

Technical training.
Product information.

G15 General Vehicle Electronics



BMW Service

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

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General information

Symbols used

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



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

Information status: June 2018

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

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

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

Additional sources of information

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

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

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1. Introduction

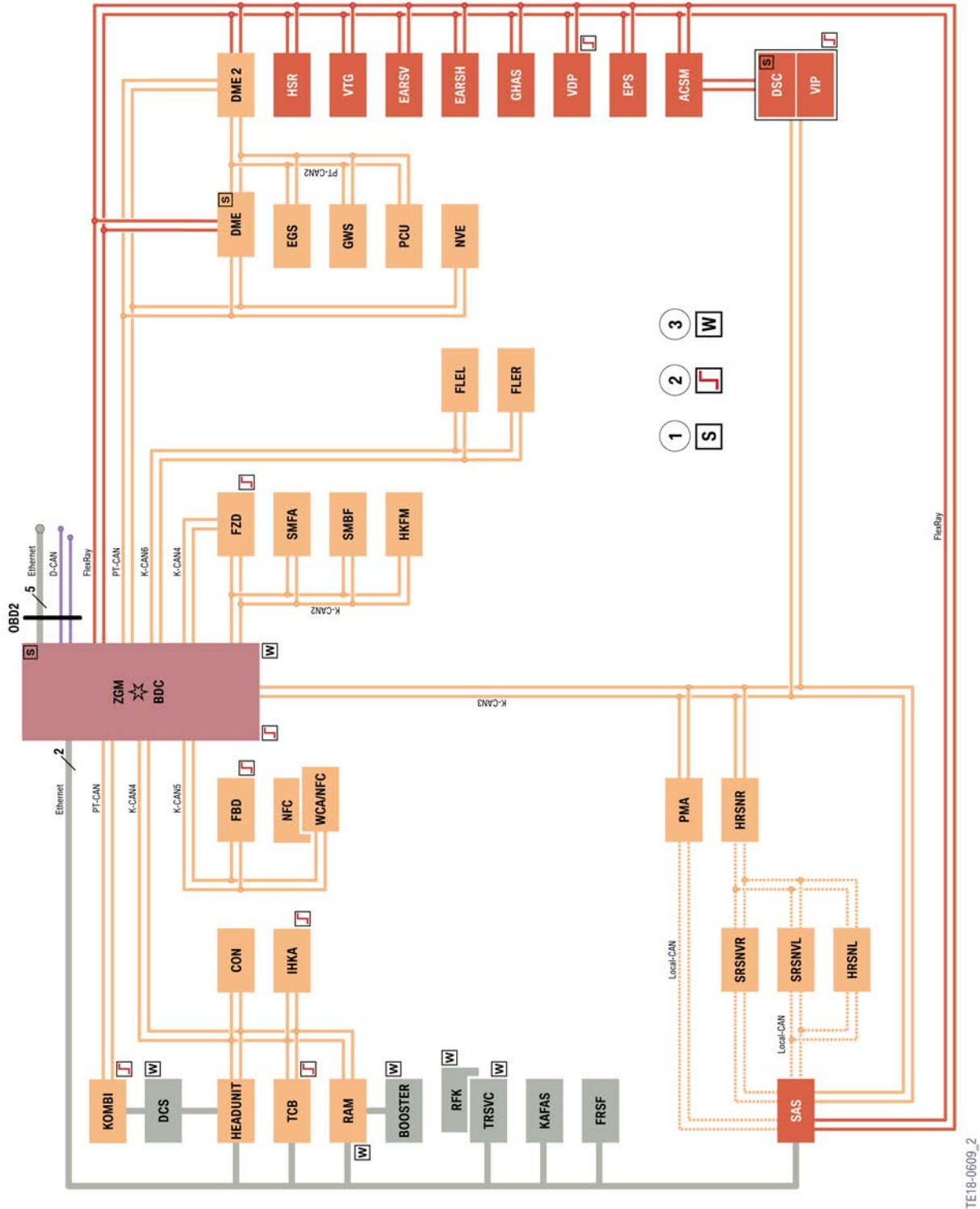
1.1. Further information

This Product Information presents the new features of and changes to the general vehicle electrical system in the G15. The focus is directed in particular at the **vehicle-specific** particularities. Basic **system-specific** descriptions of the general vehicle electrical system and further innovations for the year 2018 can be found in the Product Information **General Vehicle Electronics 2018**.

G15 General Vehicle Electronics

2. Bus Systems

2.1. Bus overview



G15 bus overview

G15 General Vehicle Electronics

2. Bus Systems

Index	Explanation
ACSM	Advanced Crash Safety Module
BDC	Body Domain Controller
BOOSTER	Hi-fi amplifier
CON	Controllers
DME	Digital Motor Electronics
DME2	Digital Engine Electronics 2
DSC	Dynamic Stability Control
DCS	Driver Camera System
EARSH	Electric active roll stabilization rear
EARSV	Electric active roll stabilization front
EGS	Electronic transmission control
EPS	Electronic Power Steering
FBD	Remote control receiver
FLEL	Frontal Light Electronics Left
FLER	Frontal Light Electronics Right
FRSF	Front radar sensor long range
FZD	Roof function center
GWS	Gear selector switch
GHAS	Regulated rear axle differential lock
HKFM	Tailgate function module
HRSNL	Rear radar sensor short range left
HRSNR	Rear radar sensor short range right
HSR	Rear axle slip angle control
HU-H	Head Unit High
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver assistance systems
KOMBI	Instrument cluster
NFC	Near Field Communication
NVE	Night Vision Electronics
PCU	Power Control Unit
PMA	Parking Manoeuvring Assistant
RAM	Receiver Audio Module
RFK	Rear view camera
SAS	Optional equipment system
SMBF	Front passenger seat module

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2. Bus Systems

Index	Explanation
SMFA	Driver's seat module
SRSNVL	Side radar sensor short range front left
SRSNVR	Side radar sensor short range front right
TCB	Telematic Communication Box
TRSVC	Top rear side view camera
VDP	Vertical Dynamic Platform
VIP	Virtual Integration 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 authorized to perform wake-up function
3	Control units also connected to wake-up line.

2.2. Main bus systems

2.2.1. K-CAN

In the G15 the following K-CAN are used:

- K-CAN2
- K-CAN3
- K-CAN4
- K-CAN5
- K-CAN6.

The control units on the K-CAN5 are not displayed during diagnosis by the BMW diagnosis system ISTA. Diagnosis is performed via the Body Domain Controller (BDC). The following control units are affected here:

- Remote control receiver (FBD)
- Wireless charging station (WCA)
- Near Field Communication (NFC).

All K-CAN bus systems have a data transfer rate of 500 kBit/s.

G15 General Vehicle Electronics

2. Bus Systems

2.2.2. PT-CAN

In the G15 the following PT-CAN are used:

- PT-CAN
- PT-CAN2.

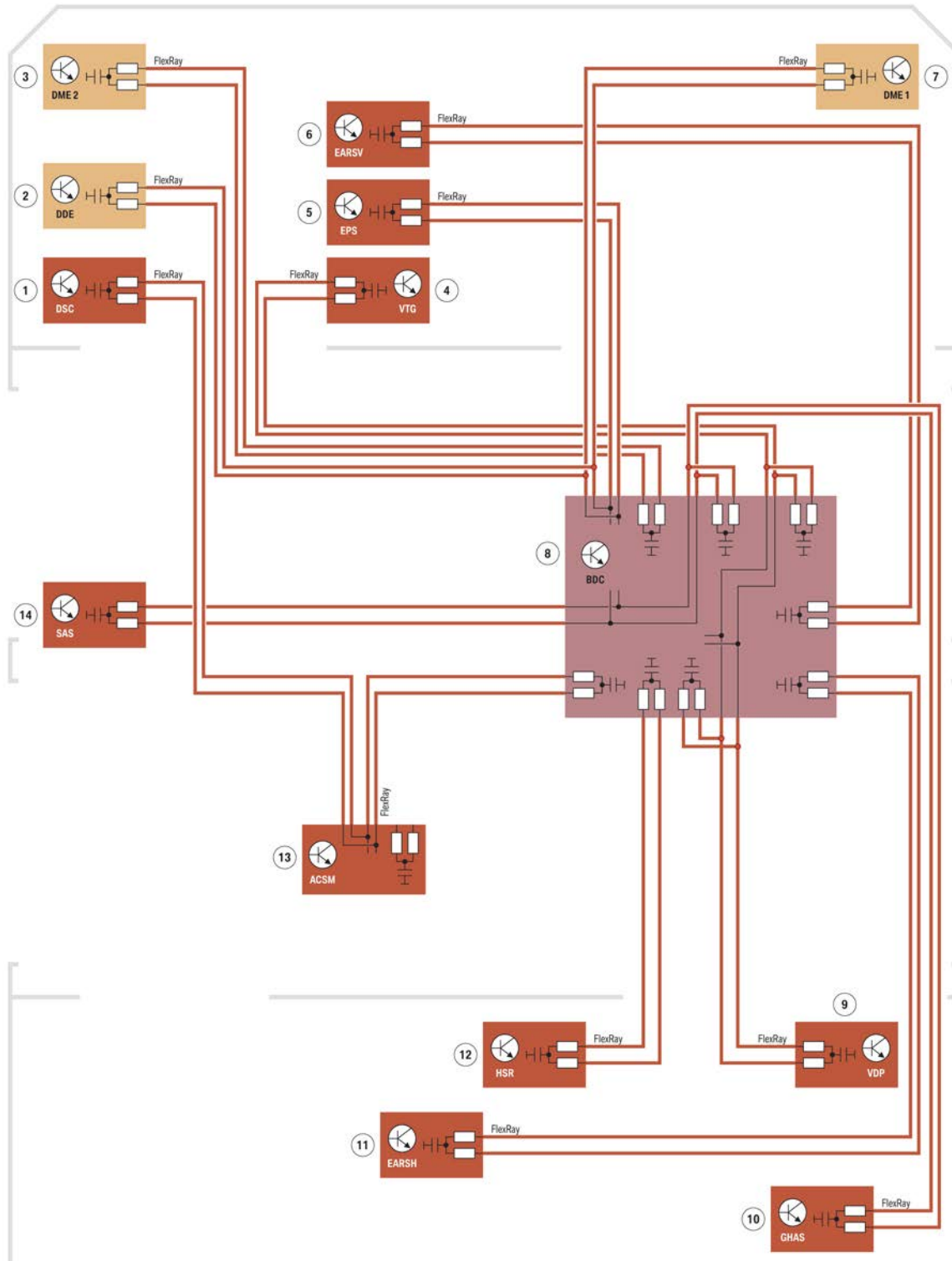
The gateway for the PT-CAN2 is located in the DME.

Both PT-CAN bus systems have a data transfer rate of 500 kBit/s.

G15 General Vehicle Electronics

2. Bus Systems

2.2.3. FlexRay



TE18-1103

G15 FlexRay

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2. Bus Systems

Index	Explanation
1	Dynamic Stability Control (DSC)
2	Digital Diesel Electronics (DDE) (Not for US)
3	Digital Engine Electronics 2 (DME2)
4	Transfer box (VTG)
5	Electronic Power Steering (EPS)
6	Electric active roll stabilization front (EARSV)
7	Digital Motor Electronics (DME)
8	Body Domain Controller (BDC)
9	Vertical Dynamic Platform (VDP)
10	Regulated rear axle differential lock (GHAS)
11	Electric active roll stabilization rear (EARSH)
12	Rear axle slip angle control (HSR)
13	Advanced Crash Safety Module (ACSM)
14	Optional equipment system (SAS)

FlexRay has a data transfer rate of 10 MBit/s.

2.2.4. Ethernet

2 Ethernet variants are used in the G15. The Ethernet variant with 5 lines (4 data lines and 1 activation line) is still used on the G15 by the OBD2 interface to the BDC.

OABR Ethernet (2 data lines) is also used in the G15.

OABR Ethernet application

The following control units are connected to the vehicle electrical system via OABR Ethernet:

- Driver Camera System (DCS)
- Top Rear Side View Camera (TRSVC)
- Rear view camera (RFK)
- Camera-based driver support systems (KAFAS)
- Front radar sensor long range (FRSF).

The following control units are, aside from a further bus system, connected to the vehicle electrical system via OABR Ethernet:

- Head Unit High (HU-H)
- Telematic Communication Box (TCB)
- Receiver Audio Module (RAM)
- Optional equipment system (SAS).

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2. Bus Systems

Wake-up line

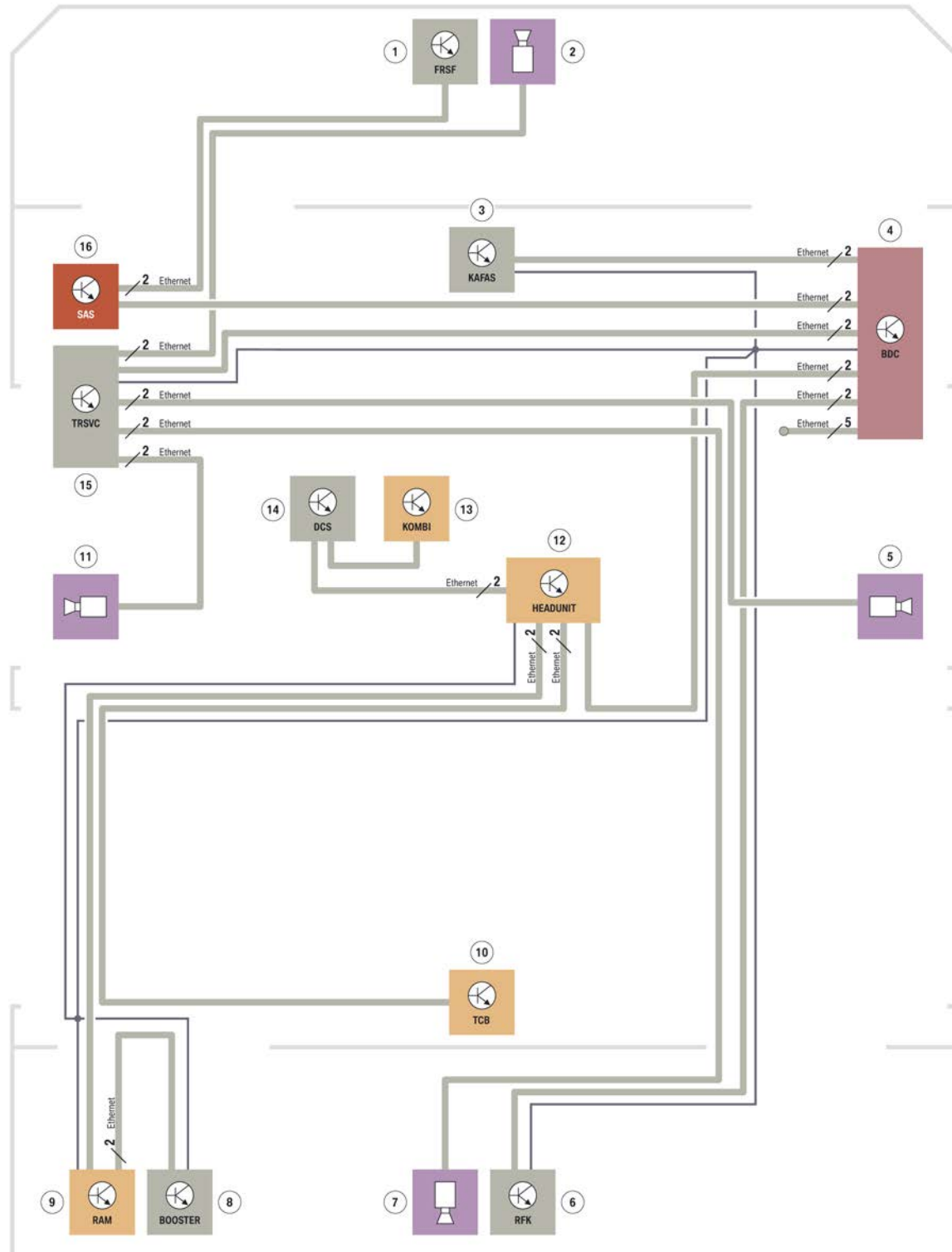
Certain control units require a separate wake-up line for wake-up. The following control units on the Ethernet have a wake-up line:

- Driver Camera System (DCS)
- Booster
- Rear view camera (RFK)
- Top Rear Side View Camera (TR SVC).

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2. Bus Systems

System wiring diagram



G15 Ethernet

TE18-0615

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2. Bus Systems

Index	Explanation
1	Front radar sensor long range (FRSF)
2	Top view camera (only in conjunction with TRSVC)
3	Camera-based driver support systems (KAFAS)
4	Body Domain Controller (BDC)
5	Side view camera right (only in conjunction with TRSVC)
6	Rear view camera (RFK)
7	Rear view camera (only in conjunction with TRSVC)
8	Audio amplifier (Booster)
9	Receiver Audio Module (RAM)
10	Telematic Communication Box (TCB)
11	Side view camera left (only in conjunction with TRSVC)
12	Head Unit High 3 (HU-H3)
13	Instrument cluster (KOMBI)
14	Driver Camera System (DCS)
15	Top Rear Side View Camera (TRSVC)
16	Optional equipment system (SAS)

2.2.5. D-CAN

The D-CAN is installed between the BDC and the diagnostic socket.

The D-CAN has a data transfer rate of 500 kBit/s.

2.3. Local CAN

Depending on the equipment specification, the following local CAN bus system are provided in the G15:

- Between optional equipment system (SAS), Parking Manoeuvring Assistant (PMA) and Top Rear Side View Camera (TRSVC).
- Between optional equipment system (SAS), rear radar sensor short range right (HRSNR), side radar sensor short range front left (SRSNVL) and side radar sensor short range front right (SRSNVR).
- Between rear radar sensor short range right (HRSNR), rear radar sensor short range left (HRSNL), side radar sensor short range front left (SRSNVL) and side radar sensor short range front right (SRSNVR).
- Between Digital Motor Electronics 1 (DME1) and Digital Motor Electronics 2 (DME2).
- Between reversible electromotive reel left (REMALI), Advanced Crash Safety Module (ACSM) and reversible electromotive reel right (REMARE).

