Technical training.
Product information.

G30 Driver Assistance Systems

BMW Service

General information

Symbols used

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

⚠

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

Information status and national-market versions

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

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

Additional sources of information

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

- Owner's Handbook
- Integrated Service Technical Application.

Contact: conceptinfo@bmw.de

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

Information status: **November 2016**
Technical training.

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G30 Driver Assistance Systems

1. Introduction

The most versatile range of Driver Assistance Systems ever for a BMW model was launched with the introduction of the G12.

Numerous innovative systems have been introduced and have opened the way for highly automated driving. It is planned that the technical prerequisites will have been laid for an "Autobahn pilot" by 2020 so that we will be able to offer highly automated driving for the first time.

At present, however, the appropriate legal foundations have not been laid for autonomous driving.

Drivers are still expected to drive with both hands on the steering wheel, although systems are already in place to drive the vehicle autonomously in certain situations.

The already comprehensive range of Driver Assistance Systems has been expanded again in the G30 to include revolutionary new systems. Systems such as Intersection Warning are in use. Evasion Aid is presented for the first time with the launch of the G30. For even greater convenience, the restart time on the Active Cruise Control Stop&Go function has been increased, and the detection of more information and the incorporation of further sensors has made more driver-like driving characteristics possible.

A further feature among the camera systems is the Remote 3D View function which makes it possible to transmit an image of the parked vehicle to mobile devices.

The interplay between the varied and intelligent Driver Assistance Systems supports the driver in every respect; from making driving more comfortable to providing the reassuring feeling of safety on all roads.

The Driver Assistance Systems help to make the driver's life easier by:

- Providing the driver with information
- Prompting the driver with suggestions
- Automatically intervening in the driving process

This reference manual contains an overview of all the Driver Assistance Systems used in the G30:

- Camera-based collision warning
- Frontal Collision Warning with City Collision Mitigation
- Daytime Pedestrian Protection
- Lane Departure Warning
- Blind Spot Detection
- Side Collision Avoidance
- Intersection Warning
- Road Sign Recognition
- Proactive Driving Assistant
- Fatigue and Focus Alert
- Night vision
- Camera systems
- Park Distance Control

G30 Driver Assistance Systems

1. Introduction

- Cross Traffic Alert
- Parking Maneuvering Assistant
- Remote Control Parking
- Speed control
- Speed limit warning
- Traffic Jam Assistant
- Active Lane Keeping Assistant with Side Collision Avoidance
- Evasion Aid

Identifying road users driving ahead as well as detecting objects and lane edges are among the most important prerequisites for the Driver Assistance Systems. This applies not only for the far range but also the close range.

The optional functions available for the G30 are implemented either as camera-based systems with a shared camera and integrated control unit, or using sensors such as ultrasonic or radar sensors. Evaluation signals provided by various control units (for example, from the Advanced Crash Safety Module (ACSM)) are also taken into consideration.

1.1. Further information

The Driver Assistance Systems in the new BMW 5 Series builds on those of the BMW 7 Series G12. Accompanying information for the topics listed below may be found in the "G12 Driver Assistance Systems" reference manual.

Topic	reference manual
Proactive Driving Assistant	G12 Driver Assistance Systems (section 12)
Auto PDC	G12 Driver Assistance Systems (section 16.2)
Active Park Distance Control	G12 Driver Assistance Systems (section 16.3)
Remote Control Parking	G12 Driver Assistance Systems (section 17)
Parking Maneuvering Assistant	G12 Driver Assistance Systems (section 19)
Hands-off-Detection	G12 Driver Assistance Systems (section 23.1.1)

For more information on the operating concept of the Driver Assistance Systems, please refer to the Owner's Handbook.

G30 Driver Assistance Systems
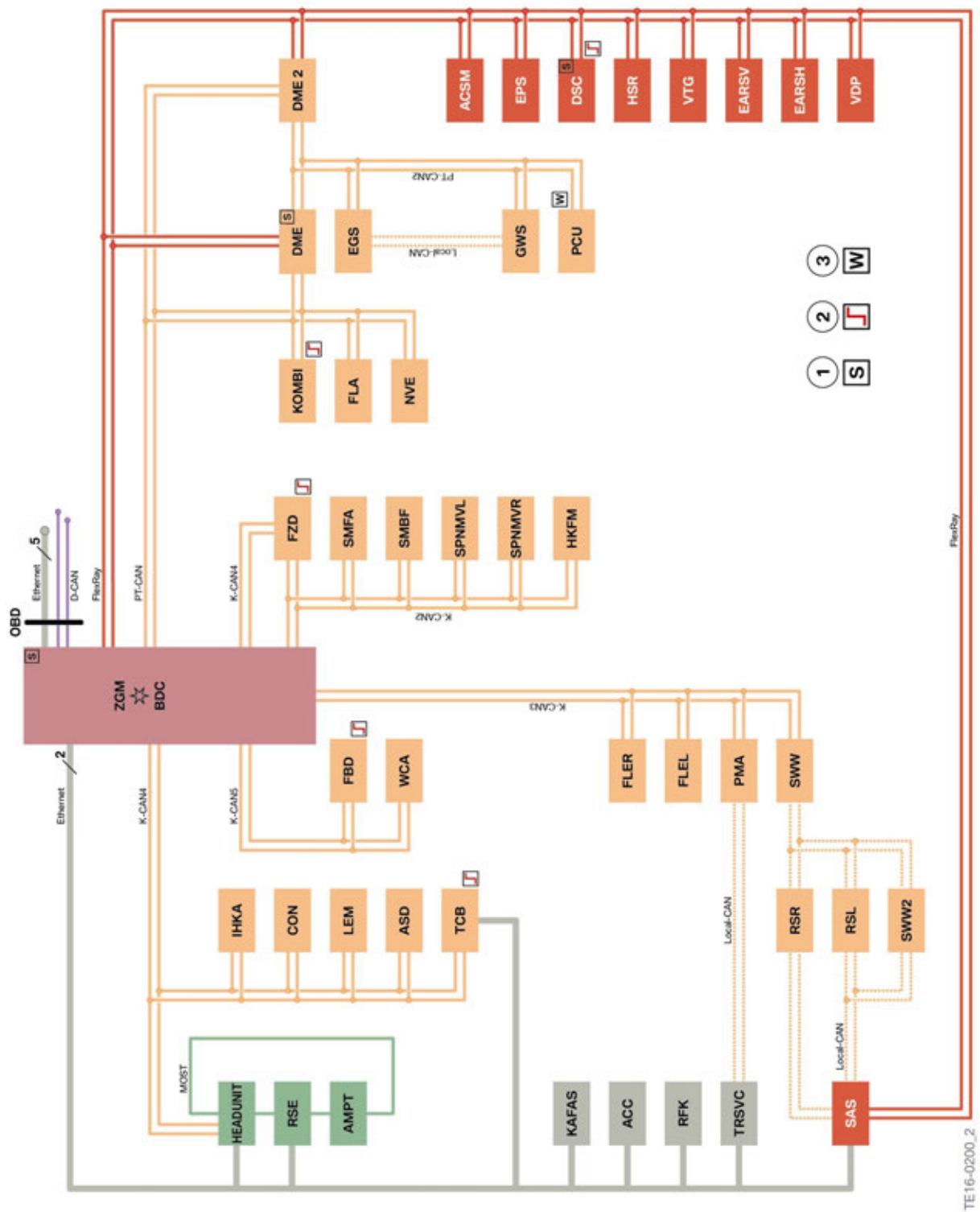
2. G30 Bus Overview

