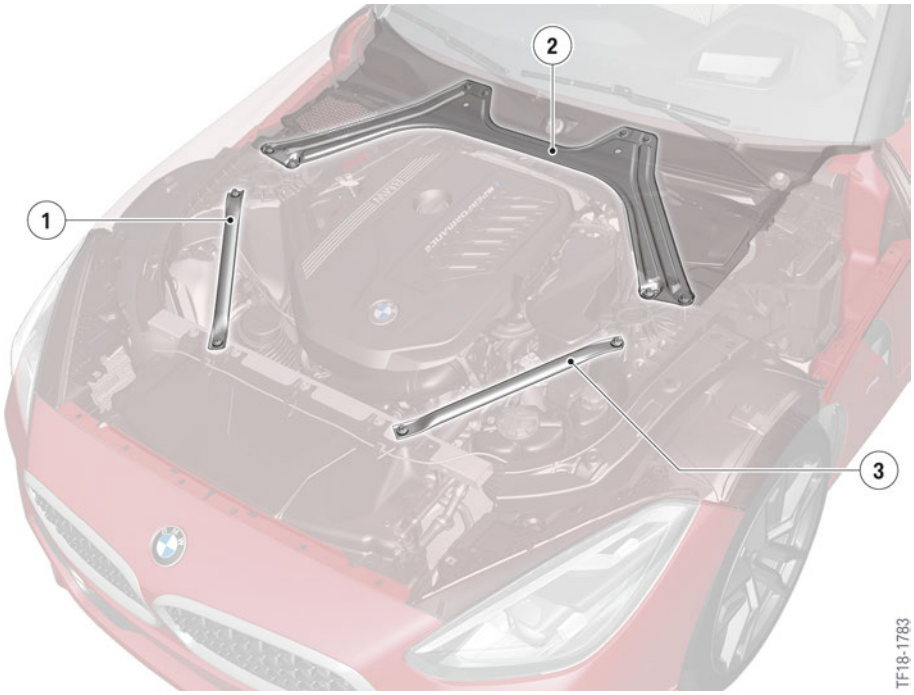


G29 rigidity measures at the vehicle underbody

Index	Explanation
1	Torsion strut at rear right
2	Torsion strut at front right
3	Stiffening plate, front axle
4	Torsion strut, front left
5	Torsion strut at rear left

4.2.2. Engine compartment

Front-end struts and a stiffening plate are used in the engine compartment for stiffening.



G29 rigidity measures in the engine compartment

Index	Explanation
1	Front-end strut right
2	Stiffening plate, engine compartment
3	Front-end strut left

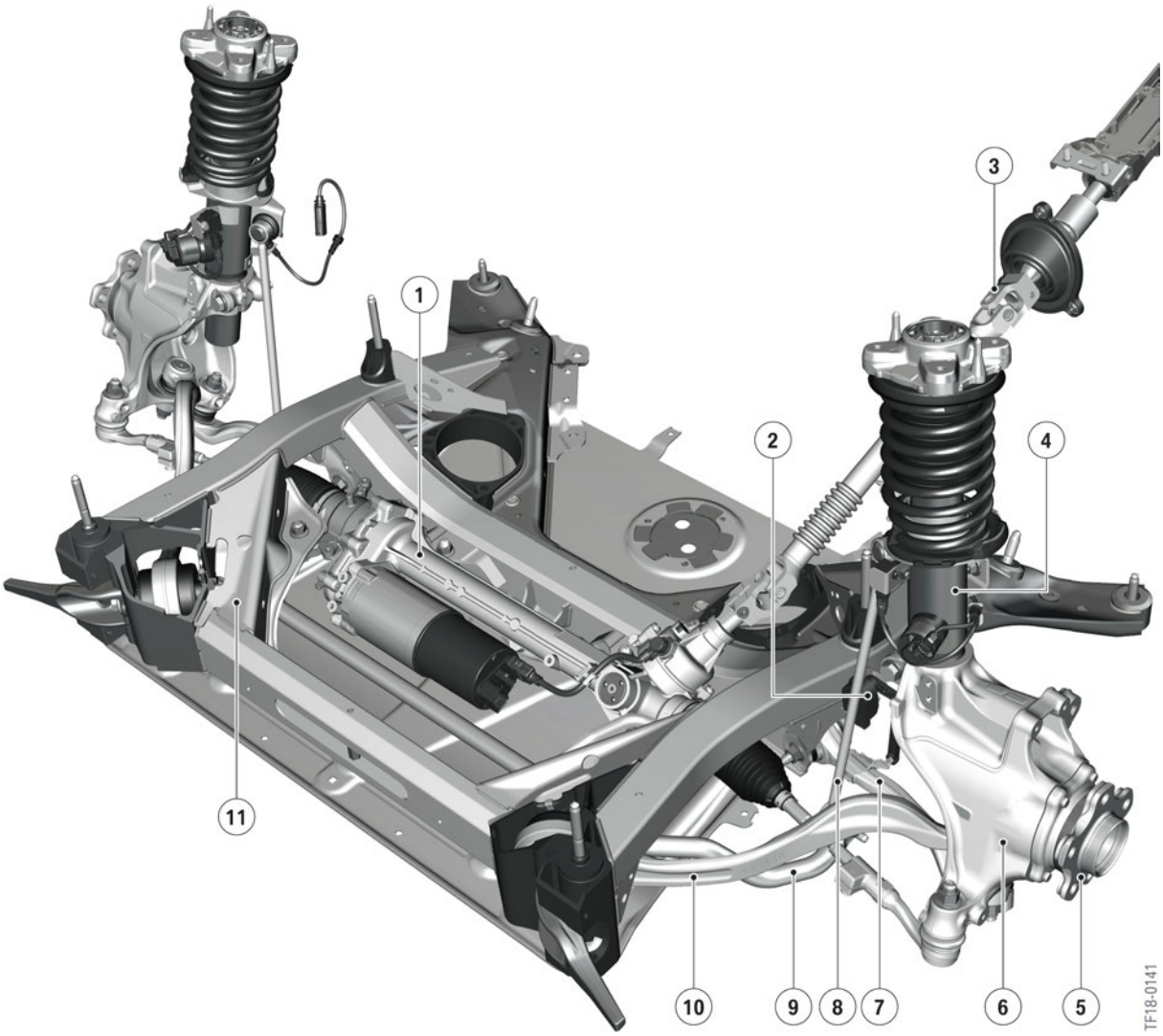
G29 Powertrain/Chassis

4. Chassis and Suspension

4.3. Suspension systems

4.3.1. Front axle

The elastokinematics was optimized at the front axle in terms of steering precision and lateral force potential. This was achieved with the use of an aluminum front axle support designed specifically for the G29, an independent kinematics design and corresponding design of wishbone and tension strut rubber mount.



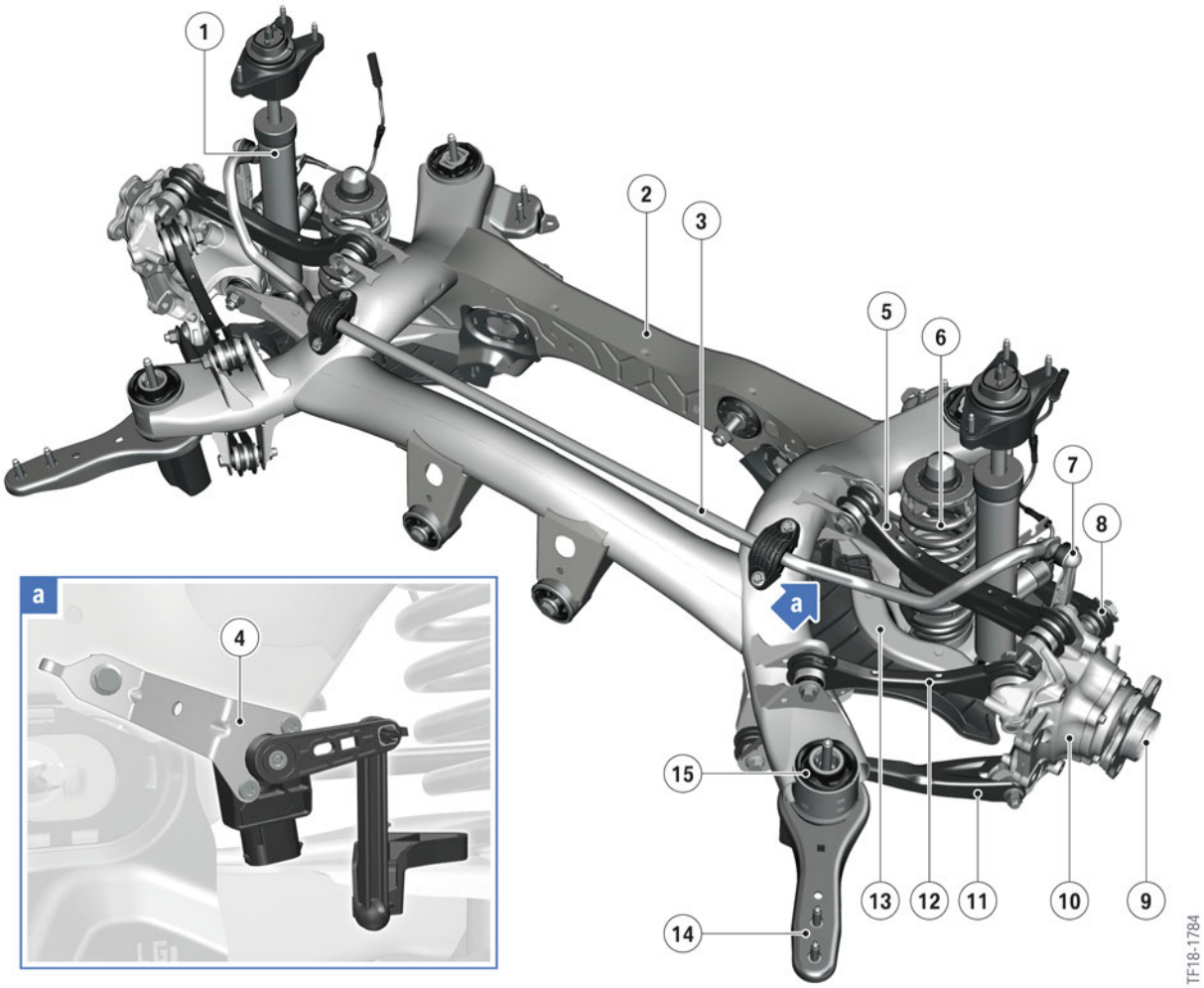
G29 Twin-arm McPherson strut front suspension

Index	Explanation
1	Steering box
2	Ride height sensor
3	Steering shaft
4	Shock absorber with EDC valve
5	Wheel bearing unit
6	Swivel bearing
7	Wishbone
8	Anti-roll bar link
9	Anti-roll bar
10	Trailing link
11	Front axle support

The swivel bearing, wishbone and tension strut are made from aluminum. This means a very low unsprung mass.

4.3.2. Rear axle

The G29 has a five-link rear axle, which was adopted from the G20. However, reinforced wheel carriers and reinforced compression struts are used for the G29.



G29 Five-link rear axle

Index	Explanation
1	Shock absorber with EDC valve
2	Rear axle support
3	Anti-roll bar
4	Ride height sensor
5	Wishbone
6	Suspension
7	Anti-roll bar link
8	Camber link
9	Wheel bearing unit
10	Wheel carrier
11	Trailing arm

Index	Explanation
12	Control arm
13	Camber control arm
14	Compression strut
15	Wiper pivot bearing, rear axle support

4.4. Suspension/dampers

4.4.1. Overview

The following overview shows the components of the suspension/damping action used in the G29, depending on the equipment:

Equipment	Axle	Basic chassis and suspension	M Sport suspension OE 704	Adaptive M sports suspension SA 2VF
Twin-tube gas-filled damper with HRS [1]	VA	●	●	-
Twin-tube gas-filled damper	RA	●	●	-
Twin-tube gas-filled damper with EDC valve	VA	-	-	●
	RA	-	-	●
Steel springs	VA	●	●	●
	RA	●	●	●
Anti-roll bar	VA	●	●	●
	RA	●	●	●
Low-slung option	VA	-	10 mm	10 mm
	RA	-	10 mm	10 mm

VA = front axle
RA = rear axle
[1] Hydraulic Rebound Stop (HRS)

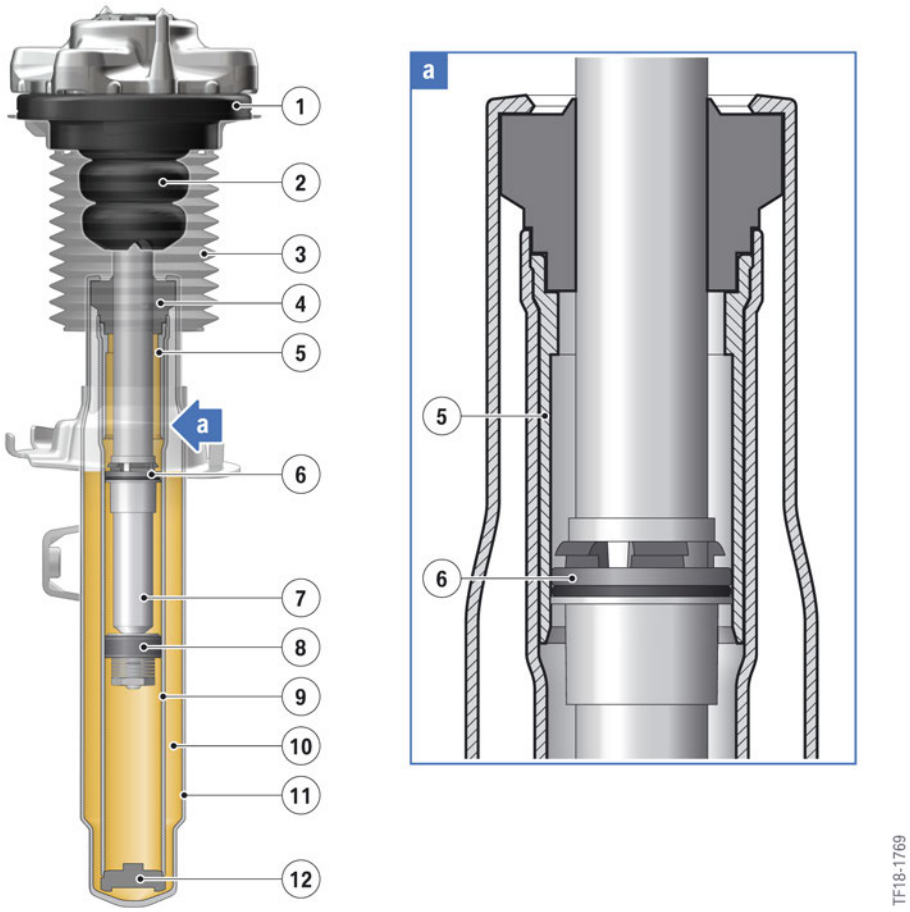
4.4.2. Hydraulic Rebound Stop (HRS)

In order to further improve the driving dynamics and ride comfort, the shock absorbers in the basic version and the M sports suspension were further developed. This could be realized with the use of a Hydraulic Rebound Stop (HRS) in the shock absorbers at the front.

With a rebound stop the range of travel of a shock absorber is limited in order to make possible a soft touch of the bumper at the end stop, also with a high load, in the case of unusually sharp bumps in road (e.g. driving through a pothole, driving over a curb, sharp bumps).

This not only protects the neighboring components, but also reduces the noises arising from these driving situations.

