

Technical training.
Product information.

G15 Powertrain/Chassis



BMW Service

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Technical Training

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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: June 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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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)

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1. Introduction

1.1. Overview

The new BMW 8 series has the development code G15.



G15 Complete Vehicle

The BMW 8 series is scheduled for the market introduction in November 2018. The 8 series will be equipped as standard with an 8-speed automatic transmission, Integral Active Steering, Electronic Damper Control and the xDrive all-wheel drive.

The G15 features the newly developed integrated brake system with internal designation Dynamic Stability Control integrated DSCi.

See the product information DSCi for more information on the Dynamic Stability Control integrated DSCi.



Important notes on handling of the new brake system must be strictly observed.

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1. Introduction

1.2. Models

The following model is available for the market introduction in November 2018:

Model	Engine	Automatic transmission	Transfer box
M850i xDrive	N63B44T3	GA8X76D	Active Torque Control -13

1.3. BMW M Performance



M Performance model M850i xDrive

A list of the technical highlights of the model M850i xDrive is shown below:

- TwinPower Turbo 8-cylinder gasoline engine
- M Sport braking system (19")
- M sport differential
- M light-alloy wheels (20")
- Sports exhaust system
- M leather steering wheel
- M rear spoiler
- Adaptive M suspension Professional suspension

As an option, the M850i xDrive can be equipped with an M carbon roof and M carbon exterior package.

G15 Powertrain/Chassis

1. Introduction

1.4. Engine identification

The engine designation is used to uniquely identify the various engines. The following table provides an overview of the composition of the different engine codes.

Position	Meaning	Index	Explanation
1	Engine developer	M, N, B P S W	BMW Group BMW Motorsport BMW M GmbH Bought-in engines
2	Engine type	3 4 5 6 7	3-cylinder in-line engine (e.g. B38) 4-cylinder in-line engine (e.g. B48) 6-cylinder in-line engine (e.g. B58) V8 engine (e.g. N63) V12 engine (e.g. N74)
3	Change to the basic engine concept	0 1 – 9	Basic engine Changes, e.g. combustion process
4	Method of operation or fuel and mounting orientation if applicable	A B C D H K	Petrol, transverse mounted Petrol, longitudinally mounted Diesel, transverse mounted Diesel, longitudinally mounted Hydrogen Petrol, horizontal mounting
5+6	Displacement in 1/10 liter	12 15 20 30 40 44 60	1.2 l 1.5 l 2.0 l 3.0 l 4.0 l 4.4 l 6.0 l
7	Performance class	K U M O T S	Lowest Lower Middle Upper Top Super
8	Redesign relevant to approval	0 1 – 9	New development Redesign

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2. Engine

2.1. Gasoline engine N63B44T3



N63B44T3 engine

M850i xDrive	
Engine identification	N63B44T3
Power output	390 kW (523 hp)
Torque	750 Nm (553 lb-ft)

2.1.1. Technical data

Parameters	Unit	N63B44T3
Displacement	cm ³	4395
Cylinder layout	—	V
Number of cylinders	—	8
Firing order	—	1-5-4-8-6-3-7-2
Hole	mm	89
Stroke	mm	88.3

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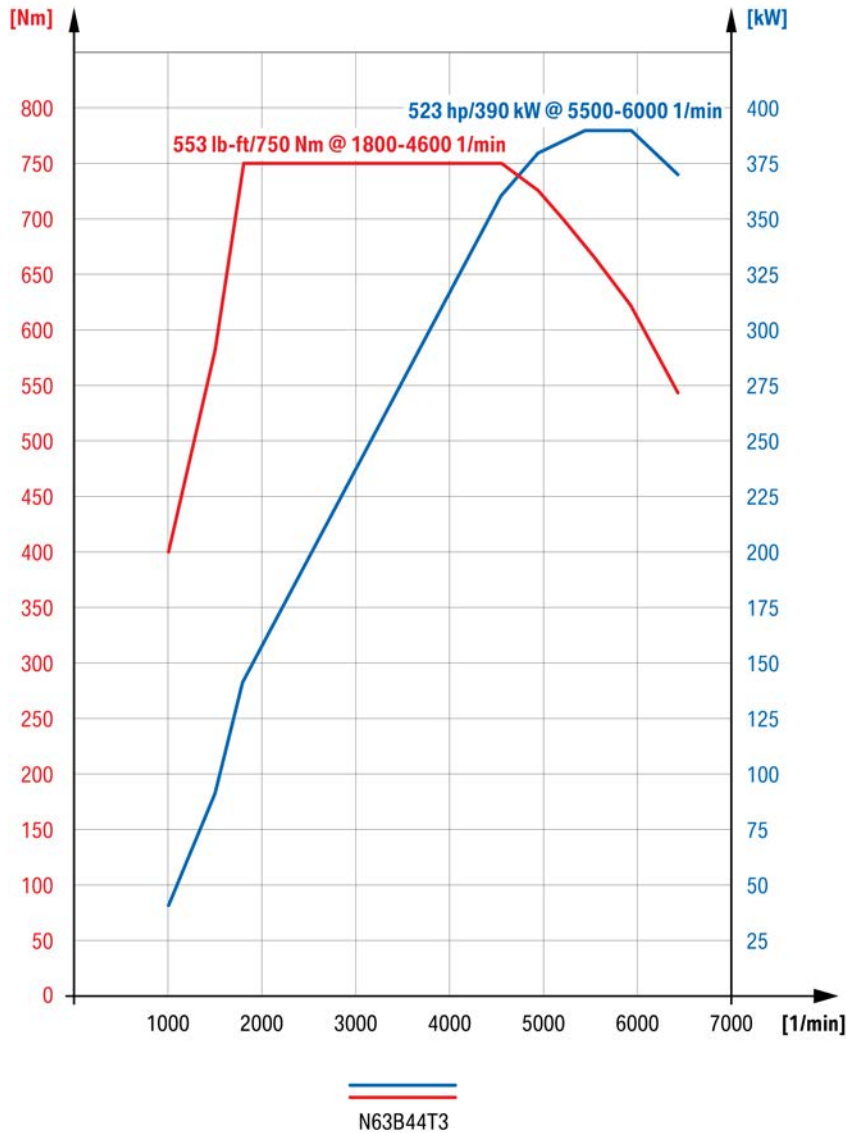
2. Engine

Parameters	Unit	N63B44T3
Compression ratio	ε	10.5:1
Combustion process	—	Turbo-Valvetronic direct injection
Max. output at rotational speed	kW rpm	390 (523 hp) 5500 – 6000
Max. torque at rotational speed	Nm rpm	750 (553 lb-ft) 1800 – 4600
Oil quantity	l	10.5

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2. Engine

2.1.2. Full load diagram



Full load diagram N63B44T3 engine

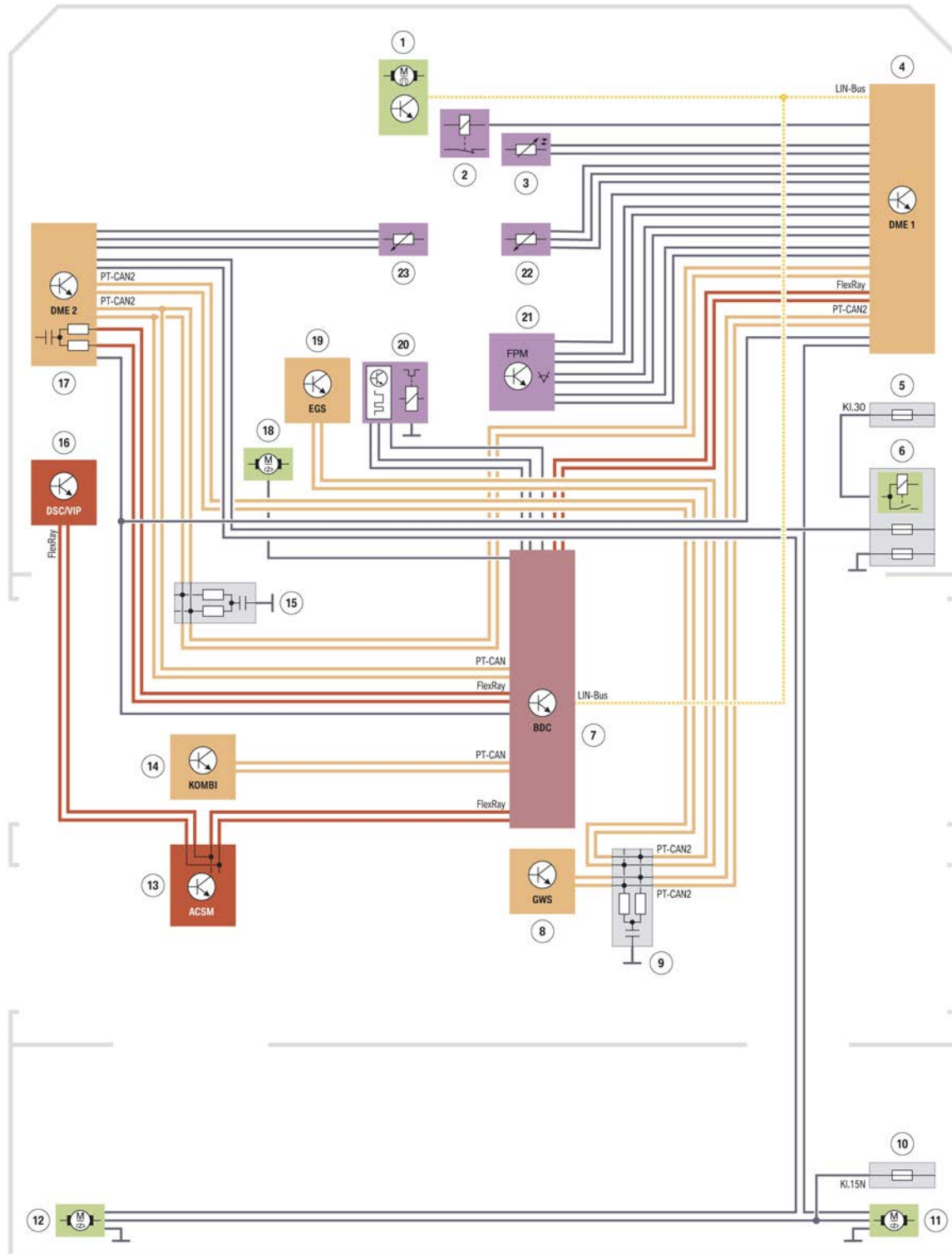
2.1.3. Special features

- Exhaust turbocharger with blow-off valves
- Indirect charge air cooler with bypass pipe
- Electric arc wire sprayed cylinder barrels
- Digital Motor Electronics DME 8.8T.0
- High-pressure injection up to 350 bar.

For more information on the N63B44T3 engine, refer to the product information N63TU3 engine.

2. Engine

2.1.4. System wiring diagram



System wiring diagram for the N63B44T3 engine

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2. Engine

Index	Explanation
1	Electric fan
2	Relay for electric fan
3	Coolant temperature sensor
4	Digital Motor Electronics (DME1)
5	Fuse, terminal 30
6	Power distribution box, front
7	Body Domain Controller (BDC)
8	Gear selector switch (GWS)
9	CAN terminator 5
10	Power distribution box, rear right
11	E-motor exhaust flap rear right
12	E-motor exhaust flap rear left
13	Crash Safety Module (ACSM)
14	Instrument cluster (KOMBI)
15	CAN terminator 5
16	Dynamic Stability Control/virtual integration platform (DSCi)
17	Digital Motor Electronics (DME2)
18	Starter motor
19	Electronic transmission control (EGS)
20	Air conditioning compressor
21	Accelerator pedal module
22	Differential pressure sensor cylinder bank 2
23	Differential pressure sensor cylinder bank 1

2.1.5. Vacuum supply

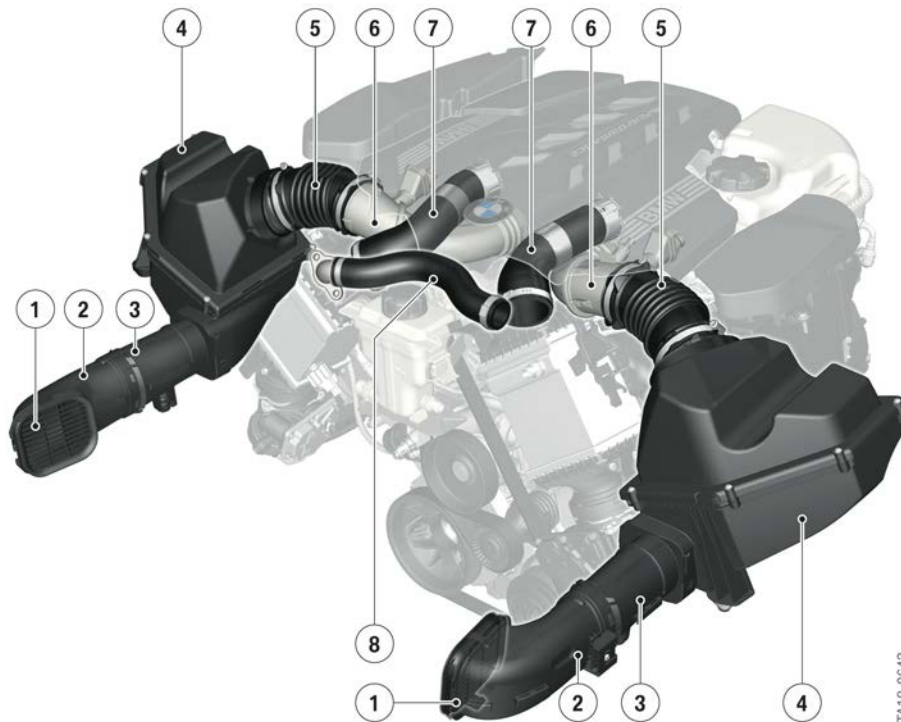
Vehicles equipped with a gasoline engine and conventional brake system require a vacuum pump to boost the pedal force. In vehicles equipped with a gasoline engine and DSCi brake system, a vacuum booster is not required as the pedal force is generated hydraulically in the DSCi brake system. A vacuum pump is therefore omitted with the M850i xDrive.

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2. Engine

2.1.6. Air intake system

Air intake duct



G15 air intake duct in N63B44T3 engine

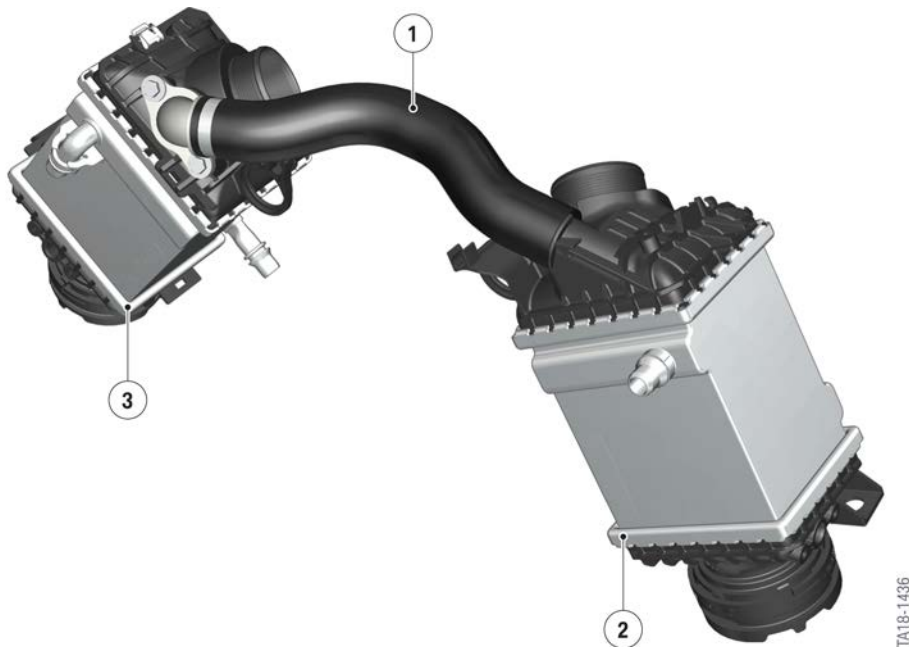
Index	Explanation
1	Unfiltered air intake with grille
2	Unfiltered-air bypass
3	Unfiltered-air duct
4	Intake silencer
5	Clean air gaiter
6	Clean air manifold incl. temperature sensor and non-return valve
7	Charge air hose from compressor for indirect charge air cooling
8	Bypass pipe

Charge air cooling

A bypass pipe is installed between the two charge air coolers of cylinder bank 1 and cylinder bank 2 to effect pressure compensation between the two cylinder banks.