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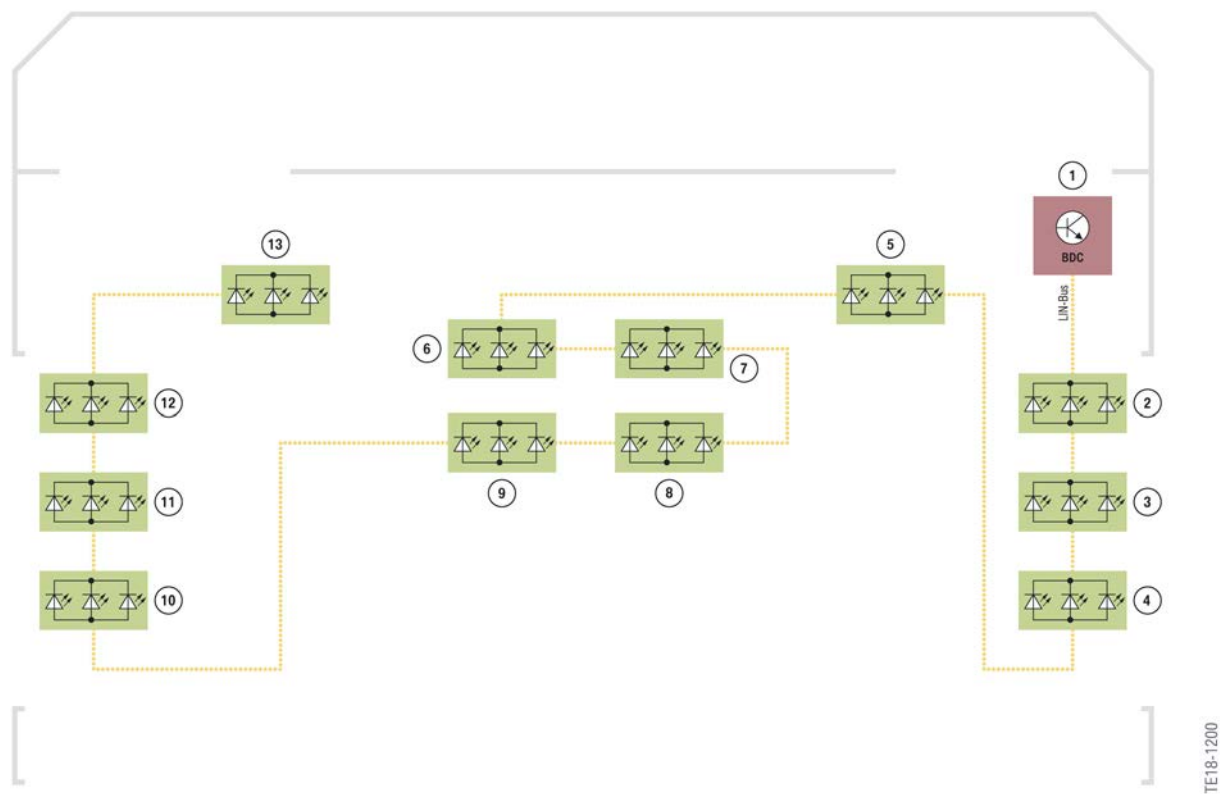
2. Bus Systems

The local CAN bus systems are not all shown in the overview during a diagnosis.

2.4. LIN bus

A multitude of LIN buses are used in the G15. 2 particular LIN buses are the LIN bus for the integrated automatic heating/air conditioning system and the LIN bus for the ambient lighting. Both LIN buses are arranged in series. If the LIN bus is interrupted at a particular point, no communication with subsequent components is possible from this point.

A simplified system wiring diagram is shown below for the ambient lighting.



G15 LIN bus, ambient lighting

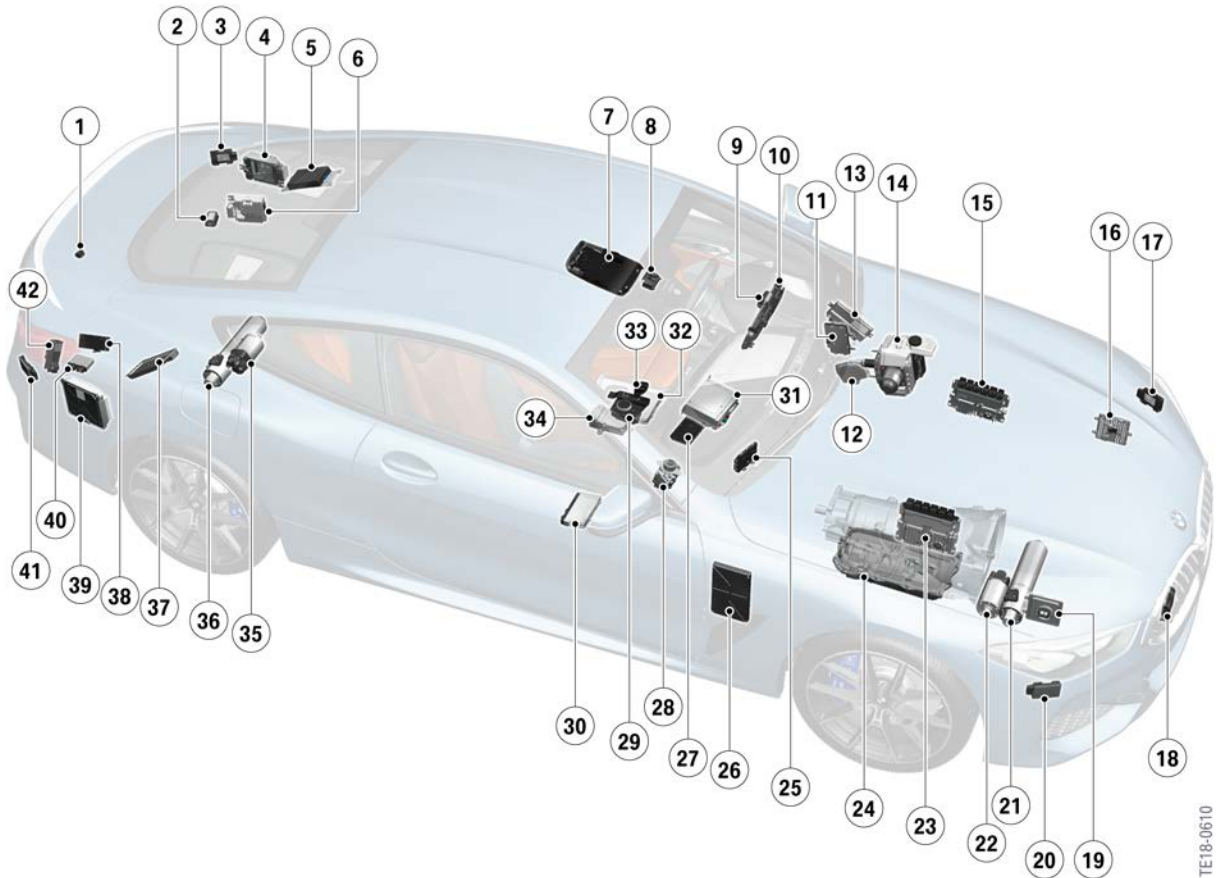
TE18-1200

Index	Explanation
1	Body Domain Controller (BDC)
2	LED modules, front passenger door
3	LED module, footwell light, front passenger
4	LED modules, center stack, left
5	LED modules, center stack, right
6	LED modules, driver's door
7	LED module, footwell light, driver

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3. Control Units

3.1. Installation location



G15 installation location of control units

Index	Explanation
1	Rear view camera (RFK)
2	Remote control receiver (FBD)
3	Rear radar sensor short range left (HRSNL)
4	Receiver Audio Module (RAM)
5	Telematic Communication Box 2 (TCB2)
6	Booster
7	Roof function center (FZD)
8	Camera-based driver support systems (KAFAS)
9	Driver Camera System (DCS)
10	Instrument cluster (KOMBI)
11	Optional equipment system (SAS)
12	Night Vision Electronics (NVE)
13	Top Rear Side View Camera (TRSVC)

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3. Control Units

Index	Explanation
14	Dynamic Stability Control (DSC)
15	Digital Motor Electronics (DME)
16	Frontal Light Electronics Left (FLEL)
17	Side radar sensor short range front left (SRSNVL)
18	Front radar sensor long range (FRSF)
19	Frontal Light Electronics Right (FLER)
20	Side radar sensor short range front right (SRSNVR)
21	Electric active roll stabilization front (EARSV)
22	Electronic Power Steering (EPS)
23	Digital Engine Electronics 2 (DME2)
24	Electronic transmission control (EGS)
25	Integrated automatic heating / air conditioning (IHKA)
26	Body Domain Controller (BDC)
27	Wireless charging station (WCA)
28	Transfer box (VTG)
29	Controller (CON)
30	Front passenger seat module (SMBF)
31	Head Unit High 3 (HU-H3)
32	Driver's seat module (SMFA)
33	Gear selector switch (GWS)
34	Advanced Crash Safety Module (ACSM)
35	Rear axle slip angle control (HSR)
36	Electric active roll stabilization rear (EARSH)
37	Vertical Dynamic Platform (VDP)
38	Tailgate function module (HKFM)
39	Power Control Unit (PCU)
40	Parking Manoeuvring Assistant (PMA)
41	Rear radar sensor short range right (HRSNR)
42	Regulated rear axle differential lock (GHAS)

G15 General Vehicle Electronics

3. Control Units

3.2. Gateway

3.2.1. Body Domain Controller



Body Domain Controller

Functions

The Body Domain Controller is responsible for the following functions:

- Gateway
- Electronic immobilizer
- Terminal control
- Central locking system
- Power windows
- Horn
- Interior light
- Exterior lights
- Wash/wipe system
- Vehicle data storage
- Data transfer, Conditioned Based Service.

Fuses

The following components are protected by fuses in the Body Domain Controller:

- Horn
- Head Unit High
- Light operating unit
- Intelligent Safety button

G15 General Vehicle Electronics

3. Control Units

- Audio operating unit
- Steering column switch cluster
- Diagnostic socket
- Vertical Dynamic Platform (electronics)
- Integrated automatic heating / air conditioning
- Rain-light-solar-condensation sensor
- Tailgate function module
- Telematic Communication Box
- Outside door handle electronics
- Control unit, contactless tailgate activation
- Power Control Unit
- Central locking system.

Relays

The following relays are located in the Body Domain Controller:

- Terminal 30F
- Horn
- Central locking system
- Headlight cleaning system.

Gateway

The central gateway module (ZGM) is integrated in the new Body Domain Controller (BDC). It is viewed as a control unit within a control unit, in that the ZGM in the BDC behaves like an autarkic control unit. The purpose of the ZGM is to connect all the bus systems to each other. By connecting them in this way, it is possible to use information from the individual bus systems on a generalized level. The central gateway module is able to implement different protocols and speeds on other bus systems. The programming data for the control units is transmitted by Ethernet to the vehicle via the ZGM.

LIN controller

The BDC is the gateway for the following components at the local interconnect network bus:

- Switch block, driver's/front passenger door
- Control unit, contactless tailgate activation
- Exterior rearview mirrors
- Audio operating unit
- Light switch
- Intelligent Safety button

G15 General Vehicle Electronics

3. Control Units

- Steering column switch cluster (SZL)
- Seat heating
- Operating facility, center console
- Wiper
- Steering column adjustment
- Interior mirror
- Roof function center (FZD) (interior lighting)
- Rain-light-solar-condensation sensor (RLSBS)
- Rear right power distribution box.

The following control units are connected via a LIN bus to the BDC, but the BDC has only one wake-up function:

- Auxiliary battery charging unit
- Intelligent battery sensor
- Electric fan
- Active air flap control
- Digital Motor Electronics.

3.3. Control units on the K-CAN2

The following control units are connected to the K-CAN2:

- Roof function center (FZD)
- Driver's seat module (SMFA)
- Front passenger seat module (SMBF)
- Tailgate function module (HKFM).

G15 General Vehicle Electronics

3. Control Units

3.3.1. Roof function center



Roof function center

Depending on the equipment specification, the roof function center (FZD) contains the following functions:

- Alarm system
- Gesture recognition camera
- Emergency call button
- Interior lighting.

3.3.2. Tailgate function module



Tailgate function module

G15 General Vehicle Electronics

3. Control Units

3.3.3. Seat modules



Seat modules

Sports seats with electrical adjustment and memory function are installed as standard equipment.

3.4. Control units on the K-CAN3

The following control units are connected to the K-CAN3:

- Parking Manoeuvring Assistant (PMA)
- Rear radar sensor short range right (HRSNR).

Further information on the two control units can be found in the Product Information **Driver Assistance Systems 2018**.

3.4.1. Parking Manoeuvring Assistant



Parking Manoeuvring Assistant

G15 General Vehicle Electronics

3. Control Units

3.4.2. Rear radar sensors short range



Rear radar sensors short range

The rear radar sensors short range are a further development of the lane change warning (SWW) radar sensors. Both rear radar sensors have diagnostic capability.

The rear radar sensor short range left is connected via a local CAN to the rear radar sensor short range right.

3.5. Control units on the K-CAN4

The following control units are connected to the K-CAN4:

- Controller (CON)
- Integrated automatic heating / air conditioning (IHKA)
- Telematic Communication Box 2 (TCB2)
- Head Unit High 3 (HU-H3)
- Receiver Audio Module (RAM).

Further information on the following control units can be found at:

Control unit	Product information
Controller (CON)	Displays and Controls 2018
Head Unit High 3 (HU-H3)	Infotainment 2018
Receiver Audio Module (RAM)	

G15 General Vehicle Electronics

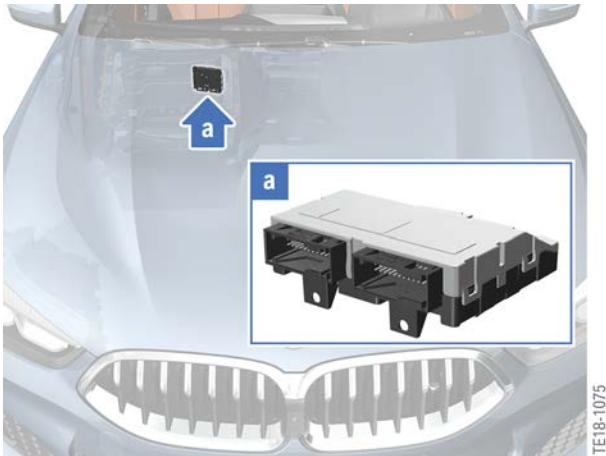
3. Control Units

3.5.1. Controllers



Controllers

3.5.2. Integrated automatic heating / air conditioning



Integrated automatic heating / air conditioning

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3. Control Units

3.5.3. Telematic Communication Box 2



Telematic Communication Box

The Telematic Communication Box 2 (TCB2) is installed in the luggage compartment.

3.5.4. Head Unit High 3



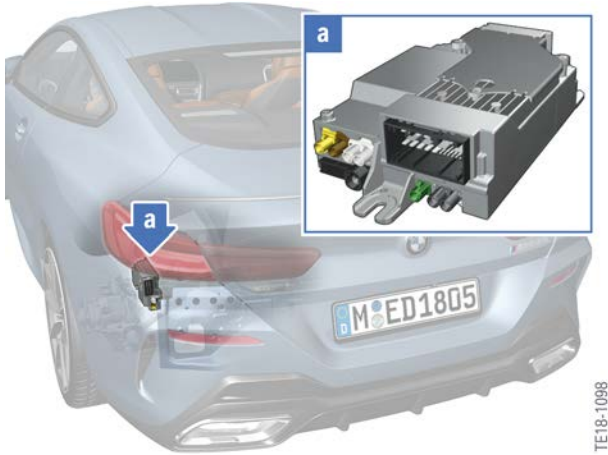
Head Unit High

The Head Unit High 3 (HU-H3) is installed in the G15. The HU-H3 does not have an integrated CD or DVD drive. The tuners for the radio are integrated in the Receiver Audio Module (RAM).

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3. Control Units

3.5.5. Receiver Audio Module



Receiver Audio Module

The Receiver Audio Module (RAM) contains the following functions:

- Antenna tuner
- Antenna amplifier
- Audio amplifier.

3.6. Control units on the K-CAN5

The following control units are connected to the K-CAN5:

- Remote control receiver (FBD)
- Wireless charging station (WCA).

Further information on the wireless charging station (WCA) can be found in the Product Information **General Vehicle Electronics 2018**.

G15 General Vehicle Electronics

3. Control Units

3.6.1. Remote control receiver



Remote control receiver

3.6.2. Wireless charging station



Wireless charging station

The wireless charging station (WCA) contains an NFC antenna and electronics for simple mobile phone connection and for communication with the BMW Digital Key.

3.7. Control units on the K-CAN6

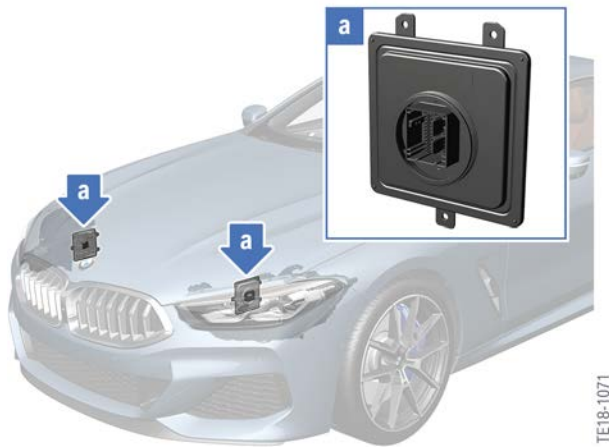
The following control units are connected to the K-CAN6:

- Frontal Light Electronics Left (FLEL)
- Frontal Light Electronics Right (FLER)

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3. Control Units

3.7.1. Frontal Light Electronics



Frontal Light Electronics left/right

3.8. Control units on the Ethernet

The following control units are connected to the Ethernet:

- Front radar sensor long range (FRSF)
- Rear view camera (RFK)
- Top Rear Side View Camera (TR SVC)
- Camera-based driver support systems (KAFAS)
- Driver Camera System (DCS)
- Booster.

