Reference Manual

G02
COMPLETE VEHICLE

Technical Training

Technical training.
Product information.

G02 Complete Vehicle

Edited for the U.S. market by:
BMW Group University
Technical Training
ST1830 6/1/2018

BMW Service

General information

Symbols used

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

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

Information status and national-market versions

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

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

Additional sources of information

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

- Owner's Handbook
- Integrated Service Technical Application.

Contact: conceptinfo@bmw.de

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

Information status: **April 2018**
Technical training.

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Contents

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1. Introduction

1.1. Overview

The 2nd generation of the BMW X4 has the development code G02. The G02 is largely based on the engineering of the G01. This document describes the new features or changes compared with the G01.

All models are equipped as standard with an 8-speed automatic transmission, variable sport steering, M sports suspension and the all-wheel drive xDrive known from the G12. A manual gearbox is not offered in the new G02 X4.

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While the radiator grill, headlights and hood clearly show the relationship to the BMW X3, the BMW X4 has a significantly sportier appearance mainly due to the flatter windshield as well as the powerfully designed lower part of the front.

Compared with the predecessor, the new BMW X4 offers significantly enhanced driving dynamics, an independent exterior trim highlighting the sporty character, a refined premium ambience in the vehicle interior, as well as state-of-the-art assistance systems and ultramodern infotainment systems. Furthermore, the dynamic and extravagant appearance of the Sports Activity Coupé is highlighted by the addition of a BMW M Performance model, the new BMW X4 M40i.

1.2. Models

1.2.1. Overview

The following models are available for the market introduction:

Model	Engine	Exhaust emission standards	Automatic transmission	Transfer box
X4 xDrive30i	B46B20O0	SULEV30	GA8HP50 Sport	ATC13–1
X4 M40i	B58B30M0	ULEV70	GA8HP50 Sport	ATC13–1

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1. Introduction

1.2.2. BMW M Performance model

BMW M Performance model

Index	Explanation
A	BMW X4 M40i

The BMW X4 is offered with a BMW M Performance model with 6-cylinder gasoline engine. The X4 M40i with B58B30M0 engine is available from the time of market introduction. The M Performance model has a specific design and equipment features.

In addition to the specific internal and external standard equipment of the vehicles, the X4 M40i is also equipped with the following technical highlights as standard:

- M Sport brakes
- M Aerodynamic kit
- Adaptive M suspension
- M Sport exhaust system
- 19" M Double-spoke bi-color wheels
- LED fog lights
- Sport leather steering wheel
- Sports seats for driver and front passenger

The M Sport differential is offered as optional equipment. The M Sport differential is not available with the X4 xDrive30i.

The following optional wheel sizes can also be ordered for the M Performance model:

- 20” and 21" M Double-spoke wheels.

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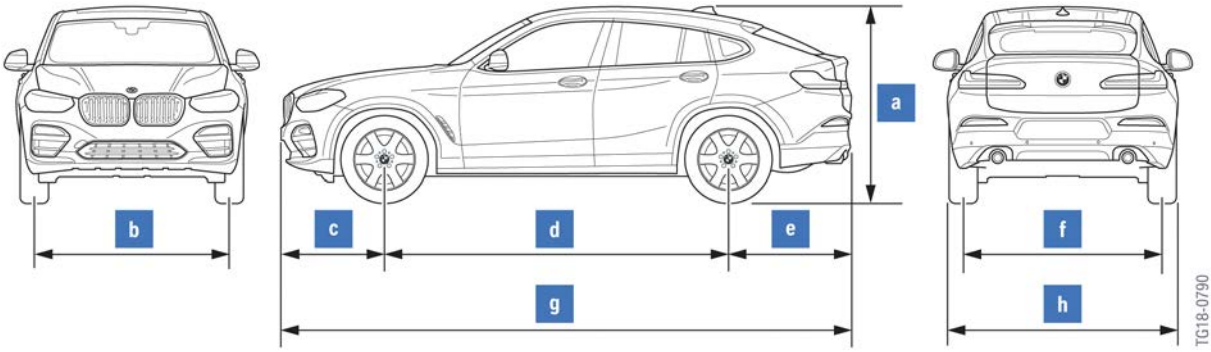
1. Introduction

1.3. Dimensions

The exterior dimensions of the G02 in the US version are shown below:



Outer dimensions G02

Index	Explanation	Unit	G02 xDrive30i	G02 M40i
a	Vehicle height	[mm]	1621	1621
b	Front track width, basic wheels	[mm]	1600	1605
c	Front overhang	[mm]	871	870
d	Wheelbase	[mm]	2864	2864
e	Rear overhang	[mm]	1027	1027
f	Rear track width, basic wheels	[mm]	1646	1646
g	Vehicle length	[mm]	4762	4761
h	Width excluding exterior rearview mirrors	[mm]	1918	1938

1.4. Weights and load capacities

The vehicle curb weight as per US specs and the payload of the G02 are set out in the following table:

Model	Unit	Vehicle curb weight (US)	Payload
X4 xDrive30i	[lbs]	4147	882
X4 M40i	[lbs]	4323	882

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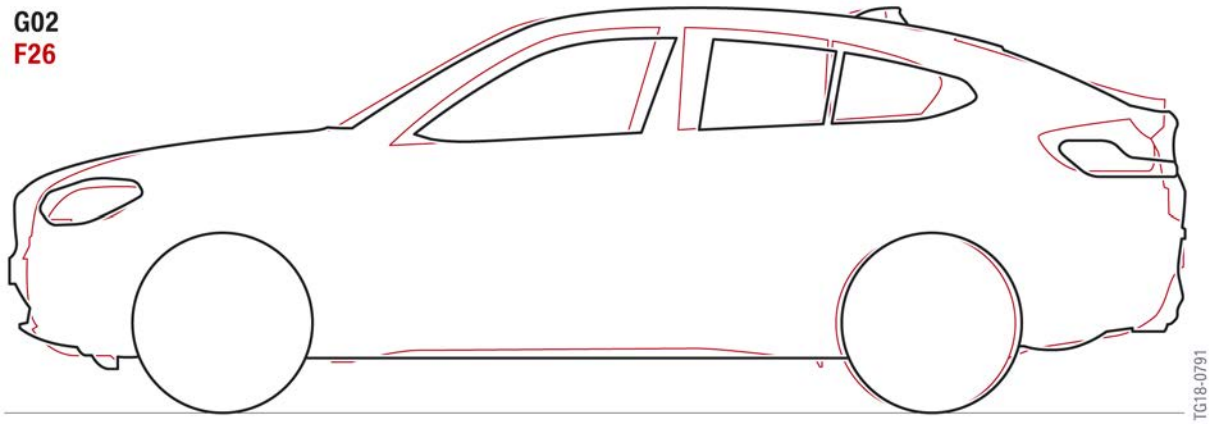
1. Introduction

1.5. Silhouette comparison

The graphic below shows a comparison of the silhouettes of the G02 and the F26. The following table compares the dimensions of the G02 with those of a F26:



Silhouette comparison of G02 with F26

Explanation	Unit	G02 xDrive30i	F26	Difference
Vehicle height	[mm]	1621	1624	-3
Front track width, basic wheels	[mm]	1600	1616	+16
Front overhang	[mm]	871	861	10
Wheelbase	[mm]	2864	2810	+54
Rear overhang	[mm]	1027	1000	+27
Rear track width, basic wheels	[mm]	1646	1632	+14
Vehicle length	[mm]	4762	4671	+91
Width excluding exterior rearview mirrors	[mm]	1918	1881	+37

The G02 approximately 55 mm lower than the G01, which emphasizes the sporty character of the vehicle. The G02 is 40 mm longer than the G01.