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2. Engine



G15 charge air cooling N63B44T3 engine

Index	Explanation
1	Bypass pipe, charge air cooler
2	Charge air cooler, bank 1
3	Charge air cooler, bank 2

The pressure compensation results in the following advantages:

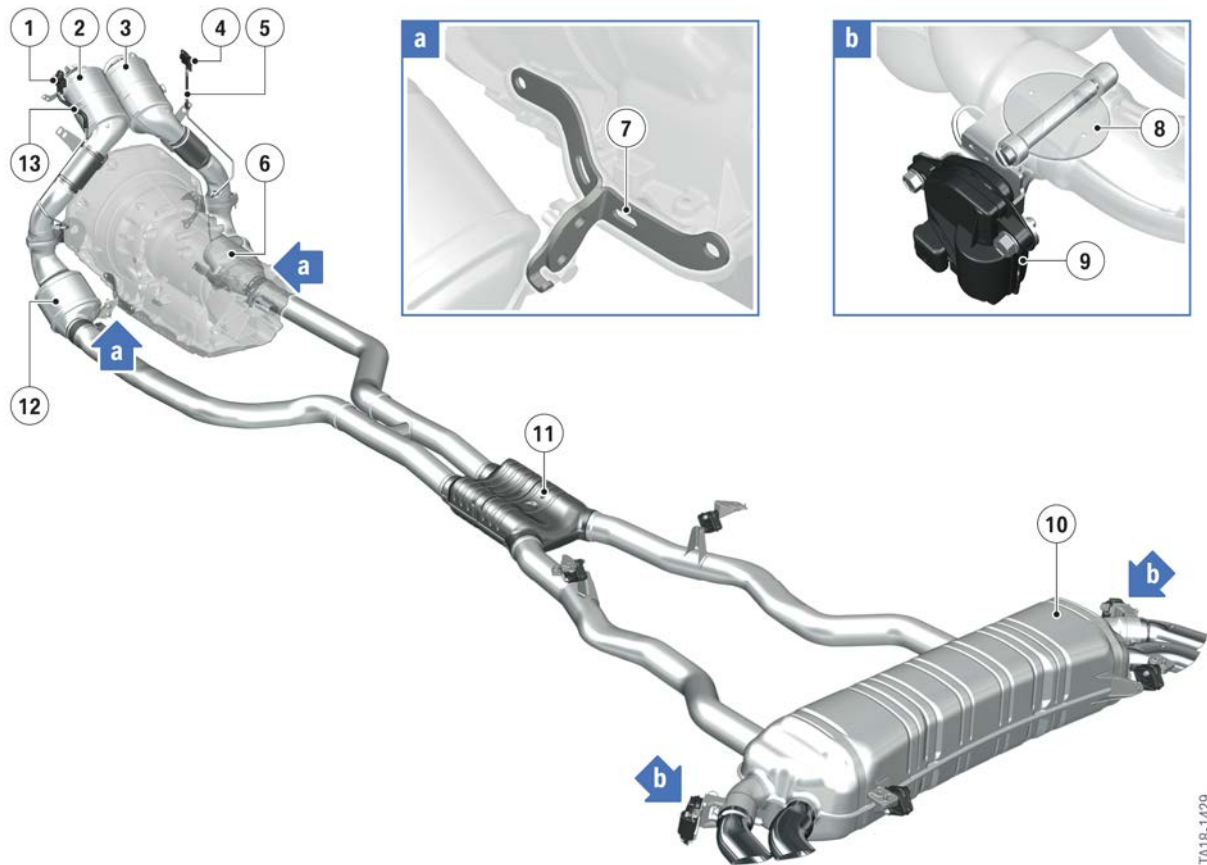
- Improved acoustics
- No pressure peaks in the charge air duct
- Optimum utilisation of characteristic maps by the engine control.

2.1.7. Exhaust emission system

A sports exhaust system is used in the M850i xDrive model.

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2. Engine



G15 exhaust emission system for N63TU3 engine

Index	Explanation
1	Differential pressure sensor, cylinder bank 2
2	Catalytic converter, cylinder bank 2
3	Catalytic converter, cylinder bank 1
4	Differential pressure sensor, cylinder bank 1
5	Differential pressure sensor line, cylinder bank 1
6	Petrol particulate filter, cylinder bank 1 (Not for the US)
7	Holder for gasoline particulate filter (Not for the US)
8	Exhaust flap
9	E-motor exhaust flap
10	Rear silencer
11	Center silencer
12	Petrol particulate filter, cylinder bank 2 (Not for the US)
13	Differential pressure sensor line, cylinder bank 2

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2. Engine

Electrical exhaust flaps

The 2 exhaust flaps, which are installed downstream of the rear silencer on the outer exhaust tailpipes can be adjusted with the assistance of an e-motor.

The e-motor is activated by the Digital Motor Electronics through pulse-width modulation. The following input variables are taken into account for this:

- Engine speed
- Engine load
- Driving speed

The various driving modes also influence the exhaust flap control.

The electrical exhaust flaps are always open in the SPORT and SPORT PLUS driving modes. In the ECO PRO and COMFORT driving modes, they are only open up to a speed of 15 km/h (10 mph) or an engine speed higher than 4000 rpm.

Conditions	ECO PRO	COMFORT	SPORT	SPORT+
< 15 km/h (10 mph)	●	●	●	●
> 15 km/h (10 mph)			●	●
<4000 rpm			●	●
>4000 rpm	●	●	●	●

● = exhaust flaps open

An intermediate setting of the exhaust flaps is not possible. They are either fully open or closed. If faults are detected or the actuation stops, or after the engine has been stopped, the preferred position is the closed position.



The e-motor of the exhaust flap can be replaced separately. The exhaust flaps can be placed in an installation position with the help of the workshop diagnosis system ISTA.



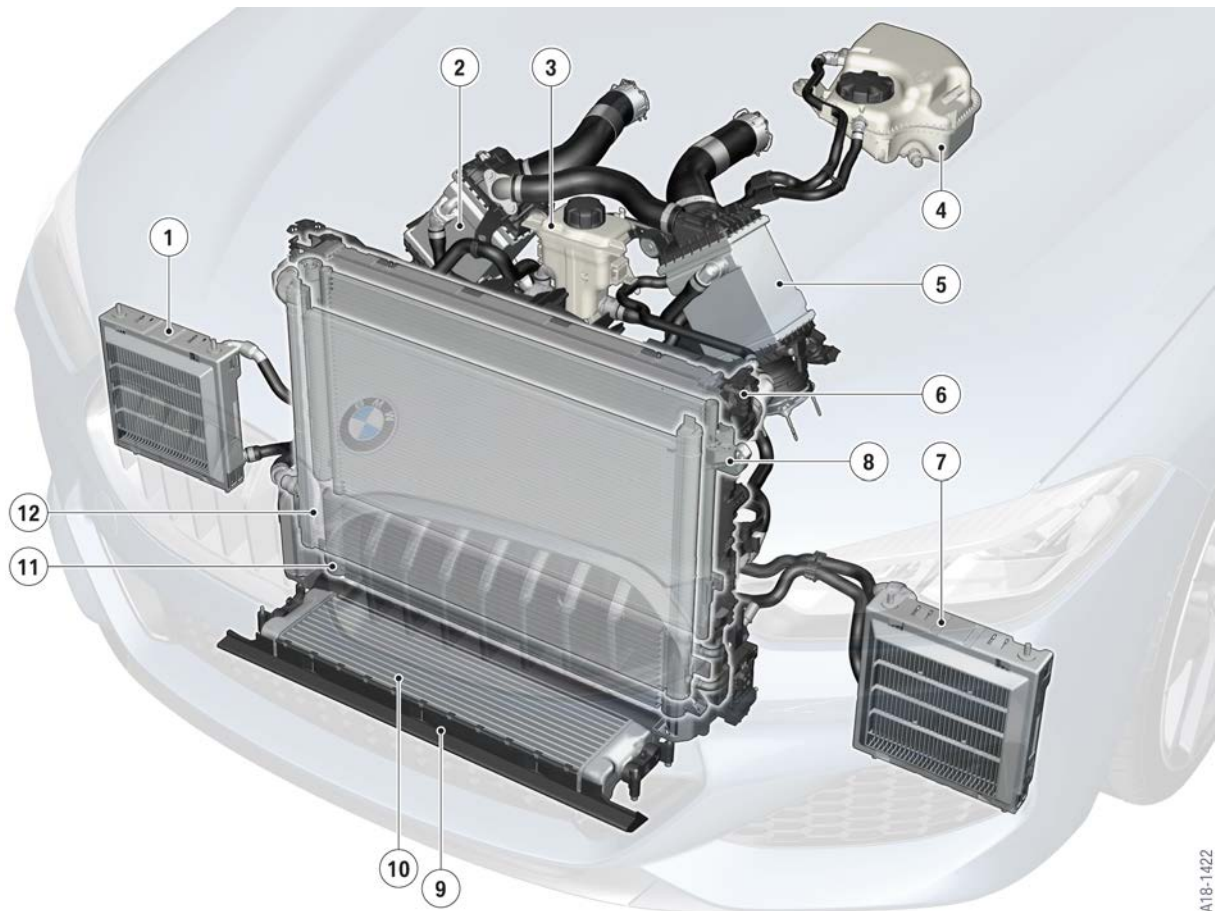
Note that the exhaust flaps may be closed when the vehicle is idling. As such, no emission measurement can be performed at these exhaust tailpipes.

2.1.8. Cooling

An additional cooling package is used for optimum cooling. This consists of an additional upstream coolant radiator including front spoiler lip.

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2. Engine



Cooling N63TU3 engine

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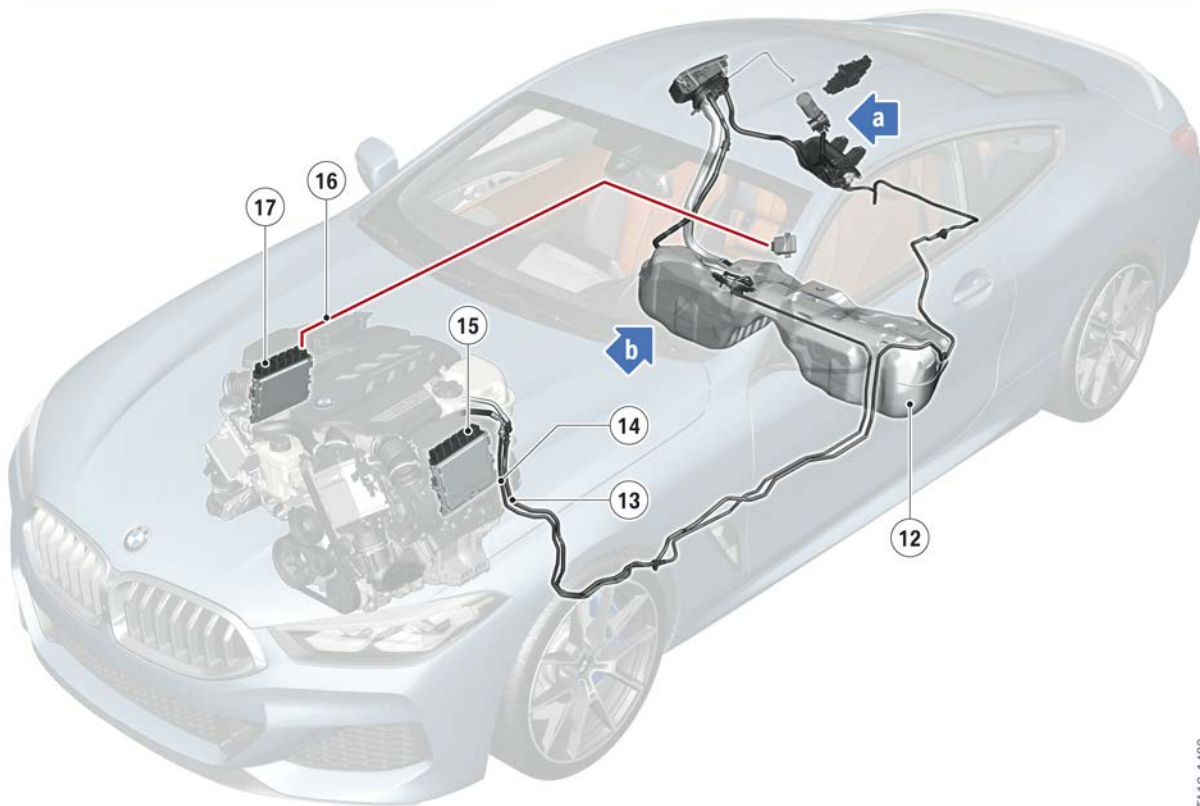
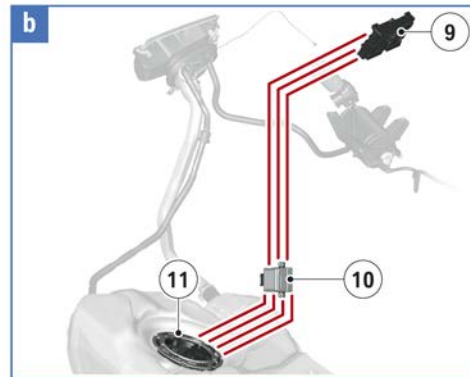
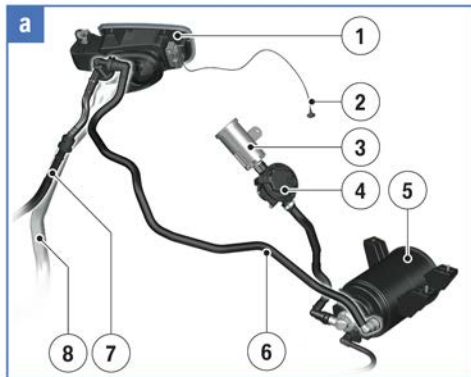
Index	Explanation
1	Auxiliary radiator, engine
2	Indirect charge air cooler
3	Expansion tank, low-temperature circuit
4	Expansion tank, high-temperature circuit
5	Indirect charge air cooler
6	High-temperature radiator
7	Auxiliary radiator, engine
8	A/C condenser
9	Front spoiler lip
10	Upstream radiator
11	Transmission oil air cooler
12	Low-temperature radiator

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2. Engine

2.2. Fuel supply

2.2.1. Engine



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G15 system overview for the engine fuel supply

Index	Explanation
1	Fuel filler cap
2	Emergency release, fuel filler cap
3	Fresh-air filter
4	Tank leak diagnosis

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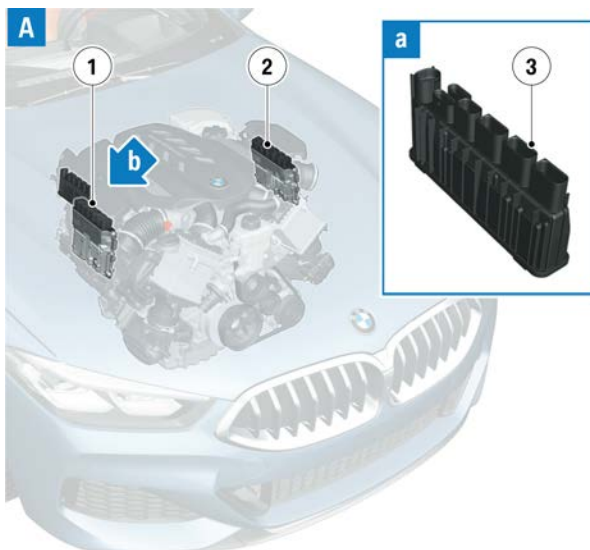
2. Engine

Index	Explanation
5	Carbon canister
6	Ventilation line, carbon canister
7	Tank ventilation line
8	Fuel filler neck
9	Power distribution box, rear right
10	Fuel pump control (FPC)
11	Delivery unit
12	Fuel tank
13	Purge air line, carbon canister
14	Fuel feed (from the fuel tank)
15	Digital Motor Electronics (DME2)
16	Data line to fuel pump control module
17	Digital Motor Electronics DME1 (primary control unit)

2.3. Engine electrical system

2.3.1. Engine control unit

The 8th generation engine electronics (DME) is used in the G15. Its appearance is characterized by a uniform housing and a uniform connector strip. However, the hardware inside has been adapted to the various applications.



G15 integrated supply module

G15 Powertrain/Chassis

2. Engine

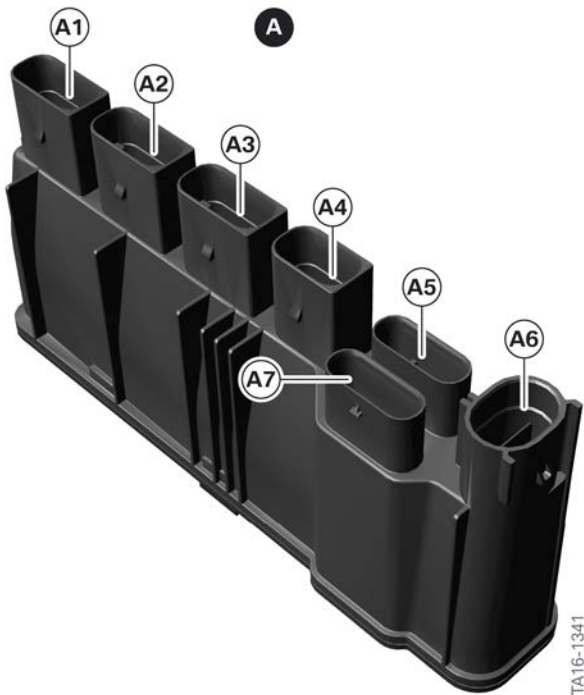
Index	Explanation
A	M850i xDrive
a	Integrated supply module
1	Digital Motor Electronics 1 (DME 8.8T.0)
2	Digital Motor Electronics 2 (DME 8.8T.0)
3	Integrated supply module

Engine control unit N63B44T3

One control unit is used per cylinder bank in the 8-cylinder engine. The actuators and sensors of cylinder bank 1 are assigned to the DME-1 control unit. Accordingly the DME-2 control unit is responsible for the functions of cylinder bank 2. The DME-1 is the main control unit and also accepts any information relevant to the entire engine, e.g. the crankshaft sensor signal. The DME-1 makes this information available to the DME-2 control unit directly via the bus system. Due to the variety of sensors and actuators it was deemed necessary to use 2 control units.

The integrated supply module is also on the engine control unit. It supplies the engine control units and various sensors and actuators with the required supply voltage.

Integrated supply module



Integrated supply module in the G15

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2. Engine

Index	
A	Integrated supply module
A1	Voltage supply for actuators and sensors
A2	Voltage supply for actuators and sensors
A3	Actuation of relay for integrated supply module
A4	–
A5	DME voltage supply
A6	Voltage supply for power distribution box in engine compartment
A7	–

2.3.2. MSAconnected 1.0


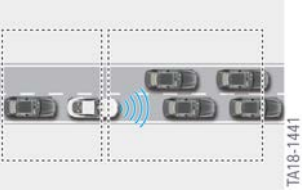



The MSAconnected 1.0 already used in other vehicles is also used in the G15. A new features of this system is that it can also respond to a traffic light situation.

G15 Powertrain/Chassis

2. Engine

Situations

The following table shows examples of how the G15 with MSAconnected 1.0 responds to different traffic situations:

Situation		Action
	Traffic light situation	If a green traffic light is detected, the engine is not switched off. If the traffic light changes from red to green when the engine is switched off, the engine starts.
	Response to a vehicle in front	If the vehicle detects that the vehicle in front is moving, the engine is not stopped. If the vehicle detects that the vehicle in front is driving off when the engine is switched off, the engine is then started.
	Roundabout/traffic circle	The engine is not stopped when the vehicle is approaching, is on or has just left a roundabout. Exception: the vehicle in front is stationary on the approach to a roundabout.
	Road junctions in residential area	The engine is not switched off if the vehicle is right in front of, in or just beyond a road junction in a residential area. Exception: the vehicle in front is stationary on the approach to a road junction in a residential area.
	Turn-off request	The engine is not switched off if the vehicle is at a crossroads and the system detects that driver is about to turn (turn indicator switched on).

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2. Engine

Sensors

The following sensors and systems are required to detect the MSAconnected 1.0 traffic situations.

