

**Technical training.**  
**Product information.**

## **G01 Driver Assistance Systems**



**BMW Service**

Edited for the U.S. market by:  
**BMW Group University**  
**Technical Training**

ST1701

9/1/2017

# 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](mailto:conceptinfo@bmw.de)

©2017 BMW AG, Munich

**Reprints of this publication or its parts require the written approval of BMW AG, Munich.**

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: **July 2017**  
**Technical training.**

# G01 Driver Assistance Systems

## Contents

<b>1.</b>	<b>Introduction.....</b>	<b>1</b>
1.1.	BMW Personal CoPilot.....	1
1.2.	The road to "Autonomous driving".....	1
1.2.1.	Overview of classification levels.....	2
1.3.	Further information.....	4
<b>2.</b>	<b>Bus Overview G01.....</b>	<b>5</b>
<b>3.</b>	<b>KAFAS.....</b>	<b>8</b>
3.1.	Functional limitations.....	10
<b>4.</b>	<b>Optional Equipment System.....</b>	<b>11</b>
<b>5.</b>	<b>Overview of Sensors.....</b>	<b>12</b>
<b>6.</b>	<b>Intelligent Safety.....</b>	<b>14</b>
6.1.	Overview of the configuration menu.....	16
<b>7.</b>	<b>Collision Warning.....</b>	<b>19</b>
7.1.	Introduction.....	19
7.2.	Functional principle.....	19
7.2.1.	Front Collision Warning with City Collision Mitigation.....	20
7.2.2.	Collision warning with braking function.....	21
7.3.	Warning and braking function.....	22
7.3.1.	Displays.....	23
7.3.2.	Early warning.....	23
7.3.3.	Acute warning.....	23
7.3.4.	Brake intervention.....	24
7.4.	Operation.....	24
7.5.	Limits of the system.....	25
<b>8.</b>	<b>Daytime Pedestrian Protection.....</b>	<b>27</b>
8.1.	Functional principle.....	27
8.2.	Warning and braking function.....	27
8.2.1.	Displays.....	28
8.2.2.	Acute warning/brake intervention.....	28
8.3.	Operation.....	28
8.4.	Limits of the system.....	29
<b>9.</b>	<b>Lane Departure Warning.....</b>	<b>31</b>
9.1.	Active steering intervention.....	33
9.2.	Deactivation criteria.....	35

# G01 Driver Assistance Systems

## Contents

9.3.	Limits of the system.....	35
<b>10.</b>	<b>Active Blind Spot Detection.....</b>	<b>36</b>
10.1.	Active steering intervention.....	38
10.2.	Limits of the system.....	39
<b>11.</b>	<b>Side Collision Avoidance.....</b>	<b>40</b>
11.1.	Limits of the system.....	43
<b>12.</b>	<b>Intersection Warning.....</b>	<b>44</b>
12.1.	Functional principle.....	44
12.1.1.	Warning.....	44
12.2.	Limits of the system.....	47
<b>13.</b>	<b>Road Sign Recognition.....</b>	<b>48</b>
13.1.	Operation.....	48
13.2.	Limits of the system.....	49
<b>14.</b>	<b>Proactive Driving Assistant.....</b>	<b>50</b>
14.1.	Operation.....	50
14.2.	Limits of the system.....	51
<b>15.</b>	<b>Fatigue and Focus Alert.....</b>	<b>52</b>
15.1.	Operation.....	52
15.2.	Limits of the system.....	53
<b>16.</b>	<b>Cameras.....</b>	<b>54</b>
16.1.	Surround view.....	54
16.1.1.	Automatic camera angle.....	55
16.1.2.	Side view.....	55
16.1.3.	Front camera.....	55
16.1.4.	Panorama View.....	55
16.1.5.	Rear view camera.....	59
16.1.6.	Moving camera angle.....	59
16.2.	Overview of exterior camera operating menu.....	61
16.3.	Assistant function.....	62
16.3.1.	Car wash view.....	62
16.3.2.	Towbar zoom.....	63
16.3.3.	Side protection.....	64
16.3.4.	Door opening angle.....	64
16.4.	Remote View 3D.....	65
16.4.1.	Functional principle.....	65

# G01 Driver Assistance Systems

## Contents

16.5.	System components.....	67
16.5.1.	Rear view camera.....	69
16.5.2.	TRSVc control unit.....	71
<b>17.</b>	<b>Park Distance Control.....</b>	<b>72</b>
17.1.	System components.....	72
17.2.	Auto PDC.....	73
17.3.	Active Park Distance Control.....	73
17.4.	Side protection.....	74
17.4.1.	Functional principle.....	75
17.5.	Operation.....	75
17.6.	Deactivation criteria.....	76
17.7.	Limits of the system.....	77
<b>18.</b>	<b>Hazard Preview.....</b>	<b>78</b>
18.1.	Functional principle.....	78
18.2.	Warning situation.....	78
<b>19.</b>	<b>Cross Traffic Alert.....</b>	<b>80</b>
19.1.	Functional principle.....	80
19.2.	Cross Traffic Alert Rear.....	80
19.3.	Cross Traffic Alert Front.....	81
19.4.	Displays.....	82
19.5.	Operation.....	83
19.6.	Limits of the system.....	84
<b>20.</b>	<b>Parking Manoeuvring Assistant.....</b>	<b>86</b>
20.1.	Parallel parking/perpendicular parking.....	86
20.1.1.	Currbside parking.....	86
20.1.2.	Cross parking.....	87
20.2.	System components.....	87
20.3.	Control unit.....	89
20.4.	Functional principle.....	89
20.4.1.	Automatic transmission.....	90
20.4.2.	Personal responsibility.....	90
20.5.	Functional prerequisites.....	90
20.5.1.	Measuring parking spaces.....	91
20.5.2.	Suitable parking spaces parallel to the roadway (parallel parking).....	92
20.5.3.	Suitable parking spaces perpendicular to the roadway (bay parking).....	92

# G01 Driver Assistance Systems

## Contents

20.5.4.	Detection of a universal parking space.....	93
20.6.	Operation.....	94
20.6.1.	Park procedure.....	95
20.6.2.	Deactivation criteria.....	95
20.7.	Limits of the system.....	96
<b>21.</b>	<b>Cruise Control.....</b>	<b>97</b>
21.1.	Introduction.....	97
21.2.	Cruise control with braking function.....	97
21.2.1.	Operation.....	97
21.3.	Active speed control with Stop&Go function.....	98
21.3.1.	Operation.....	103
<b>22.</b>	<b>Speed Limit Warning.....</b>	<b>109</b>
22.1.	Operation.....	109
<b>23.</b>	<b>Lateral Guidance Assistants.....</b>	<b>110</b>
23.1.	Launch timeline.....	110
<b>24.</b>	<b>Lane Keeping &amp; Traffic Jam Assistants.....</b>	<b>113</b>
24.1.	Functional principle.....	113
24.1.1.	Hands-off-Detection.....	115
24.1.2.	Functional prerequisites.....	115
24.1.3.	Lane change.....	116
24.1.4.	Function logic.....	116
24.1.5.	Steering interventions.....	116
24.1.6.	Operation.....	118
24.1.7.	Deactivation criteria.....	120
24.1.8.	Limits of the system.....	120
<b>25.</b>	<b>Active Lane Keeping Assistant.....</b>	<b>121</b>
25.1.	Side Collision Avoidance.....	121
25.1.1.	Reduced Side Collision Avoidance.....	121
25.2.	Lane departure warning.....	122
25.3.	Lane change warning.....	123
<b>26.</b>	<b>Evasion Aid.....</b>	<b>124</b>
26.1.	Functional principle.....	124
26.2.	System overview.....	127
26.3.	Operation.....	129
26.4.	Functional prerequisites.....	129
26.5.	Limits of the system.....	130

# G01 Driver Assistance Systems

## 1. Introduction

Assistance systems are becoming increasingly important in automotive engineering. "Autonomous driving" is a topic that is of great significance for mobility in the future, for example.

The G12 laid the foundation here, and the range of assistance systems was extended once more to include new, revolutionary systems with the G30.

The assistance systems in the new BMW X3 offer the driver extensive options for assisted driving. The G01 therefore also features the product strategy introduced with the G30.

Today, numerous and increasingly intelligent assistance systems are being incorporated in motor vehicles. The interaction of the many different systems supports the driver in every respect. Whether by offering greater comfort when driving or parking or by providing a reassuring feeling of safety in all situations.

### 1.1. BMW Personal CoPilot

The generic term **BMW Personal CoPilot** will be used in future to describe all available assistance systems and activities on the road to highly and full automated driving and autonomous parking.

The term shows that even with increasing automation, the driver decides at all times but can be provided with assistance when required.

BMW Personal CoPilot should therefore not be seen as optional equipment, but functions instead as a "generic term" for the assistance systems for automated driving, comparable with BMW ConnectedDrive, which still serves as umbrella term for bundling the services and apps for vehicle networking.

### 1.2. The road to "Autonomous driving"

Some assistance systems seem to control complex operations so independently that the term "autonomous driving" is frequently used in the media. We must therefore ask ourselves the question what "autonomous driving" really is.

In order to describe different scenarios and ensure clarity, agreement was reached on classification in different levels of automation.

Whereas the German Federal Highway Research Institute uses 4 levels for classification up to fully automated driving, the automotive industry adds Level 5 as a further important classification level.

# G01 Driver Assistance Systems

## 1. Introduction

### 1.2.1. Overview of classification levels



Classification levels

- **Level 1**  
Assistance systems assist the driver in vehicle operation, e.g. active cruise control. The driver is **not** relieved of his full responsibility for driving the vehicle.
- **Level 2**  
In the case of **semi-automated driving**, the systems assist the driver in longitudinal and lateral guidance of the vehicle by acceleration and braking or when parking and manoeuvring. At this level, the driver must **always monitor the activated functions and remains responsible for the driving task**.
- **Level 3**  
With **highly-automated driving**, the driver no longer has to permanently monitor the systems and is allowed for the first time to turn his attention to secondary activities. Nevertheless, **he must be in a position to take back control over the vehicle within a prewarning time**. When the system is activated, the vehicle independently performs functions such as activating the turn indicators and also carries out longitudinal and lateral guidance to keep the vehicle in lane or change lane. The system requests the driver to take control if it detects its limits. This form of automated driving is technically partially possible today. However, Level 3 vehicles are **not** yet approved by the statutory authorities for use on public roads.
- **Level 4**  
Designates **fully automated driving**. At this level, the vehicle can perform driving tasks on its own from start to finish. The driver no longer has to monitor the system and can devote extensive attention to other things. However, **here also the occupants are requested to take over driving tasks again if special situations occur** which mean that the system reaches its limits. With this technological level, BMW will give its customers the choice of steering the vehicle themselves.



# G01 Driver Assistance Systems

## 1. Introduction

- **Level 5**  
This is **complete autonomy of the vehicle. The vehicle is fully responsible for driving**, driverless operation is possible and the presence of a driver is no longer necessary.

"Autonomous driving" means independent driving of a vehicle to a specific target in real traffic without the intervention of a human driver. However, a number of prerequisites are still missing for realization of this level, including the necessary legal basis.

Due to the high technological level of a G12 and the G30, and now also the new BMW X3 (G01), these models are all classified as Level 2 vehicles.

Drivers are still expected to drive with both hands on the steering wheel, although systems would today already be in a position to drive the vehicle autonomously in certain situations.

The 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 Product Information contains an overview of all the assistance systems used in the G01:

- Frontal Collision Warning with City Collision Mitigation
- Daytime Pedestrian Protection
- Lane Departure Warning
- Blind Spot Detection
- Side Collision Avoidance
- Road Sign Recognition
- Proactive Driving Assistant
- Fatigue and Focus Alert
- Camera systems
- Park Distance Control
- Cross Traffic Alert
- Parking Manoeuvring Assistant
- 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 assistance systems. This applies not only for the far range but also the close range.

# G01 Driver Assistance Systems

## 1. Introduction

The optional functions available for the G01 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.

### 1.3. Further information

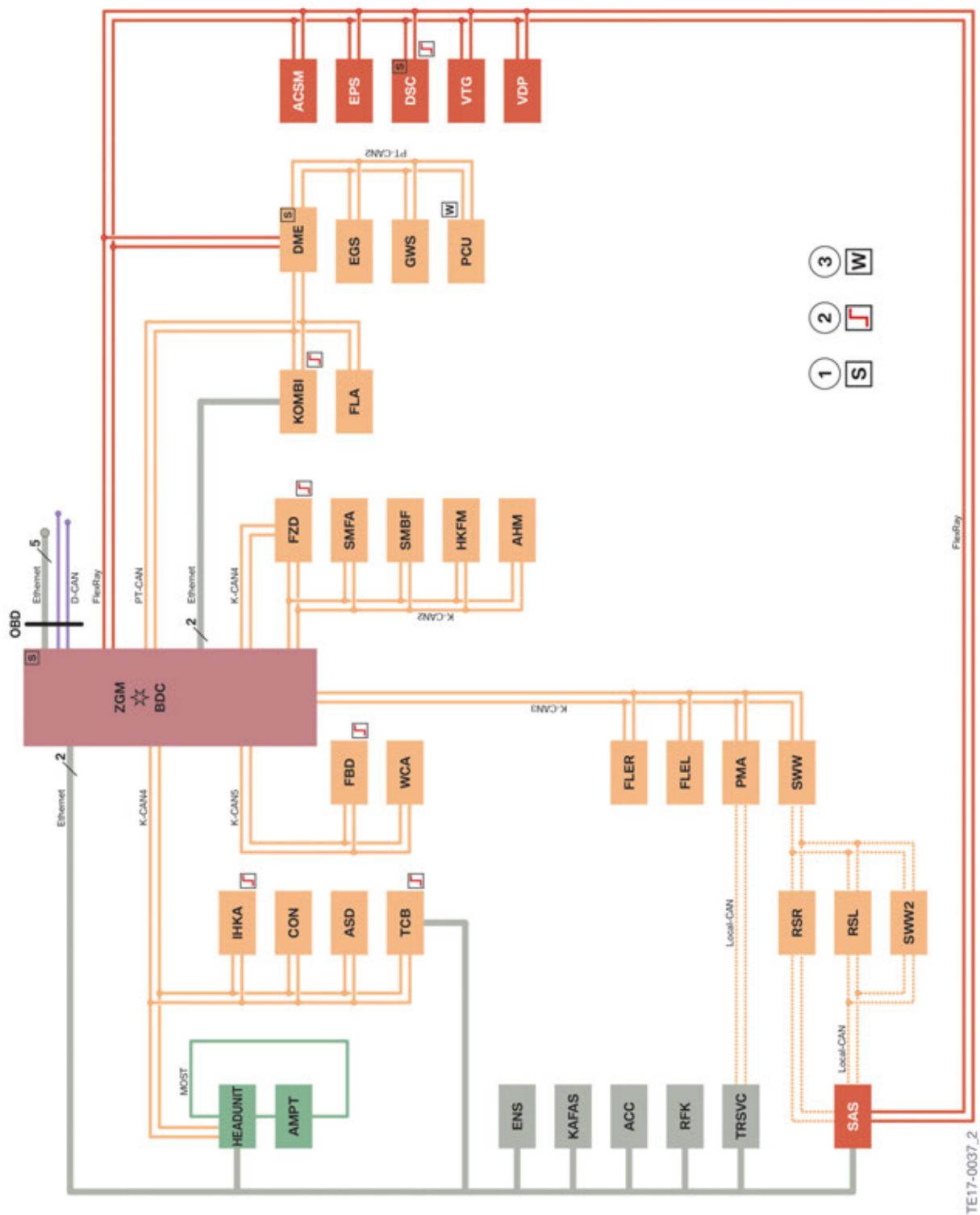
The assistance systems of the new BMW X3 build on those of the BMW 7 Series G12. Accompanying information for the topics listed below may be found in the G12 assistance systems product information.

Topic	Product information
Proactive driving assistant	ST1501 G12 Driver Assistance Systems (chapter 12)
Auto PDC	ST1501 G12 Driver Assistance Systems (chapter 16.2)
Active Park Distance Control	ST1501 G12 Driver Assistance Systems(chapter 16.3)
Parking Manoeuvring Assistant	ST1501 G12 Driver Assistance Systems (chapter 19)
Hands-off-Detection	ST1501 G12 Driver Assistance Systems (chapter 23.1.1)

For more information on the operating concept of the assistance systems, please refer to the Owner's Handbook.

# G01 Driver Assistance Systems

## 2. Bus Overview G01



G01 bus overview

# G01 Driver Assistance Systems

## 2. Bus Overview G01

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
EPS	Electromechanical Power Steering
ENS	Ethernet switch
FLA	High-beam assistant
FLER	Frontal Light Electronics Right
FLEL	Frontal Light Electronics Left
FZD	Roof function center
FBD	Remote control receiver
GWS	Gear selector
HEADUNIT	Headunit
HKFM	Tailgate function module
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver support systems
KOMBI	Instrument panel
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	Seat module, front passenger
SMFA	Seat module, driver
SWW	Lane change warning (primary)
SWW2	Lane change warning (secondary)
TCB	Telematic Communication Box
TRSVc	Top rear side view camera

# G01 Driver Assistance Systems

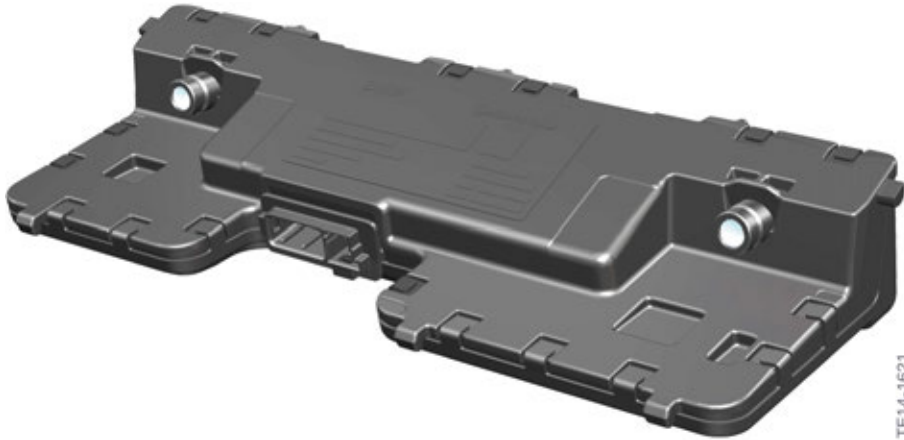
## 2. Bus Overview G01

Index	Explanation
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 authorization
3	Control units also connected at terminal 15WUP

# G01 Driver Assistance Systems

## 3. KAFAS

Since the requirements for the KAFAS camera have increased again for the new BMW X3, the KAFAS stereo camera familiar from the G12 is also used in the G01.



KAFAS stereo camera

The KAFAS stereo camera is calibrated within a distance of approximately 2 km (1.2 mph) 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
- Speed Limit Info

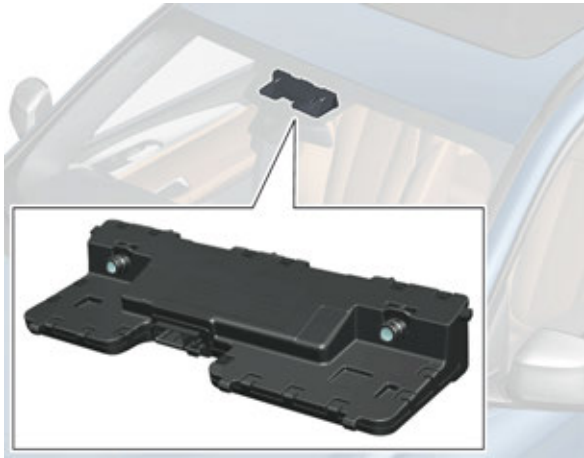
The KAFAS stereo camera plays a supporting role in the following systems:

- Active Cruise Control with Stop&Go Function
- Steering and Lane Control Assistant including Traffic Jam Assistant
- Active Lane Keeping Assistant with Side Collision Avoidance

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

# G01 Driver Assistance Systems

## 3. KAFAS



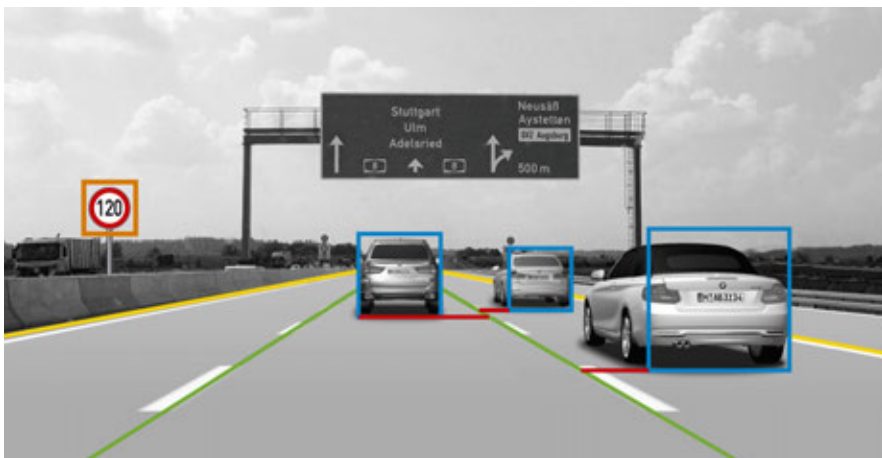
G01 KAFAS stereo camera

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 40 m / 131 feet ahead of the vehicle and up to approximately 5 m / 16 feet in front of the vehicle on the right and left. The overall detection range of the KAFAS stereo camera is approximately 500 m / 1640 feet.

The tasks of the KAFAS stereo camera are:

- Person recognition
- Speed limit info
- Lane detection



KAFAS stereo camera detection range

# G01 Driver Assistance Systems

## 3. KAFAS

### 3.1. Functional limitations

The function of the KAFAS stereo camera and thus the function of the corresponding 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 roadworks are being carried out
- 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. tax discs, 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



Example of limits of the KAFAS stereo camera



Due to functional limitations and system restrictions it may transpire that warnings and orders 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.



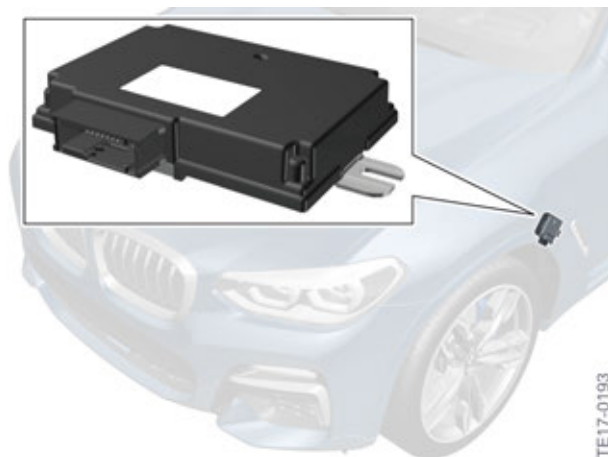
# G01 Driver Assistance Systems

## 4. Optional Equipment System

The G01 also features the optional equipment system (SAS) control unit which is already familiar and which provides a host of driver assistance 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
- Steering and Lane Control Assistant including Traffic Jam Assistant
- Active Lane Keeping Assistant with Side Collision Avoidance
- Evasion Aid
- Speed Limit Information
- Lane departure warning
- Crossing Traffic Alert
- Parking Manoeuvring Assistant
- Proactive Driving Assistant

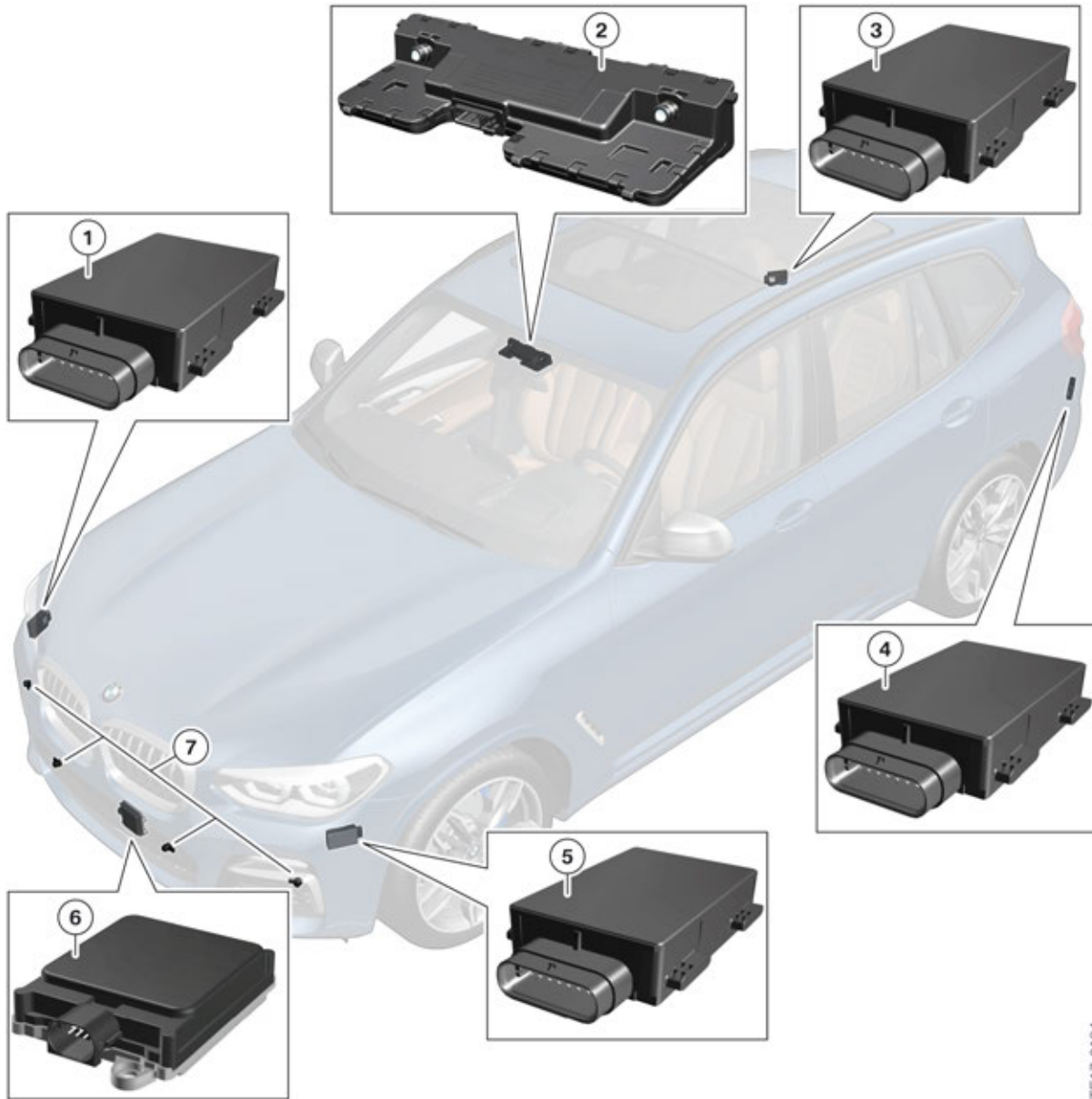


G01 Control unit for optional equipment system SAS

# G01 Driver Assistance Systems

## 5. Overview of Sensors

The graphic below provides an overview of the main sensors used in the G01 for the assistance systems and shows their installation locations.



