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F01 Interior Lighting

Subject **Page**

Interior Lighting

Model: F01/F02

Production: From Start of Production

OBJECTIVES

After completion of this module you will be able to:

- Understand the function of the interior lighting on the F01/02
- Locate and identify components of the interior lighting system on the F01/02

Introduction

All Interior Lighting Systems

The interior lighting is based on the interior lighting on the F01/02 is based on E90. The interior lighting comprises the lights in the passenger compartment roof, luggage compartment, footwell and the interior door lights.

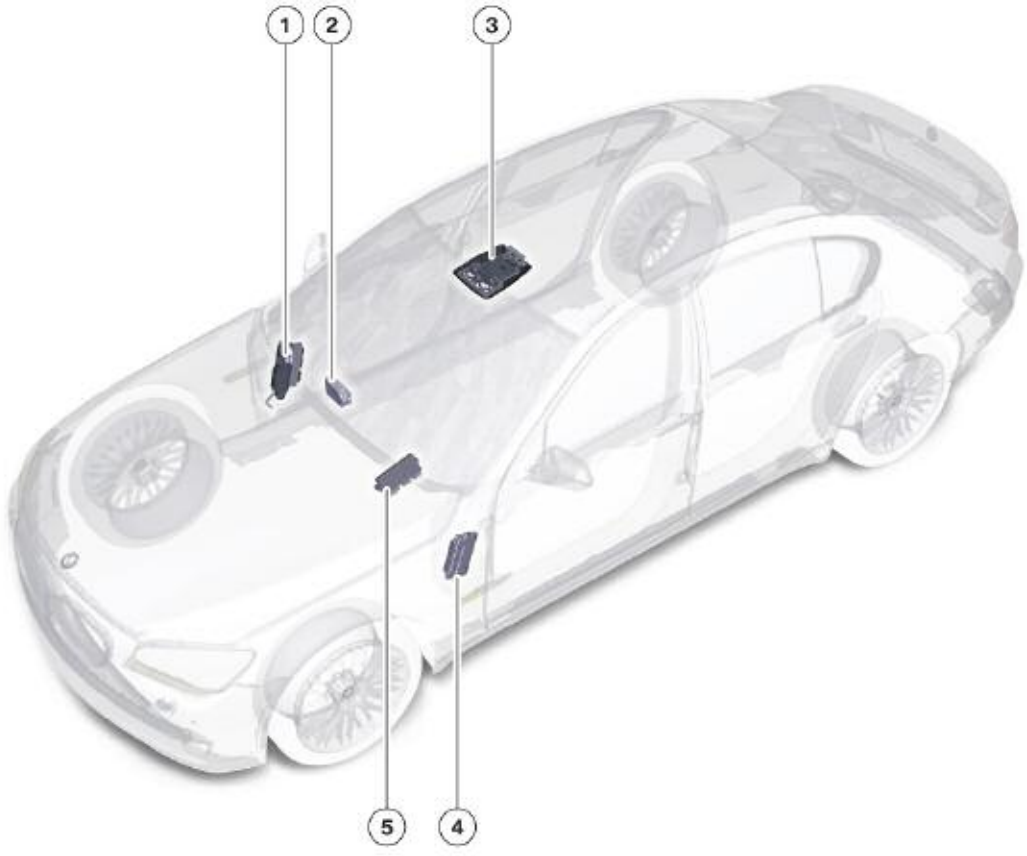
Exterior door lighting is provided by the courtesy lights (exterior door handles) and the doorway lights.

The front and rear passenger compartment roof lights are in the form single light units.

A new feature is the light for the map pocket on the backrest of the front seat.

The graphic below shows the control units that have an influence on the interior lighting:

Control units for interior lighting on F01/F02



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Interior Lighting

The following provides an overview of interior lighting.

- Interior light with interior light switch
- Reading light with reading light button for driver and front passenger
- Ambient interior light for driver and front passenger
- Front and rear door pocket lights, driver's/passenger side
- Front and rear interior door handle lights, driver's/passenger side
- Front and rear sill lights, driver's/passenger side
- Front and rear doorway lights, driver's/passenger side
- Driver's/passenger side courtesy lights, front and rear
- Driver's/passenger side exterior door handle lights, front and rear
- Driver's/passenger side vanity mirror lights, front and rear*
- Driver's/passenger side footwell lights, front and rear*
- Glove compartment light
- Center console stow compartment light, front and rear
- Map pocket lights in front seat backrests
- Rear center armrest stow compartment light
- Luggage compartment lighting