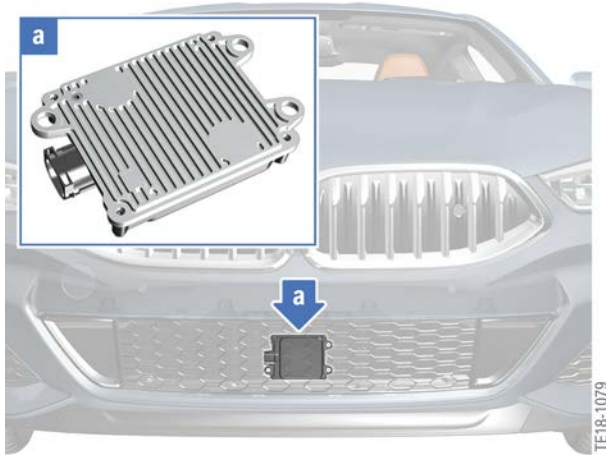
Further information on the following control units can be found at:

Control unit	Product information
Front radar sensor long range (FRSF) Camera-based driver support systems (KAFAS) Driver Camera System (DCS)	Driver Assistance Systems 2018
Booster	Infotainment 2018

G15 General Vehicle Electronics

3. Control Units

3.8.1. Front radar sensor long range



Front radar sensor long range

The front radar sensor long range (FRSF) is a further development of the ACC radar sensor.

3.8.2. Rear view camera

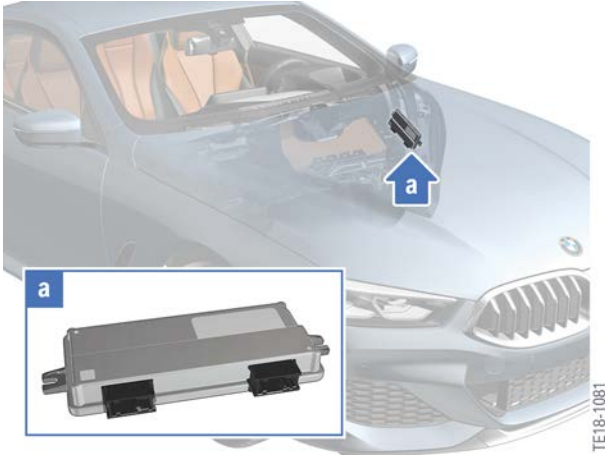


Rear view camera

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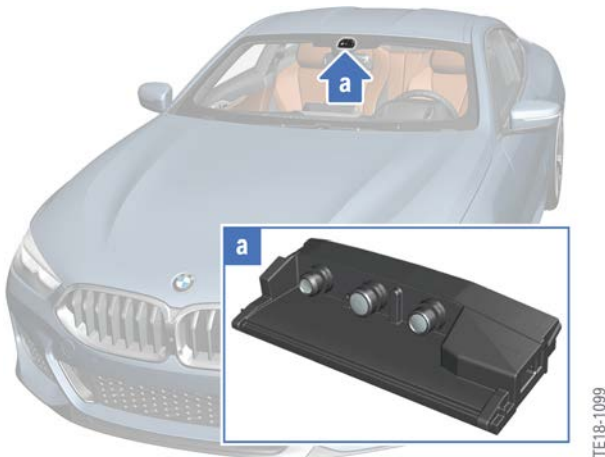
3. Control Units

3.8.3. Top rear side view camera



Top rear side view camera

3.8.4. Camera-based driver assistance systems



Camera-based driver assistance systems

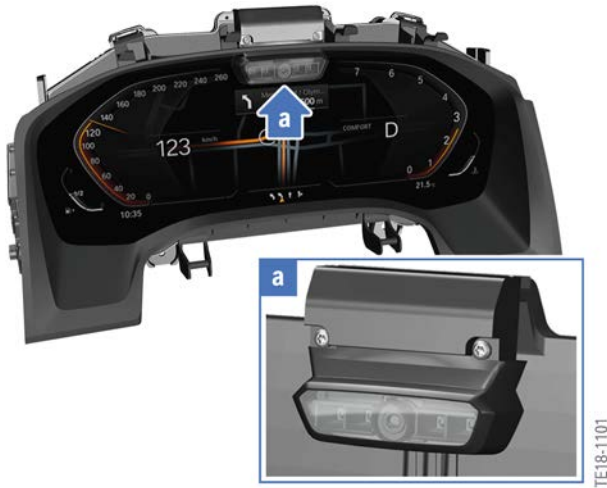
The KAFAS camera is installed in 2 variants, depending on the equipment specification:

- Camera with 1 lens
- Camera with 3 lenses.

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3. Control Units

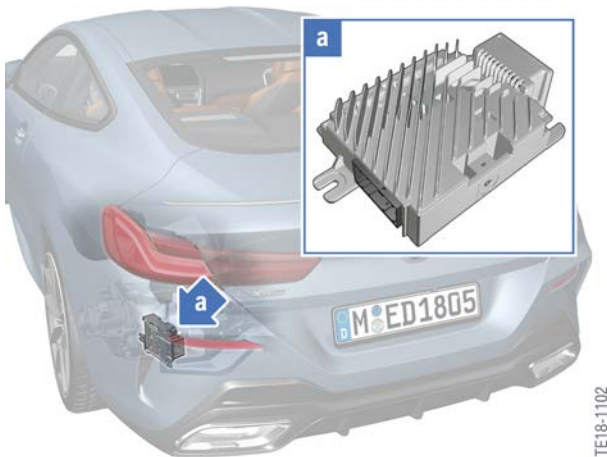
3.8.5. Driver Camera System



Driver Camera System

The Driver Camera System (DCS) contains a camera on the instrument cluster to observe the opening of the driver's eyes.

3.8.6. Booster



Booster

The Booster is the successor to the previous AMP-T audio amplifier.

G15 General Vehicle Electronics

3. Control Units

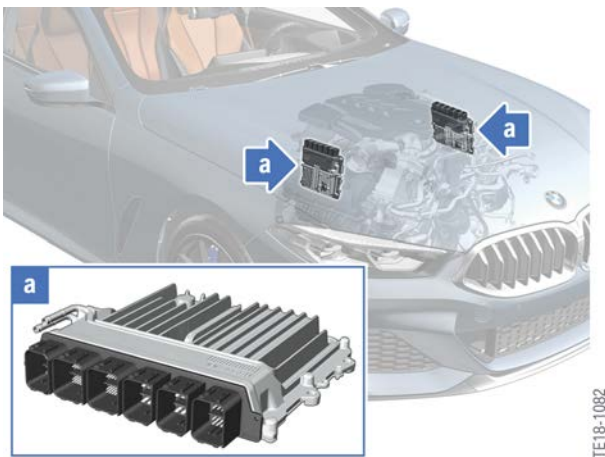
3.9. Control units on the PT-CAN

The following control units are connected to the PT-CAN:

- Digital Motor Electronics (DME)
- Instrument cluster (KOMBI)
- Night Vision Electronics (NVE).

Further information on the instrument cluster can be found in the Product Information **Displays and Controls 2018**.

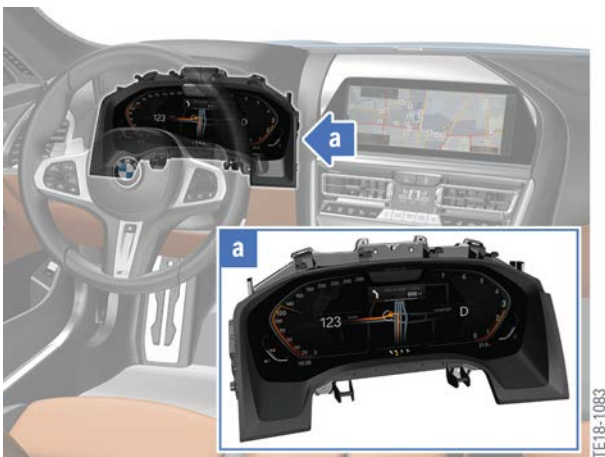
3.9.1. Digital Motor Electronics



Digital Motor Electronics

2 control units (DME1 and DME2) are installed in the M850i xDrive.

3.9.2. Instrument cluster

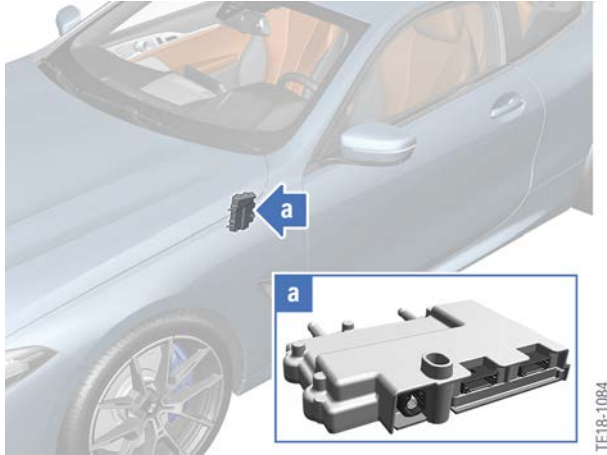


Instrument cluster

G15 General Vehicle Electronics

3. Control Units

3.9.3. Night Vision Electronics



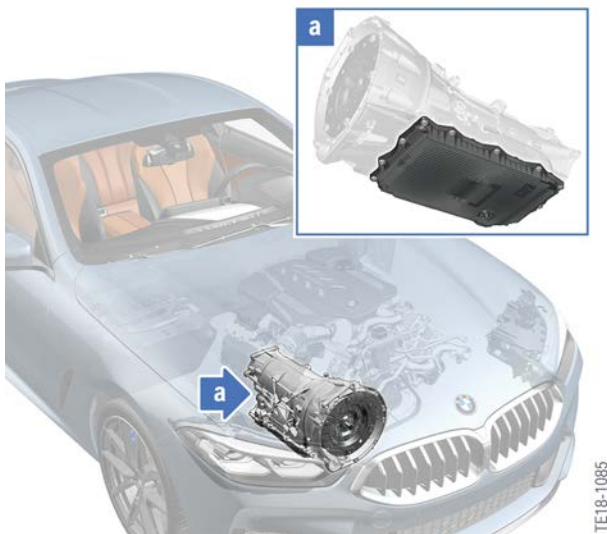
Night Vision Electronics

3.10. Control units on the PT-CAN2

The following control units are connected to the PT-CAN2:

- Electronic transmission control EGS
- Gear selector switch GWS
- Power Control Unit PCU

3.10.1. Electronic transmission control



Electronic transmission control

G15 General Vehicle Electronics

3. Control Units

3.10.2. Gear selector switch



Gear selector switch

3.10.3. Power Control Unit



Power Control Unit

3.11. Control units on the FlexRay

The following control units are connected to the FlexRay:

- Advanced Crash Safety Module (ACSM)
- Dynamic Stability Control (DSC)
- Electric active roll stabilization front (EARSV)
- Electric active roll stabilization rear (EARSH)
- Electronic Power Steering (EPS)
- Rear axle slip angle control HSR

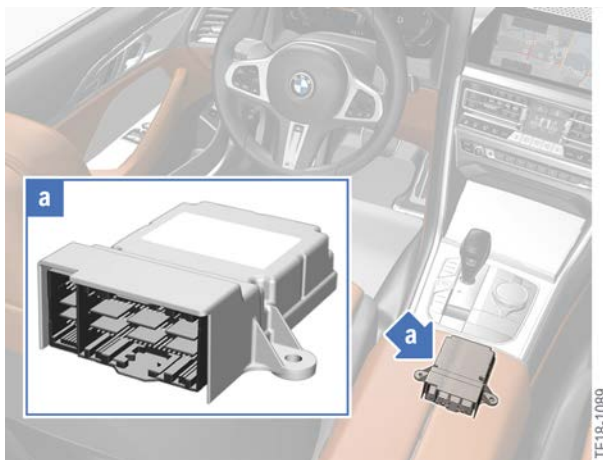
G15 General Vehicle Electronics

3. Control Units

- Optional equipment system (SAS)
- Transfer box (VTG)
- Vertical Dynamic Platform (VDP)
- Regulated rear axle differential lock.

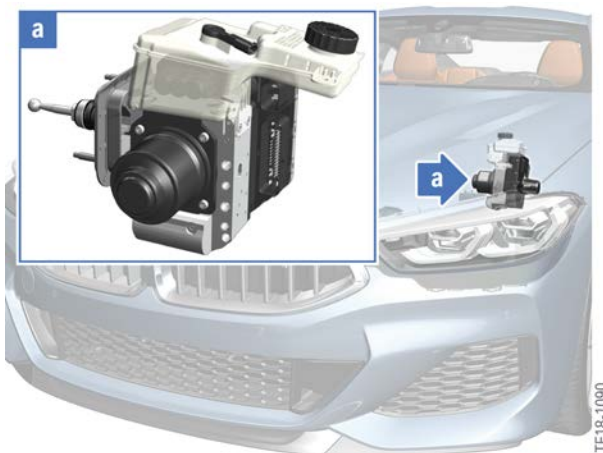
Further information on Dynamic Stability Control (DSC) can be found in the Product Information **G15 Drivetrain**.

3.11.1. Advanced Crash Safety Module



Advanced Crash Safety Module

3.11.2. Dynamic Stability Control



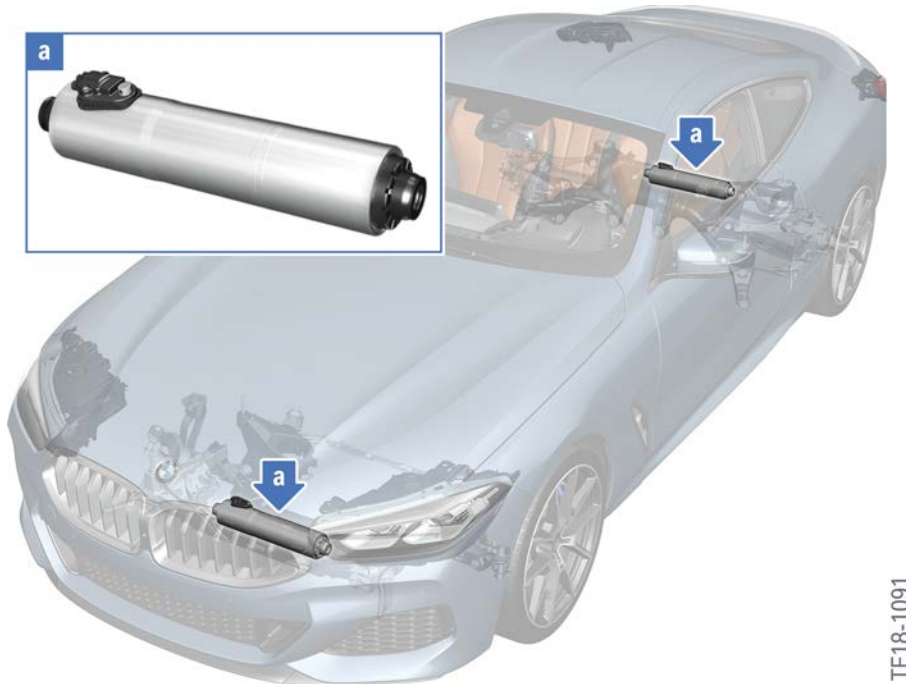
Dynamic Stability Control

DSC consists of 2 integrated control units, Dynamic Stability Control and the Virtual Integration Platform.

