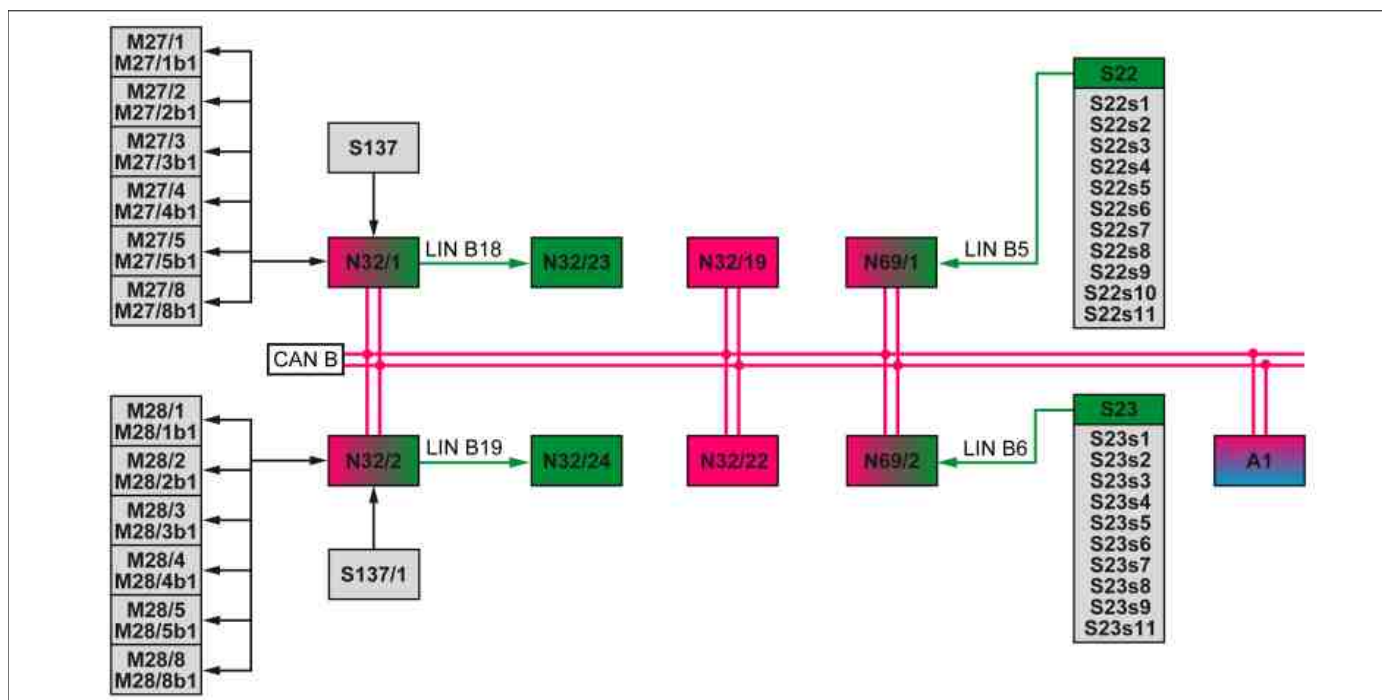


MODEL 231



P91.29-2770-79

A1	Instrument cluster	N69/2	Right door control unit
M27/1	Driver seat fore/aft adjustment motor	S22	Left seat adjustment switch group
M27/1b1	Seat fore/aft adjustment Hall sensor, driver seat	S22s1	Left front head restraint adjustment switch
M27/2	Driver seat height adjustment motor	S22s2	Left seat inclination adjustment switch
M27/2b1	Height adjustment Hall sensor, driver seat	S22s3	Left seat fore/aft adjustment switch
M27/3	Driver seat inclination adjustment motor	S22s4	Left seat height adjustment switch
M27/3b1	Inclination adjustment Hall sensor, driver seat	S22s5	Left backrest adjustment switch
M27/4	Driver seat head restraint adjustment motor	S22s6	Left memory function switch
M27/4b1	Head restraint adjustment Hall sensor, driver seat	S22s7	Left memory switch 1
M27/5	Driver seat backrest inclination adjustment motor	S22s8	Left memory switch 2
M27/5b1	Backrest inclination Hall sensor, driver seat	S22s9	Left memory switch 3
M27/8	Driver seat, seat cushion length, seat adjustment motor,	S22s10	Left or right seat setting switch
M27/8b1	Driver seat, seat cushion length Hall sensor,	S22s11	Left seat cushion length switch
M28/1	Front passenger seat fore/aft adjustment motor	S23	Right seat adjustment switch group
M28/1b1	Seat fore/aft adjustment Hall sensor, front passenger seat	S23s1	Right front head restraint adjustment switch
M28/2	Front passenger seat height adjustment motor	S23s2	Right seat inclination adjustment switch
M28/2b1	Height adjustment Hall sensor, front passenger seat	S23s3	Right seat fore/aft adjustment switch
M28/3	Front passenger seat inclination adjustment motor	S23s4	Right seat height adjustment switch
M28/3b1	Inclination adjustment Hall sensor, front passenger seat	S23s5	Right backrest adjustment switch
M28/4	Front passenger seat head restraint adjustment motor	S23s6	Right memory function switch
M28/4b1	Head restraint adjustment Hall sensor, front passenger seat	S23s7	Right memory switch 1
M28/5	Front passenger seat backrest inclination adjustment motor	S23s8	Right memory switch 2
M28/5b1	Backrest inclination Hall sensor, front passenger seat	S23s9	Right memory switch 3
M28/8	Front passenger seat, seat cushion length, seat adjustment motor,	S23s11	Right seat cushion length switch
M28/8b1	Front passenger seat, seat cushion length Hall sensor,	S137	Left rear compartment access switch
N32/1	Driver seat control unit	S137/1	Right rear compartment access switch
N32/2	Front passenger seat control unit	CAN B	Interior CAN