Hydraulic rebound stop (shock absorber at the front)



G29 front shock absorbers

Index	Explanation
1	Support bearing
2	Auxiliary damper (pressure stop)
3	Protective tube
4	Seal and guide of piston rod
5	Sleeve
6	Control ring
7	Piston rod
8	Working piston with piston valve (rebound and compression stage)

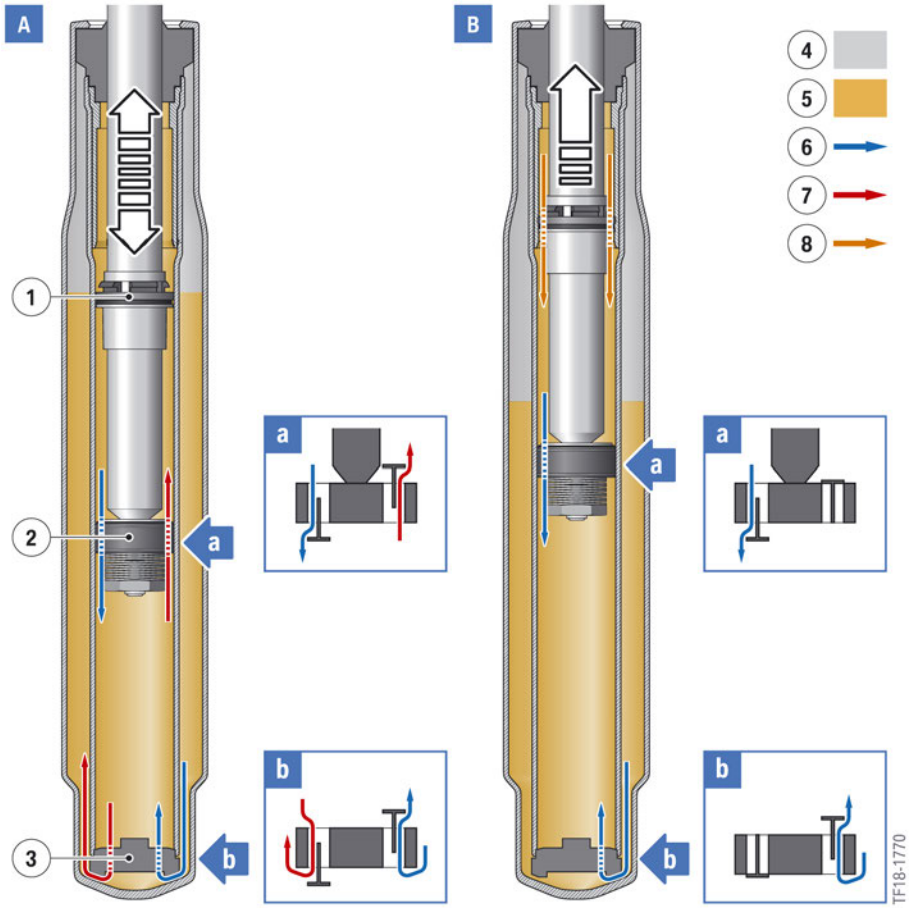
Index	Explanation
9	Working cylinder
10	Equalizing volume for the oil
11	Tank tube
12	Bottom valve (rebound and compression stage)

The front shock absorbers of the E89 were equipped with a mechanical rebound stop. Spring stops have a disadvantage, however, as they only have limited damping capacity. The introduced energy is emitted back to the body when the stop is relieved, which may lead to undesired pitch motions.

In order to further increase the ride comfort of the G29, the front shock absorbers were equipped with a Hydraulic Rebound Stop (HRS) instead of a mechanical rebound stop.

With a small wheel stroke, in normal driving, only the working piston with piston valves (8) and bottom valve (12) have an effect.

If, however, a defined outgoing movement is exceeded (approx. 17 mm), a control ring (8) also positioned on the piston rod drives into a ring-shaped sleeve (7), which is integrated in the working cylinder. The compressed oil volume is driven out of the working space via corresponding throttle cross-sections integrated in the control ring (8) and the outgoing movement is dampened in the stop area. In order to achieve a soft insert of the hydraulic rebound stop, the sleeve was shaped so that its diameter continuously narrows path-dependent. As a result, a progressively increasing force is generated in the rebound direction.



Overview of functions of hydraulic rebound

Index	Explanation
A	Small wheel stroke, in normal driving
B	Outgoing movement > 17 mm
1	Control ring
2	Working piston
3	Bottom valve
4	Gas
5	Hydraulic fluid
6	Oil flow during rebound
7	Oil flow during compression
8	Oil flow in stop range at control ring

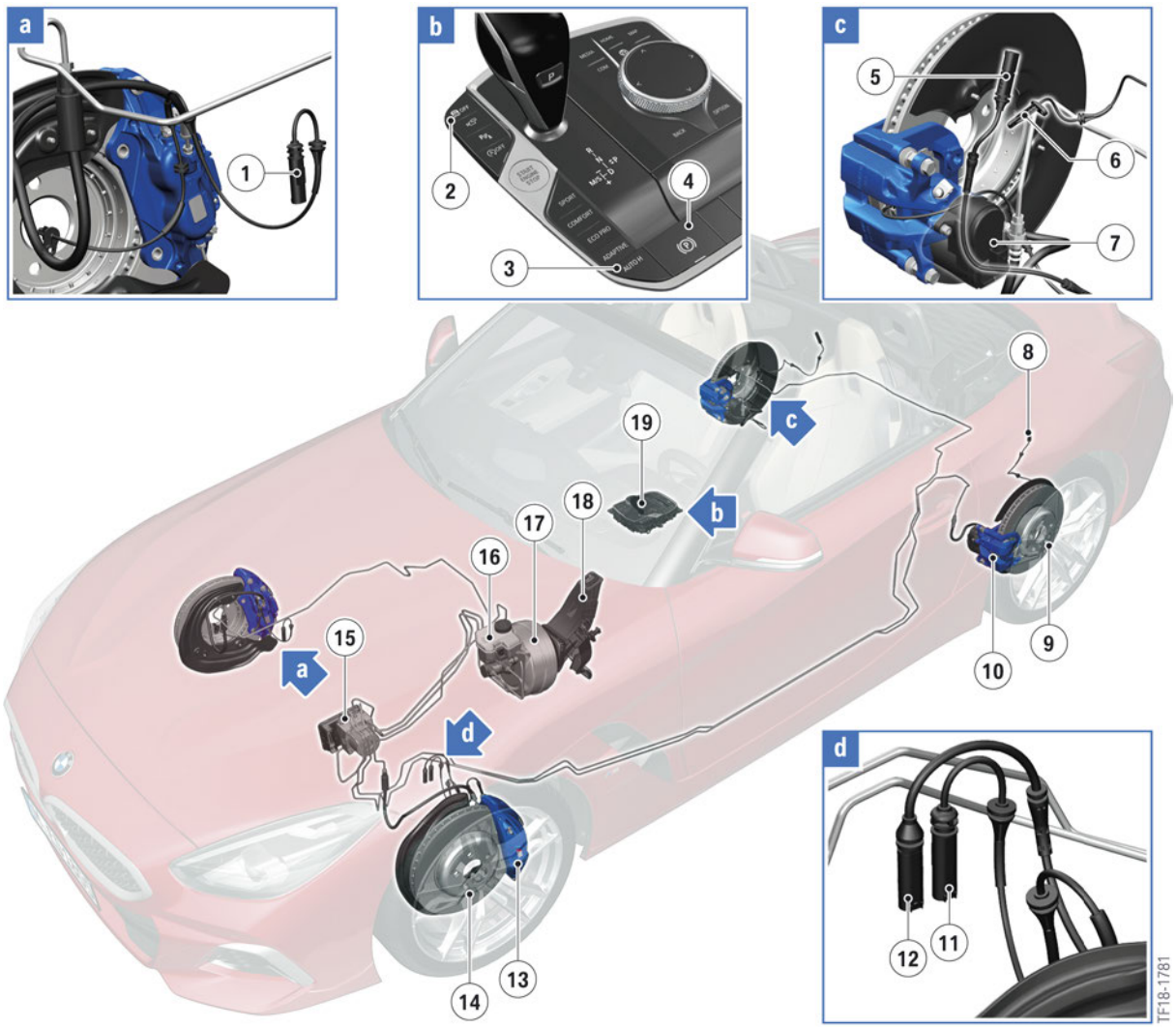
This leads to better slowdown of the wheel, i.e. annoying oscillations are dampened, and a faster restoration of the damper function is achieved. In addition, the end stop forces could be reduced with the hydraulic rebound stop, which means the neighboring components are subject to less load (no force peaks).

G29 Powertrain/Chassis

4. Chassis and Suspension

4.5. Brakes

4.5.1. Overview



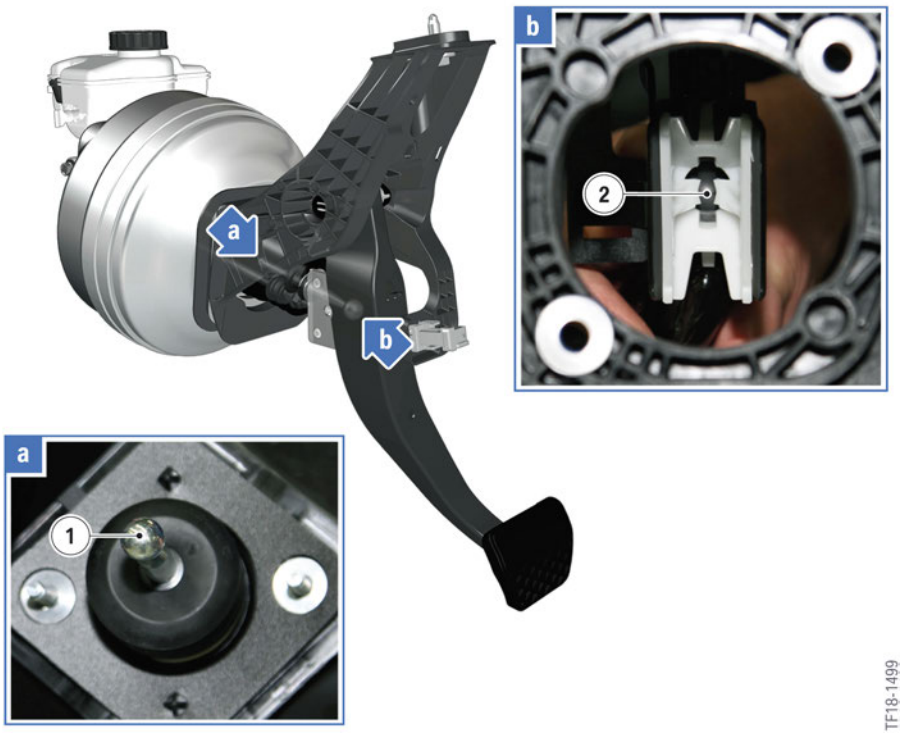
G29 overview of the brake system

Index	Explanation
1	Wheel speed sensor connector, front right
2	DSC button
3	Automatic-hold button
4	Button for electromechanical holding brake
5	Connector for brake pad wear sensor, rear right
6	Wheel speed sensor connector, rear right
7	Electromechanical parking brake actuator

Index	Explanation
8	Wheel speed sensor connector, rear left
9	Brake disc, rear left
10	Brake caliper, rear left
11	Wheel speed sensor connector, front left
12	Brake pad wear sensor connector, front left
13	Brake caliper, front left
14	Brake disc, front left
15	DSC unit
16	Expansion tank
17	Brake servo
18	Pedal mechanism
19	Center console switch cluster

4.5.2. Pedal mechanism mounting

The mounting between the pedal mechanism and the linkage of the brake servo was changed compared to the predecessor model E89. In the G29 the mounting is achieved by clipping the ball head of the linkage of the brake servo into a plastic clip at the pedal mechanism. In the E89 this was achieved with a fork head connection.



Mounting of the pedal mechanism on the brake servo linkage

Index	Explanation
1	Ball head at linkage of brake servo
2	Plastic clip at the pedal mechanism

A special tool is needed to undo this connection.

Special tool for removing the pedal mechanism

When working on the pedal mechanism, always observe the instructions in the current repair instructions.

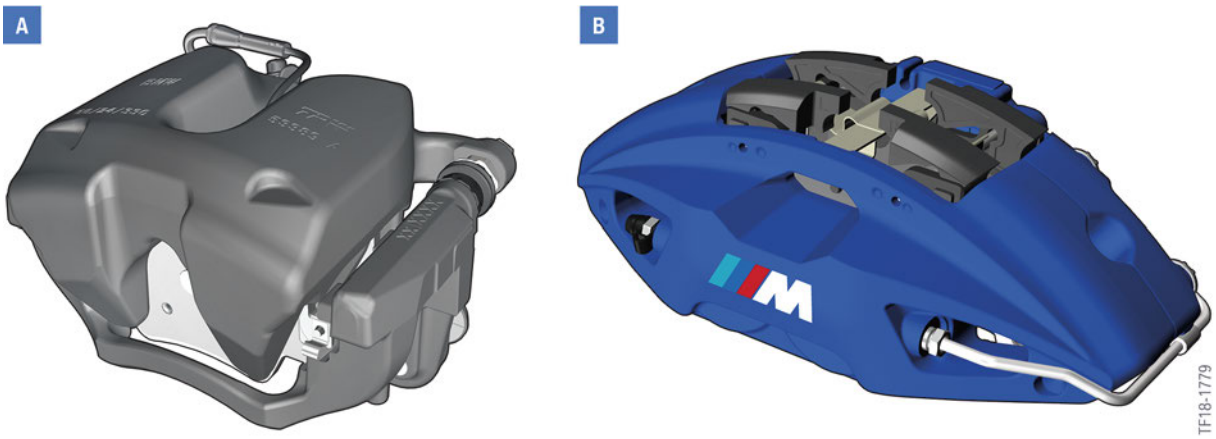
4.5.3. Service brake

Depending on the vehicle and vehicle equipment, various brake calipers are used at the front and rear axle.

G29 Powertrain/Chassis

4. Chassis and Suspension

Front axle

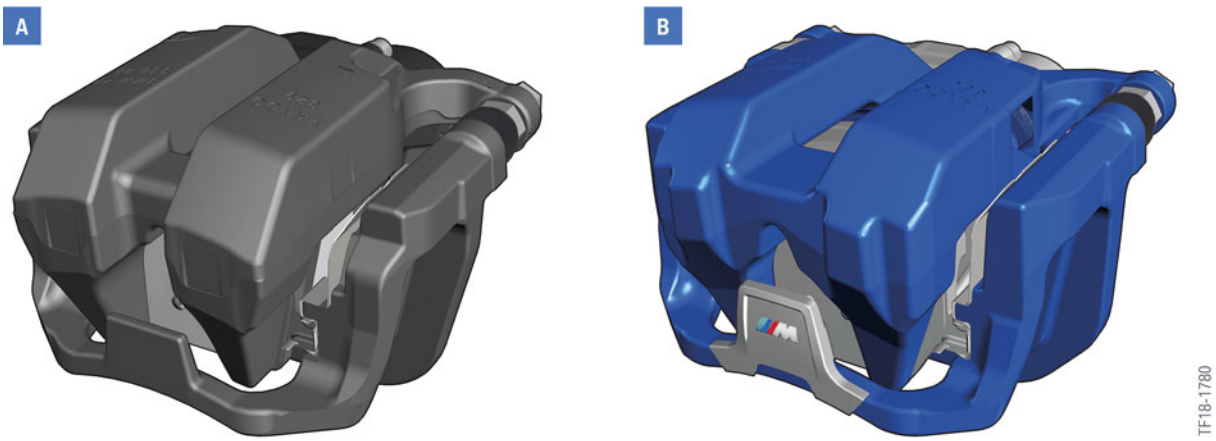


G29 brake caliper variants, front axle

Index	Explanation	Design	Material	Manufacturer	Variable	Brake disc
A	Basic brake	floating caliper	Aluminum	TRW®	17”	330 x 24
B	Sport brake	fixed caliper	Aluminum	Brembo®	17”	348 x 36

Rear axle

Floating caliper brakes with one piston are used on the rear axle. They include the electromechanical holding brake actuator.