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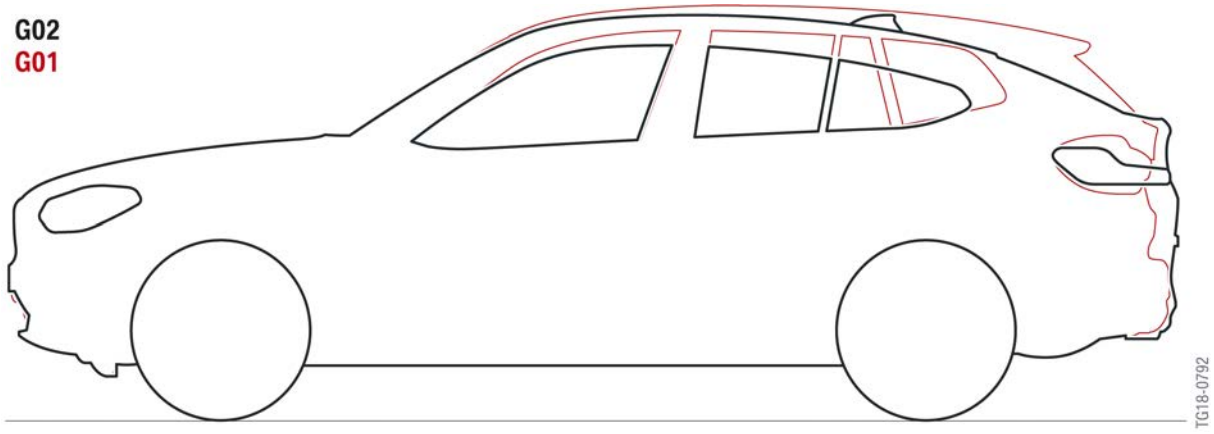
1. Introduction

The graphic below shows a comparison of the silhouettes of the G02 and the G01. The following table compares the dimensions of the G02 with those of a G01:



Silhouette comparison of G02 with G01

Explanation	Unit	G02 xDrive30i	G01 xDrive30i	Difference
Vehicle height	[mm]	1621	1676	-55
Front track width, basic wheels	[mm]	1600	1620	±0
Front overhang	[mm]	871	870	+1
Wheelbase	[mm]	2864	2864	±0
Rear overhang	[mm]	1027	988	+39
Rear track width, basic wheels	[mm]	1646	1636	+10
Vehicle length	[mm]	4762	4722	+40
Width excluding exterior rearview mirrors	[mm]	1918	1891	+27

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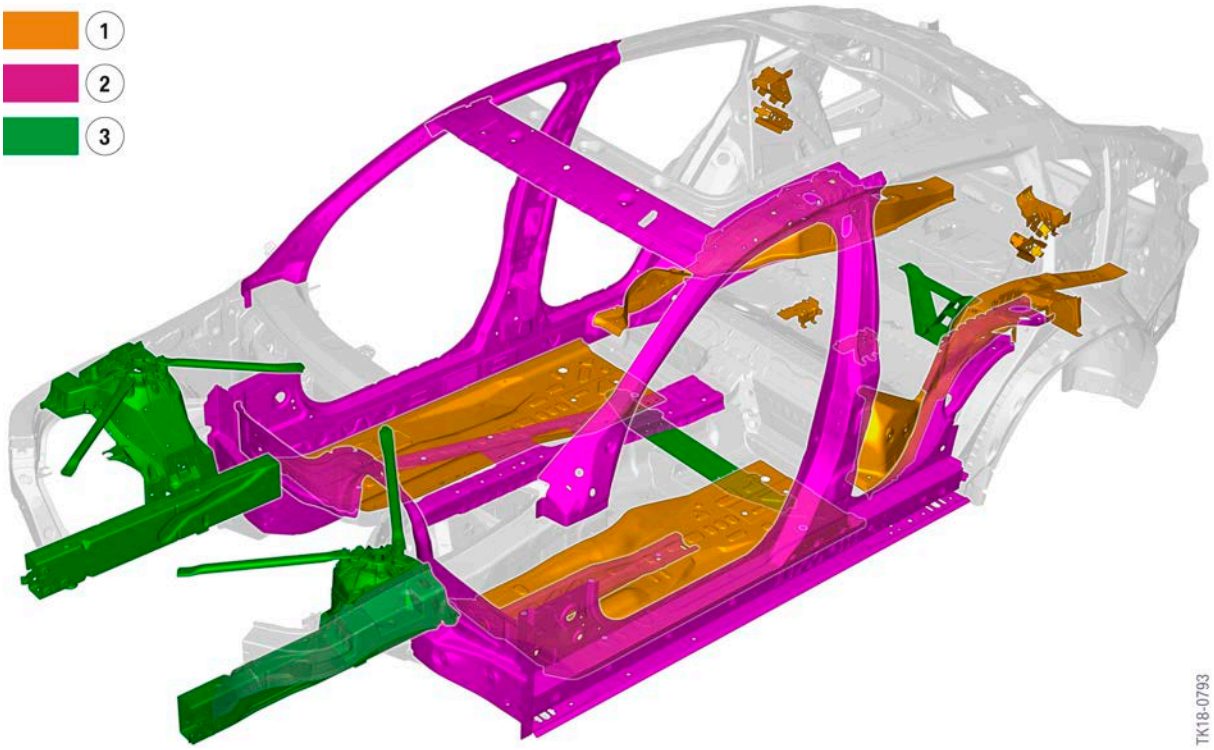
2. Body

2.1. Body structure

The lightweight body construction concept of the G02 comprises high-strength steel and aluminium components. Thanks to the material mix, the materials are able to contribute their specific strengths to the vehicle in the best possible way. As a result of the strict lightweight construction philosophy, the weight of the body has been reduced over that of the predecessor F26, but crash safety has been further improved. No carbon parts are integrated in the body structure.



G02 body structure

Index	Explanation
1	Multiphase steel (> 300 N/mm^2)
2	Ultra-high-strength steel (> 900 N/mm^2)
3	Aluminium

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2. Body

2.2. Rear

The rear of the G02 has a very sporty and flat design. The slim rear window and the low roof spoiler with striking contour and lowered area in the middle emphasize this sporty impression.

G02 rear view

The roof line dips as far as the tailgate, the spoiler enhances the aerodynamic design. The G02 appears very wide and sporty. Below the lights the strong horizontal alignment provides clear structuring of the rear.

The external rear lights emphasize the horizontal alignment and the full-bodied position on the road. Its particularly slim and flat silhouette is integrated three-dimensionally in the rear section. They evolve from the shoulder line and continue to the rear. The lower rear reflectors pick up the shape of the rear lights.

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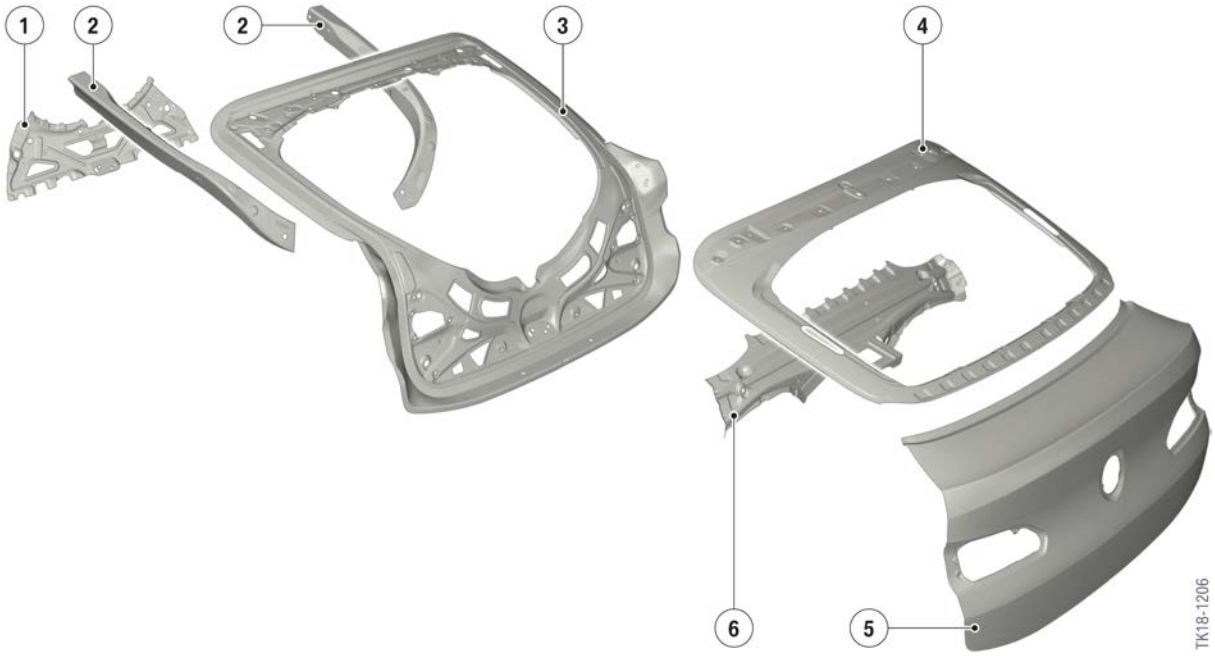
2. Body

2.3. Tailgate

The BMW G02 features a steel tailgate in monocoque construction. The weight was able to be reduced with the use of a hydroformed section in the structure of the tailgate. Deforming or damage to the IHU profile must be avoided. The multi-part layout of the tailgate is achieved with the aid of state-of-the-art laser welding techniques.



G02 tailgate

Index	Explanation
1	Reinforcement plate, inside
2	IHU profile, left and right
3	Tailgate inner panel
4	Outer skin panel, top
5	Outer skin panel, bottom
6	Reinforcement plate, outside

The G01 used a one-sided spindle drive for the raising and lowering of the tailgate. A spindle drive is now installed on both sides in the G02. The two spindle drives are mounted under the roof of the vehicle and are connected to the hinges of the tailgate.