G30 Bus overview

G30 Driver Assistance Systems
2. G30 Bus Overview

Index	Explanation
ACC	Active Cruise Control
ACSM	Advanced Crash Safety Module
AMPT	Top HiFi amplifier
ASD	Active Sound Design
BDC	Body Domain Controller
CON	Controller
DME	Digital Motor Electronics
DME2	Digital Engine Electronics 2
DSC	Dynamic Stability Control
EARSH	Electric active roll stabilization rear
EARSV	Electric active roll stabilization front
EGS	Electronic transmission control
EPS	Electromechanical Power Steering
FLA	High-beam assistant
FLER	Frontal Light Electronics Right
FLEL	Frontal Light Electronics Left
FZD	Roof function center
GWS	Gear selector
HEADUNIT	Head unit
HKFM	Tailgate function module
HSR	Rear axle slip angle control
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver support systems
KOMBI	Instrument panel
LEM	Light effect manager
NVE	Night Vision Electronics
PCU	Power Control Unit
PMA	Parking Maneuvering Assistant
RFK	Rear view camera
RSE	Rear Seat Entertainment
RSL	Radar sensor, left (also known as Short Range Radar (SRR) in Technical Systems)
RSR	Radar sensor, right (also known as Short Range Radar (SRR) in Technical Systems)
SAS	Optional Equipment System
SMBF	Seat module, passenger

G30 Driver Assistance Systems
2. G30 Bus Overview

Index	Explanation
SMBFH	Seat module, passenger, rear
SMFA	Seat module, driver
SMFAH	Seat module, driver, rear
SPNMHL	Seat pneumatics module back left
SPNMHR	Seat pneumatics module back right
SPNMVL	Seat pneumatics module front left
SPNMVR	Seat pneumatics module front right
SWW	Blind Spot Detection (primary) (also known as Short Range Radar (SRR) in Technical Systems)
SWW2	Blind Spot Detection (secondary) (also known as Short Range Radar (SRR) in Technical Systems)
TCB	Telematic Communication Box
TRSVC	Top Rear Side View Camera
VDP	Vertical Dynamic Platform
VTG	Transfer box
WCA	Wireless charging station
ZGM	Central gateway module
1	Start-up node control units for starting and synchronizing the FlexRay bus system
2	Control units with wake-up authorisation
3	Control units also connected at terminal 15WUP

G30 Driver Assistance Systems
3. KAFAS

Since the requirements on the KAFAS camera have further increased in the new BMW 5 Series, the KAFAS stereo camera, familiar from the G12, is also used on the G30.
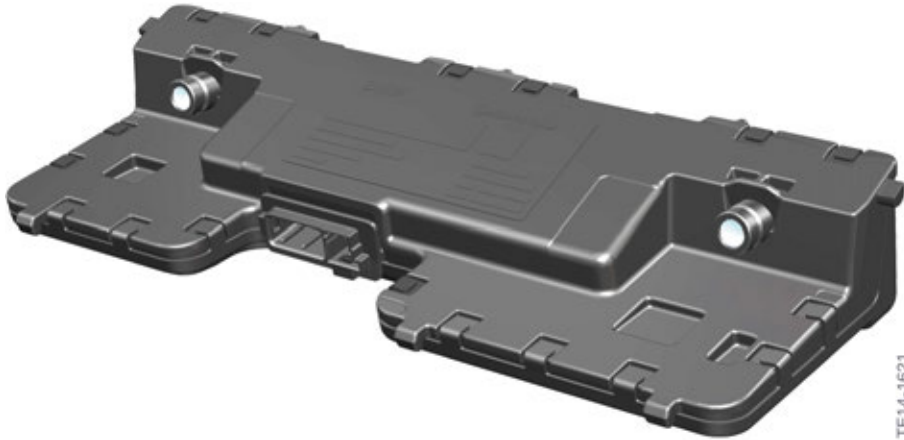
KAFAS stereo camera

The KAFAS stereo camera is calibrated within a distance of approximately 1.25 mi (2 km) during driving.

