

## FUB-FUB-FB-630001-K08 Fully automatic trailer tow hitch with LIN bus

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VIN: CY47352

Vehicle: 7' / F02 / SEDAN / 740Li / N54 / EUR / LL / AUTO / 2008 / 12

System version: 1.1.1

Data version: 2.35

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### Fully automatic trailer tow hitch with LIN bus

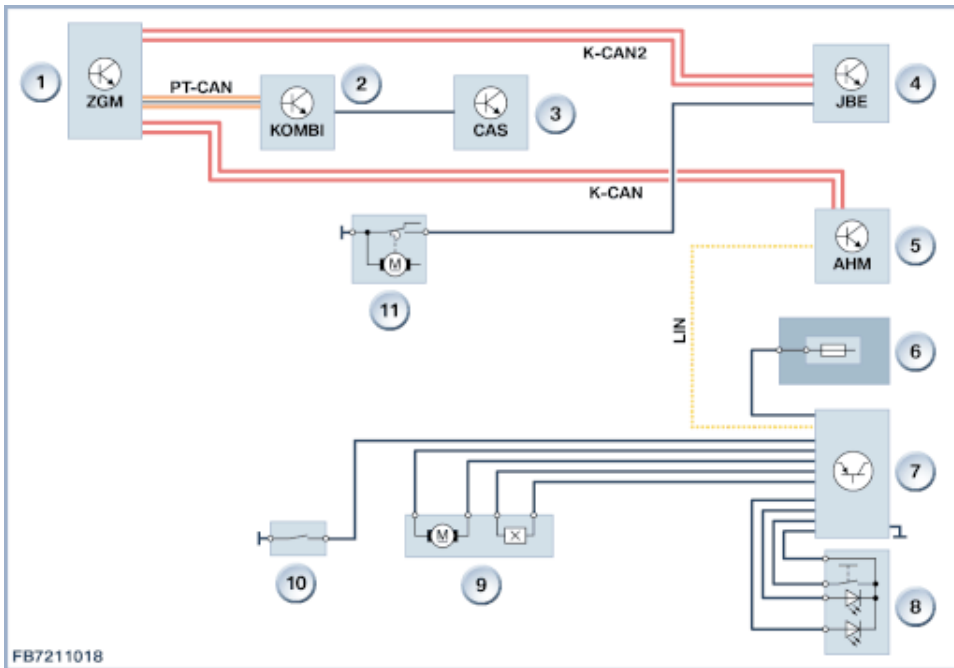
The vehicle can be ordered with a fully automatic trailer tow hitch as optional equipment. The fully automatic trailer tow hitch is operated using a button in the luggage compartment. The system has a control unit with LIN bus connection to the trailer module (AHM). The control unit for the fully automatic trailer tow hitch reports faults to the trailer module (AHM). The faults are stored in the trailer module. If necessary, a Check Control message is generated and displayed in the instrument cluster.

### Brief component description

- **Button and LED for fully automatic trailer tow hitch**  
Pressing the button prompts the fully automatic inwards or outwards pivoting movement of the ball head as far as each end position. Two coloured LEDs are integrated into the button (green and red). The indicator light shows the system status.
- **Rear lid contact switch**  
The tailgate or the rear window must be open when the trailer tow hitch is operated.
- **Microswitch for trailer detection**  
The microswitch for trailer detection is built into the trailer socket. If the connector is inserted in the trailer socket, the ball head cannot be pivoted in.
- **Hall effect sensor in drive for fully automatic trailer tow hitch**  
The hall effect sensor is integrated into the powertrain. The entire pivoting angle of the ball head is monitored with the aid of the Hall effect sensor. The spindle's rotary movement is transmitted by the Hall effect sensor to the control unit for the fully automatic trailer tow hitch in the form of a Hall effect sensor signal. In parallel to the hall effect sensor signals, the control unit measures the current required for the pivoting movement. If the permissible current consumption of the DC motor is exceeded during fully automatic pivoting out or in, or no hall effect sensor signals are emitted, the ball head's pivoting movement is halted. The ball head is pivoted back a short way in the opposite direction (reversed).
- **Control unit for fully automatic trailer hitch**  
The control unit energises the powertrain's direct current motor. The control unit has no direct connection to the bus system and cannot be programmed.
- **AHM: Trailer module**  
The trailer module (AHM) is connected to the control unit for the full automatic trailer tow hitch via the LIN bus. In the event of a system fault, the trailer module will generate a Check Control message. The trailer module is also used for trailer detection. The trailer module identifies a trailer as connected if load is detected least twice at the lighting outputs.