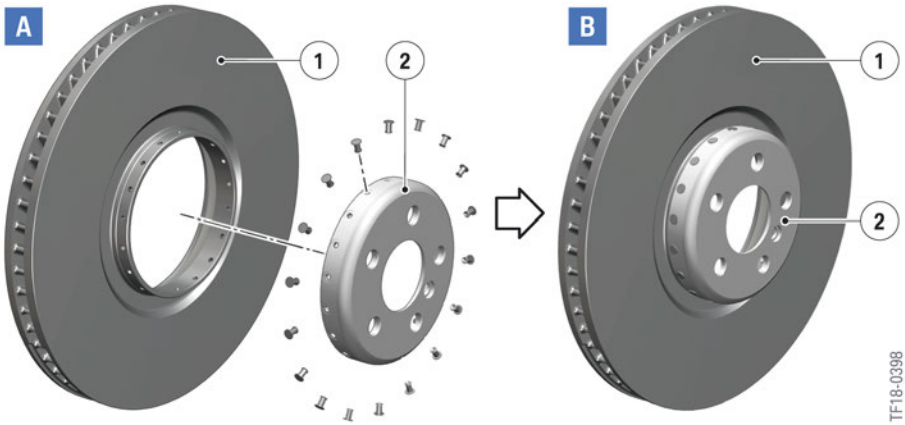


G29 brake caliper variants, rear axle

Index	Explanation	Material	Manufacturer	Variable	Brake disc
A	Basic brake	Aluminum	Mando®	17”	330 x 20
B	Sport brake	Grey cast iron	Mando®	17”	345 x 24

Brake disc

All G29 variants contain a riveted lightweight construction brake disc. The weight reduction is achieved by using a brake disc chamber made of aluminum.



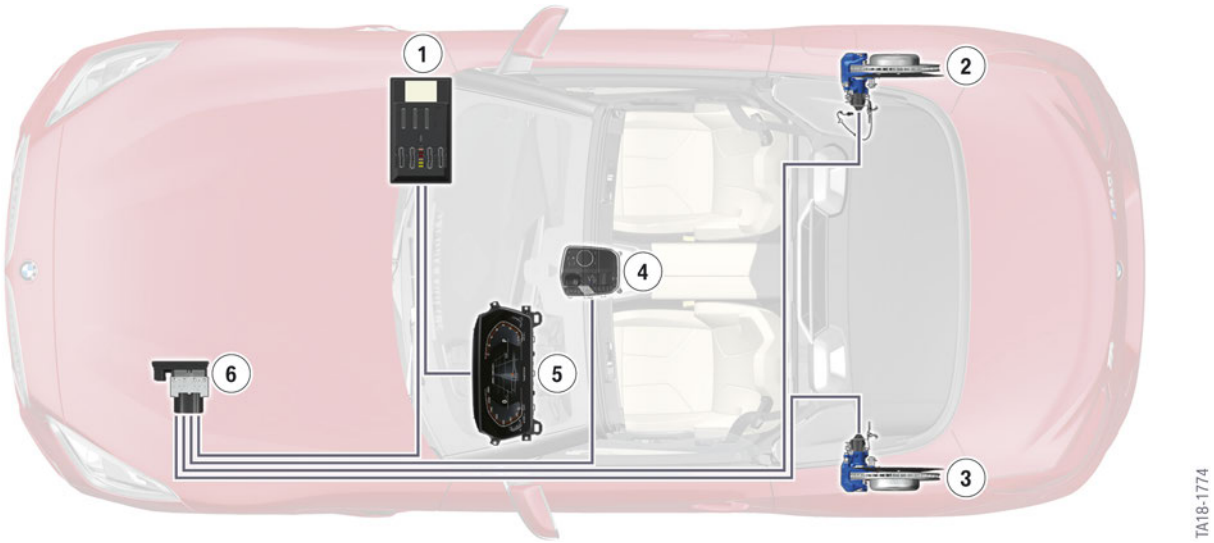
G29 brake disc

Index	Explanation
A	Two-part lightweight construction brake disc, dismantled view (cannot be dismantled in service)
B	Two-part lightweight construction brake disc, assembled view
1	Friction surface
2	Brake disc chamber

Only the complete brake disc can be renewed in service. Separation of the rivets is not permitted.

4.5.4. Parking brake

The electromechanical holding brake in the G29 differs to the predecessor E89 in that a separate control unit for the actuation of the electromechanical holding brake could be dispensed with. The actuation in the G29 is effected via the Dynamic Stability Control DSC. In the E89 the actuation of the electromechanical holding brake is effected via the control unit for the electromechanical parking brake EMF.



G29 electromechanical holding brake

Index	Explanation
1	Body Domain Controller (BDC)
2	Actuator, electromechanical holding brake, rear right
3	Actuator, electromechanical holding brake, rear left
4	Button for electromechanical holding brake
5	Instrument cluster (KOMBI)
6	Dynamic Stability Control (DSC)

At the center console switch cluster there is a parking brake button for activating or deactivating the electromechanical holding brake. The driver is informed about the current system status via the parking brake indicator light in the instrument cluster KOMBI.

Dynamic emergency braking

If the parking brake button is operated during the journey above a defined driving speed, the DSC unit initiates a dynamic emergency braking operation. This means the pump and the changeover valves in the DSC unit are activated and a pressure build-up occurs in all 4 wheel brakes. The slip limits of all wheels are monitored with the assistance of the wheel speed sensors to ensure stable deceleration until the vehicle comes to a standstill.

The two actuators of the electromechanical holding brake are activated as soon as the vehicle comes to a standstill and the vehicle is secured against rolling away.

Automatic release of the parking brake

This function allows the driver to drive off when the electromechanical holding brake is activated without operating the parking brake button to release the brake.

Prerequisites for releasing the electromechanical holding brake:

- Driver's door is closed
- Vehicle condition DRIVING
- Activated electromechanical holding brake
- Drive position engaged
- Accelerator pedal operated

Brake test stand

Test stand mode is integrated in the Dynamic Stability Control DSC for checking the braking power of the parking brake on a brake test stand. With the activation of test stand mode the electromechanical holding brake is activated via the parking brake button and the brake forces are determined.

Test stand mode is automatically detected by means of a plausibility check (wheel speed comparison). The detection takes a maximum of 5 seconds (can be recognized by flashing of the red parking brake indicator light in the KOMBI).

After activation of test stand mode the system is in test stand mode. This condition is acknowledged by the indicator light of the parking brake starting to flash at a frequency of 1 Hz.
The electromechanical holding brake can be applied in up to 5 stages using the parking brake button. The flashing frequency of the parking brake indicator light changes from 1 Hz to 3 Hz when the parking brake button is pressed in test stand mode.

If the parking brake button is operated continuously, the system automatically increases the braking power in increments up to the maximum braking power.

The following points must be observed during the test:

- Do not press accelerator pedal
- Drive position N (neutral)
- Do not press the footbrake

Replacing brake pads

In order to replace the brake pads of the rear parking brake calipers, it is first necessary to turn back the drive spindle in the brake caliper. This can be done either with a special tool manually, or with help of the workshop system. The parking brake button is blocked to prevent use after activation of workshop mode via the workshop system. This prevents injury during the brake service.

The parking brake button is enabled again at the start of a journey or after deactivation of workshop mode.

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).

Emergency release

A manual emergency release is possible via the spindle drives of the brake calipers. The actuator needs to be disassembled first. Following an emergency release, the electromechanical holding brake must be initialized.

Before performing a manual emergency release, the vehicle must be secured against rolling away.

4.6. Wheels/Tires

4.6.1. RDCi tire pressure control

The G29 is equipped with the well-known RDCi system. The following immobilization periods are required to teach-in new wheel electronics.

Vehicle condition	5 minutes	17 minutes
Parking	●	
Residing	●	
PAD mode (testing-analysis-diagnosis)	●	
Driving		●

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**
  Warning level 1 is a message to the customer that the tire pressure has dropped 21–25% tire pressure loss (cold pressure) 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 a CC message (tire inflation notice) is displayed to the driver for information.
- **Warning level 2**
  The warning level 2 message is shown when the tire pressure has dropped below the legal thr eshold and the customer's comfort and safety is impaired. Accordingly, a yellow warning light is displayed to the driver in the instrument cluster KOMBI as well as a CC message (pressure warning). However, the customer can continue to drive moderately at up to 130 km/h (80 mph). The tire pressure should, however, be corrected as soon as possible.

- **Warning level 3**

  The yellow warning light is shown in the instrument cluster KOMBI if the tire pressure drops suddenly or falls below the threshold value of warning level 3 (tire pressure < 1.5 bar). The driver also receives a CC message (breakdown warning) in which he is requested to stop carefully and visually check the tires. 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).

Notes for Service

All 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 3, the tire, tire valve and wheel rim 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.

4.6.2. Electronic tire pressures plate

As in the G30, the electronic tire pressure specification is also used in the G29. The adhesive tire pressure label is supplemented here by an additional user menu in the Central Information Display (CID).

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 the optimum tire pressure at any temperature and displays it in the central information display.

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.

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 no longer necessary. The RDCi warning pressures that are currently valid always relate to the nominal pressure displayed in the CID.

4.6.3. RDC test tool

In the G29 tire-specific data is attached to the tire sidewall in machine-readable format (QR code).

QR code on tires

Index	Explanation
1	RDC test tool
2	QR code
3	Tire sidewall
4	Wheel electronics

This makes it possible to read tire-specific data, such as tire manufacturer, tire size and tire type, using a so-called RDC test tool and to send the data by radio to the corresponding wheel electronics. The calibration of the wheel electronics in the event of a tire change is made considerably easier.

With the RDC test tool the tire pressures of the individual tires can also be read out. This can be useful for troubleshooting at the RDC system.

Further information is provided in the product information for the ST1906 "RDC Tool".

4.7. Steering

The G29 has the Electronic Power Steering (EPS) with axially parallel design (EPS-APA), which is familiar from other series.

The variable sport steering (SA 2VL) is used in the G29 as standard. The more direct steering gear ratio when compared to the basic version of the EPS and the reduced steering angle which is required as a result achieves a more direct vehicle response and higher agility. This comes in handy during avoidance manoeuvres for example. The steering column can be adjusted mechanically.

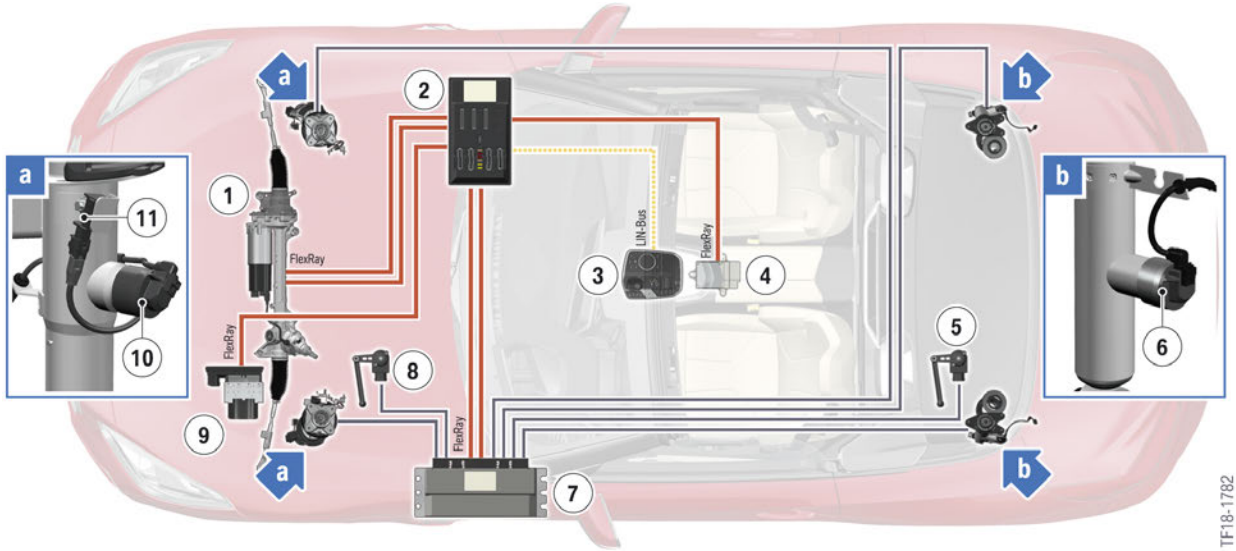
G29 Powertrain/Chassis

4. Chassis and Suspension

4.8. Electronic Damper Control (EDC)

4.8.1. Overview

The Electronic Damper Control (EDC) is a variable, electronically regulated shock absorber adjustment system for the control of the vertical dynamics and is used in the G29 with the chassis and suspension package "Adaptive M suspension" (SA 2VF). 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.



G29 system overview of Electronic Damper Control (EDC)

Index	Explanation
1	Electronic Power Steering (electromechanical power steering) (EPS)
2	Body Domain Controller (BDC)
3	Driving Experience Control (FES)
4	Advanced Crash Safety Module (ACSM-High)
5	Ride height sensor, rear left
6	EDC valve, rear
7	Vertical Dynamic Platform (VDP)
8	Ride height sensor, front left
9	Dynamic Stability Control (DSC)
10	EDC valve, front
11	Vertical acceleration sensor

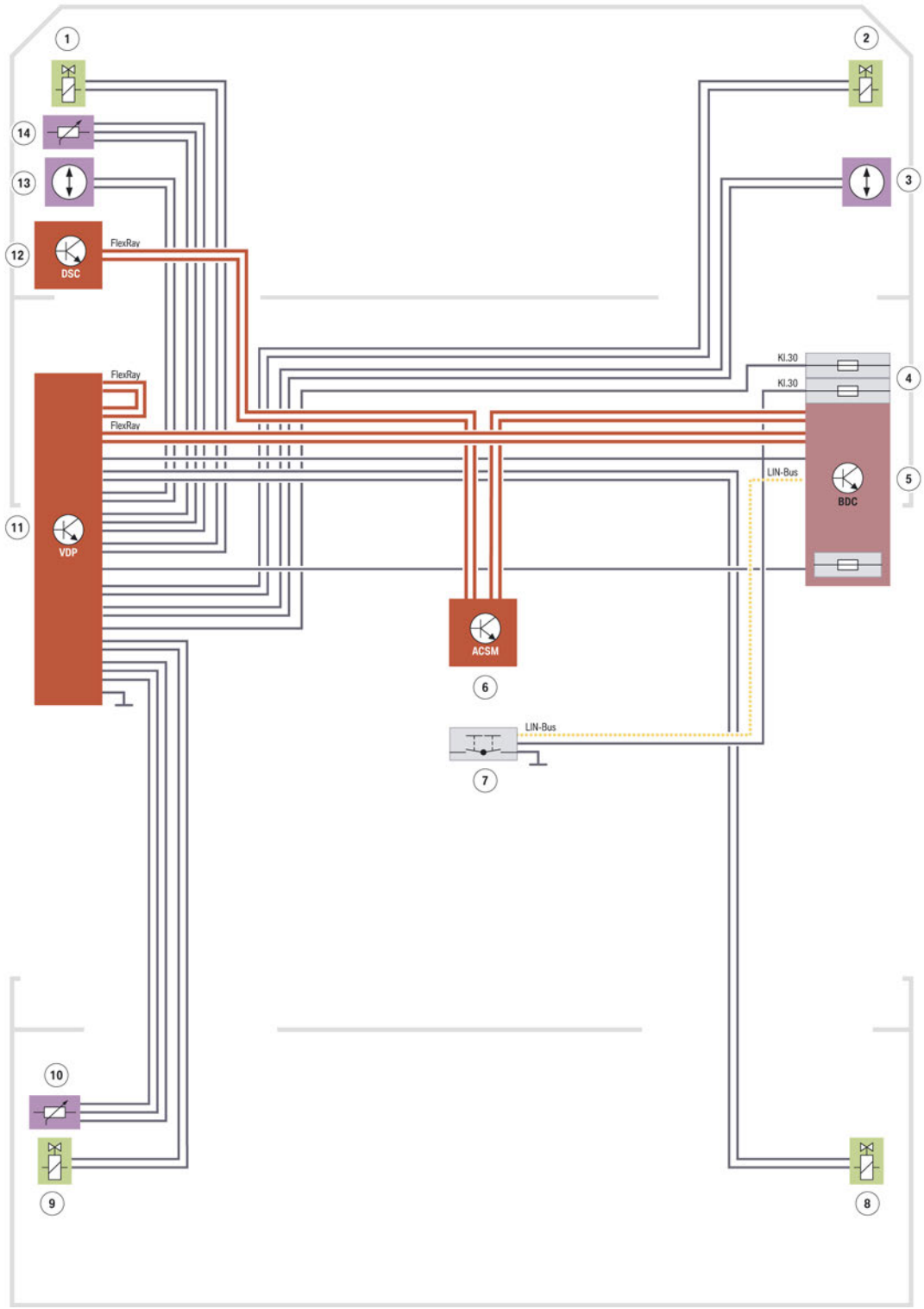
The G29 is fitted with 2 vertical acceleration sensors at the front. The body movements (pitching, rolling and lifting) are detected by the Advanced Crash Safety Module (ACSM).

