

**MODEL 230.4**

except CODE (P99) Special model "AMG Black Series"  
as of Model Year 2009

/CY 08 model refinement package

**General function requirements**

- Circuit 30

**2-battery on-board electrical system, general**

The 2-battery on-board electrical system includes the starter battery (G1/4) in the engine compartment and the on-board electrical system battery (G1) in the trunk.

The starter battery provides the energy required for the starting procedure during normal operation. The starter battery is also cut in as a reserve power supply in certain situations to stabilize the on-board power supply voltage. Cut-in of the starter battery is managed by the vehicle power supply control unit (N82/1) via the battery cutoff relay (K57).

The on-board electrical system battery supplies power to all electrical consumers in the vehicle.

The 2-battery on-board electrical system is subdivided into the following battery circuits:

- Starter battery circuit
- Supply battery circuit

The starter (M1) and starter battery are assigned to the starter battery circuit.

All other electrical consumers are assigned to the supply battery circuit. Power is supplied by the on-board electrical system battery and alternator (G2).

With the fuse through-plating (F52), the starter battery circuit is protected against overload by fuse 1 (F52f1) and the supply battery circuit by fuse 2 (F52f2).

The 2-battery on-board electrical system comprises the following subfunctions:

- **Determination of battery state function sequence**
- **Control of battery cutoff relay function sequence**
- **Consumer shutoff function sequence**
- **Display of fault messages function sequence**
- **Battery charging function sequence**

**Determination of battery state function sequence**

The state of the on-board electrical system battery and starter battery is defined by the voltage available in the on-board electrical system. The vehicle power supply control unit records the current and voltage values of the on-board electrical system battery and starter battery and calculates the respective battery states based on this.

In addition, the vehicle power supply control unit reads in the following information via interior CAN (CAN B):

- Engine speed from ME-SFI [ME] control unit (N3/10) over engine compartment CAN (CAN C) to EIS (EZS) control unit (N73))
- Vehicle speed from instrument cluster (A1)
- Circuit 61 status from front-passenger SAM control unit (N10/11)
- Interior temperature from overhead control panel control unit (N70)

The following functions are activated depending on the state of the on-board electrical system battery and starter battery:

- Consumer shutoff
- Idle speed increase
- Cut-in of starter battery

**Control of battery cutoff relay function sequence**

The battery cutoff relay is controlled depending on the state of the on-board electrical system. Depending on the state of the on-board electrical system, the on-board electrical system battery and the starter battery remain separated by the battery cutoff relay or are connected in parallel.

A distinction is made between the following on-board electrical system states:

- Normal starting mode
- Normal mode
- Emergency starting mode
- Emergency mode
- Shutoff phase

If there is no undervoltage, the on-board electrical system battery and starter battery are separated (normal and normal starting mode).

If undervoltage is detected, the system switches to emergency and emergency starting mode. The on-board electrical system battery and starter battery are connected in parallel by the battery cutoff relay.

The starter battery supports the on-board electrical system power supply until undervoltage is no longer present. An entry is also made in the fault memory and a warning indicator appears in the instrument cluster. During the shutoff phase, the on-board electrical system battery and starter battery are separated.

**Consumer shutoff function sequence**

To prevent the battery from discharging under all driving conditions, the state of charge of the on-board electrical system is monitored and evaluated continuously. If the required levels of power can no longer be supplied, the vehicle power supply control unit transmits appropriate signals requesting a reduction in power output or consumer shutoff in a defined sequence.

The following control units receive the signal over the interior CAN:

- Instrument cluster
- PSE controller unit with combined functions (A37)
- COMAND operating, display and control unit (A40/3)

- Rear SAM control unit (N10/8)
- Driver-side SAM control unit (N10/10)
- Passenger-side SAM control unit
- AAC [KLA] control and operating unit (N22)

The central gateway control unit makes the signal available on the engine compartment CAN. The following control unit receives the signal over the engine compartment CAN:

- ESP, SPS [PML] and BAS control unit (N47-5)

- Left front seat adjustment control unit with memory (N32/1)
- Right front seat adjustment control unit with memory (N32/2)
- RVC control unit (N52)
- PTS control unit (N62) (with code (220) PARKTRONIC)
- Left door control unit (N69/1)
- Right door control unit (N69/2)
- KEYLESS-GO control unit (N69/5) (with code (889) Keyless Go)
- Overhead control panel control unit (N70)
- EIS [EZS] control unit
- Central gateway control unit (N93)

The EIS (EZS) control unit sends the signal to the engine compartment CAN. The following control unit receives the signal over the engine compartment CAN:

- ME-SFI [ME] control unit

### Consumer shutoff with engine running function sequence (emergency mode)

Consumer shutoff in emergency mode is subdivided into the following three stages:

- Shutoff stage 1 with  $U < 10.6$  V in on-board electrical system battery
- Shutoff stage 2 with  $U < 10.2$  V in on-board electrical system battery
- Emergency mode stage 3 with  $U < 9.8$  V in on-board electrical system battery

In shutoff stage 1, the following functions are shut off depending on the vehicle equipment:

- Washer fluid heater (with code (875) Heated windshield washer system)
- Wiper park position heater (R2/10)
- Steering column tube adjustment
- Heated rear window (R1)
- Seat heater stage 1 (with code (873) Seat heater for left and right front seats)
- Seat heater stage 2 (with code (873) Seat heater for left and right front seats)

The following consumers are additionally switched off during shutoff stage 2:

- Mirror heater (M21/1r1 and M21/2r1)
- Inside rearview mirror unit (A67)

The following components are actuated at reduced power output in shutoff stage 2:

- Blower motor with  $P < 53$  %

The fault messages in the multifunction displays of the instrument cluster remain the same.

In emergency mode stage 3, the on-board electrical system battery and starter battery are connected following the consumer shutoff operations from shutoff stages 1 and 2. This is intended to increase the on-board power supply voltage or at least stabilize it. The fault messages in the multifunction displays of the instrument cluster remain the same.

### Consumer shutoff with engine OFF function sequence (emergency starting mode)

The consumer shutoff function sequence consists of the following subfunctions:

- **Consumer shutoff with engine running function sequence (emergency mode)**
- **Consumer shutoff with engine OFF function sequence (emergency starting mode)**
- **Consumer cut-in function sequence**

### Additional function requirements for consumer shutoff with engine running (emergency mode)

- Circuit 61 ON

**i** The status of circuit 61 is placed on the interior CAN by the passenger-side SAM control unit.

- Seat ventilation stage 1 (with code (401) Front comfort seats, incl. seat heating and seat ventilation)
- Seat ventilation stage 2 and 3 (with code (401) Front comfort seats, incl. seat heating and seat ventilation)
- Interior illumination
- Ventilation control of air conditioning system
- Vario roof control (closing procedure cannot be shutoff)

The following components are actuated at reduced power output:

- Blower motor (A32m1) with  $P < 69$  %
- Telematics (current limited to  $I = 11$  A)

Corresponding fault messages are issued by the battery symbol lighting up in the left multifunction display (A1p13) and by display of the text "Electrical consumers shut off!" in the right multifunction display (A1p15).

However, if the on-board power supply voltage drops below a voltage value of  $U = 11.5$  V for  $t > 5$  s, the fault message "Battery/alternator, stop vehicle!" is output. If the so-called "final brake message" is shown, then this means that for a period of  $t = 15$  s a current of

$I = 100$  A can be made available without the on-board electrical system voltage dropping below  $U = 9.3$  V.

**i** After circuit 61 OFF, the connection of the starter battery with the on-board electrical system battery is maintained for  $t = 5$  min.

### Additional function requirements for consumer shutoff with engine OFF (emergency starting mode)

- Circuit 15C ON
- Circuit 61 OFF

**i** The circuit status of circuit 15 is made available by the EIS [EZS] control unit on the interior CAN.

The status of circuit 61 is placed on the interior CAN by the passenger-side SAM control unit.

### Consumer cut-in function sequence

If the on-board electrical system voltage drops to a value of  $U < 10.8$  V, then when the circuit 15C On status changes to circuit 15R On, the consumer shutoff doesn't take place until after a waiting time of  $t = 30$  s in each case. In emergency starting mode the consumers for shutdown stages 1 and 2 are shut off and the on-board electrical system battery is connected to the starter battery. The connection request is transmitted by the passenger-side SAM control unit to the vehicle power supply control unit over the interior CAN. If the engine is not started within  $t = 30$  s, the on-board electrical system battery and starter battery are disconnected from each other again. The consumer shutoff from shutoff stages 1 and 2 is maintained. When the engine is started from emergency starting mode, the system switches to emergency mode stage 3. The consumer shutoff from shutoff stages 1 and 2 is maintained and the on-board electrical system battery and starter battery remain connected.

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The messages are displayed as soon as shutoff stage 1 becomes active and are displayed until the state of the on-board electrical system has stabilized. Display of the battery symbol and the fault message "Service Required" in red is an instruction and takes place under the following conditions:

- Signal from circuit 61 not present although engine running detected
- Vehicle power supply control unit defective
- Battery cutoff relay defective or wiring harness to battery cutoff relay defective
- Power supply to EZS control unit (circuit 30z) interrupted
- Front prefuse box fuse (F32) defective

**Additional function requirements for battery charging**

- Circuit 61 ON
- $U > 11$  V in on-board electrical system battery

**i** The status of circuit 61 is placed on the interior CAN by the passenger-side SAM control unit.

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The EZS control unit sends the signal via the engine compartment CAN to the ME-SFI [ME] control unit. The central gateway control unit forwards it over the engine compartment CAN to the ESP, SPS [PML] and BAS control unit. When the final charge condition is reached, the starter battery is disconnected from the on-board electrical system battery.