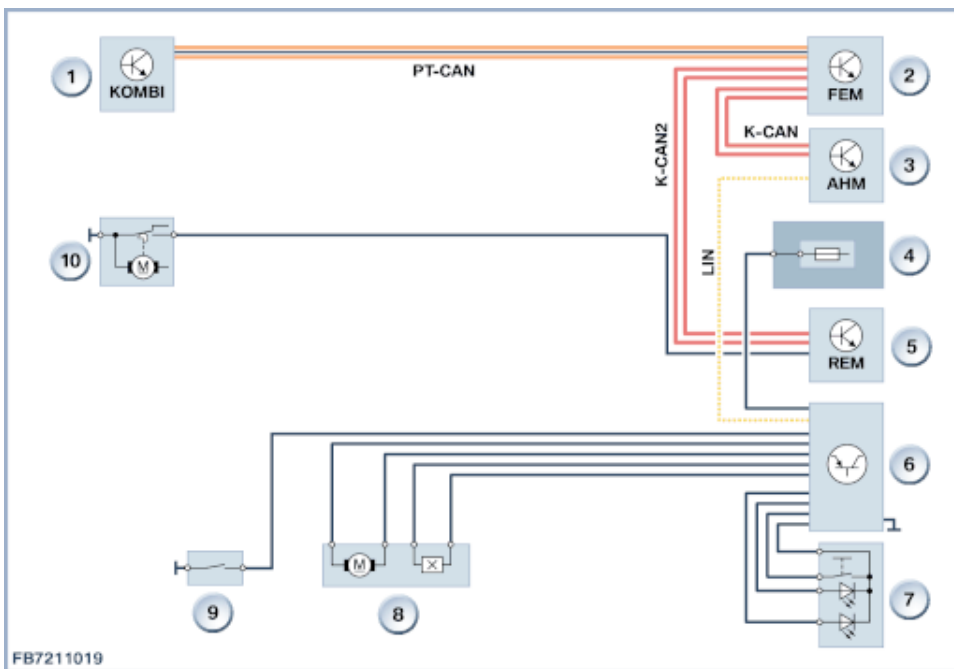
### System functions

Functional networking using the example of F01



Item	Explanation	Item	Explanation
1	Central gateway module (ZGM)	2	Instrument panel (KOMBI)
3	Car access system (CAS)	4	Junction Box Electronics (JBE)
5	Trailer Module (AHM)	6	Power distribution box, right rear
7	Control unit, fully automatic trailer tow hitch	8	Button, fully automatic trailer tow hitch, with LEDs
9	Drive, fully automatic trailer tow hitch	10	Microswitch, trailer detection
11	Tailgate/tailgate lock		

Functional networking using the example of F30



Item	Explanation	Item	Explanation
1	Instrument panel (KOMBI)	2	Front Electronic Module (FEM)

3	Trailer Module (AHM)	4	Power distribution box, right rear
5	Rear Electronic Module (REM)	6	Control unit, fully automatic trailer tow hitch
7	Button, fully automatic trailer tow hitch, with LEDs	8	Drive, fully automatic trailer tow hitch
9	Microswitch, trailer detection	10	Tailgate/tailgate lock

## Switch-on conditions

The following switch-on conditions must be fulfilled for the fully automatic trailer tow hitch:

- No overvoltage or undervoltage in the vehicle voltage
- Terminals greater than or equal to terminal 30B
- Driving speed less than 5 km/h and speed signal is valid
- Tailgate or rear window open
- Connector **not** inserted in trailer socket

## Notice!

On the F25, the system is deactivated after no later than 30 seconds with ignition switched off. LED goes out.

On the vehicles F01, F02, F07, F10 and F11, the system is disabled after 90 seconds at the latest.

The following preconditions reactivate the system:

- Close tailgate or door and reopen
- Switch on ignition.
- press the "Open central locking system" button on the radio remote control.

## System functions

### - Automatic inward and outward pivoting

- Vehicles up to model year 11/2011:

Briefly pressing the button (for less than 1 second) pivots the ball head fully automatically from one end position to the other. Fully automatic pivoting out or in can be halted at any time by briefly pressing the button a further time. Fully automatic pivoting out or in can only then be started when the ball head is in one of the two end positions. Or the fully automatic pivoting out or in has been stopped by pressing a button. The operating function of the button is as follows (starting position: ball head pivoted in):

- Short press on button: The ball head begins to pivot outwards
- Next keystroke: Pivoting out of the ball head is halted immediately
- Next keystroke: The ball head begins to pivot inwards
- Next keystroke: Pivoting in of the ball head is halted immediately
- Next keystroke: The ball head begins to pivot outwards

- Vehicles as of model year 11/2011:

Briefly pressing the button (for less than 1 second) pivots the ball head fully automatically from one end position to the other. Fully automatic pivoting out or in cannot be halted by briefly pressing the button a further time. Fully automatic pivoting out or in can only then be started when the ball head is in one of the two end positions.