The KAFAS stereo camera is the key element of the following systems:

- Frontal Collision Warning with City Collision Mitigation
- Daytime Pedestrian Protection
- Lane Departure Warning
- Road Sign Recognition

The KAFAS stereo camera plays a supporting role in the following systems:

- Active Cruise Control With Stop&Go Function
- Traffic Jam Assistant
- Active Lane Keeping Assistant with Side Collision Avoidance
- Intersection Warning

The KAFAS stereo camera installed in the mirror base of the interior mirror on the windscreen monitors the area in front of the vehicle.

G30 Driver Assistance Systems
3. KAFAS
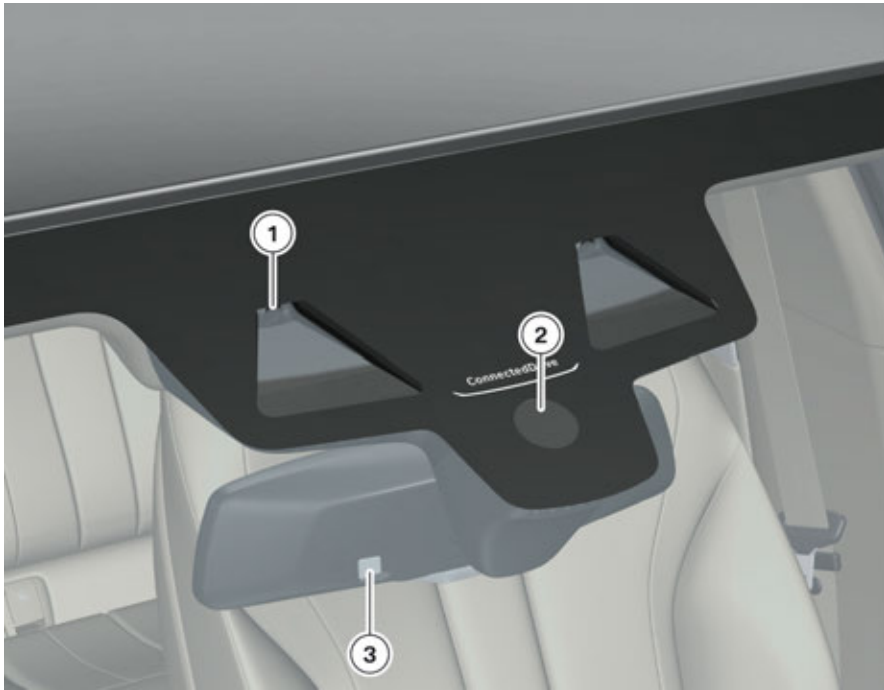
G30 KAFAS stereo camera

Index	Explanation
1	KAFAS stereo camera
2	Rain-light-solar-condensation sensor
3	Photosensor for electrochromic interior mirror

The KAFAS stereo camera has a detection range of up to approximately 130 ft (40 m) ahead of the vehicle and up to approximately 16 ft (5 m) in front of the vehicle on the right and left. The overall detection range of the KAFAS stereo camera is approximately 1600 ft (500 m).

The tasks of the KAFAS stereo camera are:

- Person recognition
- Road Sign Recognition
- Lane detection

G30 Driver Assistance Systems
3. KAFAS
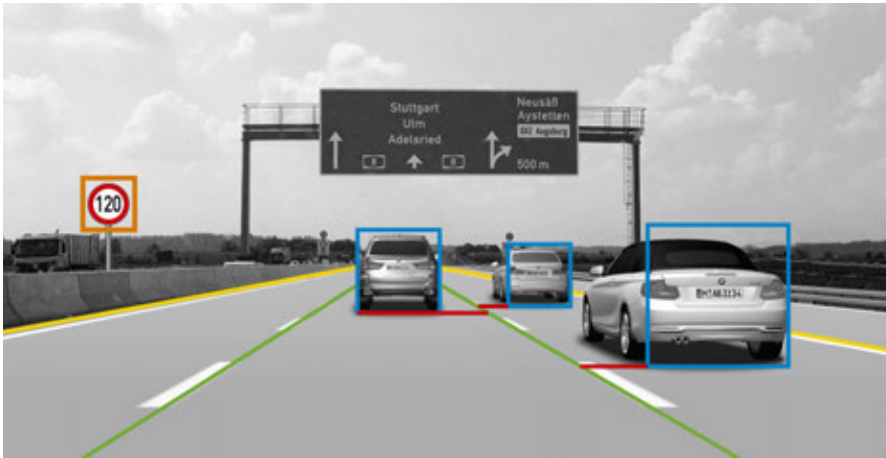
KAFAS stereo camera detection range

3.1. Functional limitations

The function of the KAFAS stereo camera and thus the function of the corresponding Driver Assistance Systems may be impaired due to the physical limits of the optical systems, for example in the following situations:

- Heavy fog, rain, spray or snow.
- Strong light in the camera lens.
- If the field of view of the KAFAS stereo camera or the windscreen is dirty.
- On tight bends.
- If boundary lines are missing, worn, poorly visible, converging or diverging, or not clearly recognizable, as may be the case when road construction is being performed.
- If boundary lines are covered by snow, ice, dirt or water.
- If boundary lines are covered by objects.
- If driving at close proximity to a vehicle driving ahead.
- If the windscreen in front of the interior mirror is misted over, soiled or covered by stickers, e.g. parking permits, etc.
- Up to 10 seconds after driving readiness is activated via the start/stop button.
- During the calibration process for the KAFAS stereo camera immediately after vehicle delivery or a camera change.