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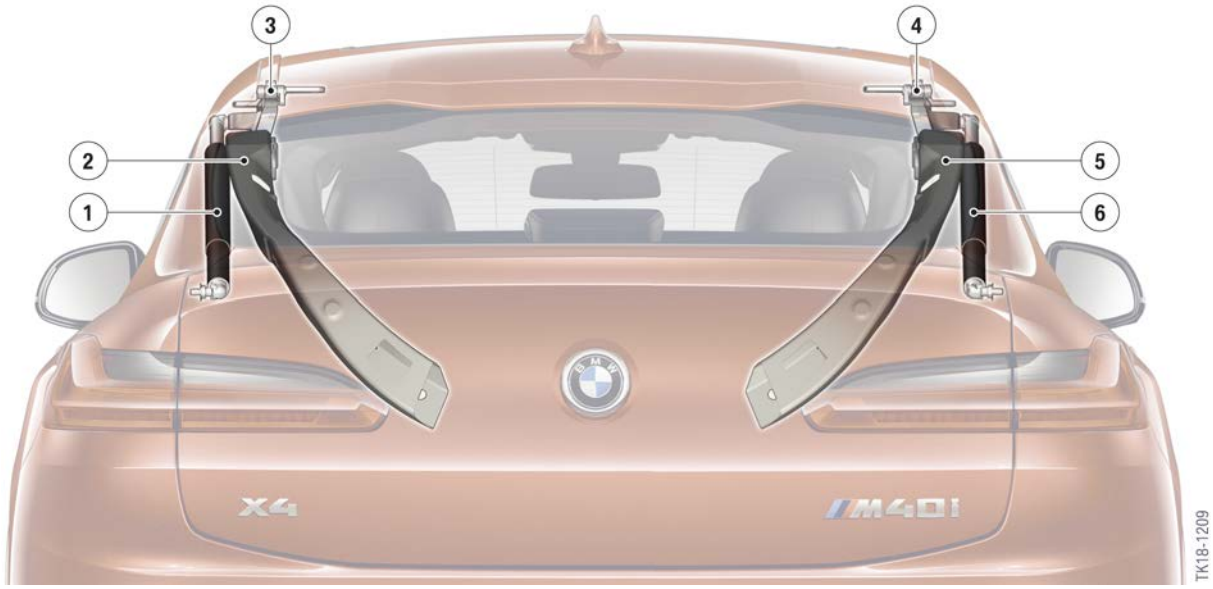
2. Body



G02 tailgate with spindle drive on both sides

Index	Explanation
1	Left spindle drive
2	IHU profile, left
3	Hinge, left
4	Hinge, right
5	IHU profile, right
6	Right spindle drive

In the Central Information Display (CID) the driver can adjust how far the tailgate is opened.

In conjunction with Comfort Access (OE 322) which is standard on the M40i and optional on the xDrive30i, the tailgate can also be opened and closed contactlessly by means of a targeted foot movement. Two sensors detect the movement contactlessly via a capacitive measurement.

2.4. Luggage compartment

The luggage compartment capacity of the G02 has increased by 25 liters to 525 liters compared with its predecessor F26. The luggage compartment could be expanded to 1430 liters by folding down the rear seat backrest divided in the ratio 40:20:40 as standard.

G02 luggage compartment capacity

Index	Explanation
A	Luggage compartment without rear seat folded
B	Luggage compartment with rear seat folded

The inclination of the armrest elements can be varied using the cargo adjuster. This is included as standard equipment "Storage package" (OE 493), which contains additional fold-down compartments, USB and 12 V connections, as well as multifunction hooks and retaining rails in the luggage compartment, among other things.

2.5. Panorama roof

A panorama roof is standard equipment and offered for the first time in the BMW X4.

G02 panorama roof

In the G02 the same panorama roof system is used as in the G01. The glass roof and roller sunblind are operated electrically. The glass slide/tilt roof panel opens outwards, . the front glass cover is moved over the rear glass panel during opening.

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2. Body

2.6. Interior equipment

The vehicle interior shows significant further developments in comparison to the F26. The fit, finish and all-round visibility have been improved. This is further supported by the very flat design of the roof function center. The graphic below shows the operating area of the G02.

G02 overview of instrument panel

2.7. Equipment packages

In addition to the comprehensive offering of optional equipment, the G02 can also be individualized with the following equipment packages.

- xLine (Standard equipment with X4 xDrive30i)
- M Sport Package (Standard equipment with X4 M40i, optional with the X4 xDrive30i)

The equipment packages contain both general optional equipment and specific features.

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2. Body

G02 Lines, exterior

G02 Lines, interior

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3. Powertrain

3.1. Engines

3.1.1. Gasoline engines

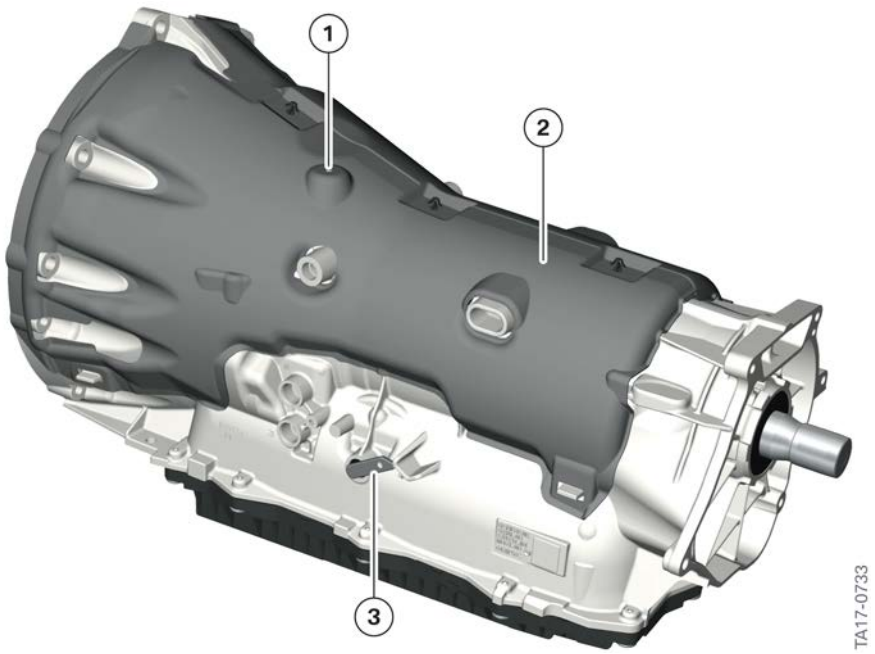
The following table features an overview of the gasoline engines used at the time of market introduction:

	X4 xDrive30i	X4 M40i
Engine type	B46B20O0	B58B30M0
Power	248 HP [185 kW]	360 HP [265 kW]
Torque	258 lb ft [350 Nm]	365 lb ft [500 Nm]
Exhaust emission standards	SULEV30	LEV III

3.2. Automatic transmission

3.2.1. Overview

In the G02 the GA8HP50 Sport automatic transmission is used, which is already known from different BMW vehicles. The following section explains the special features of the automatic transmission in the G02.



8HPTU automatic transmission with acoustic encapsulation for all-wheel drive vehicles

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

3.2.2. Variants

One transmission variant is used in both models of the G02.

Model	Engine	GA8HP50 Sport automatic transmission
X4 xDrive30i	B46B20O0	•
X4 M40i	B58B30M0	•

The sport automatic transmission is equipped with 2 shift paddles at the steering wheel and has additional functions:

- Launch Control
- Manual activation of coasting

3.3. M Sport Differential

3.3.1. Introduction

In the M Performance model X4 M40i, an M Sport Differential with regulated lock can be ordered as optional equipment (OE 322).

Model	Engine	Sport Automatic transmission	Rear axle differential	Gear ratio i
X4 M40i	B58B30M0	GA8HP50 Sport	HAG 215LWS	3.38:1

The sales designation of the system is M Sport Differential (OE 322). In the following chapters the M Sport Differential with regulated lock is called regulated rear axle differential lock.