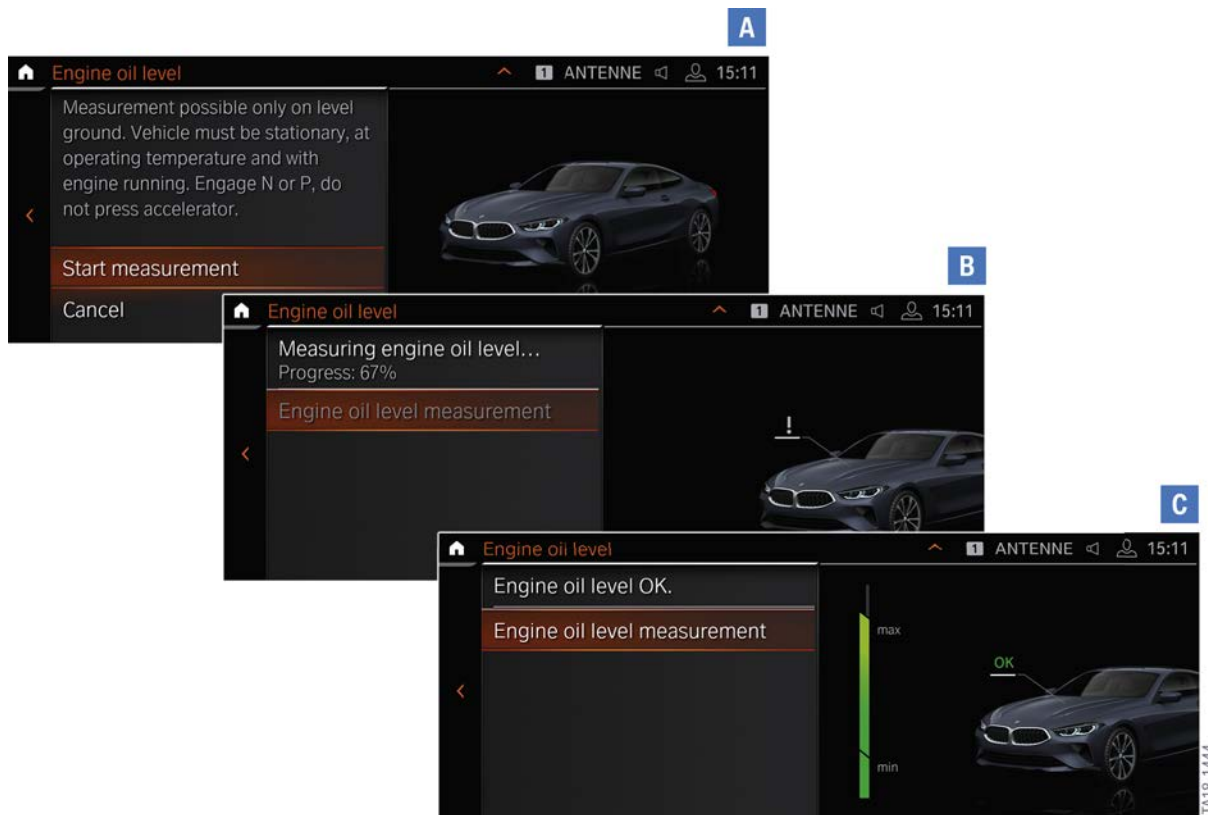
Situation	Navigation/head unit	Camera/KAFAS	Radar/ACC
Traffic light situation	Mandatory, prerequisite for enabling	KAFAS 4 High essential, prerequisite for enabling	Optional
Leading vehicle	Not mandatory, increases the reliability by plausibility check, e.g. crossing traffic at junctions	Mandatory, prerequisite for enabling	Not mandatory, increases accuracy
Roundabout/traffic circle	Mandatory, prerequisite for enabling	Not mandatory, increases the reliability by plausibility check, e.g. for deactivation in the case of tail-back	Optional
Residential area	Mandatory, prerequisite for enabling	Not mandatory, increases the reliability by plausibility check, e.g. for deactivation in the case of tail-back	Optional
Turn-off request	Mandatory, prerequisite for enabling	Not mandatory, increases the reliability by plausibility check, e.g. for deactivation in the case of tail-back	Optional

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2. Engine

2.3.3. Oil level measurement

The operating concept of the oil level measurement display has been reworked. The simplified display of prevention reasons and the forecast time increases the customer's understanding of measurement inhibitors and the measurement procedure.



Oil level measurement in the G15

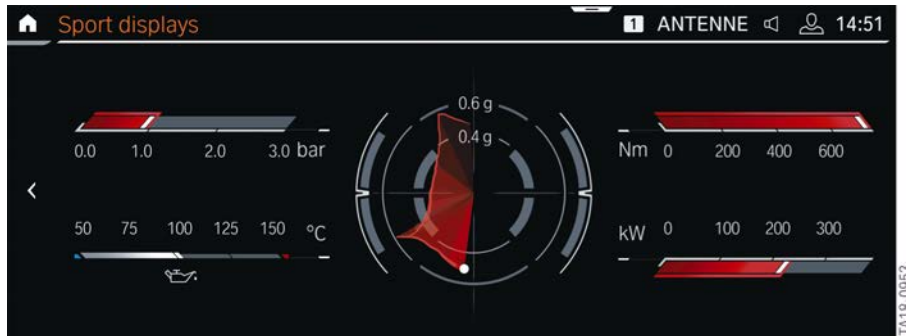
Index	Explanation
A	Start screen, oil level measurement
B	Oil level measurement
C	Final screen, oil level measurement

G15 Powertrain/Chassis

2. Engine

2.3.4. Sport displays

The sport displays in the Central Information Display have been reworked.



Sport displays

The following information is displayed:

- Charging pressure
- Engine torque
- Engine performance
- Engine oil temperature
- G forces

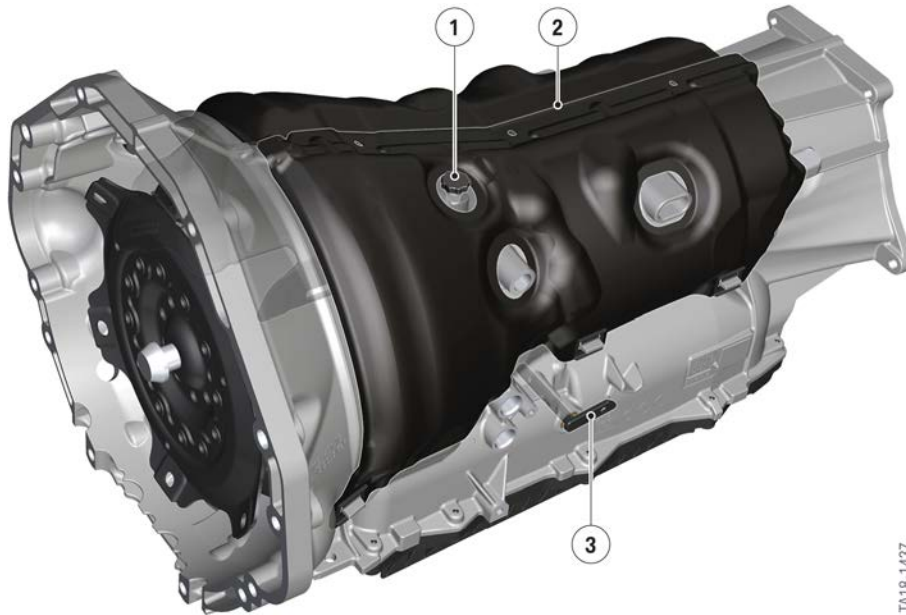
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3. Gearbox

3.1. Automatic transmission

3.1.1. Overview

In the G15 the 8HPTU2 automatic transmission is used. The 8HPTU2 supersedes the familiar 8HPTU automatic transmission.



8HPTU2 automatic transmission

Index	Explanation
1	Transmission breather
2	Acoustic capsule
3	Mechanism for emergency release

The following changes have been made to the 8HPTU2 compared to its predecessor:

- Newly developed control unit: electronic transmission control EGS
- Mechatronics with sliding pressure controller
- Increased range
- Optimized mechanical torsional vibration damper.

This brings about the following improvements:

- Better driving and shifting comfort
- Increased gearshift dynamic
- Increased gear transitions
- Increased efficiency

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3. Gearbox

The acoustic capsules in the N63B44T3 engine are manufactured in two parts.

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 official transmission designations for the 8HPTU2 automatic transmission.

Transmission designation of 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	Transferable torque	51 76	500 Nm 750 Nm
7	Steering axis inclination	C D	8.2 8.6
8	Manufacturer	Z	Zahnradfabrik Friedrichshafen

3.1.3. Technical data

The following table shows a comparison between the new 8HPTU2 (transmission variant GA8X76D) automatic transmission and the predecessor automatic transmission 8HPTU (transmission variant GA8HP75).

Technical data	Unit	8X76D (new)	8HP75 (old)
Maximum input power, gasoline	[kw]	390 (523 hp)	350
Maximum input torque, gasoline	[Nm]	750 (552 lb-ft)	700
Transmission ratio 1st gear		5.50	5.00
Transmission ratio 2nd gear		3.52	3.20
Transmission ratio 3rd gear		2.20	2.14
Transmission ratio 4th gear		1.72	1.72
Transmission ratio 5th gear		1.317	1.31
Transmission ratio 6th gear		1.00	1.00
Ratio, 7th gear		0.82	0.82

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3. Gearbox

Technical data	Unit	8X76D (new)	8HP75 (old)
Transmission ratio 8th gear		0.64	0.64
Transmission ratio reverse gear		3.93	3.47
Steering axis inclination		8.59	7.81

3.1.4. Sports automatic transmission

In the G15, the sports automatic transmission variant GA8X76D with Steptronic is used. The customer has 2 shift paddles on the steering wheel and additional functions such as:

- Launch Control
- Manual start "coasting in idle"
- Driving into the speed limiter.

3.1.5. Functional enhancements

The function "driving into the speed limiter" have been expanded.

Driving into the speed limiter

Driving into the speed limiter irrespective of the driving mode is now possible for BMW M850i xDrive. To do so, as is the case with other vehicles, the manual shift mode and Dynamic Traction Control (DTC) must be activated (briefly press the DSC button).

3.1.6. Transmission emergency release

In the event of a breakdown, emergency release of the automatic transmission is possible in 2 different ways.

- Mechanical transmission emergency release
- Electronic transmission emergency release.

The procedures to be followed for mechanical and electronic transmission emergency release are along the same lines as those for 8HPTU automatic transmission.



Before performing a mechanical or electronic transmission emergency release, the vehicle must be secured to prevent it from rolling away.

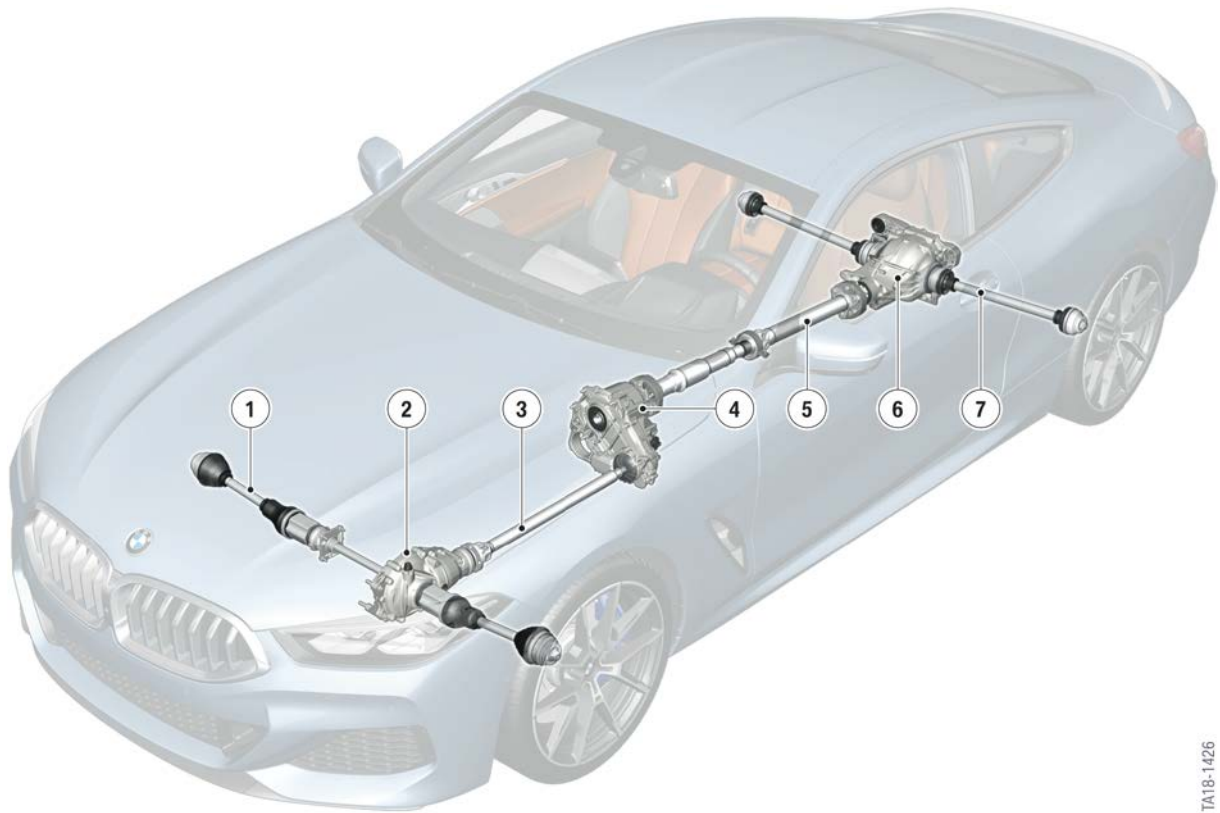
Detailed information on the electronic transmission emergency release is provided in the corresponding repair instructions and in the Owner's Handbook.

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3. Gearbox

3.2. Four-wheel drive

3.2.1. Overview



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G15 overview of four-wheel drive

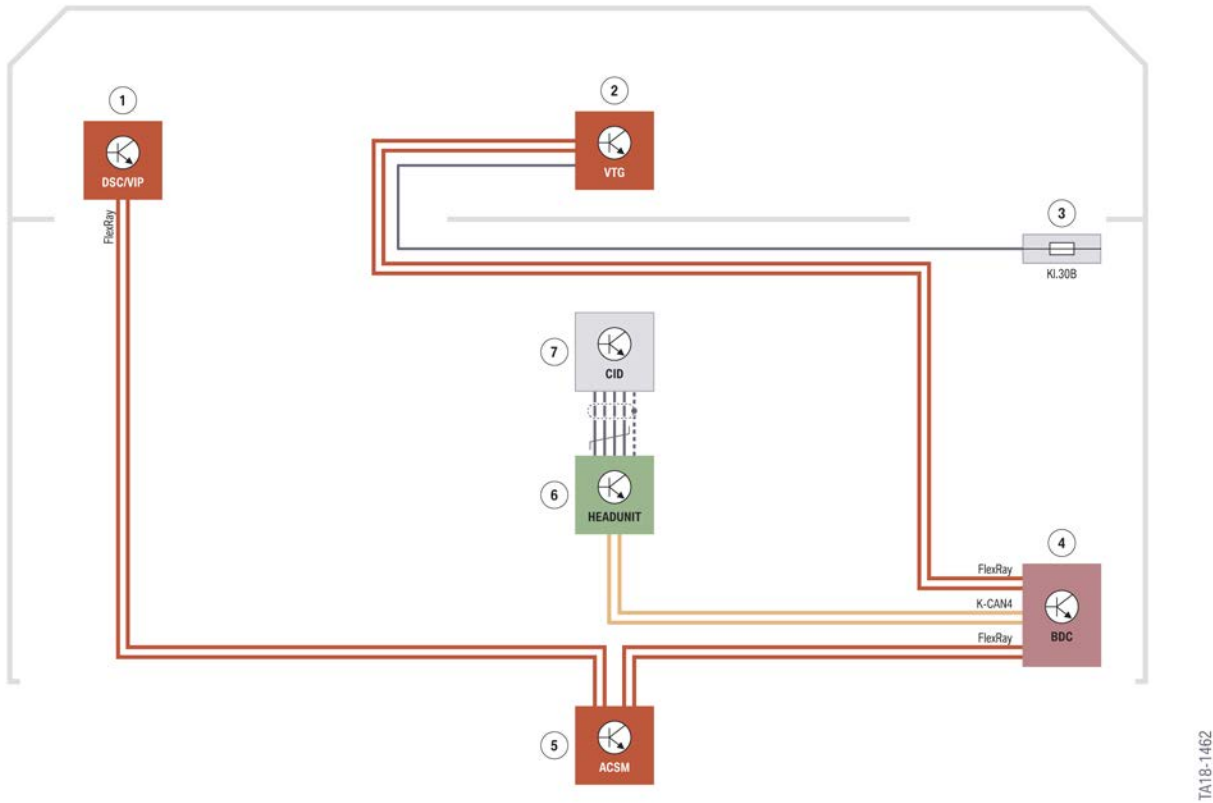
Index	Explanation
1	Output shaft, front
2	Front axle differential
3	Front propeller shaft
4	Transfer box
5	Rear propeller shaft
6	Rear axle differential with regulated lock
7	Output shaft, rear

The designation of the transfer box is ATC13-1. It is a standard transfer box and was first used in the G12. One special feature of this transfer box is the Efficiency Mode, which leads to a reduction of the splash losses and thus increases fuel economy.

G15 Powertrain/Chassis

3. Gearbox

3.2.2. System wiring diagram



G15 system wiring diagram xDrive

Index	Explanation
1	Dynamic Stability Control/virtual integration platform (DSCi)
2	VTG control unit
3	Power distribution box, front right
4	Body Domain Controller (BDC)
5	Advanced Crash Safety Module (ACSM)
6	Head unit
7	Central Information Display (CID)

3.3. Regulated rear axle differential lock

3.3.1. Introduction

The rear axle differential with regulated lock is included as standard in the M850i xDrive.