G01 Overview of sensors

TE17-0194

# G01 Driver Assistance Systems

## 5. Overview of Sensors

Index	Explanation
1	Control unit for radar sensor, right (RSR)
2	KAFAS stereo camera
3	Lane change warning, right (primary)
4	Lane change warning, left (secondary)
5	Control unit for radar sensor, left (RSL)
6	Active Cruise Control (ACC)
7	PDC sensors, front

# G01 Driver Assistance Systems

## 6. Intelligent Safety

Nowadays, we simply cannot imagine driving without assistance systems. Ever increasing traffic on our roads makes ever increasing demands on man and machine. The systems have different functions: some gather information to help the driver in the decision-making process, others take on the driver's roles in monotonous traffic situations or intervene to make corrections.

The assistance systems support the driver on highways and in urban environments. In urban traffic, for example, systems such as pedestrian warning with city braking function provide support. The lane departure and lane change warning 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.

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, the 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 G01:

- Frontal Collision Warning with City Collision Mitigation
- Pedestrian Warning with City Braking Activation function
- Lane Departure Warning
- Lane Change Warning
- Side Collision Avoidance
- Evasion Aid

The Intelligent Safety button, already familiar from other BMW models, enables the 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.



G01 Intelligent Safety button

# G01 Driver Assistance Systems

## 6. Intelligent Safety

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.



G01 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.

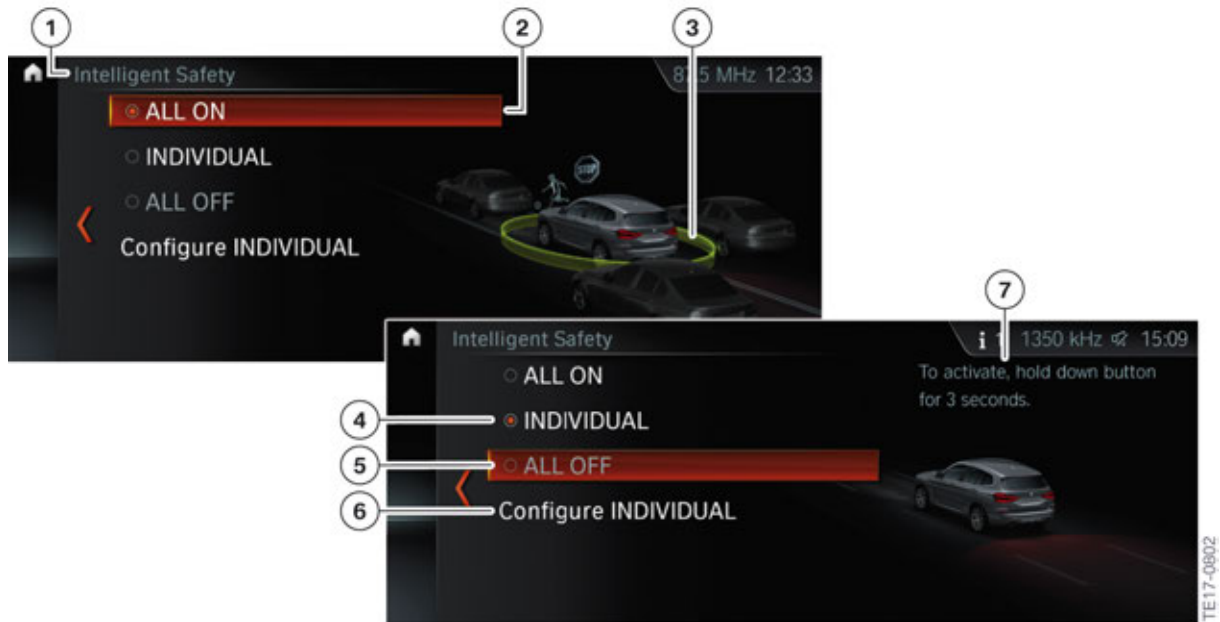
The Intelligent Safety systems are automatically active after each engine start via the START-STOP button.

# G01 Driver Assistance Systems

## 6. Intelligent Safety

### 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).



G01 Intelligent Safety overview configuration menu

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 changes 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"

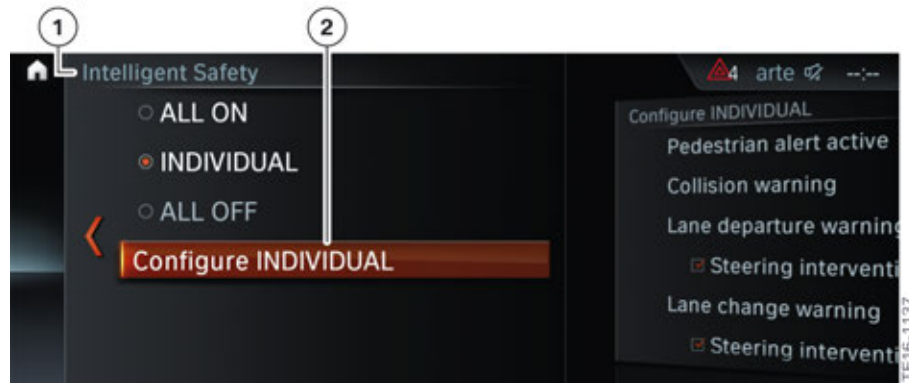
- All Intelligent Safety systems are switched on. The basic settings are activated for the subfunctions, for example the warning time setting. The Intelligent Safety button lights up green.

# G01 Driver Assistance Systems

## 6. Intelligent Safety

### "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.



G01 Intelligent Safety ("Configure INDIVIDUAL" selection)

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



G01 Intelligent Safety "INDIVIDUAL" configuration menu (settings options)

# G01 Driver Assistance Systems

## 6. Intelligent Safety

Index	Explanation
1	"Configure INDIVIDUAL "
2	"Pedestrian warning active"
3	"Collision warning" (selected setting: Early)
4	"Lane departure warning" (selected setting: Always)
5	"Steering intervention"
6	"Lane change warning" (selected setting: Medium)
7	"Steering intervention"
8	"side collision avoidance" (selected setting: on)
9	"Give way warning" (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.



# G01 Driver Assistance Systems

## 7. Collision Warning

### 7.1. Introduction

The collision warning first provides a visual warning and then also an acoustic warning about critical traffic situations. If the driver does not react, the system will initiate emergency braking as necessary in the event of danger.

The version of the collision warning system:

- **Front Collision Warning with City Collision Mitigation**

The camera-based collision warning is part of the optional equipment Active Driving Assistant (OE 5AS) in the G01.

On vehicles that have the optional equipment Active Driving Assistant (OE 5AS) as well as the active cruise control with Stop&Go function (OE 5DF), the radar sensor of the cruise control is also used to control the collision warning (in this case the vehicle is automatically equipped with the collision warning system with braking function).

The collision warning system with braking function is part of the optional equipment Active Driving Assistant Plus (OE 5AT) in the G01. In the case of the collision warning system with braking function, there is system fusion of the KAFAS stereo camera and ACC radar sensor (front radar sensor).

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

If the vehicle is not equipped with the optional equipment Active Driving Assistant (OE 5AS) or Active Driving Assistant Plus (OE 5AT), but does have the optional equipment active cruise control with Stop&Go function (OE 5DF), the customer also receives a collision warning system with braking function.

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.



---

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.

---

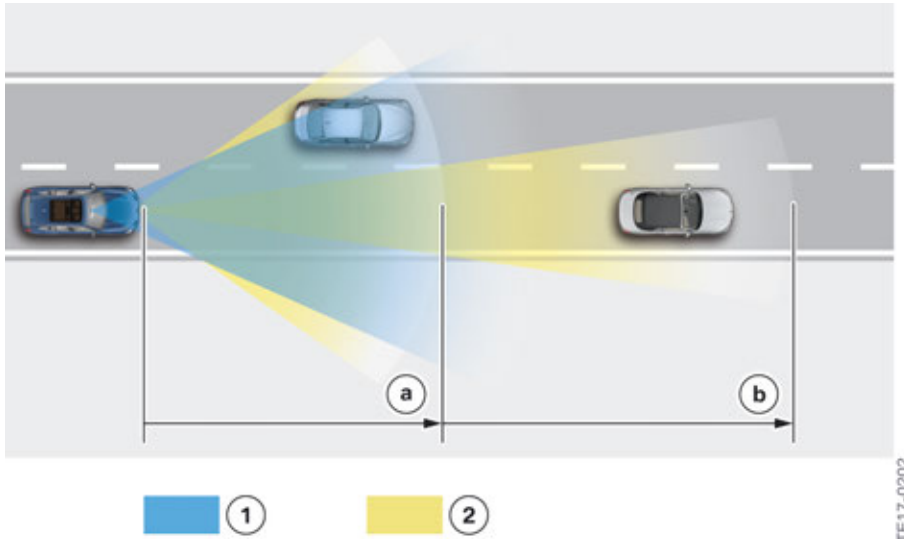
### 7.2. Functional principle

The KAFAS stereo camera captures the scene in front of the vehicle and detects entire rear views of moving and stationary vehicles in the field of view using image processing.

In vehicles with Active Cruise Control with Stop&Go function (OE 5DF) or the optional equipment Active Driving Assistant Plus (OE 5AT), the information of the radar sensor is evaluated in addition to the image data from the KAFAS stereo camera.

# G01 Driver Assistance Systems

## 7. Collision Warning



G01 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

The corresponding warning stages "prewarning" and "acute warning" are output in critical situations on the basis of the calculated positions, distances and relative speeds of other vehicles. For the prewarning, the brakes of the vehicle are prepared and the activation thresholds of the brake assistant are reduced. This permits faster response characteristics of the brakes. If the driver makes the conscious decision to drive up close to the vehicle ahead, warnings which may otherwise be distracting can be prevented by reducing the sensitivity of the system.

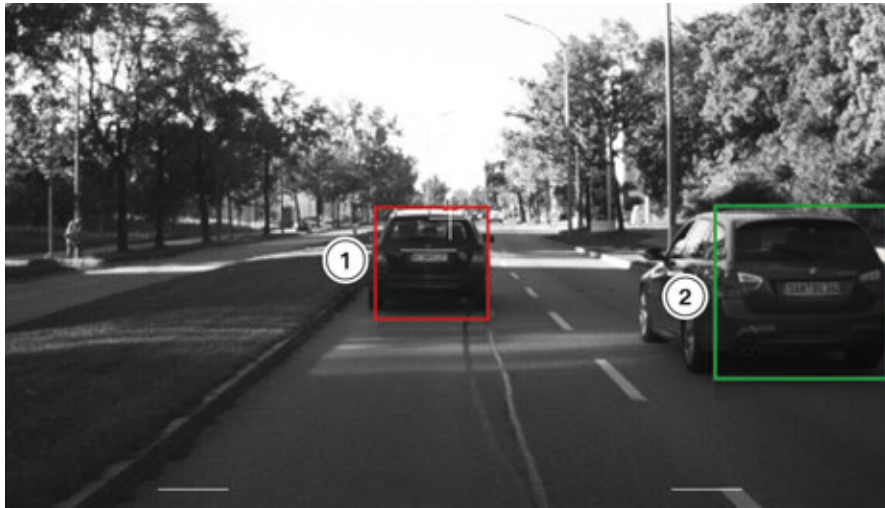
### 7.2.1. Front Collision Warning with City Collision Mitigation

The collision warning with city collision mitigation provides assistance from a speed of around 5 km/h (3 mph) up to a maximum speed of approx. 85 km/h (52 mph). This takes place with a supporting brake intervention if required. If the driver still does not react after an acute warning in this speed range, the vehicle will be decelerated by an automatically initiated brake intervention. The brake force of the brake intervention is regulated depending on the situation and can also reach maximum deceleration.

In the G01, the camera-based collision warning with city braking function is part of the optional equipment Active Driving Assistant (OE 5AS) and is realized using the KAFAS stereo camera.

# G01 Driver Assistance Systems

## 7. Collision Warning



Example of vehicle identification by KAFAS camera

Index	Explanation
1	Vehicle in same lane
2	Vehicle in different lane

### 7.2.2. Collision warning with braking function

The collision warning with braking function is active from a speed of around 5 km/h (3 mph) up to a maximum speed of 250 km/h (155 mph).

If there is still no driver reaction after an acute warning in this speed range, a brake intervention will be automatically initiated. The automatically initiated brake intervention takes place in 2 different forms, depending on the speed of the vehicle.

The brake intervention types differ as follows:

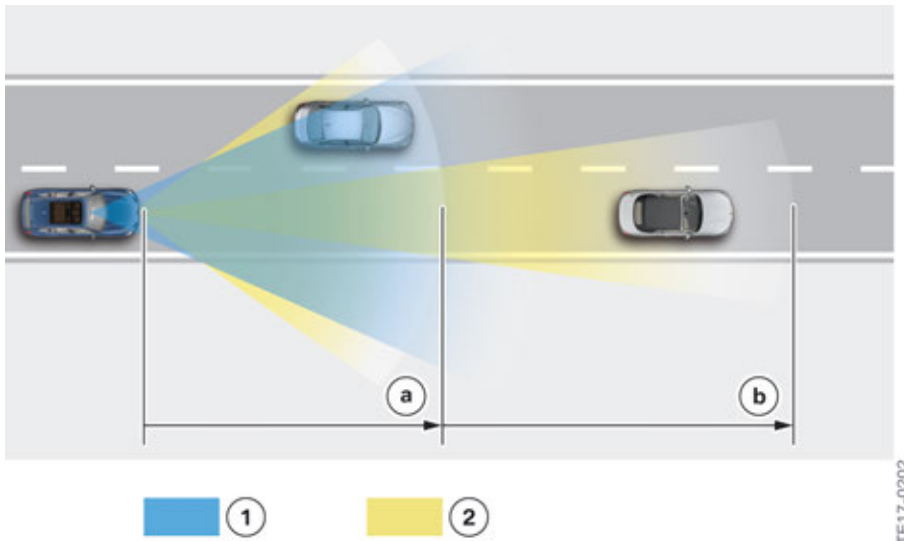
Speed range	Brake intervention
Speed from around 5 km/h (3 mph) up to a speed of approx. 210 km/h (130 mph)	<ul style="list-style-type: none"><li>The vehicle is decelerated by an automatically initiated brake intervention*</li></ul>
Speed from around 210 km/h (130 mph) up to a maximum speed of approx. 250 km/h (155 mph)	<ul style="list-style-type: none"><li>Brake intervention takes place as a short braking jolt</li><li>There is no automatic deceleration</li></ul>

\*The force of the brake intervention is situation-dependent.

In the case of the collision warning system with braking function, there is system fusion of the KAFAS stereo camera and ACC radar sensor (front radar sensor).

# G01 Driver Assistance Systems

## 7. Collision Warning



G01 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



### 7.3. Warning and braking function

The operating principle of the collision warning is based on a detection and warning algorithm. The image processing system recognizes vehicles in the detection range of the camera. If there is a risk of a collision, a warning symbol is shown in the instrument cluster (KOMBI), or in the Head-Up Display for vehicles with the Head-Up Display optional equipment (OE 610). The warning function is divided into two stages. The next probable movement of an object is determined based on the current movement of the detected object and, taking into account the movement of the object, a collision risk is identified. If a situation is evaluated as critical by the warning algorithm, a warning is issued and braking is introduced based on a multistage warning concept.

# G01 Driver Assistance Systems

## 7. Collision Warning

### 7.3.1. Displays

Symbols	Explanation
	Early warning: <ul style="list-style-type: none"><li>• Vehicle symbol lights up red</li><li>• Increase distance and brake if necessary</li></ul>
	Acute warning: <ul style="list-style-type: none"><li>• Vehicle symbol flashes red and a signal sounds</li><li>• Request for intervention by braking and evasive action, if necessary</li></ul>

### 7.3.2. Early warning

Occasions when an early warning is issued include when there is a collision risk because the vehicle driving ahead is being driven at a much slower speed and/or if the distance to a driven or stationary vehicle ahead is extremely short.

An early warning is indicated by a vehicle symbol which lights up red in the instrument cluster (KOMBI) or Head-Up Display.

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



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.

### 7.3.3. Acute warning

The acute warning is issued by the system as late as possible and only if there is an immediate danger of a collision when the vehicle is approaching the vehicle driving ahead at a relatively high differential speed. The acute warning therefore cannot be deliberately brought about or monitored by the driver.

If the vehicle is approaching the vehicle ahead very slowly, for example, no acute warning is issued even if the distance is very small. This way there are fewer meaningless and annoying acute warnings issued by the system.

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.

# G01 Driver Assistance Systems

## 7. Collision Warning

If an acute warning is issued, this is indicated to the driver by a red flashing vehicle symbol in the instrument cluster (KOMBI) or Head-Up Display. An acoustic warning signal also sounds.

When the acute warning is issued, the brake system is also preconditioned in order to achieve quicker and sharper deceleration. With these measures the driver also receives specific support at the same time as the warning in order to be able to respond effectively.



---

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

---

### 7.3.4. Brake intervention

If the driver no longer has the option to avoid the accident with his own response, automatic brake intervention is effected as a last step.

The automatically initiated brake intervention is functionally realized in different ways depending on the system installed in the vehicle, either "collision warning with city braking function" or "collision warning with braking function". Additional information on this is provided in section 7.2.1 "Collision warning with city braking function" and in section 7.2.2 "Collision warning with braking function".

The brake force depends on the distance and differential speed in relation to the detected obstacle and may also correspond to maximum deceleration. The driver has the possibility to override and thus cancel the automatic panic braking at any time by means of a steering wheel movement (avoidance maneuver), acceleration or a strong brake intervention.

For a brake intervention to be possible, the Dynamic Stability Control (DSC) must be switched on. However, the brake intervention also takes place if DTC mode was previously activated, because Dynamic Stability Control (DSC) is automatically activated in the event of a brake intervention initiated by the system.

## 7.4. Operation

The collision warning function is switched on and off via the Intelligent Safety button.

# G01 Driver Assistance Systems

## 7. Collision Warning



G01 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. The front protection function must be deactivated if the acute warning should not take place. This can be realized only by deactivating all Intelligent Safety systems by a long press of the Intelligent Safety button.

### 7.5. Limits of the system

#### Range of detection



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.

# G01 Driver Assistance Systems

## 7. Collision Warning

### Functional limitations

The function of the KAFAS stereo camera and thus also the function of the corresponding 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.
- 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 orders 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.

---



# G01 Driver Assistance Systems

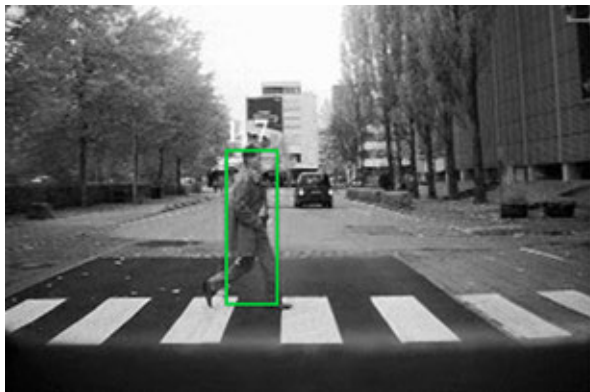
## 8. Daytime Pedestrian Protection

In the G01, the camera-based pedestrian warning with city braking function is part of the optional equipment Active Driving Assistant (OE 5AS) is done by using the KAFAS stereo camera.

The pedestrian warning with city braking function is designed to prevent possible collisions with pedestrians in urban areas or reduce the effects of an accident. The system warns of a possible collision with pedestrians from a speed of approximately 5 km/h (3 mph) up to a maximum speed of 65 km/h (40 mph) and assists the driver with a brake intervention shortly before a collision.

### 8.1. Functional principle

The KAFAS stereo camera captures the scene in front of the vehicle and detects pedestrians in the field of view using image processing.



Example of person recognition by KAFAS camera

Based on the calculated positions, distances and the movement of the detected pedestrians, an acute warning is issued in critical situations. A prewarning is **not** implemented with the pedestrian warning with city braking function.

In the case of an acute warning, there is an automatic brake intervention up to maximum deceleration as necessary.


### 8.2. Warning and braking function

The image processing system recognizes persons in the detection range of the camera. Based on a detection and warning algorithm, a warning symbol in the form of a red flashing person is displayed in the instrument cluster KOMBI or in the optional equipment Head-Up Display (OE 610) if there is an imminent danger of a collision. An acoustic warning also sounds at the same time as display of the warning symbol.

# G01 Driver Assistance Systems

## 8. Daytime Pedestrian Protection

### 8.2.1. Displays

Symbols	Explanation
	<p>Acute warning:</p> <ul style="list-style-type: none"><li>• Person symbol flashes red and a signal sounds</li><li>• Request for intervention by braking and evasive action, if necessary</li></ul>

### 8.2.2. Acute warning/brake intervention

On the basis of the current movement of the detected person, the probable further movement is determined and a possible collision risk calculated. A warning is issued if the warning algorithm evaluates a situation as being critical. Braking is also initiated automatically if necessary.

#### Brake intervention

If the driver is not longer able to prevent the collision by reacting on his own, an automatic brake intervention takes place as the last step. The driver has the possibility to override and thus cancel the automatic panic braking at any time by means of a steering wheel movement (avoidance maneuver), acceleration or a strong brake intervention.

For a brake intervention to be possible, the Dynamic Stability Control (DSC) must be switched on. However, the brake intervention also takes place if DTC mode was previously activated, because Dynamic Stability Control (DSC) is automatically activated in the event of a brake intervention initiated by the system.



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

### 8.3. Operation

The pedestrian warning is switched on and off via the Intelligent Safety button.

# G01 Driver Assistance Systems

## 8. Daytime Pedestrian Protection



G01 Intelligent Safety button

Index	Explanation
1	Intelligent Safety button

No option is provided for individual configuration or deactivation of the pedestrian warning function. Deactivation is possible only by deactivating all Intelligent Safety systems. This is done by a long press of the Intelligent Safety button.

### 8.4. Limits of the system

Persons may be partially hidden as a result of the traffic situation and may therefore not be detected.

#### Functional limitations

The function of the KAFAS stereo camera and thus also the function of the corresponding 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 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.

# G01 Driver Assistance Systems

## 8. Daytime Pedestrian Protection



---

Due to functional limitations and system restrictions it may transpire that warnings and orders 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.

---

# G01 Driver Assistance Systems

## 9. Lane Departure Warning

The lane departure warning is an element of the optional equipment Active Driving Assistant (OE 5AS) and the optional equipment Active Driving Assistant Plus (OE 5AT).

The lane departure warning detects lane markings from a speed of approximately 70 km/h (43 mph) 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 haptically 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 haptic warnings on the steering wheel via the iDrive.



G01 Settings menu for steering wheel vibration in the 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.

The lane departure warning can be configured individually in the Intelligent Safety system submenu.

# G01 Driver Assistance Systems

## 9. Lane Departure Warning



G01 Intelligent Safety view on the CID (lane departure warning)



Index	Explanation
1	"Configure INDIVIDUAL"
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.

# G01 Driver Assistance Systems

## 9. Lane Departure Warning

Displays in the instrument cluster (KOMBI)

Symbol	Explanation
 A top-down view of a yellow car icon positioned between two vertical yellow lines representing lane markings. The car is slightly angled towards the right lane. A small vertical text '1E15-09/8' is visible on the right side of the icon.	System is activated. Prerequisites for warnings are no longer met.
 A top-down view of a green car icon positioned between two vertical green lines representing lane markings. The car is slightly angled towards the right lane. A small vertical text '1E15-09/9' is visible on the right side of the icon.	At least one lane boundary has been detected and warnings can be issued.

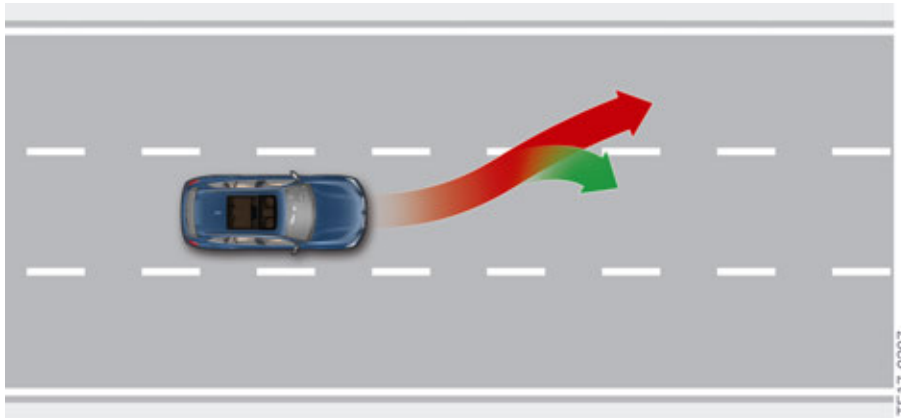
### 9.1. Active steering intervention

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 briefly active steering intervention.

# G01 Driver Assistance Systems

## 9. Lane Departure Warning



G01 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.



G01 Intelligent Safety view in the CID (lane departure warning with active steering intervention)

Index	Explanation
1	"Configure INDIVIDUAL "
2	"Steering intervention" (switching the steering intervention for lane departure warning on and off)

Steering interventions are not initiated when the trailer socket is in use, such as when a trailer is being towed or a bicycle carrier is mounted.



# G01 Driver Assistance Systems

## 9. Lane Departure Warning

### 9.2. Deactivation criteria

The lane departure warning is available at a speed range from 70 km/h to 210 km/h.

A warning is not issued in the following situations:

- Use of the turn indicator
- In roadworks
- Lane is narrower than 2.60 m.

The warning is cancelled in the following situations:

- Automatically after approximately 3 seconds
- As soon as the driver moves back into his own lane
- The turn indicator is used
- When sharp braking or steering maneuvers are made and when the Dynamic Stability Control (DSC) intervenes.

### 9.3. Limits of the system

The function of the system may not be available or may only be available to a limited extent in the following situations:

- Heavy fog, rain or snow.
- At sharp bends or on narrow roadways.
- If boundary lines are covered by snow, ice, dirt or water.
- If boundary lines are covered by objects.
- If boundary lines are missing, worn, poorly visible, converging or diverging, or not clearly recognizable, such as when driving through roadworks.



---

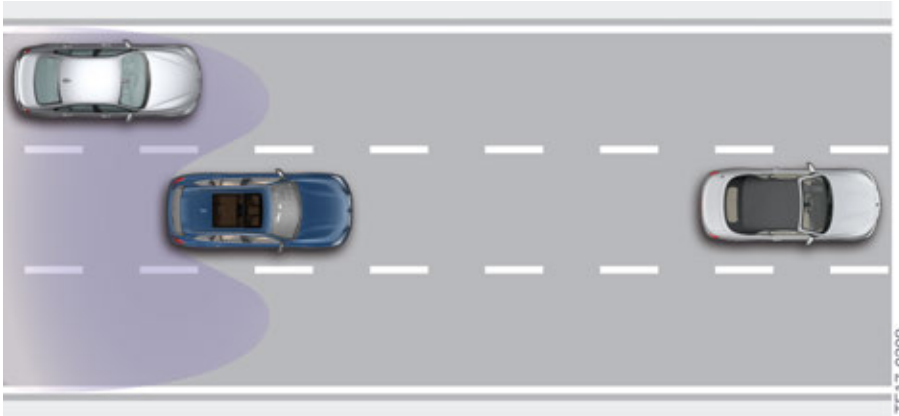
The system does not replace the personal assessment of the road and the traffic situation. The lane departure warning is only intended to assist the driver. When active lane departure warnings are issued, the steering wheel should not be moved through any unnecessarily heavy-handed actions.

---

# G01 Driver Assistance Systems

## 10. Active Blind Spot Detection

The Active Blind Spot Detection system can detect traffic situations that could pose a risk if the driver changes lane. These traffic situations include vehicles approaching quickly from behind or vehicles in the driver's blind spot.