### - Reversing the pivoting movement

If during fully automatic pivoting out or in the permitted DC motor power consumption is exceeded (e.g. due to an obstruction or stiff movement at low ambient temperature): The control unit initiates reversing for the fully automatic trailer tow hitch. The ball head's pivoting movement is halted. The ball head is pivoted back a short way in the opposite direction

(reversed). It can now only be moved by continuous operation of the button (manual operation). Reversing is suppressed close to either end position and a higher current consumption is permitted. This allows the ball head to be pivoted out of each end position with more force (e.g. to release the ball head if stuck).

#### - **Pivoting out or in by continuous operation of button**

- Vehicles up to model year 11/2011:

This mode is initiated by operating the button for the fully automatic trailer hitch for longer than 1 second. The ball head only pivots for as long as the button is pressed. If the button is pressed again, the ball head is pivoted in the opposite direction to its previous pivoting. The ball head's pivoting movement stops when the button is released. A further pivoting movement can only be performed in this mode. Increased current consumption by the DC motor is permissible in the continuous button-operated mode. If the current consumption permissible in this mode is exceeded, the ball head's pivoting movement stops. The ball head does **not** pivot in the opposite direction to its previous pivoting (no reversing in this mode). Only if an end position is reached in this mode is automatic pivoting out or in possible again.

#### - **Initialisation**

When initialising, the entire swivel angle and both end positions of the ball head are tracked in the control unit for the fully automatic trailer hitch. The limit positions are stored in the control unit.

If the initialisation of the fully automatic trailer tow hitch is lost, the red LED in the button for the fully automatic trailer to hitch will flash or light up.

- **Sequence for manual initialisation:**

Press the button and hold it until the trailer tow hitch has completely moved in the direction of the work position and back to the rest position.

**Note:** If the trailer tow hitch stops in an end position, but the LED does not light up green, the button must be released briefly. Next, press the button again until the other end position is reached.

The LED will continue to flash until the initialisation is finished. Next, it will light up green continuously.

**If the initialisation was unsuccessful, repeat the procedure or run the initialisation with the diagnosis**

During the initialisation process, the maximum current of the drive motor is permitted and reversing of the ball head is suppressed.

#### - **Signalling via the indicator light in the button for the fully automatic trailer tow hitch**

The indicator light in the button for the fully automatic trailer hitch is a 2-coloured LED (red and green). The indicator light is activated directly by the control unit for the fully automatic trailer hitch.

The indicator light shows the system status. Example:

- Indicator light off:
  - Conditions required for switch-on not met
  - System not operational, e.g. due to blown fuse or broken lead
- Indicator light lights up green:
  - Ball head locked in one of the 2 end positions and conditions required for switch-on met
- The indicator light flashes or lights up red continuously: Fault

#### - **Adjusting the trailer hitch**

To ensure that the trailer tow hitch remains pivoted in the end position, the DC motor is energised briefly in the direction of the limit stop every 60 seconds. The control unit for the fully automatic trailer tow hitch activates adjustment in the following conditions: Terminal 15 on and pivoted ball head in end position.

#### - **Emergency function**

Cyclical readjustment of the pivoted-out ball head can result in the ball head becoming mechanically jammed. In this event, the ball head can be freed from the limit stop by the emergency function. A defined swivel motion must be achieved in the initial phase for pivoting the ball head out or in. This pivoting movement corresponds to a defined number of Hall impulses by the DC motor. The Hall pulses are picked up by the Hall effect sensor on the DC motor. If a defined number of Hall pulses is **not** reached, the control unit activates the emergency function. In the emergency function, the DC motor is energised five times cyclically (each cycle comprises energising for 300 ms followed by a pause of 200 ms). If the minimum number of hall signals are not achieved, the ball head can then only be pivoted in or out by continuous operation of the button for the electrically pivoted trailer tow hitch.

#### - **Emergency operation**

If the voltage supply is interrupted during operation, various signal statuses could be lost. When power is available again, the button must be pressed and held for 5 seconds. This will switch the powertrain on (emergency operation).

- **Undervoltage and overvoltage**

The fully automatic trailer tow hitch control unit detects undervoltage and overvoltage. Undervoltage: Vehicle voltage less than 9 V. Overvoltage: Vehicle voltage greater than 16 V. If overvoltage or undervoltage is detected during pivoting in or out of the ball head, the ball head still pivots as far as the end position. The fault is then indicated via the LED in the button. If an overvoltage or undervoltage is detected during continuous operation of the button for the fully automatic trailer hitch, the ball head can still be pivoted into the end position. The ball head's pivoting movement stops when the button is released. The DC motor can then no longer be energised while the overvoltage or undervoltage persists.

## **Notice! Drive can be replaced separately.**

In the event of a fault, the electric motor of the fully automatic trailer tow hitch can be replaced separately.

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