



ECO start/stop function

Service Technology Guide



Mercedes-Benz

Mercedes-Benz Service

ECO start/stop function Service Technology Guide

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Dear Reader,

This Technology Guide is intended to provide you with an overview of the ECO start/stop function and its functions in the current passenger car model series (except hybrid model series).

The purpose of this information is to provide technicians, fitters and service advisor at the service operations with a link between the Introduction into Service manuals and the more detailed information in the Workshop Information System (WIS) and Xentry Diagnostics.

The contents focus on the following topics:

- System and function description
- Diagnosis

This Technology Guide acts as an aid for the repair and the diagnosis of technical problems. For such needs, the WIS and Xentry Diagnostics systems are available as usual.

We will publish modifications and new features in the relevant WIS documents only. The information presented in this brochure may therefore differ from the information published in the WIS.

All the information relating to technical data in this brochure is valid as of the copy deadline on 01.11.2014 and may therefore differ from the current production configuration.

Daimler AG

Retail Operations (GSP/OR)

Note

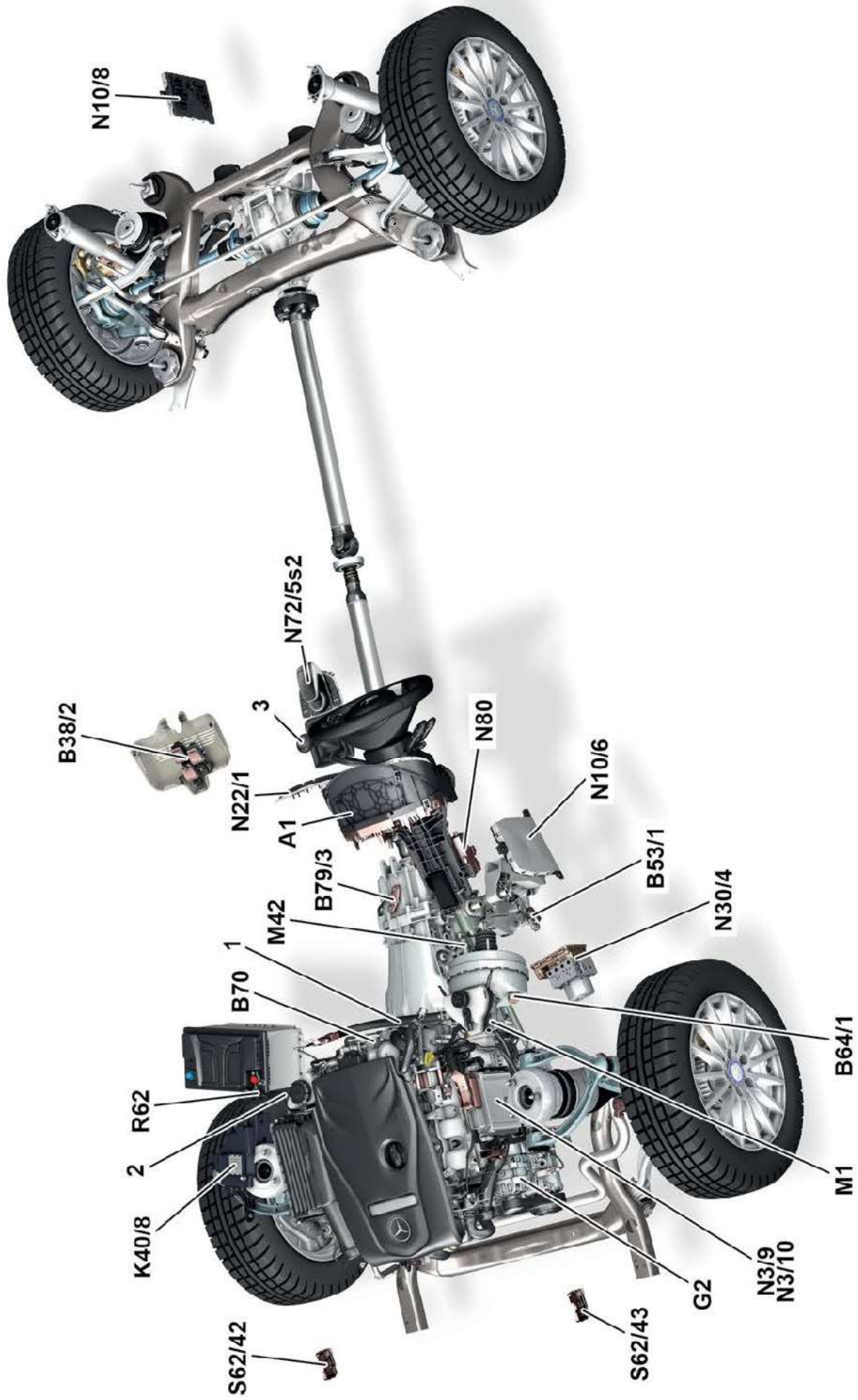
Wherever possible, the images in this brochure have been designed to be language-neutral. If this was not possible, German or English texts appear in exceptional cases.

Note

The printed documents are now available in WIS via WIS Service Media.

Note

Information about the vehicles and about operating the vehicle functions can also be found in the interactive owner's manual on the Internet.



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System overview of ECO start/stop function illustrated on model series 205 with manual transmission

System overview of ECO start/stop function

- 1 Starter-alternator wiring harness
 - 2 Battery line
 - 3 Neutral badge on shift lever knob
- A1 Instrument cluster
- B38/2 Rain/light sensor with additional functions
- B53/1 Clutch pedal sensor
- B64/1 Brake vacuum sensor
- B70 Crankshaft Hall sensor

- B79/3 Manual transmission main shifter shaft position sensor
- G2 Alternator
- K40/8 Engine fuse and relay module
- M1 Starter
- M42 Electric transmission oil pump
- N3/9 CDI control unit
- N3/10 ME-SFI [ME] control unit
- N10/6 Front SAM control unit
- N10/8 Rear SAM control unit
- N22/1 Climate control control unit

- N30/4 Electronic Stability Program control unit
- N72/5s 2ECO start/stop function button
- N80 Steering column tube module control unit
- R62 Voltage dip limiter
- S62/42 Right engine hood contact switch
- S62/43 Left engine hood contact switch

The designation “ECO” stands for “Engine Cut Off”.

