Exterior mirrors

E60, E61, E63, E64

Introduction

Electric exterior mirrors are fitted as standard to the driver's and front-passenger door.
The exterior mirrors are adjusted centrally at the switch block in the driver's door. The switch block is connected to the LIN bus.

The following optional extras are available:

- Electrochromic interior mirror and electrochromic exterior mirrors (option 430)
- Driver's mirror memory in conjunction with seat memory (option 459)
- Lights package with courtesy lighting in the exterior mirrors (option 563)

The driver's mirror memory is controlled by the driver's seat module (SMFA).

>Up to 09/2005
The exterior mirrors are actuated by the driver's door module (TMFA) and by the front-passenger door module (TMBF). The door modules communicate with each other on the **byteflight**.

>From 09/2005
The door modules and the **byteflight** are discontinued. The body gateway module (KGM) actuates the exterior mirrors.
In the basic equipment specification, the exterior mirrors are electrically adjusted and heated.
With the special equipment listed above, the exterior mirrors are connected to the body gateway module (KGM) via the LIN bus.
The electrochromic interior mirror is likewise connected to the KGM.
[system overview ...]

Brief description of components

The following components deliver an input signal for the electrical adjustment of the exterior mirrors:

- **Driver's door switch block**

  The two exterior mirrors are operated from the driver's door switch block.

  [more ...]

  >up to 09/2005

  The switch block is connected via a LIN bus on the driver's door module (TMFA) (LIN = Local Interconnect Network).

  >from 09/2005

  The driver's door switch block is connected to the body gateway module (KGM) via the LIN bus (LIN = Local Interconnect Network).

- **Position potentiometer in exterior mirror**

  The mirror glass is adjusted horizontally and vertically by separate motors. The position of the motors is detected by potentiometers.

  >up to 09/2005

  The position is sent to the relevant door module.

  >from 09/2005

  Information about the position is sent to the body gateway module.

The following control units are involved in the operation of the exterior mirrors:

- **TMFA and TMBF: Driver's door module and front passenger door module**

  >up to 09/2005

  The door modules control the exterior mirrors. The driver's door module (TMFA) receives the operation request for the exterior mirrors from the switch block in the driver's door.
  [more ...]

  >from 09/2005

  The body gateway module actuates the exterior mirrors: The door modules and **byteflight** are discontinued.

- **SGM: Safety and gateway module**

  >up to 09/2005

  The safety and gateway module (SGM) forms the gateway between K-CAN and **byteflight**.

- **Body gateway module**

  >from 09/2005

  The body gateway module (KGM) is the central gateway in the bus system. The KGM actuates the exterior mirrors.

  [more ...]

- **SMFA: Seat module, driver**

  The driver's seat module (SMFA) activates the seat memory and the driver's mirror memory. The message is sent to the door modules on the K-CAN.

- **SH: Independent heating**

  The independent heating control unit uses the K-CAN to report independent heater operation. Exterior mirror heating is activated during independent heater operation.

The following information is also required:

- **EGS or LM:Electronic transmission control (with automatic transmission) or light module (with manual transmission)**

  The reverse-gear signal is delivered by the transmission control (PT-CAN) or the light module (K-CAN). The reverse-gear signal is required for the automatic parking function.

- **AHM: Trailer module**

  The trailer module (AHM) sends a signal indicating whether or not the vehicle is towing a trailer. The automatic parking function is deactivated if a trailer is detected.

The following motors are controlled to provide the exterior mirror functions:

- **Motors for adjusting the mirror glass horizontally and vertically**

  One motor adjusts the mirror glass horizontally, another adjusts the mirror glass vertically. The mirror is adjusted by reversing the motor's direction of rotation.

- **Motor for folding in the mirrors**

  The exterior mirror consists of a mirror base and mirror body. The motor for folding the mirror body in and out is fitted in the mirror base.

  The mirror is folded in and out by reversing the motor's direction of rotation.

- **Mirror heating**

  The mirror heating defrosts the mirror glass in the exterior mirrors.

System functions

The exterior mirrors have the following functions:

- Horizontal and vertical adjustment
- Folding in and out
- Mirror heating
- Automatic parking aid
- Mirror memory, driver
- Safety functions
- Electrochromic exterior mirrors

Horizontal and vertical adjustment of the exterior mirrors

It is possible to adjust the exterior mirrors from terminal R ON. Other conditions are: Door module or body gateway module active (not in Sleep mode), consumer cutoff not active.

The exterior mirrors can be adjusted in the horizontal and the vertical from a button pad (4 arrows = 4 directions). The button pad is located in the switch block in the driver's door. A slide switch switches between the driver's side and the front-passenger side.

It is only possible to adjust the mirror in either the horizontal or the vertical at any one time. Diagonal adjustment is not possible.

Adjustment is not possible with the exterior mirrors folded in.

The exterior mirror is moved as far as the mechanical stop while the button pad is pressed down in a certain direction.

The adjustment time is limited to a maximum of 10 seconds to protect the motors and the mechanisms. Once the maximum adjustment time has elapsed, it is not possible to adjust the exterior mirrors for another 10 seconds.