G01 Vehicle detection using radar sensors (active blind spot detection)

The control units (radar sensors) for the Active Blind Spot Detection (SDD) are located under the rear bumper.



G01 Active blind spot detection (SDD) (radar sensors)

The control unit for the Active Blind Spot Detection (SDD) (primary) is installed on the right and the control unit for the Active Blind Spot Detection (SDD2) (secondary) is installed on the left.

When a vehicle is detected and the system is activated, the driver is informed of the situation by an unobtrusive indicator in the exterior mirror. By having this information before making a lane change maneuver, the driver can confidently prepare for the lane change and avoid critical situations from the outset.

The Active Blind Spot Detection indicators are located in the exterior mirror glass.

# G01 Driver Assistance Systems

## 10. Active Blind Spot Detection



G01 Signal unit (LED) in mirror glass

The driver must steer the vehicle back into his own lane to avoid a potential collision.

The Active Blind Spot Detection can be configured individually in the Intelligent Safety system submenu.



G01 Intelligent Safety view on the CID (active blind spot detection)

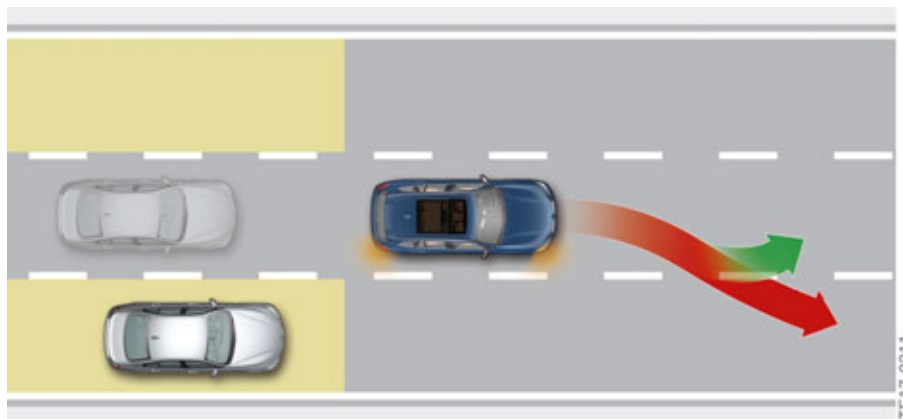
# G01 Driver Assistance Systems

## 10. Active Blind Spot Detection

Index	Explanation
1	"Configure INDIVIDUAL "
2	"Lane change warning" (selected setting: Medium)
3	"Lane change warning" (settings options: Early, Medium, Late, Off)

### 10.1. Active steering intervention

Depending on the setting in the "Intelligent Safety" menu, a brief active steering intervention is initiated by the system that assists in moving the vehicle back into the original lane (vehicles with the side collision avoidance (included in the Active Driving Assistant Plus optional equipment OE 5AT)).



G01 Lane change warning (active steering intervention)

The corresponding lane change warning indicator flashes in the exterior mirror at the same time.

The steering intervention is initiated within a speed range of between 70 km/h and 210 km/h (43 mph and 130 mph).

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.

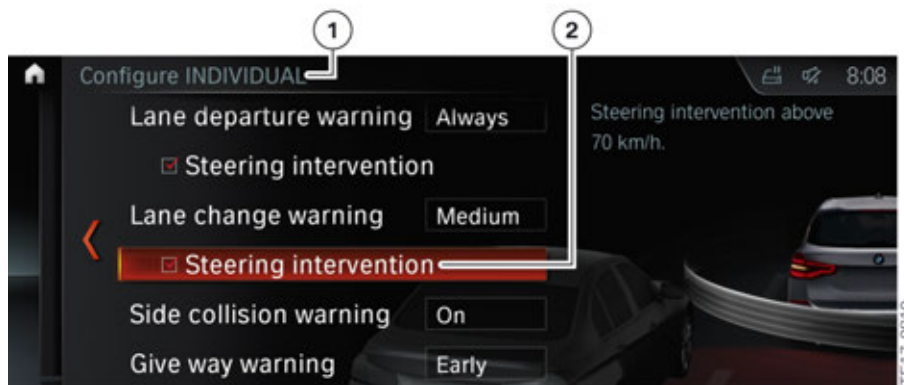
The "steering intervention" for the lane change warning can be switched on and off via the iDrive menu in vehicles with the side collision avoidance by making the following selection via the controller:

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

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

# G01 Driver Assistance Systems

## 10. Active Blind Spot Detection



G01 Intelligent Safety view on the CID (lane change warning with active steering intervention)

Index	Explanation
1	"Configure INDIVIDUAL "
2	"Steering intervention" (switching the steering intervention for lane change warning on and off)

### 10.2. Limits of the system

The function of the system may not be available or may only be available to a limited extent in the following situations:

- Heavy fog, rain or snow.
- At sharp bends or on narrow roadways.
- If the bumper is dirty, iced up or stickers are placed over it.
- If the speed of the approaching vehicle is much higher than the driver's speed.

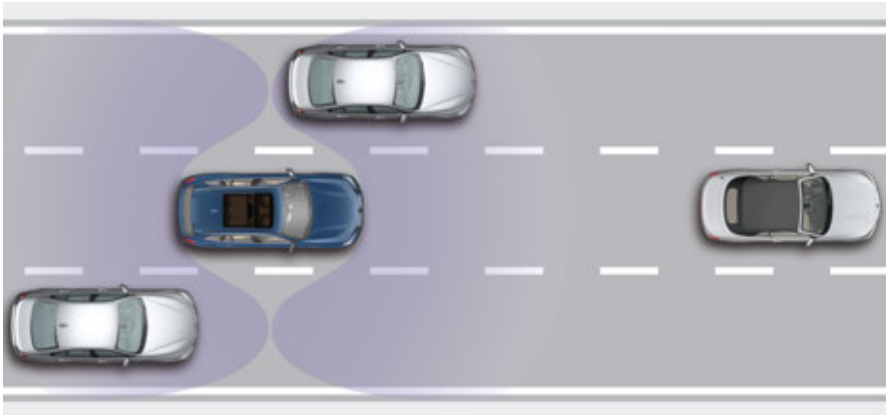
# G01 Driver Assistance Systems

## 11. Side Collision Avoidance

The Side Collision Avoidance is part of the Active Lane Keeping Assistant with active side collision protection. The Active Lane Keeping Assistant with active side collision protection is part of the scope of supply of the Active Driving Assistant Plus optional equipment (OE 5AT). The side collision avoidance is not available separately.

The side collision avoidance assists the driver in avoiding a potential side collision.

Four radar sensors monitor the area next to the vehicle and function regardless of the lighting conditions and largely irrespective of the weather conditions.



G01 vehicle detection using radar sensors (side collision avoidance)

If there is a risk of a collision, the corresponding indicator flashes (depending on which side the risk relates to, left or right) in the exterior mirror with high intensity and the steering wheel starts to vibrate.

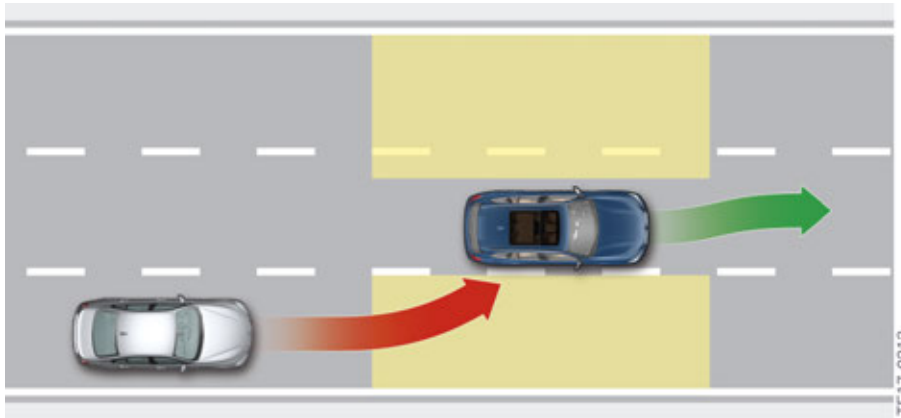


G01 signal unit (LED) in mirror glass

An active steering intervention is then initiated, which assists the driver in moving his vehicle back to a safe area within his own lane.

# G01 Driver Assistance Systems

## 11. Side Collision Avoidance



G01 side collision avoidance with active steering intervention in the event of a potential side collision

The steering intervention is initiated within a speed range of between 70 km/h and 210 km/h.

The active steering intervention can be felt on the steering wheel, but can be manually overridden by the driver at any time.

### Radar sensors

The rear radar sensors are lane change warning (SWW) sensors.



G01 lane change warning (SWW) (radar sensors)

Two additional radar sensors are used for the front side collision avoidance.

# G01 Driver Assistance Systems

## 11. Side Collision Avoidance



G01 side collision avoidance (radar sensors)

### Functional prerequisites

A prerequisite for the activation of the side collision avoidance with steering intervention is that the lane markings must be detected by the KAFAS stereo camera.

If the lane markings are not detected or if the driver is driving within the speed range of 30 km/h to 70 km/h, only the Reduced Side Collision Avoidance is active. The warning functions in the form of the flashing indicator in the exterior mirror and the vibration of the steering wheel continue to be implemented.

With the Reduced Side Collision Avoidance there is no active lateral guidance of the vehicle. In this case the driver is only warned by a single steering wheel pulse on the opposite side of the wheel to the danger.

The side collision avoidance can be switched on and off via the iDrive menu by making the following selection via the controller:

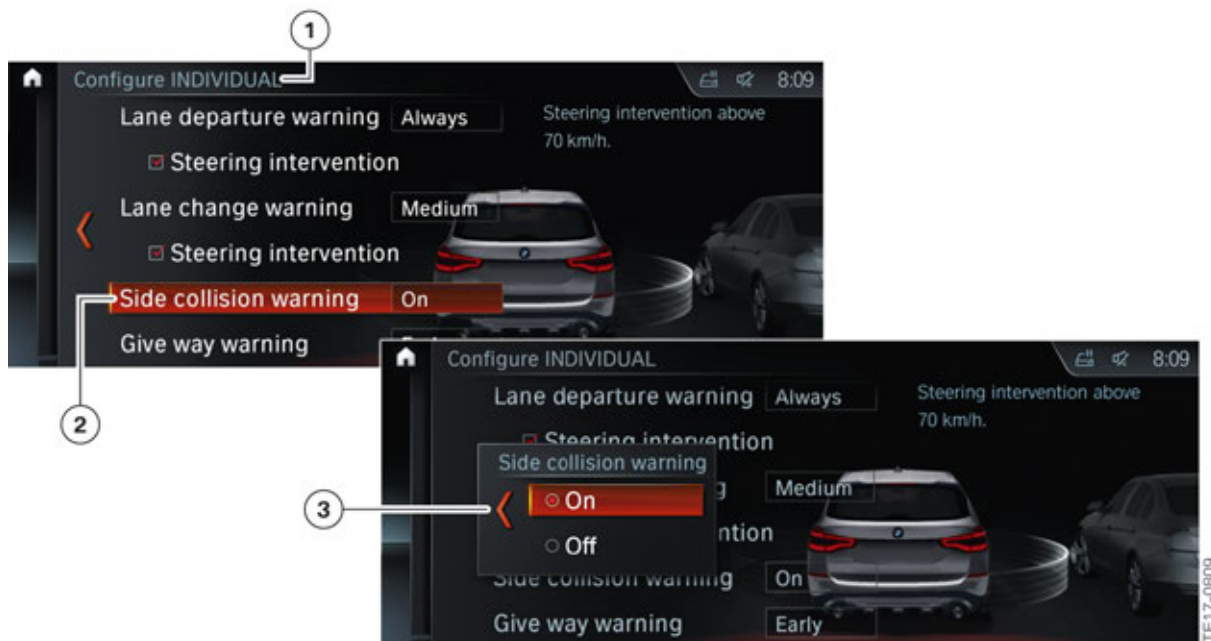
- "My Vehicle"
- "Vehicle settings"
- "Intelligent Safety"
- "Side Collision Avoidance"

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



# G01 Driver Assistance Systems

## 11. Side Collision Avoidance



G01 Intelligent Safety view on the CID (side collision avoidance)

Index	Explanation
1	"Configure INDIVIDUAL"
2	"Side collision avoidance"
3	"Side collision avoidance" (switching the side collision warning with steering intervention on and off)

It is not possible to switch off the steering intervention for the side collision avoidance separately.

The side collision avoidance automatically activates itself again after the vehicle moves off if the function was switched on at the time of the last engine shutdown.

### 11.1. Limits of the system

The function of the system may not be available or may only be available to a limited extent in the following situations:

- Heavy fog, rain or snow.
- At sharp bends or on narrow roadways.
- If the bumper is dirty, iced up or stickers are placed over it.
- If driving at close proximity to a vehicle driving ahead.
- If the speed of the approaching vehicle is much higher than the driver's speed.

# G01 Driver Assistance Systems

## 12. Intersection Warning

Intersections are some of the most likely points for accidents in urban traffic. Statistics tell us that approximately one accident in three with injury to persons occurs at an intersection. Accidents here can largely be attributed to distraction or poor estimation by the drivers.

The intersection warning function was used for the first time in G30 and is able to make a significant contribution to safety. The new BMW X3 is also equipped with this innovative warning system.

The driver is warned both visually and audibly in the event of a risk of a collision with crossing traffic. This can significantly reduce the likelihood of an accident or even the severity of an accident at Intersections.

Intersection warning is an integral part of the optional equipment Active Driving Assistant Plus (OE 5AT).

### 12.1. Functional principle

Intersection warning is able to detect an impending collision with crossing traffic in good time and so such collisions can possibly be prevented by this.

The KAFAS stereo camera and the front radar sensor (ACC radar sensor) monitor the traffic conditions. The information obtained from these sources forms the basis for the system. The sensors detect the distance from other traffic and its speed and direction of movement. The speed of the car is also determined.



G01 Intersection warning

#### 12.1.1. Warning

A warning is issued if a risk of a collision (approximately 1 second before the collision) with crossing traffic is detected and its avoidance by the driver or the crossing traffic is only now possible through an uncomfortable maneuver.

# G01 Driver Assistance Systems

## 12. Intersection Warning

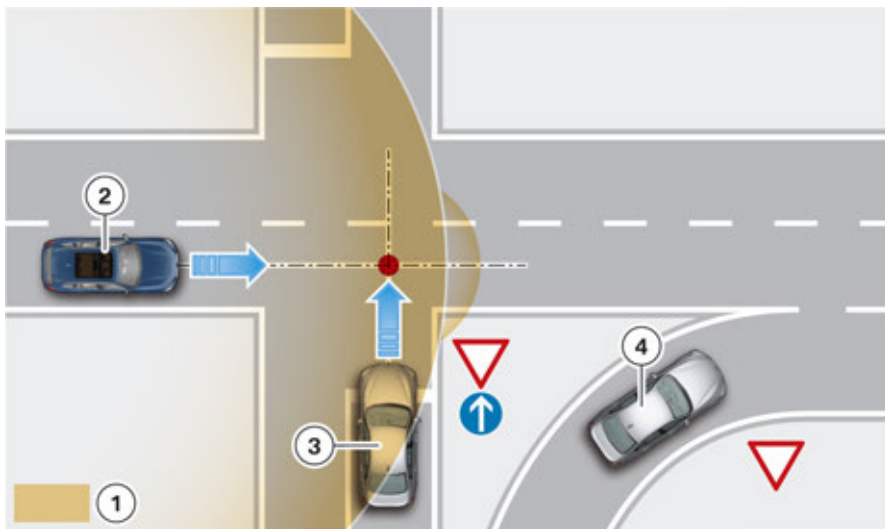


The warning is, however, only issued if the crossing traffic is travelling more slowly than the vehicle.

So if the crossing vehicle is travelling faster than the car, **no** warning would be issued, as the crossing vehicle would be outside the detection range of the sensor system until shortly before the collision.

### Warning range

The graphic below shows the danger area which is decisive for the Intersection warning:



G01 Intersection warning: Danger area

Index	Explanation
1	Danger area
2	Own vehicle
3	Vehicle located in the danger area
4	Vehicle outside the danger area

If the detection system identifies a hazardous situation, it prompts the driver into emergency braking by a visual and an audible warning.



At the same time, the brake system is prefilled. However, there is no automatically triggered brake intervention by the system. It is rather that the driver is prompted to act quickly and to apply the brakes himself. There may be automatic brake-servo assistance during the emergency braking, as necessary. The brake pressure is regulated as needed for effective panic braking.

# G01 Driver Assistance Systems

## 12. Intersection Warning

### Displays

The visual warning is given by the following warning symbols:

Symbol	Explanation
	Intersection warning symbol (warning of vehicle approaching from the left)
	Intersection warning symbol (warning of vehicle approaching from the right)

The visual warning appears in the KOMBI instrument cluster or Head-Up Display if the vehicle is fitted with the Head-Up Display (OE 610).



G01 Intersection warning: Warning symbol

The Intersection warning is active in the speed range from approximately 15 km/h (9 mph) to approximately 65 km/h (40 mph).

The Intersection warning is also switched off by selecting ALL OFF. There is no separate deactivation or configuration option in the iDrive menu for the Intersection warning.



The Intersection warning system does not relieve the driver of personal responsibility for correctly judging the visibility and traffic situation. The driver's driving style should be adapted to the traffic conditions. The driver should check the traffic conditions, and react accordingly if required.

# G01 Driver Assistance Systems

## 12. Intersection Warning

### 12.2. Limits of the system

The function of the Intersection warning may be restricted because of system limits or unfavorable conditions in the following situations, for example:

- If there are other objects in the field of view of the sensors that are concealing the cross traffic.
- Heavy fog, rain or snow.
- If the front bumper is dirty or iced up.
- If stickers have been attached near the radar sensors on the bumper.
- If the speed of the approaching vehicle is very high.
- If crossing objects are moving very slowly.
- If it is almost impossible to detect the crossing traffic because of the way the road runs or topographical conditions, for example in tight bends, building complexes in the way etc.



---

The system does not replace the personal assessment of the road and the traffic situation. The Intersection warning is only intended to assist the driver. There can be functional limitations because of system restrictions or unfavorable topographical conditions.

---

# G01 Driver Assistance Systems

## 13. Road Sign Recognition

The Speed Limit Information optional equipment has been expanded to include the display of no overtaking signs and will be referred to as Road Sign Recognition from now on in this document. Current speed limit signs are detected by the road sign recognition system and displayed in the instrument cluster or the Head-Up Display in the form of road sign symbols.



Top speed limitation symbol shown in the instrument cluster

Index	Explanation
1	Road sign recognition (example: a detected top speed limitation is displayed)

Road sign recognition (Speed Limit Information) is part of the Active Driving Assistant optional equipment (OE 5AS) in the G01.



The system does not relieve the driver of personal responsibility for correctly judging the visibility and traffic situation. The driver is solely responsible for the vehicle and the speed at which it is driven.

### 13.1. Operation

The road sign detection can be switched on and off via the iDrive menu by making the following selection via the controller:

- "My Vehicle"
- "System settings"
- "Displays"
- "Instrument cluster"
- Apply desired settings

# G01 Driver Assistance Systems

## 13. Road Sign Recognition

### 13.2. Limits of the system

Road signs for top speed limitations that do not comply with the legal standard, particularly those without circular frames, are not always detected. The same also applies for road signs which are fully or partially covered by labels, dirt or vegetation. Long distances to the road sign, high driving speeds and poor weather conditions, particularly at night, make it more difficult for the system to recognize road signs reliably. To ensure the current top speed limitations are displayed as accurately as possible, the data of the navigation road map should be up-to-date.

The functionality of the road sign recognition may be impaired in the following situations and may lead to incorrect information being displayed:

- Heavy fog, rain or snow.
- If signs are covered by objects.
- If driving at close proximity to a vehicle driving ahead.
- Strong light in the camera lens.
- If the windscreen in front of the interior mirror is misted over, soiled or covered by stickers, etc.
- As a result of incorrect detection by the camera.
- If the top speed limitations stored in the navigation system are incorrect.
- In areas not covered by the navigation system.
- In the event of deviations from the navigation, e.g. due to modified road layouts.
- When overtaking buses or trucks with speed limit stickers.
- If road signs do not correspond to the standard.
- When calibrating the camera immediately after vehicle delivery.



---

The system does not replace the personal assessment of the traffic situation. Due to system restrictions and functional limitations, it may transpire that warnings and orders are not issued, are issued too late or are unwarranted. The road sign recognition supports the driver and does not replace the human eye.

---

# G01 Driver Assistance Systems

## 14. Proactive Driving Assistant

The Proactive Driving Assistant indicates to the driver the ideal time to lift off the accelerator pedal for a reduction in consumption.

Relevant sections of road are:

- Intersections
- Bends
- Crossroads
- Roundabouts
- Entrances to towns
- Top speed limitations
- Highway exits

Operation of the proactive driving assistant in the G30 requires the active cruise control with Stop&Go function, ACC Stop&Go (OE 5DF) and navigation system Professional (OE 609) optional equipment.



G01 proactive driving assistant displays in the instrument cluster

An indicator in the instrument cluster or Head-Up Display (only with optional equipment OE 610) alerts the driver that he is on a section of road relevant for the proactive driving assistant and gives him the option to react accordingly.

### 14.1. Operation

To use the proactive driving assistant, ECO PRO mode or ECO PRO+ mode must be activated via the driving experience switch.



# G01 Driver Assistance Systems

## 14. Proactive Driving Assistant



G01 Switch block with driving experience switch

The proactive driving assistant can be switched on and off in the ECO PRO configuration menu.



---

The reliability of the system depends on the up-to-dateness and quality of the navigation data.

---

### 14.2. Limits of the system

The proactive driving assistant **is not** available in the following situations:

- Speed below 50 km/h (31 mph)
- Temporary and variable top speed limitation, such as on building sites
- Quality of navigation data insufficient
- Cruise control active
- Trailer towing

For additional information, please refer to the product information **ST1501 G12 Driver Assistance Systems**.

# G01 Driver Assistance Systems

## 15. Fatigue and Focus Alert

The Fatigue and Focus Alert helps to avoid accidents caused by tiredness on long, monotonous journeys. It is part of the Active Protection (OE 5AL) included as standard equipment.

A change in the driver's driving behavior is perceived by the attentiveness assistant. In the event of increasing inattentiveness or if the driver is tired, the Fatigue and Focus Alert shows a display recommending that the driver take a break as a Check Control message in the Central Information Display (CID).

The Fatigue and Focus Alert is automatically active after each engine start from a speed of roughly 70 km/h (43 mph).

### 15.1. Operation

The Fatigue and Focus Alert can be switched on and off via the iDrive menu. The driver can also set the level of sensitivity in this menu by making the following selection via the controller:

- "My Vehicle"
- "Vehicle settings"
- "Attentiveness Assistant"
- Select desired settings



G01 Fatigue and Focus Alert display on the CID

Index	Explanation
1	"Attentiveness Assistant" menu
2	Additional note for the driver
3	"Sensitive"
4	"Standard"
5	"Off"

# G01 Driver Assistance Systems

## 15. Fatigue and Focus Alert

The settings have the following differences:

Selected setting	Explanation
"Sensitive"	The break recommendation is issued earlier (significantly more sensitive or in other words earlier output compared to the "Standard" setting).
"Standard"	The break recommendation is issued with a defined value (in the same way as for BMW models up to now).
"Off"	A break recommendation is not issued.

### 15.2. Limits of the system

The functionality may be impaired in the following situations and no warning or an incorrect warning may be issued:

- If the clock is set incorrectly.
- If the speed is predominantly below approximately 70 km/h (43 mph).
- If the driver adopts a sporty driving style, for example rapid acceleration or fast cornering.
- In active driving situations, for example frequent lane changes.
- Poor road condition.
- Strong crosswind.



The system does not relieve the driver of personal responsibility for correctly judging his physical condition. Increasing inattentiveness or fatigue may not be detected at all or in time.

# G01 Driver Assistance Systems

## 16. Cameras

The camera systems provide support for parking, manoeuvring and for complex exits and Intersections.

The product strategy in relation to the camera systems was adopted from the G30. With the exception of the rear view camera (country-dependent), the systems are no longer available as individual items of optional equipment.

The new range strategy now looks like this:

- The rear view camera is now standard.
- Surround View is offered with the Parking Assistant optional equipment (OE ZX3). The Surround View function with Top View, Panorama View and 3D View provides visibility 360° around the vehicle.
- The Remote 3D view (remote 360°) is presented for the first time with the Parking Assistant optional equipment (OE 5DN). This function allows the customer to display images of his parked vehicle on a mobile device (such as a smartphone).

### 16.1. Surround view

Surround View shows the vehicle surroundings and displays them in TOP View and 3D View on the Central Information Display.

The system comprises the front camera, the two cameras integrated in the exterior mirrors, the rear view camera (RFK) and the top rear side view camera (TRSVK) control unit.

The images from the four cameras are combined into a panorama view around the vehicle from different angles using 3D computer graphics.

The driver can choose from preset views or can freely select the view (for example towbar zoom and car wash entrances).

In addition, assistance functions such as guidance lines can be shown on the Central Information Display.

**The following camera angles can be displayed:**

- Automatic camera angle
- Side view
- Front camera
- Panorama View
- Rear view camera
- Moving camera angle

# G01 Driver Assistance Systems

## 16. Cameras

### 16.1.1. Automatic camera angle

The system automatically shows the most appropriate camera angle depending on the driving situation, thus providing the driver with optimum assistance when parking and manoeuvring. The automatic camera angle shows a steering-dependent view and takes into account the respective direction of travel and the distance information from the Park Distance Control (PDC).

As soon as obstacles are detected, the view changes to a fixed display of the area in front of or behind the vehicle, or changes to the corresponding side view if required.

### 16.1.2. Side view

This view helps the driver to position the vehicle next to the curb or other obstacles at the side of the vehicle by displaying the side surroundings. The side view is from the rear to the front and automatically focuses on potential obstacles if there is a collision risk.

Both the left and right sides of the vehicle are recorded.

### 16.1.3. Front camera

The front camera supports the driver when parking and manoeuvring. The area in front of the vehicle is recorded by the front camera and shown on the Central Information Display. The front camera view cannot be selected separately. The driver must select the "Auto" camera angle to view it or if desired, switch on the "Panorama View" function.

### 16.1.4. Panorama View

Panorama View enables the driver to see the cross traffic at blind exits and Intersections before proceeding and provides the driver with optimum assistance in this situation. Road users that are hidden by obstacles to the side of the vehicle are sometimes only seen by the driver very late or not at all. To improve the view, the front and rear view cameras record the lateral roadway area. Depending on which drive position is engaged, the front or rear view camera can be activated.

# G01 Driver Assistance Systems

## 16. Cameras



G01 Panorama View on the CID

Yellow lines in the screen display mark the front and rear ends of the vehicle. The camera image is badly distorted in some areas and is therefore not suitable for estimating distances.

The function can be activated using the Panorama View button. Press the button again to deactivate the function. The Panorama View function is automatically deactivated at speeds above approximately 15 km/h (9 mph).

### Panorama View (GPS-based)

GPS-supported, automatic activation of the Panorama View function has been implemented in the G01.