The ECO start/stop function ensures that the engine is switched off automatically at low speeds and under certain conditions.

The engine then restarts automatically to drive off again. In this way, the ECO start/stop function helps to reduce the fuel consumption and the exhaust emissions of the vehicle.

The ECO start/stop function is activated each time the engine is started with the key. The system is ready to operate automatically when the ECO symbol is shown in the multifunction display or is highlighted in green in vehicles with color display.

The ECO start/stop function can be switched on and off via the ECO switch. The function is reactivated at the next key start.

ECO display concept

The availability of the ECO start/stop function to stop the engine is indicated to the driver by the ECO symbol in the instrument cluster.

Display conditions *

Driving:

Start/stop function on and engine stop possible

Start/stop function on and engine stop **not** possible (at least one stop inhibitor)

Start/stop function off OR start/stop function on and fault

Global				Canada/USA	
ECO button		Rainbow		ECO button	

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* The display concept differs in model variants of the USA national version and does not apply for hybrid vehicles

Display conditions *

Stop phase:

Automatic engine stop active

Start/stop function on but at least one stop inhibitor active, automatic engine stop not possible

Start/stop function on but operation preventing stop (e.g. steering angle, N engaged or clutch not operated)

Global				Canada/USA	
ECO button		Rainbow		ECO button	

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* The display concept differs in model variants of the USA national version and does not apply for hybrid vehicles

On the launch of model series 205, a new symbol was introduced in the instrument cluster display and on the ECO start/stop function button.



Lower control panel

- 1 ECO start/stop function button

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Instrument cluster in model series 205

- 1 ECO start/stop symbol

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Function principle of ECO start/stop function

The ECO start/stop function allows the engine to be shut off at very low speeds and while stationary provided that certain vehicle-dependent and driver-related conditions are met (autostop function).

In this way, fuel consumption is further reduced. If necessary, the starter can perform an automatic restart (autostart function) of the engine.

While the engine is stopped, the electrical consumers are supplied via the 12V starter battery. In vehicles with a backup concept, an additional battery supplies the on-board electrical system for the duration of the starting procedure.

Certain criteria must be met for the ECO start/stop function to be activated.

If the conditions are not satisfied, the ECO symbol in the instrument cluster lights up yellow instead of green (on monochrome displays the ECO symbol disappears). The engine is then not switched off when the vehicle is stationary.

The ECO start/stop function allows the engine to be switched off when the following conditions are met:

General function requirements for the engine control ECO start/stop function:

- Circuit 15 (ignition ON)
- Circuit 87M (engine control ON)
- Engine running
- Outside temperature in range: $-10\text{ °C} < T < 40\text{ °C}$
- System diagnosis completed and free of faults

Influenced by the driver:

- Doors are closed
- Driver seat belt buckle is fastened
- After the key start, a speed of 8 km/h must have been exceeded

Manual transmission:

- Speed is lower than 8 km/h
- Accelerator pedal is not depressed
- Brakes are applied, or HOLD function is activated
- Gearshift lever is at neutral and clutch is not operated

Automatic transmission:

- Vehicle stationary, speed is 0 km/h
- Brakes must be applied, or HOLD function activated
- Transmission mode D or N
- Accelerator pedal is not depressed
- Steering wheel must not be operated

i Note

If the ECO indicator does not appear in the instrument cluster and the green indicator lamp in the ECO button does not light up, then either the system is switched off or, in the rarest case, the ECO start/stop function has actually been deactivated due to a fault!

Vehicle-related parameters:

- Powertrain is open, transmission is in neutral
- The driver is present (seat belt fastened and door contact closed)
- Engine hood is closed
- No crash has been detected
- Component protection of the starter permits an automatic stop
- The fuel quantity is in the permissible range; the tank fill level is above reserve (diesel)
- The speed threshold of 8 km/h has been exceeded once (the speed threshold for the activation condition must have been exceeded once since the key start or after 3 automatic stops)
- The interior temperature set via the air conditioning system has stabilized (the condition must only be met once in the ignition cycle (circuit 15))
- Pressure reservoir of the brake system is sufficiently full
- Pressure reservoir of the air suspension (with AIRMATIC) is sufficiently full
- Air suspension or ABC not in control intervention mode
- Steering wheel angle is $< 210^\circ$ (hydraulic power steering)
- Voltage of the on-board electrical system (batteries) is sufficient, e.g. backup battery charge, intelligent battery sensor (IBS), actual current too high, regeneration of diesel particulate filter (DPF), activation of rear window and stationary heater

Further parameters "temperatures and atmospheric pressures":

- Coolant, gasoline engine: 60°C to 115°C
- Coolant, diesel engine: 15°C to 115°C
- Engine oil: 15°C to 130°C
- Outside temperature: -10°C to 40°C
- Battery temperature: 0°C to 60°C (IBS)
- Diesel fuel temperature: 10°C to 90°C
- Automatic transmission fluid: 10°C to 120°C
- Gasoline engine: Ambient pressure below 0.75 bar or below 2500 m
- Diesel engine: Ambient pressure 0.7 bar or below 3000 m

i Note

After an automatic engine stop, a maximum of three automatic engine starts without exceeding the speed threshold of $v = 8$ km/h are permitted. After the fourth engine start, the speed of $v = 8$ km/h must be exceeded before the engine can be stopped again. If the engine hood is opened during an automatic engine stop, the ECO start/stop function is deactivated and all the indicators in the instrument cluster light up. The engine must then be restarted using the transmitter key or via the KEYLESS-GO start/stop button (with code 889 Keyless-Go).