For this purpose, an enhanced Advanced Crash Safety Module (ACSM High) is installed in the G29 in combination with the Electronic Damper Control (EDC). 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	•	
Sports suspension	•	
M sports suspension		•

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.

4.8.2. System wiring diagram



G29 System wiring diagram for Electronic Damper Control (EDC)

G29 Powertrain/Chassis

4. Chassis and Suspension

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

Technical training.
Product information.

G29 General Vehicle Electronics

Edited for the U.S. market by:
BMW Group University
Technical Training
ST1834 2/1/2019

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: October 2018

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.

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This information is available by accessing TIS at www.bmwcenternet.com.

Additional sources of information

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

- Owner's Handbook
- Integrated Service Technical Application
- Aftersales Information Research (AIR)

G29 General Vehicle Electronics

Contents

G29 General Vehicle Electronics

Contents

G29 General Vehicle Electronics

1. Introduction

1.1. Additional documents

This Product Information presents the new features of and changes to the general vehicle electrical system in the G29. The focus is particularly on **vehicle-specific** features. Basic, **system-specific** descriptions of the General Vehicle Electrical system, as well as other innovations in 2018, can be found in the product information **ST1856 General Vehicle Electronics 2018**, **ST1855 Displays and Controls 2018** and **ST1857 Infotainment 2018**.

G29 General Vehicle Electronics

2. Bus Overview

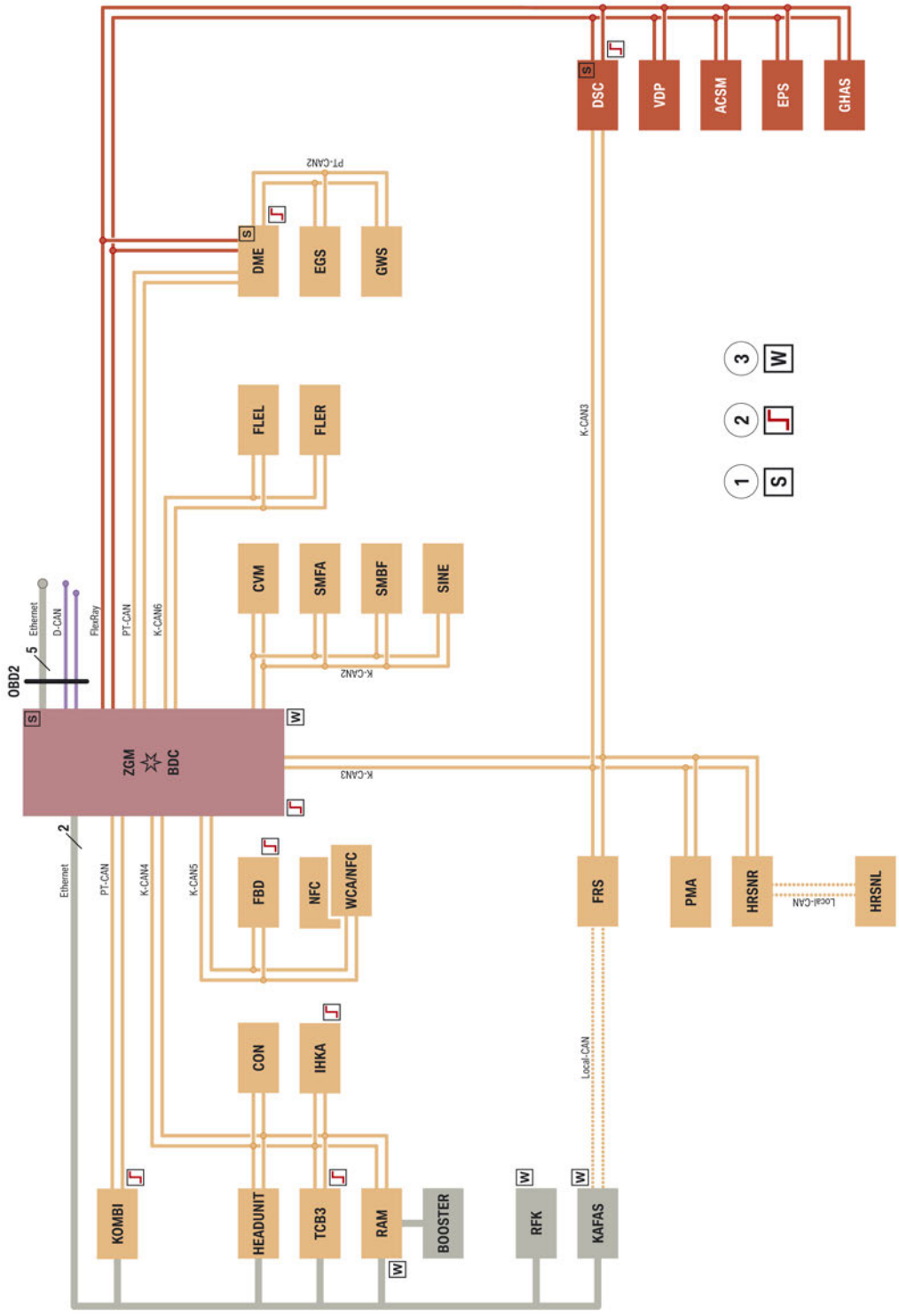
2.1. Bus overview

The G29 receives a bus system with the 2018 service pack. Special features of this bus system include:

- Omission of MOST bus
- Addition of a K-CAN6

G29 General Vehicle Electronics

2. Bus Overview



TE18-1980

G29 bus overview

G29 General Vehicle Electronics

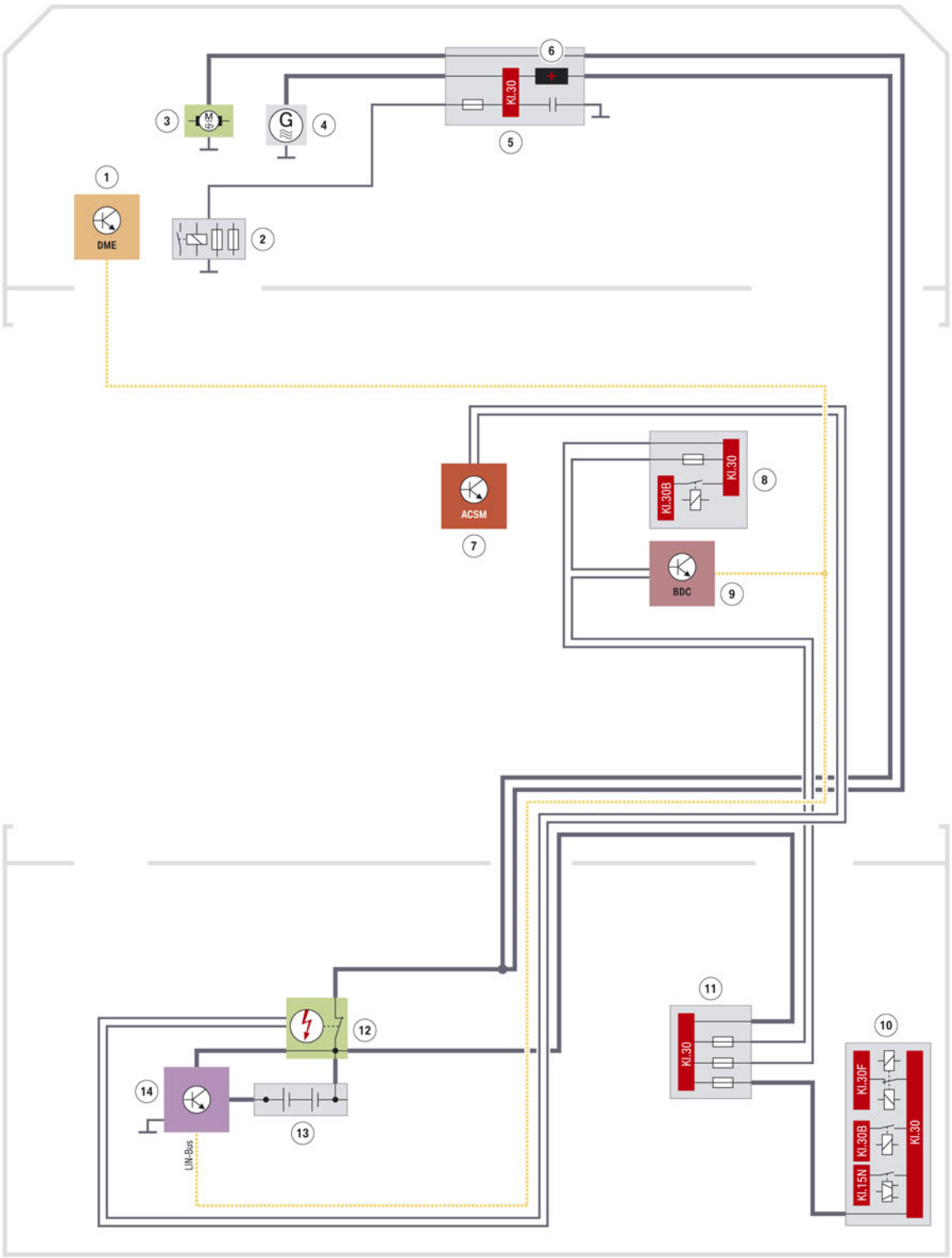
2. Bus Overview

Index	Explanation
ACSM	Advanced Crash Safety Module
BDC	Body Domain Controller
BOOSTER	Booster (audio amplifier)
CON	Controller
CVM	Convertible top module
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EGS	Electronic transmission control
EPS	Electronic Power Steering
FBD	Remote control receiver
FLEL	Frontal Light Electronics Left
FLER	Frontal Light Electronics Right
FRS	Front radar sensor
GHAS	Regulated rear axle differential lock
GWS	Gear selector switch
HEAD UNIT	Head unit
HRSNL	Rear radar sensor short range left
HRSNR	Rear radar sensor short range right
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver assistance systems
KOMBI	Instrument panel
NFC	Near Field Communication
PMA	Parking Manoeuvring Assistant
RAM	Receiver Audio Module
RFK	Rear view camera
SINE	Siren with tilt alarm sensor
SMBF	Front passenger seat module
SMFA	Driver's seat module
TCB3	Telematic Communication Box 3
VDP	Vertical Dynamic Platform
WCA	Wireless charging station
ZGM	Central Gateway Module
1	Start-up nodes
2	Wake-up authorization
3	Wake-up line

G29 General Vehicle Electronics

3. Voltage Supply

3.1. System wiring diagram



G29 voltage supply

G29 General Vehicle Electronics

3. Voltage Supply

Index	Explanation
1	Digital Motor Electronics (DME)
2	Integrated supply module
3	Starter motor
4	Alternator
5	Power distribution box, engine compartment
6	Positive battery connection point
7	Advanced Crash Safety Module (ACSM)
8	Power distribution box, front right
9	Body Domain Controller (BDC)
10	Power distribution box, luggage compartment
11	Power distribution box, battery
12	Safety battery terminal
13	Battery
14	Intelligent battery sensor (IBS)

In the G29 vehicles with the (B46 engine) receive a dual storage system.

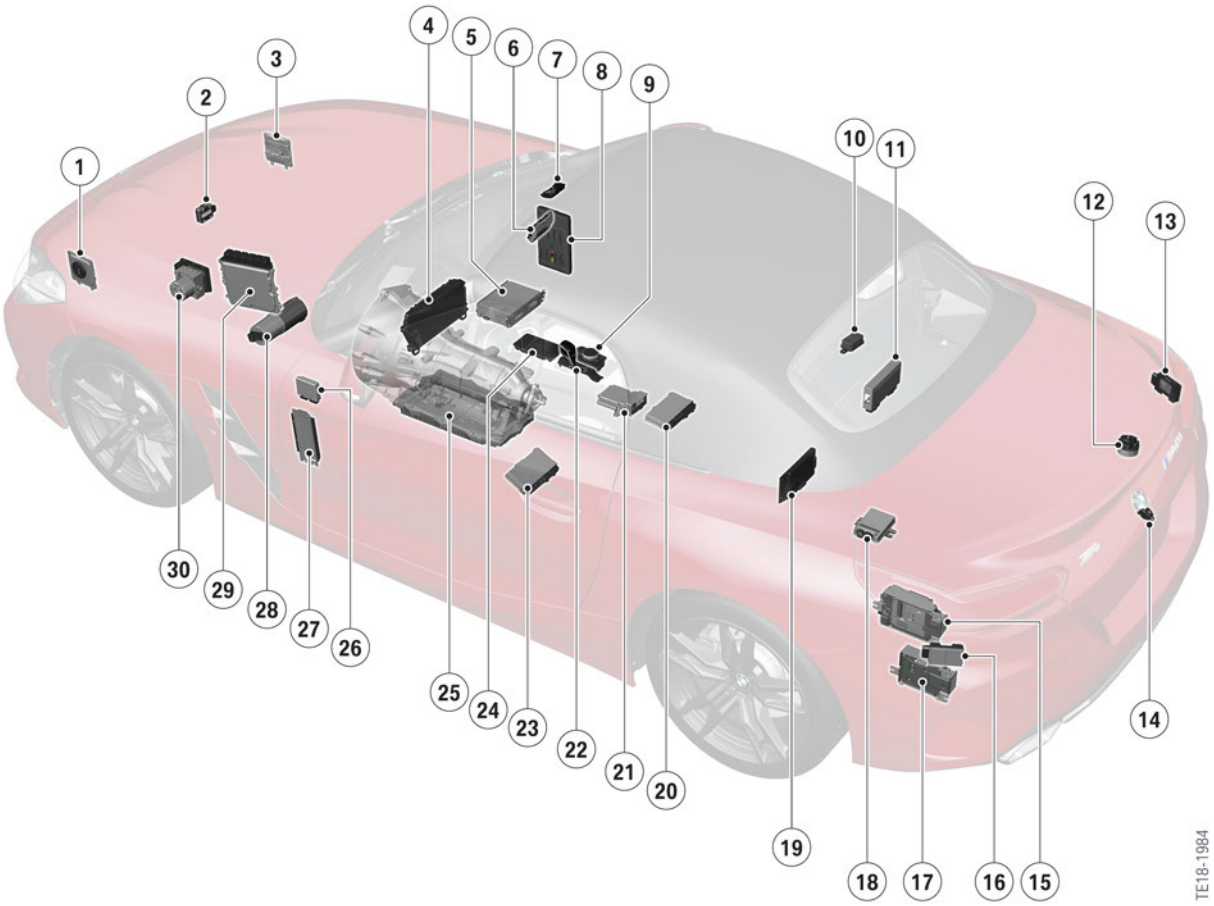
G29 General Vehicle Electronics

4. General Vehicle Electronics

4.1. Control units

4.1.1. Installation location

The following graphic shows the maximum equipment.