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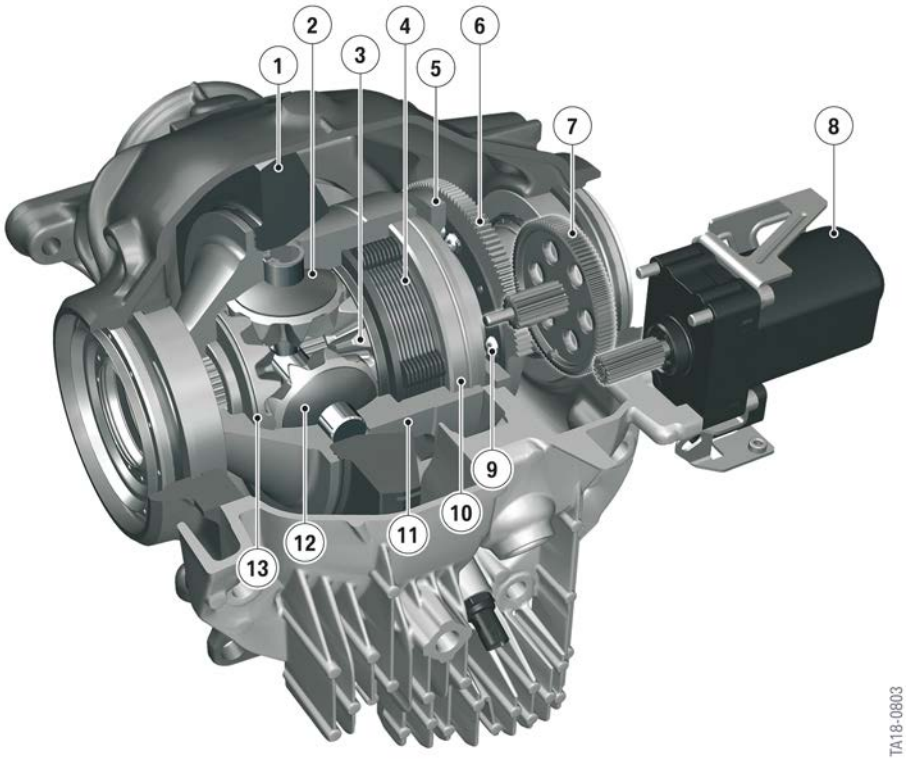

Regulated rear axle differential lock

Index	Explanation
1	Crown 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	Gear 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 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. The clutch assembly can be closed if needed via an electric motor and operates between the housing of the rear axle differential and the right output. 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 regulated rear axle differential lock are:

- Improved handling.
- Optimal traction.
- Greater driving stability.

The regulated rear axle differential lock is based on the active M differential of M GmbH. The following table provides an overview of the differences of the M differential used in the F90, the rear axle differential 225M and the rear axle differential used in the G01 and G02 (215LWS):

	HAG 215LWS	**HAG 225M**
Used in series	G01/G02	F90
Structure		
Maximum lock-up torque	1500 Nm	2000 Nm
Disc type	Disc set with carbon lining	Disc set with carbon lining
Attachment of housing cover	Rear	Bottom

3.3.2. System overview

The central control unit for controlling the regulated rear axle differential lock 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).

The DSC control unit can also request separate and higher-level locking interventions to stabilise the vehicle both when the DSC control system is activated and deactivated. The following diagram shows the information required for the functioning of the regulated rear axle differential lock:

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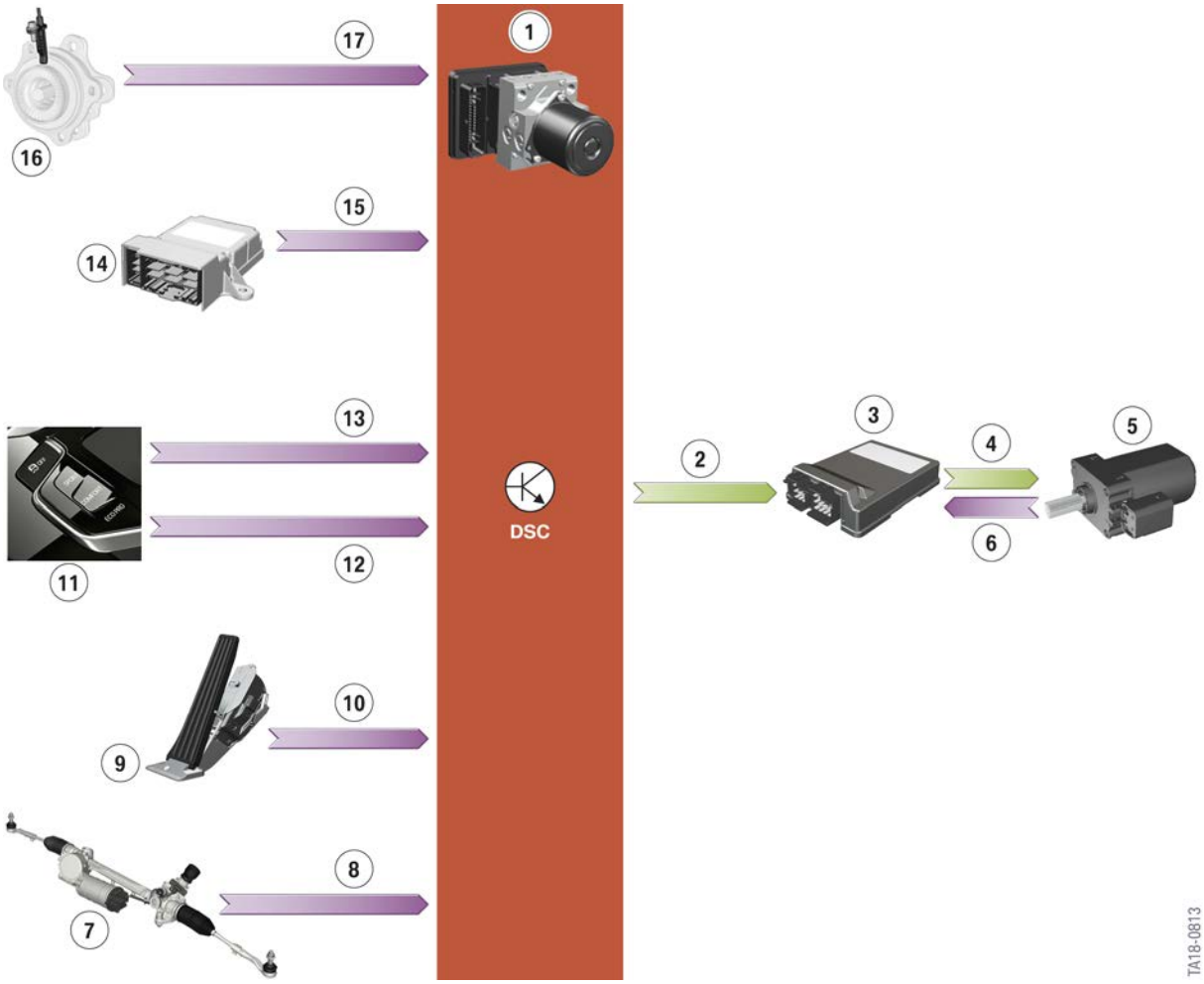
3. Powertrain



System overview of regulated rear axle differential lock

Index	Explanation
1	Dynamic Stability Control (DSC) control unit
2	Lock-up torque request
3	Control unit for regulated rear axle differential lock (GHAS)
4	Electric motor actuation
5	Electric motor, multidisc clutch
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 program (SPORT, COMFORT, ECO PRO)

Index	Explanation
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

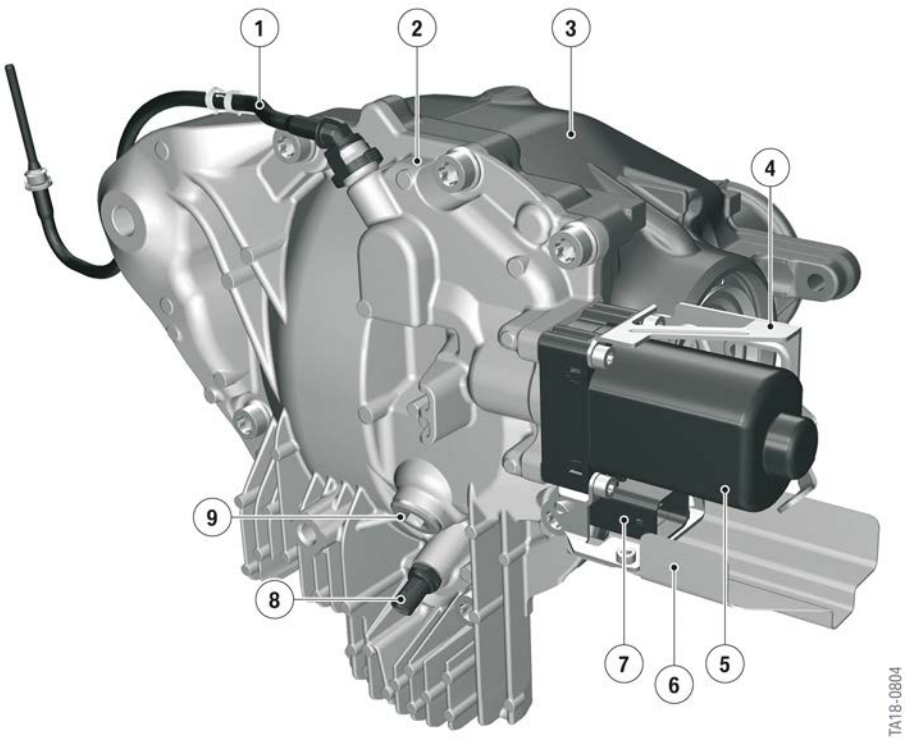
3.3.3. Design

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

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

External structure

The rear axle differential can be recognized by an aluminium housing cover mounted from the rear and an electric motor which is visible from the outside. The main housing for the G02 is made from grey cast iron.