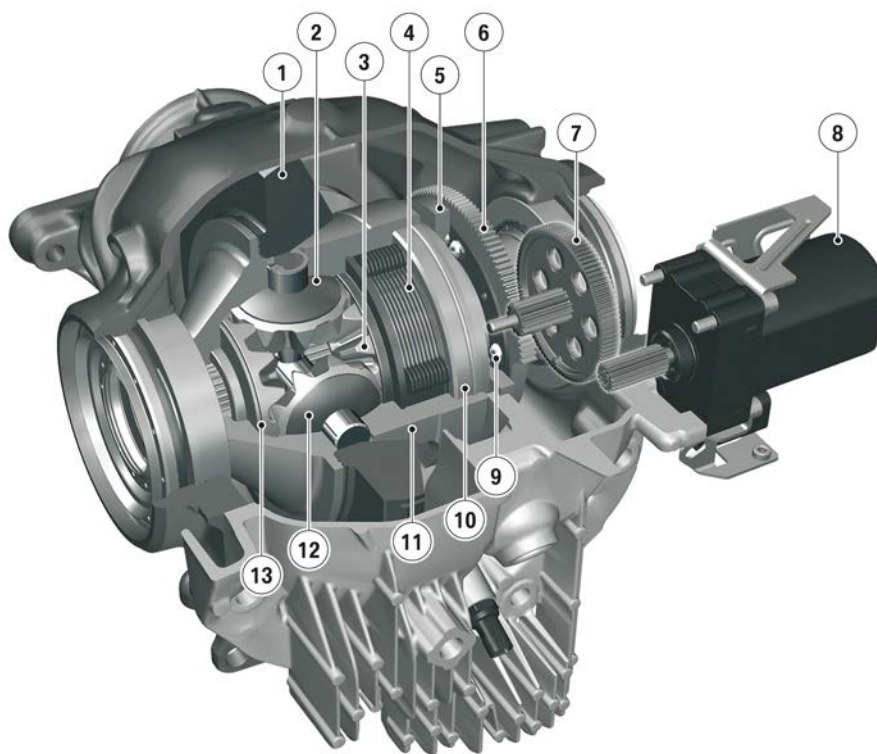
G15 Powertrain/Chassis

3. Gearbox

In the G15, the rear axle differential 225ALS is used. In the G01, G02 and G05, the HAG215LWS used is different to the above in terms of materials and housing design as well as housing cover. The ring gear is also bigger than the one in the HAG215LWS.

Model	Engine	Automatic transmission	Rear axle final drive	Gear ratio i
M850i xDrive	N63B44T	GA8X76D Sport	HAG 225ALS	2.81:1

The sales designation of the system is M Sport differential. In the following chapters the rear axle differential with regulated lock is called regulated rear axle differential lock.



TA18-0803

Regulated rear axle differential lock

Index	Explanation
1	Ring Gear
2	Differential bevel gear
3	Output bevel gear
4	Multidisc clutch
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	Intermediate gear
8	Electric motor

G15 Powertrain/Chassis

3. Gearbox

Index	Explanation
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 regulated rear axle differential lock makes possible the reduction of the slip between right and left rear wheel by joining both wheels via a multidisc clutch. If required, the clutch package can be closed via an e-motor. A lock-up torque of up to 1500 Nm can be made available irrespective of the requested drive torque of the engine.

The advantages of the controlled rear axle differential lock are:

- Improved handling
- Improved traction
- Greater driving stability.

The regulated rear axle differential lock is based on the active M differential of BMW M GmbH.

The following table provides you with an overview of the various rear axle differentials with locks.

	Unit	HAG 225M	HAG 225ALS	HAG 215LWS
Used in series		F90	G15	G01, G02, G05
Structure				
Maximum lock-up torque	[Nm]	2000	1500	1500
Ring gear diameter	[mm]	225	225	215
Housing material		Aluminum	Aluminum	Grey cast iron
Material of housing cover		Aluminum	Aluminum	Aluminum
Disc type		Disc set with carbon lining	Disc set with carbon lining	Disc set with carbon lining
Attachment of housing cover		bottom	Rear	Rear

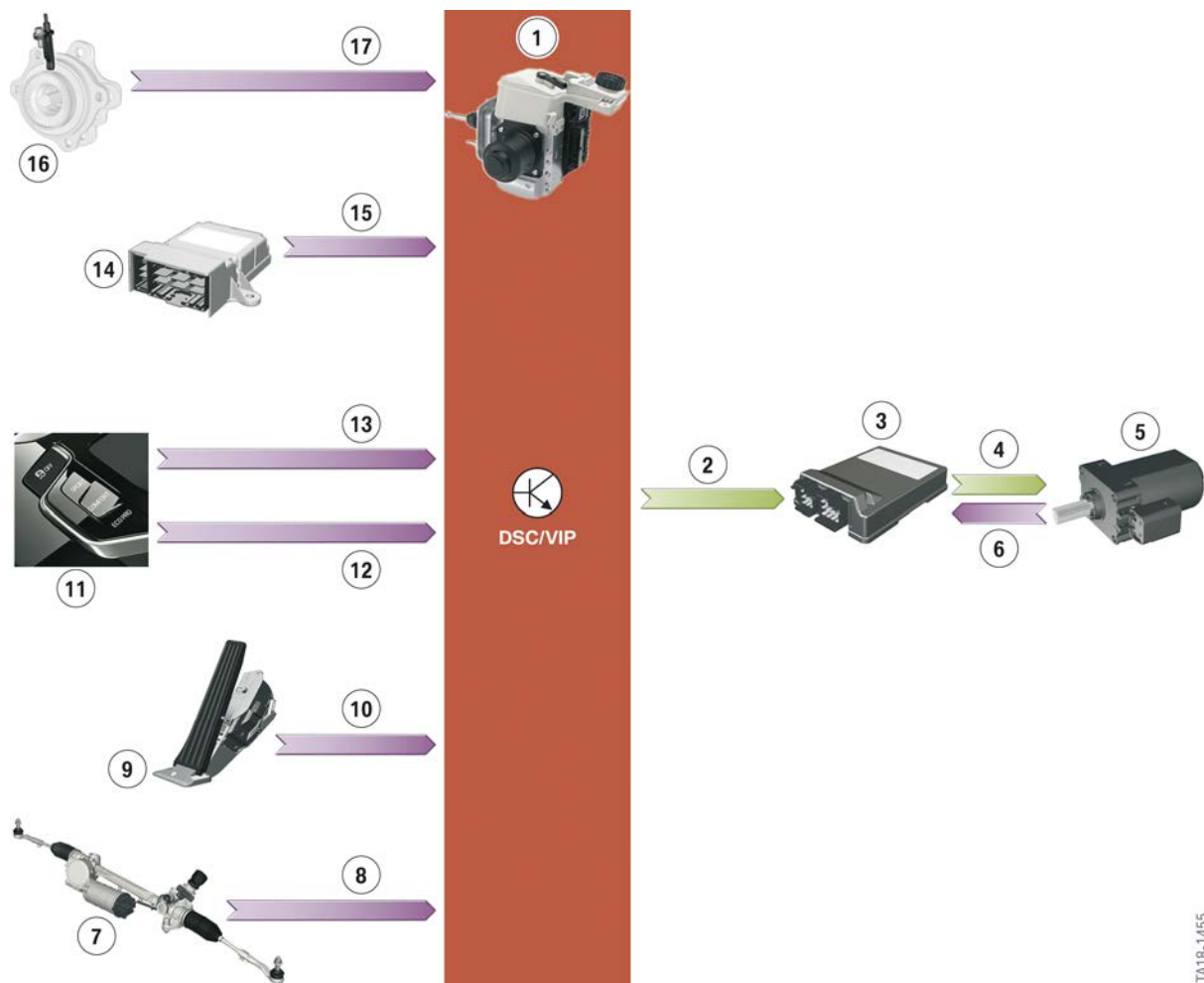
G15 Powertrain/Chassis

3. Gearbox

3.3.2. System overview

The central system for controlling the regulated rear axle differential lock is the Dynamic Stability Control integrated DSCi. It evaluates the driving dynamic parameters provided by other sensors and control units and forwards the calculated lock-up torque to be set to the control unit for the regulated rear axle differential lock (GHAS).

The DSCi can also request separate and higher-level locking interventions to stabilise and enhance the agility of the vehicle when the DSC control system is activated and also deactivated. 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/virtual integration platform (DSCi)
2	Lock-up torque request
3	Control unit for regulated rear axle differential lock (GHAS)
4	Electric motor actuation
5	Electric motor, multidisc clutch

TA18-1455

G15 Powertrain/Chassis

3. Gearbox

Index	Explanation
6	Position and temperature of electric motor
7	Electromechanical power steering (EPS) control unit
8	Steering angle
9	Accelerator pedal module (FPM) control unit
10	Accelerator pedal angle
11	DSC/DTC switch, driving experience switch
12	Active driving mode (SPORT, COMFORT, ECO PRO)
13	DSC/DTC status (DSC/DTC activated/deactivated)
14	Advanced Crash Safety Module (ACSM) control unit
15	Yaw rate, longitudinal acceleration and lateral acceleration
16	Wheel speed sensor
17	Vehicle speed

3.3.3. Design

The regulated rear axle differential lock consists of the following components:

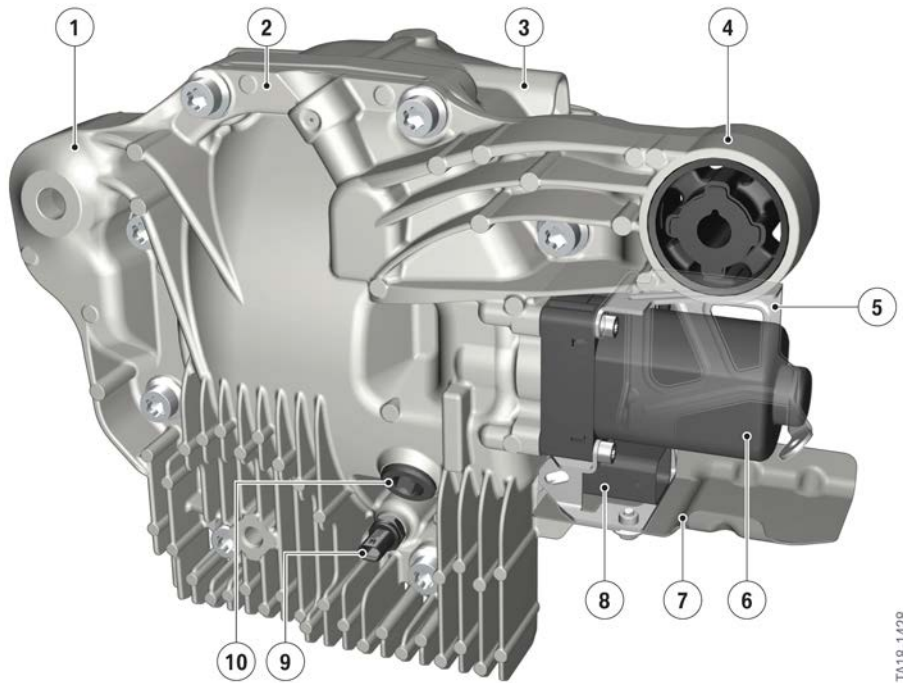
- Rear axle differential with multidisc clutch and ball ramp
- Electric motor with transfer box
- Control unit for regulated rear axle differential lock (GHAS).

External structure

The rear axle differential can be recognized by an aluminum housing cover mounted from the rear and an electric motor which is visible from the outside. The housing of the G15 is made of aluminum.

G15 Powertrain/Chassis

3. Gearbox



Structure of regulated rear axle differential lock

Index	Explanation
1	Connection to rear axle support
2	Housing cover
3	Housing
4	Connection to rear axle support
5	Holder for heat shield
6	Electric motor
7	Heat shield
8	Electrical connection, electric motor
9	Transmission oil temperature sensor
10	Oil filler plug

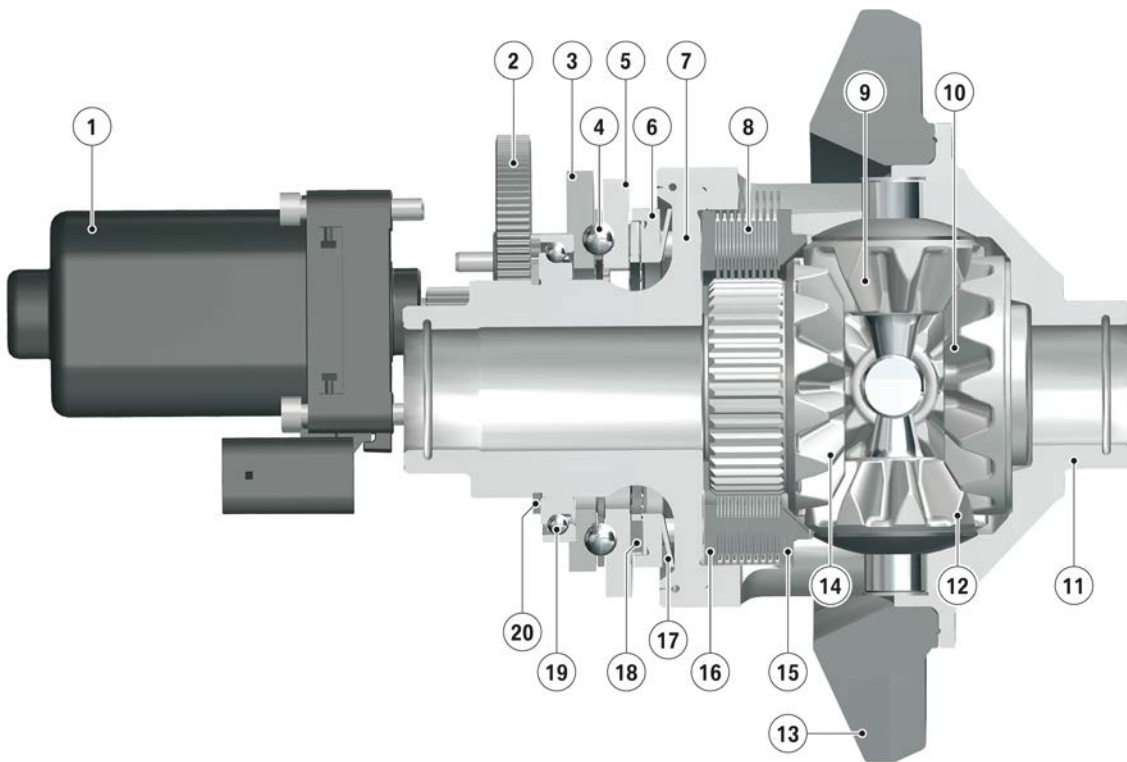
Inner structure

The rear axle differential consists of the following main components on the inside:

- Differential gear
- Multidisc clutch
- Ball ramp
- Transfer box, electric motor.

G15 Powertrain/Chassis

3. Gearbox



TA18-0808

Regulated rear axle differential lock: Internal structure (viewing direction: opposite to direction of travel)

Index	Explanation
1	Electric motor
2	Transfer box
3	Ball ramp consisting of geared mobile adjusting disc and first half of ball ramp
4	Balls/Spherical washer
5	Fixed pressure disc with second half of ball ramp
6	Disc spring pressure ring
7	Differential lid (connected to differential housing, cannot rotate)
8	Disc set
9	Differential bevel gear
10	Output bevel gear
11	Differential housing (connected to outer discs)
12	Differential bevel gear
13	Crown wheel
14	Output bevel gear
15	Counter pressure plate
16	Pressure plate

G15 Powertrain/Chassis

3. Gearbox

Index	Explanation
17	Disc spring
18	Axial needle bearing with axial needle bearing thrust washer
19	Ball bearing between inner output hub and differential housing
20	Circlip (ball bearing fixing)

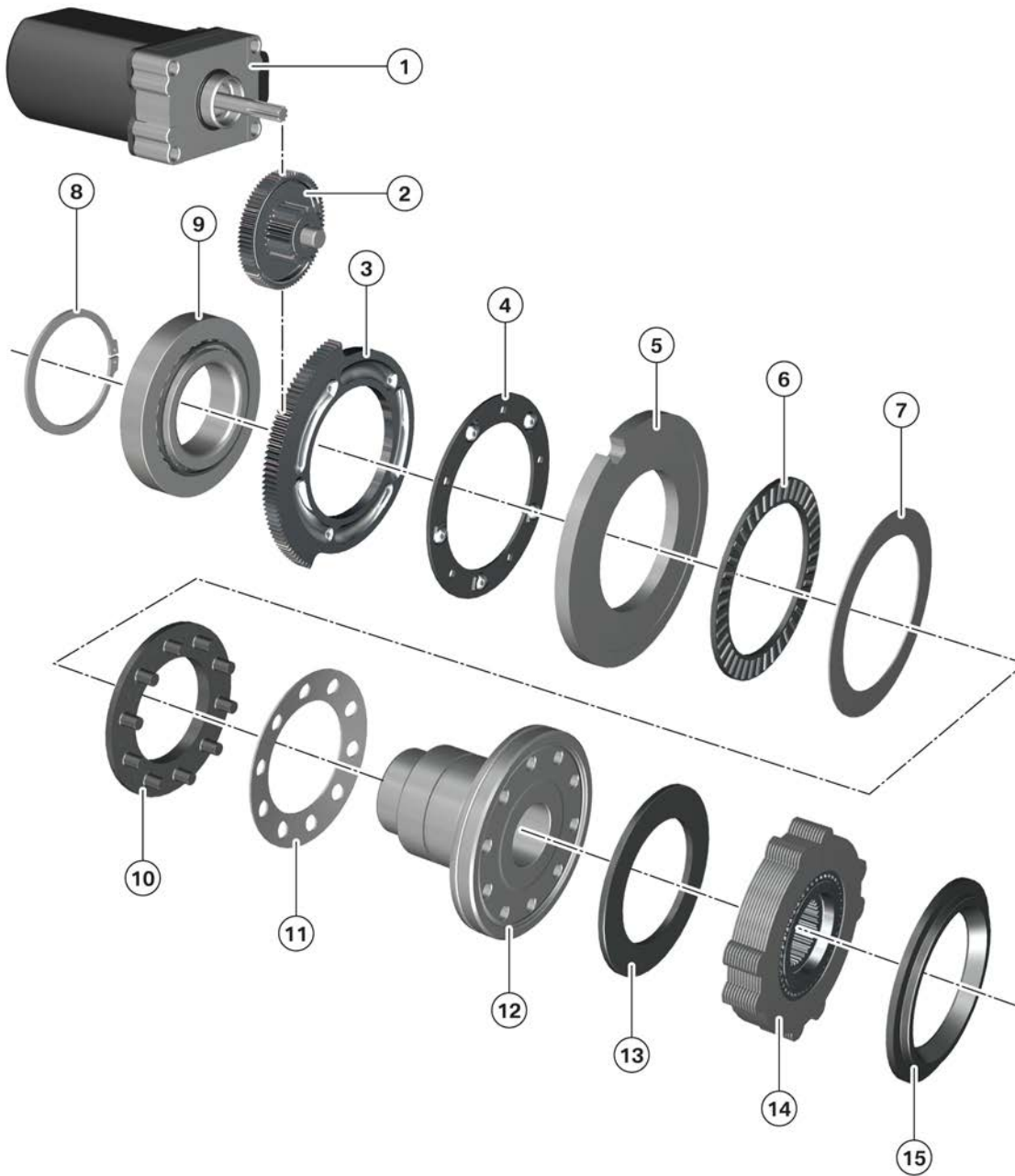
The electric motor (1) with transfer box (2) is screwed on at the housing. The pressure disc with the second ball ramp half (5) is fixed in the housing. The mobile components of the ball ramp (3 and 4) generate the necessary axial displacement of the fixed pressure disc (5) with the aid of the transfer box (2). These components are not subject to the differential transmission rotation and are disconnected from the rotating components by an axial needle bearing (18).