Function principle of ECO start/stop function

Driver/vehicle-related variable influencing the behavior of the ECO start/stop function

Stop enable sequence for the **driver** with **manual**

transmission:

- Vehicle moving
- Brakes applied
- Clutch operated
- Transmission in neutral
- Engine stops
- Operate clutch
- Engine starts
- Engage gear
- Release clutch
- Release brakes, accelerate

Stop enable sequence for the **driver** with **automatic**

transmission:

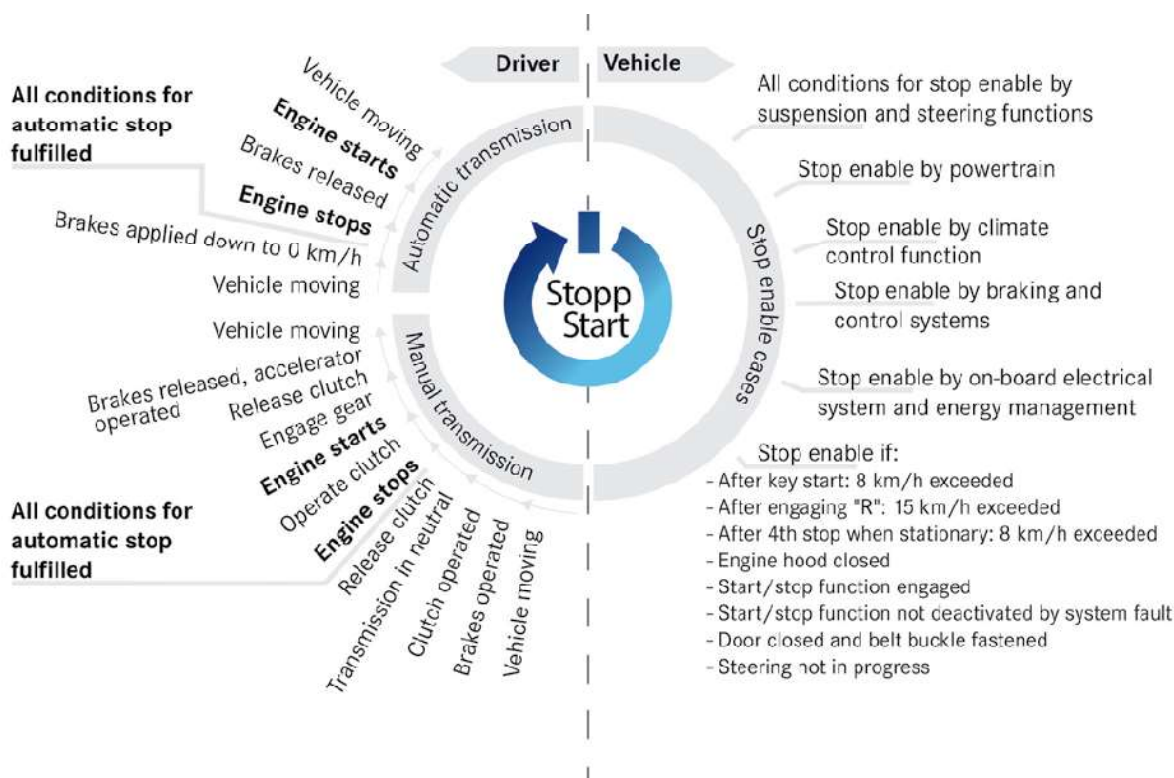
- Vehicle moving in "D"
- Apply brakes $v = 0$ km/h
- Engine stops
- Release brakes
- Engine starts
- Depress accelerator pedal
- Vehicle moving

Stop enable for the **vehicle** by:

- Stop enable by suspension and steering functions
- Stop enable by powertrain
- Stop enable by climate control function
- Stop enable by braking and control systems
- Stop enable by on-board electrical system and energy management

Prerequisites for the stop enable:

- After key start: $v = 8$ km/h exceeded
- After engaging "R": $v = 15$ km/h exceeded
- After 4th stop when stationary: $v = 8$ km/h exceeded
- Engine hood closed
- 3S engaged
- 3S not deactivated by system error
- Door closed and seat belt buckle fastened
- No steering movement



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Driver/vehicle-related variable influencing the behavior of the ECO start/stop function

Function sequence for automatic engine start

In vehicles with manual transmission, the engine is started automatically when the accelerator pedal or the clutch pedal is operated. With automatic transmissions, the engine is automatically started when the brakes are released or the accelerator pedal is depressed.

The ME-SFI control unit actuates the starter circuit 50 relay (K40/8kH, the designation may vary in different model series) with a ground signal. The power contact of the relay closes and the solenoid switch of the starter (M1) is supplied with voltage from "circuit 30" at "circuit 50".

Over the drivetrain CAN the fuel system control unit receives the CAN signal "Specified fuel pressure" from the ME-SFI control unit and actuates the fuel pump (M3) accordingly.

Function sequence for forced engine start (system-dependent start)

The forced engine start subfunction is available as a protection function. This starts the engine automatically (with no action by the driver).