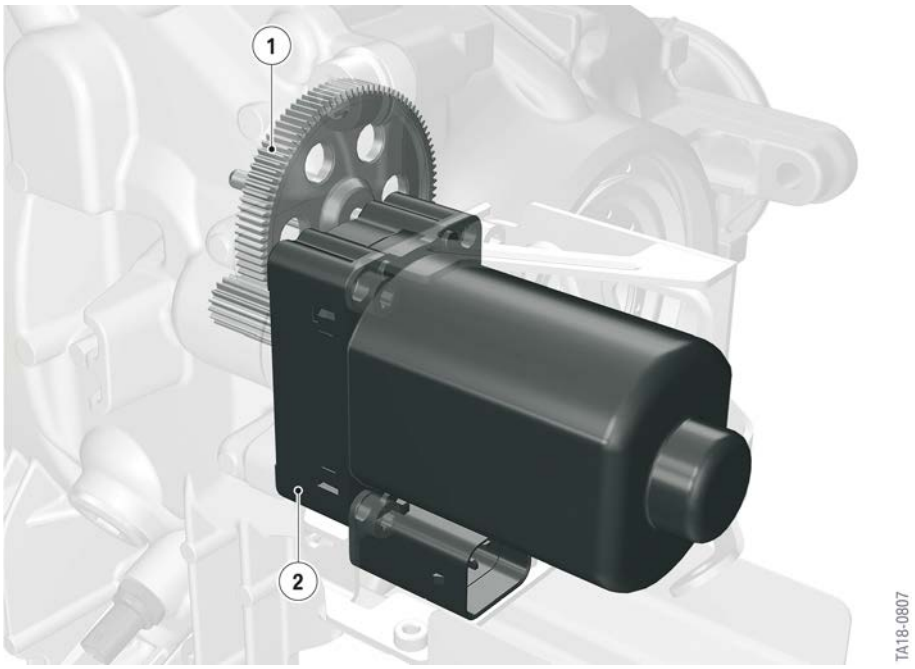


Structure of regulated rear axle differential lock

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

Electric motor

An electric motor is used for adjusting the multidisc clutch. The electric motor transfers an axial force, which presses the discs together, via the gear box and the ball ramp.



Regulated rear axle differential lock, electric motor

Index	Explanation
1	Gear box
2	Electric motor

The electric motor consists of:

- Engine
- Temperature sensor
- 2 hall effect sensors.

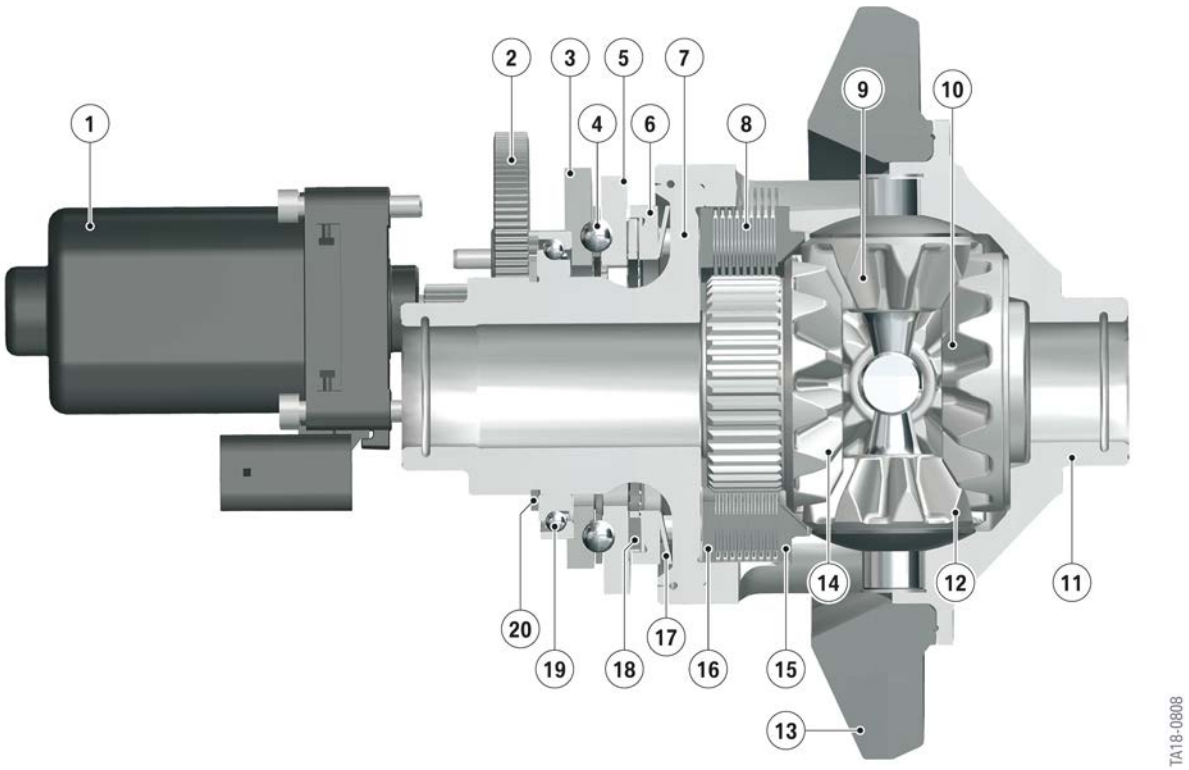
To determine the position of the electric motor, 2 hall effect sensors in the engine are used.
A temperature sensor, also installed in the electric motor, is used to protect the electric motor against overheating.

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 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.

Inner structure

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

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



Inner structure of regulated rear axle differential lock – Viewing direction: opposite the direction of travel

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Index	Explanation
1	Electric motor
2	Gear 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
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 gear 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 gear 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 the engine is not supplied with current.

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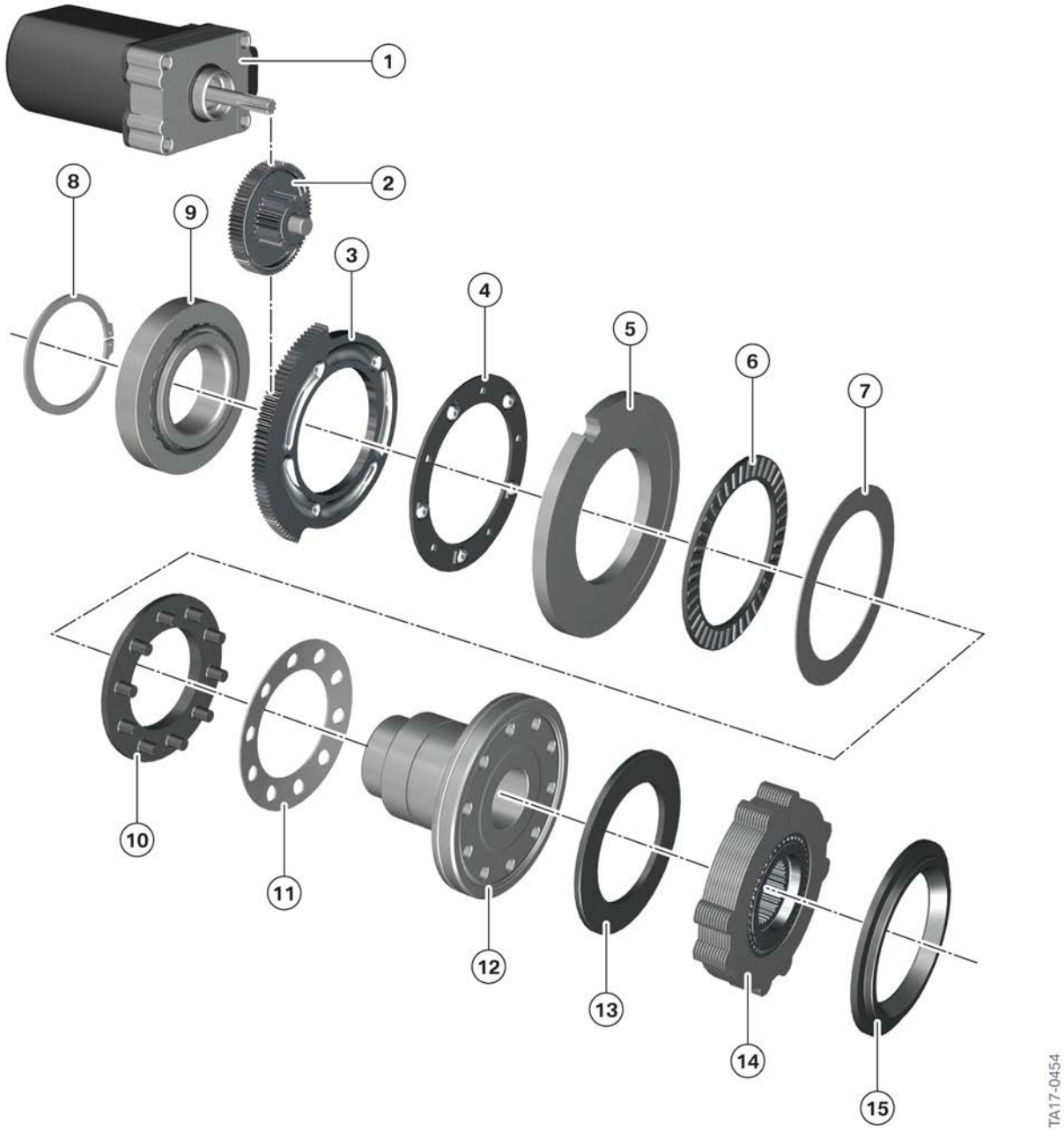
3. Powertrain



Structure of regulated rear axle differential lock

Index	Explanation
1	Electric motor
2	Gear 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

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

Temperature monitoring

Three temperature sensors are used. The temperature of the GHAS control unit (driver output stage), the temperature of the electric motor and the transmission oil temperature are monitored.