G29 installation location of control units

Index	Explanation
1	Frontal Light Electronics Left (FLEL)
2	Front radar sensor (FRS)
3	Frontal Light Electronics Right (FLER)
4	Instrument cluster (KOMBI)
5	Head unit
6	Integrated automatic heating/air conditioning (IHKA)
7	Camera-based driver support systems (KAFAS)
8	Body Domain Controller (BDC)
9	Controller (CON)

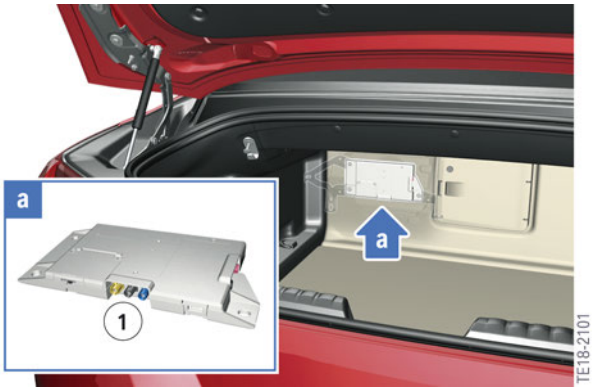
Index	Explanation
10	Remote control receiver (FBD)
11	Soft top module (CVM)
12	Siren with tilt alarm sensor (SINE)
13	Rear radar sensor short range right (HRSNR)
14	Rear view camera (RFK)
15	Receiver Audio Module (RAM)
16	Rear radar sensor short range left (HRSNL)
17	Booster
18	Regulated rear axle differential lock (GHAS)
19	Telematic Communication Box 3 (TCB3)
20	Front passenger seat module (SMBF)
21	Advanced Crash Safety Module (ACSM)
22	Gear selector switch (GWS)
23	Driver's seat module (SMFA)
24	Wireless charging station (WCA)/Near Field Communication (NFC)
25	Electronic transmission control (EGS)
26	Parking Manoeuvring Assistant (PMA)
27	Vertical Dynamic Platform (VDP)
28	Electronic Power Steering (EPS)
29	Digital Motor Electronics (DME)
30	Dynamic Stability Control (DSC)

4.1.2. Telematic Communication Box 3

The G29 receives a **new** control unit, the Telematic Communication Box 3 (TCB3). The TCB3 is the latest generation of the telematics control units. The TCB3 in the G29 is installed in the luggage compartment.

G29 General Vehicle Electronics

4. General Vehicle Electronics



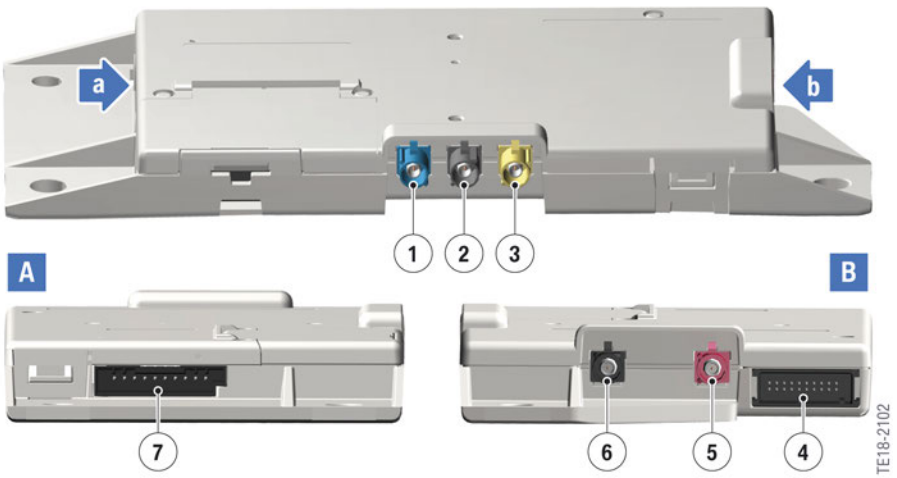
G29 installation location of the TCB3

Index	Explanation
1	Telematic Communication Box 3 (TCB3)

The differences between the TCB3 and the TCB2 are the following:

- LTE advanced (4.5 G)
- Higher data transfer (up to 300 MBit/s)
- New safety standard (IPSEC)
- No integrated Internet hotspot (in the Head Unit High 3)

Connections



G29 Telematic Communication Box 3 connections

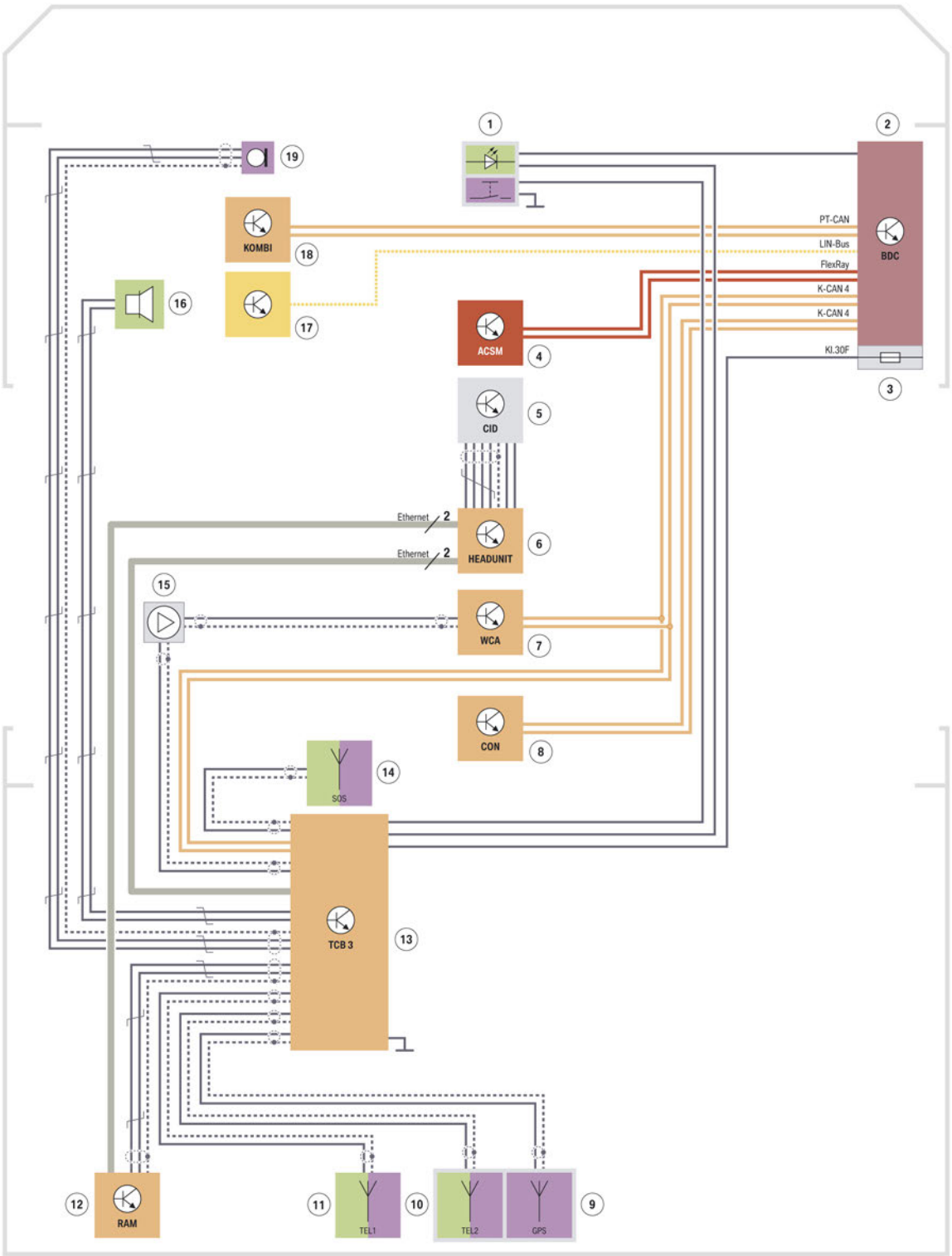
4. General Vehicle Electronics

Index	Explanation
1	GPS antenna
2	Telephone antenna
3	Telematic antenna
4	Ethernet, K-CAN4, microphone on driver's side
5	Wireless charging station (WCA)
6	Emergency GSM antenna
7	Emergency loudspeaker, voltage supply, emergency call button, emergency call LED

G29 General Vehicle Electronics

4. General Vehicle Electronics

System wiring diagram



G29 Telematics

Index	Explanation
1	Emergency call button and emergency call LED
2	Body Domain Controller (BDC)
3	Fuse for Body Domain Controller power distribution box
4	Advanced Crash Safety Module (ACSM)
5	Central Information Display (CID)
6	Head Unit High 3 (HU-H3)
7	Wireless charging station (WCA)
8	Controller (CON)
9	GPS antenna
10	Telematic antenna
11	Telephone antenna
12	Receiver Audio Module (RAM)
13	Telematic Communication Box 3 (TCB3)
14	GSM antenna for emergency
15	Line amplifier
16	Emergency speaker
17	Steering column switch cluster
18	Instrument cluster (KOMBI)
19	Microphone, driver's side

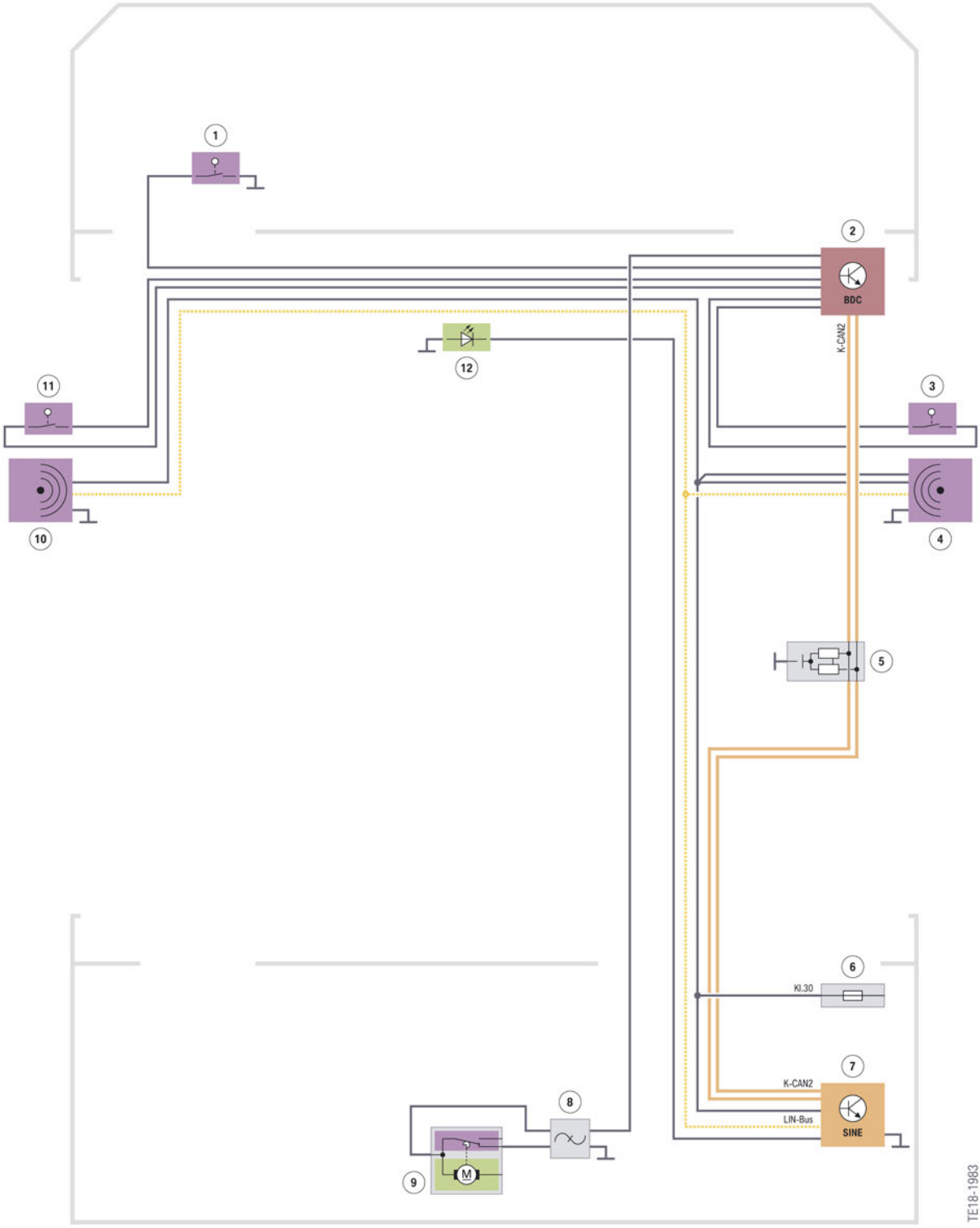
4.2. Alarm system

The G29 has microwave sensors for the alarm system in the driver's door and front passenger door. The control unit Siren with tilt alarm sensor (SINE) is also used in the convertible.

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.2.1. System wiring diagram



G29 alarm system

Index	Explanation
1	Engine compartment lid contact switch
2	Body Domain Controller (BDC)
3	Door lock, right
4	Microwave sensor, passenger's door
5	CAN terminator
6	Fuse for luggage compartment power distribution box
7	Siren with tilt alarm sensor (SINE)
8	Interference suppression filter
9	Tailgate lock
10	Microwave sensor, driver's door
11	Door lock, left
12	Alarm system LED

4.3. Comfort Access

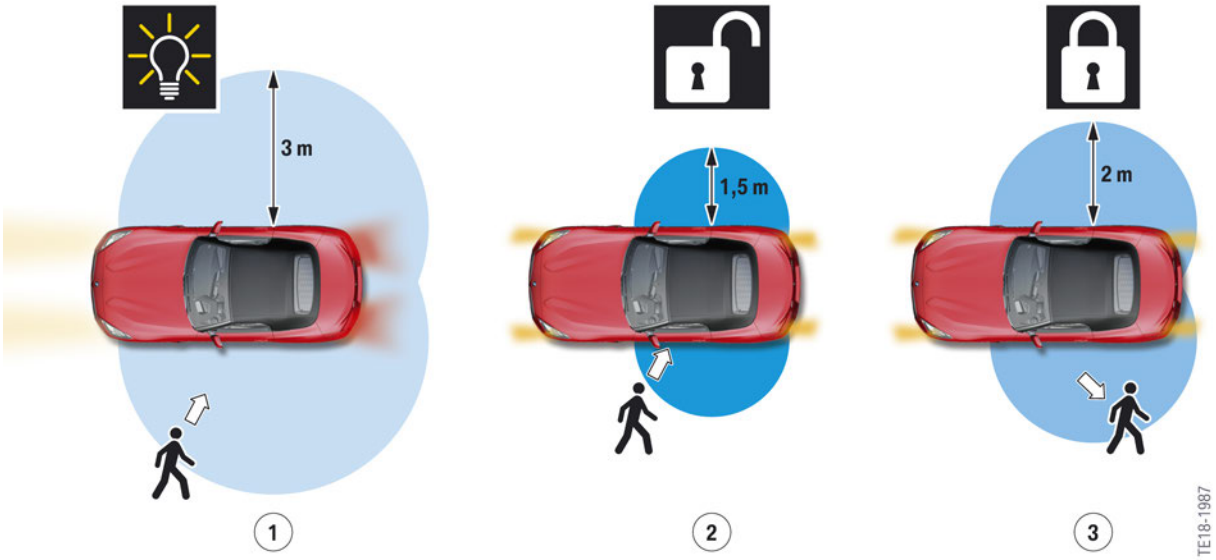
Comfort Access (SA 322) is available as optional equipment. Comfort Access includes locking and unlocking the vehicle without a key and the use of a BMW Digital Key. More information on the BMW Digital Key can be found in the following product information **ST1856 General Vehicle Electronics 2018**.

In the G29 the new Comfort Access 2.0 is used, with which the doors automatically unlock when approaching the vehicle and automatically lock on moving away from the vehicle.