G30 Driver Assistance Systems
3. KAFAS
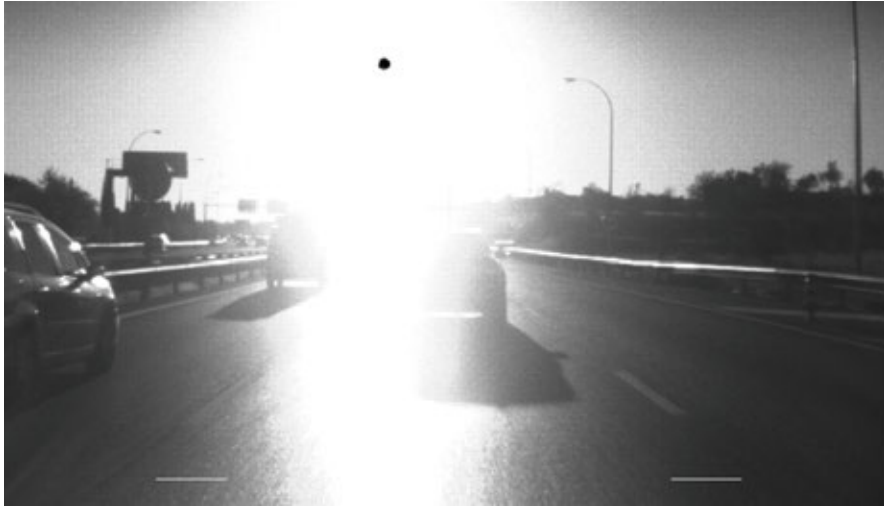
Example of limits of the KAFAS stereo camera

⚠️

Due to functional limitations and system restrictions it may transpire that warnings and alerts are not issued, are issued too late or are unwarranted. Therefore, be attentive in order to be able to actively intervene at any time. Otherwise, there is a risk of an accident.

G30 Driver Assistance Systems
4. Optional Equipment System

The G30 also features the Optional Equipment System (SAS) control unit which is already familiar and which provides a host of Driver Assistance System functions.

Possible functions:

- Frontal Collision Warning with City Collision Mitigation
- Daytime Pedestrian Protection
- Dynamic Brake Control
- Distance information
- Cruise control with braking function
- Active Cruise Control with Stop&Go function
- Traffic Jam Assistant
- Active Lane Keeping Assistant with Side Collision Avoidance
- Evasion Aid
- Speed Limit Information
- Blind Spot Detection
- Lane Departure Warning
- Cross Traffic Alert
- Intersection Warning
- Parking Maneuvering Assistant
- Remote Control Parking
- Proactive Driving Assistant
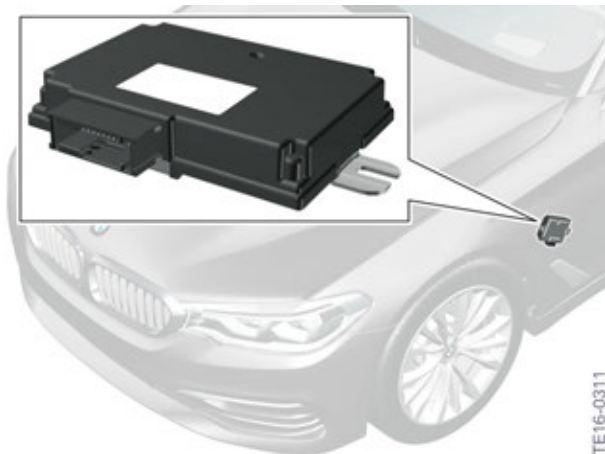
G30 Control unit for Optional Equipment System (SAS)

G30 Driver Assistance Systems
5. Overview of Sensors

The graphic below provides an overview of the main sensors used in the G30 for the Driver Assistance Systems and shows their installation locations.
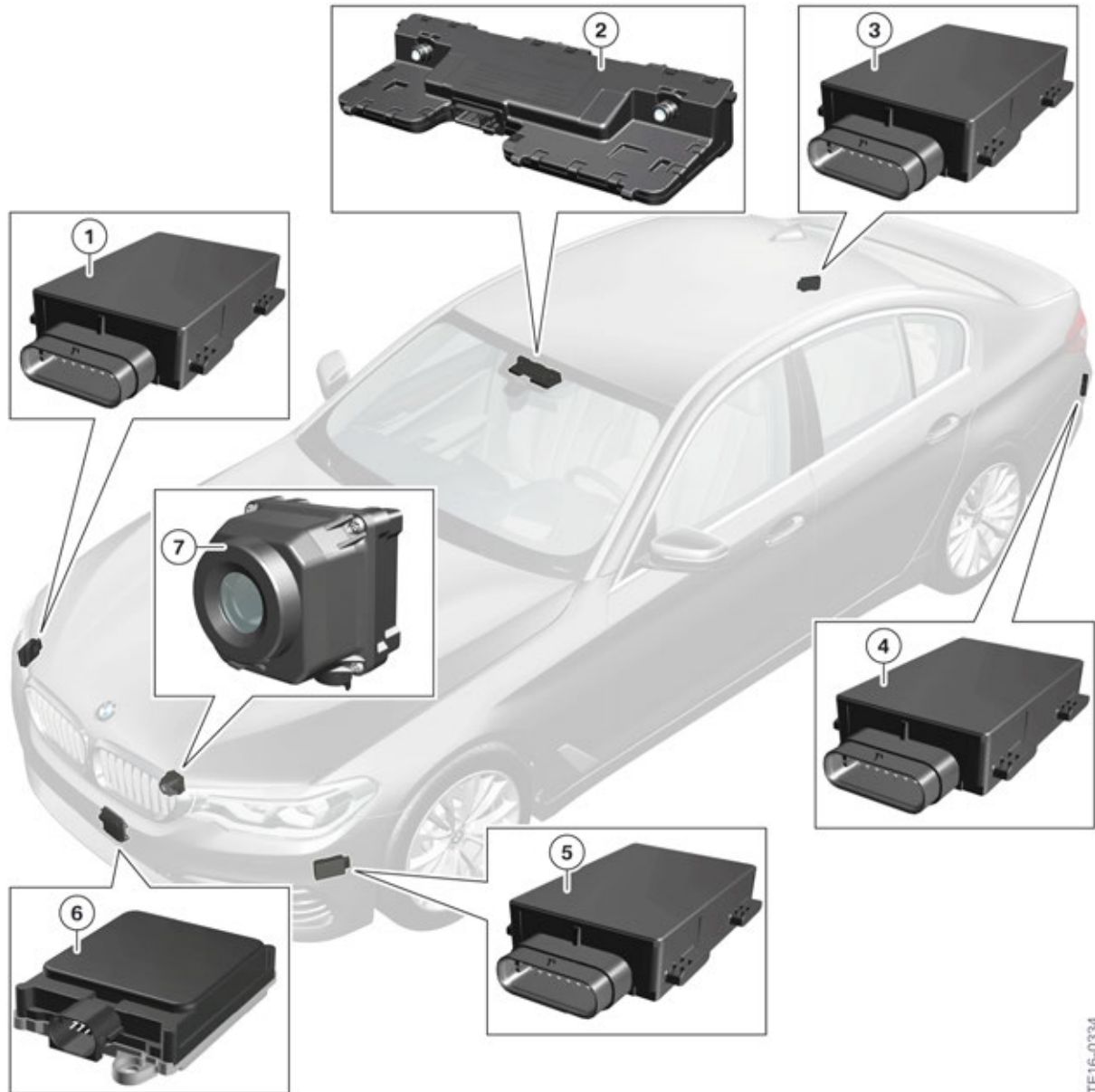
G30 Overview of sensors