G15 General Vehicle Electronics

3. Control Units

3.11.3. Electric active roll stabilization



Electric active roll stabilization

TE18-1091

3.11.4. Electronic Power Steering



Electronic Power Steering

TE18-1092

G15 General Vehicle Electronics

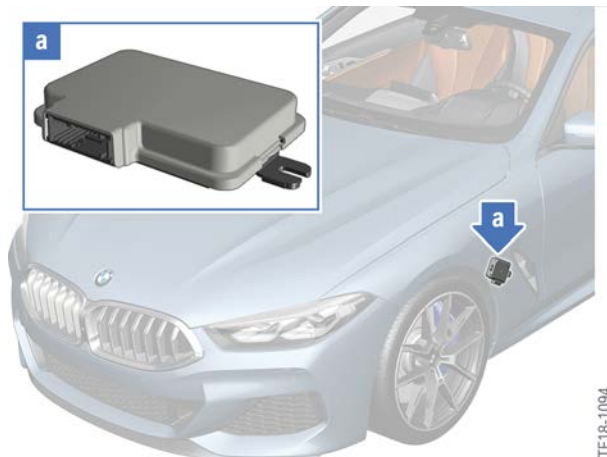
3. Control Units

3.11.5. Rear axle slip angle control



Rear axle slip angle control

3.11.6. Optional equipment system



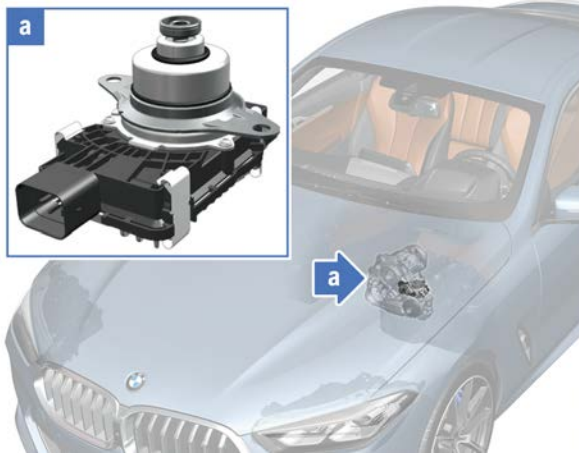
Optional equipment system

TE18-1094

G15 General Vehicle Electronics

3. Control Units

3.11.7. Transfer box



Transfer box

TE18-1095

3.11.8. Vertical dynamic platform



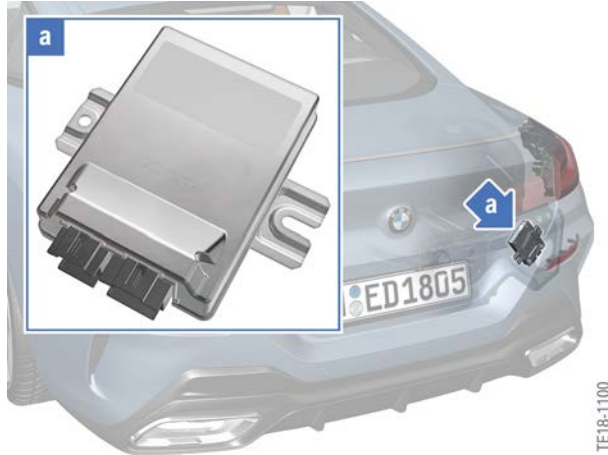
Vertical dynamic platform

TE18-1096

G15 General Vehicle Electronics

3. Control Units

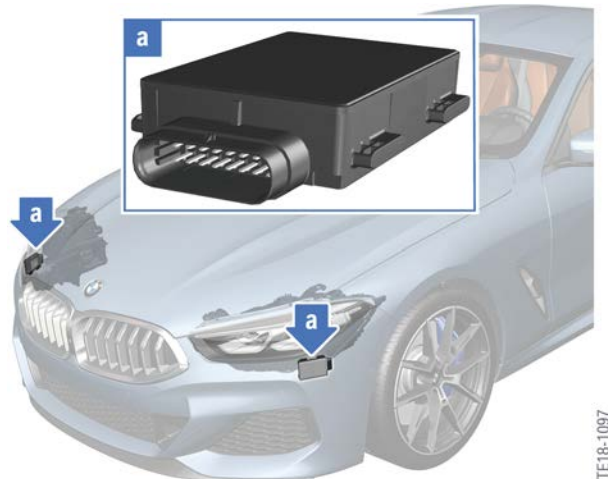
3.11.9. Regulated rear axle differential lock



Regulated rear axle differential lock

3.12. Control units on the local CAN

3.12.1. Side radar sensors short range front



Side radar sensors short range front

The two side radar sensors are a further development of the radar sensors left and right. Both radar sensors are displayed in the diagnosis.

G15 General Vehicle Electronics

4. Voltage Supply

4.1. Overview

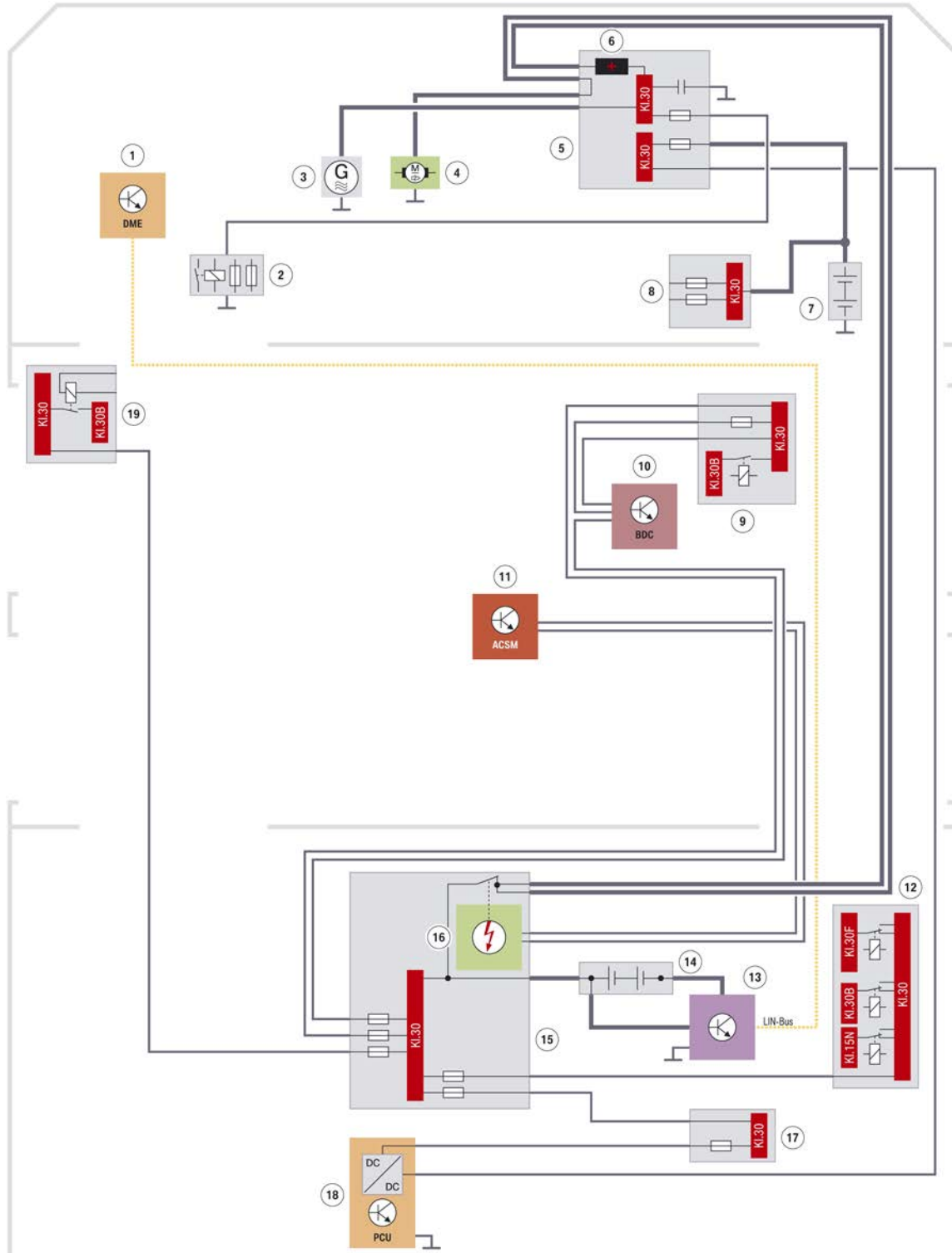
A vehicle electrical system support with an auxiliary battery and a Power Control Unit is installed.

Further information on the dual storage system can be found in the Product Information **General Vehicle Electronics 2018**.

G15 General Vehicle Electronics

4. Voltage Supply

4.1.1. System wiring diagram, vehicle electrical system support



Voltage supply

TE18-1104

G15 General Vehicle Electronics

4. Voltage Supply

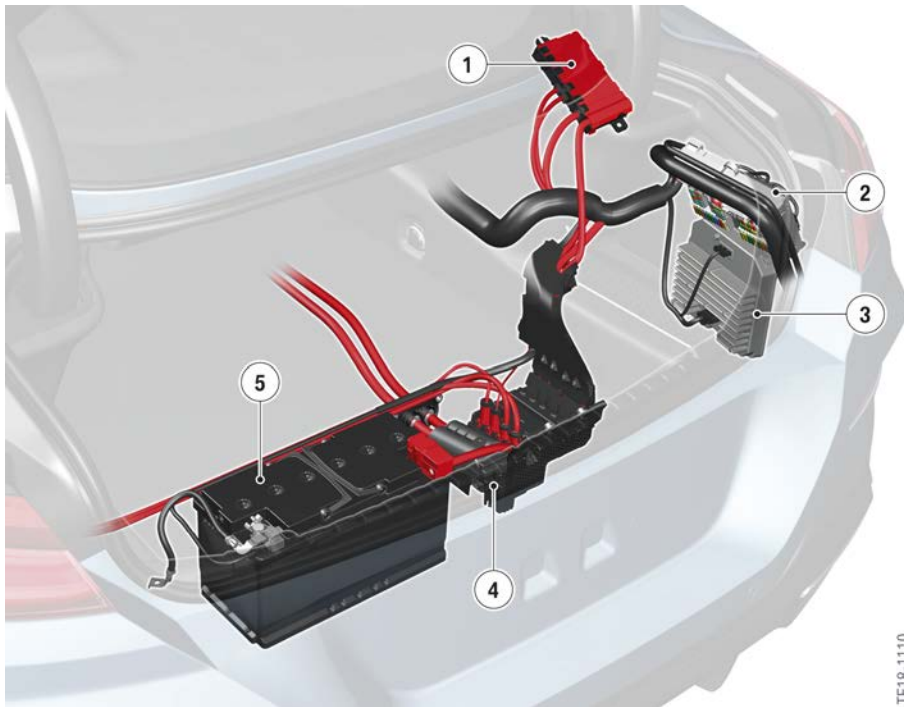
Index	Explanation
1	Digital Motor Electronics (DME)
2	Power supply module
3	Alternator
4	Starter motor
5	Power distribution box, engine compartment
6	Positive battery connection point
7	Auxiliary battery
8	Power distribution box, auxiliary battery, engine compartment
9	Power distribution box, front right
10	Body Domain Controller (BDC)
11	Advanced Crash Safety Module (ACSM)
12	Power distribution box, luggage compartment
13	Intelligent Battery Sensor (IBS)
14	Battery
15	Battery power distribution box
16	Safety battery terminal (SBK)
17	Power distribution box, battery, right
18	Power Control Unit (PCU)
19	Power distribution box, front left

G15 General Vehicle Electronics

4. Voltage Supply

4.2. Components

4.2.1. Overview of luggage compartment



G15 overview of luggage compartment

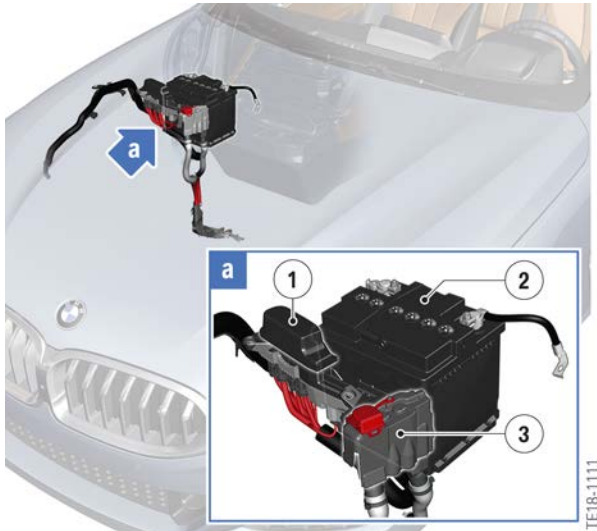
Index	Explanation
1	Power distribution box, battery, right
2	Power distribution box, luggage compartment
3	Power Control Unit PCU 500 W
4	Power distribution box with safety battery terminal
5	Battery

G15 General Vehicle Electronics

4. Voltage Supply

4.2.2. Overview of engine compartment

The following graphic shows the vehicle electrical system support.



G15 overview of engine compartment

Index	Explanation
a	Vehicle electrical system support with AGM auxiliary battery
1	Power distribution box, engine compartment
2	Auxiliary battery, vehicle electrical system support
3	Jump start terminal point

4.2.3. Battery

AGM batteries are to supply the G15 with electric power. The vehicle battery is installed in the luggage compartment. Depending on the equipment specification, an auxiliary battery is installed in the engine compartment.

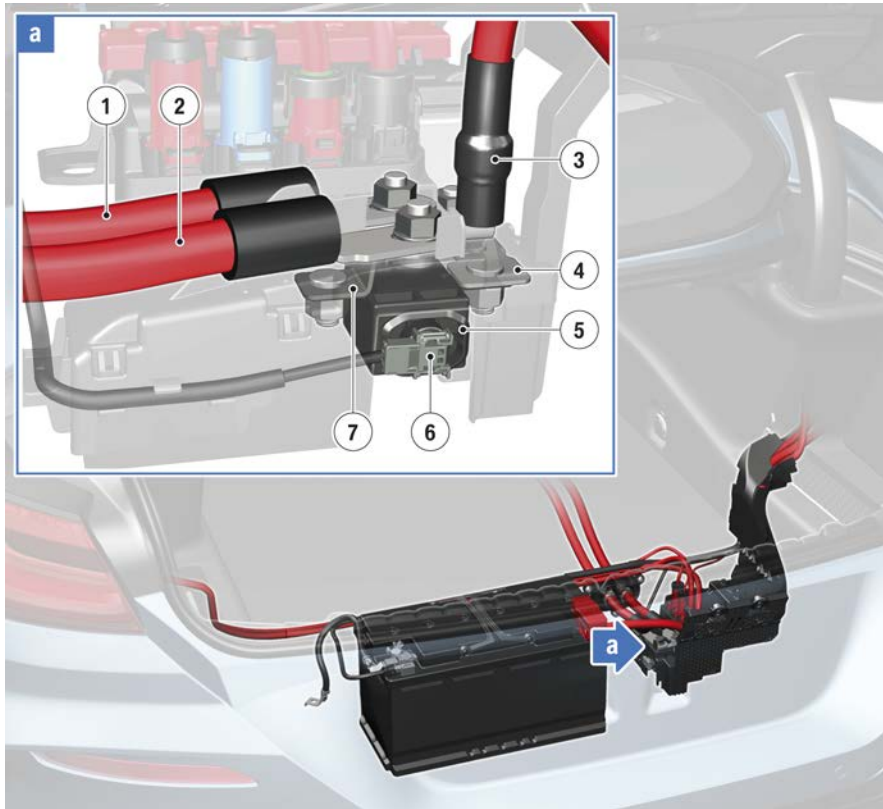
Depending on the equipment specification, either a 90 Ah or a 105 Ah vehicle battery can be installed.

The auxiliary battery in the engine compartment is installed with vehicle electrical system support. This is a 60 Ah AGM battery.

G15 General Vehicle Electronics

4. Voltage Supply

Safety battery terminal



G15 safety battery terminal

Index	Explanation
1	B+ cable to the starter motor and alternator
2	B+ cable to the jump start terminal point
3	Positive wire in the power distribution box
4	Busbar
5	Safety battery terminal (SBK)
6	Connector, safety battery terminal
7	Busbar

G15 General Vehicle Electronics

4. Voltage Supply

4.2.4. Integrated supply module

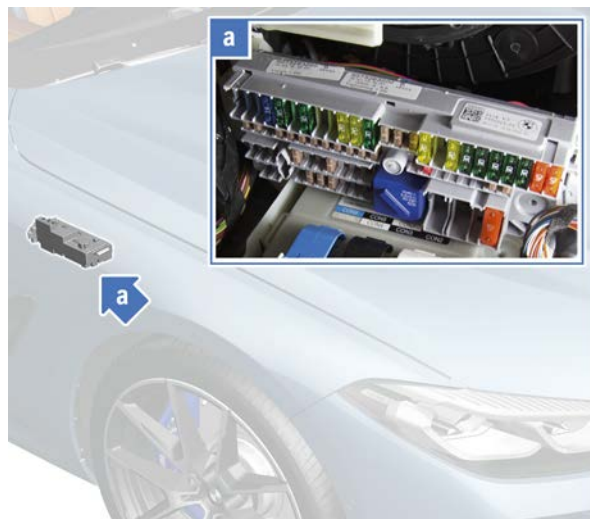


G15 integrated supply module

The engine control and its components are supplied with voltage via the integrated supply module.

4.2.5. Power distribution box

Front right



G15 power distribution box, front right

G15 General Vehicle Electronics

4. Voltage Supply

A relay for terminal 30B is installed in the front right power distribution box.

The connected consumers are supplied with terminal 30, terminal 30B and terminal 15N.
Terminal 15N is controlled by the luggage compartment power distribution box.

Front left



G15 power distribution box, front left

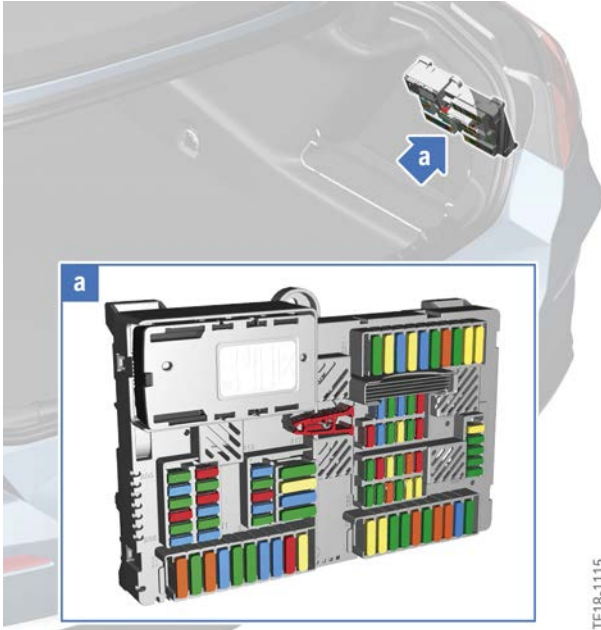
A relay for terminal 30B is installed in the front left power distribution box.

The connected consumers are supplied with terminal 30 and terminal 30B.

G15 General Vehicle Electronics

4. Voltage Supply

Luggage compartment



G15 power distribution box, luggage compartment

The following relays are installed in the luggage compartment power distribution box:

- 1 relay, terminal 15N
- 2 relays, terminal 30B
- 2 relays, terminal 30F
- 1 relay, rear window heating.