N32/19	Driver side active multicontour seat control unit (with code (409) Left/right front multicontour seats or with code (432) Active multicontour seat)	LIN B5	Left door LIN
N32/22	Front passenger side active multicontour seat control unit (with code (409) Left/right front multicontour seats or with code (432) Active multicontour seat)	LIN B6	Right door LIN

N32/23	Driver seat lumbar support adjustment control unit (without code (409) Left/right front multicontour seats and without code (432) Active multicontour seat)
N32/24	Front passenger seat lumbar support adjustment control unit (without code (409) Left/right front multicontour seats and without code (432) Active multicontour seat)
N69/1	Left door control unit

LIN B18	Left seat-LIN
LIN B19	Right seat-LIN

Function requirements, general

- Circuit 30g On or run-on active
- No overvoltage or undervoltage

i Run-on:

If circuit 30g is switched off, the electric seats can still be adjusted for $t = 180$ s. If a change in circuit status or a door status change occurs during the run-on time, the run-on time is restarted. The status of the doors (open/closed) is sent by the door control units via interior CAN to the driver seat control unit or to the front passenger seat control unit.

Electrical seat adjustment (ESA), general

The following electrical driver and front passenger seat settings can be made with the ESA:

- Seat fore/aft position
- Seat height
- Seat inclination
- Seat cushion length
- Backrest angle
- Head restraint height

The respective settings can also be saved and retrieved.

i Priorities:

The seat adjustment is divided up into three groups and two priorities. Each adjustment in a group is independent from an adjustment in another group. If adjustment requests for several adjustments are received in a group by the driver's seat control unit or the front passenger seat control unit, the adjustment request with the highest priority is carried out.

The priorities are determined as follows:

- Group 1

Function sequence for normalization

Normalization is the basis for assigning the current position to the seat position that is recorded by the driver seat control unit and the front passenger seat control unit. Normalization must be performed during initial startup or in a denormalized condition. For this, the front mechanical end stop of the seat fore/aft position and the backrest angle and the bottom mechanical end stop for the seat inclination, seat height and head restraint height must be moved to.