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.3.1. Function



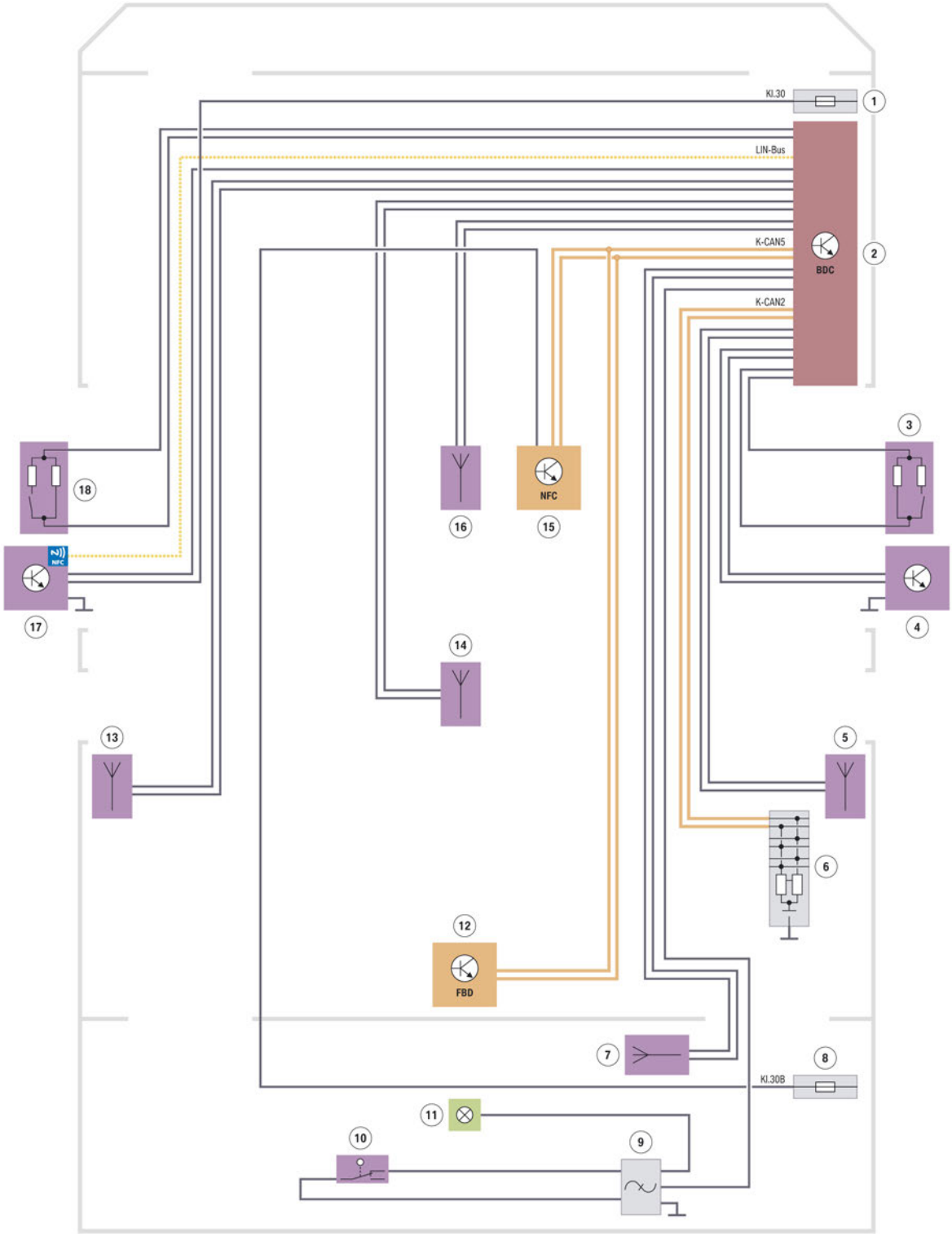
G29 operating principle of Comfort Access 2.0

Index	Explanation
1	Welcome light on approaching the vehicle
2	Automatic release of door locks on approaching the vehicle further
3	Automatic central locking system on moving away from the vehicle

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.3.2. System wiring diagram



G29 Comfort Access

G29 General Vehicle Electronics

4. General Vehicle Electronics

Index	Explanation
1	Fuse for front right power distribution box
2	Body Domain Controller (BDC)
3	Door lock, right
4	Outside door handle electronics (TAGE), right
5	Exterior antenna, right
6	CAN terminator
7	Luggage compartment antenna
8	Fuse for luggage compartment power distribution box
9	Interference suppression filter
10	Tailgate lock
11	Luggage compartment light
12	Remote control receiver (FBD)
13	Exterior antenna, left
14	Interior antenna
15	Near Field Communication (NFC)
16	Interior antenna
17	Outside door handle electronics (TAGE), left, incl. Near Field Communication
18	Door lock, left

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.3.3. BMW Digital Key

A BMW Digital Key is available in conjunction with the optional equipment Comfort Access (SA 322). With Comfort Access the vehicle can be unlocked via a compatible Samsung® smartphone and also able to start the engine.

G29 Near Field Communication

Only the driver's door can be unlocked with the digital key since the relevant NFC electronics are located in the drivers door handle.

G29 antenna, Near Field Communication

Index	Explanation
1	NFC antenna and electronics

The smartphone must be placed in the wireless charging smartphone tray to start the engine. The NFC electronics are also located in the smartphone tray.

G29 smartphone tray

4.4. Lighting

There are 2 different equipment specifications available for the lighting:

- LED headlights (standard equipment)
- Adaptive Full LED lights (SA 552)

The LED modules are activated via the two control units Frontal Light Electronics Left (FLEL) and Frontal Light Electronics Right (FLER).

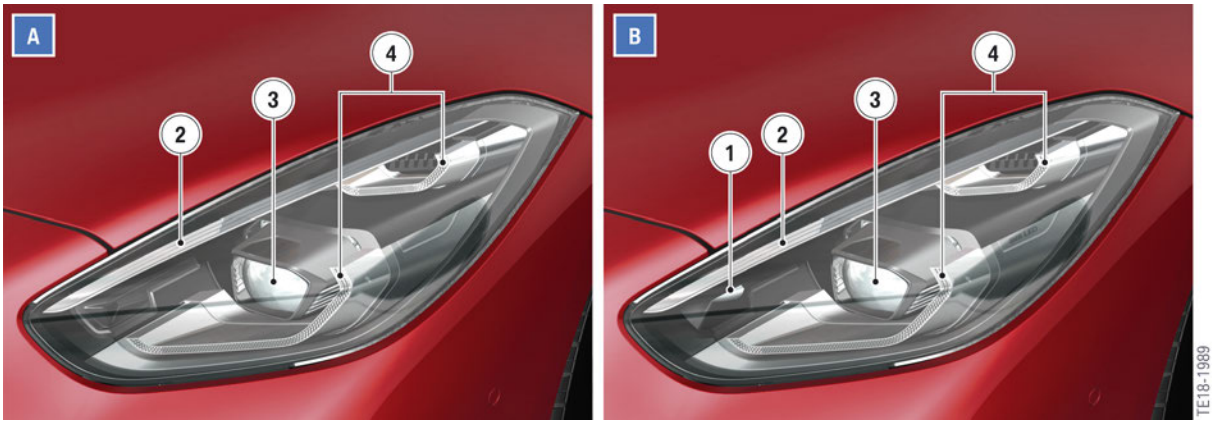
The G29 does **not** have a headlight cleaning system. This is not required by law for these LED headlights.

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.4.1. Headlight

The headlights only have one projection module per side. The low-beam headlight and the high beam are produced via this projection module. The projection modules can only be swivelled **vertically**.



G29 LED headlights

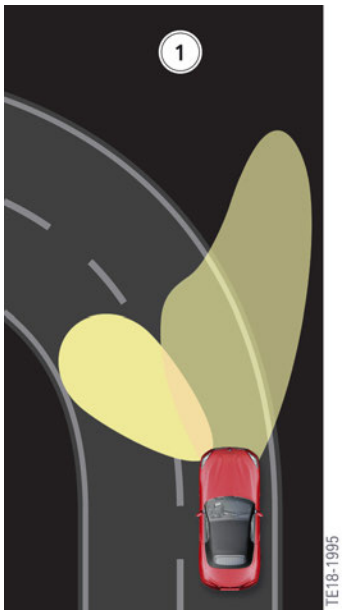
Index	Explanation
A	LED headlights (standard equipment)
B	Adaptive Full LED lights (SA 552)
1	Cornering light
2	Turn indicator
3	Low beam/high beam
4	Side light/ daytime driving light

4.4.2. Light distributions

The following light distributions are also available with the adaptive LED headlight:

- Static adaptive light
- Cornering light distribution

Adaptive light distributions



G29 adaptive light distributions

Index	Explanation
1	Static adaptive headlight with cornering light

For the function of the static Adaptive Headlight the LED of the cornering light is switched on for the low-beam headlight in order to better illuminate the inside area of the bend. The prerequisites are:

- Bend detected (steering angle and yaw rate)
- Speed up to 70 km/h (45 mph)

Cornering light

For a cornering manoeuvre the LED for the cornering light is switched on at the respective side in order to better illuminate the area at the side. The prerequisites for activating the cornering light are:

- Cornering detected (steering angle or turn indicator)
- Speed up to 40 km/h (25 mph)

4.4.3. Lighting functions

With the introduction of the new light switch (buttons) in the 2018 service pack and as a result of statutory provisions, the **operating logic** of the lighting functions is changing. The following table should illustrate the logic in the different driving conditions:

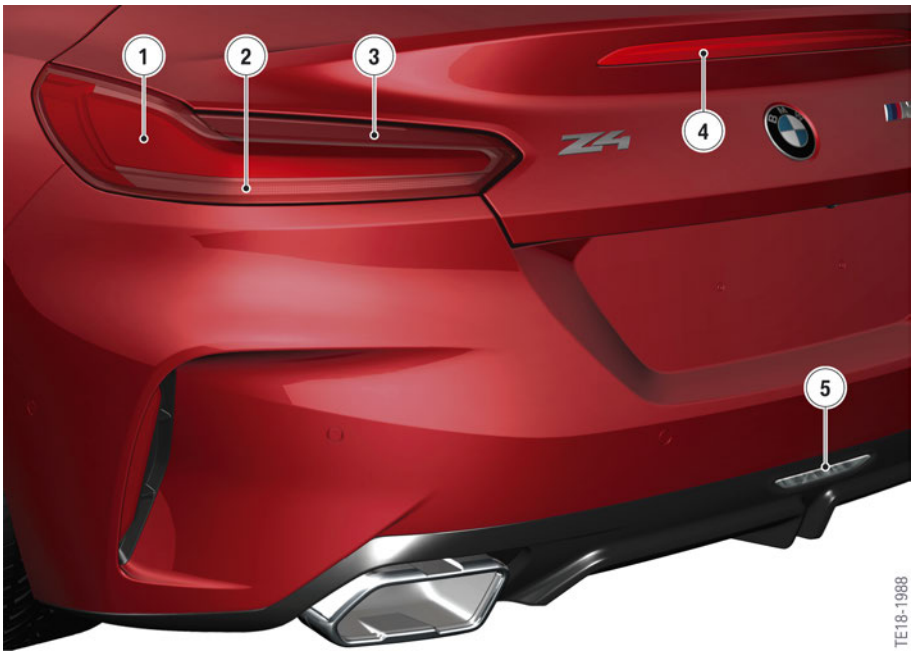
Position of light switch	Parking	Residing	Driving
OFF 	Light OFF	Light OFF	Daytime driving lights, from engine start change to AUTO
AUTO 	Light OFF	Light OFF	With sufficient ambient brightness daytime driving lights, in the case of insufficient ambient brightness low-beam headlight
Low-beam headlight 	Light OFF	Light OFF; if the low-beam headlight is switched on directly in "Residing" condition, then this is on.	Low-beam headlight, without adaptive light distributions
Side light 	Side light	Side light	Side light, from engine start change to AUTO

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.4.4. Rear lights

All light functions in the rear light assembly, additional brake light and reverse light are now LEDs.

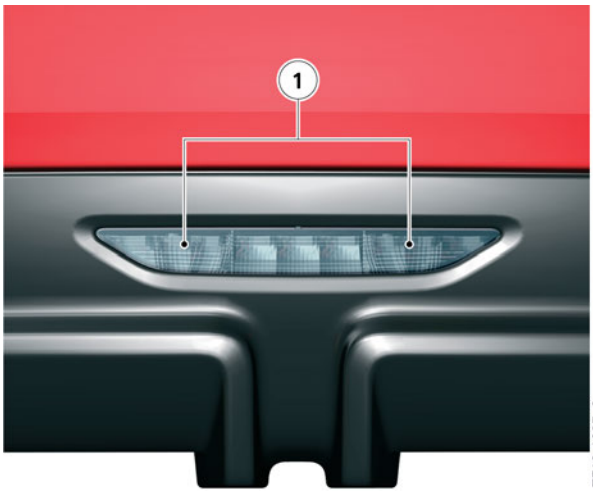


G29 rear lights

Index	Explanation
1	Tail light
2	Turn indicator
3	Brake light
4	Additional brake light
5	Reverse light

4.4.5. Reverse light

The reversing light is now in the center of the vehicle.



G29 reversing light

Index	Explanation
1	Reversing light

4.5. Heating and air conditioning system

The following climate control system is installed:

- 2/1-zone Automatic air conditioning

From a technical perspective the climate control is divided into zones (e.g. driver, front passenger). The first digit represents the individually adjustable temperature settings, whilst the second digit represents the zones in which the amount of air can be individually adjusted.

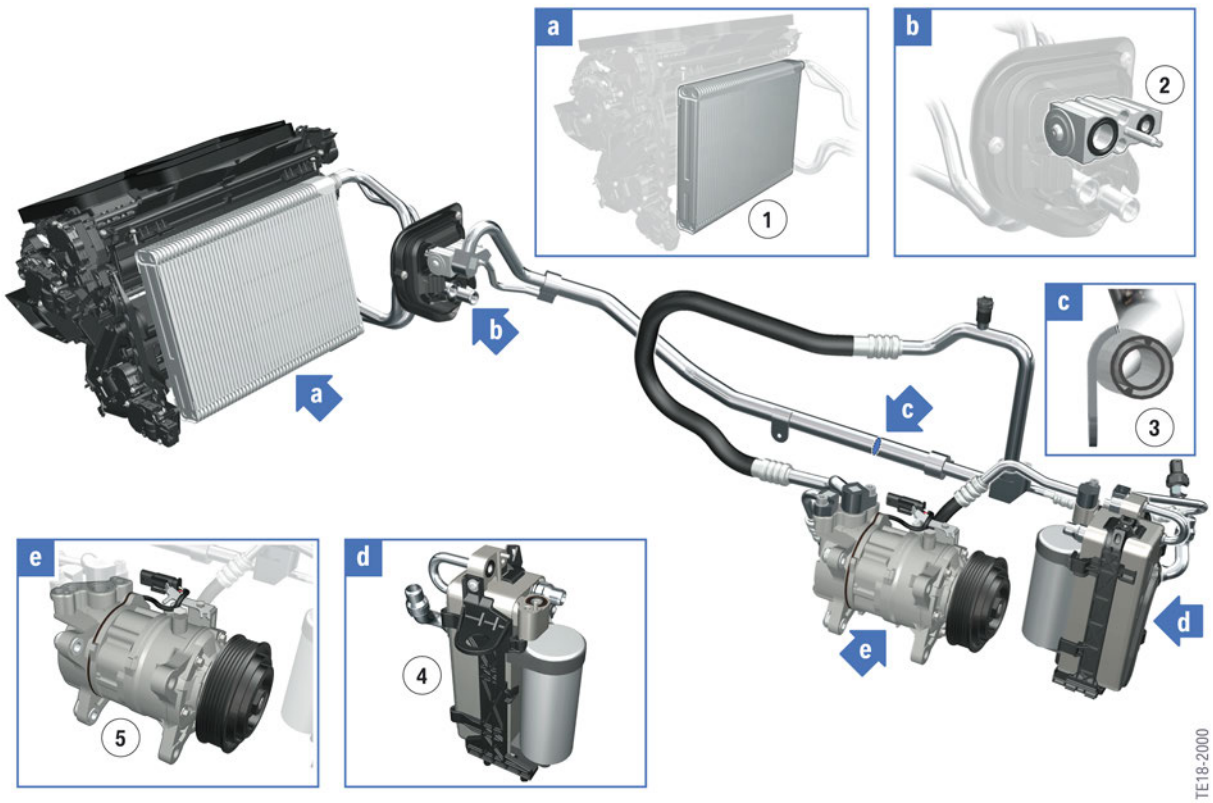
4.5.1. Control panel

The following graphic shows the air conditioning control panel of a 2/1-zone automatic heating/air conditioning system:

G29 control panel of 2/1-zone automatic heating/air conditioning system

4.5.2. Overview of refrigerant circuit

A compact coolant-cooled condenser is installed. The line from the evaporator to the air conditioning compressor and from the air conditioning condenser to the evaporator is double-walled. The refrigerant for the evaporator is already pre-cooled.