All the relays are bi-stable. The relays are activated by the Body Domain Controller via a LIN bus. The luggage compartment power distribution box controls the terminal 30B relays of the two front power distribution boxes.

Body Domain Controller

A terminal 30F relay is installed in the Body Domain Controller (BDC).

A number of consumers are supplied via the BDC with terminal 30 and terminal 30F.

4.2.6. Power Control Unit with vehicle electrical system support

Present-day vehicles have a high energy consumption due to the many electrical consumers. As a result, there is a high demand on the vehicle battery particularly in phases in which the combustion engine is not running and the alternator is not supplying any power (e.g. engine start-stop phases).

In order to protect the vehicle battery, the G15 is fitted with DC/DC converter in the Power Control Unit (PCU) and an auxiliary battery.

G15 General Vehicle Electronics

4. Voltage Supply

The preconditions for the direction of the energy management are calculated from the use of the vehicle. When the engine is running the auxiliary battery is charged from the conventional vehicle electrical system. During the phases in which the combustion engine is not running, the energy is supplied from the auxiliary battery to the conventional vehicle electrical system.

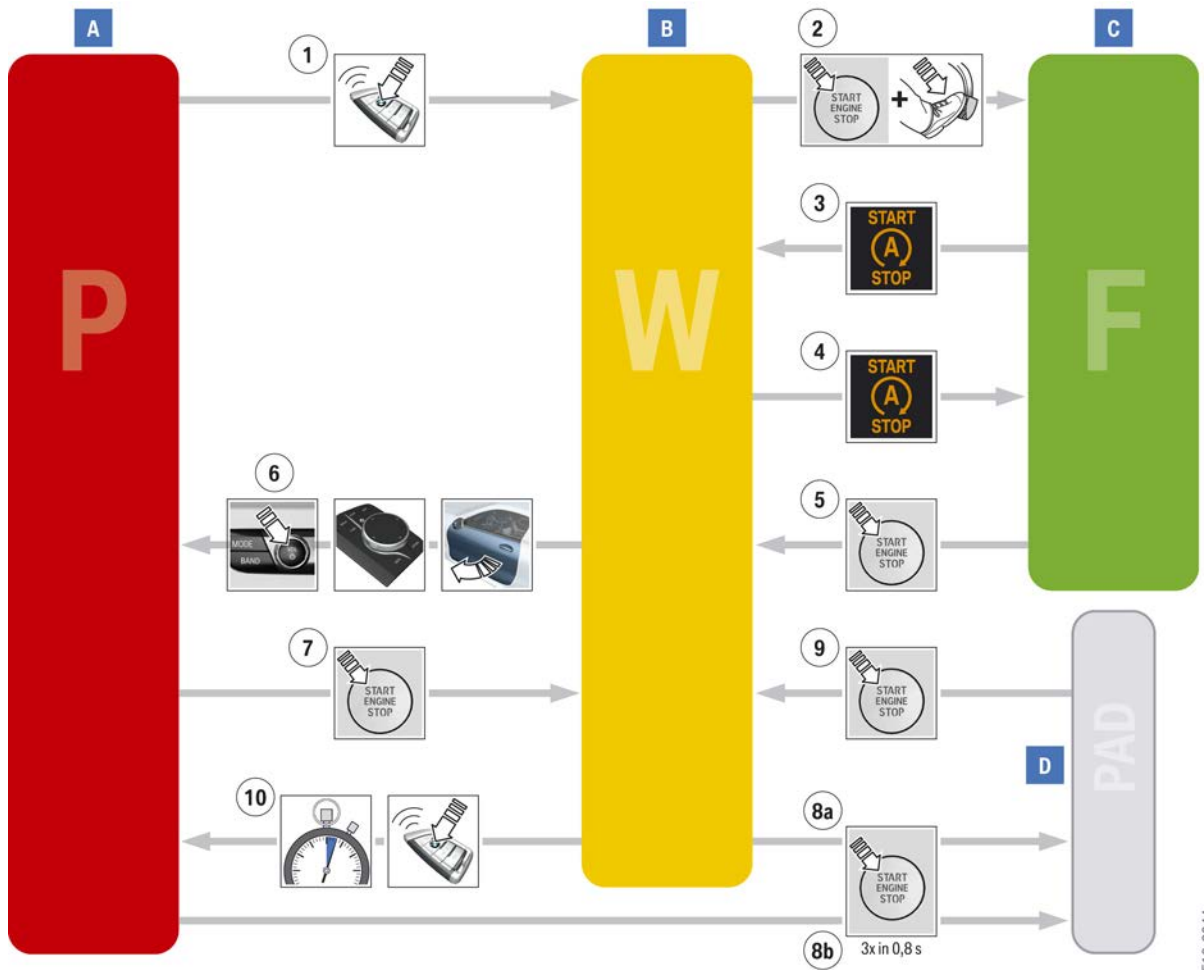
A control unit which is connected to the PT-CAN2 is integrated in the PCU. A DC/DC converter with an output of 500 W is also integrated.

G15 General Vehicle Electronics

5. Terminal Control

5.1. Introduction

The G15 is provided with the terminal control **P**arking **R**esiding **D**riving known since the G12.



TE16-2044

G15 terminal control

Index	Explanation
A	Parking
B	Residing
C	Driving
D	Testing-analysis-diagnosis (PAD) mode
1	Change from parking to residing by waking up the vehicle (e.g. vehicle unlocking)
2	Change from residing to driving by pressing the start/stop button and the brake pedal at the same time (combustion engine is started)
3	Automatic engine start-stop function stop
4	Automatic engine start-stop function start

G15 General Vehicle Electronics

5. Terminal Control

Index	Explanation
5	When the start/stop button is pressed, the terminal status changes from driving to residing (combustion engine is switched off).
6	Change from residing to driving (activate the head unit media button for more than 3 s, confirm change via controller, change by leaving the vehicle)
7	When the start/stop button is pressed, the terminal status changes from parking to residing.
8a	When the start/stop button is pressed (3 times in 0.8 s), the terminal status changes from residing to testing-analysis-diagnosis (PAD).
8b	When the start/stop button is pressed (3 times in 0.8 s), the terminal status changes from parking to testing-analysis-diagnosis (PAD).
9	When the start/stop button is pressed, the terminal status changes from testing-analysis-diagnosis (PAD) to residing.
10	Change from residing to driving (locking vehicle, no customer interaction for 10 minutes.)

Further information on terminal control can be found in the Product Information **G12 General Vehicle Electronics**.

5.2. Partial network operation

Present-day vehicles contain up to 70 control units with well over 100 microcontrollers which are networked with each other. Depending on the current vehicle condition, not all comfort and assistance systems are always required.

Through the targeted cutting out and cutting in of control units that are not required, it is possible to save energy and thus relieve the strain on the battery.

5.2.1. Control units

Different transceivers are used in the control units in order to realize partial network operation. These transceivers are able to evaluate and interpret messages. This control unit remains switched off as long as any bus communication takes place without a valid wake-up event for the control unit being present. If a wake-up event is transmitted on the corresponding bus, the transceiver can activate the microcontroller's voltage regulator and the control unit starts up.

Certain control units on the Ethernet require a separate wake-up via the terminal 15 wake-up line for starting up.

5.2.2. Residing

If e.g. the radio is being listened to in the vehicle condition, only the bus system to which the radio function is connected is active. The other bus systems are woken up only when a further function, such as e.g. seat heating, is required.

G15 General Vehicle Electronics

5. Terminal Control

5.2.3. Driving

If during the drive functions are not used or required, e.g. seat adjustment, the corresponding control units can be switched off.

G15 General Vehicle Electronics

6. Exterior Lights

6.1. Headlights

6.1.1. Variants

The G15 is fitted exclusively with BMW laser lights.

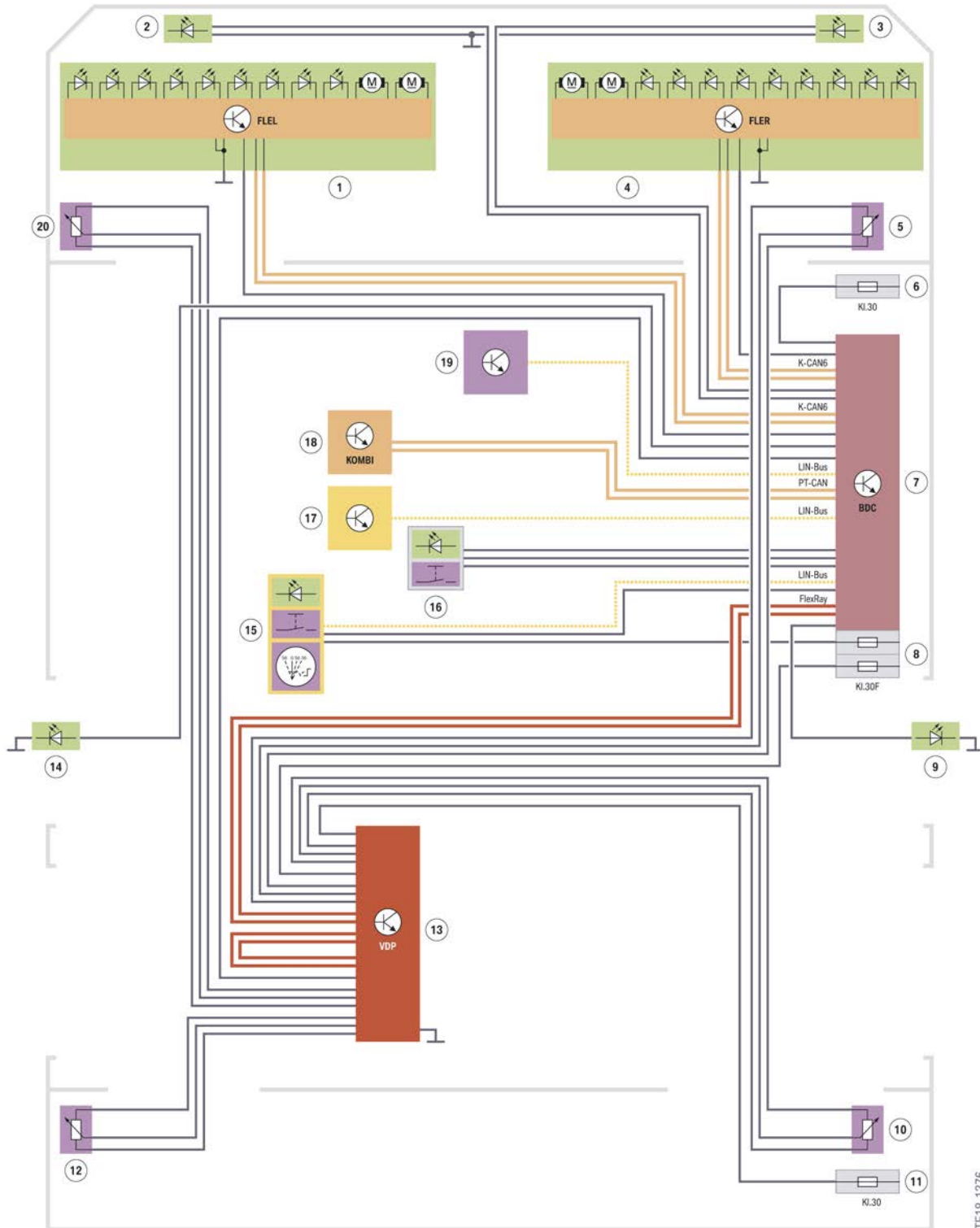
- BMW laser light (SA 5AZ).

A headlight cleaning system is not offered.

G15 General Vehicle Electronics

6. Exterior Lights

6.1.2. System wiring diagram



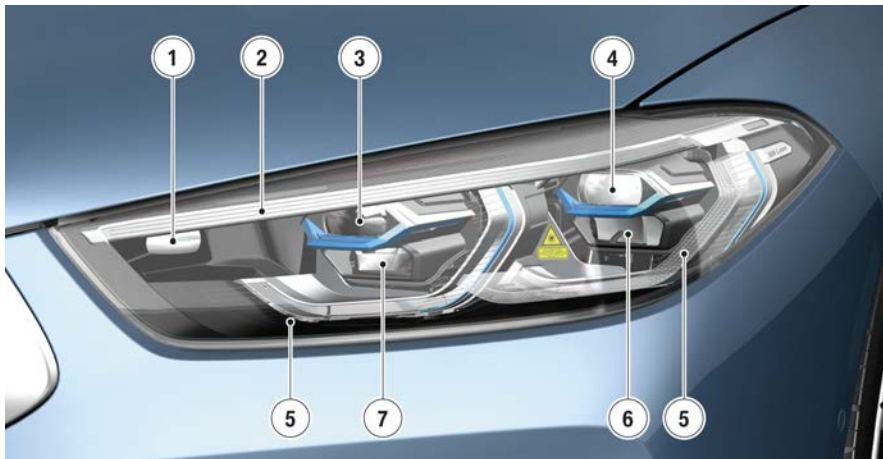
G15 lighting, front

G15 General Vehicle Electronics

6. Exterior Lights

Index	Explanation
1	Frontal Light Electronics Left (FLEL)
2	Left fog light
3	Right fog light
4	Frontal Light Electronics Right (FLER)
5	Ride height sensor, front right
6	Fuses in the power distribution box, front right
7	Body Domain Controller (BDC)
8	Fuse in the Body Domain Controller
9	Turn indicator in exterior rearview mirror, right
10	Ride height sensor, rear right
11	Fuse for rear right power distribution box
12	Ride-height sensor, rear left
13	Vertical Dynamic Platform (VDP)
14	Turn indicator in exterior rearview mirror, left
15	Light operating unit
16	Hazard warning switch/Intelligent Safety button
17	Steering column switch cluster (SZL)
18	Instrument cluster (KOMBI)
19	Rain-light-solar-condensation sensor (RLSBS)
20	Ride height sensor, front right

6.1.3. BMW laser light



G15 BMW laser light

G15 General Vehicle Electronics

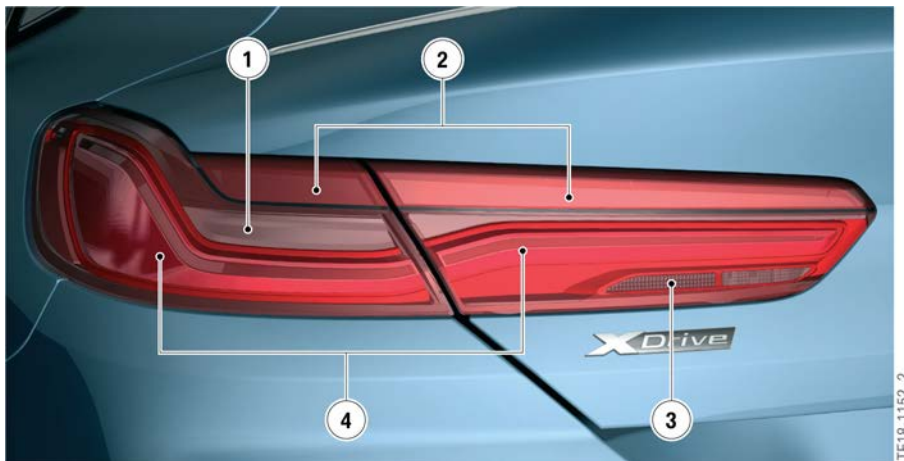
6. Exterior Lights

Index	Explanation
1	Cornering light
2	Turn indicator
3	Low-beam headlight
4	Low-beam headlight and high beam
5	Side light/daytime driving light
6	High beam laser and high beam
7	High beam

A warning sticker in the headlight is required by law in some countries.