G30 Driver Assistance Systems
5. Overview of Sensors

Index	Explanation
1	Control unit for radar sensor, right (RSR) (also known as Short Range Radar (SRR) in Technical Systems)
2	KAFAS stereo camera
3	Blind Spot Detection (primary) (also known as Short Range Radar (SRR) in Technical Systems)
4	Blind Spot Detection (secondary) (also known as Short Range Radar (SRR) in Technical Systems)
5	Control unit for radar sensor, left (RSL) (also known as Short Range Radar (SRR) in Technical Systems)
6	Active Cruise Control (ACC) (also known as Full Range Radar Sensor (FRR) in Technical Systems)
7	Night Vision camera

G30 Driver Assistance Systems
6. Intelligent Safety

Due to the ever increasing amount of traffic on our roads, Driver Assistance Systems in vehicles continue to gain in importance. The systems have different functions: some gather information to help the driver in the decision-making process, while others take on the driver's roles in monotonous traffic situations or intervene to make corrections.

The Driver Assistance Systems support the driver on highways, single-lane roads and in urban environments. Systems such as the Daytime Pedestrian Protection provide support in urban traffic, for instance. Night Vision can assist the driver when driving on single-lane roads with adjacent woodland (deer crossings, etc.). The Lane Departure Warning and Blind Spot Detection as well as the Side Collision Avoidance provide even more safety in traffic. Accidents can be avoided through automatic brake interventions, active steering interventions or a combination of both.

Once more, new Driver Assistance Systems are being presented with the launch of a new BMW 5 Series. The Intelligent Safety menu has been adapted to the new systems accordingly.

Depending on the vehicle equipment, the driver has a multitude of individual configurations available in the Intelligent Safety menu. For some systems, no configuration options are provided by the operating concept. Thus, for example, Evasion Aid can only be deactivated by switching off all Intelligent Safety systems (ALL OFF).

Depending on the vehicle equipment, Intelligent Safety consists of one or several systems, which can help to avoid a potential collision. The following systems are offered in the G30:

- Daytime Pedestrian Protection
- Night Vision with person and animal recognition
- Lane Departure Warning
- Blind Spot Detection
- Side Collision Avoidance
- Evasion Aid
- Frontal Collision Warning with City Collision Mitigation

The Intelligent Safety button, already familiar from other BMW models, enables the Driver Assistance Systems to be operated centrally. This means the systems can be switched on or off using a button and the submenu can be called up to personalize the settings.

G30 Driver Assistance Systems

6. Intelligent Safety

G30 Intelligent Safety button

Index	Explanation
1	Intelligent Safety button

Press button

- The "Intelligent Safety" menu is displayed on the Central Information Display (CID).
  Settings can be made using the controller. The individual settings are stored for the respective ID transmitter used.

Press and release button

- When all Intelligent Safety systems are switched on:
  Intelligent Safety systems are switched off individually depending on the individual setting.

- When all Intelligent Safety systems are not switched on:
  All Intelligent Safety systems are switched on.

Press button for an extended period

- All Intelligent Safety systems are switched off.

G30 Driver Assistance Systems

6. Intelligent Safety

G30 Status indicator light (Intelligent Safety button)

Index	Explanation
A	All Intelligent Safety systems are switched on
B	Some Intelligent Safety systems are switched off or sub-function settings have been changed
C	All Intelligent Safety systems are switched off

The Intelligent Safety systems are automatically active after each engine start via the START-STOP button.