During the initial startup, the normalization is performed with the diagnostic tester. After denormalization, the normalization procedure can be performed using the adjustment function. To do this, press and hold the corresponding switch in the switch group, seat adjustment for an additional $t = 250$ ms after reaching the mechanical end stop. Upon successful normalization, the driver seat control unit or the front passenger seat control unit switches off the corresponding seat adjustment motor.

Function sequence for manual adjustment

-
- High priority: fore/aft adjustment, steering column fore/aft adjustment (driver's seat only)
 - Low priority: inclination adjustment
 - Group 2
 - High priority: backrest inclination, steering column adjustment up/down (driver's seat only)
 - Low priority: height adjustment
 - Group 3
 - High priority: head restraint adjustment, seat cushion length

i PRE-SAFE:

In certain danger situations the front passenger seat is adjusted. Detailed information about this can be found in the "PRE-SAFE Function" function description.

The ESA includes the following subfunctions:

- **Function sequence for position recognition**
- **Function sequence for normalization**
- **Function sequence for antilock device**
- **Function sequence for manual adjustment**
- **Function sequence for saving and retrieving seat positions**
- **Function sequence for rear compartment access**

Function sequence for position recognition

The seat adjustment motors are equipped with Hall sensors. The signals from the Hall sensors are read in and evaluated by the driver's seat control unit or the front passenger seat control unit directly. Normalization resets a location counter in the driver's seat control unit or the front passenger seat control unit. During seat adjustments, the driver's seat control unit or front passenger seat control unit defines the adjustment range of the seats by counting the Hall sensor signals.

Denormalization

An adjustment is denormalized if the signal of the corresponding Hall sensor is not received. The Hall sensors are allocated to the particular seat adjustment motors. The denormalization procedure can also be performed using the diagnostic tester.

Function sequence for antilock device

If the Hall sensor signals are not received for $t > 2$ s with actuation active, this is evaluated as blocking. The driver seat control unit or front passenger seat control unit then stops the relevant actuation. The same actuation is only permissible again after the request is discontinued (e.g. by releasing the corresponding switch) for $t > 2$ s. Any other actuation is permitted immediately.

Seat adjustment motor, inclination adjustment

Operation of the left switch group, seat adjustment or the right switch group, seat adjustment is read in via the door LIN by the respective door control unit. The respective door control unit sends the requests for seat adjustment via interior CAN to the driver seat control unit or to the front passenger seat control unit.

i In order to make the adjustment, the relevant switch must be held down until the required position has been reached.

The driver seat control unit or the front passenger seat control unit actuates the following motors directly according to the request:

- Seat adjustment motor, seat fore/aft adjustment
- Seat adjustment motor, height adjustment

Additional function requirements for saving and retrieving seat positions

- ESA normalized

Function sequence for saving and retrieving seat positions

There are two options for storing the seat position:

- Operate and hold down the memory function switch, then press the relevant memory 1, 2 or 3 switch.
- Press memory function switch for $t > 100$ ms and then release, then press the corresponding memory 1, 2 or 3 switch within $t > 0.2$ to 3 s.

The respective door control unit reads in the status of the switches in the switch group, seat adjustment via the door LIN and sends the "Store memory position" request via interior CAN to the driver seat control unit or the front passenger seat control unit. The driver's seat control unit or front passenger seat control unit uses the signals of the Hall sensors to store the current seat position.

Successful storage of the seat position is confirmed by the instrument cluster with an acknowledgment tone. The request for this is transmitted to the instrument cluster by the driver seat or front passenger seat control unit via the interior CAN.

In order to call up the stored positions, the memory 1, 2 or 3 switch must be pressed until the respective stored end position is reached. Releasing leads to immediate termination of the adjustment procedure.

The respective door control unit reads in the status of the switches in the switch group, seat adjustment via door LIN and sends the "Adopt memory position" request via interior CAN to the driver seat control unit or the front passenger seat control unit. The driver's seat control unit or the front passenger seat control unit actuates the seat adjustment motors accordingly.

Abort conditions:

- Manual seat adjustment
- Manual mirror adjustment (driver only)
- Manual steering column adjustment (driver only)
- Pressing other memory switches

i As well as the seat position, the following settings are saved or retrieved:

Additional function requirements for rear compartment access

- Circuit 15C OFF
- Appropriate door open
- ESA normalized

i The status of the doors (open/closed) is sent by the door control units via interior CAN to the driver seat control unit or to the front passenger seat control unit.