When the voltage of the on-board electrical system battery has stabilized at  $U > 12.5$  V, the consumer shutoff is canceled with a delay:

- Emergency mode stage 3 after approx.  $t = 7$  min
- Shutoff stage 2 after approx.  $t = 3$  min
- Shutoff stage 1 after approx.  $t = 3$  min

**Display of fault messages function sequence**

If faults are detected in the 2-battery on-board electrical system, the vehicle power supply control unit transmits corresponding messages to the instrument cluster over interior CAN. These fault messages are either displayed in the form of symbols on the left multifunction display or as plain text on the right multifunction display in the instrument cluster. Fault messages displayed in white are of an informative nature only. They inform the driver about consumer shutoff operations that do not affect driving safety.

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**Battery charging function sequence**


During normal operation, the starter battery is charged according to a charging characteristic stored in the vehicle power supply control unit. The vehicle power supply control unit records the current and voltage values of the starter battery and uses these to calculate the temperature of the starter battery to ensure optimal charging. If necessary, the interior temperature can be drawn on as a reference value. The interior temperature is recorded by the in-car temperature sensor (N70b1) in the overhead control panel control unit. The signal from the in-car temperature sensor is made available on the interior CAN by the overhead control panel control unit. When the starter battery is being charged, the vehicle power supply control unit transmits a corresponding signal to the following control units via interior CAN:

- Instrument cluster
- EIS [EZS] control unit
- Central gateway control unit

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The system then switches to maintenance charging mode. The on-board electrical system battery is charged directly by the alternator.

**i** Starting assistance can only be provided by the starter battery to protect the electrical consumers of the on-board electrical system.

	2-battery on-board electrical system, location of components		GF54.10-P-0001-01RI
	Electrical function schematic 2-battery onboard electrical system		PE54.10-P-2053-97KA
	2-battery on-board electrical system, block diagram		GF54.10-P-0001-02RI
	Instrument cluster, component description	A1 Model 230.4 (except model 230.470) Model 230.470	GF54.30-P-6000RI GF54.30-P-6000RIA
	Pneumatic controller unit with combined functions, component description	A37	GF80.20-P-4136RI
	COMAND operating, display and controller unit, component description	A40/3 With code (527) COMAND APS with single DVD drive (with navigation system)	GF82.85-P-3134RIJ

		With code (512) COMAND APS with DVD changer or With code (528) COMAND with DVD changer	GF82.85-P-3134RI
	ME-SFI [ME] control unit, component description	N3/10 Engine 156 Engine 272 Engine 273 Engine 275	GF07.61-P-6000MAR GF07.61-P-6000MIR GF07.61-P-6000MLR GF07.61-P-6000MOR
	Rear SAM control unit with fuse and relay module, component description	N10/8	GF54.21-P-6030RI
	Driver-side SAM control unit with fuse and relay module, component description	N10/10	GF54.21-P-6010RI
	Passenger-side SAM control unit with fuse and relay module component description	N10/11	GF54.21-P-6020RI
	Automatic air conditioning control and operating unit, component description	N22	GF83.40-P-3000RI
	Left front seat adjustment control unit with memory, component description	N32/1	GF91.29-P-5221RI
	Right front seat adjustment control unit with memory, component description	N32/2	GF91.29-P-5222RI
	ESP control unit, component description	N47-5	GF42.45-P-5118RI
	Vario roof control unit, component description	N52	GF77.39-P-3210RI
	PARKTRONIC control unit component description	N62 With code (220) PARKTRONIC	GF54.65-P-5001RI
	Left door control unit, component description	N69/1	GF72.29-P-4124RI
	Right door control unit, component description	N69/2	GF72.29-P-4128RI
	Keyless-Go control unit, component description	N69/5 With CODE (889) Keyless Go	GF80.61-P-4204RI
	Overhead control panel control unit, component description	N70	GF82.20-P-5216RI
	Component description for the EIS [EZS] control unit	N73	GF80.57-P-6003RI
	Vehicle power supply control unit, component description	N82/1	GF54.21-P-4126RI
	Central gateway control unit, component description	N93	GF54.21-P-4170RI
	Blower motor, component description	A32m1	GF83.10-P-4125RI
	Inside rearview mirror unit, component description	A67	GF68.49-P-2105RI
	Battery cutoff relay, component description	K57	GF54.10-P-4202RI
	Outside mirror, component description	M21/1, M21/2	GF88.79-P-4003RI
	Heated rear window, component description	R1	GF67.29-P-5000RI