6.1. Overview of the configuration menu

The system is operated by pressing the Intelligent Safety button and using a menu to configure the Intelligent Safety systems on the Central Information Display (CID).
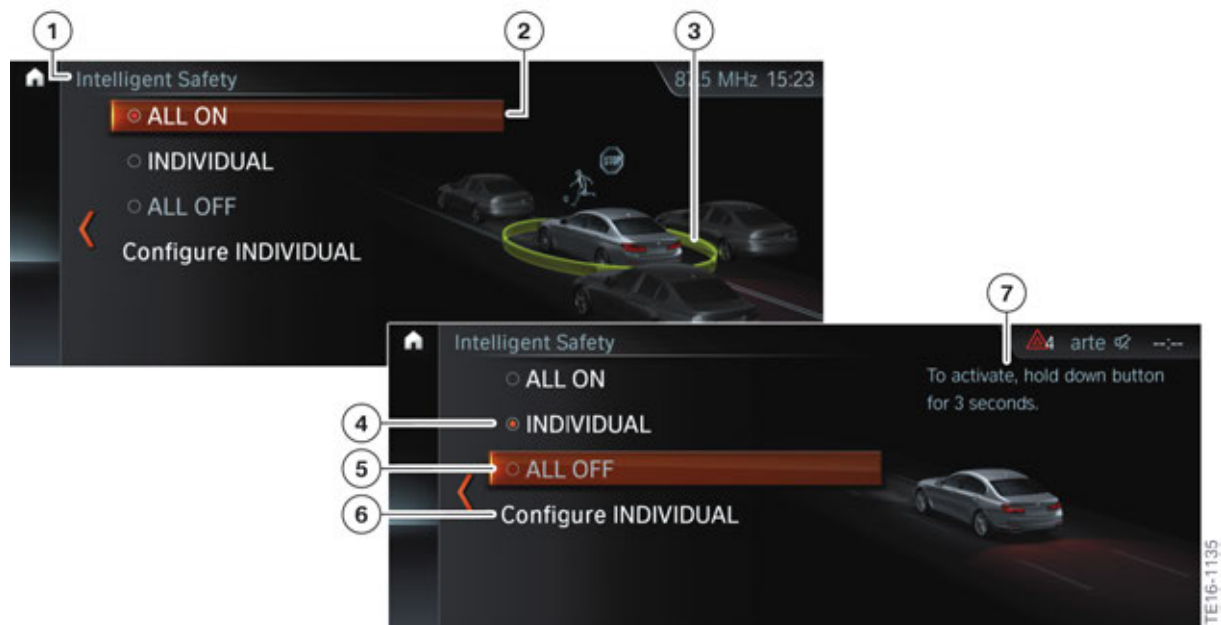
G30 Intelligent Safety overview configuration menu

G30 Driver Assistance Systems

6. Intelligent Safety

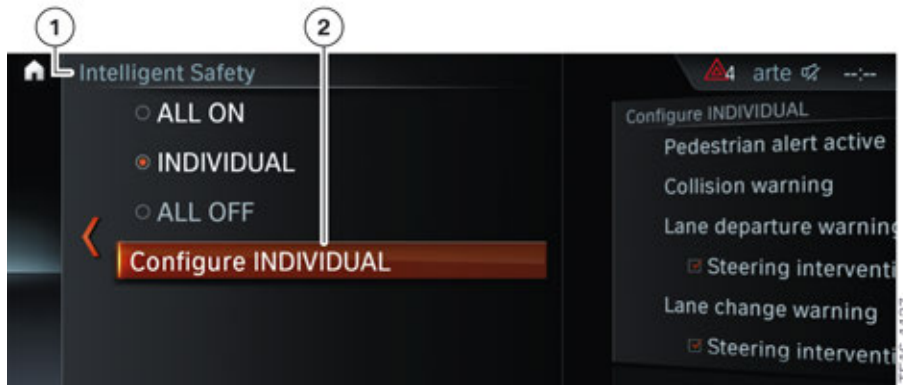| Index	Explanation
1	"Intelligent Safety" configuration menu
2	"ALL ON" selection
3	Note for the driver: the colored circle shows the driver the activation status of the Intelligent Safety systems. The color of the circle always matches the color of the Intelligent Safety button indicator light.
4	"INDIVIDUAL" selection
5	"ALL OFF" selection
6	"Configure INDIVIDUAL"
7	Note for the driver: In this example the information is being provided that the driver must hold the controller down for three seconds after selecting the ALL OFF menu item to deactivate the Intelligent Safety systems.

"ALL ON"

- All Intelligent Safety systems are switched on. The basic settings are activated for the subfunctions, for example the warning time setting. The Intelligent Safety button lights up green.

"INDIVIDUAL"

- The Intelligent Safety systems are switched on in accordance with the individual settings. Depending on the vehicle equipment, the Intelligent Safety systems can be configured individually. The individual settings are activated and stored for the respective ID transmitter used.
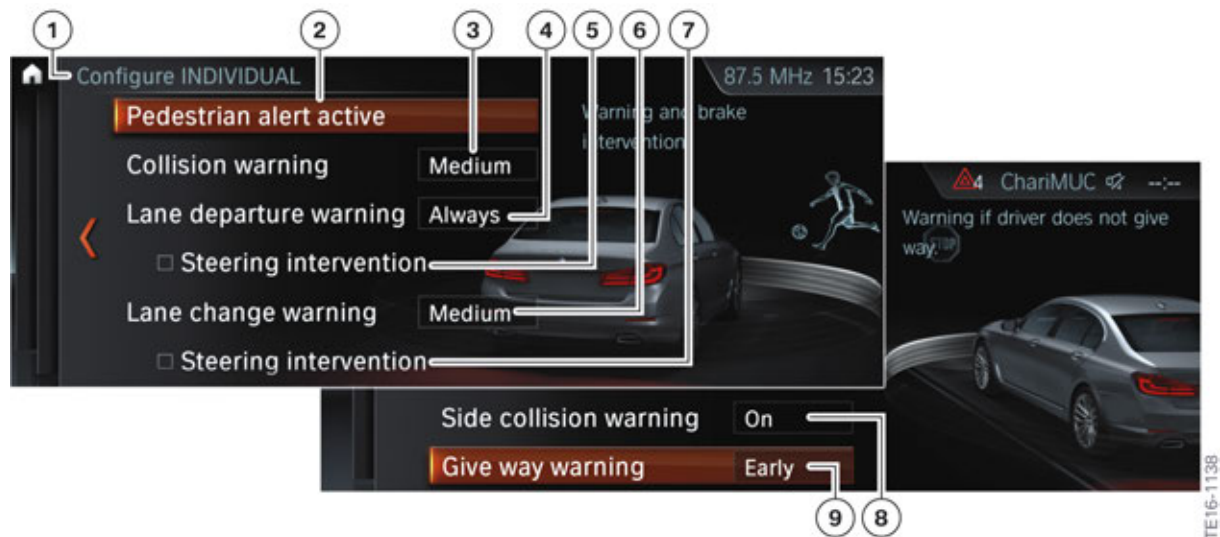