Control unit for regulated rear axle differential lock (GHAS)

The control unit of the regulated rear axle differential lock (GHAS) is installed at the rear right under the luggage compartment trim panel in the G02.

G02 mounting orientation of GHAS

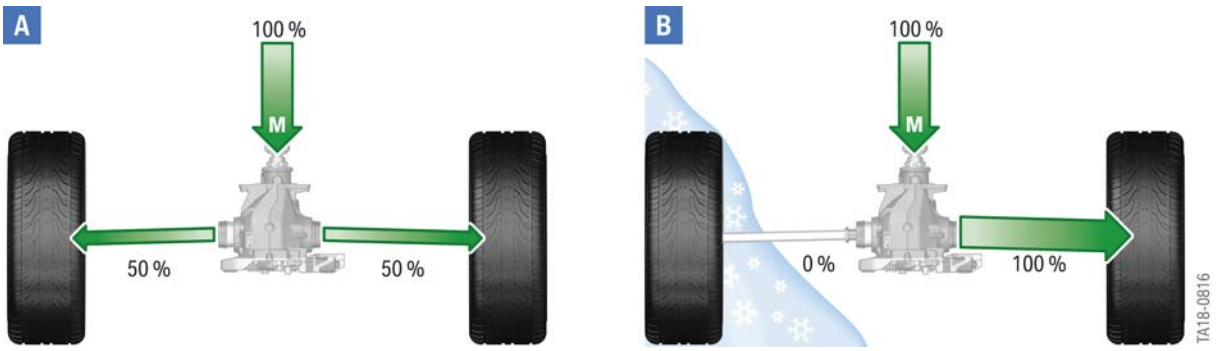
Index	Explanation
1	Regulated rear axle differential lock (GHAS) control unit

3.3.4. Operating principle

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

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 pack of the multidisc clutch is closed or open.

If the multidisc clutch is open, the drive torque is split equally to the right and left wheel. This means that both wheels at the rear axle receive 50% of the drive torque.



Regulated rear axle differential lock examples for drive torque distribution

Index	Explanation
A	Drive torque distribution with open multidisc clutch and lock-up torque <1500 Nm
B	Maximum drive torque distribution with closed multidisc clutch and lock-up torque <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 electric motor until the desired drive torque distribution is set.

The maximum lock-up torque of the regulated rear axle differential lock is 1500 Nm. For instance, if needed the entire drive torque can be delivered only via one rear wheel. This corresponds to a 100% locking effect. In the case of a higher overall drive torque (>1500 Nm),
the regulated rear axle differential lock can no longer be locked 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. With the evaluation of 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 already be detected at an early stage. In connection with the all-wheel drive system xDrive, which is also controlled by the DSC control unit, an optimal drive torque distribution for the driving situation can be generated for the vehicle.

The DSC takes into account the following criteria for calculation of the torque distribution:

- Vehicle speed
- Lateral and longitudinal acceleration
- Yaw rate
- DSC intervention
- Steering angle
- Wheel speeds
- Vehicle longitudinal inclination
- Pedal sensor position
- Driving program (SPORT, COMFORT, ECO PRO)
- DSC status (DSC activated/deactivated, DTC activated/deactivated).

In the Sport and Sport plus driving programs, an adapted electric motor control leads to more agile and manoeuvrable drivability. The traction of the vehicle is also increased in Sport mode with electric motor control.

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

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.
Roadway 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.

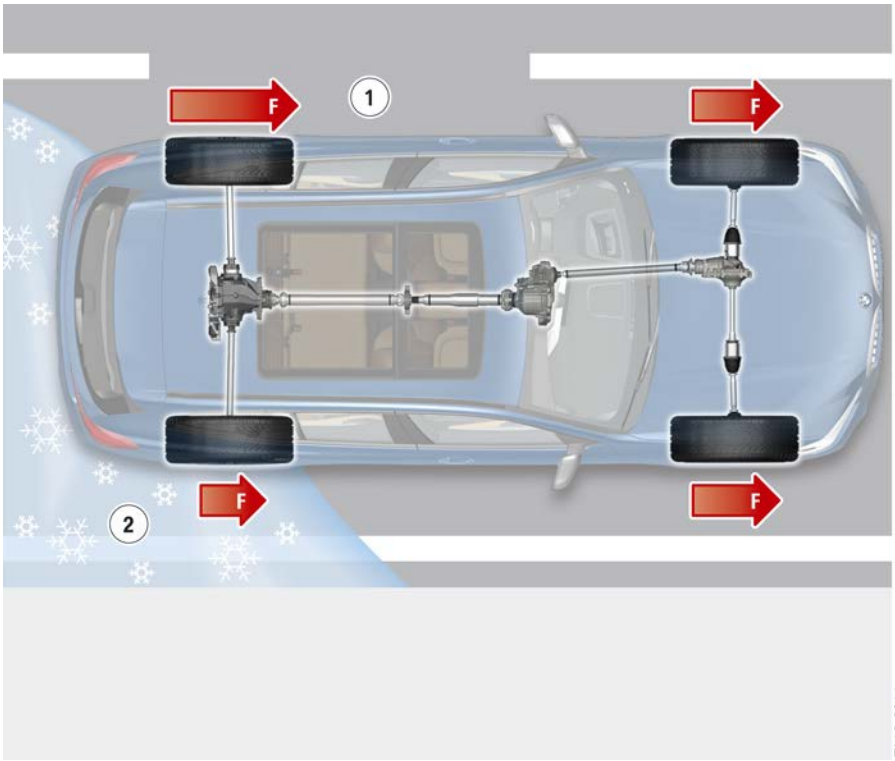
The control and the operating principle of the regulated rear axle differential lock are explained below using examples of driving situations:

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.

Driving off with different coefficient of friction on right and left

If one of the rear wheels are on a road surface with a low coefficient of friction (e.g. on snow), the driving power that can be applied without a regulated rear axle differential lock is very low. Permanent control interventions are necessary in order to be able to drive off at all. Moreover, it is only possible to drive off very slow. Even the control systems are not able to increase the physical coefficients of friction.



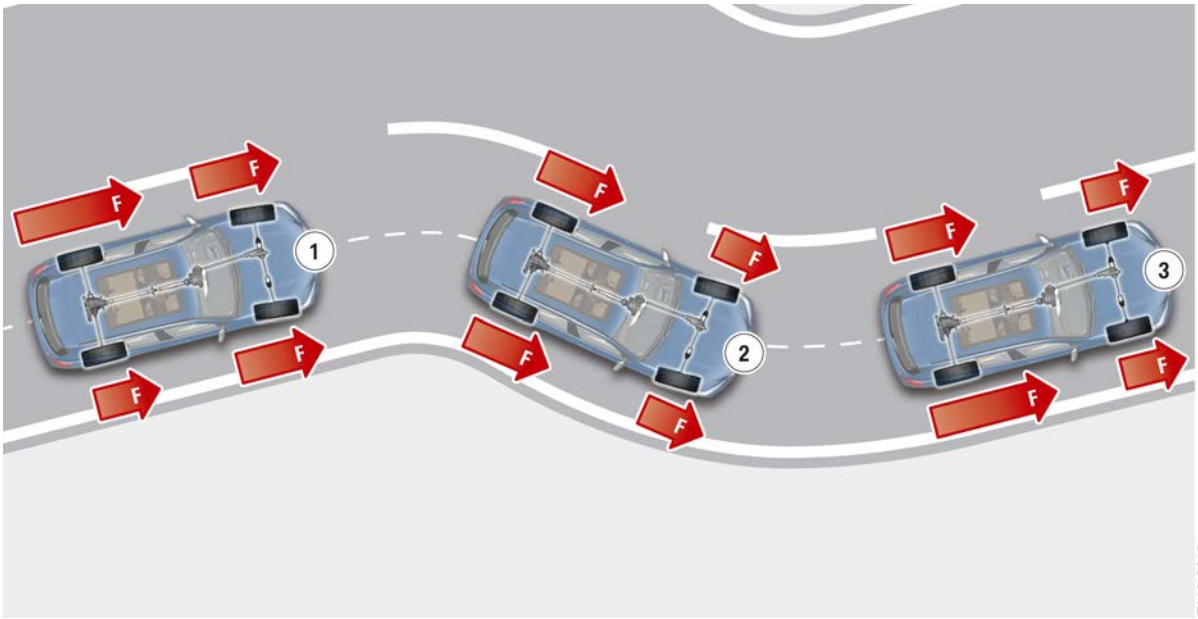
Regulated rear axle differential lock with different coefficients of friction when driving off (vehicle: G01)

Index	Explanation
1	Road surface with high coefficient of friction
2	Road surface with low coefficient of friction

In a vehicle with regulated rear axle differential lock, it is possible to drive off more quickly even with different coefficients of friction of the wheels on the rear axle, e.g. if the right rear wheel is in snow. The regulated rear axle differential lock distributes the greatest possible share of the drive torque to the side of the rear axle with the highest coefficient of friction when driving off.