G29 Refrigerant circuit

4. General Vehicle Electronics

Index	Explanation
1	Evaporator
2	Expansion valve
3	Refrigerant line with inner heat exchanger
4	Coolant-cooled condenser
5	Air conditioning compressor

G29 General Vehicle Electronics

5. Driver Assistance Systems

The G29 receives assistance systems and sensors introduced with the 2018 service pack. This product information shows only an overview of the available assistance systems and sensors. Further information on the assistance systems is provided in the product information **ST1858 Driver Assistance Systems 2018**.

5.1. Overview

The purpose of the following tables is to provide an overview of the dependencies between the offer structure and assistance systems used as well as their system components. Furthermore, they also list all assistance systems available in the G29.

5.1.1. Offer structure "Driving"

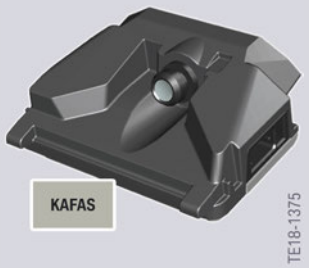
Standard equipment

Active Guard (SA 5AV) and Dynamic Cruse Control (SA 544) are standard in the G29. All G29 vehicles are always equipped with the KAFAS-Mid-Camera.

Optional equipment

In the G29 the customer has a choice of optional equipment for Advanced Driver Assistance Systems (ADAS).

Below you can see the standard and options that are available:

Active Guard (5AV standard)	
- Lane Departure Warning - Front Collision Mitigation - Daytime Pedestrian Protection - Speed Limit Info - Speed Limiter	

G29 General Vehicle Electronics

5. Driver Assistance Systems

Active Driving Assistant (OE 5AS optional)

- Blind Spot Collision Warning

- Cross Traffic Warning, Rear

Active cruise control with Stop&Go function (OE 5DF optional)

- Active cruise control with Stop&Go (up to 160 km/h (100 mph))

Driving Assistance Package (ZDA)

Includes all features of the **Active Driving Assistant (OE 5AS)** and the following:
- Blind Spot Detection

- Lane Departure Warning

Dynamic Cruise Control (standard)

- Cruise Control with braking function
- Speed Limiter

G29 General Vehicle Electronics

5. Driver Assistance Systems

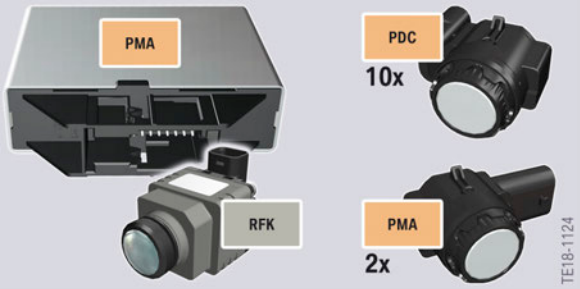
5.1.2. Offer structure "Parking"

The familiar optional equipment Park Distance Control (PDC) (SA 508) and Parking Assistant (SA 5DM) are also offered in the G29.

Vehicles not equipped with the Parking Manoeuvre Assistant (PMA) but with the Park Distance Control (PDC) have a separate control unit, which is recognized as the PMA control unit by the diagnosis and is also referred to by this name in the bus diagram. In other words, there is no longer a difference in the naming of the PDC and PMA control unit (there are however differences in the hardware design between the control units and the software is adapted to the equipment specification).

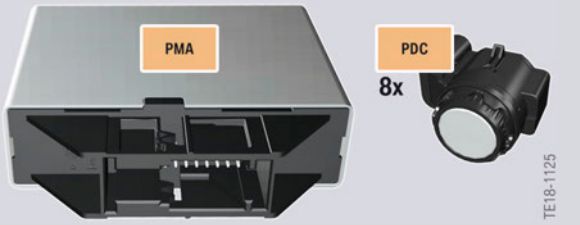
Parking Assistant (SA 5DM) is included in M Sport Package (ZMP) and Convenience Package (ZCV)

- Automatic Parking with parallel parking and manoeuvring out of parking spaces
- Back-up Assistant
- Auto PDC
- Front and rear Park Distance Control (PDC)
- Side protection
- Rear view camera



Park Distance Control PDC (SA 508)

- Front and rear
- Auto PDC



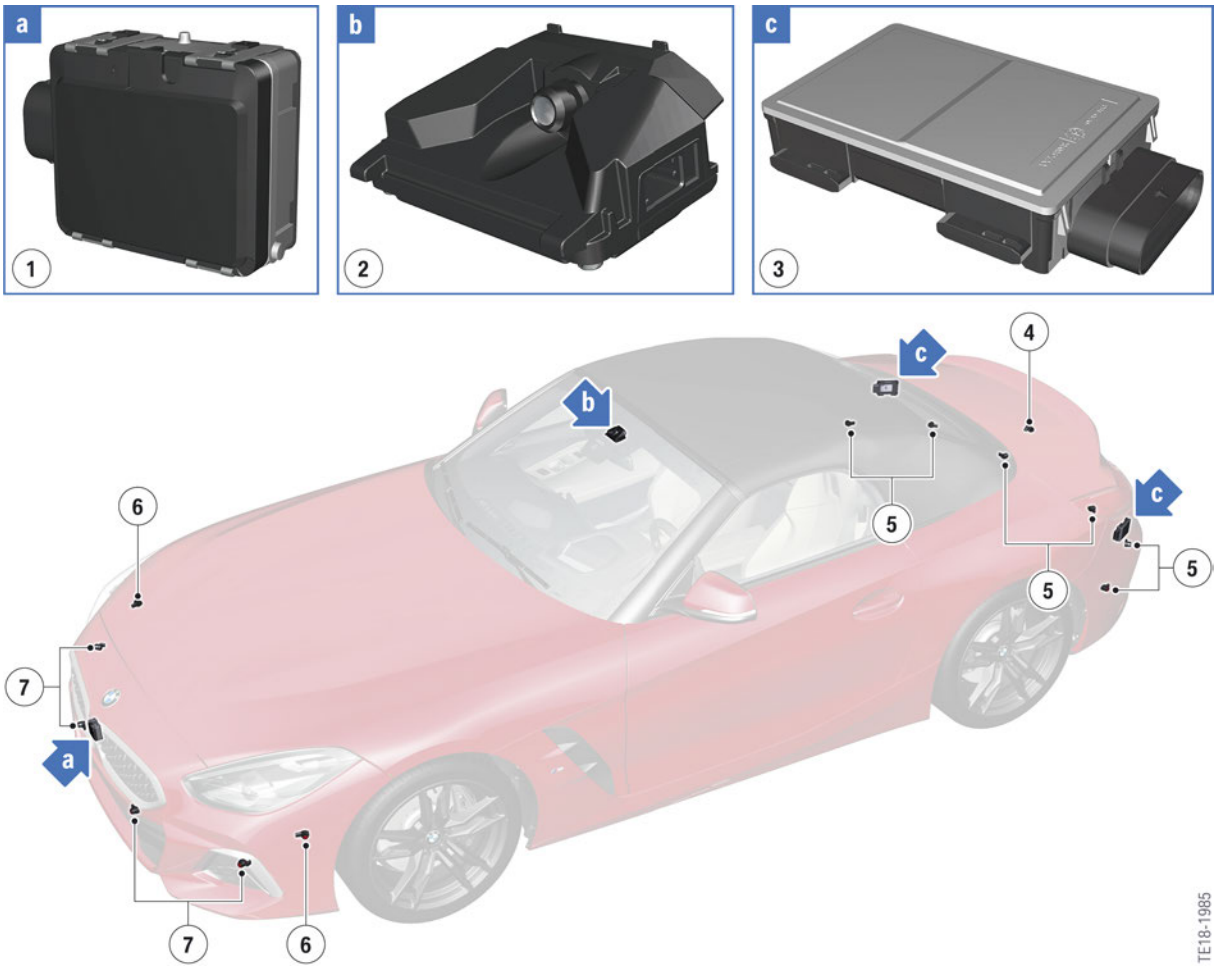
As can be seen in the overview, the G29 does not have the optional equipment system SAS control unit. Therefore, the PMA and DSC control units assume the longitudinal and lateral guidance of the Parking Manoeuvring Assistant PMA.

G29 General Vehicle Electronics

5. Driver Assistance Systems

5.2. Sensor installation locations

Depending on the vehicle equipment, the sensors shown are used:



G29 overview of sensors of assistance systems

Index	Explanation
1	Front radar sensor (FRS)
2	KAFAS-Mid-Camera
3	Side rear radar sensor (HRSNR, HRSNL)
4	Rear view camera (RFK)
5	Ultrasonic sensors for Park Distance Control (PDC), rear
6	PMA ultrasonic sensors, front
7	Ultrasonic sensors for Park Distance Control (PDC), front

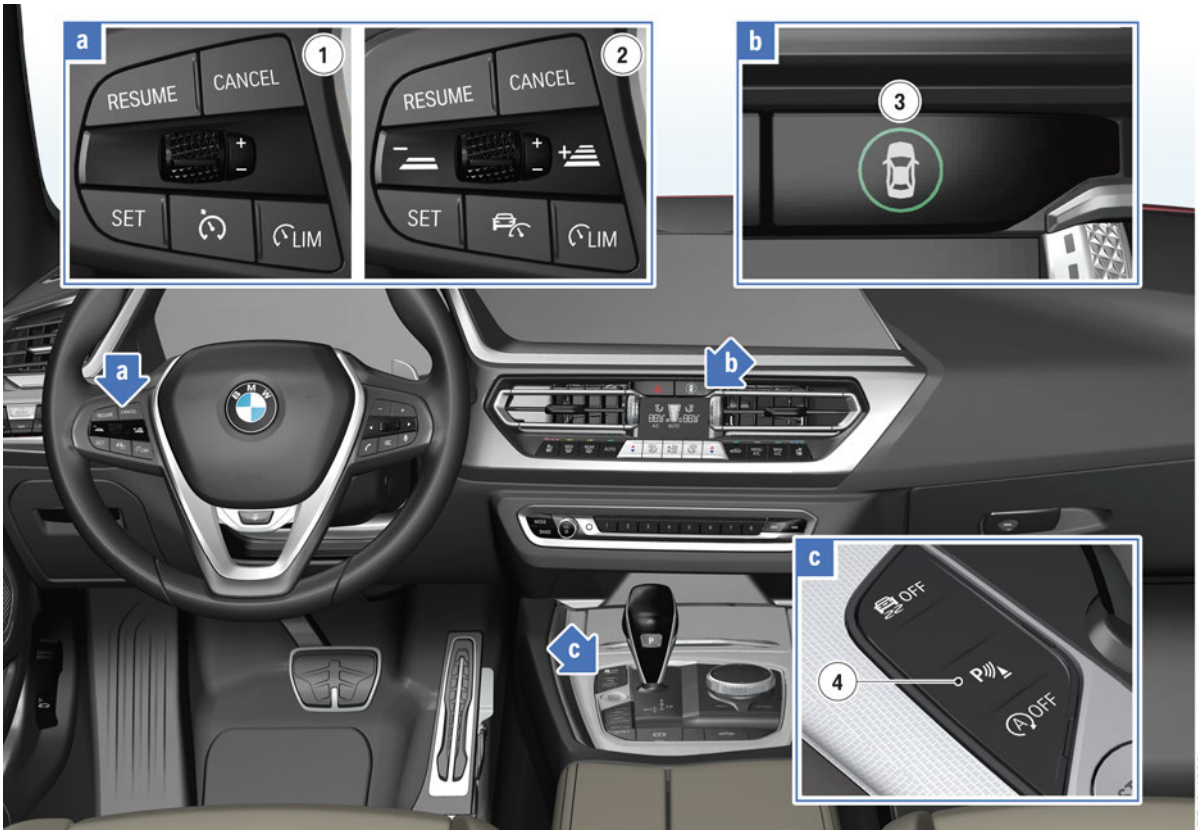
G29 General Vehicle Electronics

5. Driver Assistance Systems

5.3. Operating elements

The assistance systems are operated when the vehicle is in motion via 3 operating elements:

- Control panel on the multifunction steering wheel
- Intelligent Safety button
- Center console control panel.



G29 control elements for assistance systems

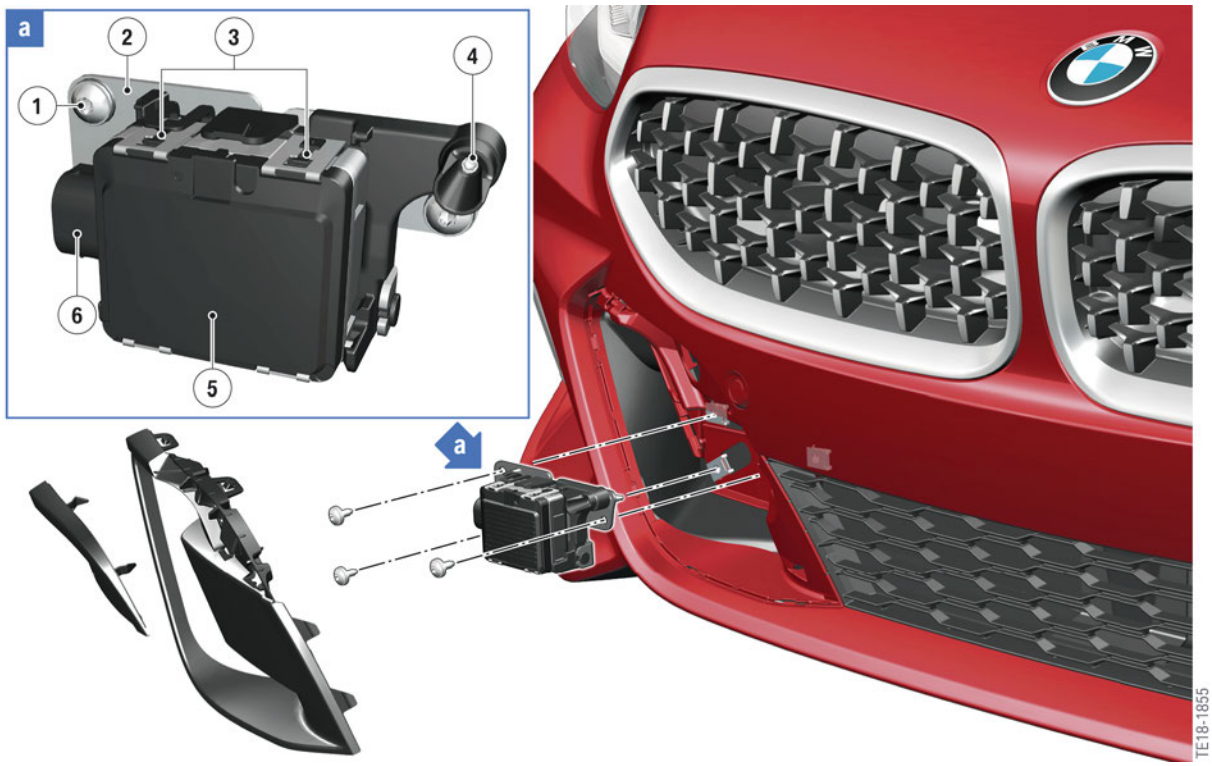
Index	Explanation
1	Control panel for assistance systems on the multifunction steering wheel for standard equipment
2	Control panel for assistance systems on the multifunction steering wheel for optional equipment "Active Cruise Control with Stop&Go function" (SA 5DF)
3	Intelligent Safety button
4	Parking Assistance button

G29 General Vehicle Electronics

5. Driver Assistance Systems

5.4. Front radar sensor

The front radar sensor FRS is located in the front bumper under the right radiator grill behind a cover.