G30 Intelligent Safety ("Configure INDIVIDUAL" selection)

Index	Explanation
1	"Intelligent Safety" configuration menu
2	"Configure INDIVIDUAL"

G30 Driver Assistance Systems

6. Intelligent Safety

G30 Intelligent Safety "INDIVIDUAL" configuration menu (settings options)

Index	Explanation
1	"Configure INDIVIDUAL"
2	"Pedestrian alert active"
3	"Collision warning" (selected setting: Medium)
4	"Lane Departure Warning" (selected setting: Always)
5	"Steering intervention"
6	"Blind Spot Detection" (selected setting: Medium)
7	"Steering intervention"
8	"Side Collision Avoidance"
9	"Give way warning" (not for US) (setting selected: Early)

As soon as a setting is changed in the menu, all the settings the driver has previously configured are activated. The Intelligent Safety button lights up orange.

"ALL OFF"

- All Intelligent Safety systems are switched off. The Intelligent Safety button does not light up.

G30 Driver Assistance Systems
7. Collision Warning

The camera-based collision warning is part of the Active Driving Assistant optional equipment (OE 5AS) in the G30 and is implemented using the KAFAS stereo camera.

The collision warning in the new BMW 5 Series contains the familiar Frontal Collision Warning with City Collision Mitigation and Daytime Pedestrian Protection functions.

In vehicles with the Active Driving Assistant Plus optional equipment (OE 5AT), the cruise control radar sensor is also used to control the collision warning.
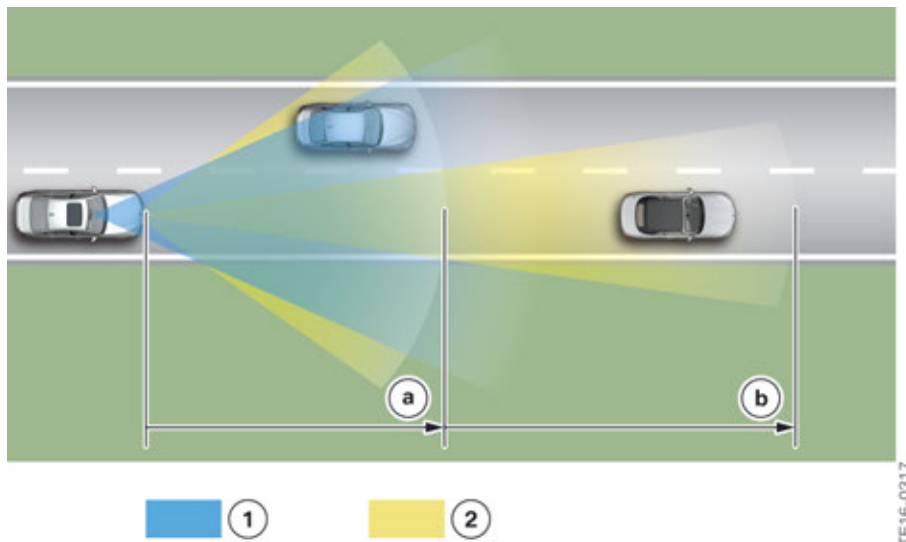
G30 Fusion of the KAFAS stereo camera/ACC radar sensor (diagram of the monitoring ranges)

Index	Explanation
a	Close range
b	Long distance
1	KAFAS stereo camera detection range
2	Detection range of the radar sensor

Vehicles with the Active Driving Assistant Plus optional equipment (OE 5AT) have the Active Cruise Control with Stop&Go function integrated as standard.

The system warns the driver in situations where a collision is imminent. The early warning, a visual signal, is issued first to draw the driver's attention to the situation. If the situation becomes more critical, an acute early warning in the form of a visual and acoustic signal is issued. The nature of the warning is such that the driver can still prevent a collision providing he acts quickly.

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The collision warning is dependent on the vehicle's own driving speed. The distance measured for the collision warning is significantly lower than the legally required minimum distance. It is therefore the responsibility of the driver to adhere to the legal minimum distance.

G30 Driver Assistance Systems
7. Collision Warning

7.1. Warning and braking function

7.1.1. Displays

Symbols	Explanation
	Early warning: • Vehicle symbol lights up red • Increase distance and brake if necessary
	Acute warning: • Vehicle symbol flashes red and a signal sounds • Request for intervention by braking and evasive action, if required
	Acute warning: • Person symbol flashes red and a signal sounds • Request for intervention by braking and evasive action, if required

⚠️

The acute warning does not relieve the driver of his responsibility to adapt the speed and driving style to the traffic conditions.

Additional information regarding the collision warning may be found in the "G12 Driver Assistance Systems" reference manual (sections 7.1 and 7.2).

G30 Driver Assistance Systems
7. Collision Warning

7.2. Operation

The collision warning and pedestrian warning are switched on and off using the Intelligent Safety button.

G30 Intelligent Safety button

Index	Explanation
1	Intelligent Safety button

The point at which the early collision warning is issued can be configured in the "Intelligent Safety systems" menu on the Central Information Display (CID).