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.



Regulated rear axle differential lock, accelerated cornering

Index	Explanation
1	Cornering
2	Change of direction
3	Accelerating out of bend/corner

In the event of a change of direction of the vehicle, 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

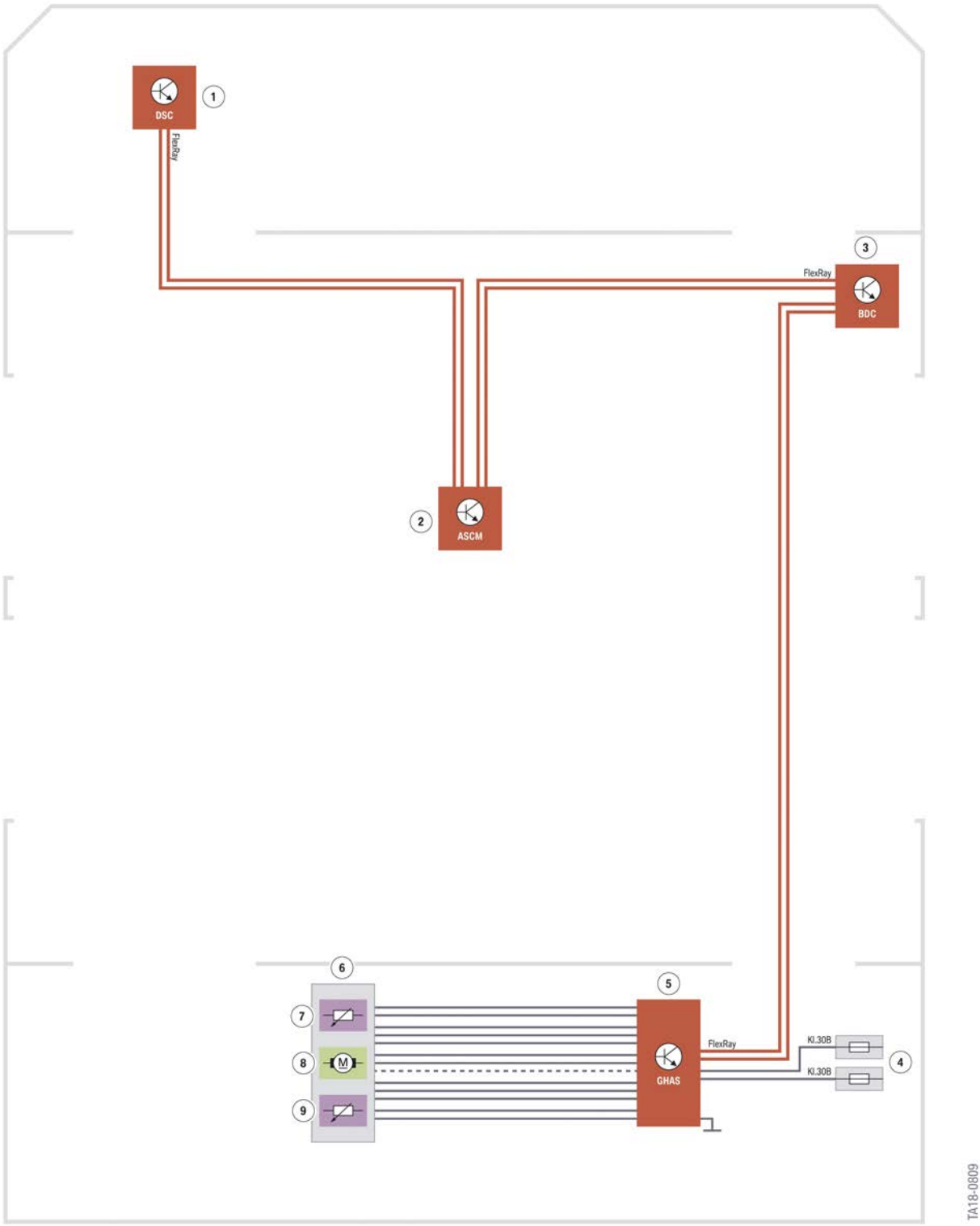
In the case of fast lane changes or upon cornering, all vehicles are prone to significant yaw responses and the vehicle may end up oversteering, for example. If the Dynamic Stability Control (DSC) detects a deviation between the driver's choice and the vehicle response, the vehicle is stabilized by means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

In this situation the regulated rear axle differential lock distributes the torque to both sides as needed in order to prevent oversteering. It is possible to largely do without decelerating DSC 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.

G02 Complete Vehicle

3. Powertrain

3.3.6. System wiring diagram



Regulated rear axle differential lock, system wiring diagram

Index	Explanation
1	Dynamic Stability Control (DSC)
2	Advanced Crash Safety Module (ACSM)
3	Body Domain Controller (BDC)
4	Rear right power distribution box
5	Regulated rear axle differential lock (GHAS)
6	Regulated rear axle differential lock
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", an oil change may be useful before an entire component is replaced.

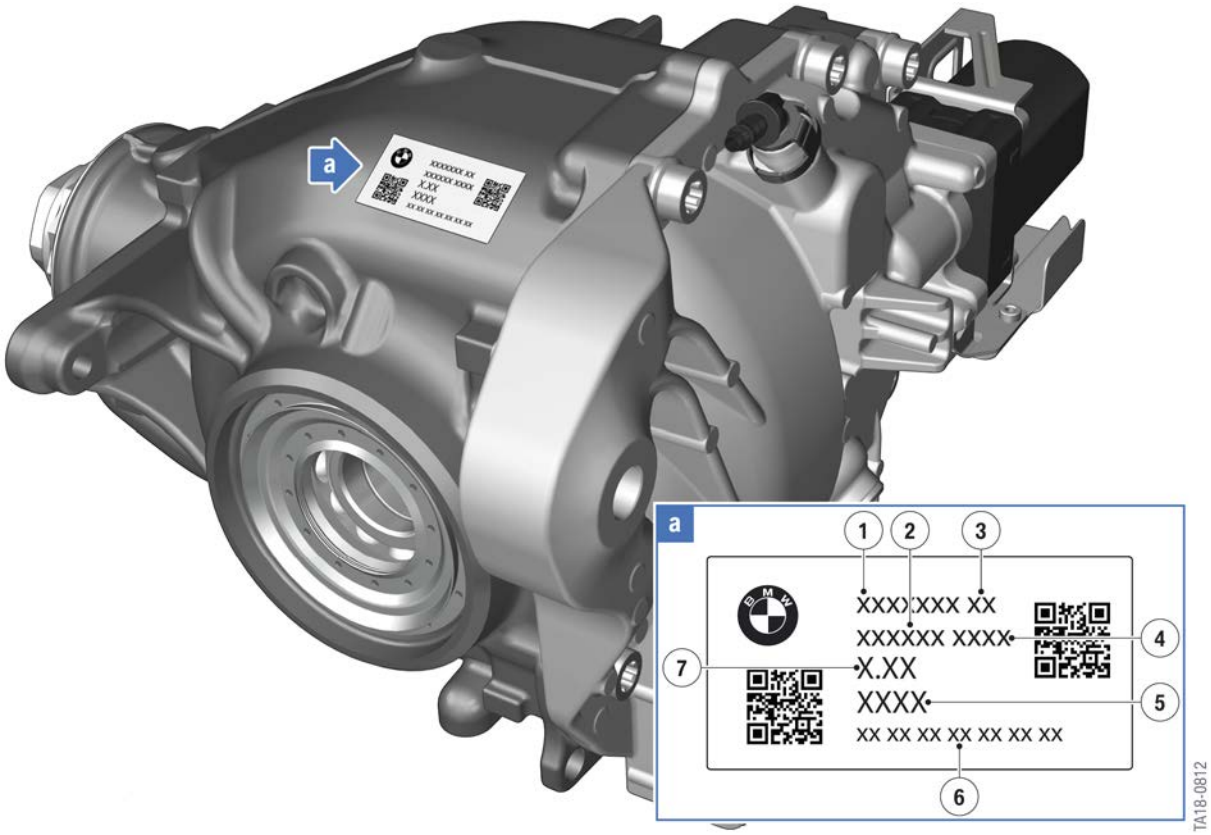
Classification

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 attached to 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.