The components with the index 6 to 20 belong to the differential gear.

The lock is effected between the right output (14) and the differential housing (11) and counteracts a difference in speed between the output bevel gears (9 and 13). The disc spring (17) opens the lock when current is not supplied to the e-motor.

G15 Powertrain/Chassis

3. Gearbox



TA17-0454

Regulated rear axle differential lock: structure of lock

Index	Explanation
1	Electric motor
2	Transfer box
3	Ball ramp consisting of geared mobile adjusting disc and first half of ball ramp
4	Balls/Spherical washer
5	Fixed pressure disc with second half of ball ramp
6	Axial needle bearing

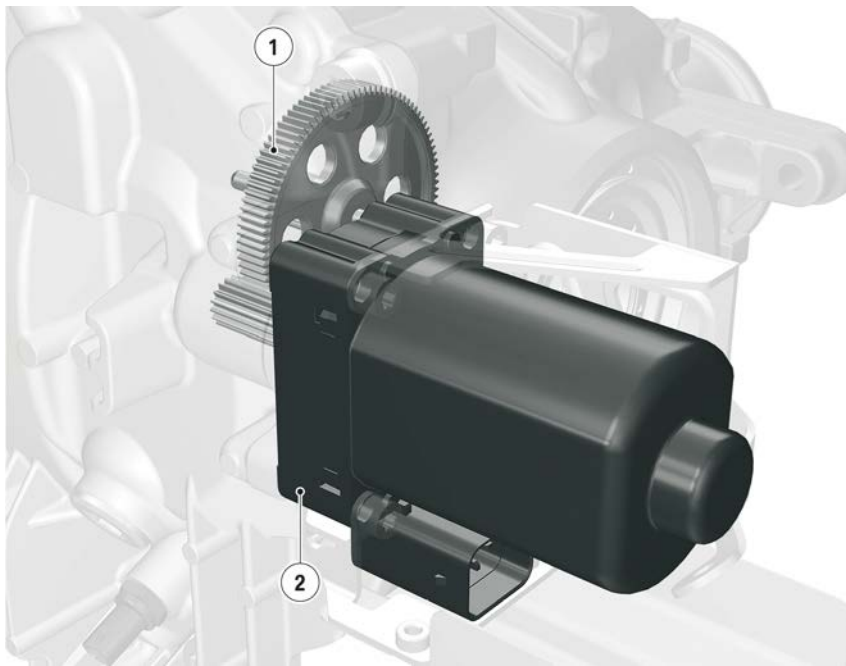
G15 Powertrain/Chassis

3. Gearbox

Index	Explanation
7	Axial bearing thrust washer
8	Circlip (ball bearing fixing)
9	Ball bearing between inner output hub and differential housing
10	Disc spring pressure ring
11	Disc spring
12	Differential lid (connected to differential housing, cannot rotate)
13	Pressure plate
14	Disc set
15	Counter pressure plate

Electric motor

An e-motor controls the lock-up torque to be set via the multidisc clutch.



Regulated rear axle differential lock, electric motor

Index	Explanation
1	Transfer box
2	Electric motor

The rotational movement of the e-motor is transmitted via the transfer box with ball ramp. This produces an axial force which compresses the multidisc clutch. Depending on this contact pressure the multidisc clutch transmits more or less lock-up torque. The control is effected via the angle of rotation of the e-motor. This is determined with the assistance of engine-internal hall effect sensors.

G15 Powertrain/Chassis

3. Gearbox

The electric motor consists of:

- Engine
- Temperature sensor
- 2 hall effect sensors.

A temperature sensor, also installed in the electric motor, is used to protect the electric motor against overheating. To determine the position of the electric motor, 2 hall effect sensors in the engine are used.

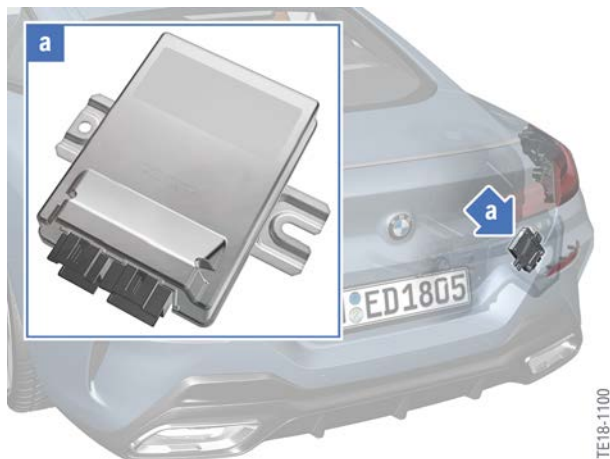
A recalibration of the characteristic curve of the lock-up torque via the engine position is regularly performed to compensate the wear in the clutch. To be able to assign a certain position of the electric motor a corresponding coupling lock-up torque and to take the wear influences into account while doing so, a reference run is performed after the combustion engine is switched off. During this reference run the engine is subjected to a defined current level. The lock-up torque of 0 Nm is assigned to the resulting position.

Temperature monitoring

Three temperature sensors in total are used to protect the components against overheating. The temperature of the control unit GHAS (driver output stage), temperature of the e-motor and transmission oil temperature are monitored.

Control unit for regulated rear axle differential lock (GHAS)

In the G15, the control unit of the regulated rear axle differential lock (GHAS) is in the rear area of the vehicle and is screwed to the support of the rear trim panel.



G15 mounting orientation of GHAS

3.3.4. Operating principle

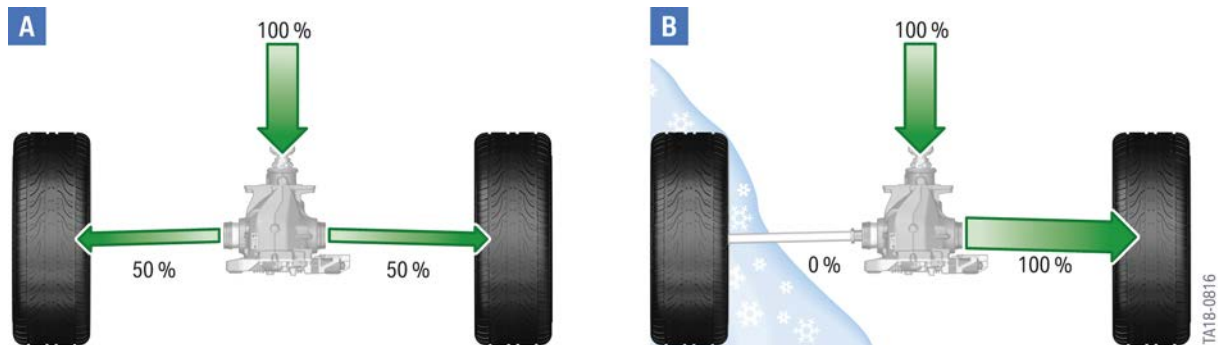
The drive torque to be transmitted at the wheels of the rear axle is calculated in the DSCi and is forwarded to the regulated rear axle differential lock (GHAS) control unit via the FlexRay bus. The GHAS calculates the adjusting torque to be set at the toothed mobile adjusting disc from the requested drive torque.

G15 Powertrain/Chassis

3. Gearbox

The adjusting torque required for control is generated by the electric motor. The rotational movement of the electric motor is converted to an axial movement by a ball ramp mechanism and the clutch package of the multidisc clutch is closed or open.

If the multidisc clutch is opened, the drive torque is distributed evenly between the right and left wheel. This means that 50% of the drive torque is applied to both wheels on the rear axle.



Regulated rear axle differential lock, drive torque distribution

Index	Explanation
A	Drive torque distribution with multidisc clutch open
B	Maximum drive torque distribution with closed multidisc clutch and lock-up torque up to 1500 Nm (left wheel in snow)

In the event of a driving situation where it is necessary to shift the drive torque from one wheel to the other, the multidisc clutch is closed with the aid of the e-motor until the desired drive torque distribution is set.

The maximum lock-up torque of the regulated rear axle differential lock is 1500 Nm. This means that the entire drive torque can be applied to only one rear wheel if required. This corresponds to a 100 % locking effect. If the required lock-up torque is higher than the maximum achievable torque of 1500 Nm, the controlled rear axle differential lock will no longer be able to lock 100%.

3.3.5. Operating strategy

The regulated rear axle differential lock system is a proactive system that adapts the drive torque at the rear axle to the current driving situation using a variety of sensors. By evaluating all driving data in the DSC control unit a driving situation where a shift of the drive torque at the rear axle is useful can be detected in advance. An optimum drive torque distribution for the vehicle can be generated through interaction with the xDrive all-wheel system.

An adapted e-motor control In the SPORT and SPORT PLUS driving modes leads to more agile and manoeuvrable drivability. The traction of the vehicle is also increased in the SPORT driving mode with e-motor control.

The DSC status (DSC activated/deactivated, DTC activated/deactivated) also influences the characteristics of the functions. With Dynamic Traction Control (DTC) and deactivated DSC (DSC off), an adapted e-motor control also leads to more agile and manoeuvrable drivability. The agile drivability is most pronounced with deactivated DSC.

G15 Powertrain/Chassis

3. Gearbox

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
Driving off	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	Additional 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	The lock is closed in the event of deliberately induced oversteering. The yaw-rate signal and accelerator pedal position are used to detect this kind of situation.

The regulation and the operating principle of the regulated rear axle differential lock are explained below using examples of driving situations:

Driving off with similar coefficient of friction on right and left

When driving off the clutch is closed in order to achieve the maximum traction. If the maximum lock-up value is no longer required when driving off, the clutch is opened further again.

Cornering

When steering into a corner, drive torque is transmitted from the inner cornering wheel to the outer cornering wheel. This increases the steerability of the vehicle. If the vehicle changes direction, the drive torque is shifted so that the vehicle remains stable. When accelerating out of a bend/corner, the drive torque is then shifted back again to the outer cornering wheel.

Stabilization upon cornering or lane change

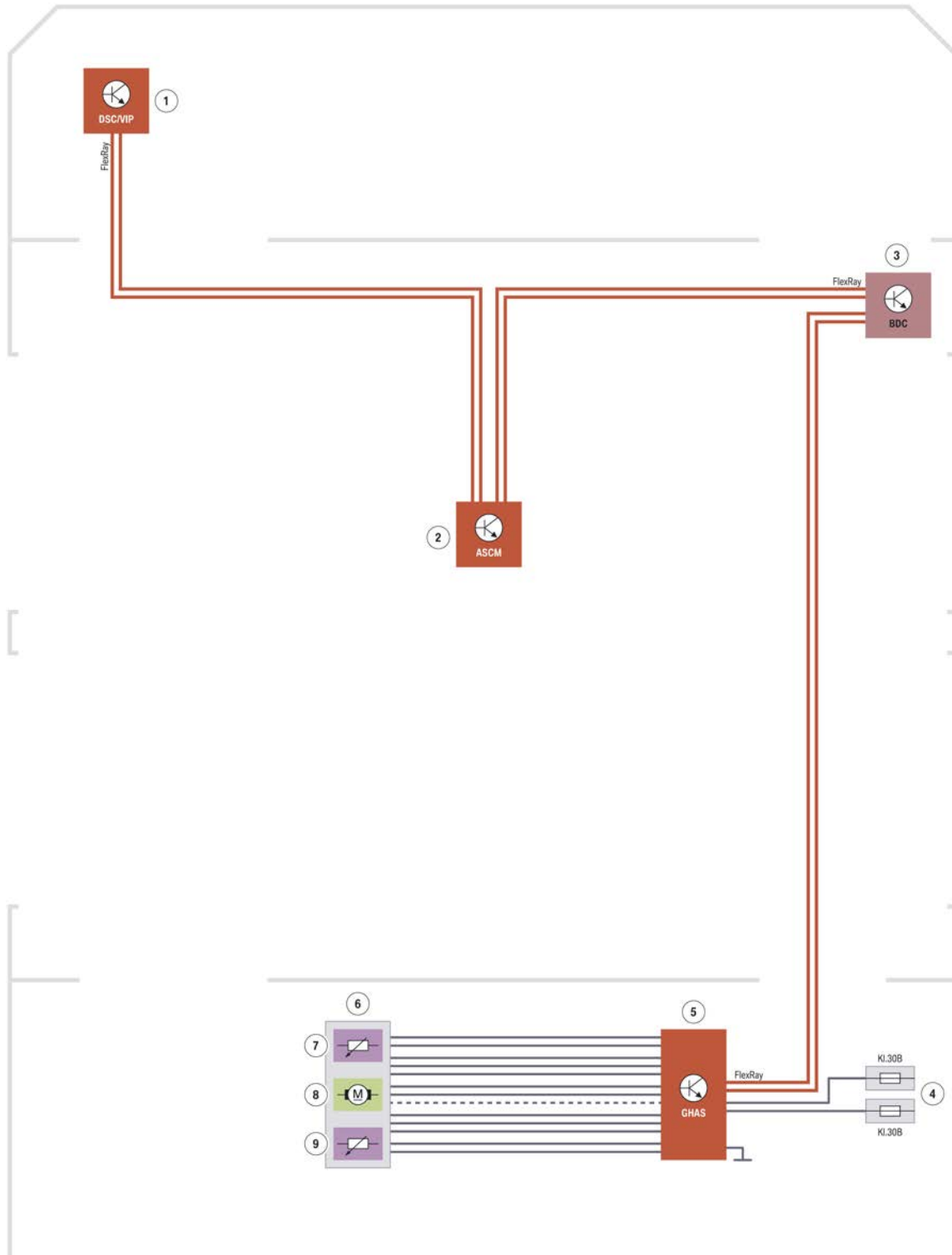
In the case of fast lane changes or upon cornering, all vehicles are prone to significant yaw responses and the vehicle may end up oversteering, for example. If the Dynamic Stability Control integrated DSCi system detects a deviation between the driver's choice and the vehicle response, the vehicle is stabilized by means of xDrive control and the regulated rear axle differential lock.

In this situation the regulated rear axle differential lock distributes the drive torque to both sides as needed in order to prevent oversteering. It is possible to largely do without decelerating brake interventions. The vehicle handling is more stable as a result and the driving dynamics is increased. As a result, the driver can accelerate very quickly out of a bend/corner, for example.

G15 Powertrain/Chassis

3. Gearbox

3.3.6. System wiring diagram



Regulated rear axle differential lock, system wiring diagram in G15

TA18-1464

G15 Powertrain/Chassis

3. Gearbox

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

3.3.7. Notes for Service

Oil change

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



BMW AG 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", before replacing the entire component it may be worth changing the oil first to see if this resolves the problem.

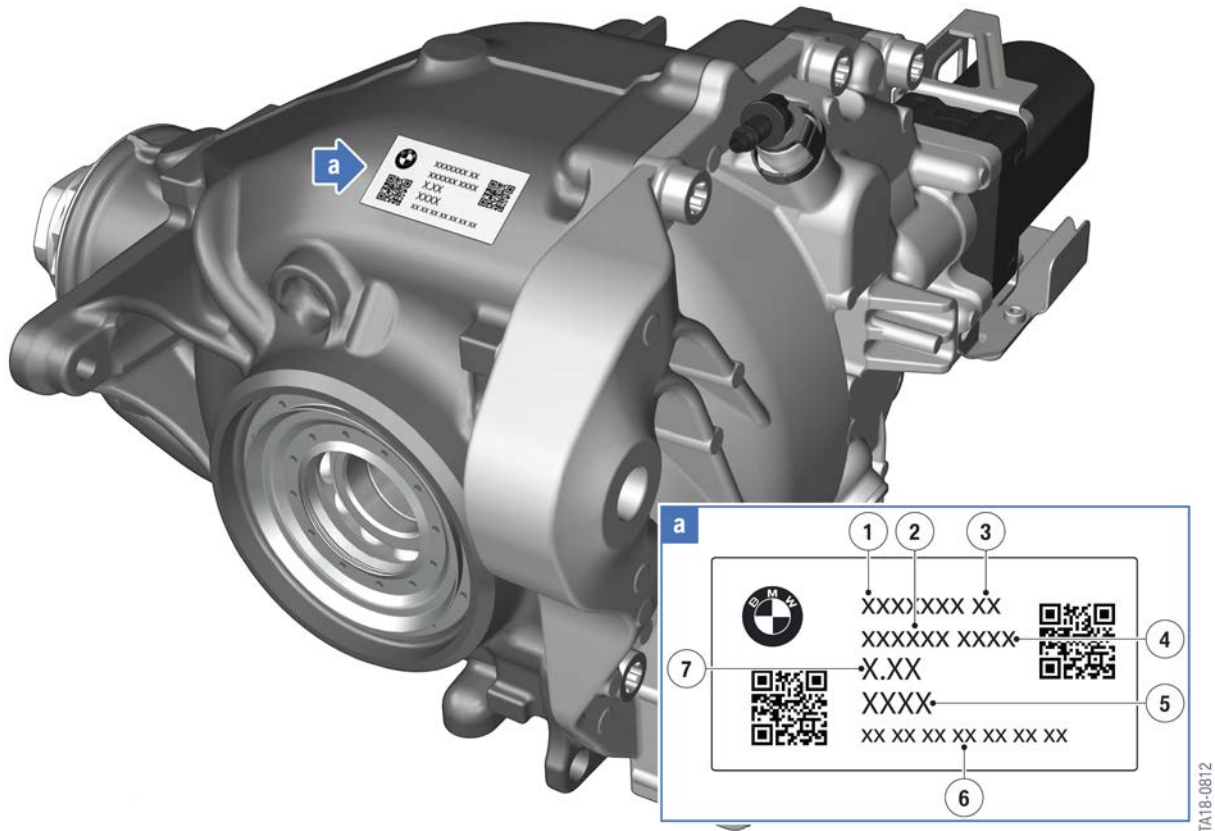
Classification

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 classification code is determined during production and printed on the type plate of the regulated rear axle differential lock. This type plate is located on the top of the regulated rear axle differential lock.