* Equipment option only available in rear on F02

System Overview

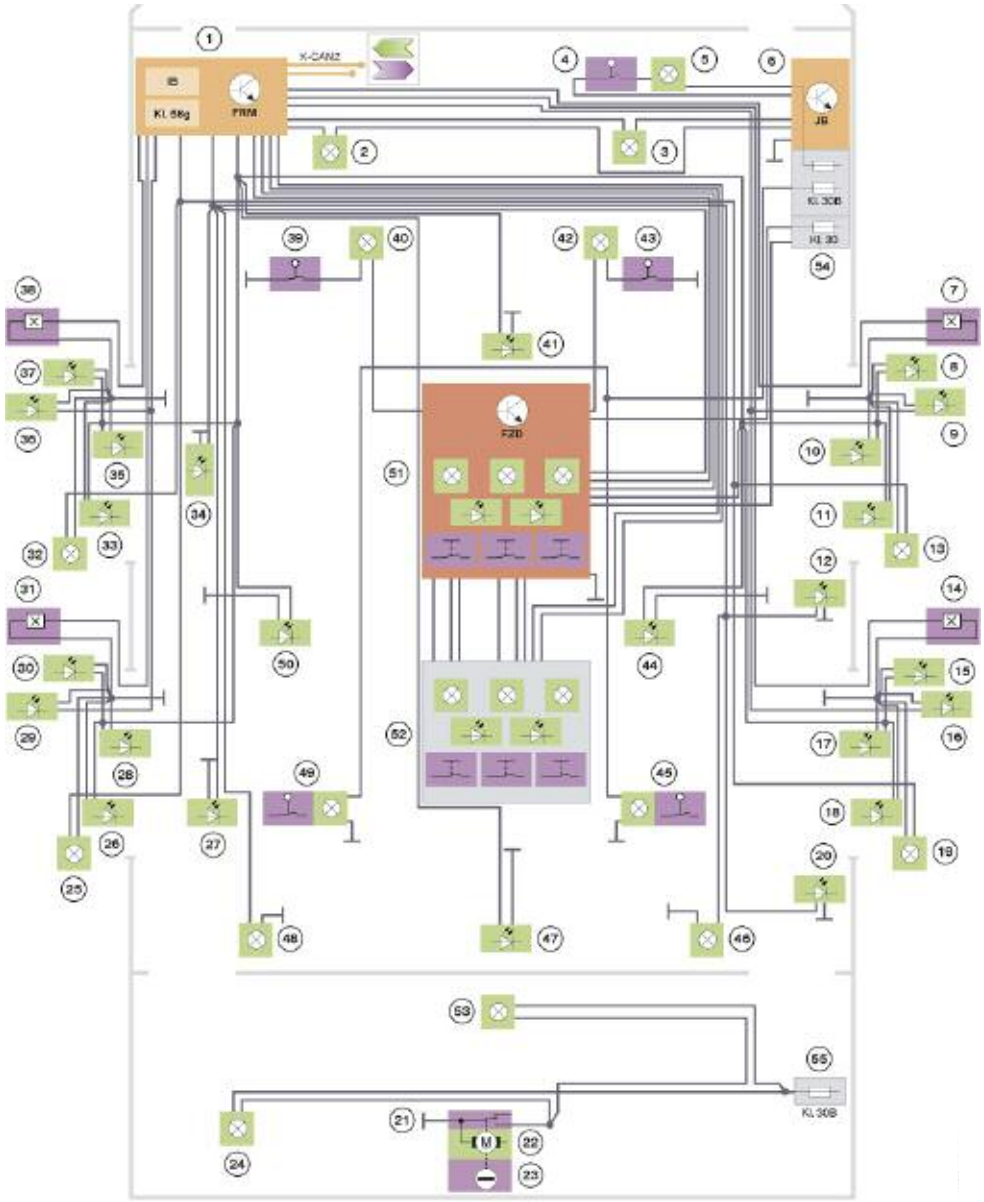
Schematic System Circuit Diagram - Interior Lighting

The system circuit diagram follows the description below and provides an overview of the full extent of all possible interior lighting options.

The status of the door contact (Hall sensor) in the lock (38) changes, for example, when the door is opened with the vehicle unlocked. The footwell module (1) evaluates the status and sends the request to switch on the interior lighting.