G01 automatic switch on at a set activation point

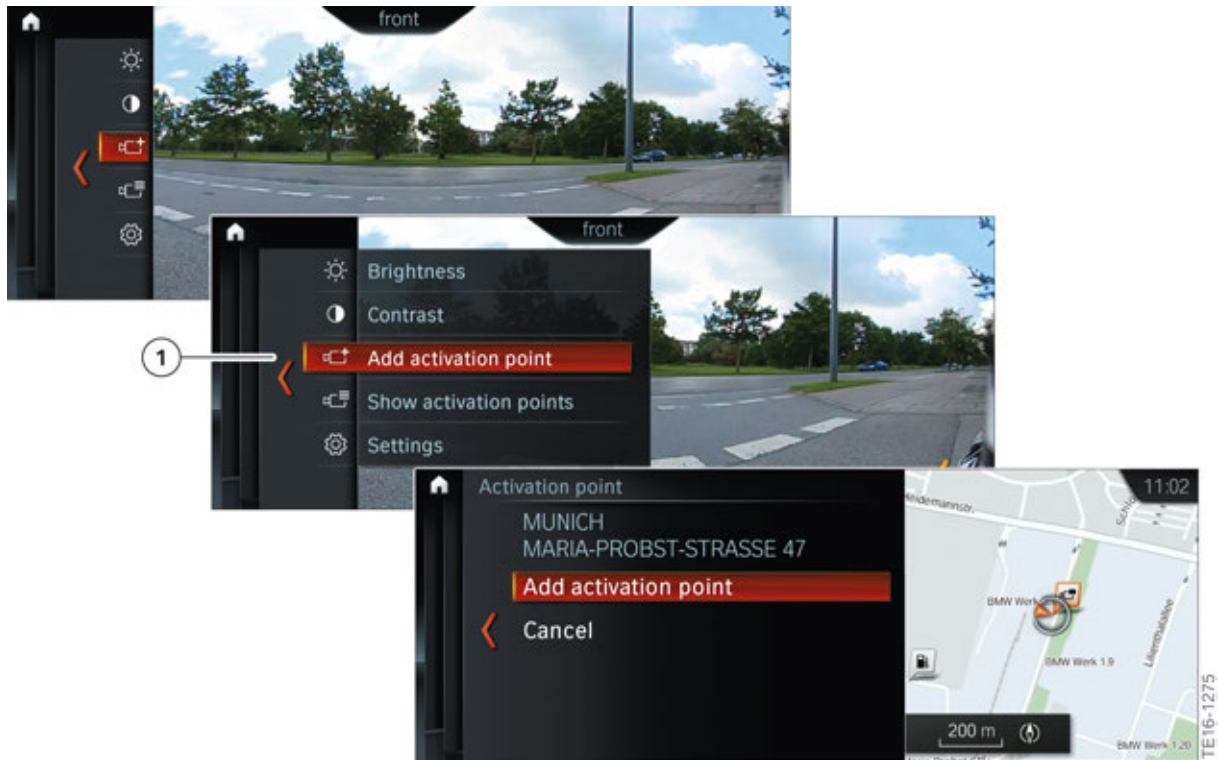
Positions, at which the Panorama View should switch itself on automatically, can be saved as activation points, provided that a GPS signal is received. A maximum of ten activation points can be saved for the front camera.

# G01 Driver Assistance Systems

## 16. Cameras

To save the activation points, the driver must proceed as follows:

Stop after reaching the place where the Panorama View should switch itself on automatically. Press the Panorama View button and then tilt the controller to the left. Then select "Add activation point" (the current position is displayed) and confirm by selecting "Add activation point".



G01 setting activation points

Index	Explanation
1	"Add activation point"

If possible, the activation points are saved with the town/city and street or with the GPS coordinates. The direction of travel is also saved in conjunction with the activation point.

The driver can display the saved activation points on the Central Information Display.



# G01 Driver Assistance Systems

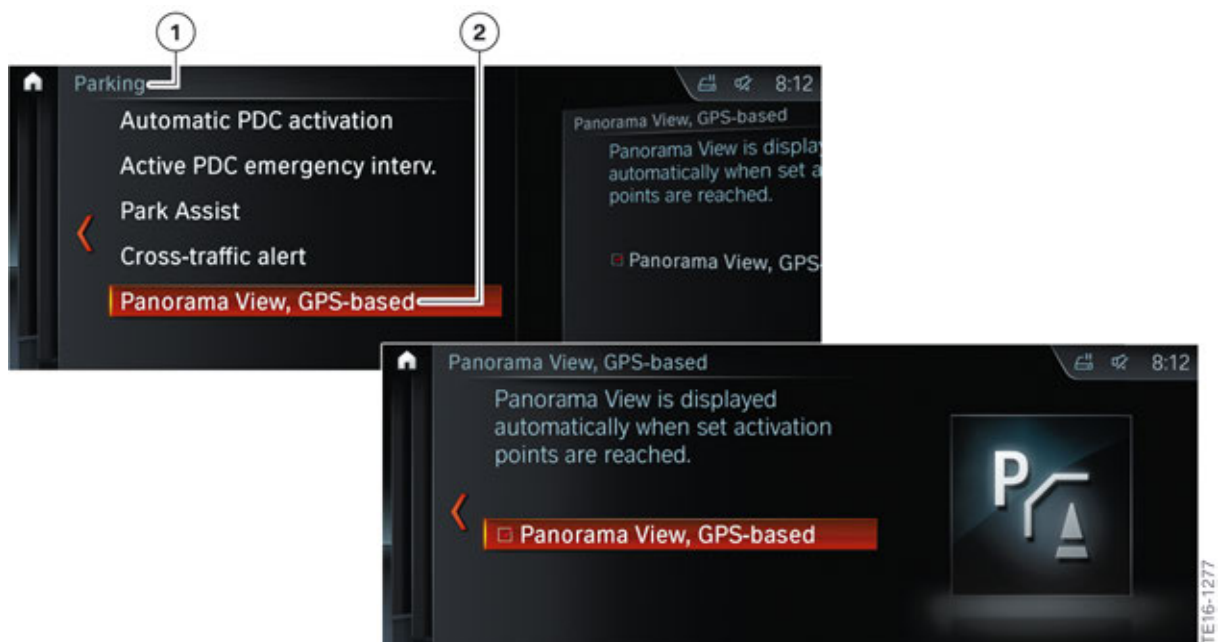
## 16. Cameras



G01 displaying activation points

Index	Explanation
1	"Show activation points"

The use of activation points can be switched on and off via iDrive.



G01 Panorama View activation menu on the CID

Index	Explanation
1	"Parking" menu
2	"Panorama View, GPS-based"

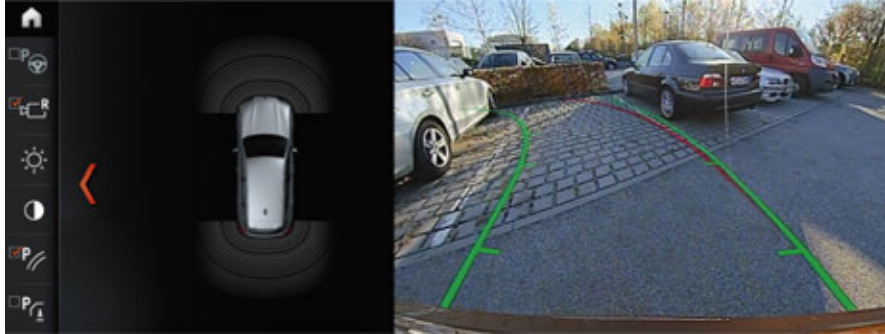


# G01 Driver Assistance Systems

## 16. Cameras

### 16.1.5. Rear view camera

The rear view camera supports the driver when parking and manoeuvring. The area behind the vehicle is recorded by the rear view camera and shown on the Central Information Display.



G01 rear view camera image in the CID

### 16.1.6. Moving camera angle

When the moving camera angle is selected, a circular trajectory is shown around the vehicle on the Central Information Display. Predetermined angles can be selected on the circular trajectory by turning the controller or using the touch function.

In vehicles with the gesture control optional equipment (OE 6U8), the moving camera angle can also be controlled in this way.

The current angle is identified by a camera symbol. Depending on the view, the surroundings of the vehicle or a partial area of the surroundings are shown on the Central Information Display.

# G01 Driver Assistance Systems

## 16. Cameras



TE17-0801

G01 exterior camera view (moving camera angle) on the CID

To leave this view, tilt the controller to the side, press it or touch the highlighted camera symbol via the touch screen.

If gesture control is being used, the gesture symbol is shown on the right half of the Central Information Display screen.



TE15-1058

Rotating the camera view using gesture control

# G01 Driver Assistance Systems

## 16. Cameras

### 16.2. Overview of exterior camera operating menu

Once the camera systems have been activated successfully the driver has the option of selecting the appropriate view or camera via iDrive.



G01 switch block with Panorama View button

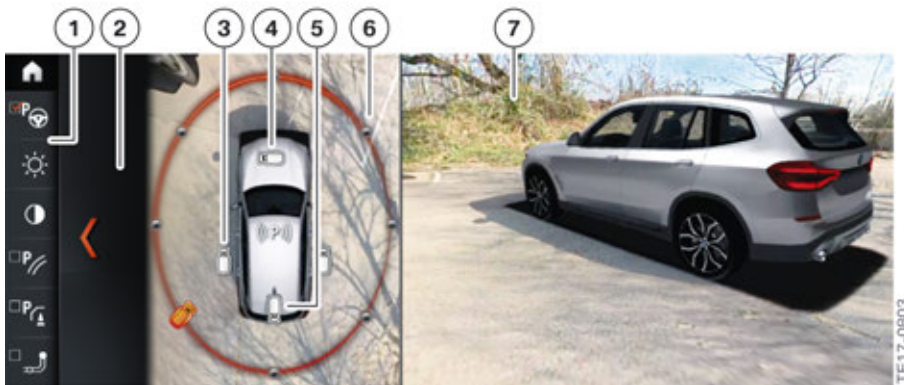
Index	Explanation
1	Parking assistance button
2	Panorama View button

The camera systems can be activated (depending on the vehicle equipment) as follows:

- Manually by pressing the parking assistance button or the camera button (Panorama View)
- By engaging drive position "R"
- By engaging reverse gear (on vehicles with a manual gearbox)
- Automatically via the "Auto PDC" function
- Automatically via the GPS-supported automatic activation of the Panorama View function, provided that activation points have been saved.

# G01 Driver Assistance Systems

## 16. Cameras



G01 exterior cameras view (camera angles) on the CID

Index	Explanation
1	Toolbar
2	Selection window
3	Side view
4	Automatic camera angle
5	Rear view camera
6	Moving camera angle
7	Camera image

Other settings and options can be found in the toolbar, depending on the vehicle equipment. Thus, for example, the driver can switch the parking assistance lines, the obstacle marking etc. on and off, or also make adjustments to the image brightness and contrast. The driver can also activate or deactivate the assistance functions here such as the car wash view, for instance.

### 16.3. Assistant function

The following assistance functions are available:

- Car wash view
- Towbar zoom
- Side protection
- Door opening angle

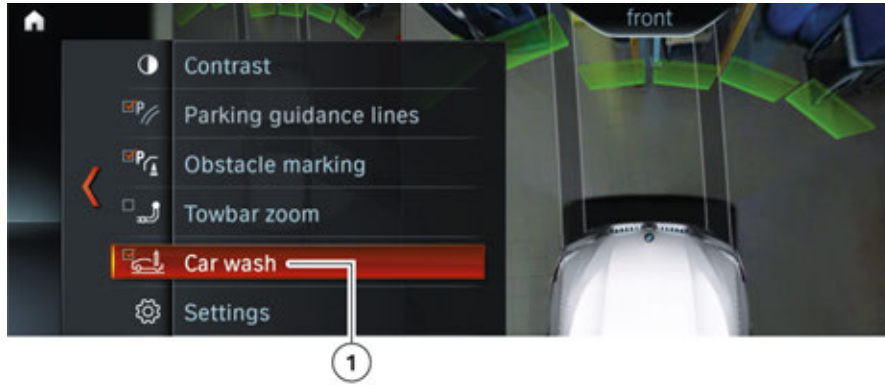
#### 16.3.1. Car wash view

The car wash view assists the driver when entering a car wash. When the car wash view is selected, immediately before entering the car wash, a bird's eye view is displayed on the Central Information Display. To enable the driver to align the vehicle more easily, at the same time the vehicle's tire tracks are shown on the display.

# G01 Driver Assistance Systems

## 16. Cameras

The car wash view can be activated via the iDrive in the toolbar under the "Car wash" menu item.

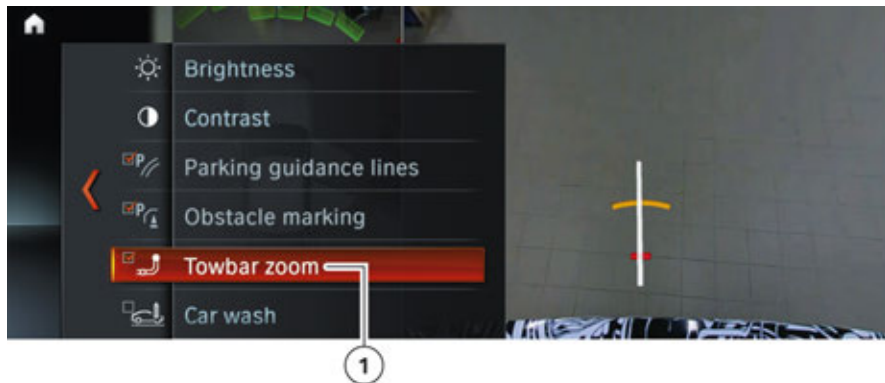


G01 PDC car wash view on the CID

Index	Explanation
1	"Car wash"

### 16.3.2. Towbar zoom

The towbar zoom view provides assistance when attaching a trailer by showing an enlarged version of the towbar image area on the Central Information Display. The driver can estimate the distance from the trailer to the towbar using two static circle segments.



G01 towbar zoom view on the CID

Index	Explanation
1	"Towbar zoom"

A "docking line" dependent on the steering angle helps the driver to aim the towbar at the trailer.

The towbar zoom function can be activated via the iDrive in the toolbar under the "Towbar zoom" menu item.



# G01 Driver Assistance Systems

## 16. Cameras

### 16.3.3. Side protection

The side protection warns against obstacles at the side of the vehicle and thus supports the driver when parking and manoeuvring.

To protect the sides of the vehicle from collisions with obstacles, additional obstacle markings are shown to the side of the vehicle on the Central Information Display if necessary.



G01 side protection view (additional obstacle markings)

More information on the operation of the side protection function can be found in section 18.3.3.

### 16.3.4. Door opening angle

When the vehicle is stopped and the selector lever position "P" is engaged, the maximum opening angle of the doors is displayed on the Central Information Display.

If there is an obstacle near the door and it is detected by the side protection, this is marked on the Central Information Display. The obstacle marking display only points out objects in the area of the door. It is not possible for a view from the camera systems to be displayed, as the door area is simulated. Therefore, the driver is only informed that there is an object at the side of the vehicle; it is not certain that the door will definitely collide with the identified object. The driver must judge this for himself.



G01 door opening angle view on the CID

The "Parking assistance lines" and "Obstacle marking" features already used in other BMW models can also be activated and deactivated via the iDrive in the toolbar under the relevant menu items.

# G01 Driver Assistance Systems

## 16. Cameras



The camera systems do not relieve the driver of personal responsibility for correctly judging the traffic situation. There is still a risk of an accident. The driver's driving style should be adapted to the traffic conditions. The driver should check the traffic conditions and the vehicle's surroundings by looking around and react accordingly if required.

---

### 16.4. Remote View 3D

The Remote View 3D (Remote 360°) function familiar from the G30 is used in the G01. This function allows the customer to display images of his parked vehicle on a mobile device (such as a smartphone).

The user can send a remote request to the parked vehicle through his device. The vehicle takes images of its surroundings and sends these to the device where an app generates a 3D view. The view can be adjusted by gesture, as in the vehicle.

The customer thus has the capability of viewing his vehicle's surroundings at any time.

Examples:

- What does it look like around my vehicle?
- Who or what is near my vehicle?

Remote View 3D is part of the Parking Assistance optional equipment (OE 5DN).

#### 16.4.1. Functional principle

Surround View is a prerequisite for Remote View 3D (Remote 360°) as it includes the Top View 3D function. This means that the already familiar cameras are used.

The function is sold via the Remote Services optional equipment (6AP). The BMW TeleService connection optional equipment (OE 6AE) is a prerequisite for the Remote Services optional equipment (OE 6AP).

The Remote Services optional equipment (OE 6AP) contains a number of functions that active for the lifetime. Remote View 3D is, however, an exception. The function is active for 2 years following activation. The service expires after 2 years. In this event, the customer is notified by text and e-mail, 2 weeks before expiry of the Remote View 3D service.

When the service has expired, the customer has the option of activating or purchasing the function for a further two years through the ConnectedDrive Shop. Availability of the function can be extended as many times as desired via the ConnectedDrive Shop.

#### Application:

The customer should like to have an image of the area around his parked vehicle.

# G01 Driver Assistance Systems

## 16. Cameras



G01 Remote 3D View

- 1 He sends a request to the BMW back end via the BMW Connected App (Remote View 3D) on his smartphone.
- 2 Following verification of the data, the BMW back end passes the request on to the appropriate vehicle. The vehicle then takes four separate Surround View images using the external cameras. These are then sent in the top rear side view camera control unit to the Telematic Communication Box TCB and temporarily buffered.



G01 Remote 3D View

- 3 The images are then sent by the vehicle through the Telematic Communication Box TCB to the BMW back end.



# G01 Driver Assistance Systems

## 16. Cameras

- 4 The BMW back end sends the image data and a matching encryption code to the customer's smartphone. Once the data has been sent to the smartphone it is deleted from the BMW back end. The image data received is merged to form a 360° all-round view in the smartphone.



G01 Remote 3D View: view in the smartphone

The 3D optical display appears once the smartphone has received all four images.

### Availability

The system includes a function detecting any border crossing or the country in which the vehicle is located in order to allow a country-specific release and configuration of the Remote View 3D function while at the same time taking account of local laws which might possibly prohibit the use of this function. The function may be automatically deactivated, as appropriate.

The driver also has the possibility of activating or deactivating the function itself via the iDrive (if the function is supported in the country in which the vehicle is located).

The new status is sent to the BMW back end after every change to the setting (to Remote View 3D deactivated, for example). The BMW back end stores the status permanently and releases or inhibits the function calls as appropriate on the basis of this.

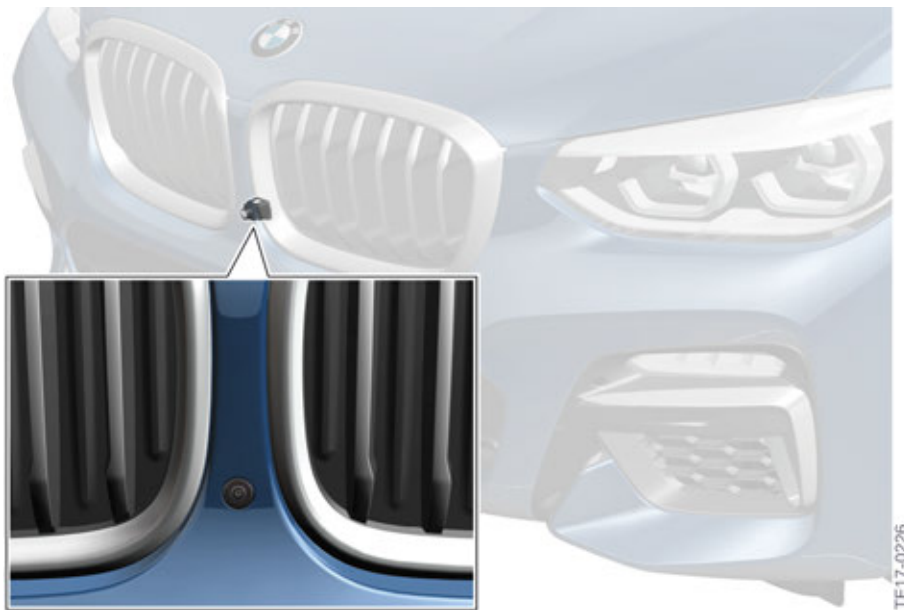
## 16.5. System components

### Front camera

The front camera is installed in the center between the two front ornamental grilles on the G01.

# G01 Driver Assistance Systems

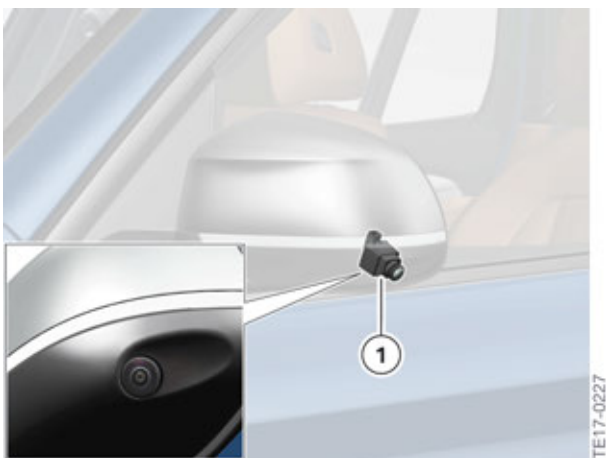
## 16. Cameras



G01 Front camera

### Top view camera

The two are installed in the exterior mirrors on the G01.



G01 Exterior mirror camera, left

Index	Explanation
1	Exterior mirror camera

# G01 Driver Assistance Systems

## 16. Cameras

### 16.5.1. Rear view camera

The rear view camera supports the driver when parking and manoeuvring. The area behind the vehicle is shown on the Central Information Display. Guidance lines integrated in the image provide the driver with additional assistance with distances, the turning circle, obstacle markings and a towbar zoom function, if required.

The rear view camera is located in the tailgate handle strip.



G01 rear view camera

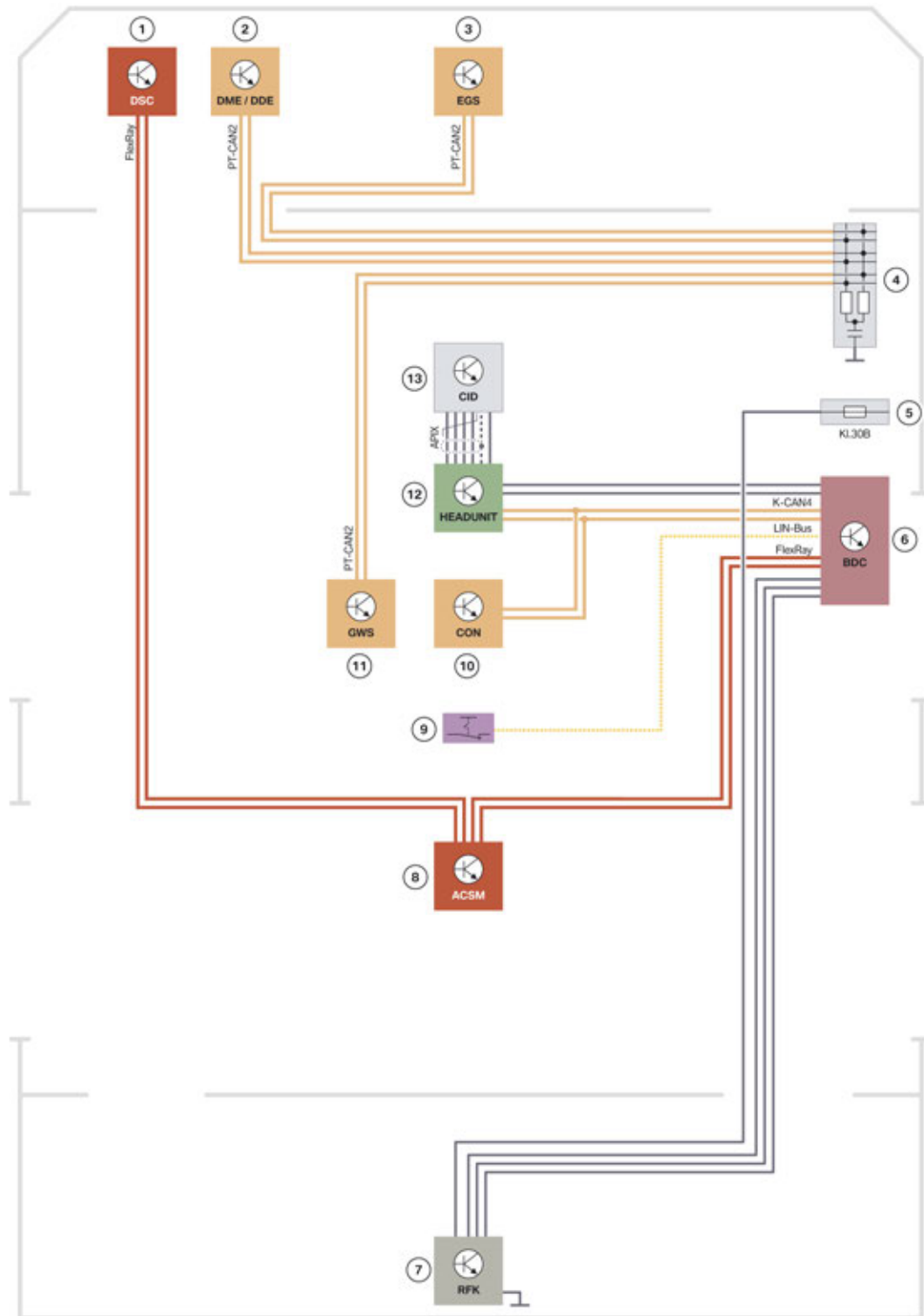
The camera has been revamped and the video signals are now transmitted via an Ethernet line in the stand-alone variant also, like in the G30. The control unit remains integrated in the reversing camera (RFK) in this version.

### System wiring diagram

The system wiring diagram below shows the scope of the rear view camera RFK.

# G01 Driver Assistance Systems

## 16. Cameras



TE17-0338

G01 rear view camera RFK (OE 3AG) system wiring diagram

# G01 Driver Assistance Systems

## 16. Cameras

Index	Explanation
1	Dynamic Stability Control (DSC)
2	Digital Motor Electronics (DME)
3	Electronic transmission control (EGS)
4	CAN terminator
5	Fuses in the power distribution box, front right
6	Body Domain Controller (BDC)
7	Rear view camera (RFK)
8	Advanced Crash Safety Module (ACSM)
9	Button for camera activation
10	Controller (CON)
11	Gear selector switch (GWS)
12	Headunit
13	Central Information Display (CID)

### 16.5.2. TRSVC control unit

The exterior cameras record the area around the vehicle from various angles and send this information to the TRSVC control unit via Ethernet. The video signals are transmitted from the TRSVC control unit to the head unit via an Ethernet line. The head unit transmits the signals to the Central Information Display via an Automotive Pixel Link line.

The installation location of the TRSVC control unit is in the luggage compartment on the driver's side.