The ECO start/stop function performs an automatic start under the following conditions:

Driver-related conditions:

- No gear is engaged (manual transmission)
- The powertrain is open (automatic transmission)
- Engine hood is closed
- No crash has been detected
- The driver is present (door contact closed and driver seat belt fastened)

Vehicle-related events:

- The maximum stop duration of 3 minutes is exceeded
- The system detects fogging on the windshield
- The brake system vacuum is below a threshold value
- The driver seat belt buckle is unfastened or the driver door is opened
- The distance control system is active and requesting an engine start
- Battery temperature $< 0^{\circ}\text{C}$, $> 60^{\circ}\text{C}$
- Coolant temperature (gasoline engine) $< 60^{\circ}\text{C}$, $> 110^{\circ}\text{C}$
- System or communication error in one of the following systems: Driver seat occupancy, steering, on-board electrical system, braking and control systems, accelerator pedal, transmission, starter, engine

Driver-related control events:

- The clutch is operated and no gear is engaged
- The vehicle speed exceeds 2 km/h in forward travel and immediately when rollback is detected (with automatic transmission)
- The vehicle speed exceeds 8 km/h in forward travel and reverse travel (with manual transmission)
- The accelerator pedal is operated
- The brake pedal is released or P mode is disengaged, or R mode is engaged
- The steering wheel angle changes by more than 8° (HPS), 3° EPS without backup concept, 0° EPS with backup concept
- A control intervention by the ABC or air suspension is occurring
- User request for climate control system (defrost button)
- Operation of the ECO button to deactivate start/stop

Function principle of ECO start/stop function

Note

When reverse gear is engaged, a maneuvering process is detected and the ECO start/stop function is deactivated. If the engine is in stop mode, a forced engine start is performed by the system; if the engine is running, any engine stop is suppressed. The start/stop function is subsequently reactivated when a forward gear is engaged and the vehicle speed exceeds 15 km/h. The engine is also started if the driver door is opened, the driver's seat belt buckle is unfastened or the ECO start/stop function is deactivated via the ECO start/stop function button.

Note

Vehicles with electric steering do not have a maneuvering function because the steering operates even without engine assistance. A forced engine start is performed if the steering is operated while the on-board electrical system voltage is below the minimum value.

Operation of ECO start/stop function with manual transmissions

In vehicles with manual transmission, the automatic stop occurs with no further action by the driver when the speed $v < 8$ km/h and the transmission is in neutral and the clutch is not (no longer) operated and the brakes have been applied.

Sequence with manual transmission:

- Vehicle moving
- Speed $v < 8$ km/h
- Brakes applied
- Clutch operated
- Transmission in neutral
- Release clutch
- Engine stops
- Operate clutch
- Engine starts
- Engage gear
- Depress accelerator pedal, release clutch
- Vehicle moves off



Illustration of function sequence with manual transmission

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Function principle of ECO start/stop function

Operation of ECO start/stop function with automatic transmissions

In vehicles with automatic transmission, the automatic stop occurs with no further action by the driver as soon as the driver comes to a standstill (stop = 0 km/h) in D mode with the brakes applied.

Sequence with automatic transmission:

- Vehicle moving
- Brakes applied
- $v = 0$ km/h
- Standstill in "D"
- Engine stops
- Release brakes
- Engine starts
- Depress accelerator pedal
- Vehicle moves off



Illustration of function sequence with automatic transmission

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Refer to WIS for function descriptions of the ECO start/stop function

The description of the ECO start/stop function is divided into engine functions and electrical system functions. The subfunction “engine control start/stop function” is considered from the perspective of the engine control system.

Information on the subfunction “energy management of the start/stop function” is included in the function description “Energy management, function”.

Function descriptions for engine control ECO start/stop in function group 07

The screenshot shows the WIS interface with the following details:

- Vehicle identification number: WDB 205
- Chassis mode: CAR
- Search mode: Standard
- Groups list: 07 Module formation, 07.00 General, 07.02 Injection pump, Plug-in pump, High pressure pump, 07.03 Injection jets, Injection valves, Lines
- Information types (ITs) list: All information types, Repair, Testing and repair work (ar), Service information (si), Introduction into Service Manuals (sm), Service measures and instructions (smi), Maintenance and care (ac), Aftermarket installation and modification (an,az), Specifications for operating fluids (lf), **Subgroup/Serial configurations (sp)**, Technical modifications (tb), Diagnostics
- Document list table:

Document title	Gr.	IT	Status	Document number
Table of contents for function description of common rail diesel injection (CDI)	07.16	gf		g'07.16-p-099old
Common rail diesel injection (CDI), function	07.16	gf		g'07.16-p-0001old
Alternator interface function	07.10	gf		g'07.10-p-100old
Engine timing start-stop function	07.10	gf		g'07.10-p-041old
Charging, function	03.00	gf		g'09.03-p-200old
Smooth running control, function	07.16	gf		g'07.16-p-011old

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Energy management of ECO start/stop in function group 54

The screenshot shows the WIS interface with the following details:

- Vehicle identification number: WDB 205
- Chassis mode: CAR
- Search mode: Standard
- Groups list: 54 Electrical system, equipment and instruments, 54.00 General, 54.10 Battery, power supply, voltage converter, 54.15 Fuse and relay box, 54.18 Cable harnesses, 54.19 Integrated electronic system (IES), 54.20 Module box, 54.21 Control units/basic modules
- Information types (ITs) list: All information types, Repair, Testing and repair work (ar), Service information (si), Introduction into Service Manuals (sm), Service measures and instructions (smi), Maintenance and care (ac), Aftermarket installation and modification (an,az), Specifications for operating fluids (lf), **Subgroup/Serial configurations (sp)**
- Document list table:

Document title	Gr.	IT	Status	Document number
Overview of energy management system components	54.10	gf		g'54.10-p-999old
Drivetrain control unit, component description	54.21	gf		g'54.21-p-2141old
Component description for the electronic ignition lock control unit	89.57	gf		g'89.57-p-6001old
Table of contents for function description of energy management	54.10	gf		g'54.10-p-089old
Energy management, function	54.10	gf		g'54.10-p-0003old
DClAC converter function	54.10	gf		g'54.10-p-2005old
Engine on energy management, function	54.10	gf		g'54.10-p-100old
ECO start/stop, function energy management, function	54.10	gf		g'54.10-p-104old

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Energy management of ECO start/stop function with additional battery

When the vehicle is stationary, the ECO start/stop function automatically switches the engine off and restarts it as soon as the driver is ready to move off.