G15 Powertrain/Chassis

3. Gearbox



Classification of regulated rear axle differential lock

Index	Explanation
1	BMW 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 workshop diagnosis system ISTA.
- Read off the classification code on the type plate of the rear axle differential (rear axle differential may need 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 workshop diagnosis system ISTA.

G15 Powertrain/Chassis

3. Gearbox

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

At the time this product information was created, three service functions were 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 this case, the classification code on the type plate of the rear axle differential must be read off.

G15 Powertrain/Chassis

4. Brakes

4.1. Service brake

4.1.1. Variants

Depending on the motorization and vehicle equipment, various brake calipers are used at the front and rear axle. The M Sport braking system in 19" is available as standard equipment with the BMW M850i xDrive. With the BMW 840d xDrive, an 18" Sport brake can be ordered in combination with the M Sport package (SA 337) and a 19" Sport brake can be ordered in combination with the M Technic Sport package.

Front axle

A two-part fixed caliper brake made of aluminum with 4 pistons is used on the front axle. The brake pad backplate is glued.



Brake caliper for front axle in the G15

Index	Explanation	Manufacturer	Variable	Brake disc
A	Sport brake, painted	Brembo®	19"	395 x 36

Rear axle

A floating brake caliper made of cast iron with one piston is used on the rear axle. It includes the electromechanical parking brake actuator. The brake pad backplate is greased.



Brake caliper for rear axle in the G15

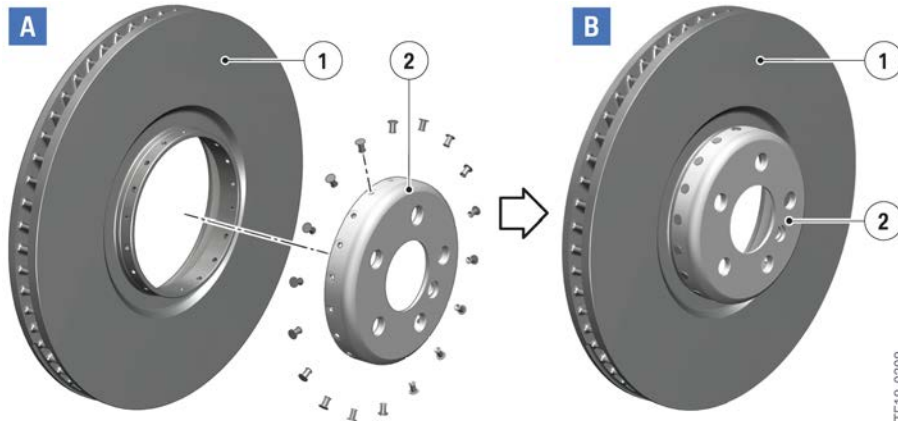
Index	Explanation	Manufacturer	Variable	Brake disc
A	Sport brake, painted	TRW®	19"	398 x 28

G15 Powertrain/Chassis

4. Brakes

4.1.2. Brake discs

The G15 uses riveted lightweight construction brake discs. The weight reduction is achieved by using a brake disc chamber made of aluminum.



Brake disc in the G15

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	Brake disc chamber
2	Friction surface

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

4.2. Parking brake

The parking brake is realized by means of a combined brake caliper on the rear axle. The parking brake functions are integrated into the Dynamic Stability Control DSCi integrated.

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).

G15 Powertrain/Chassis

5. Wheels/Tires

5.1. Tires

Just like the vehicle, the tires of the G15 have been designed for sporting character and driving dynamics. The vehicle is delivered as standard with mixed tires. The tires used on the rear axle are therefore wider than those on the front axle. This meant that it was possible to base the chassis and suspension design on the significantly higher cornering potential of wide rear axle tires.

The following tires are used as standard for the M840i xDrive model:

- Front: 8 x 20, 245/35 R20
- Rear: 9 x 20, 275/30 R20

5.2. Integrated RDCi tire pressure monitor

The G15 contains the familiar RDCi tire pressure monitor. 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		●

The TPM wheel electronics of the RDCi in the G15 are provided by Sensata®.

For more information on the RDCi system, refer to the product information G01 and G30 chassis and suspension.

5.3. Electronic tire pressures plate

The G15 is equipped with the electronic tire pressure specification introduced in the G30. The adhesive tire pressure label is supplemented here by an additional user menu in the Central Information Display CID.

G15 Powertrain/Chassis

5. Wheels/Tires



G15 overview of electronic tire pressure specification

Index	Explanation
A	Electronic tire pressures label in the CID
B	Tire pressures information label

Unlike the tire pressures plate sticker, the electronic tire pressures plate permanently monitors the nominal pressures taking into consideration the current temperatures. This means that it determines and displays the optimum tire pressure at any temperature. For the valid tire inflation pressures, check the Central Information Display (CID).



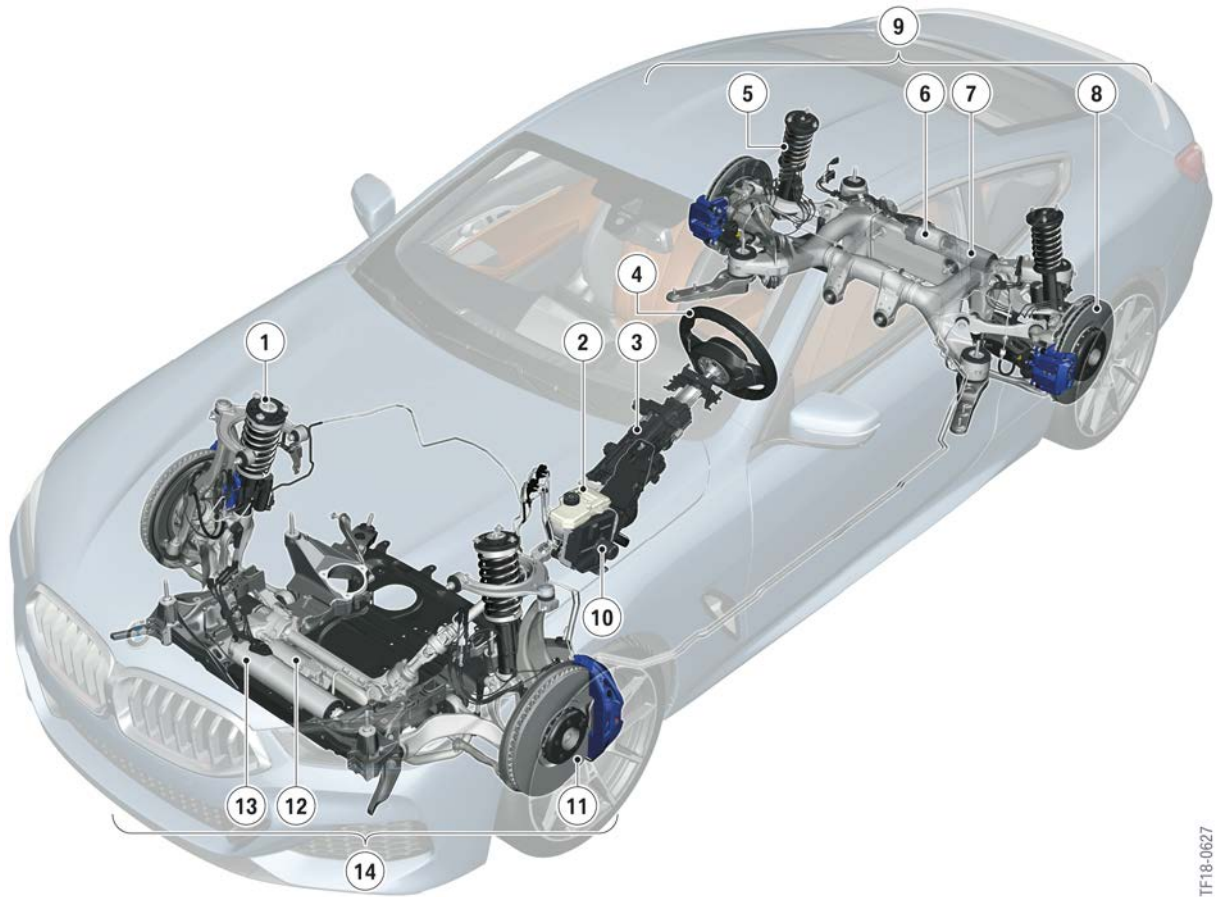
The RDC reset is omitted following adjustment of the tire inflation pressures in vehicles with activated electronic tire pressure specification.

For more information on the electronic tire pressure specification, refer to the product information G30 chassis and suspension.

G15 Powertrain/Chassis

6. Chassis and Suspension

6.1. Overview



Overview of chassis and suspension G15

TF18-0627

Index	Explanation
1	Front spring strut
2	Brake fluid expansion tank
3	Steering column
4	Steering wheel
5	Spring strut, rear
6	Rear axle slip angle control (HSR)
7	Electric active roll stabilization rear (EARSH)
8	Disc brake with parking brake on the rear axle
9	Five-link rear suspension
10	Dynamic Stability Control integrated (DSCi)

G15 Powertrain/Chassis

6. Chassis and Suspension

Index	Explanation
11	Disc brake for front axle
12	Electronic Power Steering (electromechanical power steering) EPS
13	Electric active roll stabilization at the front (EARSV)
14	Double-wishbone front axle

6.1.1. Comparison

The following table provides you with an overview of the chassis and suspension systems used in the G15 in comparison with the BMW 6 series (the F13):

Component	F13	G15
Front axle	Double-wishbone	Double-wishbone
Front suspension	Steel	Steel
Front damping	Conventional or Electronic Damper Control (EDC)	Electronic Damper Control (EDC)
Anti-roll bar, front	Conventional or Hydraulic active roll stabilization (ARS)	Conventional or Electric active roll stabilization front (EARSV)
Rear axle	Integral rear axle V	Five-link rear suspension
Rear suspension	Steel	Steel
Rear damping	Conventional or Electronic Damper Control (EDC)	Electronic Damper Control (EDC)
Rear anti-roll bar	Conventional or Hydraulic active roll stabilization (ARS)	Conventional or Electric active roll stabilization rear (EARSH)
Front brake	Brake discs up to dia. 374 mm	Brake discs up to dia. 395 mm
Rear brakes	Brake discs up to dia. 345 mm	Brake discs up to dia. 398 mm
Parking brake	Electromechanical holding brake	Electromechanical holding brake
Tire pressure	RDC	RDCi
Front steering	Electronic Power Steering (EPS)	Electronic Power Steering (EPS)
Rear steering	Rear axle slip angle control (HSR)	Rear axle slip angle control (HSR)

An "Adaptive M suspension Professional" (SA 2VW) can be ordered as optional equipment in the M850i xDrive model. This contains the electric active roll stabilization (EARS) system instead of a conventional stabilizer. The optional equipment "Adaptive M suspension Professional" can only be ordered with the M850i xDrive model.

G15 Powertrain/Chassis

6. Chassis and Suspension

6.1.2. Overview of system descriptions

The systems already familiar from other vehicle models will not be examined in any further detail in this document. If required, refer to the detailed system descriptions in the product information documents listed below:

Topic	Product information
Electronic Damper Control EDC High	G12 Chassis and Suspension
Electric active roll stabilization (EARS)	G12 Chassis and Suspension
Integral Active Steering	G12 Chassis and Suspension

6.2. Stiffening measures

The vehicle is designed to ensure a high basic rigidity. This was achieved by installing the following components:

- Front-end struts
- Torsion struts on front axle
- Stiffening plate on front and rear axle.

6.2.1. Front-end struts

To increase the rigidity of the vehicle, front-end struts were installed in the engine compartment. The front-end struts are fastened to the die-cast aluminum spring strut dome and cross-connection support plate of the engine compartment.



Overview of front-end struts G15

G15 Powertrain/Chassis

6. Chassis and Suspension

Index	Explanation
A	Engine compartment
1	Die-cast aluminum spring strut dome front right
2	Die-cast aluminum spring strut dome front left
3	Front-end strut left
4	Front-end strut right

Special front-end struts are installed in the M850i xDrive. The front-end struts must be removed in order to remove the air filter insert.



The screw cycles on the aluminum pressure cast spring strut dome must be noted. It may be necessary to rework the threads on the aluminum pressure cast spring strut dome using threaded inserts to ensure their strength after multiple screw cycles.

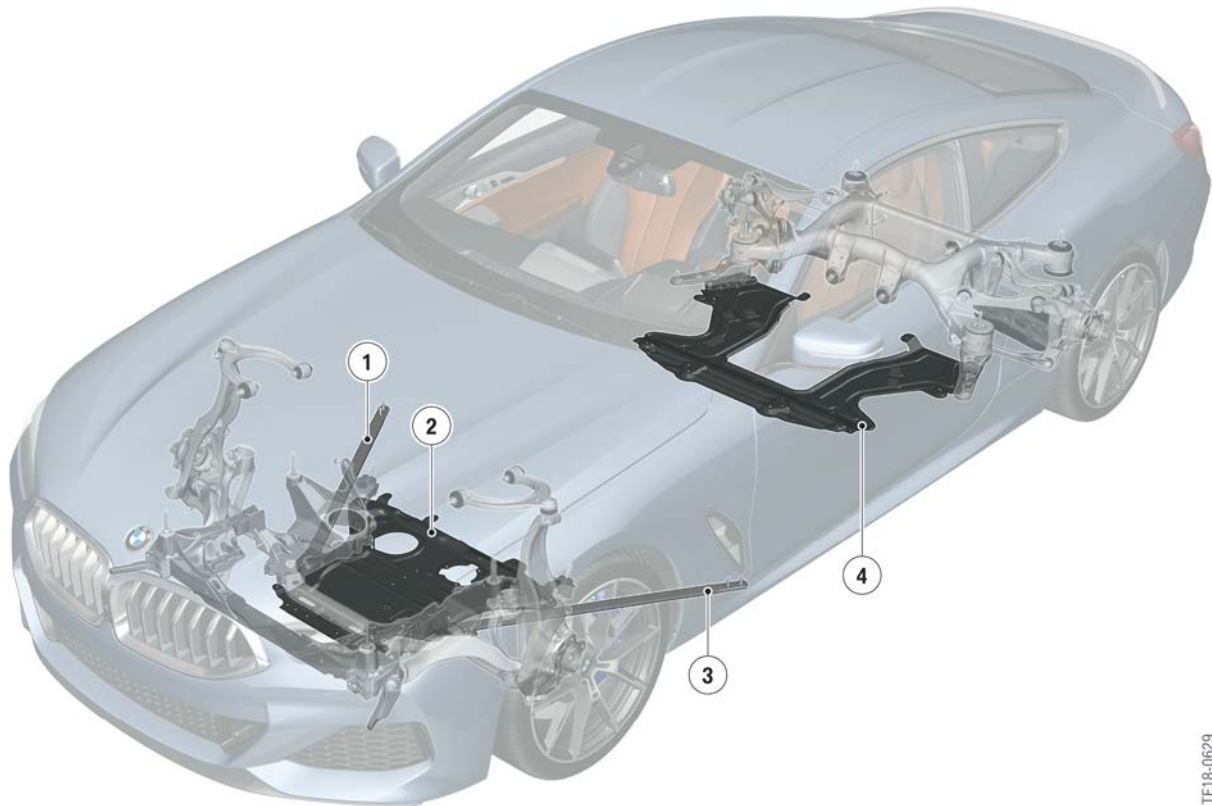
To perform the necessary servicing, observe the information and specifications of the documents in ISTA in each case which are updated on a daily basis.

6.2.2. Measures for front and rear axle

In addition to the stiffening plate on the front axle, a new stiffening plate is used on the rear axle of the G15. Torsion struts are used on the front axle. These measures increase the rigidity of the vehicle and allow a more sporty chassis and suspension setting.

G15 Powertrain/Chassis

6. Chassis and Suspension



TF18-0629

Stiffening measures, front and rear axle G15

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

6.3. Suspension systems

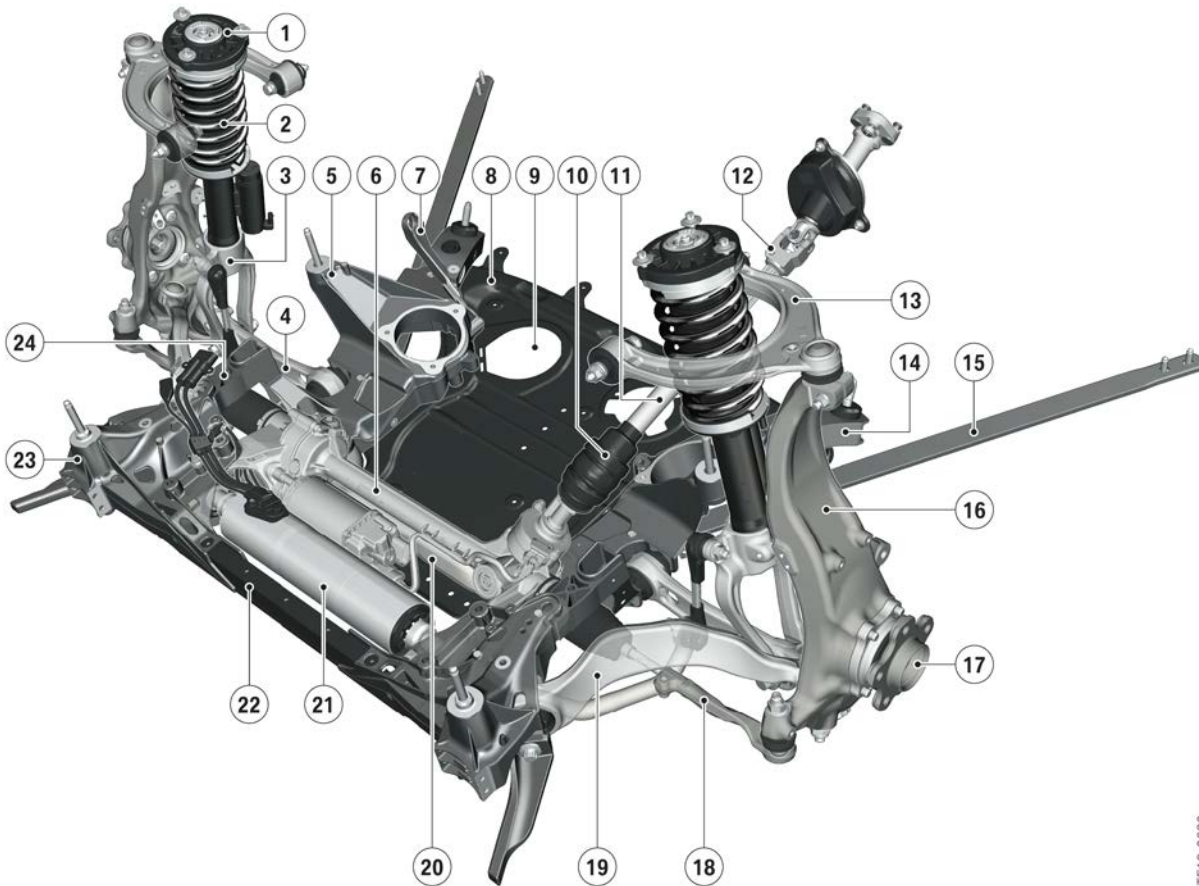
The axles of the G15 are designed, as is the entire vehicle, for sporting character and driving dynamics. The wheel guidance has been optimized by increasing the negative camber on the front and rear axle (compared to the G30).