Function sequence for rear compartment access

In order to facilitate access to the rear compartment, the driver seat can be moved to the front end stop position using the left rear compartment access switch or the front passenger seat moved to the front end stop position via the right rear compartment access switch. When doing so, the various seat adjustments are automatically started at increased speed.

The forwards and backward movement of the respective seat takes place automatically after a brief press of the rear compartment access switch. The automatic seat movement can be stopped at any time by tapping one or both of the direction buttons. Movement in the required direction requires another operation of the rear compartment access switch.

-
- Seat adjustment motor, head restraint adjustment'
- Seat adjustment motor, backrest inclination
- Seat adjustment motor, seat cushion length

The front passenger seat can also be adjusted using the left switch group, seat adjustment:

You can switch between driver and front passenger seat adjustment by operating the left or right seat adjustment switch. Front passenger seat adjustment is then possible for $t = 10$ s. After this time, or if the switch is operated again, the driver seat can be adjusted again.

Operation of the left seat adjustment switch group is read in via the left door LIN by the left door control unit. The left door control unit transmits the status of the left seat adjustment switch group to the front passenger seat control unit via the interior CAN.

-
- Pressure in the air cushions of the lumbar support (without code (409) Left/right front multicontour seats and without code (432) Active multicontour seat):

The request for this is sent by the driver seat control unit or the front passenger seat control unit via the seat LIN to the respective lumbar support adjustment control unit, which then initiates the adjustment.

- Pressure in the air cushions of the multicontour seat (with code (409) Left/right front multicontour seats or code (432) Active multicontour seat):

The request for this is sent by the driver seat control unit via interior CAN to the respective active multicontour seat control unit, which then initiates the adjustment.

- Position of steering column (when saving/retrieving position of driver seat):
The adjustment is initiated by the driver seat control unit.
- Adjustment of outside mirror (when saving/calling up position of driver seat):

The request for this is sent by the driver seat control unit via interior CAN to the door control units, which then initiates the adjustment.

i Detailed information about this can be found in the following separate function descriptions:

- "Lumbar support adjustment, function"
- "Multicontour seat (MKS), function"
- "Electrically adjustable steering column (ESC) function"
- "Electric mirror function"

i Compensating movements:

If collisions occur despite the defined priorities, compensating movements are started. When adjusting the backrest to the rear, the fore/aft adjustment, height adjustment and the inclination adjustment are ended first and the backrest is then positioned.

When adjusting the fore/aft adjustment to the rear, the backrest adjustment to the rear and the height adjustment upwards, the memory setting is implemented according to the following procedure:

- Fore/aft adjustment to the rear up to the characteristic map limit, then inclination adjustment
- Stop fore/aft adjustment at characteristic map limit
- Height adjustment until memory position is reached, then inclination adjustment
- Fore/aft adjustment until memory position is reached, then inclination adjustment
- Backrest adjustment until memory position is reached, then inclination adjustment

The driver's seat control unit or the front passenger seat control unit then directly actuates the following motors:

- Seat adjustment motor, seat fore/aft adjustment
- Seat adjustment motor, height adjustment
- Seat adjustment motor, inclination adjustment
- Seat adjustment motor, head restraint adjustment'
- Seat adjustment motor, backrest inclination
- Seat adjustment motor, seat cushion length

i Excess force limiter:

The excess force limiter is active during seat fore/aft adjustment and seat backrest adjustment. If an obstacle or a sluggishness that has not been adapted beforehand is encountered before the target position during automatic reversing, this is detected and the active adjustment is reversed at single adjusting speed.

Operation of the left rear compartment access switch is read in the driver's seat control unit, and operation of the right rear compartment access switch is read in by the front passenger seat control unit.

	Electrical function schematic for seat adjustment (ESE) with memory		PE91.29-P-2054-97RKA
	Overview of system components, electric seats		GF91.29-P-9992RK