6.2. Lighting, rear

6.2.1. Rear light



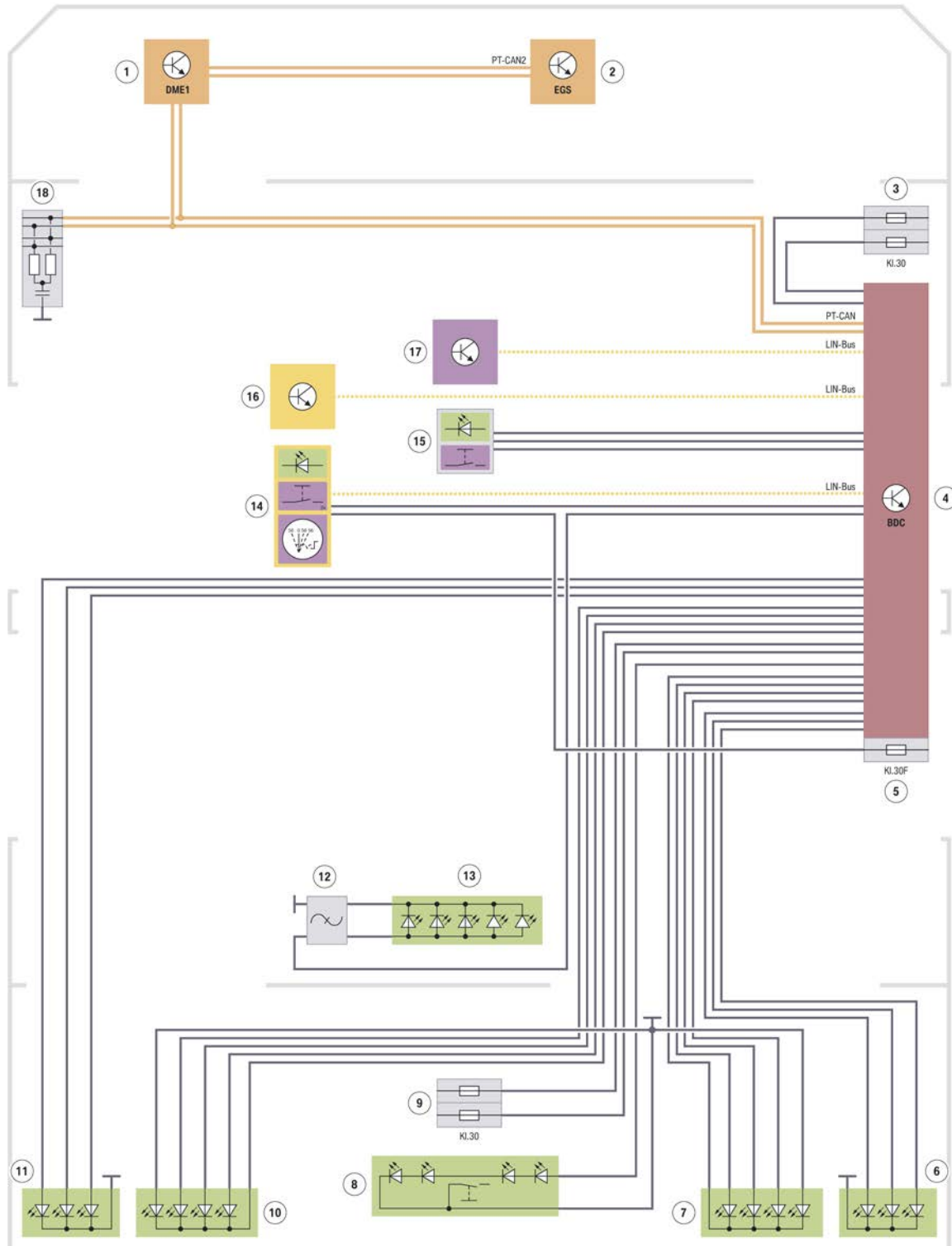
G15 rear light

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

G15 General Vehicle Electronics

6. Exterior Lights

6.2.2. System wiring diagram



G15 lighting, rear

TE18-0616

G15 General Vehicle Electronics

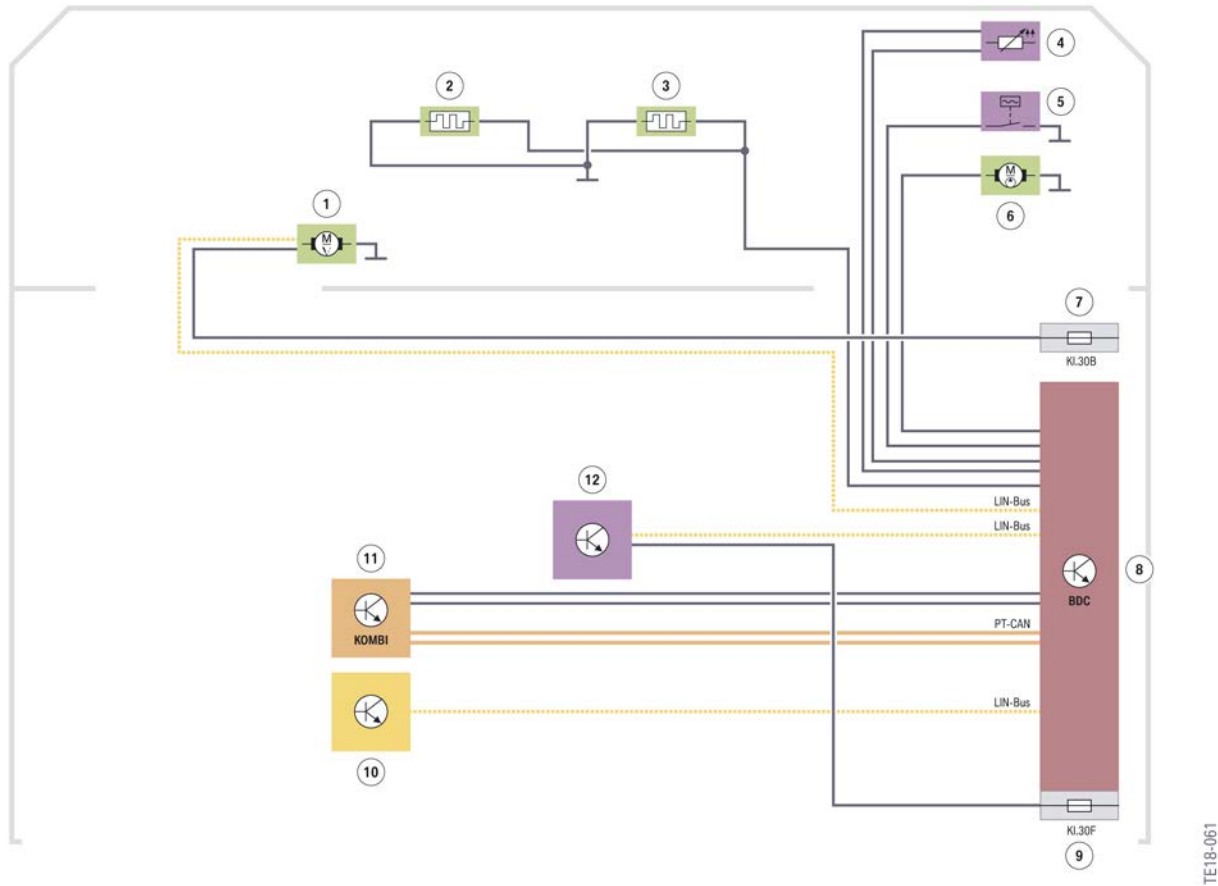
6. Exterior Lights

Index	Explanation
1	Digital Motor Electronics 1 (DME1)
2	Electronic transmission control (EGS)
3	Fuses in power distribution box, front right
4	Body Domain Controller (BDC)
5	Fuse, Body Domain Controller
6	Rear light, outer right (turn indicator, brake light, tail light)
7	Rear light, inner right (turn indicator, brake light, tail light, reversing light)
8	Number plate lights/tailgate button
9	Battery power distribution box fuses
10	Rear light, inner left (turn indicator, brake light, tail light, reversing light)
11	Rear light, outer left (turn indicator, brake light, tail light)
12	Interference suppression filter
13	Additional brake light
14	Light switch
15	Hazard warning switch/Intelligent Safety button
16	Steering column switch cluster (SZL)
17	Rain-light-solar-condensation sensor (RLSBS)
18	CAN terminator

G15 General Vehicle Electronics

7. Wash/Wipe System

7.1. System wiring diagram



G15 wash/wipe system

Index	Explanation
1	Wiper motor
2	Washer jet heating, left
3	Washer jet heating, right
4	Outside temperature sensor
5	Washer fluid level switch
6	Window washer pump
7	Fuse for front right power distribution box
8	Body Domain Controller (BDC)
9	Fuse, Body Domain Controller
10	Steering column switch cluster (SZL)
11	Instrument cluster (KOMBI)
12	Rain-light-solar-condensation sensor (RLSBS)

G15 General Vehicle Electronics

7. Wash/Wipe System

The wiper motor is a 12 V motor with gearing. The control unit, the wiper motor and the transmission form one replaceable unit. This wiper motor unit comprises:

- A permanently excited direct current motor with attached reduction gear
- Control unit electronics with position sensor and suppressor components with attached plug connection.

The control unit in the wiper motor is able to identify the following faults:

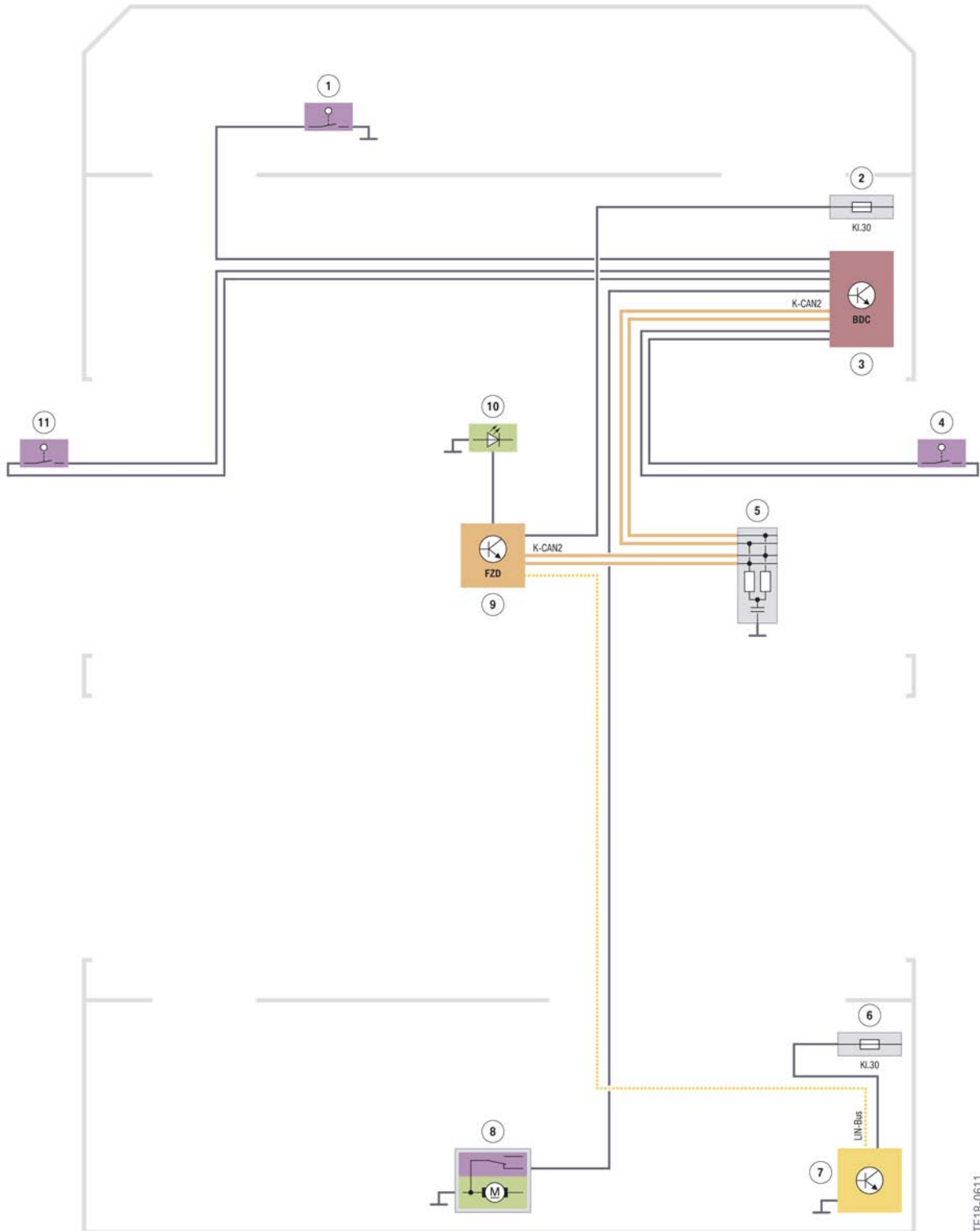
- Fault, control unit electronics
- Short circuit
- Open circuits.

The control unit in the wiper motor does not have a fault memory. The fault code entry is effected in the Body Domain Controller BDC.

G15 General Vehicle Electronics

8. Alarm System

8.1. System wiring diagram



G15 alarm system

TE18-0611

G15 General Vehicle Electronics

8. Alarm System

Index	Explanation
1	Bonnet switch
2	Fuse, power distribution box, front
3	Body Domain Controller (BDC)
4	Door lock, passenger's side
5	CAN terminator
6	Luggage compartment power distribution box fuse
7	Siren with tilt alarm sensor (SINE)
8	Tailgate lock
9	Roof function center (FZD)
10	LED interior mirror
11	Door lock, driver's side

The alarm system is equipped with an ultrasonic interior movement detector for monitoring the passenger compartment. This is integrated in the roof function center.

The Body Domain Controller monitors the door contacts, the bonnet switches and the tailgate. As soon as a status changes, the ultrasonic interior movement detector receives this information via the K-CAN2. When the alarm system is activated, an alarm is set off by the siren with tilt alarm sensor (SINE) in the event of a break-in.

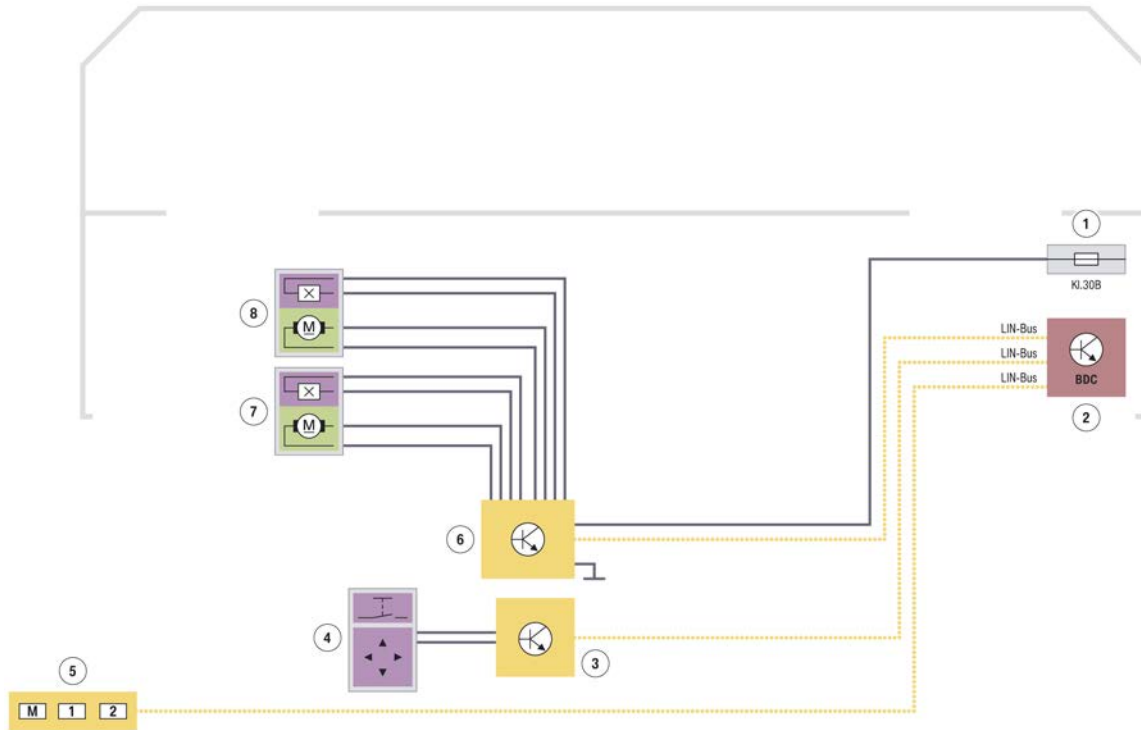
The siren with tilt alarm sensor (SINE) is connected to the roof function center via a LIN bus.

The status of the alarm system is displayed via an LED in the interior mirror.

G15 General Vehicle Electronics

9. Electr. Steering Column Adjustment

9.1. System wiring diagram



TE18-0612

G15 electric steering column adjustment

Index	Explanation
1	Fuse for front right power distribution box
2	Body Domain Controller (BDC)
3	Steering column switch cluster (SZL)
4	Steering column adjustment switch
5	Memory switch, driver's door
6	Steering column adjustment
7	Motor, steering column adjustment
8	Motor, steering column adjustment

G15 General Vehicle Electronics

10. Interior Lighting

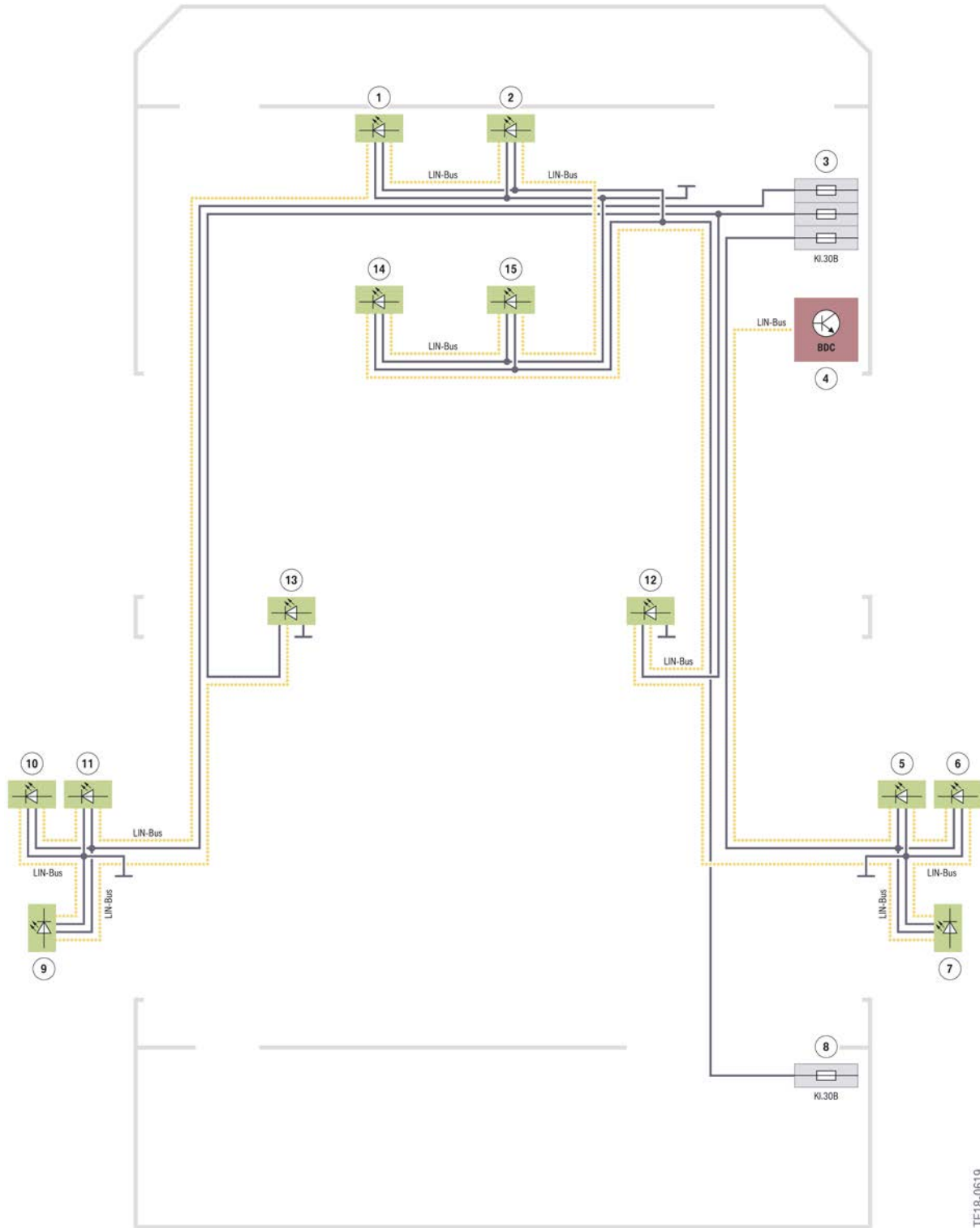
10.1. Basic

The G15 has ambient lighting as standard equipment.