G29 installation location, front radar sensor (FRS)

Index	Explanation
1	Mounting bolt of the holder
2	Holder
3	Latch mechanism for front radar sensor at the holder
4	Adjusting screw
5	Front radar sensor (FRS)
6	Electrical connection for front radar sensor

The fault-free function of the FRS is very much dependent on the exact setting. With the adjustment option the FRS can be adjusted during start-up using special tools. The start-up of the FRS must be carried out in the following situations:

- In the case of a fault memory entry
- After the removal and installation of the front radar sensor
- After the installation of a new front radar sensor

G29 General Vehicle Electronics

5. Driver Assistance Systems

In the case of an incorrectly set front radar sensor FRS it can happen that objects and vehicles are not properly detected or not detected at all. The functions of the related assistance systems may be restricted or fail. Therefore, the instructions and conditions for a start-up from the current version of the repair instructions must be observed.

G29 General Vehicle Electronics

6. Infotainment

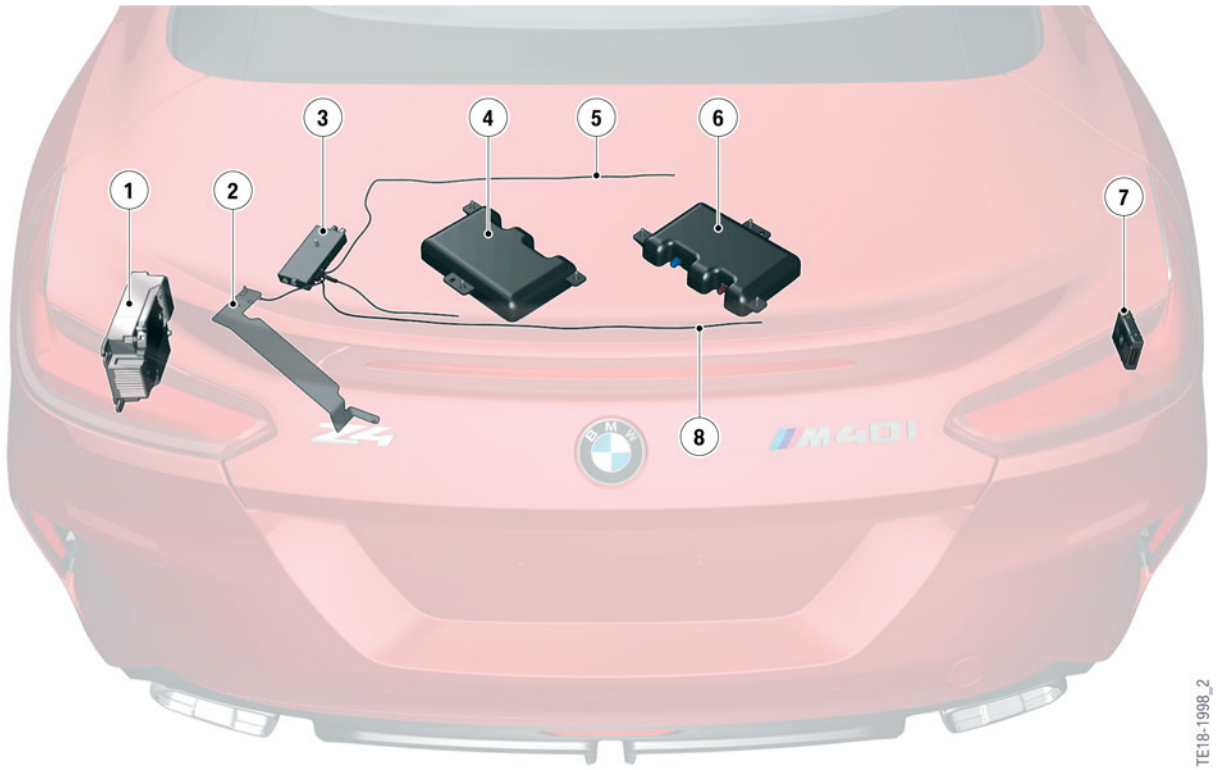
6.1. Head unit

The G29 is standard with the Live Cockpit Pro which includes a navigation system (SA 6U3) in the **standard equipment**. The head unit is the Head Unit High 3 (HU-H3).

G29 Head Unit High 3

6.2. Antennas

6.2.1. Components



G29 antennas, installation location of components

G29 General Vehicle Electronics

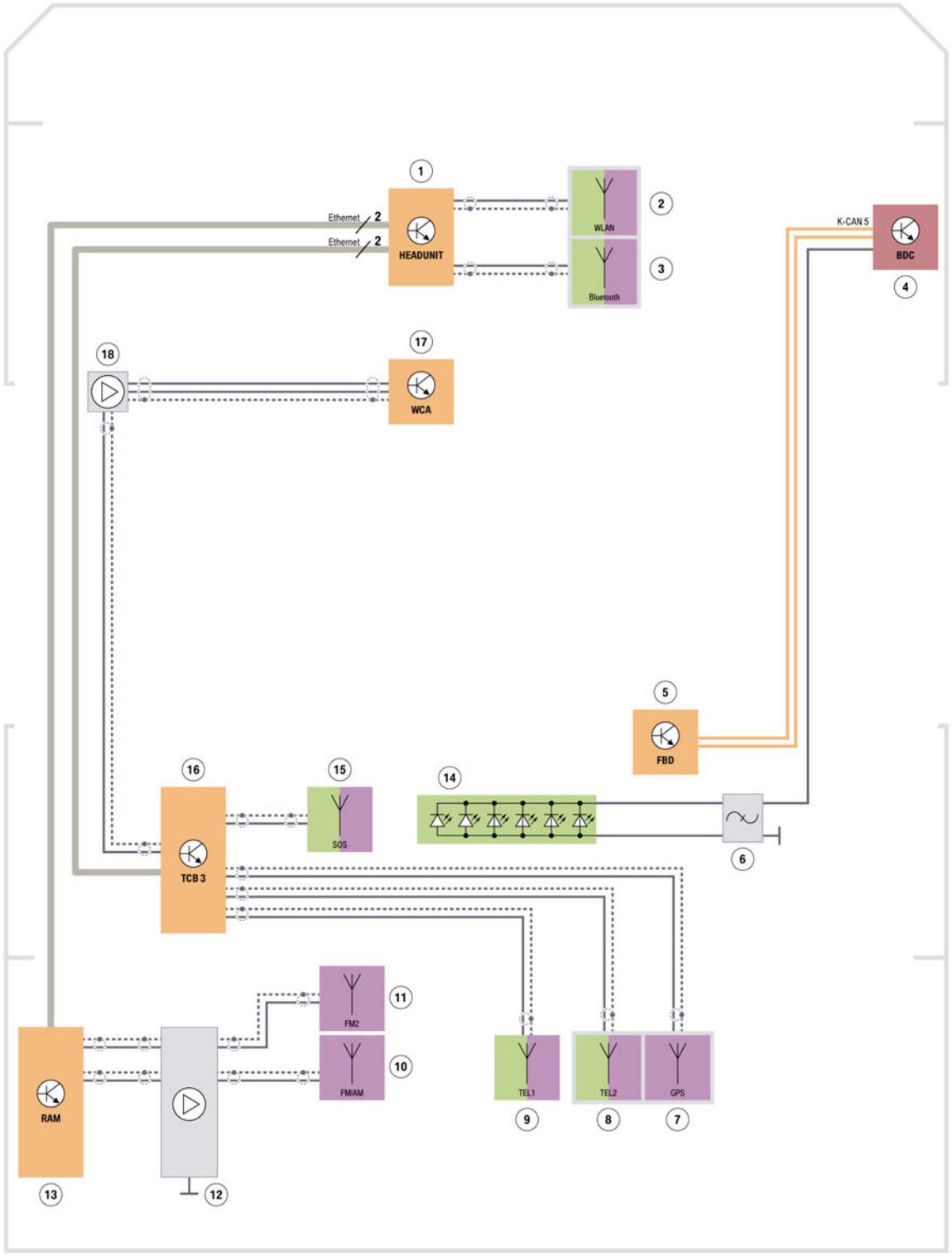
6. Infotainment

Index	Explanation
1	Receiver Audio Module (RAM)
2	AM antenna
3	Antenna amplifier
4	Telephone antenna and SDARS antenna
5	FM2 antenna
6	Telematics/GPS antenna
7	Emergency GSM antenna
8	FM1 antenna

G29 General Vehicle Electronics

6. Infotainment

6.2.2. System wiring diagram



G29 Antennas

G29 General Vehicle Electronics

6. Infotainment

Index	Explanation
1	Head Unit High 3 (HU-H3)
2	WLAN antenna
3	Bluetooth antenna
4	Body Domain Controller (BDC)
5	Remote control receiver (FBD)
6	Interference suppression filter
7	GPS antenna
8	Telephone antenna 1
9	Telephone antenna 2
10	FM/AM antenna
11	FM2 antenna
12	Antenna amplifier
13	Receiver Audio Module (RAM)
14	Additional brake light
15	Emergency GSM antenna
16	Telematic Communication Box 3 (TCB3)
17	Wireless charging station (WCA)
18	Amplifier

6.3. Speaker systems

Three speaker systems are offered depending on the equipment:

- Hi-fi sound system (SA 676)
- Harman Kardon Surround Sound System (SA 688)

The following table provides an overview of the speaker systems:

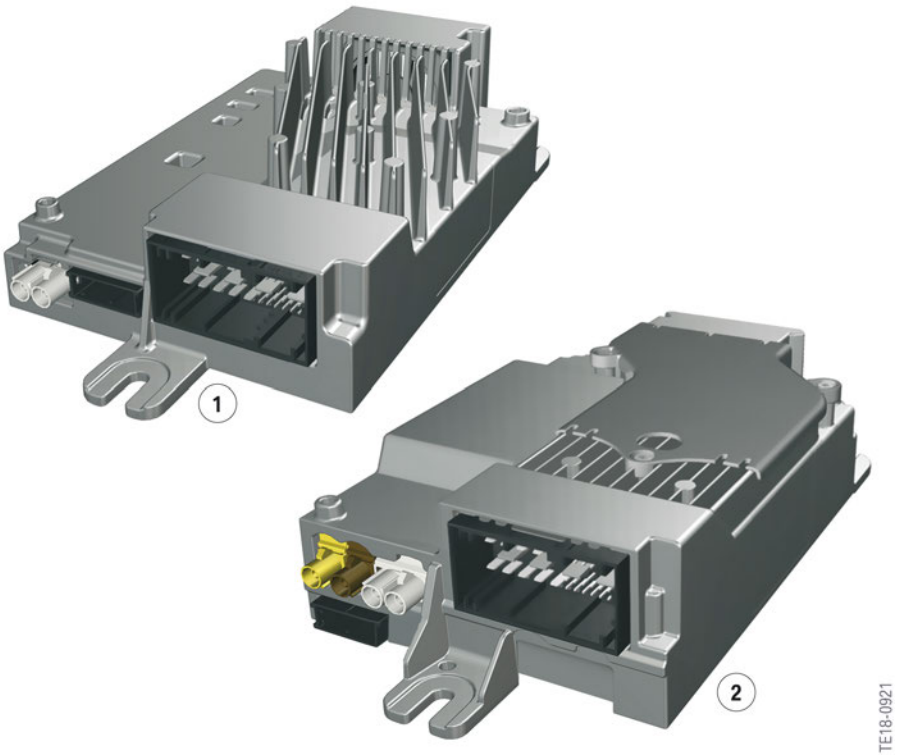
Speaker system	Speakers	Amplifier
Hi-fi sound system (205 W)	• Total of 10 speakers • 3 tweeters • 5 mid-range speakers • 2 bass speakers	Receiver Audio Module (RAM)
Harman Kardon Surround Sound system (464 W)	• Total of 12 speakers • 5 tweeters • 5 mid-range speakers • 2 bass speakers	Receiver Audio Module (RAM) and booster

6.3.1. Receiver Audio Module

In the G29 the Receiver Audio Module RAM is used.

Depending on the equipment, the following functions are integrated in the RAM:

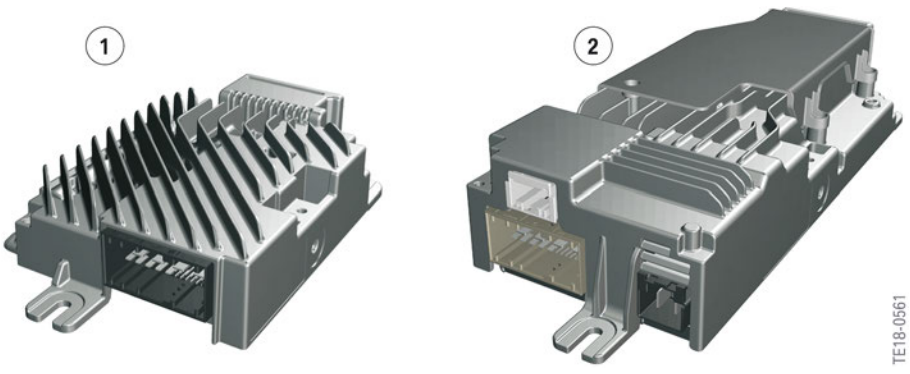
- AM/FM tuner
- Antenna diversity
- Audio amplifier for hi-fi sound system
- Active Sound Design
- Turn indicator sound in the instrument cluster.



G29 Receiver Audio Module (RAM)

Index	Explanation
1	Receiver Audio Module (RAM) basic
2	Receiver Audio Module (RAM) high

6.3.2. Booster



G29 Booster

Index	Explanation
1	Booster for hi-fi sound system
2	Booster for Harman Kardon Surround Sound system

6.4. USB port

The G29 receives a USB port, type A and type C. Both USB ports are responsible for charging and for data transfer. Both USB ports are connected directly to the head unit.

G29 USB ports

Index	Explanation
1	USB type C
2	USB type A

The charge current of the two USB variants is:

- USB port, type A, maximum 1.5 A
- USB port, type C, maximum 3 A

G29 General Vehicle Electronics

6. Infotainment

6.5. Telephone

The standard equipment configuration of the G29 comprises a hands-free system with USB port. Wireless charging is available as optional equipment (SA 6NW). An WiFi hotspot (SA 6WD) can be ordered in conjunction with wireless charging.

The **WiFi hotspot** in conjunction with Telematic Communication Box 3 (TCB3) is integrated in the **head unit** and no longer in the Telematic Communication Box. The antenna for the WiFi hotspot is the familiar vehicle WLAN antenna. This is used for both functions in the vehicle.

G29 General Vehicle Electronics

7. Displays and Operation

7.1. Cockpit

The following graphic shows the components of the display and operation.

- Light switch
- Steering column switches
- Instrument panel
- Head-Up Display
- Central Information Display
- Air conditioning control panel
- Radio control panel
- Controller
- Center Operation Unit

The light switch is only operated using buttons.

The content of the instrument cluster is displayed on a 12.3" TFT display.

The Central Information Display is 10.25" and can be controlled by touch. With the Head Unit High 3 the display-operating concept ID7 is used.

The controller has 8 direct access keys and a touch control box.

G29 Displays and Controls

G29 General Vehicle Electronics

7. Displays and Operation

7.2. Head-Up Display

The G29 receives a full-color Head-Up Display as optional equipment.

G29 Head-Up Display