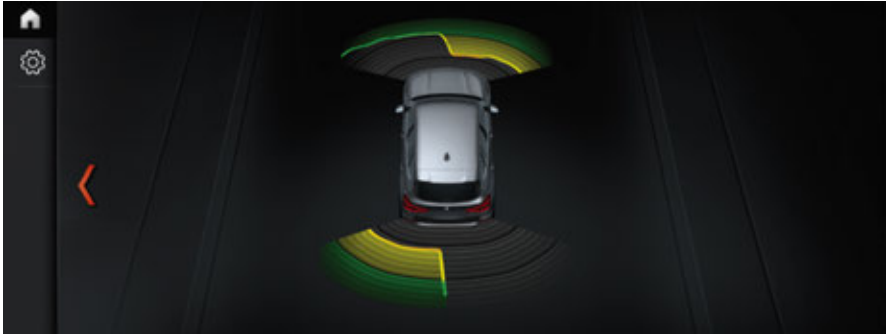


G01 TRSVC control unit

# G01 Driver Assistance Systems

## 17. Park Distance Control

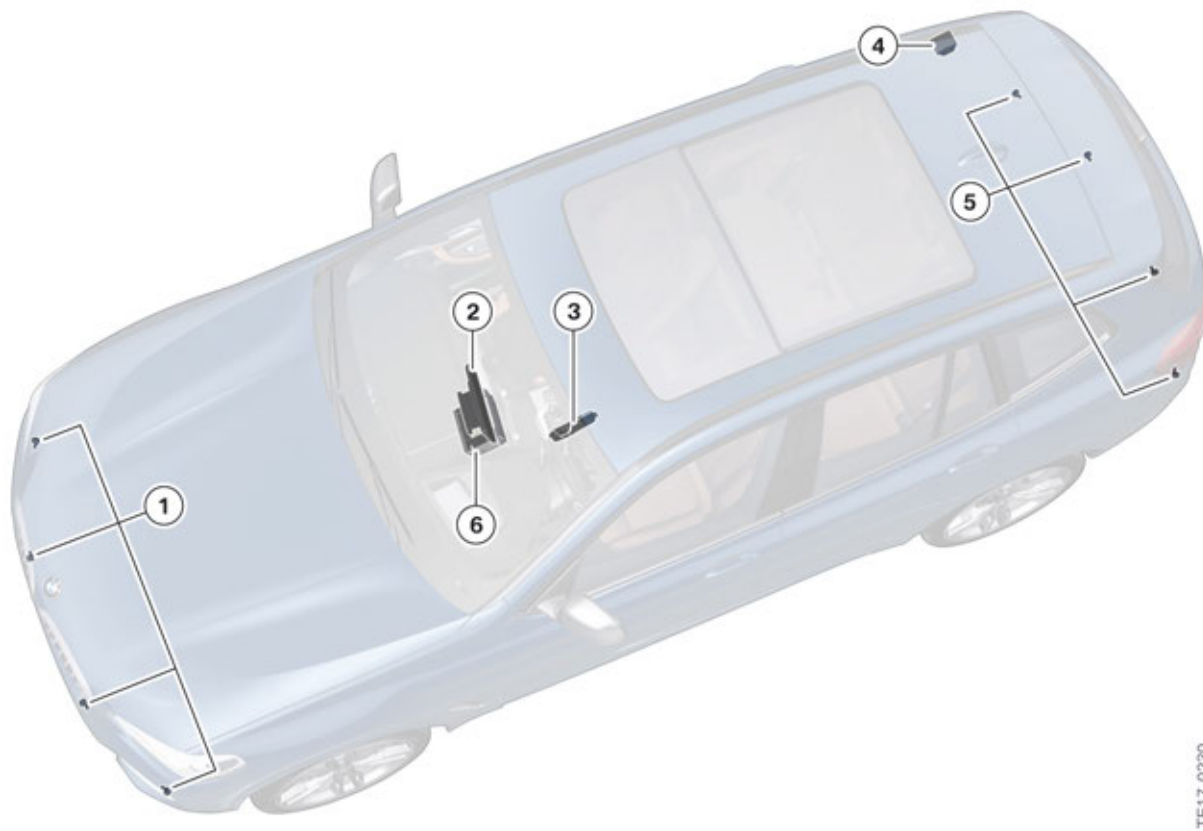
The Park Distance Control (PDC) (OE 508) optional equipment assists the driver when manoeuvring in and out of a parking space. The current distance from an obstruction is indicated by acoustic signals and on a visual display.



G01 Park Distance Control (PDC) view in the CID

The distance from an obstruction is measured by four ultrasonic sensors in the rear bumper panel and four additional ultrasonic sensors in the front bumper panel.

### 17.1. System components



G01 Park Distance Control system components

# G01 Driver Assistance Systems

## 17. Park Distance Control

Index	Explanation
1	Ultrasonic sensors for Park Distance Control, front
2	Central Information Display (CID)
3	Operating unit
4	Control unit for Parking Manoeuvring Assistant (PMA)
5	Ultrasonic sensors, Park Distance Control, rear
6	Headunit High

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



G01 Control unit for Parking Manoeuvring Assistant (PMA)

### 17.2. Auto PDC

On the G01, Auto PDC is activated automatically if the vehicle is approaching an object at a speed below approximately 5 km/h and the object is located in a collision-critical area. The Auto PDC function is available for both the front and rear of the vehicle.

The automatic switch-on function when obstacles are detected can be switched on and off via iDrive.

Further information about Auto PDC may be found in the G12 assistance systems product information (chapter 16.2).

### 17.3. Active Park Distance Control

In G01 vehicles with the Parking Assistant (OE 5DM) or Parking Assistance (OE 5DN) optional equipment, the Park Distance Control PDC function has been extended to include the active Park Distance Control function. This automatically brakes the vehicle to a halt when it is travelling at walking speed (< approximately 6 km/h) if an object is detected behind the vehicle.

# G01 Driver Assistance Systems

## 17. Park Distance Control

The active Park Distance Control function can be switched on and off via iDrive.



The system does not relieve the driver of personal responsibility for correctly judging the traffic situation. The driver should check the traffic conditions and the vehicle's surroundings by looking around and react accordingly if required.

Further information about the active Park Distance Control function may be found in the G12 assistance systems product information (chapter 16.3).

### 17.4. Side protection

The side protection warns against obstacles at the side of the vehicle and thus supports the driver when parking and manoeuvring.



G01 Side protection

Vehicles with the Parking Assistant (OE 5DM) optional equipment have side protection.

Obstacles detected by the four side ultrasonic sensors integrated in the bumpers can be displayed by the Park Distance Control system.

Display in the Central Information Display (CID)	Meaning
Colored markings	Warning of detected obstacles
Grey markings	The area next to the vehicle has not yet been recorded
No markings	No obstacles have been detected



# G01 Driver Assistance Systems

## 17. Park Distance Control

### 17.4.1. Functional principle

Four side ultrasonic sensors, two integrated in the front bumper and two integrated in the rear bumper, measure the distance to an obstruction. Obstructions detected by the sensors are tracked along the side of the vehicle as it moves. They are shown on the Central Information Display and, in situations where a collision is imminent, an acoustic warning also sounds.



G01 side protection view on the CID

Obstructions approaching the stationary vehicle are not taken into account, as in this case the system cannot evaluate the situation unequivocally. The prerequisite for identifying obstructions is that the (driver's) vehicle is moving.

The distance markings shown on the Central Information Display are displayed for approximately 13 seconds once the vehicle has stopped. The markings are only shown again once the vehicle starts moving.

### 17.5. Operation

The Park Distance Control system is enabled in the following situations:

- if drive position R reverse gear are engaged when driving readiness is switched on.
- if the parking assistance button in the switch block next to the controller is pressed when driving readiness is switched on.
- Auto PDC is activated and all conditions for automatic activation are given.

# G01 Driver Assistance Systems

## 17. Park Distance Control



G01 Switch block with parking assistance button

Index	Explanation
1	Parking assistance button

Further information about the operating concept for Auto PDC, the Active Park Distance Control function and acoustic signal output may be found in the G12 assistance systems product information (chapter 16.5.1-16.5.3).

### 17.6. Deactivation criteria

Similar to other BMW models, the deactivation is distance-/speed-based. The switch-off is effected after a journey of approximately 50 m or at a speed over 36 km/h.

If a fault develops, a Check Control message ("PDC has malfunctioned. Have system checked.") is displayed in the Central Information Display (CID). In addition, the detection range of the sensors is shown shaded in the Central Information Display (CID).

# G01 Driver Assistance Systems

## 17. Park Distance Control

### 17.7. Limits of the system

Due to the physical limits during the ultrasonic measurement, obstructions may not be detected by the Park Distance Control system. Several examples of this are shown below:

- If the objects are thin or wedge-shaped.
- When the objects are low.
- When objects that, due to their shape, have corners and sharp edges.
- With snow.
- If the objects have a porous surface.

A warning may also be displayed although there is no obstruction in the detection range. This may be the case in the following situations:

- When it is raining heavily.
- If the sensors are heavily soiled or iced over.
- If the sensors are covered with snow.
- If the street surface is rough.
- If there are bumps, e.g. speed bumps.
- In large right-angled buildings with smooth walls, e.g. underground car parks.
- Due to heavy exhaust gas fumes.
- Due to other ultrasound sources.

To ensure the ultrasonic sensors remain fully operational, they must be kept clean and free of ice. When cleaning the sensors using a high pressure cleaner, avoid direct and sustained contact with a high-pressure water jet. Furthermore, when using high pressure cleaners, a distance of at least 30 cm from the sensors must be maintained.



---

The Park Distance Control cannot replace the driver's personal judgement of the traffic situation. Also check the traffic situation around the vehicle by looking around, otherwise there may be a risk of an accident as a result of road users or objects which lie outside the detection range of the Park Distance Control. Loud sound sources outside and inside the vehicle could drown out the PDC signal.

---

# G01 Driver Assistance Systems

## 18. Hazard Preview

The "hazard preview" function is presented for the first time with the introduction of the G01. The function transmits additional traffic information to the driver and therefore contributes to a better traffic flow and greater safety on the road.

The "hazard preview" function makes information using the BMW vehicle fleet.

### 18.1. Functional principle

BMW vehicles are equipped with numerous sensors which detect the vehicle surroundings as well as assistance systems which warn the driver if necessary or support him in performing his driving tasks. In the past, however, the systems analyses each vehicle on its own.

For a long time now, BMW has been conducting work in the field of so-called Car-to-X-Communication (car-to-infrastructure). The first step in this area was Real Time Traffic Information (RTTI). If there are no position changes of several vehicles in a certain period, this means that there is most probably a traffic jam situation.

Like Real Time Traffic Information (RTTI), "hazard preview" also uses this premise as a basis and evaluates the available information for following traffic.

Data is collected by means of the BMW vehicle fleet and forwarded to the BMW back end. In this way, vehicles that skid on slippery roads for example, can supply valuable information via the "hazard preview" function. The collected transmitted data is then processed in the BMW back end. Existing local danger warnings are then transmitted to the following vehicles via Real Time Traffic Information (RTTI).

### 18.2. Warning situation

The following hazard situations are taken into account:



**Heavy rain**



**Slippery road**

# G01 Driver Assistance Systems

## 18. Hazard Preview



### Breakdowns

The system will also create disabled vehicle warnings from automatic ecalls and manual ecalls that are serious (carriage way blocked initiated by automatic ecall or from the agent during a manual ecall).

The following graphic shows different situations in which a warning would be issued via the hazard preview function:



G01 Hazard preview

- 1 BMW vehicles that are in a danger situation send information corresponding to this situation to the BMW back end.
- 2 After this data has been processed, the information is sent to the data services provider for verification.
- 3 Finally, the BMW back end transmits the danger warning to following vehicles, for example.

The "hazard preview" function makes it possible to achieve a significant increase in quality through the enhanced up-to-dateness of existing local danger warnings.

# G01 Driver Assistance Systems

## 19. Cross Traffic Alert

The Cross Traffic Alert was used for the first time in the G12. This warning assists the driver when manoeuvring out of a parking space and in other everyday situations where it is difficult to see the traffic, such as at blind entrances and exits.

Depending on the vehicle equipment, the Cross Traffic Alert is available in the G01 for rear or also for the front.

The system can detect objects that are approaching the vehicle from the side, either from the front or rear (depending on the vehicle equipment). The driver is made aware of or warned of crossing traffic by the Cross Traffic Alert function when manoeuvring out of a parking space or entering the crossing traffic.

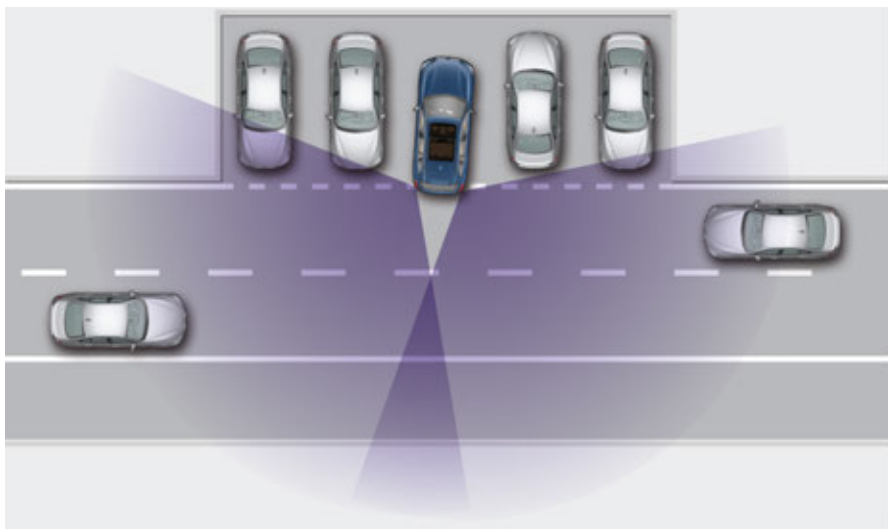
### 19.1. Functional principle

If a moving object is detected, which based on the current speed would be in the area in front of or behind the vehicle in approximately the next two seconds, a visual and acoustic warning is issued.

When a rear Cross Traffic Alert is issued, the LED in the mirror glass is also switched on. The lane change warning signal unit is used as an indicator. The indicator is switched on in either the left or right mirror depending on the direction from which the object is approaching the vehicle.

The Cross Traffic Alert works up to a speed of approximately 7 km/h (4 mph). Another prerequisite of the function is that the side radar sensors are able to detect the road or approaching object. The radar sensors can detect objects up to a maximum of 80 m (262 feet) away from the vehicle.

### 19.2. Cross Traffic Alert Rear



G01 Cross Traffic Alert rear: manoeuvring out of a parking space

The rear Cross Traffic Alert assists the driver when reversing out of a parking space and warns of potential collisions with cross traffic in traffic situations where it is difficult to see obstructions.

The rear Cross Traffic Alert is included in the Active Driving Assistant optional equipment (OE 5AS) scope of supply.

# G01 Driver Assistance Systems

## 19. Cross Traffic Alert

The warning is displayed in the Park Distance Control image on the Central Information Display.

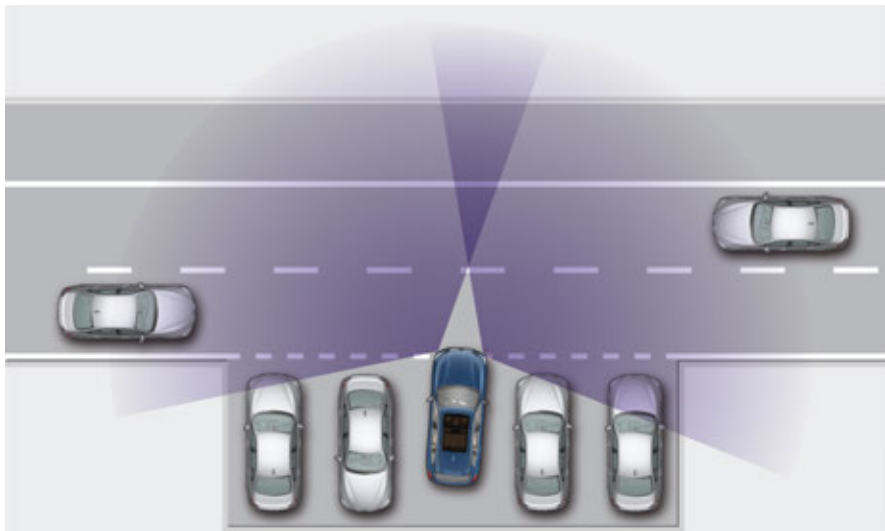
Using the rear view camera, the rear Cross Traffic Alert will be extended to include an additional display on the Central Information Display. The warning will be shown in the form of a red bar in the camera's video screen.

The rear Cross Traffic Alert is enabled if the driver engages the "R" drive position or the Park Distance Control is active.

In vehicles with the Parking Assistance Plus optional equipment (OE 5DN), the rear Cross Traffic Alert is also enabled if Panorama View has been activated.

The rear Cross Traffic Alert is available at speeds up to approximately 7 km/h (4 mph).

### 19.3. Cross Traffic Alert Front



G01 Example of Cross Traffic Alert at the front: manoeuvring out of a parking space

The front Cross Traffic Alert assists the driver when entering the cross traffic from exits and blind intersections.

The front Cross Traffic Alert is included in the Active Driving Assistant Plus Package optional equipment (OE 5AT) scope of supply. If the Cross Traffic Alert for the front of the vehicle is installed, the rear version is activated automatically.

The warning is displayed in the Park Distance Control image on the Central Information Display.

The front Cross Traffic Alert is enabled if the Park Distance Control is active and the speed of the vehicle does not exceed approximately 7 km/h (4 mph).

In vehicles with the Parking Assistance Plus optional equipment (OE 5DN), the front Cross Traffic Alert is also enabled if Panorama View has been activated.

Like the rear Cross Traffic Alert, the front Cross Traffic Alert function is available at speeds from to approximately 7 km/h (4 mph).



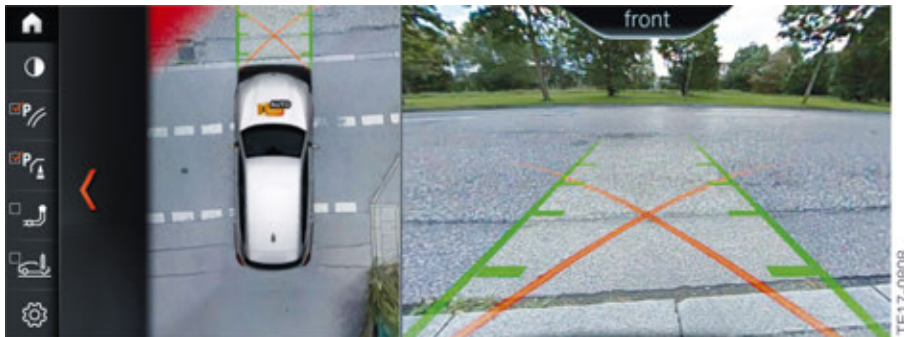
# G01 Driver Assistance Systems

## 19. Cross Traffic Alert

### 19.4. Displays

Various representations in the Central Information Display (CID) are possible depending on the vehicle equipment.

The respective peripheral region in the PDC view flashes red if vehicles are detected by the sensors.



G01 Cross Traffic Alert in the PDC view

In vehicles with the Parking Assistance Plus optional equipment (OE 5DN), the warning is shown on the Central Information Display in the PDC view image and in the front camera and rear view camera video images in the form of a red bar.

If Panorama View is activated, the Cross Traffic Alert is shown in the form of a red bar on the Central Information Display.



G01 Panorama View (front Cross Traffic Alert)



# G01 Driver Assistance Systems

## 19. Cross Traffic Alert



G01 Panorama View (rear Cross Traffic Alert)

The Cross Traffic Alert is available to the driver for both the front and rear views.

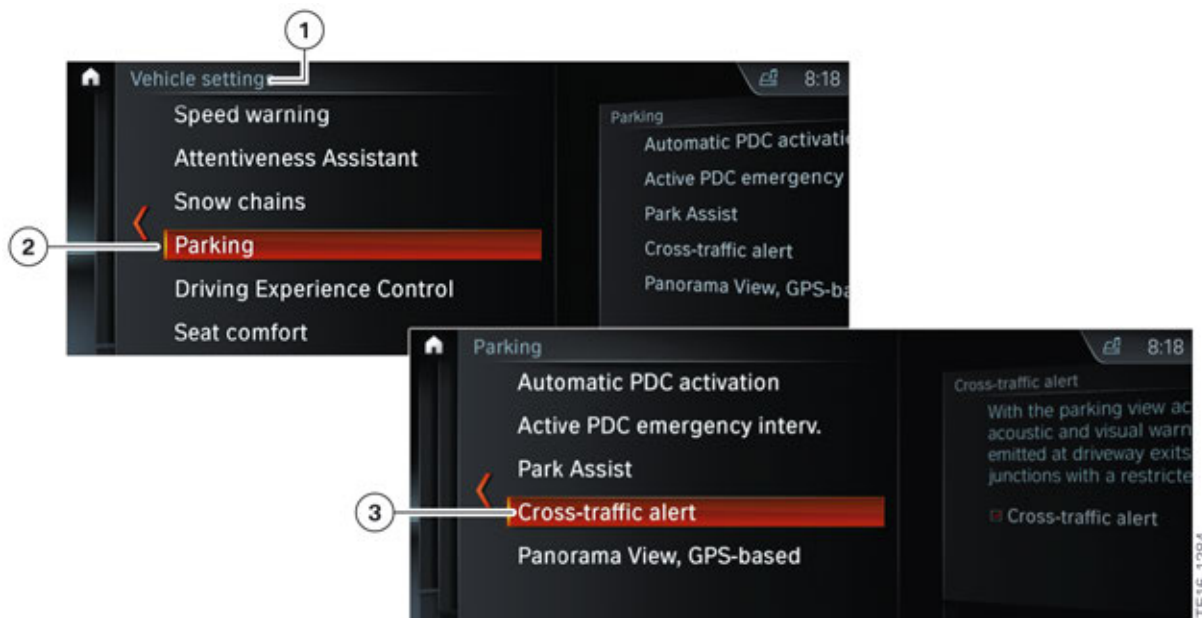
### 19.5. Operation

Cross Traffic Alert can be switched on and off via the iDrive menu by making the following selection via the controller:

- "My Vehicle"
- "Vehicle settings"
- "Parking"
- "Cross-traffic alert"

# G01 Driver Assistance Systems

## 19. Cross Traffic Alert



G01 Cross Traffic Alert activation on the CID

Index	Explanation
1	"Vehicle settings"
2	"Parking"
3	"Cross-traffic alert" (switching the Cross Traffic Alert on and off)

If the Cross Traffic Alert has been activated in the iDrive menu, the function is switched on automatically as soon as the Park Distance Control or Panorama View is active.

The Cross Traffic Alert is deactivated automatically in the following situations:

- If the driver's vehicle is travelling at a speed higher than walking speed with a threshold value approximately 7 km/h (4 mph).
- If the steering and lane control assistant is active.
- If the driver is currently parking using the Parking Manoeuvring Assistant

### 19.6. Limits of the system

The function may be restricted in the following situations:

- If there are other objects in the field of view of the sensors that are concealing the cross traffic.
- Heavy fog, rain or snow.
- If the bumper is dirty or iced over.
- If stickers have been attached near the radar sensors on the bumper.

# **G01 Driver Assistance Systems**

## **19. Cross Traffic Alert**

- If the speed of the approaching vehicle is very high.
- If crossing objects are moving very slowly.
- On sharp bends.

If a trailer socket is being used, for example to operate a trailer or bicycle carrier, the cross-traffic warning is not available for the area behind the vehicle.

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

The Parking Manoeuvring Assistant PMA supports the driver in many ways. The assistant measures the size of a gap between cars and decides based on the result whether the gap is large enough on the one hand and relieves the driver of the task of manoeuvring into the space on the other.

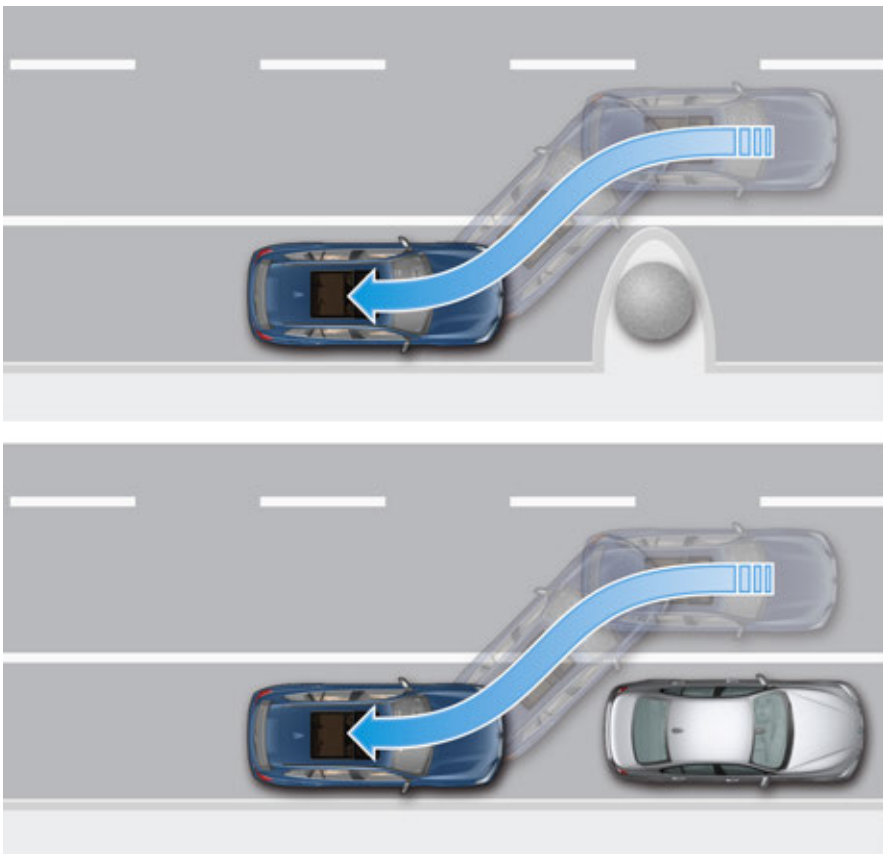
The Parking Manoeuvring Assistant PMA (OE 5DN) is no longer available as an individual item of optional equipment.

The Parking Manoeuvring Assistant PMA is included in the Parking Assistant Package optional equipment (OE ZPK) or the Executive Package (OE ZPX) in the G01.

### 20.1. Parallel parking/perpendicular parking

The Parking Manoeuvring Assistant function facilitates manoeuvring into parking spaces that are parallel (parallel parking) and perpendicular (bay parking) to the roadway.