Shutting off the engine when the vehicle is idle reduces fuel consumption and thus the exhaust emissions. The master control unit of the ECO start/stop function is the CDI control unit (N3/9) (with diesel engine) or the ME-SFI control unit (N3/10) (with gasoline engine), recording and evaluating all influencing factors.

It is still possible to switch off and start the engine conventionally using the transmitter key (A8/1) or the KEYLESS-GO start/stop button (S2/3) (in vehicles with code (889) Keyless-Go). The use of the ECO start/stop function additional battery (G1/13) prevents any voltage dip which is noticeable to the vehicle occupants when the engine is started (e.g. during radio or A/C operation).

The ECO start/stop function additional battery now assumes the power supply for the active consumers while the 12V starter battery (G1) is isolated from the on-board electrical system (at engine start). Active comfort functions are not switched off.

Immediately after the engine is cold-started, the CDI control unit or the ME-SFI control unit performs a system diagnosis and evaluates the operational capability of the start/stop function.

The front SAM control unit with fuse and relay module (N10/1) performs a so-called relay check of the components involved in decoupling the 12V starter battery and connecting the ECO start/stop function additional battery. The prerequisite for this check is a vehicle speed ≥ 20 km/h once since engine start.

The relay check occurs after every key start and after every engine start from the stop function. If the relay check results in an error, a battery “red message” appears in the instrument cluster.

The on-board electrical system battery is decoupled from the on-board electrical system by the on-board electrical system decoupling relay (K19/7, or K1 in some model series) in vehicles with manual transmission and by the ECO start/stop function diode (V19) in vehicles with automatic transmission.

The ECO start/stop function comprises the following subfunctions:

- Function sequence for engine stop
- Function sequence for engine start
- Function sequence for forced engine start
- Determining the status of the ECO start/stop function additional battery
- Charging the ECO start/stop function additional battery
- Function description of voltage dip limiter (SEB)

i Note

The ECO start/stop function additional battery is connected by closing the ECO start/stop function additional battery relay (K1 14 electrical relay, K57/2 mechanical relay).

As the master control unit for the ECO start/stop function, the CDI control unit or the ME-SFI control unit checks the various influencing factors for the stop enable signal.

For this, the on-board electrical system management supplies information which describes the state of, and the demands on, the on-board electrical system.

In model series 172, W/X204, 207, 212, 218 and 231, the following information for the on-board electrical system management is provided by the rear SAM control unit with fuse and relay module (N10/2):

- State of the on-board electrical system battery
- State of the ECO start/stop function additional battery
- State of the on-board electrical system
- Requirements of load-intensive consumers (e.g. air conditioning)

The CDI control unit or the ME-SFI control unit evaluates all relevant data and then issues the stop enable signal accordingly. The engine is then switched off.

i Note

In model series 117, X156, 176, 246 and W/X 166, the function is contained in the SAM (N10), and in model series 222 in the front SAM (N10/6)

i Note

When the blower for automatic air conditioning is active, the blower output is reduced. At warm ambient temperatures, the system switches to air recirculation mode depending on the specified temperature setting.

After an engine stop, a maximum of three engine starts without exceeding the speed threshold of $v = 8$ km/h are permitted.

Function sequence for engine start

The CDI control unit or the ME-SFI control unit evaluates all of the relevant variables and issues the start enable signal (warm start signal).

The front SAM control unit (N10/6, N10 in model series 117, X156, 176, 246 and W/X 166) reads this warm start signal over a direct line and actuates the on-board electrical system decoupling relay (manual transmission) or the ECO start/stop function diode (automatic transmission) in the front pre-fuse box (F32, in model series 222 F33) and the ECO start/stop function additional battery relay.

The ECO start/stop function additional battery is connected to the on-board electrical system. Shortly afterwards, the on-board electrical system decoupling relay (manual transmission) or the ECO start/stop function diode (automatic transmission) disconnects the on-board electrical system battery from the on-board electrical system for the duration of the starting procedure.

The power requirements of the on-board electrical system are now provided by the ECO start/stop function additional battery. This prevents any voltage dip which would otherwise be noticeable to the vehicle occupants when the engine is started (e.g. during radio or A/C operation).

The on-board electrical system battery provides the energy required to start the engine.

As soon as the CDI control unit or the ME-SFI control unit detects an engine speed of $n = 400$ to 700 rpm, it terminates the starting procedure and transmits a corresponding signal over the chassis CAN 1 (CAN E1) to the front SAM control unit. The front SAM control unit then actuates the on-board electrical system decoupling relay (manual transmission) or the ECO start/stop function diode (automatic transmission) and the ECO start/stop function additional battery relay.

The on-board electrical system decoupling relay (manual transmission) or the ECO start/stop function diode (automatic transmission) connects the 12V starter battery to the on-board electrical system. The ECO start/stop function additional battery relay isolates the ECO start/stop function additional battery from the on-board electrical system. The power requirements of the on-board electrical system are once again provided by the 12V starter battery.

Note

In model series 212 as of 03/13, a pre-fuse box with V19 (diode) is installed! Also in vehicles with manual transmission.

The wiring diagram for this can be found in WIS under: PE54.15-Q-2502-97DAA

In order to ensure the stability of the on-board electrical system even with the engine stopped, the CDI control unit or the ME-SFI control unit can initiate a forced engine start.