At the same time, the doorway light (13) for the door that is open and the footwell lights (2, 3, 46, 48) are switched on by the footwell module. The status of the door contact changes again when the vehicle door is closed. The footwell module initiates the procedure to switch off the interior lighting. If the tailgate is opened, the status of the tailgate switch (21) registered by the tailgate central locking module changes. The luggage compartment lighting (24, 53) is connected to the power supply via Terminal 30B so that the luggage compartment lights are switched on via the tailgate switch.

F01/F02 interior lighting, maximum possible configuration



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15	Exterior door handle light, passenger side, rea	45	Vanity mirror light with switch, passenger side, rear
16	Courtesy light, passenger side, rear	46	Footwell light, rear right
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26	Door pocket light, driver's side, rear	Kl. 30	Terminal 30
27	Sill light, driver's side, rear	Kl. 30B	Terminal 30 basic mode
28	Interior door handle light, driver's side, rear	Kl. 58g	Terminal 58g
29	Courtesy light, driver's side, rear	IB	Interior lighting control
30	Exterior door handle light, driver's side, rear		

K-CAN2 signals at footwell module

In/Out	Information	Source/sink	Function
In	Status, central locking	Car Access System > footwell module	Interior lighting ON
In	Status, central locking	Car Access System > footwell module	Interior lighting OFF
In	Crash signal	Crash sensor > advanced crash safety management	Interior lighting ON
Out	Electrical load cutout	Footwell module > Junction box module	Interior lighting OFF through electrical load cutout
Out	Status, terminal 58g	Light switch > footwell module	Instrument lighting ON (e.g. control buttons, instrument cluster, gear selector lever)
Out	Status, door switch	Footwell module > Car Access System	Condition for activation of central locking (enabling/allowing)

NOTES PAGE

Functions

Important Control Units in the Interior Lighting System

The interior lighting on the F01/F02 is switched on and off by the footwell module (FRM).

The roof function center (FZD) is responsible for the interior lighting components in the passenger compartment roof.

The paragraphs that follow now describe the interior lighting functions in more detail.

Footwell Module

The footwell module is the central control unit for the interior lighting system. All interior lighting outputs of the footwell module are pulse-modulated. This ensures the interior lighting functions at a constant brightness level in the event of voltage fluctuations. The pulse width modulation is additionally used for the soft ON/soft OFF function.

The footwell module features the following functions for the interior lighting:

- Switching the interior lighting on/off
- Electric load shut-down after 8 minutes
- Lighting via terminal 58g.

Switching on the interior lighting

The footwell module receives numerous input signals that switch on the interior lighting. The input signals are read directly by the footwell module or are received via the K-CAN2. The input signals for the interior lighting are listed in the following.

Input signals	From
Central locking signals	CAS
Crash signal	ACSM
Door contacts	FRM
Driver's door barrel lock	FRM
Interior light switch	FRM
Rear reading light buttons	FZD

Switching-on conditions

If any of the following conditions for switching on the interior lighting is met, the interior lighting is switched on. The switch-on function is limited in terms of time. The electrical loads are:

- Unlock via barrel lock in driver's door
- Vehicle unlocked using ID transmitter
- Terminal 15 OFF if Terminal 58g was ON no more than 2 min previously
- Lock button on ID transmitter pressed after the central locking has been in double-locked status for longer than 10 seconds.

The interior lighting remains permanently switched on in certain situations. These situations are:

- Receiving crash signal
- Interior lighting button briefly pressed.

Note: Pressing the interior lighting button again switches it off.

Switching off interior lighting

The footwell module receives numerous signals to switch off the interior lighting. Those signals are received via the K-CAN2 or are read directly by the footwell module.

Switch-off conditions

The interior lighting is switched off under the following conditions:

- Central locking in central arrest, all doors and the tailgate are closed
- 8 min after Terminal 15 OFF (cut-out of electrical equipment)
- Interior lighting button pressed for longer than 3 seconds (continuous "OFF")
- Terminal 15 ON when doors closed
- Terminal 58g ON and Terminal 15 OFF. The interior lighting is switched off if no door is opened within 20 seconds.
- The interior lighting is switched off if the vehicle is unlocked via the ID transmitter and no door is opened within 20 seconds.
- "Power down" via diagnosis.

Cut-out of electrical equipment

As of Terminal 15 OFF, the interior lighting is switched off by the footwell module after 8 min. For that purpose, the footwell module broadcasts the electrical equipment cut-out instruction via the K-CAN2.

The roof functions center FZD receives this information and switches off the interior lighting in the roof area.

The interior lights that are switched on directly by the footwell module are also switched off.