#### 20.1.1. Curbside parking



G01 principle of curbside parking

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

### 20.1.2. Cross parking



G01 principle of cross parking

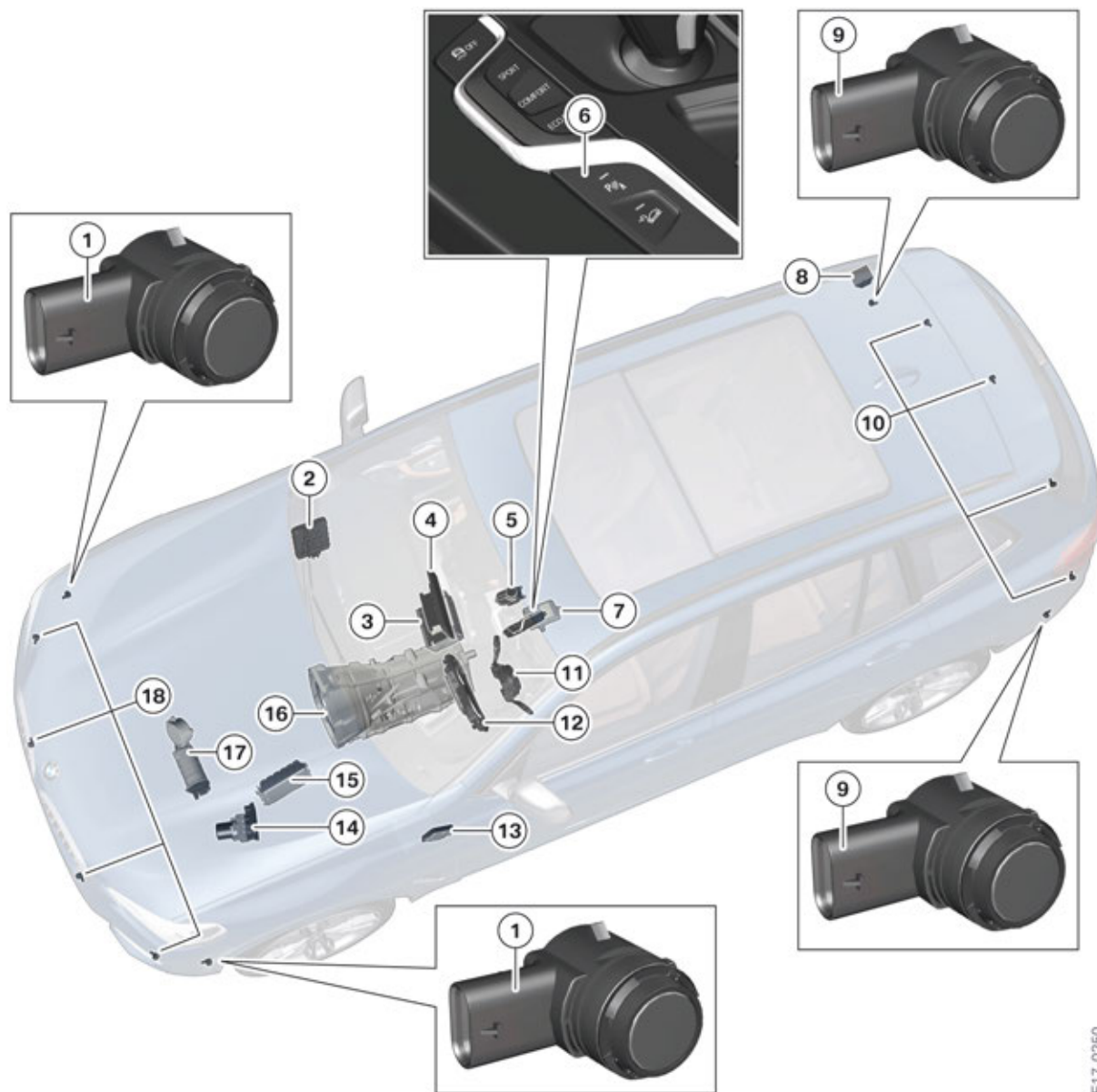
### 20.2. System components

Below is an overview of important sensors and operating elements:

- The parking assistance button is the central control panel for the Parking Manoeuvring Assistant function (position 6).
- Two additional ultrasonic sensors in the front bumper measure parking spaces while driving (position 1).
- The distance from an obstruction is measured by four ultrasonic sensors in the rear bumper panel and four additional ultrasonic sensors in the front bumper panel (positions 1 and 9).
- Two additional ultrasonic sensors are installed in the rear bumper to precisely detect the size of a transverse parking space during the parking maneuver. The additional ultrasonic sensors measure the distance to detected objects.

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant



TE17-0250

G01 Parking Manoeuvring Assistant system components

Index	Explanation
1	Ultrasonic sensors of Parking Manoeuvring Assistant
2	Body Domain Controller (BDC)
3	Headunit
4	Central Information Display (CID)
5	Controller (CON)
6	Parking assistance button
7	Advanced Crash Safety Module (ACSM)

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

Index	Explanation
8	Control unit for Parking Manoeuvring Assistant (PMA)
9	Ultrasonic sensors, Park Distance Control, rear side
10	Ultrasonic sensors, Park Distance Control, rear
11	Steering column switch cluster (SZL)
12	Instrument cluster (KOMBI)
13	Control unit for optional equipment system (SAS)
14	Dynamic Stability Control (DSC)
15	Digital Motor Electronics (DME)
16	Electronic transmission control (EGS)
17	Electronic Power Steering (EPS)
18	Ultrasonic sensors for Park Distance Control, front

### 20.3. Control unit

In vehicles with the Parking Manoeuvring Assistant, both the Park Distance Control and Parking Manoeuvring Assistant functions are provided by the PMA control unit.



G01 Control unit for Parking Manoeuvring Assistant PMA

### 20.4. Functional principle

The system measures potential parking spaces when driving past at a speed below approximately 35 km/h (21 mph) even without the system having been activated.

The parking spaces are measured by two additional ultrasonic sensors, which are integrated into the front wheel arch. Two additional ultrasonic sensors are installed in the rear bumper in the G01 to precisely detect the size of a perpendicular parking space during the parking maneuver. The additional ultrasonic sensors measure the distance to detected objects.

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

The four sensors are connected to the Parking Manoeuvring Assistant (PMA) control unit, which also incorporates the Park Distance Control function. The function of the four ultrasonic sensors is similar to that of the Park Distance Control (PDC). Ultrasonic pulses are sent and echo impulses are received.

If a parking space of a sufficient length and width is found and the system is activated, the driver is shown the space on the Central Information Display.

When searching for a parking space and when parking, all relevant information is presented to the driver in an integrated display; from the parking space itself to the status of the parking assistant and corresponding handling instructions through to distances from other objects.

The driver is still responsible for monitoring the vehicle environment and can intervene in the automatic parking maneuver at any time if required due to the vehicle environment.

### 20.4.1. Automatic transmission

Once the system is activated the Parking Manoeuvring Assistant PMA takes over complete control of the vehicle including steering, braking and gear selection.

### 20.4.2. Personal responsibility

- Directly monitor the parking space and parking procedure and intervene if necessary, as otherwise there is a risk of accidents.
- If a parking space that has already been measured changes, the system does not take this into account.
- The system does not take loads that project above the vehicle into account during parking.
- The Parking Manoeuvring Assistant PMA may steer the vehicle over or up onto curbs. You should therefore use the facility for active intervention at any time with caution as you may otherwise damage wheels and tires or the vehicle itself.



---

The Parking Manoeuvring Assistant PMA does not relieve the driver of personal responsibility during parking. Therefore, be attentive in order to be able to actively intervene at any time. Otherwise, there is a risk of an accident.

---

## 20.5. Functional prerequisites

To use the Parking Manoeuvring Assistant function, the following basic prerequisites must be met:

- The doors must be closed.
- The tailgate must be closed.
- The driver's seat belt must be fastened.
- The parking brake must be released.



# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

### 20.5.1. Measuring parking spaces

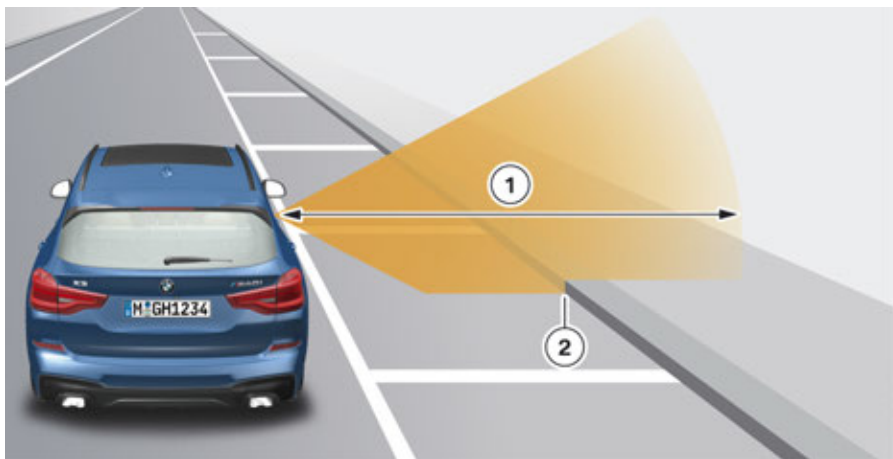
Parking spaces are measured while driving. The following parameters apply:

- Driving forwards straight-ahead up to approximately 35 km/h (21 mph)
- Maximum distance to the row of parked vehicles: 1,5 m.

#### Detecting the curb

If a curb is detected within the range of the ultrasonic sensor while the system is searching for a parking space, the parking space is for the most a space that is parallel to the road.

In the case of parking spaces that are perpendicular to the roadway, the curb is usually outside the detection range of the ultrasonic sensors (range approximately 4.2 m (14 feet)).



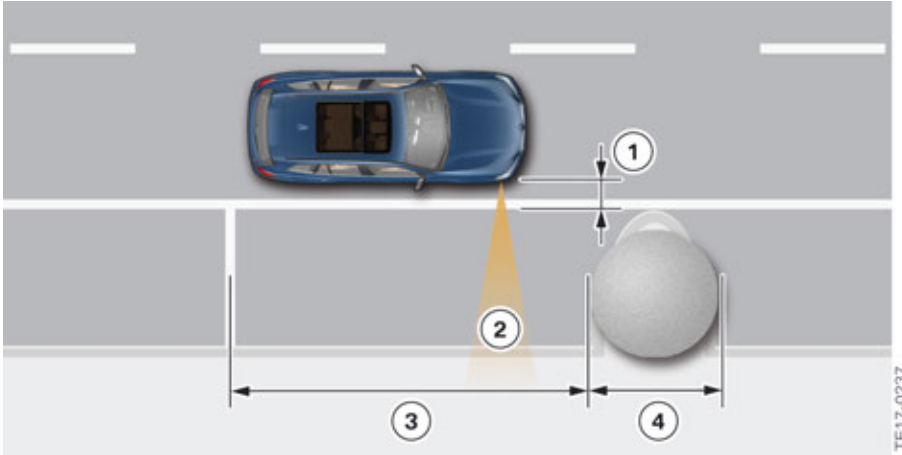
G01 curb detection via the ultrasonic sensors

Index	Explanation
1	Range approximately 4.2 m (14 feet); opening angle of ultrasonic sensors vertical $\pm 30^\circ$
2	Curb detection

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

### 20.5.2. Suitable parking spaces parallel to the roadway (parallel parking)



G01 requirement, parking spaces, curbside parking

Index	Explanation
1	Maximum distance to the row of parked vehicles or objects: 1.5 m (5 feet)
2	Opening angle of the ultrasonic sensor horizontal: $\pm 40^\circ$ , range approx. 4.2 m (14 feet)
3	Length of the parking space: vehicle length plus approx. 0,8 m (2 feet)
4	Object or vehicle length at least 0.5 m (1.6 feet)

### 20.5.3. Suitable parking spaces perpendicular to the roadway (bay parking)



G01 Requirements for parking spaces for perpendicular parking

# G01 Driver Assistance Systems

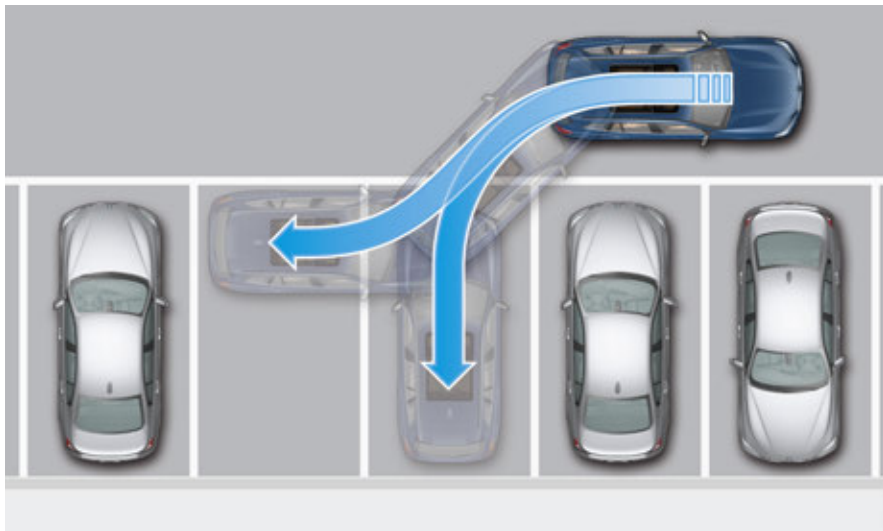
## 20. Parking Manoeuvring Assistant

Index	Explanation
1	Maximum distance to the row of parked vehicles: 1.5 m (5 Feet)
2	Opening angle of the ultrasonic sensor horizontal: $\pm 40^\circ$ , range approx. 4.2 m (14 Feet)
3	Minimum depth of the parking space: own vehicle length
4	Vehicle or object width at least 0.5 m (1.6 Feet)
5	Width of the parking space: vehicle width plus approx. 0.7 m up to max. 5 m (2.2 feet up to max 16 feet.)

### 20.5.4. Detection of a universal parking space

Due to the technical system limits, the vehicle does not always detect the correct parking space. Situations may occur where parking spaces are wrongly detected, or parking spaces that are unsuitable or not actually classed as parking spaces are detected.

The below graphic shows a situation where this may be the case.



G01 detection of a universal parking space

The detected parking space is big enough to park the vehicle in both perpendicularly and parallel to the roadway. Because of the absence of a curb, the vehicle cannot correctly determine the parking space. The vehicle proposes a universal parking space. In this case, the driver must decide how he wants to maneuver into the parking space. For this purpose, a selection window is displayed in the Central Information Display (CID) with corresponding information. The driver can then make a selection by means of the controller.

Additional information on parking spaces suitable for the Parking Manoeuvring Assistant may be found in the **ST1501 G12 Driver Assistance Systems** product information.

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

### 20.6. Operation

There are two ways to activate the Parking Manoeuvring Assistant function:

- Activation via parking assistance button.
- Activation by "Engaging reverse gear" followed by "iDrive controller operation".

#### Activation via parking assistance button

When the PMA is activated via the parking assistance button in the center console the parking assistance menu in the Central Information Display (CID) is displayed. As soon as a parking space is found, the driver receives handling instructions that guide him through the parking procedure with the support of the system.



G01 Switch block with parking assistance button

Index	Explanation
1	Parking assistance button

#### Activation by "Engaging reverse gear" followed by "iDrive controller operation"

When reverse gear is engaged, the Parking Manoeuvring Assistant menu is displayed on the Central Information Display accompanied by the status of the parking space search. The Parking Manoeuvring Assistant (PMA) is however not yet activated. This is indicated to the driver by the Parking Manoeuvring Assistant symbol in the toolbar of the Central Information Display. In order to park supported by the system, the parking operation must be activated via the controller by selecting the corresponding symbol in the symbol bar at the Central Information Display (CID).

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

### 20.6.1. Park procedure

As soon as a parking space is found, the driver is instructed to stop the vehicle and confirm the parking space by using the turn indicator corresponding to the parking direction. During the entire parking procedure, the driver receives further instructions that guide him through the entire parking procedure with the support of the system.

#### Vehicles with automatic transmission

The driver is prompted to take his hands from the steering wheel during automatic parking and hold down the parking assistance button until the parking procedure is complete.

### 20.6.2. Deactivation criteria

#### Manual deactivation criteria

The Parking Manoeuvring Assistant (PMA) can be deactivated at any time if necessary by the driver via the controller by selecting the corresponding symbol in the symbol bar on the Central Information Display (CID). Another way to deactivate the Parking Manoeuvring Assistant (PMA) is to release the parking assistance button in the switch block next to the iDrive controller.

If a fault develops, a Check Control message ("The PDC has malfunctioned. Have system checked.") is displayed in the Central Information Display (CID).

#### Automatic deactivation criteria

The Parking Manoeuvring Assistant (PMA) is switched off automatically when the following events occur:

- The parking assistance button is released
- The driver holds on to the steering wheel or steers himself
- A gear is selected that does not correspond to the instruction on the control display
- When accelerating
- The parking brake is secured
- The turn indicator opposite the required parking side is switched on
- At speeds above approximately 10 km/h (6 mph)
- Possibly on snow-covered or slippery roads
- The tailgate is open
- Possibly if there are objects which are difficult to overcome, e.g. curbs
- If obstructions suddenly appear
- A maximum number of parking maneuvers or the parking duration has been exceeded.

# G01 Driver Assistance Systems

## 20. Parking Manoeuvring Assistant

### 20.7. Limits of the system

The detection of objects can test the ultrasonic measurement system to its limits. Several examples of this are shown below:

- With trailer towbars and couplings.
- If the objects are thin or wedge-shaped.
- If the objects are projecting and elevated, e.g. wall projections or loads.
- If the objects have corners and sharp edges.
- If the objects have fine surfaces or structures, e.g. fences.

Low objects that are already displayed, e.g. curbs, may fall within the blind spot of the sensors before or after a continuous alarm sounds. It would not be possible to detect objects that are higher up and projecting, e.g. wall projections. Parking spaces may be detected although these are not suitable.

There may be other functional limitations in the following situations, for example:

- If the sensors are soiled or iced up.
- Heavy fog, rain or snow.
- On uneven surfaces, e.g. gravel roads.
- On slippery surfaces.
- On steep inclines or downhill gradients.
- If leaves have gathered or snow has piled up in the parking space.

To ensure the ultrasonic sensors remain fully operational, they must be kept clean and free of ice. When cleaning the sensors using a high pressure cleaner, avoid direct and sustained contact with a high-pressure water jet. Furthermore, when using high pressure cleaners, a distance of at least 30 cm from the sensors must be maintained.



---

The Parking Manoeuvring Assistant (PMA) cannot replace the driver's personal judgement of the traffic situation. Also check the traffic situation around the vehicle by looking around, otherwise there may be a risk of an accident as a result of road users or objects which lie outside the detection range of the Park Distance Control. Loud sound sources outside and inside the vehicle may mask the acoustic signals of the Parking Manoeuvring Assistant (PMA) or the Park Distance Control (PDC).

---

# G01 Driver Assistance Systems

## 21. Cruise Control

### 21.1. Introduction

Two cruise control systems are available in the G01. The cruise control with braking function (DCC) is part of the standard equipment.

The customer also has the option of ordering the Active Cruise Control with Stop&Go function (ACC Stop&Go) optional equipment (OE 5DF).

ACC Stop&Go can also be obtained if the customer opts for the Active Driving Assistant Plus Package optional equipment (OE ZDB), as it is contained in this equipment package.

The active cruise control with Stop&Go function, ACC Stop&Go (OE 5DF) and the Active Driving Assistant Plus Package (OE ZDB) optional equipment require the navigation system Professional (OE 609) optional equipment.



---

The cruise control systems support the driver with adapting the speed, distance and driving style to the traffic conditions, but do not relieve him of his responsibility. The driver must actively intervene, e.g. by braking, steering or taking evasive action, as otherwise there is a risk of an accident.

---

### 21.2. Cruise control with braking function

The cruise control with braking function is included as part of the G01's standard equipment. The system is also known as "Dynamic Cruise Control" (DCC). Dynamic Cruise Control (DCC) supports the driver on roads with less traffic by keeping the speed constant irrespective of rolling resistances (incline, downhill driving and vehicle load). In spite of the support, the driver remains responsible for control of the vehicle. It is possible to override the DCC function at any time by braking or accelerating the vehicle.

#### 21.2.1. Operation

The driver has the option of adjusting the set speed in small or large increments, which is then set and maintained by the system by controlling the drive and brakes. It can be changed using the left-hand switch block on the multifunction steering wheel (MFL). The speed is increased or reduced by 1 km/h (1 mph) by tapping the rocker switch. Each time the rocker button is pressed beyond the pressure point, the speed increases or reduces by 10 km/h (6 mph). The DCC steadily maintains a selected speed from approximately 30 km/h (18 mph).

The set speed is indicated in the instrument cluster in the familiar way; by a mark that moves round the speed reading. Notes are added to the displays in the instrument cluster if necessary.

If the vehicle's own deceleration is not sufficient to maintain the preset speed, the brake is activated accordingly.

If ECO PRO or SPORT mode is activated, cruise control is also set to a fuel-efficient or sporty driving style. Due to the fuel-efficient driving style in ECO PRO driving mode, in some situations the vehicle's speed may exceed or drop below the set speed, for example on downhill gradients or inclines.

# G01 Driver Assistance Systems

## 21. Cruise Control



G01 Buttons of the Dynamic Cruise Control DCC

Index	Explanation
1	Button for activating or deactivating the Dynamic Cruise Control (DCC)
2	Rocker switch for changing the set speed
3	Button for setting the speed of cruise control
4	Button for calling up a saved set speed/temporarily switching off the cruise control

**The system is interrupted automatically in the following situations:**

- If the brakes are used.
- If the selector lever position is moved out of position "D".
- If the Dynamic Traction Control (DTC) is activated or the Dynamic Stability Control (DSC) is deactivated.
- If the Dynamic Stability Control (DSC) is performing an adjustment.

### 21.3. Active speed control with Stop&Go function

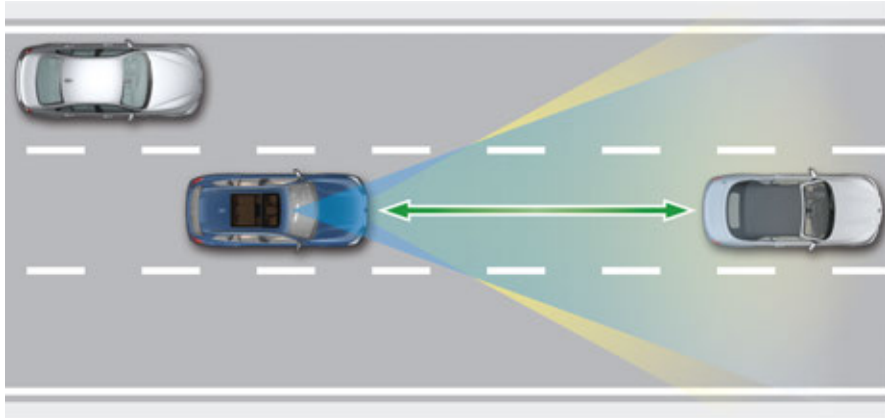
The active cruise control with Stop&Go function, ACC Stop&Go (OE 5DF) is offered as optional equipment for the G01.

ACC Stop&Go adjusts a driver-specified set speed and, if required by the traffic situation, also automatically adjusts the preselected following distance to the vehicle driving ahead (detected vehicles include passenger cars, trucks and motorbikes). The application range of ACC Stop&Go ranges from higher speeds down to a standstill. The distance and the speed are automatically adjusted in this range.



# G01 Driver Assistance Systems

## 21. Cruise Control



G01 Active Cruise Control (ACC) Stop&Go

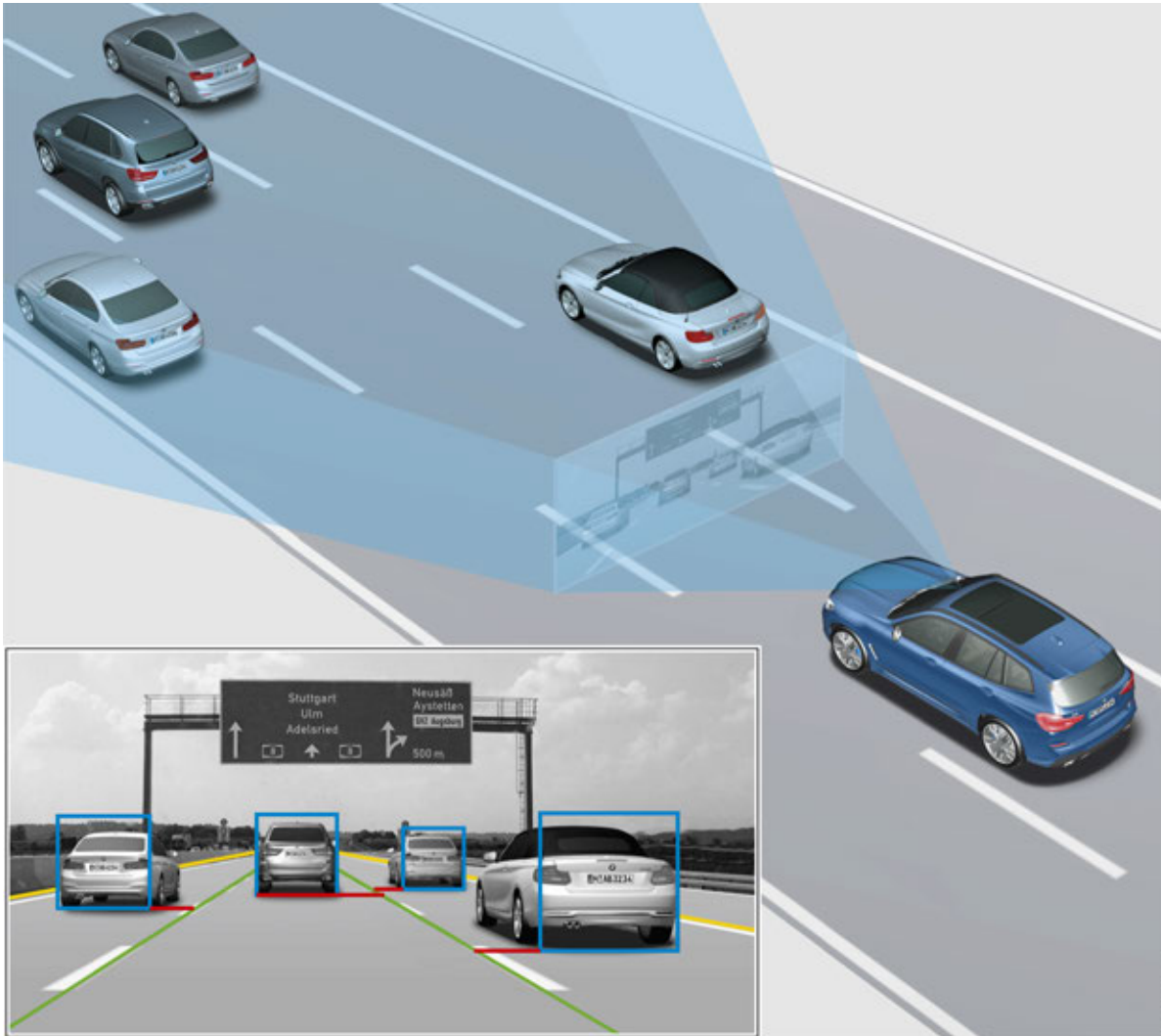
Depending on the stationary time, driving off from a standstill is performed automatically or in response to a prompt by the driver. ACC Stop&Go not only detects vehicles that are slowly coming to a halt, but also stationary vehicles.

Due to improved monitoring in front of the vehicle, the system is capable of reacting more quickly to vehicles swinging in and out and turning off.

The extended application range has been achieved by the incorporation of the KAFAS stereo camera. Image data is evaluated by the ACC Stop&Go system. The KAFAS control unit clearly detects vehicles when their rear ends are recorded by the camera. In addition, the KAFAS control unit ensures that the driving lane information, vehicle positions and movements are determined.