Folding in and out

The mirror bodies are folded in to the side window and pivoted upwards to reduce the width of the vehicle.

It is possible to fold the exterior mirrors when terminal R ON. Other conditions are: Door module or body gateway module active (not in Sleep mode), consumer cutoff not active.

It is not possible to fold the mirrors at speeds above 20 km/h.

Mirror folding is initiated by pressing a button in the driver's door switch block (for driver and front-passenger side). Pressing the button again after the mirror has folded in or out folds it back again in the opposite direction. An anti-repeat circuit has been integrated to prevent frequent folding of the mirrors (see "Safety functions").

If the mirror body has been disengaged from the mirror base by an external force, the next time the button is pressed, each mirror body is moved in the "fold in" direction. The motor of the disengaged mirror body is controlled by lock detection until the mirror body engages in the mirror base. It is then necessary to press the button once or twice for synchronisation purposes (position of the mirror body and position of the mirror

folding motor). The exterior mirrors are folded out again the next time the button is pressed.

Mirror heating

The heat output (percentage switch-on time) is controlled automatically. The heat output depends on ambient temperature and wiper intensity. If the wipers are operating, the heat output is increased to ensure reliable defrosting of the mirror glass.

Mirror heating is operational from terminal 15 ON.

Mirror heating is deactivated under the following conditions:

- Terminal 50 ON (load cut-off)
- Supply voltage below 10.8 V (switch-on at 11.6 V)
- Activation of an exterior mirror memory position

With the independent heating option:

The exterior mirrors are also heated when the independent heating is switched on even if terminal 15 is off.

Signal path up to 09/2005:

Independent heating control unit -> K-CAN -> Safety and gateway module (SGM) -> **byteflight** -> Door modules -> Exterior mirrors.

Signal path from 09/2005:

Control unit independent heating -> K-CAN -> Body gateway module (SGM) -> Exterior mirrors.

Automatic parking function

The automatic parking function is only available in conjunction with the "Driver's mirror memory" option.

To improve the view of the kerb, the mirror glass of the exterior mirror on the front-passenger side is folded downwards.

This function can only be performed under the following conditions:

- Slide switch for controlling the exterior mirrors set to the "driver's door" position
- No trailer coupled to the vehicle

The automatic parking function is activated:

- If terminal 15 ON
- 1 second after reverse gear is engaged

The automatic parking function is deactivated (mirror glass reverts to original position):

- If terminal 15 OFF
- If the slide switch for controlling the exterior mirrors is set to the "front-passenger door" position
- When reverse gear is disengaged

Manual control of the exterior mirrors is inhibited when the automatic parking aid is activated. The automatic parking function works regardless of whether the driver's door is open or closed.

Mirror memory, driver

The driver's mirror memory is an option and is part of the seat memory/steering column memory system.

The current positions of the exterior mirror on the driver's side and the front-passenger side are stored by:

- Memory buttons on the driver's seat control panel
- Remote control with Key Memory

Each time the vehicle is locked, the current mirror position is stored in the memory of the remote control that is currently being used. This means that the mirrors are always adjusted to the last position when the vehicle is unlocked (depending on the remote control used).

Pressing a memory button interrupts an adjustment activated by Key Memory.

Manual setting using the button pad in the driver's door switch block interrupts any adjustment initiated by a memory function.

The mirror memory function is independent of the terminal status.

Safety functions

- Obstruction detection for mirror fold-in function:
  The door modules or the body gateway module (from 09/2005) have an obstruction detection circuit as protection against overloading.
  If the drive is blocked, the current flow in the engine increases. The control units compare the starting current in normal operating mode with the current in the obstructed drive. An obstruction is detected by any difference in the current. The motor is no longer driven.

- Anti-repeat circuit:

  To provide overheating protection for the motor the mirror folding function is locked after it has been working for a total of 45 seconds.

  If the anti-repeat circuit is active, the exterior mirrors can be unfolded once more.

- Undervoltage shutdown:

  >up to 09/2005

  The power supply to the exterior mirrors is monitored in the door module. All exterior mirror functions are locked if the voltage drops below 8.5 V.

  The functions are available again when the voltage rises above 9 V.

  >from 09/2005

  The exterior mirrors and the driver's door switch block have a direct power supply.

Electrochromic exterior mirrors

Electrochromic exterior mirrors automatically dim the mirror glass if a source of light from the rear is detected.

The electrochromic interior mirror has 2 sensors that measure incident light from the front and the rear. A voltage signal is output (the strength of which depends on the difference in intensity between the light from the front and the rear) if the light from the rear is more intense. The greater the voltage signal, the more the mirror glass is dimmed.

>up to 09/2005

The electrochromic exterior mirrors are directly controlled by the electrochromic interior mirror.

>from 09/2005

The electrochromic interior mirror is connected to the body gateway module (KGM). The KGM actuates the electrochromic interior mirror via the LIN bus.

Notes for service staff

Service staff should note the following points:

- General note: ---
- Diagnosis: ---
- Encoding/programming: ---
- Car & Key Memory: [more ...]

Subject to change.