Terminal 58g

The footwell module supplies the Terminal 58g signal via the K-CAN2 or conventional wiring. Terminal 58g is pulse width-modulated and features the following two brightness levels:

- The brightness level for the locator lighting is individually adjustable using the thumb wheel on the lights operating unit.
- The brightness level for the function lighting is not dimmed and is switched on at full brightness.

Hazard warning switch

As soon as the hazard warning switch is pressed, the footwell module switches on the switch lighting at full brightness.

Note: The hazard warning switch is not illuminated at full brightness level at terminal 58g. The brightness depends on the setting of the locator lighting.

Roof Function Center

The roof function center (FZD) incorporates the front interior light unit.

The FZD is the link to the interior light unit in the rear passenger-compartment roof.

Interior lighting functions

The interior lighting functions in the roof functions center are:

- Loop-through of power supply provided by the footwell module, e.g. IB and Terminal 58g
- Reading of signals from rear reading light buttons
- Power supply to vanity mirror lights or reading lights in the rear interior light unit.

Reading of signals from rear reading light buttons

The roof function center reads the signals from the rear reading light buttons. A flip-flop circuit is used for the purpose for each rear reading light button. Pressing the reading light button changes the status of the flip-flop circuit. The change of status causes the roof function center to switch the reading light concerned on or off accordingly.

The footwell module supplies the Terminal VA status signal. The rear reading lights are among the devices switched off by the electrical equipment cut-out function.

Luggage Compartment Lighting

The luggage compartment lighting is connected directly to Terminal 30B.

The luggage compartment lighting is functional as of status Terminal 30B ON and fused in the rear power distribution box.

When the tailgate is opened, the status of the tailgate switch changes. This means the luggage compartment lights are connected to ground and therefore switched on.

The status of the tailgate switch changes when the tailgate is closed again. The ground connection is interrupted and the luggage compartment lighting switched off.

Glove Compartment Lighting

The light is connected to Terminal 30B in the front power distribution box and protected against short circuits by a fuse.

When the glove compartment is opened, the glove compartment switch closes.
As a result, the glove compartment lighting is connected to ground.

The glove compartment lighting is switched off by closing the glove compartment.

Car Access System
The Car Access System supplies the central vehicle has been locking status signal via the K-CAN2. In this way, the footwell module recognizes when the unlocked and consequently switches on the interior lighting.

Courtesy Lighting
The courtesy lighting operates in sync with the interior lighting. That means that the courtesy lighting remains switched on as long as the interior lighting is on.

Note: Previously, the courtesy lighting was limited to 20 seconds. This functional feature on the F01/F02 is a change from other BMW models.

System Components

Interior Lighting, Front

The components for the interior lighting in the front roof area are integrated in the roof functions center and in the sun visors. The footwell lighting is located on the underside of the dashboard.

Interior Lighting in the Roof Function Center

The interior light unit on the F01/F02 is integrated in the roof function center.
The interior light unit consists of:

- Reading light with button for driver and front passenger
- Interior light with button
- Ambient interior light for driver and front passenger.

The roof function center is matched to the color of the roof lining.

Various equipment options make it necessary to install additional components in the roof functions center.

If a panoramic glass roof is installed, the roof functions center contains not only the button for the panoramic glass but also the necessary control and monitoring facilities.

The ultrasonic interior movement detector is completely integrated in the roof function center on vehicles equipped with an anti-theft alarm system.

The rood function center simply loops through the signals for all other components. This means the components are connected directly to their respective control units.

These components are:

- Emergency call button
- Passenger airbag OFF lamp.

Interior Light Unit, Rear

The rear interior light unit incorporates the following lights:

- Reading light with button for left and right rear passengers
- Interior light with button
- Ambient interior light for driver and front passenger.

Interior Door Lighting

The interior door lighting comprises the interior door handle light, armrest light and door pocket light. The lights are in the form of LEDs with fiber-optic leads for light distribution. In addition, the doorway light is fitted in the bottom of the door. A 5 W bulb is used for the doorway light.

Example of interior door lighting on driver's door - Left: view from front; right: angled view upwards from below

Map Pocket Lights

The map pocket lights are in the backrests of the front seats. An LED supplies light to a fiber-optic lead. The fiber-optic lead is integrated in the seat backrest. The light from the LED is directed downwards by the fiber-optic lead, thereby illuminating the map pocket.

Map pocket light in driver's seat backrest on F01/F02

Sill Lights

The sill lights are connected directly to the footwell module. LEDs are used as the light source. All four doors have sill lights.