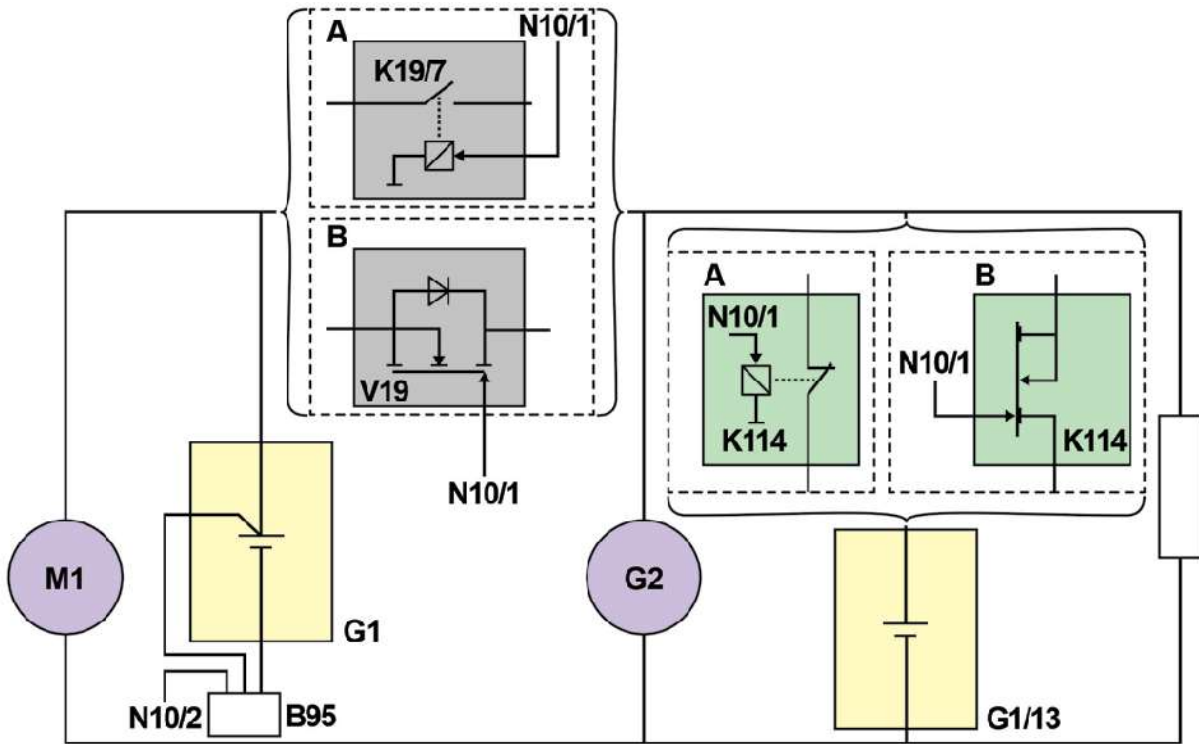
A forced engine start is carried out if the stability of the on-board electrical system can no longer be guaranteed due to the requirements of load-intensive consumers. Load-intensive consumers may be requested by the following systems:

- Supplemental restraint system
- PRESAFE
- Brake Assist System and distance control systems
- Air conditioning
- Steering
- Shifting from P to D or from N to D (depending on model series)

When the on-board electrical system management can no longer guarantee the stability of the on-board electrical system, the rear SAM control unit transmits an engine start request over the interior CAN (CAN B), the front SAM control unit and chassis CAN 1 to the CDI control unit or the ME-SFI control unit.

The CDI control unit or the ME-SFI control unit receives this and starts the engine. If the stability of the on-board electrical system still cannot be guaranteed after this, the engine is not switched off again. The ECO start/stop function is deactivated.

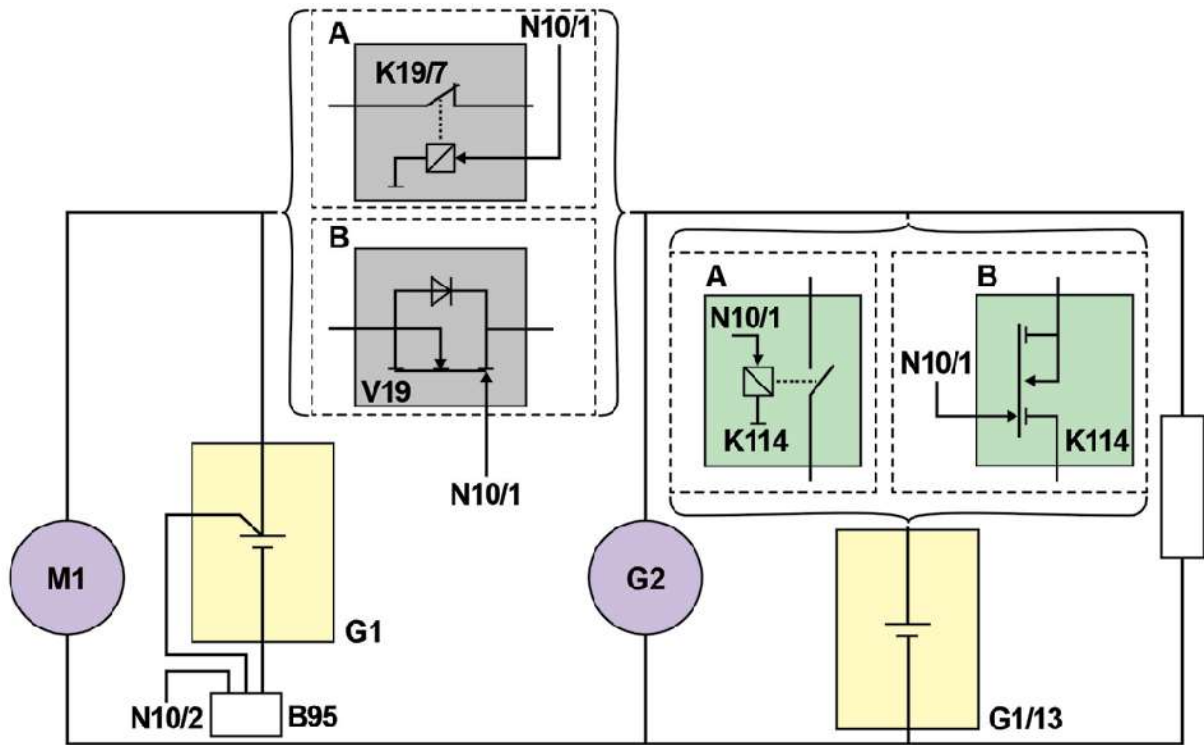
Illustrations of the power supply principle