G15 General Vehicle Electronics

10. Interior Lighting

10.1.1. System wiring diagram, ambient lighting



G15 ambient lighting

TE18-0619

G15 General Vehicle Electronics

10. Interior Lighting

Index	Explanation
1	RGB LED center stack, left
2	RGB LED center stack, right
3	Fuses in power distribution box, front right
4	Body Domain Controller (BDC)
5	RGB LED storage compartment, door, right
6	RGB LED door opener, right
7	RGB LED contour lines, door, right
8	Luggage compartment power distribution box fuse
9	RGB LED contour lines, door, left
10	RGB LED door opener, right
11	RGB LED storage compartment, door, left
12	RGB LED footwell, right
13	RGB LED footwell, left
14	RGB LED center stack, left
15	RGB LED center stack, right

The ambient lighting comprises 11 predefined light designs.

During an incoming phone call the ambient lighting flashes at a specified frequency.

The ambient lighting is activated when the vehicle is unlocked or locked.

RGB LEDs (**R**ed, **G**reen, **B**lue) are used for the ambient lighting. The lighting is controlled via a separate LIN bus. Here the individual LED modules are connected in series. If the LIN bus is interrupted at a point, the lighting is interrupted at this point. A search for the fault must be carried out at the location where the last LED illuminates.

G15 General Vehicle Electronics

11. Exterior Rearview Mirror

Index	Explanation
1	Outside temperature sensor
2	Fuses in power distribution box, front right
3	Body Domain Controller (BDC)
4	Exterior rearview mirror, front passenger side
5	Switch block for driver's side
6	Exterior rearview mirror, driver's side
7	Instrument cluster (KOMBI)
8	Interior mirror

The outside temperature sensor is connected to the instrument cluster. This makes the value available via the PT-CAN. The BDC evaluates the signal and activates the exterior mirror heating as required via the LIN bus. Control of the heater output is dependent on the outside temperature.

The exterior mirror motors are activated via the LIN bus.

G15 General Vehicle Electronics

12. Locking and Security Functions

12.1. Central locking system

12.1.1. Function

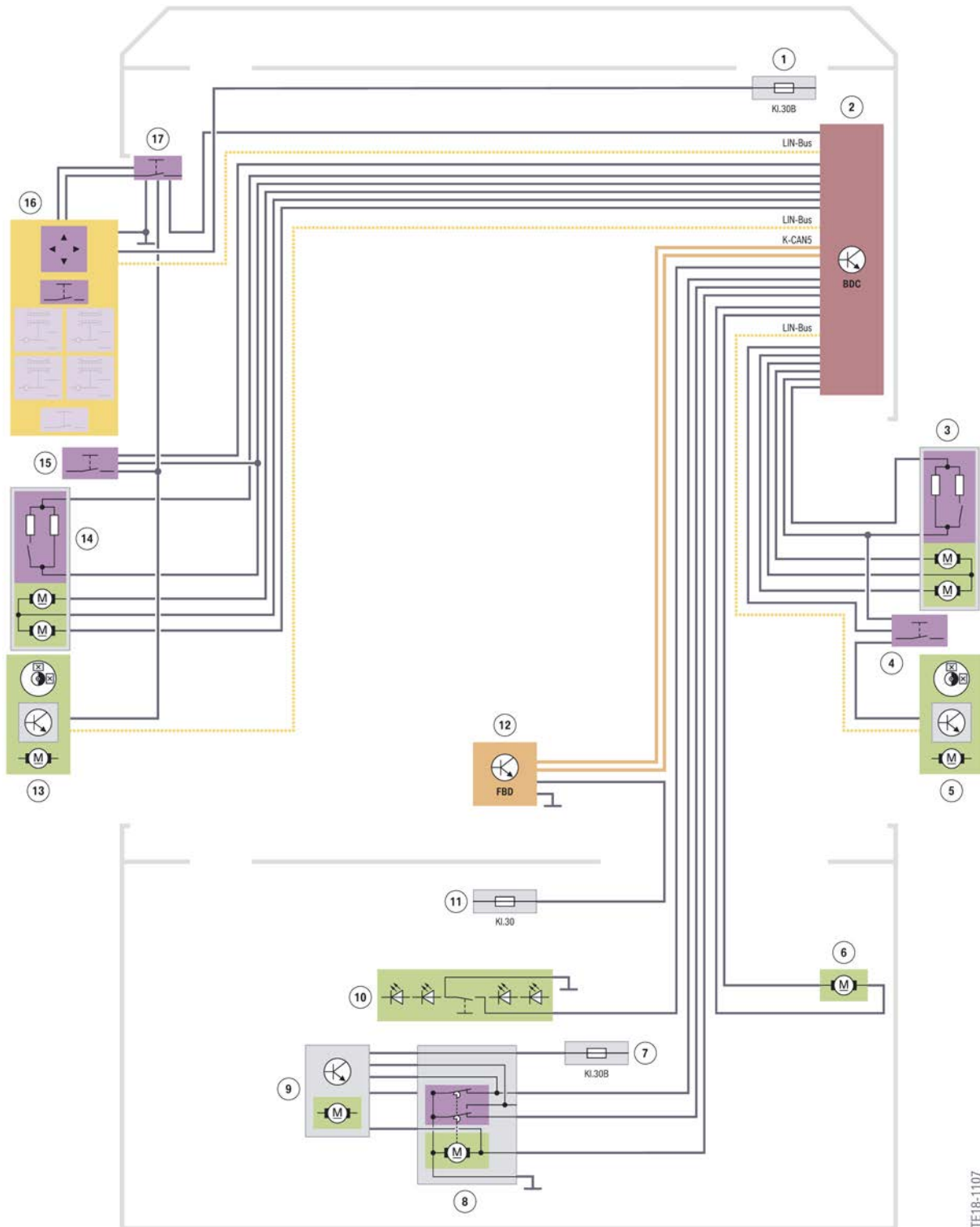
The function of the central locking system is controlled via the BDC. The function is as follows:

- The radio signal from the ID transmitter is received via the remote control receiver (FBD).
- The BDC activates the central locking system and the interior lighting.
- The BDC evaluates the status of the doors, lids and gates.
- The BDC evaluates the status of the central locking button.
- The BDC controls the Soft Close drives.
- The BDC unlocks the fuel filler flap.

G15 General Vehicle Electronics

12. Locking and Security Functions

12.1.2. System wiring diagram



G15 central locking system

G15 General Vehicle Electronics

12. Locking and Security Functions

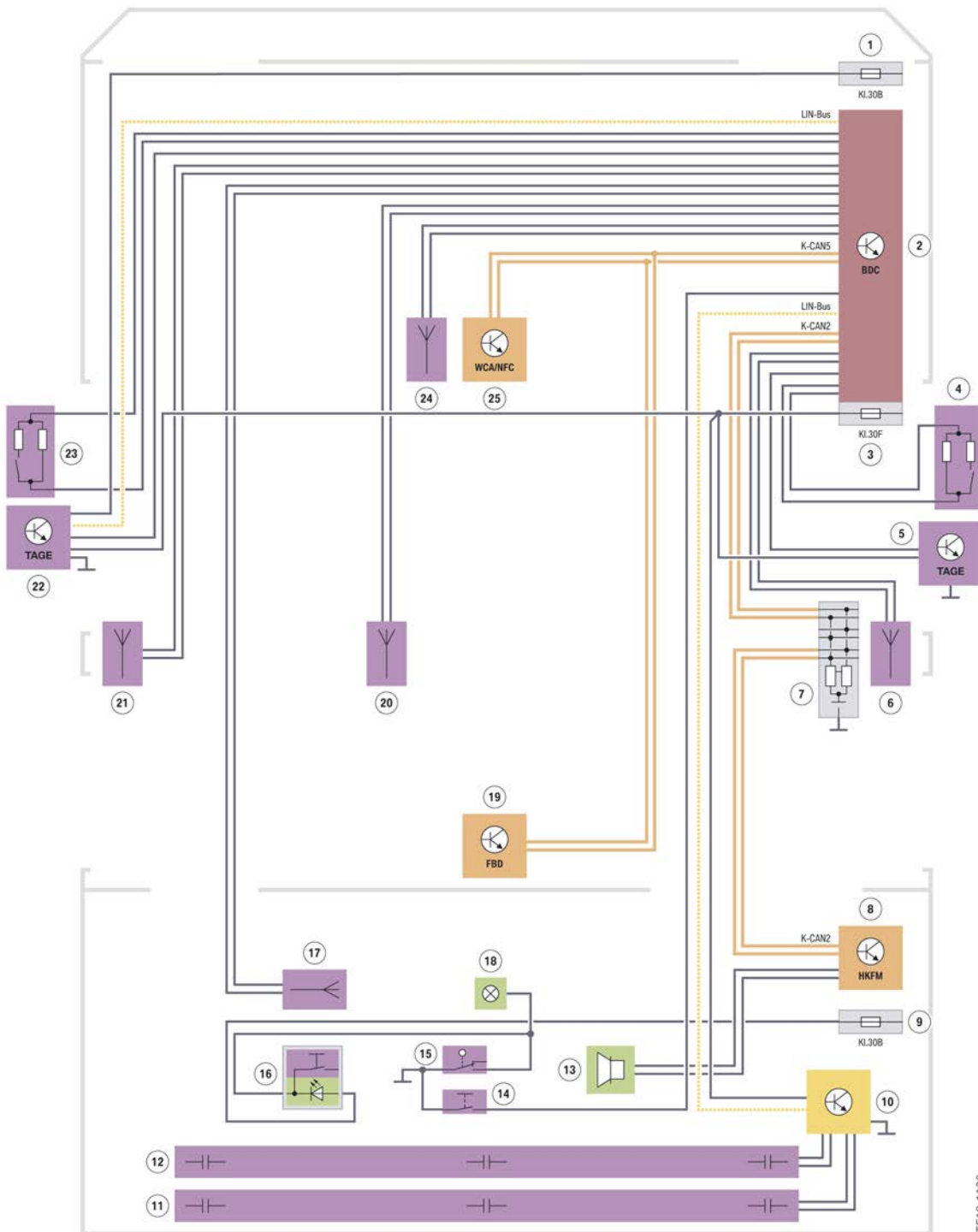
Index	Explanation
1	Fuse, power distribution box, front
2	Body Domain Controller (BDC)
3	Door lock, passenger's side
4	Central locking button on passenger's side (US version)
5	Power window regulator, passenger side
6	Motor, fuel filler flap lock
7	Luggage compartment power distribution box fuse
8	Door lock, tailgate
9	Soft-close automatic drive
10	Number plate light/tailgate button
11	Luggage compartment power distribution box fuse
12	Remote control receiver (FBD)
13	Power window regulator, driver's side
14	Door lock, driver's side
15	Central locking button, driver's side
16	Switch block for driver's side door
17	Inside tailgate button

G15 General Vehicle Electronics

12. Locking and Security Functions

12.2. Comfort Access

12.2.1. System wiring diagram



TE18-1106

Comfort Access

G15 General Vehicle Electronics

12. Locking and Security Functions

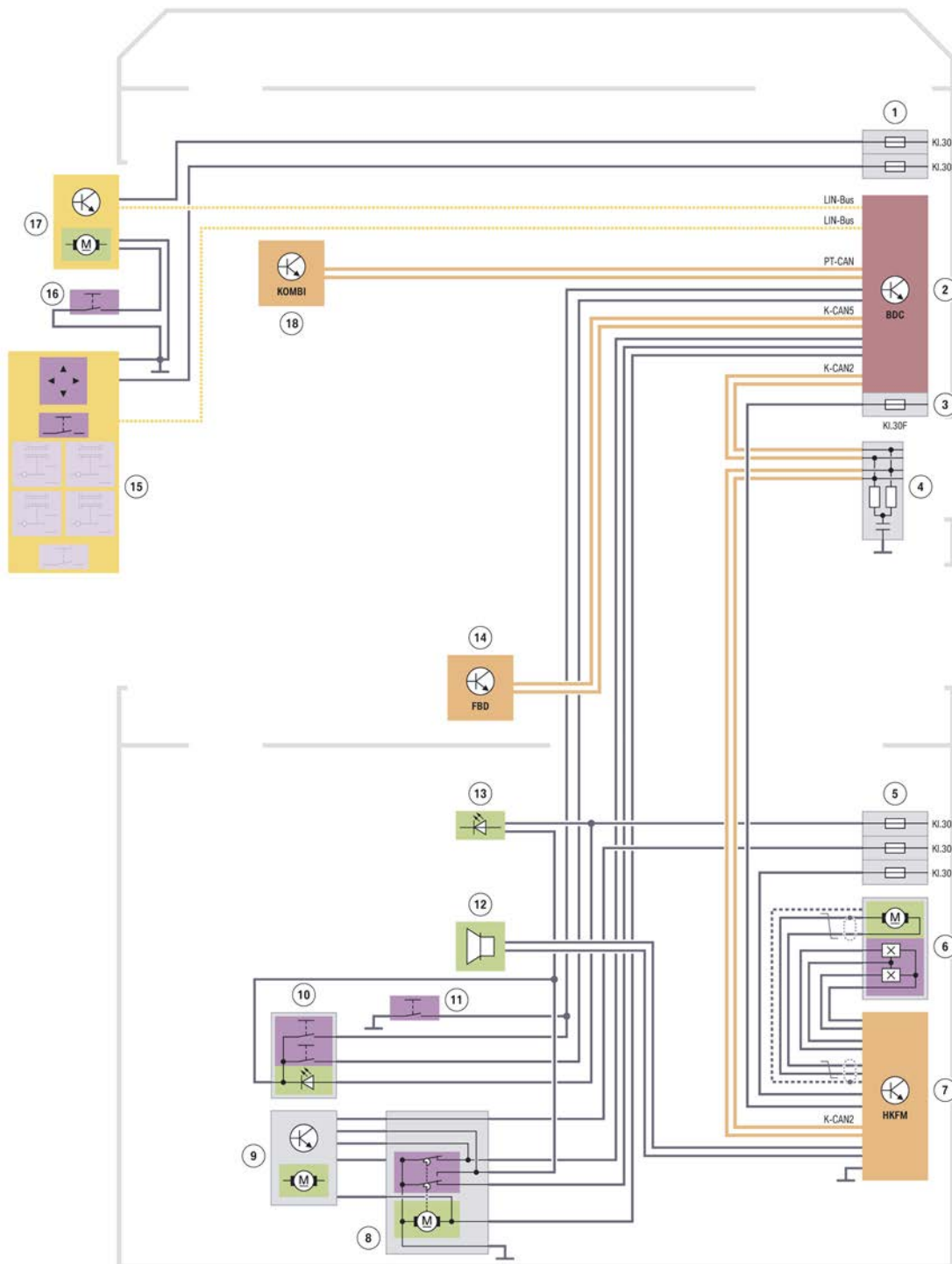
Index	Explanation
1	Fuse for front right power distribution box
2	Body Domain Controller (BDC)
3	Fuse, Body Domain Controller
4	Switch, door lock, passenger's side
5	Outside door handle electronics (TAGE) on front passenger side
6	Comfort Access antenna, passenger's side
7	CAN terminator
8	Tailgate function module (HKFM)
9	Luggage compartment power distribution box fuse
10	Control unit, contactless tailgate activation
11	Sensor at bottom for contactless tailgate activation
12	Sensor at top for contactless tailgate activation
13	Acoustic warning device
14	Outside tailgate button
15	Tailgate lock switch
16	Inside tailgate button
17	Comfort Access antenna, luggage compartment
18	Luggage compartment light
19	Remote control receiver (FBD)
20	Comfort Access antenna, passenger compartment
21	Comfort Access antenna, driver's side
22	Outside door handle electronics (TAGE) on driver's side
23	Switch, door lock, driver's side
24	Comfort Access antenna, passenger compartment
25	Wireless charging station (WCA)/Near Field Communication (NFC)