Example of sill lights on F01

Vanity Mirror

Vanity mirrors are fitted as standard on the driver's and passenger side at the front. The vanity mirror lights are fused in the front power distribution box and connected to Terminal 30B.

Note: Terminal 30B is looped through by the roof function center. 1 On the F02, rear vanity mirrors are also available. The vanity mirror lights are supplied with power directly by the footwell module.

On the F02, rear vanity mirrors are also available. The vanity mirror lights are supplied with power directly by the footwell module.

A vanity mirror light has a power consumption of approximately 5 W.

Rear passenger side vanity mirror on F01/F02

Luggage Compartment Lighting

Two lights are used for the luggage compartment lighting. One of the lights is located on the underside of the rear parcel shelf. The other light is integrated in the tailgate. The light in the tailgate has two lenses. One of the lenses is colored red. When the tailgate is open, that lens serves as an indicator lamp for vehicles behind. The second lens directs the light downwards into the luggage compartment.

A 10 W bulb is used for each of the luggage compartment lights.

Luggage compartment lighting integrated in tailgate on F01/F02

Control Units

The “interior lighting” function is distributed between several control units that communicate with each other via the K-CAN2. The individual control units are described in the following.

Car Access System

The Car Access System sends the request to unlock/lock the central locking via the KCAN2.

The signals are required to switch the interior lighting on and off.

Footwell Module

The footwell module detects the request to switch the interior lighting on/off based on the signals from the Car Access System, for example.

The footwell module provides a number of outputs for the interior lighting functions.

Output	Light
Doorway light	All doorway lights in the doors
Terminal 58g	Interior door lights, center console stow compartment, center armrest stow compartment, ambient interior lights, map pocket lights and backlighting for various switches, etc.
Footwell light	Footwell lights, front
Interior lighting 1	Rear footwell lights, sill lights, front interior light
Interior lighting 2	Interior light, rear
Courtesy lighting	Courtesy lights in the doors
Electrical equipment cutout	Reading lights

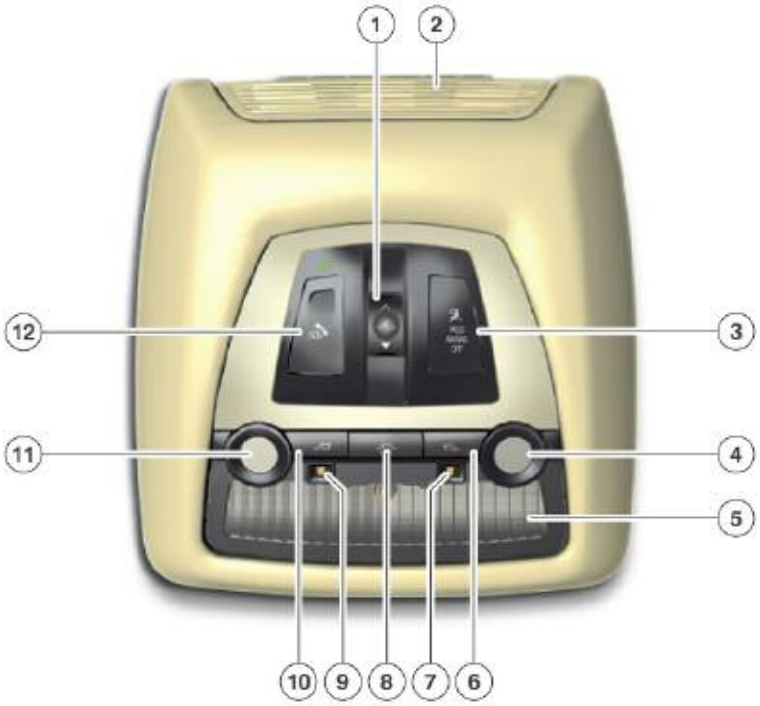
The footwell module evaluates the status of the door contacts. The interior lighting is switched on when a door is opened. Each door switch is connected individually to the footwell module.

The footwell module analyzes the status of the front reading light buttons and front/rear interior light buttons.

Roof Function Center

The roof function center provides the power supply for the rear interior light unit. The front vanity mirrors also receive their power supply from the roof function center.

Example of roof function center on F01/F02



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2	Openings for ultrasonic interior movement detector	8	Interior lighting button
3	Passenger airbag OFF light	9	Ambient lighting
4	Passenger's reading lamp	10	Driver's reading light button
5	Interior light	11	Driver's reading light
6	Passenger's reading light button	12	Emergency call button

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