# G01 Driver Assistance Systems

## 21. Cruise Control

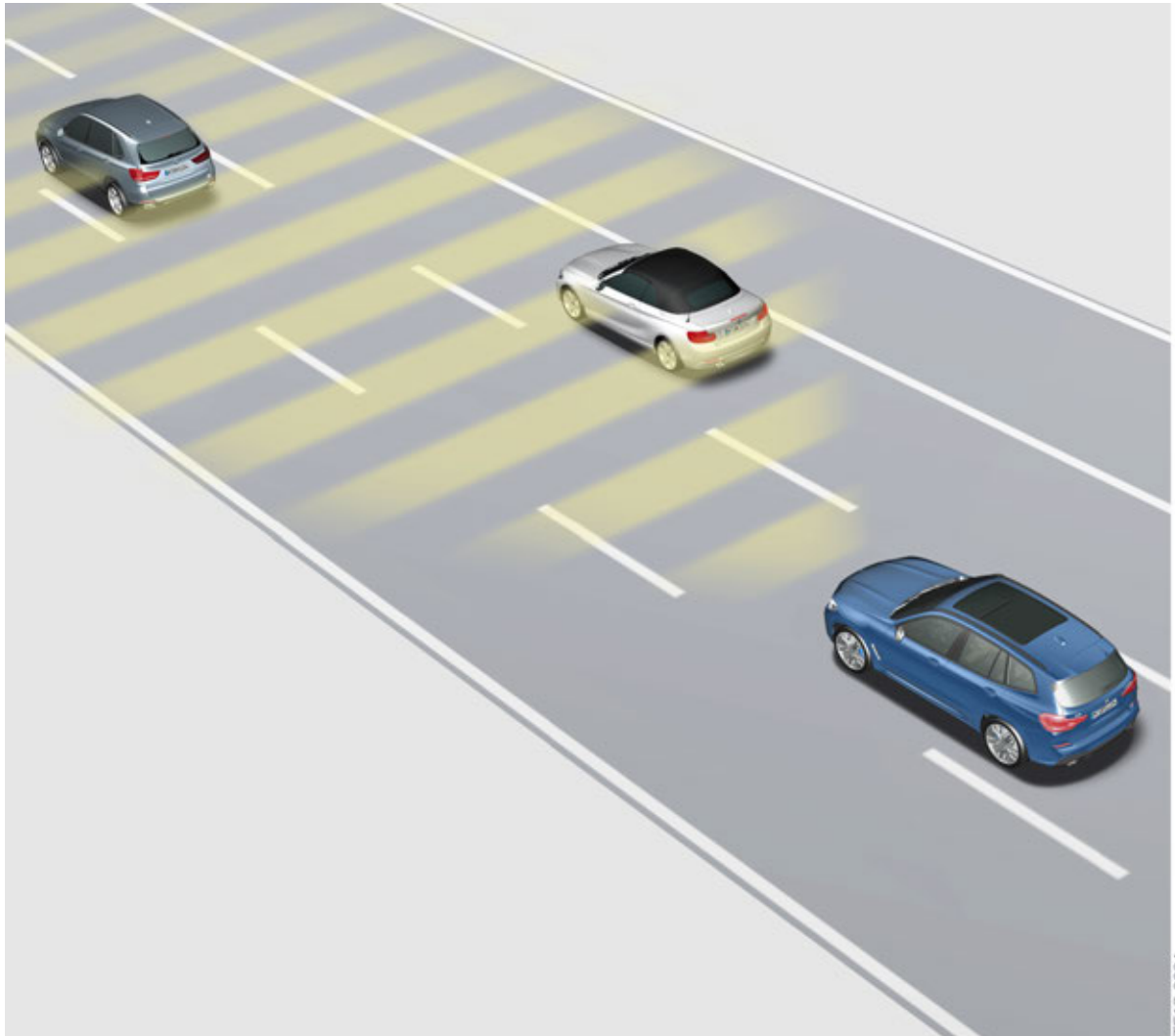


G01 Radar sensor/KAFAS stereo camera fusion: KAFAS stereo camera object detection

In addition to image data, radar data is also gathered and evaluated by the radar sensors. This fusion of image and radar data makes possible the clear identification of lane markings and the distinction between stationary vehicles and other fixed objects.

# G01 Driver Assistance Systems

## 21. Cruise Control



G01 Radar sensor/KAFAS stereo camera fusion: Radar sensor object detection

A 77 GHz radar sensor emits bundled electromagnetic waves. The echoes reflected by objects are received and evaluated by the radar sensor. This enables information about objects located in front of the radar sensor to be obtained. This information includes size, distance and the deduced speed. The system's radar sensor can identify vehicles ahead up to a distance of 200 m (650 feet), to a large extent irrespective of weather conditions.

The sensor is located behind the air inlet grille on the front bumper.

# G01 Driver Assistance Systems

## 21. Cruise Control



G01 installation location of front radar sensor for ACC Stop&Go

Index	Explanation
1	Removable grill
2	Sensor for ACC Stop & Go

Thanks to the radar sensor's improved detection capability and alignment with the image data from the KAFAS stereo camera, vehicles in neighboring lanes are also detected. If these vehicles are driving in their own lane, then ACC Stop&Go adapts the speed to the vehicle pulling in or vehicle ahead. As a result, a time lag selected by the driver is constantly maintained.

ACC Stop&Go adjusts the speed if there is no vehicle driving directly ahead and automatically switches to distance control if the sensor system detects a slower vehicle in its lane. The system's Stop & Go function brings the vehicle to a complete standstill if necessary.

### Detecting the vehicle in front of the vehicle in front

This is analysed using the sensors already fitted. Object detection is based on a fusion of the front radar sensor and the KAFAS stereo camera. Both sensors are, in principle, capable of detecting a vehicle in front of the vehicle in front.

In most cases, the vehicle in front of the vehicle in front is, however, concealed by the vehicle in front, which is why the camera can generally not detect it. The front radar, however, consistently provides good detection quality here by 'looking under' the vehicle in front.

The advantages of this are as follows:

- Improved "driver-like" speed governing behavior.
- Smoother following driving ("ACC cruising").
- Enhanced dynamics for traffic light-controlled journeys.
- Driver-like behavior when approaching distant objects.

# G01 Driver Assistance Systems

## 21. Cruise Control

### Evaluation of ultrasound data

Since both the front radar sensor and the KAFAS stereo camera are only of limited use for near-range monitoring, the ultrasonic data for the ACC Stop&Go system is evaluated for the first time. The data is provided by the front ultrasonic sensors already described. These are needed to monitor the close range in front of the vehicle for freedom from obstacles.

### Coupling to the navigation system

Improved cornering behavior is made possible by coupling ACC Stop&Go to the navigation system. This contributes to a further improvement of driver-like behaviour. This also takes into consideration the intention to turn off the road and intersections, among other aspects.

### Restart time

The restart time after automatic braking to a stop by ACC Stop&Go of previously approximately 3 seconds has also been increased to **approximately 30 seconds** on the G01.



---

If the vehicle in front starts driving again after being stopped (for more than approximately 3 seconds or longer than approximately 30 seconds, a note is shown to the driver. To drive off again the driver must confirm this note, by pressing the RES/CNCL button or the accelerator pedal.

---

Additional convenience is provided by the extended restart time without driver intervention.

ACC Stop & Go does not only support the driver in flowing traffic, but also in traffic jam situations, both on multiple-lane roadways and ordinary roads.

The adjustment range for the set speed is limited to a maximum of 210 km/h (130 mph).

If ECO PRO or SPORT mode is activated, the Active Cruise Control with Stop&Go function is also set to a fuel-efficient or sporty driving style. Due to the fuel-efficient driving style in ECO PRO driving mode, in some situations the vehicle's speed may exceed or drop below the set speed, for example on downhill gradients or inclines.

### 21.3.1. Operation

#### Activation and deactivation

The activation and deactivation of the ACC Stop & Go and the Dynamic Cruise Control are almost the same. ACC Stop&Go can either be activated while driving or at a standstill. For safety reasons, when the vehicle is at a standstill the function can only be put in Standby mode or deactivated while the foot brake is applied.

If the function is active, it can be interrupted by pressing the RES/CNCL button. The distance and speed will no longer be maintained and the set speed is greyed out in the instrument cluster.

The driver can select a desired distance in four stages using the left-hand multifunction button on the multifunction steering wheel (MFL). The following distance most recently selected is saved depending on the key being used.

# G01 Driver Assistance Systems

## 21. Cruise Control

The following graphic shows the button assignment for the assistance systems on the multifunction steering wheel (MFL) in vehicles **without** the steering and lane control assistant including traffic jam assistant:



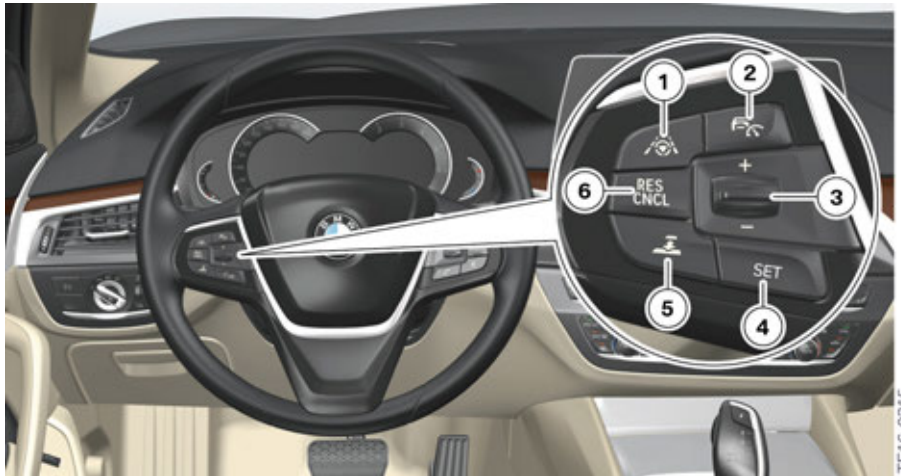
G01 buttons for Active Cruise Control with Stop&Go function optional equipment (OE 5DF)

Index	Explanation
1	Button for adjusting the distance of the driver's vehicle to the vehicle driving ahead (increase distance)
2	Button for activating or deactivating ACC Stop & Go
3	Rocker switch for changing the set speed
4	Button for setting the speed of cruise control
5	Button for adjusting the distance of the driver's vehicle to the vehicle driving ahead (reduce distance)
6	Button for calling up a saved set speed/temporarily switching off the cruise control

The following graphic shows the button assignment for the assistance systems on the multifunction steering wheel (MFL) in vehicles **with** the steering and lane control assistant including traffic jam assistant:

# G01 Driver Assistance Systems

## 21. Cruise Control



G01 buttons for ACC Stop&Go with Active Driving Assistant Plus Package (OE ZDB)

Index	Explanation
1	Button for activating or deactivating the Active Lane Keeping Assistant and Traffic Jam Assistant
2	Button for activating or deactivating ACC Stop & Go
3	Rocker switch for changing the set speed
4	Button for setting the speed of cruise control
5	Button for adjusting the distance of the driver's vehicle to the vehicle driving ahead
6	Button for calling up a saved set speed/temporarily switching off the cruise control

### The following conditions must also be satisfied for activation:

- Seat belt fastened and doors closed.
- Drive position "D" engaged and brake pressed.
- Engine running.
- Parking brake not activated.
- Camera and radar sensor operational.
- No system faults detected.

### The system is interrupted automatically in the following situations:

- If the brakes are used.
- If the selector lever position is moved out of position "D".
- If the Dynamic Traction Control (DTC) is activated or the Dynamic Stability Control (DSC) is deactivated.
- If the Dynamic Stability Control (DSC) is performing an adjustment.



# G01 Driver Assistance Systems

## 21. Cruise Control

- If the seat belt is unfastened and the driver's door is opened in a stationary vehicle.
- If the system has not detected an object for a long time, e.g. on rarely frequented sections of road with no distinct edge.
- If the detection range of the radar is impaired, e.g. due to contamination or heavy precipitation.
- Following a longer immobilization period, if the vehicle has been decelerated to a standstill by ACC Stop&Go.

The set speed is indicated in the instrument cluster in the familiar way; by a mark that moves round the speed reading. If ACC Stop&Go is activated, this mark is green, whereas in "Standby" mode it is grey and the last set speed is displayed. After the ACC Stop&Go function is activated or after the driver has adjusted the set speed, the current digital value is displayed. If the distance is changed, a symbol appears briefly as an acknowledgement. The symbol screen masks are for example the set speed and the distance bar. With each subsequent operation the display is shown for another three seconds.

The distances set by the driver, as well as the distances to any vehicles driving ahead, that must be maintained to ensure a safe distance are displayed between the two round instruments (speed reading and engine speed display). The distance setting is stored for the ID transmitter currently being used. Like for DCC, it is also necessary that the symbol screen masks are complemented if necessary with notes in the instrument cluster for ACC Stop & Go.

With active control the displays are also shown in the Head-Up Display (optional equipment OE 610).

If the system can no longer adjust a safe distance, for example due to very high differential speeds, then the driver is prompted to take over the vehicle handling by a flashing red vehicle symbol and an acoustic signal.

### Displays




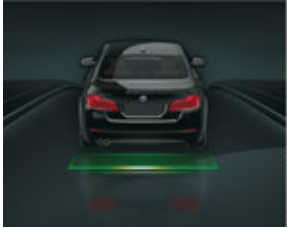



Displays in the instrument cluster when ACC Stop&Go is activated






# G01 Driver Assistance Systems

## 21. Cruise Control

Symbols	Explanation
 TE15-0971	Display lights up black/grey, no vehicle symbol shown: System has been interrupted.
 TE15-1033	Distance control briefly paused, as the accelerator pedal is depressed.
 TE15-0972	Vehicle symbol and distance bars flash red and a signal sounds: Request for intervention by braking and evasive action, if necessary.
 TE15-0973	Distance control (ranging) active: ACC Stop&Go adjusts to the set distance (distance 1). The speedometer mark for the Active Cruise Control with Stop&Go function also lights up green in the speed reading.
 TE15-0974	Distance control (ranging) active: ACC Stop&Go adjusts to the set distance (distance 2). The speedometer mark for the Active Cruise Control with Stop&Go function also lights up green in the speed reading.

# G01 Driver Assistance Systems

## 21. Cruise Control

Symbols	Explanation
 TE15-0975	Distance control (ranging) active: ACC Stop&Go adjusts to the set distance (distance 3). The speedometer mark for the Active Cruise Control with Stop&Go function also lights up green in the speed reading. Distance 3 is approximately half the value of the speed indicator in meters and is pre-set automatically when the system is first switched on.
 TE15-0976	Distance control (ranging) active: ACC Stop&Go adjusts to the set distance (distance 4). The speedometer mark for the Active Cruise Control with Stop&Go function also lights up green in the speed reading.
 TE15-1034	This symbol is displayed if the distance to the vehicle ahead is too short.

# G01 Driver Assistance Systems

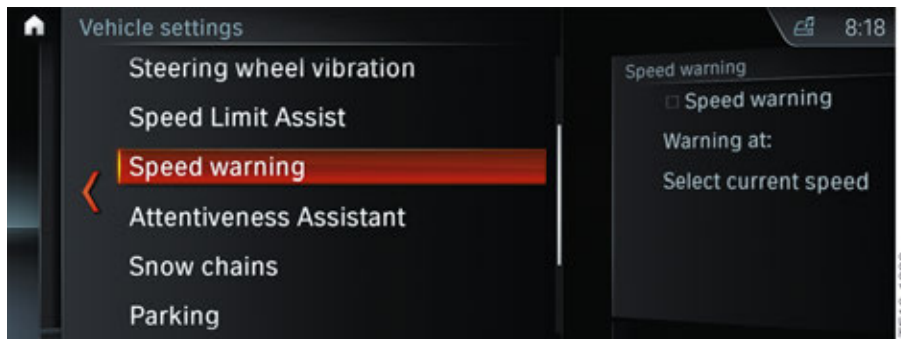
## 22. Speed Limit Warning

The driver has the option of setting a speed at which a warning is issued when the system is activated and the preset speed is exceeded.

### 22.1. Operation

The speed limit warning can be switched on and off in the iDrive menu, as well as the speed setting at which the warning should be issued by making the following selection via the controller:

- "My Vehicle"
- "Vehicle settings"
- "Speed limit warning"
- "Warning at:"
- Turn controller until the desired speed is displayed
- Press controller
- Speed limit warning is saved



G01 Speed limit warning display on the CID

# G01 Driver Assistance Systems

## 23. Lateral Guidance Assistants

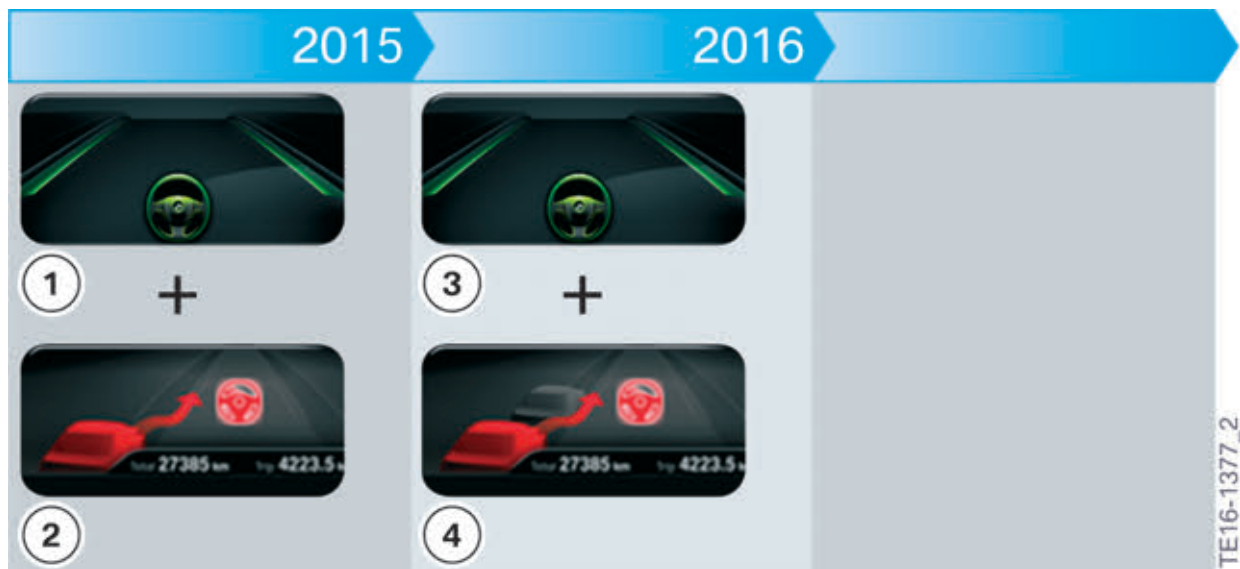
The traffic jam assistant was first introduced in the I01. This increased the speed range in which the system can be used from 40 km/h (24 mph) to 60 km/h (37 mph).

The steering and lane control assistant and Active Lane keeping Assistant with active side collision protection were introduced for the first time in the G12.

Further innovative systems were introduced with the launch of the G30. The driver of a new BMW X3 now also has the Evasion Aid and lane change assistant at his disposal.

### 23.1. Launch timeline

The graphic below shows when the lateral guidance systems were introduced:



Overview of lateral guidance assistance

# G01 Driver Assistance Systems

## 23. Lateral Guidance Assistants

Index	System	Functional characteristics of the systems
1	Second generation Traffic Jam Assistant (from 2015 with launch of G12)	<ul style="list-style-type: none"> <li>• 0 km/h – 70 km/h (0 mph–43 mph)</li> <li>• Traffic jam following distance control with lane center guidance</li> <li>• No road-type restrictions</li> </ul>
1	Active Lane Keeping Assistant (from 2015 with launch of G12)	<ul style="list-style-type: none"> <li>• 70 – 210 km/h (43 mph–130 mph)</li> <li>• Lane center guidance</li> <li>• No road-type restrictions</li> </ul>
2	Active Lane Keeping Assistant with Side Collision Avoidance (from 2015 with launch of G12)	<ul style="list-style-type: none"> <li>• 30 km/h – 70 km/h (18 mph–43 mph) (warning in form of single steering wheel pulse)</li> <li>• 70 km/h – 210 km/h (43 mph–130 mph) (corrective steering interventions)</li> <li>• Active steering interventions in situations where a collision is imminent</li> <li>• No road-type restrictions</li> </ul>
3	Second generation Traffic Jam Assistant	<ul style="list-style-type: none"> <li>• 0 km/h – 70 km/h (0 mph–43mph)</li> <li>• Traffic jam following distance with lane center guidance</li> <li>• No road-type restrictions</li> </ul>

# G01 Driver Assistance Systems

## 23. Lateral Guidance Assistants

Index	System	Functional characteristics of the systems
3	Active Lane Keeping Assistant	<ul style="list-style-type: none"><li>• 70 km/h – 210 km/h (43 mph–130 mph)</li><li>• Lane center guidance</li><li>• No road-type restrictions</li></ul>
4	Active Lane Keeping Assistant with Side Collision Avoidance	<ul style="list-style-type: none"><li>• 30 km/h – 70 km/h (18 mph–43 mph) (warning in form of single steering wheel pulse)</li><li>• 70 km/h – 210 km/h (43 mph–130 mph) (corrective steering interventions)</li><li>• Active steering interventions in situations where a collision is imminent</li><li>• No road-type restrictions</li></ul>
4	Evasion Aid (from 2016 with the launch of the G30)	<ul style="list-style-type: none"><li>• 40 km/h – 160 km/h (24 mph–100 mph)</li><li>• Supporting steering intervention after warning from the collision warning system and previously initiated avoidance maneuver</li></ul>

# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants

What drivers wish for most while driving is relief from monotonous situations such as sitting in a jam or slow moving traffic. In addition to active cruise control with Stop&Go function (OE 5DF), drivers are now also supported by steering and lane control assistance. The steering and lane control assistant was first introduced in the G12.

The steering and lane control assistant including traffic jam assistant is part of the Active Driving Assistant Plus optional equipment (OE 5AT).

The system assists the driver in keeping the vehicle in lane by initiating corrective steering interventions if required.



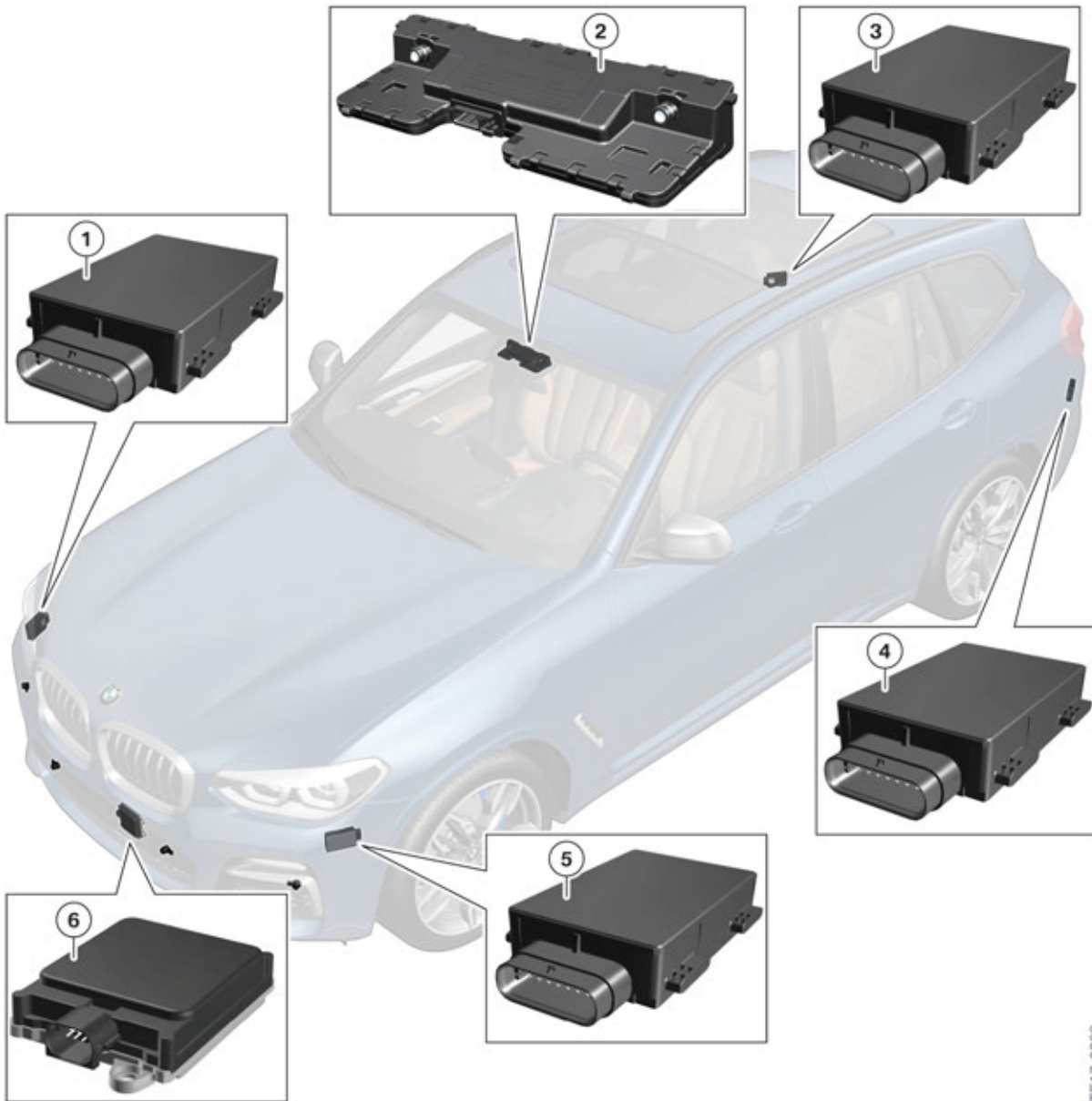
G01 Active steering intervention

### 24.1. Functional principle

Depending on the speed, the system is guided by the lane edges or vehicles driving ahead. The position of the lane edges and the vehicle driving ahead is determined with the help of five radar sensors and the KAFAS stereo camera.

# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants



TE17-0268

G01 installation locations of radar sensors and KAFAS stereo camera

Index	Explanation
1	Control unit for radar sensor, right (RSR)
2	KAFAS stereo camera
3	Lane change warning, right (primary)
4	Lane change warning, left (secondary)
5	Control unit for radar sensor, left (RSL)
6	Active Cruise Control (ACC)



# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants

The system has two subfunctions: the traffic jam assistant (second generation) and the lane control assistant.

The traffic jam assistant is available for speeds up to approximately 70 km/h (43 mph), the steering and lane control assistant from approximately 70 km/h (43 mph) to approximately 210 km/h (130 mph).

The table below shows an overview of the differences between the two subfunctions:

<b>Traffic Jam Assist</b>	<b>Lane Control Assistant</b>
Speed range 0 – 70 km/h (0– 43 mph)	Speed range from 70 – 210 km/h (43– 130 mph)
Corrective steering interventions in the direction of the vehicle driving ahead	Corrective steering interventions in the direction of the center of the lane
Detected lane markings taken into consideration	Gaps in lane markings can be bridged for a limited time by aligning with vehicle ahead

If the traffic jam and lane control assistants are activated, the side collision avoidance is also interlinked.

### 24.1.1. Hands-off-Detection

To ensure the driver is alert and able to react, he is urged to always have both hands on the steering wheel when the steering and lane control assistant including traffic jam assistant are activated (established in the German road traffic regulations). If the driver takes both hands off the steering wheel rim, control is stopped after a few seconds during active control and the driver is requested to take over steering.

Additional information about Hands-off-Detection may be found in the **ST1501 G12 Driver Assistance Systems** product information.

### 24.1.2. Functional prerequisites

The following prerequisites must be met in order for the steering and lane control assistant including traffic jam assistant to be used:

- Speed must be below 210 km/h (130 mph).
- Above 70 km/h (43 mph): both lane edges must be detected.
- Below 70 km/h (43 mph): both lane edges or a vehicle driving ahead must be detected.
- The lane width must be sufficient.
- The vehicle should be positioned as centrally as possible in the lane.
- There must be a sufficient curve radius.
- At least one hand must be on the steering wheel rim.
- The turn indicator must not be activated.
- The camera calibration process must be completed immediately after vehicle delivery.

The active lateral control function with data evaluation of the KAFAS stereo camera is implemented with the assistance of the lane markings identified on the left and right.

# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants

In order for the system to be activated, two lane boundary lines must be detected. Below a speed of approximately 70 km/h (43 mph) a vehicle driving ahead in the same lane is sufficient to activate the system.

The system is put in Standby mode if the marginal conditions are not satisfied (e.g. hands not on steering wheel, lane too narrow or dazzling of KAFAS stereo camera). Once all marginal conditions have been met, the system is re-enabled automatically.

To activate the system, the speed of the vehicle is another input quantity that is evaluated. The system uses these values to decide which function will be enabled. As mentioned above, the threshold values are set as follows:

- The traffic jam assistant can be enabled within a speed range of 0 to approximately 70 km/h (43 mph).
- The lane control assistant can be enabled within a speed range from approximately 70 km/h (43 mph) to approximately 210 km/h (130 mph).