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- B95 Intelligent battery sensor (IBS)
- G1 On-board electrical system battery
- G2 Alternator (except model 21 2.095)
- G1/13 ECO start/stop function additional battery
- K19/7 On-board electrical system decoupling relay (relay open)
- K114 ECO start/stop function additional battery relay (relay closed)

- M1 Starter
- N10/1 Front SAM control unit with fuse and relay module
- N10/2 Rear SAM control unit with fuse and relay module
- V19 ECO start/stop function diode (diode open)
- A With manual transmission
- B With automatic transmission



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- | | | | |
|-------|---|-------|---|
| B95 | Intelligent battery sensor (IBS) | M1 | Starter |
| G1 | On-board electrical system battery | N10/1 | Front SAM control unit with fuse and relay module |
| G2 | Alternator (except model 21 2.095) | N10/2 | Rear SAM control unit with fuse and relay module |
| G1/13 | ECO start/stop function additional battery | V19 | ECO start/stop function diode (diode open) |
| K19/7 | On-board electrical system decoupling relay (relay open) | A | With manual transmission |
| K114 | ECO start/stop function additional battery relay (relay closed) | B | With automatic transmission |

State of ECO start/stop function additional battery

Immediately after the engine is started, the front SAM control unit carries out the process of battery state recognition, and the so-called relay check of the components involved in decoupling the on-board electrical system battery and connecting the ECO start/stop function additional battery (described under “Function sequence for engine stop”).

The check supplies information about the availability of electrical power from the ECO start/stop function additional battery.

If the engine is switched off during the battery state recognition process, the front SAM control unit aborts it and rejects the results up to that point.

In addition to battery state recognition, the voltage at the ECO start/stop function additional battery is tested after every engine start in start/stop function mode.

Battery state recognition can also be launched using the diagnostic tester.

The ECO start/stop function additional battery relay is no longer actuated under the following conditions:

- ECO start/stop function additional battery deep-discharged
- Internal short circuit
- Short circuit in positive line of ECO start/stop function additional battery
- Malfunction of additional battery coupling relay (relay fails to close (K57/2 and K114 relay opens due to an internal fault (K114))

To ascertain this, the voltage of the ECO start/stop function additional battery is compared with an internal value. A corresponding fault message is shown in the multifunction display (A1p13) of the instrument cluster (A1).

The data required for this is transmitted by the SAM control unit (in model series 172, W/X204, 207, 212, 218, 231, rear SAM (N10/2), model series 117, X156, 176, 246 and W/X166, SAM (N10), in model series 222, front SAM (N10/6)) over the interior CAN to the instrument cluster.

The charging strategy of the ECO start/stop function additional battery must take two requirements into account:

- A sufficient charge level must be maintained in the ECO start/stop function additional battery.
- The number of actuations of the ECO start/stop function additional battery relay and the associated load on the ECO start/stop function additional battery must be minimized as far as possible.

If the open circuit voltage ($U > 12.5 \text{ V}$) of the ECO start/stop function additional battery is too low, the alternator's output limitation (alternator management) (except model 212.095) is deactivated so that the ECO start/stop function additional battery can be charged.

If the voltage dip ($U < 11 \text{ V}$) at engine start is too great, the engine stop function is deactivated for $t = 1$ minute in order to recharge the ECO start/stop function additional battery.

The ECO start/stop function additional battery is only connected if the output limitation of the alternator is not active and the on-board electrical system voltage is high enough ($U > 13 \text{ V}$). It is disconnected again if the output limitation of the alternator is active or if the on-board electrical system is severely overloaded.

i Note

In vehicles of model series 117, X156, 176, 246 and W/X 166, the ECO start/stop function additional battery is charged at 200 mA when the engine hood is open and the SAM (N10) detects that it is being charged from an external source.

Other components and functions

Function description of voltage dip limiter (SEB) without additional battery

Model series 205 is the first model in which the additional battery has been replaced with a voltage dip limiter.

The use of the voltage dip limiter (R62) at the positive terminal of the on-board electrical system battery reduces any voltage dip which is noticeable to the vehicle occupants when the engine is started (e.g. during radio or A/C operation).