G15 General Vehicle Electronics

12. Locking and Security Functions

12.3. Tailgate

12.3.1. System wiring diagram



Automatic operation of tailgate

TE18-1108

G15 General Vehicle Electronics

12. Locking and Security Functions

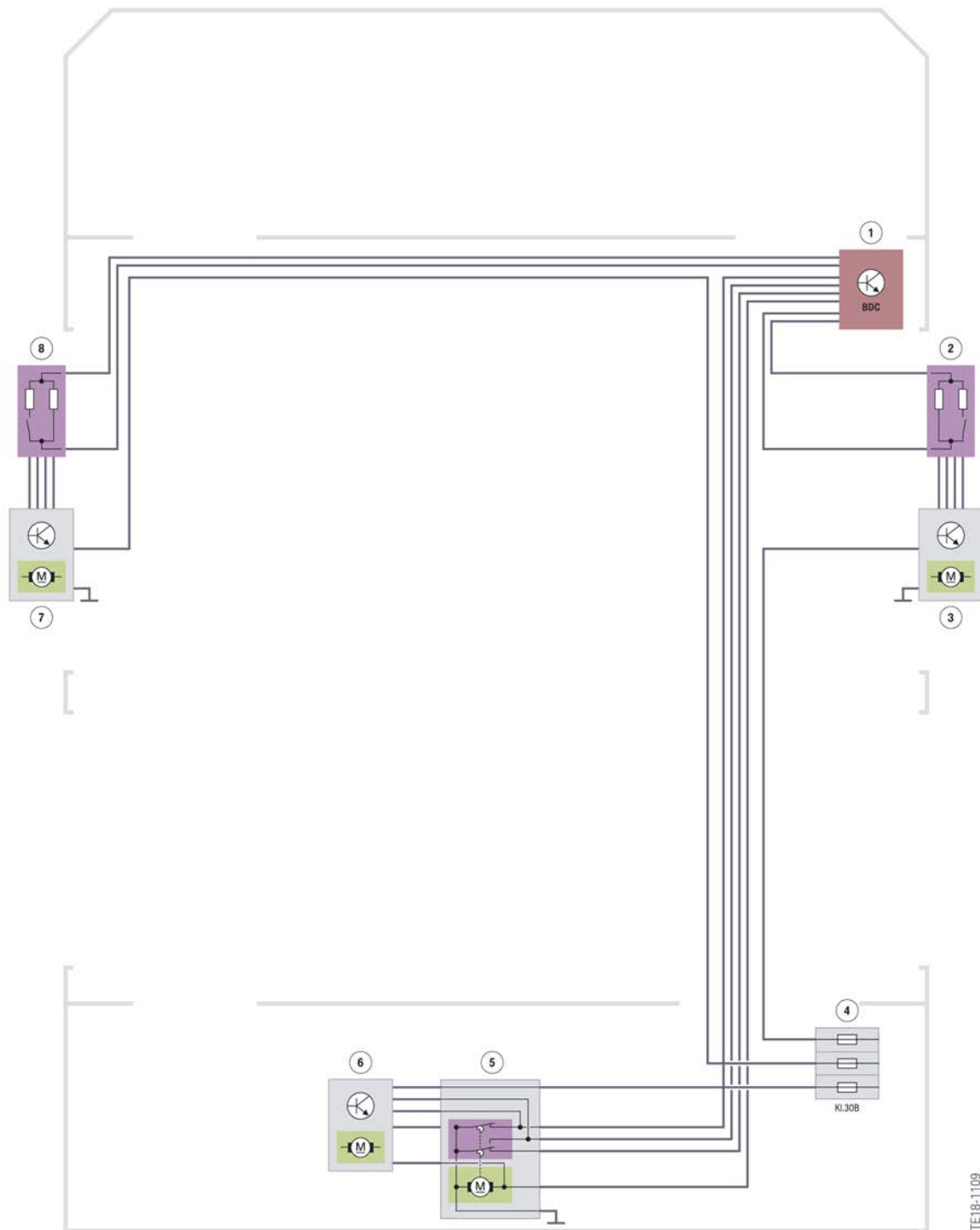
Index	Explanation
1	Fuses in power distribution box, front right
2	Body Domain Controller (BDC)
3	Fuse, Body Domain Controller
4	CAN terminator
5	Fuses, power distribution box, luggage compartment
6	Tailgate drive, right
7	Tailgate function module (HKFM)
8	Tailgate lock
9	Soft-close automatic drive
10	Tailgate buttons (close/lock)
11	Outside tailgate button
12	Acoustic warning device
13	Luggage compartment light
14	Remote control receiver (FBD)
15	Switch block for driver's side
16	Tailgate button, driver's side
17	Power window motor, driver's side
18	Instrument cluster (KOMBI)

G15 General Vehicle Electronics

12. Locking and Security Functions

12.4. Automatic Soft Close system

12.4.1. System wiring diagram



Automatic Soft Close system

TE18-1109

G15 General Vehicle Electronics

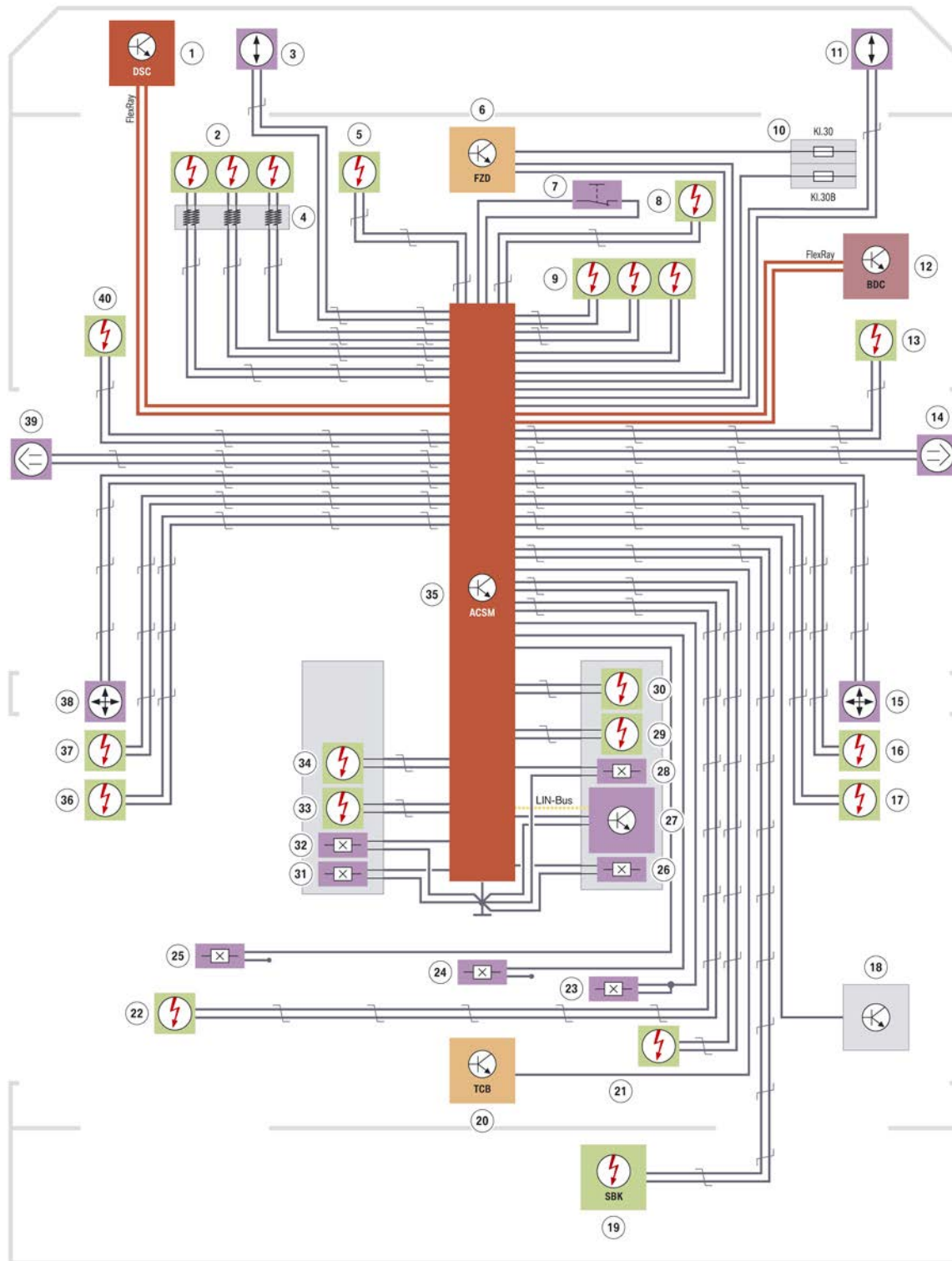
12. Locking and Security Functions

Index	Explanation
1	Body Domain Controller (BDC)
2	Door lock, right
3	Soft-close drive, right
4	Fuses, power distribution box, luggage compartment
5	Tailgate lock
6	Soft-close drive, tailgate
7	Soft-close drive, left
8	Door lock, left

G15 General Vehicle Electronics

13. Safety Systems

13.1. System wiring diagram



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G15 safety systems

G15 General Vehicle Electronics

13. Safety Systems

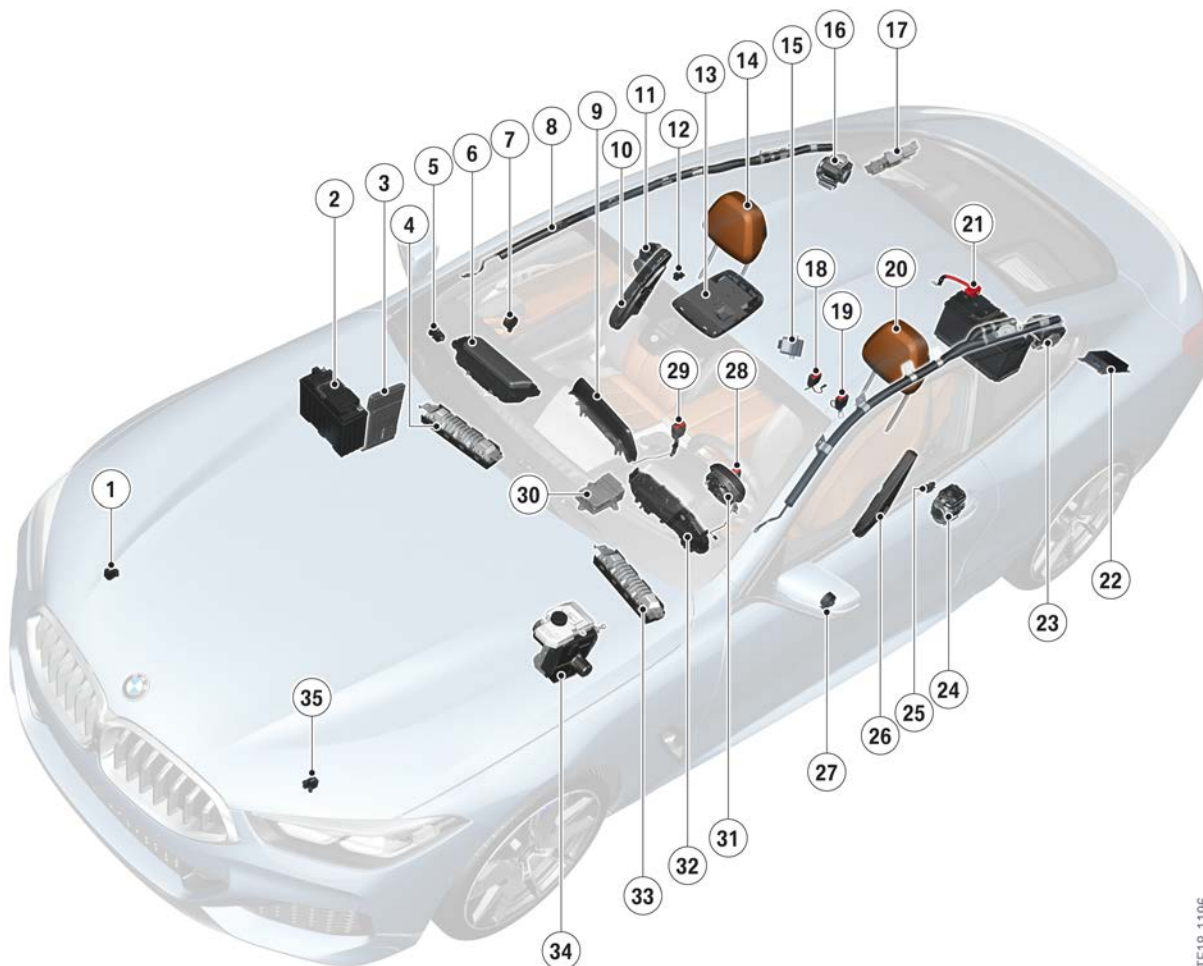
Index	Explanation
1	Dynamic Stability Control (DSC)
2	Driver's airbag
3	Airbag sensor, front left
4	Clock spring
5	Knee airbag, driver
6	Roof function center (FZD)
7	Switch for front passenger airbag deactivation (not for US)
8	Knee airbag, front passenger
9	Front passenger airbag
10	Fuses in power distribution box, front right
11	Airbag sensor, front right
12	Body Domain Controller (BDC)
13	Head airbag, right
14	Airbag sensor, door, right (pressure)
15	Acceleration sensor, B-pillar on right
16	Adaptive belt force limiter, passenger's side
17	Reel pretensioner, front passenger
18	Electric fuel pump
19	Safety battery terminal (SBK)
20	Telematic Communication Box 2 (TCB2)
21	Reel pretensioner, rear right
22	Reel pretensioner, rear left
23	Seat belt buckle switch, rear right
24	Seat belt buckle switch, rear center
25	Seat belt buckle switch, rear left
26	Seat belt buckle switch, front passenger
27	Seat occupancy mat, CIS mat
28	Seat-position sensor, front right
29	Side airbag, front passenger
30	Crash-active headrest, front passenger
31	Seat belt buckle switch, driver
32	Seat-position sensor, front left
33	Side airbag, driver's side
34	Crash-active headrest, driver
35	Advanced Crash Safety Module (ACSM)

G15 General Vehicle Electronics

13. Safety Systems

Index	Explanation
36	Reel pretensioner, driver
37	Adaptive belt force limiter, driver's side
38	Acceleration sensor, B-pillar on left
39	Airbag sensor, door, left (pressure)
40	Head airbag, left

13.2. System overview



TE18-1196

G15 system overview,

G15 General Vehicle Electronics

13. Safety Systems

Index	Explanation
1	Airbag front sensor, right
2	Dual storage system, lithium ion battery
3	Body Domain Controller (BDC)
4	Knee airbag, front passenger
5	Switch for front passenger airbag deactivation (not for US)
6	Front passenger airbag
7	Airbag sensor, door, right (pressure)
8	Head airbag, right
9	Central information display (CID)
10	Side airbag, front passenger
11	Automatic tensioner, front passenger
12	Acceleration sensor, B-pillar on right
13	Roof function center (FZD)
14	Crash-active headrest, front passenger
15	Electric fuel pump
16	Reel tensioner, rear right
17	Power distribution box, luggage compartment
18	Seat belt buckle switch, rear center
19	Seat belt buckle switch, rear left
20	Crash-active headrest, driver
21	Safety battery terminal (SBK)
22	Telematic Communication Box 2 (TCB2)
23	Reel tensioner, rear left
24	Automatic tensioner, driver
25	Acceleration sensor, B-pillar on left
26	Side airbag, driver's side
27	Airbag sensor, door, left (pressure)
28	Seat belt buckle switch, driver
29	Seat belt buckle switch, front passenger
30	Advanced Crash Safety Module (ACSM)
31	Driver's airbag
32	Instrument cluster (KOMBI)
33	Knee airbag, driver
34	Dynamic Stability Control (DSC)
35	Airbag front sensor, left

G15 General Vehicle Electronics

13. Safety Systems

13.3. Functions

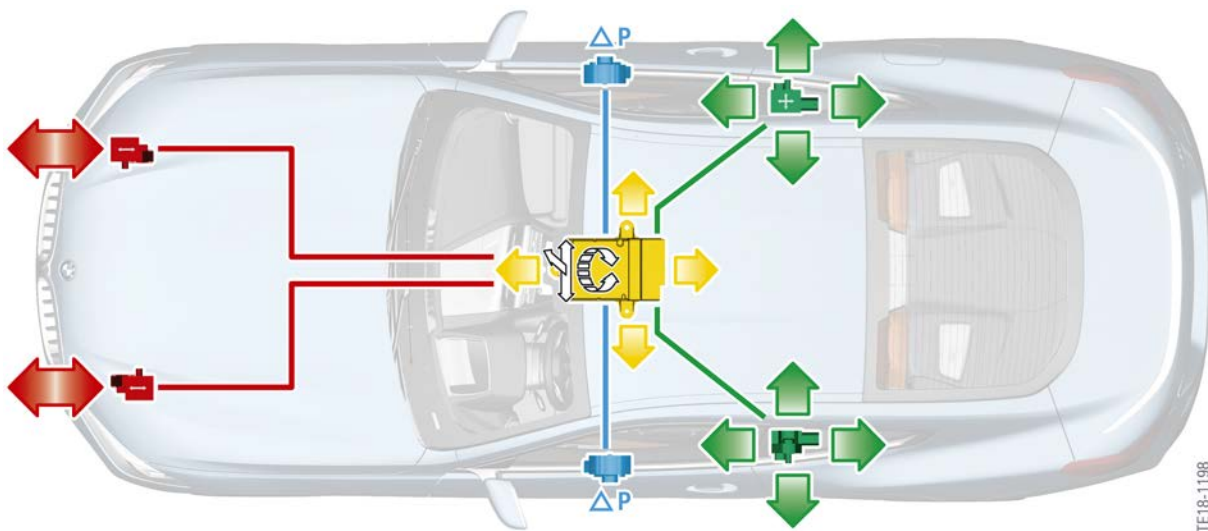
13.3.1. Impact detection

The US version of the vehicles is equipped with the following sensors:

- one lateral and one longitudinal acceleration sensor in the B-pillars (green)
- one airbag sensor to monitor the pressure in each of the front doors (blue)
- one lateral and one longitudinal acceleration sensor in the ACSM (yellow)
- one roll rate sensor in the ACSM (yellow)
- one vertical acceleration sensor in the ACSM (yellow)
- one airbag front sensor each on the engine supports (red)

The airbag sensors in the doors assist with the identification of a side-on crash.

The airbag front sensors assist with the identification of a head-on crash and its corresponding severity.



G15 impact detection, US version