6.3.1. Front axle

A double-wishbone front axle is used in the G15. The bearings of the front axle wishbone were specially developed for the vehicle and are harder, e.g. than those in the G30. A rubber mount originating from the F90 is used on the upper wishbone.

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6. Chassis and Suspension



TF18-0630

Double-wishbone front axle in the G15

Index	Explanation
1	Support bearing
2	Spring strut
3	Spring strut holder
4	Wishbone, bottom
5	Cast side section
6	Steering box
7	Strut
8	Rear stiffening plate
9	Service opening
10	Universal joint of steering shaft to steering gear
11	Steering shaft
12	Universal joint of steering shaft to steering column
13	Triangle wishbone, top
14	Side member

G15 Powertrain/Chassis

6. Chassis and Suspension

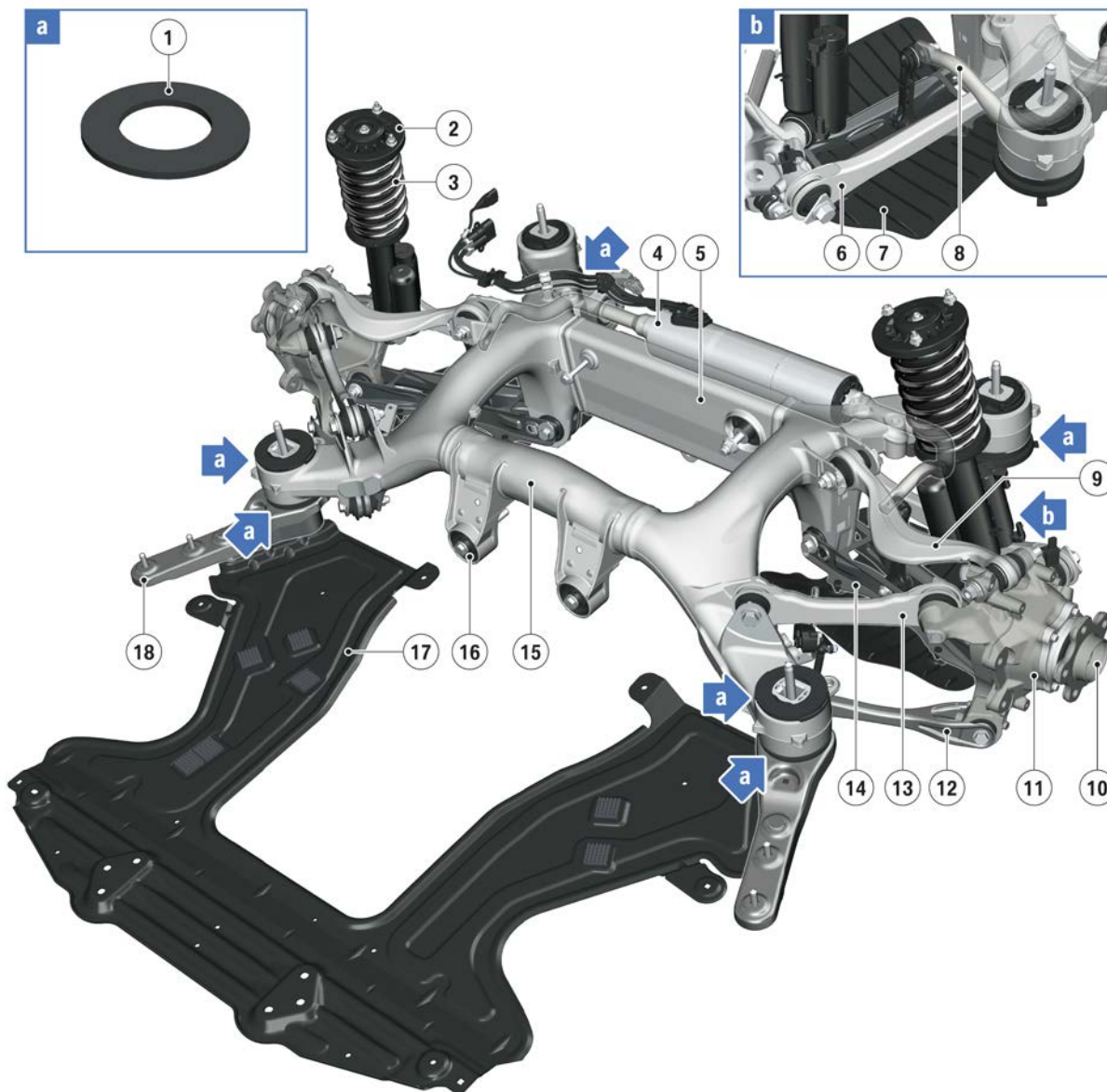
Index	Explanation
15	Torsion strut
16	Swivel bearing
17	Wheel bearing unit
18	Track rod end
19	Trailing link
20	Cross member
21	Electric active roll stabilization at the front (EARSV) (optional equipment)
22	Transverse tube
23	Cast corner
24	Cast corner connection

6.3.2. Rear axle

A five-link rear axle is used on the rear axle. The newly developed stiffening plate increases the rigidity of the vehicle. It is screwed to the mountings on the compression struts and the body of the vehicle. Damping discs made of Cellasto are used on the rear axle to increase the driving dynamics.

G15 Powertrain/Chassis

6. Chassis and Suspension



TF18-0631

Five-link rear axle in the G15

Index	Explanation
1	Damping discs
2	Support bearing
3	Spring strut
4	Rear axle slip angle control (HSR)
5	Connection of rear axle support to rear axle differential
6	Camber link
7	Air deflector
8	Anti-roll bar

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Index	Explanation
9	Wishbone
10	Wheel bearing unit
11	Wheel carrier
12	Trailing arm
13	Control arm
14	Camber control arm
15	Rear axle support
16	Rubber mount of the rear axle support on the rear axle differential
17	Stiffening plate
18	Compression strut

6.4. Dynamic Stability Control integrated (DSCi)

6.4.1. Overview

The G15 features the newly developed integrated brake system with the internal designation Dynamic Stability Control integrated (DSCi).

The DSCi combines the functions brake actuation, braking force assistance and the braking control system (DSC) into a compact, weight-saving braking module.

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6. Chassis and Suspension



Dynamic Stability Control integrated DSCi

Index	Explanation
1	Brake control linkage with adjustable ball head
2	Expansion tank
3	Brake fluid level sensor
4	Plug connection, power supply (DC)
5	Plug connection, electrical system
6	Control unit

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Index	Explanation
7	Hydraulic unit
8	Brake pedal force simulator
9	3-phase e-motor (AC)
10	DSCi unit

The brake system has the following driving characteristics:

- Outstanding driving dynamics and vehicle control due to the dynamics and precision of the vehicle stabilization
- More sporting character and feeling of safety due to a brake pedal feel short travel and effective modulation
- Increased active safety due to shorter stopping distances combined with assistance systems
- Due to the fast pressure build-up, much faster and more precise interventions can be achieved compared to previous brake systems.

6.4.2. Special features

The DSCi brake system is characterized by the following technical features:

- Electro-hydraulic brake-by-wire braking function
- Changeover from front/back to diagonal brake force distribution
- Changeover from a brake fluid level switch to a brake fluid level sensor
- Vacuum supply omitted
- Vacuum brake servo omitted
- Integration of the tandem brake master cylinder
- Integrated brake pedal travel sensor.

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6. Chassis and Suspension

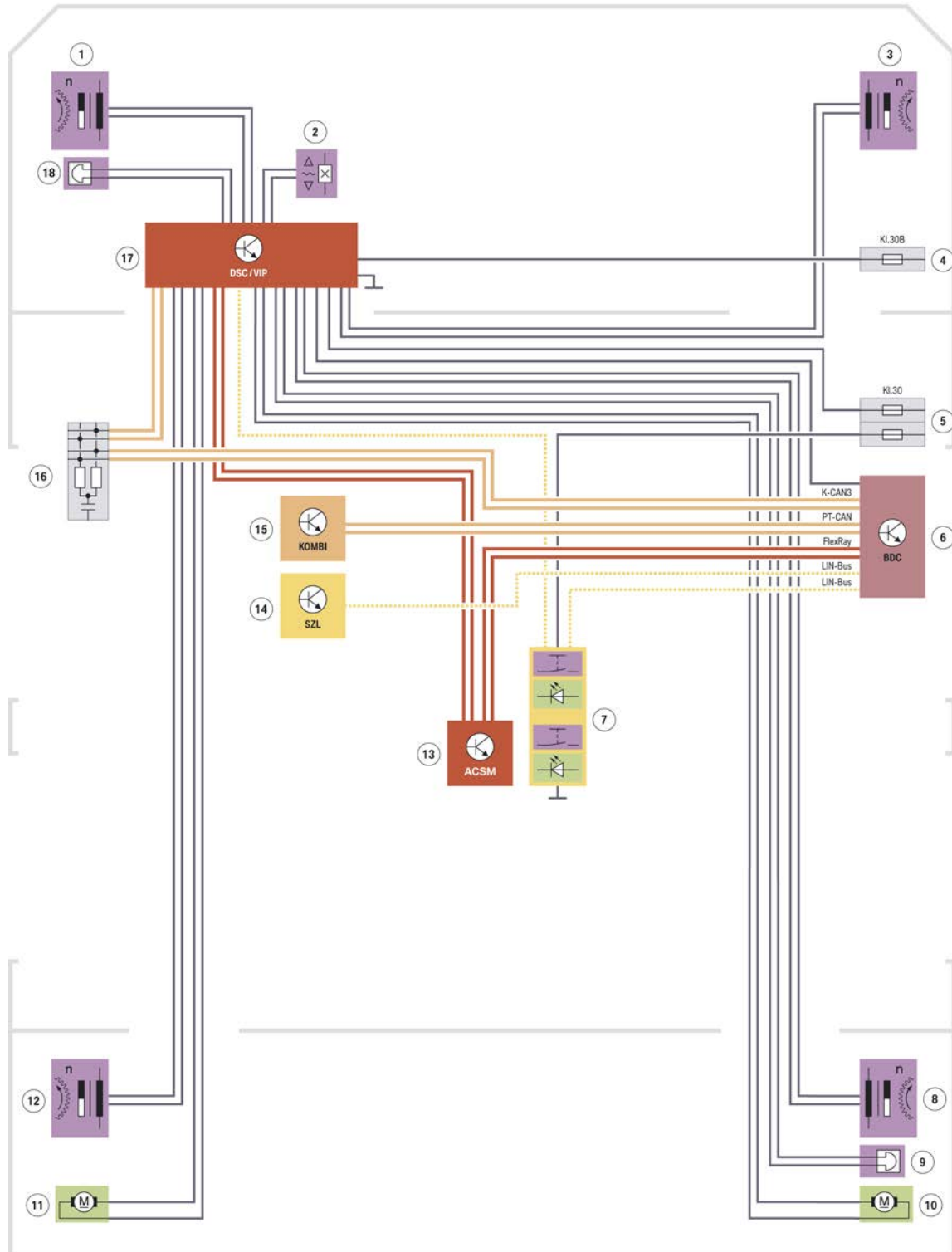
6.4.3. Brake functions

Function	Explanation
Antilock Brake System (ABS)	Prevents blocking of individual wheels when braking by means of targeted modulation of brake pressures. Vehicle steerability is maintained.
Cornering Brake Control (CBC)	Prevents the vehicle from turning in when braking gently and when subjected to a high degree of lateral acceleration by adjusting the control of the brake pressures. The cornering stability is improved.
Automatic Stability Control (ASC)	Prevents the drive wheels from spinning by targeted braking of these wheels and adaptation of the drive torque delivered by the engine. Vehicle propulsion is optimized as a result and driving stability is maintained.
Dynamic Brake Control (DBC)	In the event of panic braking initiated by the driver, the system supports the driver by automatically immediately applying the maximum brake pressure to ensure the best possible deceleration.
Dynamic Stability Control (DSC)	If the vehicle starts to understeer or oversteer, it is stabilized by targeted brake interventions at individual wheels.
Automatic Differential Brake (ADB-X)	Simulates the function of the differential lock. If a wheel displays a tendency to spin, this wheel is automatically braked so that propulsion can still be achieved via the other wheel of the driven axle.
Dynamic Traction Control (DTC)	In cooperation with ASC and DSC, the intervention thresholds on normal road surfaces are widened, for example, to enable an even sportier driving style without intervention. On loose surfaces, such as snow, sand or gravel, maximum forward momentum is achieved.
Brake standby	Builds up a moderate brake pressure in the system when the driver takes his foot off the accelerator pedal quickly. The braking effect then acts more quickly if the driver then performs panic braking.
Dry by applying brake	Depending on operation of the wiper, applies the brake pads gently at intervals in order to clean (dry) the brake discs. The braking effect is significantly improved by this when the vehicle is braked.
Drive-off assistant	Holds the vehicle on inclines for roughly 1.5 seconds as soon as the driver releases the brake pedal in order to drive off. This means that the driver can drive off comfortably, without the vehicle rolling back down the hill unintentionally.
Automatic Hold	Automatically holds the vehicle after it has come to a standstill without it being necessary to still press the brake when the drive position is selected. The brake is automatically released when the accelerator pedal is pressed and the vehicle drives off normally. The function can be switched on and off by means of a button.

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6. Chassis and Suspension

6.4.4. System wiring diagram



System wiring diagram DSCi

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6. Chassis and Suspension

Index	Explanation
1	Wheel-speed sensor, front left
2	Brake fluid level sensor
3	Wheel-speed sensor, front right
4	Power distribution box, engine compartment
5	Power distribution box, front
6	Body Domain Controller (BDC)
7	center Operation Unit
8	Wheel speed sensor, rear right
9	Brake pad wear indicator, rear right
10	Parking brake actuator, right
11	Parking brake actuator, left
12	Wheel speed sensor, rear left
13	Advanced Crash Safety Module (ACSM)
14	Steering column switch cluster (SZL)
15	Instrument cluster (KOMBI)
16	CAN terminator
17	Dynamic Stability Control/virtual integration platform (DSCi)
18	Brake pad wear indicator, front left

For more information on the integrated brake, refer to the product information DSCi.

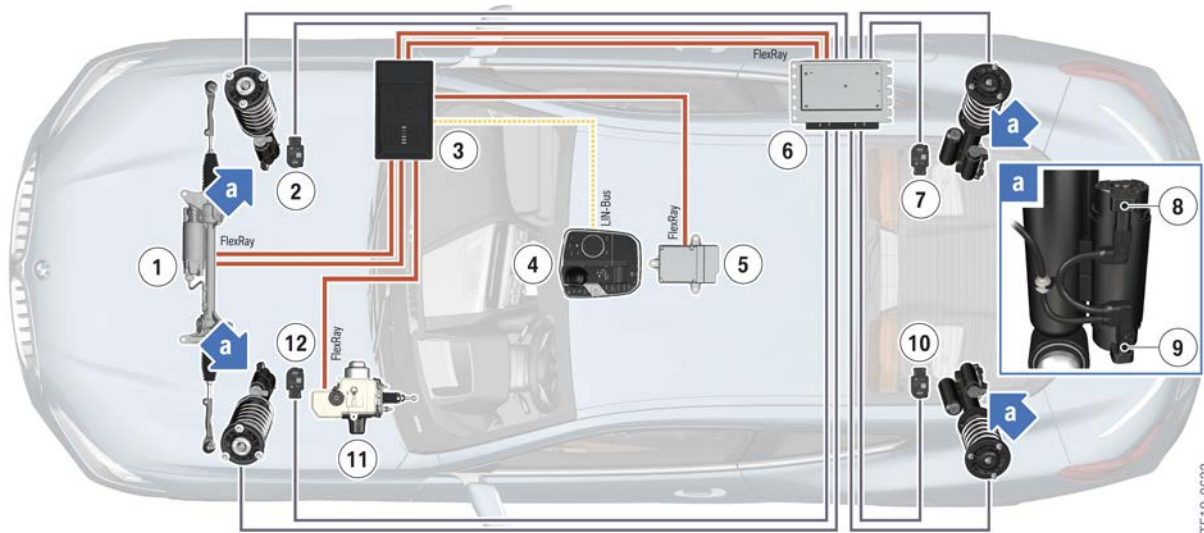
6.5. Electronic Damper Control EDC High

6.5.1. Overview

The Electronic Damper Control (EDC) with compression and rebound stage control is used as standard in the G15 and is a variable, electronically-controlled shock absorber adjustment system for controlling the vertical dynamics. The vertical dynamics platform VDP control unit uses various data such as body movement, transverse and longitudinal acceleration, steering angle and the road condition to calculate wheel-individual control commands for the electrical control valves in the shock absorbers.