### 24.1.3. Lane change

For a lane change to be as comfortable as possible, the steering and lane control assistant including traffic jam assistant is put silently into Standby mode when the turn indicator is activated and reactivates itself automatically once the turn indicator is back in its initial position and a lane change has occurred.

### 24.1.4. Function logic

The main function logic of the lateral guidance is implemented in the optional equipment system (SAS) control unit.

The majority of the data for the function is provided by the KAFAS stereo camera, where algorithms for the lane and object detection run.

Vehicle dynamics data, such as the driving speed, wheel speeds, yaw rate, steering angle, lateral acceleration, longitudinal acceleration, etc., is provided by the rest of the vehicle network via a FlexRay or CAN connection.

A target trajectory (also known as a path curve) is calculated in the optional equipment system (SAS) control unit. This is used to determine whether a steering correction is required.

### 24.1.5. Steering interventions

If the current course of the vehicle deviates too much from the target trajectory (path curve), a steering correction is initiated.

The steering intervention is a corrective measure. This means the driver is not relieved of his duty to steer the vehicle. As the corrective steering interventions are limited to approximately 1.5 m/s<sup>2</sup> based on the lateral acceleration, the system cannot navigate curves above the respective speed-dependent curve radius without the driver's assistance. The driver must therefore steer the vehicle at the same time in order to stay on the roadway.

# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants

The target trajectory and required steering corrections are calculated based on the driving speed as follows:

### **Speed range 0 to 70 km/h (0 to 43 mph):**

- The position and previous movements of the vehicle driving ahead are given priority when determining the appropriate steering corrections.
- Detected lane markings are taken into account to avoid unwanted steering corrections that would result in leaving the lane.
- Corrective steering interventions in the direction of the center of the lane are initiated if the vehicle detects there is not a vehicle driving ahead.

### **Speed range 70 km/h to 130 km/h (43 to 80 mph) :**

- Corrective steering interventions in the direction of the center of the lane are initiated.
- It is possible to bridge the gap for a limited time where lane markings are not detected by estimating the course of the lane based on the vehicle driving ahead.

### **Speed range 130 km/h to 210 km/h (80 to 130 mph):**

- Corrective steering interventions in the direction of the center of the lane are initiated.
- For safety reasons above a driving speed of approximately 130 km/h (80 mph) the course of the lane is **not** estimated using the vehicle driving ahead.

The vehicle driving ahead is given priority as the "correction target" at speeds up to approximately 70 km/h (43 mph) due to the limited detection of lane markings.

In traffic jams or slow-moving traffic following distances are often extremely small (< 10 m) due to tailgating and lanes ahead are often partially covered due to staggered driving.

This means the KAFAS stereo camera is unable to correctly interpret the lane markings in some cases.

When classifying the object driving ahead, vehicles such as motorbikes are not used as the "correction target".

### **Steering momentum**

The driving dynamics function software in the Dynamic Stability Control (DSC) control unit calculates a target steering torque based on the curve nominal value. The target steering torque is then converted to an engine torque by the Electronic Power Steering (EPS), which finally results in a steering wheel movement at the wheels.

The maximum steering torque has been set in such a way that it can always be overruled by the driver and therefore steering past the maximum steering torque is possible.

# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants

### 24.1.6. Operation

The system is switched on via the traffic jam assistant button on the multifunction steering wheel (MFL).





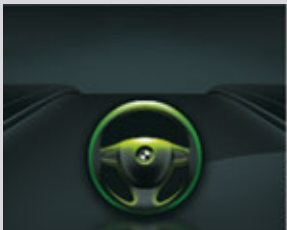

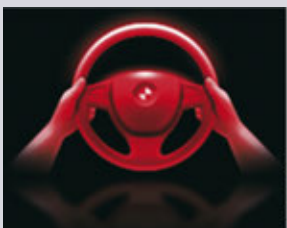
G01 buttons for ACC Stop&Go with Active Driving Assistant Plus optional equipment (OE 5AT)

Index	Explanation
1	Button for activating or deactivating the Active Lane Keeping Assistant and Traffic Jam Assistant
2	Button for activating or deactivating ACC Stop & Go
3	Rocker switch for changing the set speed
4	Button for setting the speed of cruise control
5	Button for adjusting the distance of the driver's vehicle to the vehicle driving ahead
6	Button for calling up a saved set speed/temporarily switching off the cruise control

# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants

### Displays

Symbols	Explanation
 <p>TE15-0986</p>	<p>Grey steering wheel symbol:</p> <ul style="list-style-type: none"> <li>The system has been interrupted and will not make any further steering wheel movements. The system is in Standby mode.</li> <li>Once the system conditions are met, the system reactivates itself automatically.</li> </ul>
 <p>TE15-0982</p>	<p>Green steering wheel symbol and lane edges:</p> <ul style="list-style-type: none"> <li>The system assists in keeping the vehicle in the lane.</li> </ul>
 <p>TE15-0983</p>	<p>Green steering wheel symbol, grey lane edges:</p> <ul style="list-style-type: none"> <li>No lane edges detected. The vehicle follows the vehicle driving ahead.</li> </ul>
 <p>TE15-0984</p>	<p>Yellow steering wheel symbol:</p> <ul style="list-style-type: none"> <li>Request for driver to place hands back on the steering wheel (grasp steering wheel). System continues to be active.</li> </ul>
 <p>TE15-0985</p>	<p>Red steering wheel symbol and acoustic signal sounds:</p> <ul style="list-style-type: none"> <li>The system has been interrupted. It will not make any further steering wheel movements.</li> </ul>

### Configuration options

The driver can change the system settings in the Intelligent Safety configuration menu.

# G01 Driver Assistance Systems

## 24. Lane Keeping & Traffic Jam Assistants

### 24.1.7. Deactivation criteria

The steering and lane control assistant including traffic jam assistant is deactivated automatically in the following situations:

- If the vehicle departs from the detected lane or the lane width does not meet the requirements.
- If the lane edges of the current lane are not detected by the KAFAS stereo camera.
- If no vehicle driving ahead is detected.
- The vehicle is travelling at a speed greater than 210 km/h (130 mph).
- If the Hands-off-Detection cannot detect the hands (at least one hand) on the steering wheel rim. The system is switched off once a defined time threshold (several seconds) has elapsed.
- Due to the radius of the bend in the road, the inner lane edge is no longer detected due to the camera aperture angle.
- Pedestrian protection assumes the operating condition "Fault exists".
- If the turn indicator is on.
- The driver intervenes actively in the steering.
- If over a certain time period no lane edges are detected and there is not a vehicle driving ahead.
- If the driver manually deactivates the DSC (DSC off).
- If there is an intervention from the preventative pedestrian protection.
- After Dynamic Brake Control braking (brake assistant).

### 24.1.8. Limits of the system

When driving in narrow lanes, e.g. when driving through roadworks or when emergency lanes are formed, the system cannot be activated or used meaningfully.



---

Due to the limited detection capacity of the KAFAS stereo camera, the driver must remain alert and observant in order to be able to actively intervene at any time so as to avoid the risk of an accident. The system does not relieve the driver of personal responsibility for correctly judging the traffic situation. The driver is solely responsible for the vehicle.

---

# G01 Driver Assistance Systems

## 25. Active Lane Keeping Assistant

The Active Lane keeping Assistant with active side collision protection is part of the Active Driving Assistant Plus optional equipment (OE 5AT).

By making corrective steering interventions, the system, already familiar from the G12 helps the driver to keep the vehicle in lane at speeds from approximately 70 km/h (43 mph) to approximately 210 km/h (130 mph) and to actively avoid potential side collisions. The system endeavours to orient the vehicle in its lane according to the situation and within the framework of the system limits.

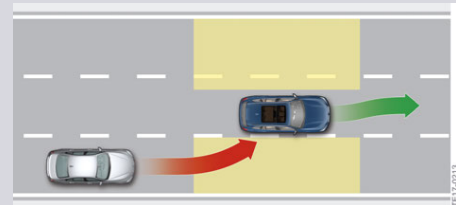
The system consists of the following four subfunctions:

- Side Collision Avoidance
- Reduced Side Collision Avoidance
- Lane Departure Warning
- Blind Spot Detection

### 25.1. Side Collision Avoidance

The table below shows an overview of the functional characteristics of the "Side Collision Avoidance" subfunction:

Speed range	Warning functions	Corrective steering intervention
70 km/h – 210 km/h (43 mph – 130 mph)	<ul style="list-style-type: none"> <li>• Issued if the vehicle detects that it is getting critically close to another vehicle to the side</li> <li>• Haptic warning in the form of vibration in the steering wheel using an unbalanced actuator</li> <li>• Visual warning in exterior mirror in the form of the corresponding warning light</li> </ul>	<ul style="list-style-type: none"> <li>• Corrective steering intervention in the direction of the available space on the roadway</li> </ul> <p>Requirements:</p> <ul style="list-style-type: none"> <li>• Detected lanes</li> <li>• Sufficient available space on the roadway</li> </ul>



#### 25.1.1. Reduced Side Collision Avoidance

The Reduced Side Collision Avoidance comes into play if it is not possible to adequately monitor the available space on the roadway or there is no available space on the roadway.

The Reduced Side Collision Avoidance is interlinked with the steering and lane control assistants including traffic jam assistant function.

# G01 Driver Assistance Systems

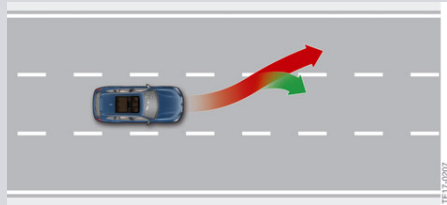
## 25. Active Lane Keeping Assistant

The table below shows an overview of the functional characteristics of the "Reduced Side Collision Avoidance" subfunction:

Speed range	Warning functions	Corrective steering intervention
30 km/h – 210 km/h (18 mph – 130 mph)	<ul style="list-style-type: none"> <li>Issued if the vehicle detects that it is getting critically close to another vehicle to the side</li> <li>Haptical warning in the form of vibration in the steering wheel using an unbalanced actuator</li> <li>Visual warning in exterior mirror in the form of the corresponding warning light</li> <li>30 km/h – 75 km/h (18 mph – 46 mph) additional warning in form of single steering wheel pulse</li> </ul>	<ul style="list-style-type: none"> <li>A corrective steering intervention is <b>not</b> initiated; instead only a single steering wheel pulse warning is issued in the opposite direction to the detected object the vehicle could collide with.</li> </ul>

### 25.2. Lane departure warning

The table below shows an overview of the functional characteristics of the "Lane departure warning" subfunction:

Speed range	Warning functions	Corrective steering intervention
70 km/h – 210 km/h (43 mph – 130 mph)	<ul style="list-style-type: none"> <li>Triggered if a lane departure is detected by the lane departure warning function. The associated haptic warning in the form of a vibration in the steering wheel using an unbalanced actuator is issued and visual warning in the exterior mirror in the form of the corresponding warning light.</li> </ul>	<ul style="list-style-type: none"> <li>Corrective steering intervention in the direction of the original lane if vehicle moves towards neighboring lane</li> </ul> <p>Requirements:</p> <ul style="list-style-type: none"> <li>Detected lanes</li> </ul> 

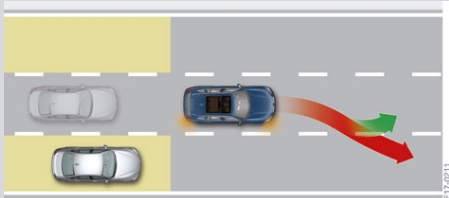


# G01 Driver Assistance Systems

## 25. Active Lane Keeping Assistant

### 25.3. Lane change warning

The table below shows an overview of the functional characteristics of the "Lane change warning" subfunction:

Speed range	Warning functions	Corrective steering intervention
70 km/h – 210 km/h (43 mph – 130 mph)	<ul style="list-style-type: none"> <li>Triggered if a lane change that could result in a collision is detected by the lane change warning function. The associated haptic warning in the form of a vibration in the steering wheel using an unbalanced actuator is issued and visual warning in the exterior mirror in the form of the corresponding warning light.</li> </ul>	<ul style="list-style-type: none"> <li>Corrective steering intervention in the direction of the available space on the roadway when lane change intention is made and neighboring lane is obstructed</li> </ul> <p>Prerequisites:</p> <ul style="list-style-type: none"> <li>Detected lanes</li> <li>Sufficient available space on the roadway</li> </ul> 

Further information can be found in the system descriptions of the respective subfunctions (see section 10-12).



The Active Lane keeping Assistant with active side collision protection does not relieve the driver of his overall responsibility for driving the vehicle. Due to the system limits be attentive in order to be able to actively intervene at any time. Otherwise, there is a risk of an accident.

# G01 Driver Assistance Systems

## 26. Evasion Aid

Often a collision with another vehicle (at the end of a tailback for example) or obstacle can only be prevented by an avoidance maneuver. Since the driver's response time plays a decisive role in an avoidance maneuver just as in a braking maneuver, the Evasion Aid is able to make a considerable contribution to avoiding an impending collision.

The Evasion Aid supports the driver in such critical driving situations with a focused steering intervention if the driver needs to avoid an obstacle. The system also help keep the vehicle stable during and after the avoidance maneuver.

This is achieved by an interaction between the Dynamic Stability Control DSC, the Electronic Power Steering EPS and the analysis of data from the assistance sensors.



G01 Evasion Aid: interaction of Dynamic Stability Control DSC and Electronic Power Steering EPS

The Evasion Aid is part of the optional equipment Active Driving Assistant Plus (OE 5AT) and was used for the first time in the G30.

### 26.1. Functional principle

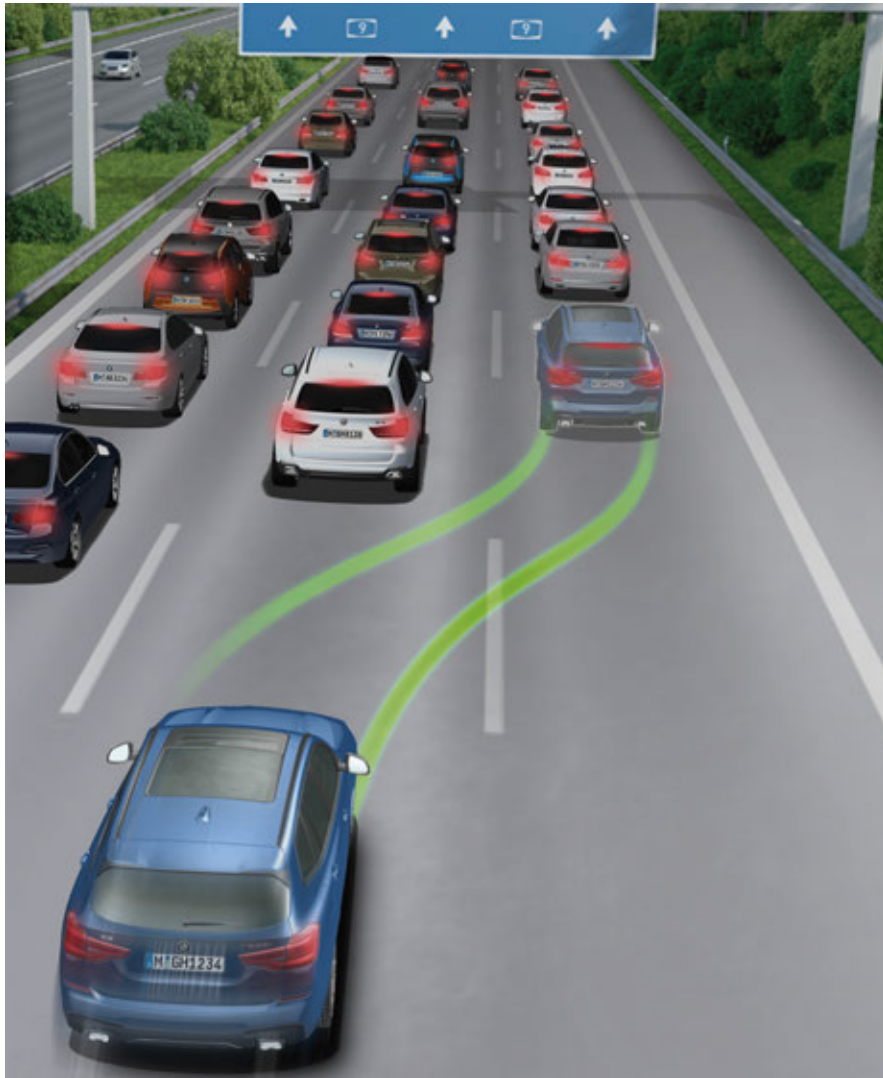
An emergency avoidance maneuver takes place when a suddenly occurring obstacle is detected in front of the vehicle and the driver has to avoid this obstacle quickly and without “significant” braking.

The Evasion Aid supports the driver in avoidance maneuvers in emergency situations and calculates an optimum “escape track” past the obstacle.

The “escape track” is calculated within the physical limits of the particular vehicle. The calculated “escape track” is designed to minimize transverse dynamics.

# G01 Driver Assistance Systems

## 26. Evasion Aid



G01 Evasion Aid

The vehicle is preconditions before an anticipated avoidance maneuver.

Here all functions that contribute to stabilize the vehicle are adapted in their configuration for the maximum support of the driver. This can reduce the risk of unstable vehicle behavior or overloading the driver in an acute avoidance maneuver.

The Evasion Aid checks the current vehicle inclination and the driver's steering wheel actions and compares the information with the computed "escape track". Should the system detect discrepancies, an appropriate steering intervention is applied to steer the vehicle to the previously estimated "escape track".

The design objective for the system was that the driver's selected steering is not bypassed, but instead the haptics of steering wheel use are modified. The driver is supported by an additional support torque in the Electronic Power Steering (EPS) for the avoidance maneuver.

If a collision-threatening situation is detected and an acute warning has been issued, the Evasion Aid evaluates the traffic situation.

# G01 Driver Assistance Systems

## 26. Evasion Aid

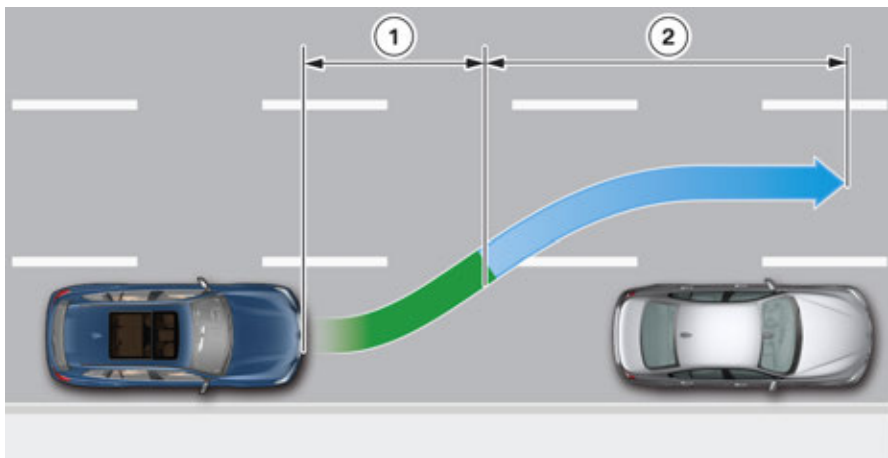
The possible free space for an avoidance maneuver is analyzed on the basis of this critical situation. Radar sensors and the KAFAS stereo camera here monitor the vehicle's surroundings. The system can intervene to provide support if an avoidance opportunity next to the vehicle in front is available and if no collision object has been detected to the side of the own vehicle.

The system assists the driver in the speed range from 40 km/h to 160 km/h (25 mph – 100 mph).

The driver initiates the avoidance maneuver by turning the steering wheel rapidly, at the same time determining the avoiding direction. Any brake intervention initiated by the acute warning is aborted or suppressed as appropriate. The Electronic Power Steering (EPS) implements a supporting steering intervention.

The vehicle is made “more agile” by the system as it steers around the obstacle and then stabilized again when it reaches the escape lane.

Rapid and effective avoidance is possible thanks to the vehicle's improved response to steering commands, without, however, endangering the general driving stability.



G01 Evasion Aid: make agile/stabilise

Index	Explanation
1	Make agile
2	Stabilize

The hard shoulder may be used as the escape lane, in addition to a normal lane.



The supporting steering intervention by the system is not performed until after the driver has actively initiated the avoidance maneuver. An avoidance maneuver by the Evasion Aid alone is thus **not** performed. The driver must likewise determine the direction of the avoidance.

# G01 Driver Assistance Systems

## 26. Evasion Aid

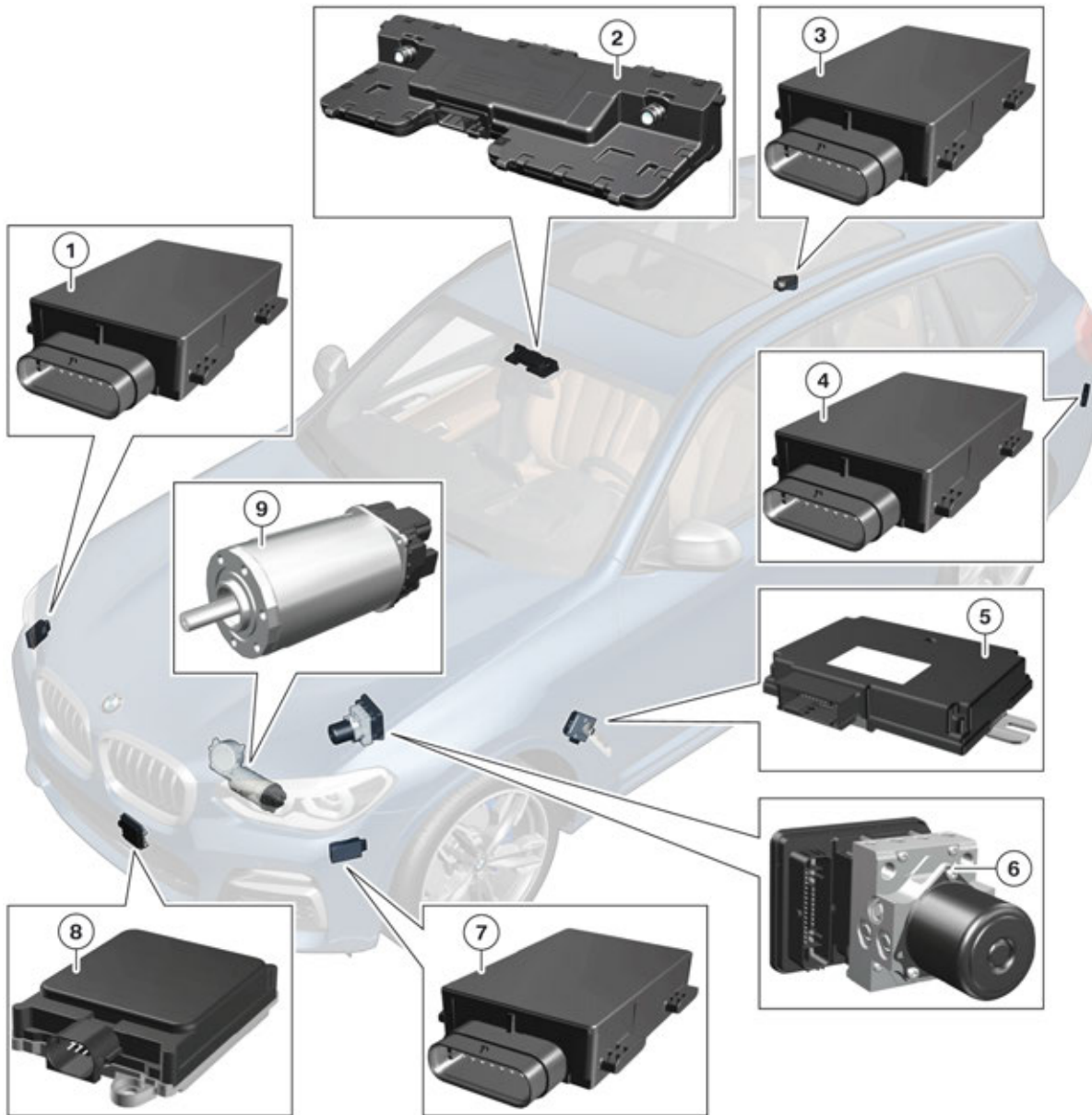
### 26.2. System overview

Below we describe which main components or sensors are relevant to the Evasion Aid.

- Object or obstacles are detected by means of the KAFAS stereo camera and the ACC Stop&Go front radar sensor.
- The four side radar sensors monitor the area around the vehicle. The data from the KAFAS stereo camera is also analyzed and in this way a possible free space for an avoidance maneuver can be identified.
- A target trajectory (also known as a path curve), that is the “escape track” itself, is calculated in the Optional Equipment System (SAS) control unit.
- The driving dynamics function software in the Dynamic Stability Control (DSC) control unit calculates a target steering torque based on the “escape track”.
- The target steering torque is converted to an engine torque by the Electronic Power Steering (EPS), which finally results a supporting steering intervention if necessary. The maximum steering torque has been set in such a way that it can always be overruled by the driver and therefore steering past the maximum steering torque is possible.

# G01 Driver Assistance Systems

## 26. Evasion Aid



TE17-0281

G01 Evasion Aid system overview

Index	Explanation
1	Control unit for radar sensor, right (RSR)
2	KAFAS stereo camera
3	Lane change warning, right (primary)
4	Lane change warning, left (secondary)
5	SAS Optional equipment system

# G01 Driver Assistance Systems

## 26. Evasion Aid

Index	Explanation
6	Dynamic Stability Control (DSC)
7	Control unit for radar sensor, left (RSL)
8	Active Cruise Control (ACC)
9	Electronic Power Steering (electromechanical power steering) EPS

### 26.3. Operation

A special precondition such as the individual configuration capability for the system or deactivation of this function only is not possible.

The Evasion Aid can only be deactivated by switching off all Intelligent Safety systems (ALL OFF).



The system does not relieve the driver of personal responsibility for correctly judging the traffic situation. The driver is solely responsible for the vehicle.

### 26.4. Functional prerequisites

The Evasion Aid is not linked to a particular road type.

The following basis parameters are the prerequisites for the availability of the Evasion Aid:

- The vehicle's speed must not be below approximately 40 km/h (25 mph) and be no higher than approximately 160 km/h (100 mph).
- The system must have identified a free space for an avoidance maneuver.

The Evasion Aid is generally **not** available in the following cases:

- The vehicle's speed is below approximately 40 km/h (25 mph) or higher than approximately 160 km/h (100 mph).
- During a dynamic overtaking maneuver initiated by the driver.
- If the Dynamic Stability Control has been switched off by the driver, or there is a fault in the DSC.
- When all Intelligent Safety systems are switched off.
- In the event of systemic limitations of the radar sensors or the KAFAS stereo camera.

# G01 Driver Assistance Systems

## 26. Evasion Aid

### 26.5. Limits of the system

The collision warning has a limited capacity for detection. As a result, incorrect or delayed warnings may occur and consequently the Evasion Aid is limited in its operation. It is also possible that 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.

The function of the KAFAS stereo camera and the radar sensors, and thus also the function of the Evasion Aid 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.
- Up to 10 seconds after engine start via the START-STOP button.
- On restriction or deactivation of the driving dynamics systems, for example DSC OFF.
- During the calibration process for the KAFAS stereo camera immediately after vehicle delivery or a camera change.



---

The Evasion Aid does not release the driver from his comprehensive responsibility as the driver. There can be functional limitations because of system restrictions.

---







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