G02 Complete Vehicle

3. Powertrain



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 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.

G02 Complete Vehicle

3. Powertrain

After the following servicing 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 can no longer be read out in the case of a renewal of 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.

G02 Complete Vehicle
4. General Vehicle Electronics

4.1. Exterior lights

4.1.1. Headlights

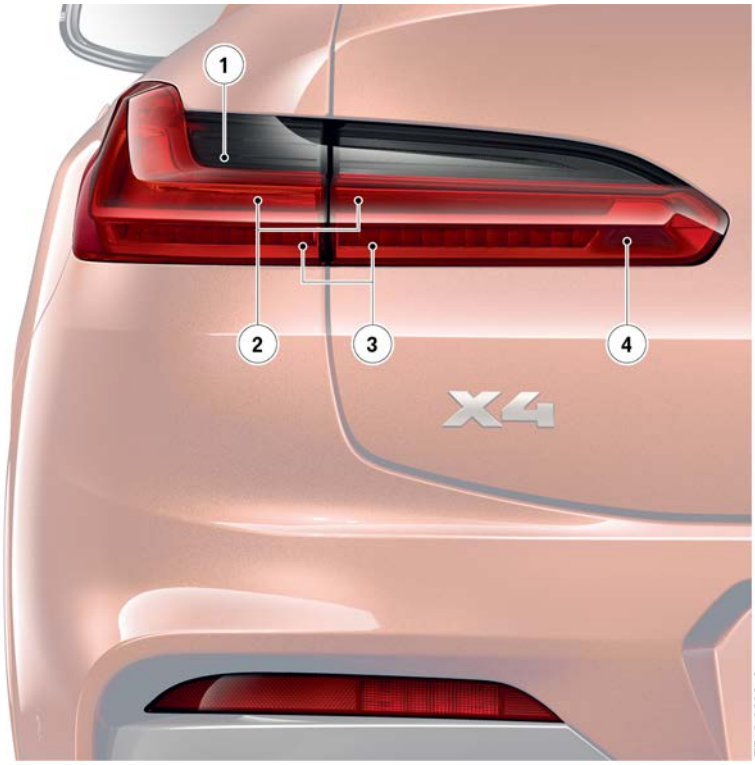
The following exterior light versions are offered for the G02:

	LED Headlights with Cornering Lights	Adaptive Full LED Lights
Equipment	Standard on X4 xDrive30i	Standard on X4 M40i Optional on X4 xDrive30i [OE 552]
Design		
Bulbs	Turn indicator	
LED	Side lights Daytime driving lights Low-beam headlight High beam	Side lights Daytime driving lights Low-beam headlight High beam Turn indicator
Additional functions	Adaptive headlight	Full adaptive headlight

G02 Complete Vehicle
4. General Vehicle Electronics

4.1.2. Rear lights

In the G02 a two-part full LED rear light in 3D look is installed. The use of dark tinted glass makes the typical BMW L-shaped lighting signature even more pronounced.



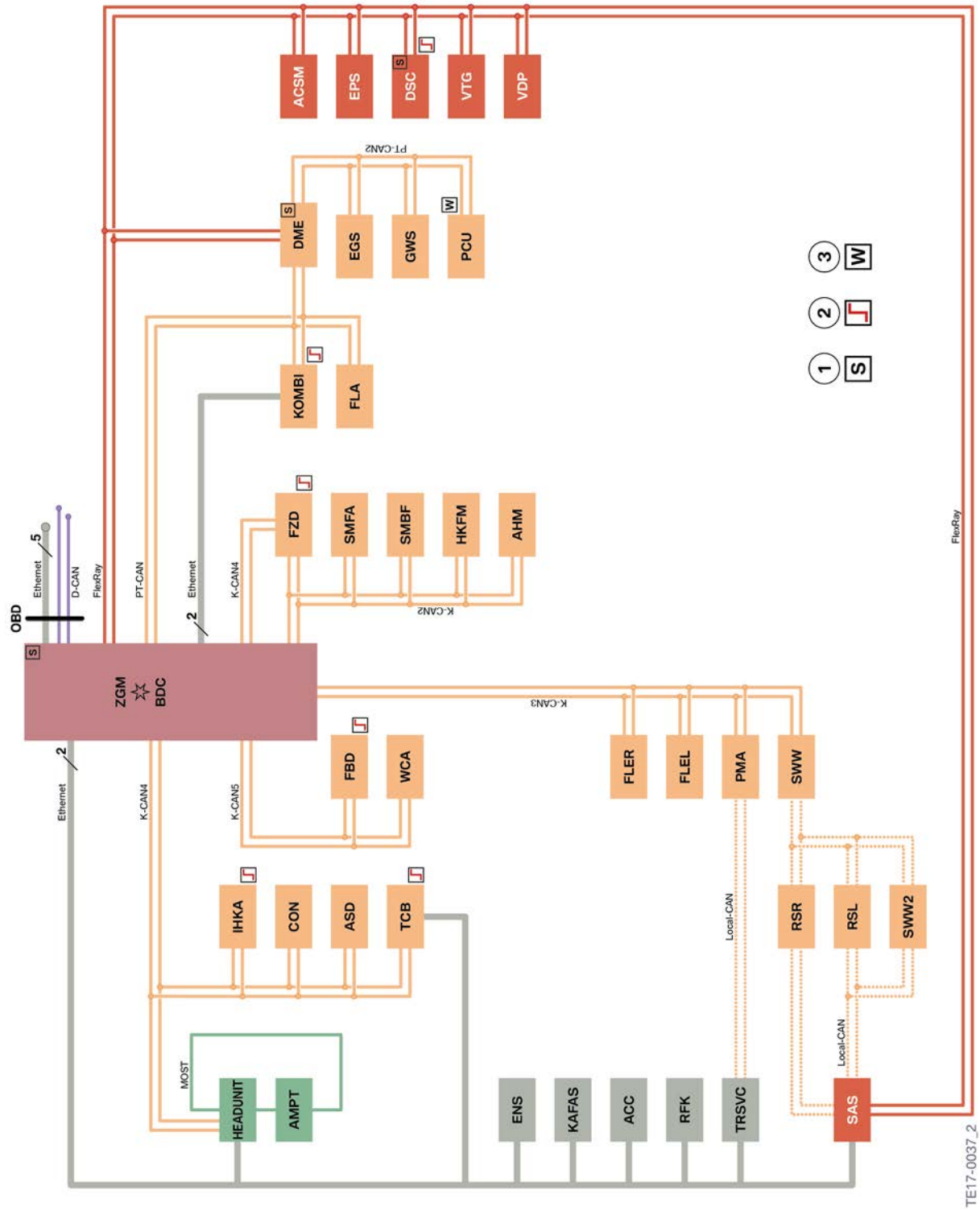
G02 rear light

Index	Explanation
1	Brake light
2	Tail light
3	Turn indicator
4	Reversing light

G02 Complete Vehicle

4. General Vehicle Electronics

4.2. Bus overview



G02 bus overview

G02 Complete Vehicle
4. General Vehicle Electronics

Index	Explanation
ACC	Active Cruise Control
ACSM	Advanced Crash Safety Module
AHM	Trailer module
AMPT	Top HiFi amplifier
ASD	Active Sound Design
BDC	Body Domain Controller
CON	Controller
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EGS	Electronic transmission control
ENS	Ethernet switch
EPS	Electromechanical Power Steering
FBD	Remote control service
FLA	High-beam assistant
FLER	Frontal Light Electronics Right
FLEL	Frontal Light Electronics Left
FZD	Roof function center
GHAS	Regulated rear axle differential lock
GWS	Gear selector switch
HEAD UNIT	Head unit
HKFM	Tailgate function module
IHKA	Integrated automatic heating / air conditioning system
KAFAS	Camera-based driver assistance systems
KOMBI	Instrument cluster
PCU	Power Control Unit
PMA	Parking Manoeuvring Assistant
RFK	Rear view camera
RSL	Radar Sensor Left
RSR	Radar Sensor Right
SAS	Optional equipment system
SMBF	Front passenger seat module
SMFA	Driver's seat module
SWW	Lane change warning (primary)
SWW2	Lane change warning (secondary)
TCB	Telematic Communication Box

Index	Explanation
TRSVC	Control unit for rear view camera and side view
VDP	Vertical Dynamic Platform
VTG	Transfer box
WCA	Wireless charging tray
ZGM	Central Gateway Module
1	Start-up node control units for starting and synchronizing the FlexRay bus system
2	Control units authorised to perform wake-up function
3	Control units also connected at terminal 15WUP

Bayerische Motorenwerke Aktiengesellschaft
Händlerqualifizierung und Training
Röntgenstraße 7
85716 Unterschleißheim, Germany