G15 Powertrain/Chassis

6. Chassis and Suspension



Electronic Damper Control (EDC) in the G15

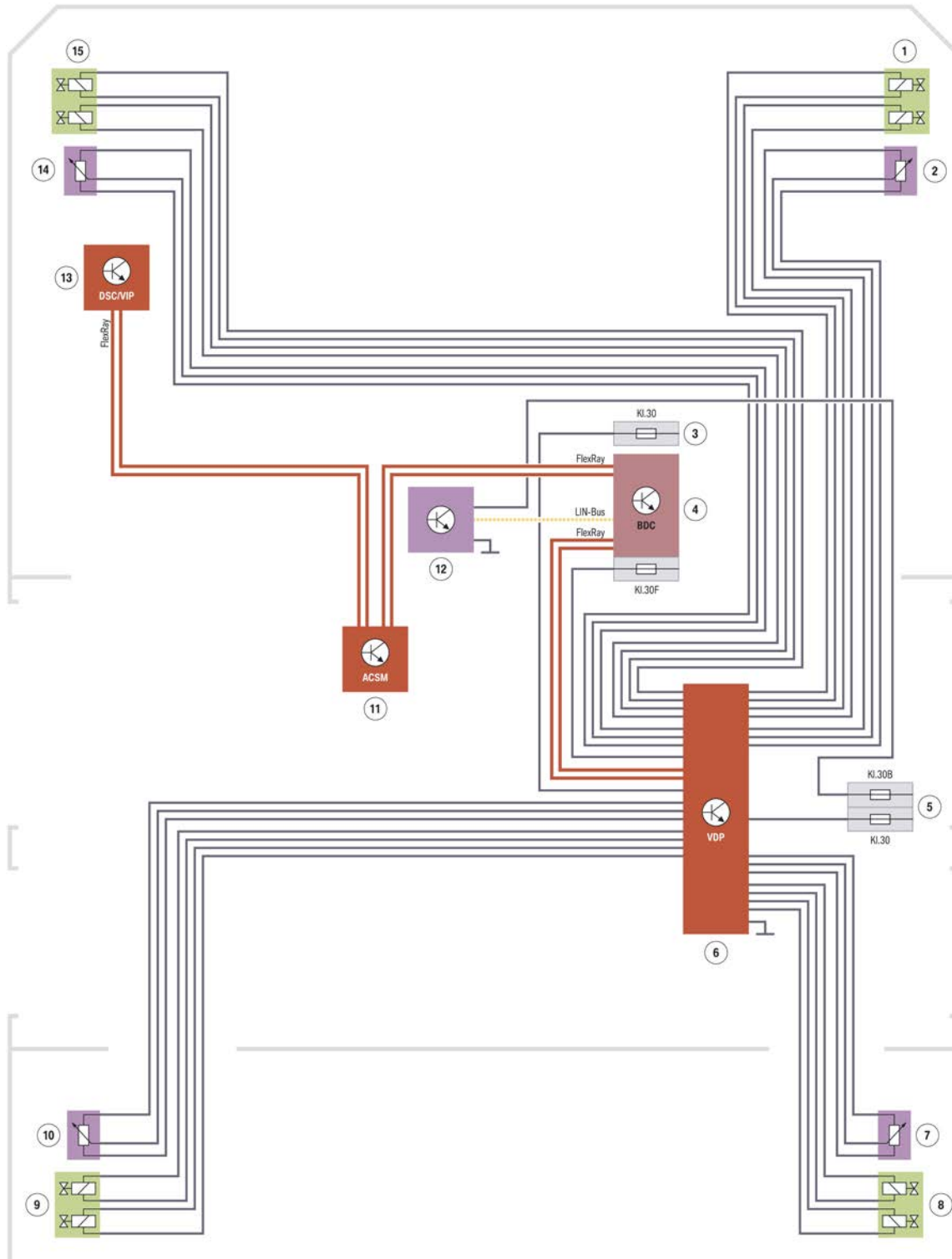
Index	Explanation
1	Electronic Power Steering (electromechanical power steering) (EPS)
2	Ride height sensor, front right
3	Body Domain Controller (BDC)
4	Driving Experience Control (FES)
5	Crash Safety Module (ACSM)
6	Vertical Dynamic Platform (VDP)
7	Ride height sensor, rear right
8	Control valve, compression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

The electronically regulated shock absorbers form a unit in combination with the respective spring strut. There are 2 electric control valves on each shock absorber which allow the compression and rebound stages of the regulated shock absorbers to be adjusted separately. This improves the tire comfort of the vehicle while at the same time increasing the driving dynamics. The retraction and extension speeds of the shock absorbers are determined by means of the ride height sensors. The driver can use the Driving Experience Control to select a comfortable, soft or sporty taut chassis and suspension setting.

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6. Chassis and Suspension

6.5.2. System wiring diagram



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System wiring diagram for Electronic Damper Control (EDC) G15

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6. Chassis and Suspension

Index	Explanation
1	Control valves for shock absorber adjustment, front right
2	Ride height sensor, front right
3	Power distribution box, front right
4	Body Domain Controller (BDC)
5	Power distribution box, rear right
6	Vertical Dynamic Platform (VDP)
7	Ride height sensor, rear right
8	Control valves for shock absorber adjustment, rear right
9	Control valves for shock absorber adjustment, rear left
10	Ride-height sensor, rear left
11	Advanced Crash Safety Module (ACSM)
12	Driving experience switch
13	Dynamic Stability Control/virtual integration platform (DSCi)
14	Ride height sensor, front left
15	Control valves for shock absorber adjustment, front left

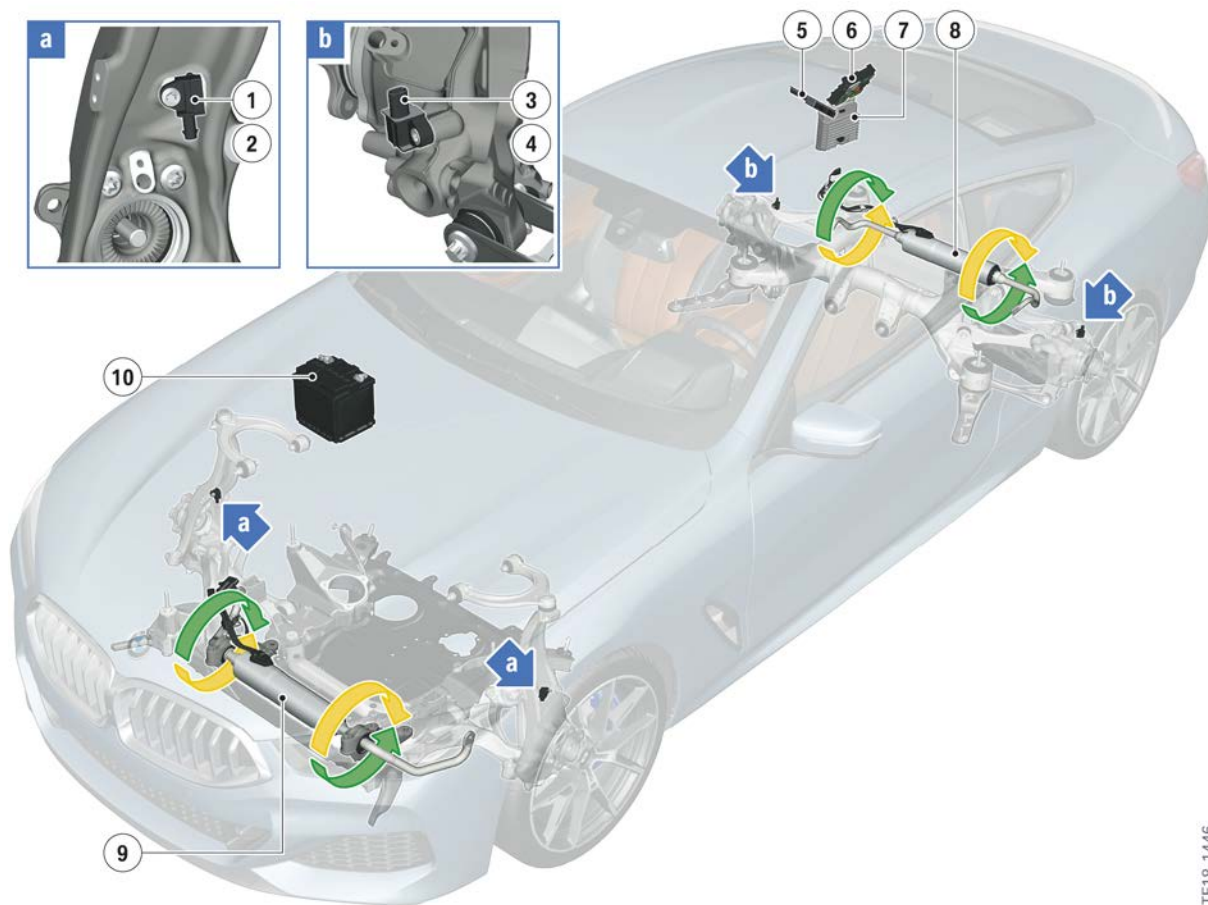
6.6. Electric active roll stabilization (EARS)

6.6.1. Overview

The electric active roll stabilization (EARS) reduces the roll tendency of the body when cornering by systematically applying mechanical torques to the stabilizer halves assisted by an e-motor.

G15 Powertrain/Chassis

6. Chassis and Suspension



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System overview of electric active roll stabilization (EARS) in the G15

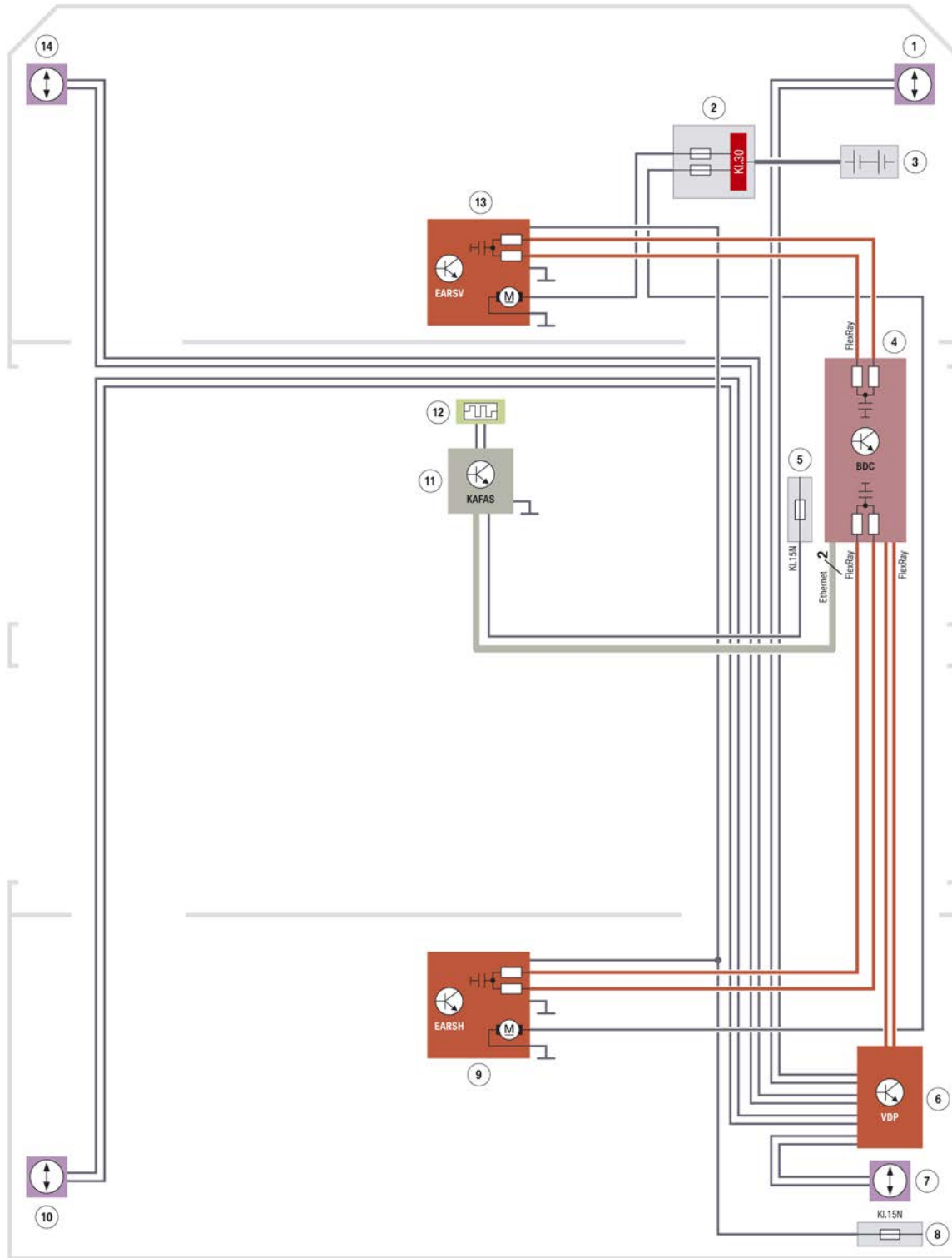
Index	Explanation
1	Front right vertical acceleration sensor
2	Vertical acceleration sensor, front left
3	Rear left vertical acceleration sensor
4	Rear right vertical acceleration sensor
5	Vertical Dynamic Platform (VDP)
6	Power distribution box, rear right
7	Power Control Unit (PCU) 500 W
8	Electric active roll stabilization rear (EARSH)
9	Electric active roll stabilization front (EARSV)
10	Auxiliary battery in the engine compartment

The electric active roll stabilization (EARS) system is available at the market launch in the M850i xDrive as standard equipment "Adaptive M suspension Professional".

G15 Powertrain/Chassis

6. Chassis and Suspension

6.6.2. System wiring diagram



System wiring diagram for electric active roll stabilization (EARS) G15

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G15 Powertrain/Chassis

6. Chassis and Suspension

Index	Explanation
1	Vertical acceleration sensor, front left
2	Power distribution box, engine compartment
3	Auxiliary battery in the engine compartment
4	Body Domain Controller (BDC)
5	Power distribution box, front right
6	Vertical Dynamic Platform (VDP)
7	Rear right vertical acceleration sensor
8	Power distribution box, rear right
9	Rear electric active stabilizer (EARSH)
10	Rear left vertical acceleration sensor
11	Camera-based driver assistance systems (KAFAS)
12	Heating for camera-based assistance system
13	Front electric active stabilizer (EARSV)
14	Front right vertical acceleration sensor

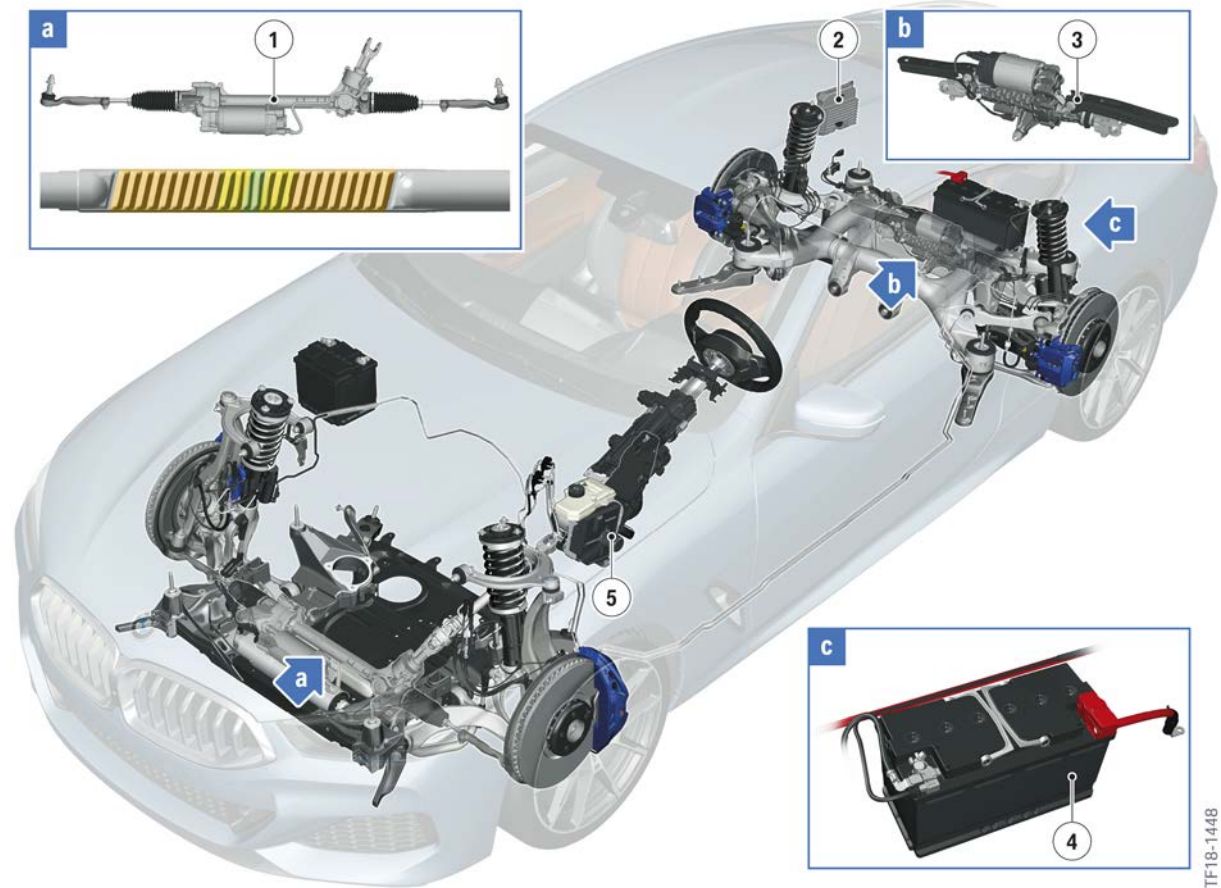
G15 Powertrain/Chassis

6. Chassis and Suspension

6.7. Steering

6.7.1. Overview

The familiar Integral Active Steering with 12 V is installed as standard in the G15. The following graphic shows the installation locations of the Integral Active Steering system components.



Overview of Integral Active Steering in the G15

Index	Explanation
1	Electronic Power Steering with variable rack geometry
2	Power Control Unit (PCU) 500 W
3	Rear axle slip angle control (HSR)
4	12 V battery
6	Dynamic Stability Control integrated (DSCi)

G15 Powertrain/Chassis

6. Chassis and Suspension

6.7.2. Steering wheel

The M850i xDrive, are equipped with a Steptronic sport transmission with shift paddles on the steering wheel.

- Leather sports steering wheel
- M leather steering wheel

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

- Heated steering wheel rim
- Steering wheel vibration with assistance systems such as Lane Departure or Lane Change Warning
- Touch detection for the Traffic jam assistant function.

6.7.3. Steering column adjustment

The steering column adjustment is electrical.



Electric steering column adjustment in the G15