The acute warning cannot be deactivated separately. The timing of the acute warning also cannot be adjusted. If the acute warning is not to be issued, the "collision warning" front protective function must be deactivated. The collision warning can be switched off by holding down the Intelligent Safety button.

It is also not possible to configure or deactivate the pedestrian warning separately. The "collision warning" front protective function must be also deactivated by holding down the Intelligent Safety button in order to deactivate the pedestrian warning function.

G30 Driver Assistance Systems
7. Collision Warning

7.3. Limits of the system

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The collision warning has a limited capacity for detection.

As a result, incorrect or delayed warnings may occur. It is possible the following vehicles are not detected:

- A slow vehicle when driving off at high speed.
- Vehicles that suddenly swerve or decelerate rapidly.
- Vehicles with an unusual rear view or with insufficiently visible rear lights.
- Partially concealed vehicles.
- Two-wheeled vehicles travelling ahead.

Functional limitations

The function of the KAFAS stereo camera and thus the function of the corresponding Driver Assistance Systems may be impaired in the following situations, for example:

- Heavy fog, rain, spray or snow.
- Insufficient light.
- Strong light in the camera lens.
- If the field of view of the KAFAS stereo camera or the windscreen is dirty.
- On sharp bends.
- With pedestrians up to approximately 2.5 ft (80 cm) in height.
- Up to 10 seconds after engine start via the START-STOP button.
- During the calibration process for the KAFAS stereo camera immediately after vehicle delivery or a camera change.

⚠️

Due to functional limitations and system restrictions it may transpire that warnings and alerts are not issued, are issued too late or are unwarranted. Therefore, be attentive in order to be able to actively intervene at any time. Otherwise, there is a risk of an accident.

G30 Driver Assistance Systems
8. Lane Departure Warning

The Lane Departure Warning is an element of the Active Driving Assistant, optional equipment (OE 5AS) and the Active Driving Assistant Plus, optional equipment (OE 5AT).

The Lane Departure Warning detects lane markings from a speed of approximately 43 mph (70 km/h) and warns the driver against unintentionally leaving the lane.

The information required about usable roadway and lane markings is provided by the KAFAS stereo camera. Based on the calculated positions, lane edges and curves in relation to the relative position of the driver's vehicle, a corresponding warning is issued.

If the driver crosses the lane marking unintentionally (without using the turn indicator) or leaves the road boundary, he is warned abruptly by the steering wheel vibrating gently and has the opportunity to react accordingly. The vibration in the steering wheel can be compared to the vibration effect when driving over a profiled road marking.

In the settings menu the driver can set the desired strength of the abrupt warnings on the steering wheel via the iDrive.

G30 Steering wheel vibration settings menu on CID

Index	Explanation
1	Steering wheel vibration menu
2	Additional note for the driver
3	"Strong"
4	"Medium"
5	"Light"

If the driver uses the turn indicator when moving across to another lane, the Lane Departure Warning recognizes that this is an intentional lane change and a warning is not issued.

G30 Driver Assistance Systems

8. Lane Departure Warning

The Lane Departure Warning can be configured individually in the Intelligent Safety system submenu.

G30 Intelligent Safety view on the CID (Lane Departure Warning)

Index	Explanation
1	"Configure INDIVIDUAL" menu
2	"Lane Departure Warning" (selected setting: Always)
3	"Lane Departure Warning" (settings options: Always, Reduced, Off)

The individual settings applied by the driver are saved for the driver profile currently in use.

Displays in the Instrument Cluster (KOMBI)

| Symbol	Explanation
	At least one lane boundary has been detected and warnings can be issued.

G30 Driver Assistance Systems
8. Lane Departure Warning

8.1. Active steering intervention

In vehicles with the Side Collision Avoidance (included in Active Driving Assistant Plus, optional equipment OE 5AT), the driver is assisted by another measure known as "active steering intervention".

If the driver does not react to the warning issued by the Lane Departure Warning system and crosses the lane marking, he is assisted to stay in lane by a brief active steering intervention.
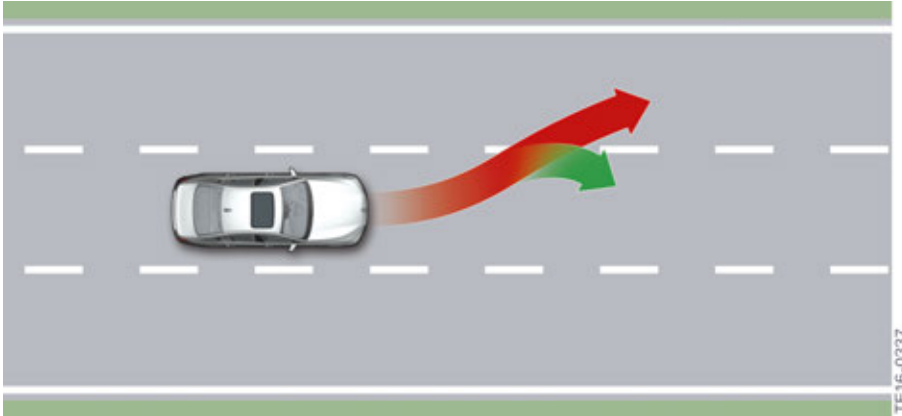
G30 Lane Departure Warning (active steering intervention)

The active steering intervention can be felt on the steering wheel, but can be overridden by the driver at any time. If the driver does override the intervention, the active steering intervention is cancelled.

The "steering intervention" for the Lane Departure Warning can be switched on and off via the iDrive menu in vehicles with the Side Collision Avoidance by making the following selection via the controller:

- "My Vehicle"
- "Vehicle settings"
- "Intelligent Safety"
- "Steering intervention"

The configuration menu can be accessed quickly by pressing the Intelligent Safety button.

G30 Intelligent Safety view on the CID (Lane Departure Warning with active steering intervention)