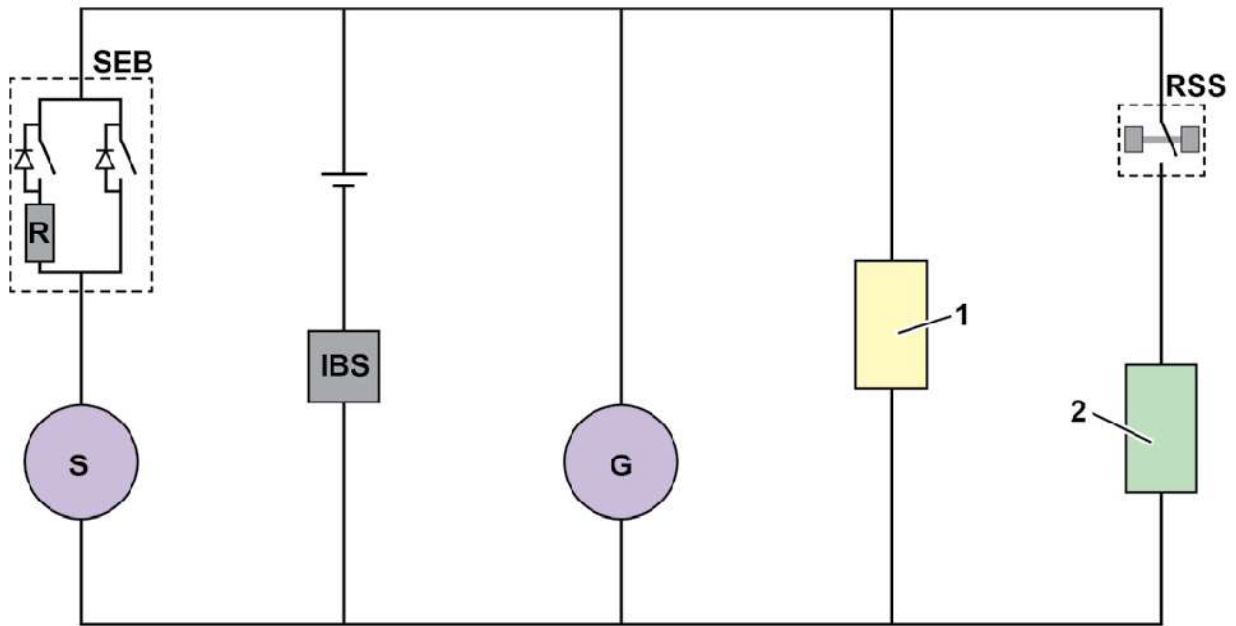
The voltage dip limiter is an electronically switchable series resistor which for reducing the high power consumption of the starter (M1) when it is starting to crank the engine and is connected via circuit 87 to the starter circuit 50 relay (K40/8kH).

When the engine is being started, a voltage is applied to the voltage dip limiter. From this it detects the starting procedure and connects the series resistor. If the on-board electrical system voltage drops too much due to the high power consumption of the starter, the voltage dip limiter disconnects the series resistor again. It should be noted that 12 V is only present at the starter positive line during the starting procedure.



Voltage dip limiter (R62)

P15.30-2290-00



P15.30-2296-00

Wiring diagram of voltage dip limiter

- 1 Circuit 30 consumer
- 2 Circuit 30g consumer
- G Alternator
- IBS Intelligent battery sensor

- RSS No-load current shutoff relay
- S Starter
- SEB Voltage dip limiter

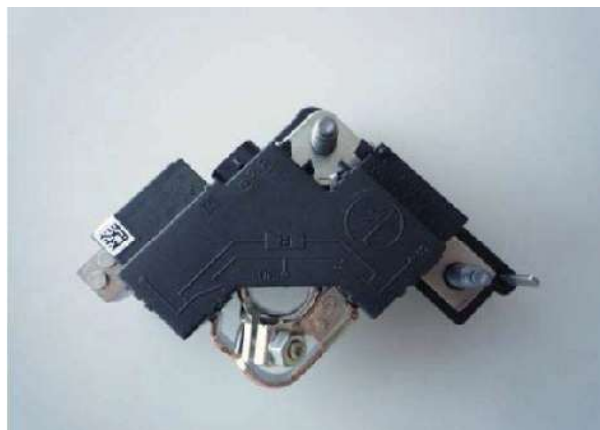
Other components and functions

Function description of starter front-end relay (SVR)

Model series 117, 156, 176, 242 and 246 as of 03.11.2014 without code 460 (Canada version) have no additional battery; a starter front-end relay (SVR) (K92) is used instead. In model series 205 with engine 274, the starter front-end relay is used from 2015 onwards.

The starter front-end relay (K92) has no semiconductor output stages, but two mechanical relays. It connects and disconnects a fixed resistance for a certain period of time (120 msec). This reduces the high power consumption of the starter (M1) when it is starting to crank the engine. The starter front-end relay (K92) is connected via circuit 87 to the starter circuit 50 relay (F58kM).

When the engine is started by the CDI control unit, the ME-SFI control unit or the powertrain control unit, a voltage is applied to the starter front-end relay. From this it detects the starting procedure and connects the resistor. If the on-board electrical system voltage drops too much due to the high power consumption of the starter, the starter front-end relay disconnects the resistor again.



P15.30-2292-00

Starter front-end relay (K92)

i Note

The wiring diagram for model series 117, 156, 176, 242 and 246 as of 03.11.2014 without code 460 (Canada version) can be found in WIS under: P15.00-Q-2101-971AA

Brief description of direct starting function for gasoline engines

Gasoline engines are equipped with a starter-assisted in-engine direct starting function. This function together with the engine stop function constitutes a direct starting function which makes use of the fact that, with the selected piezo injection valve coupled with the correct injection timing, the very first compression stroke of a cylinder can be utilized for a controlled combustion.

Clutch protection (as of model series 205)

The clutch protection function calculates the temperature of the clutch constantly. At 300 °C a red message is activated in the display together with a warning tone. In parallel with this display, a stop inhibitor event is set because the clutch cools down more quickly when the engine is running due to the turbulence of the air. The red message disappears at 250 °C and the stop inhibitor is revoked.

Auxiliary oil pump (ZÖP)

When the engine is shut off in start/stop mode, the auxiliary oil pump takes over the task of supplying oil to the hydraulic controller unit of the transmission from the primary pump which is now idle, in order to enable the vehicle to move off quickly and smoothly when the engine is restarted.

The auxiliary oil pump is a powertrain CAN bus subscriber. Fault codes are stored in the transmission control unit. It is an independent component with its own control unit.

There are a variety of conditions (stop inhibitors, start requesters) which must be fulfilled for the ECO start/stop system to be activated. If the engine does not shut off or restarts against the expectations of the customer, this does not necessarily mean that there is a fault.



Clutch protection display

P54.33-4752-00



Automatic transmission with auxiliary oil pump

P27.57-2054-00

Other components and functions

Deactivation of the ECO start/stop function in model series 205

In model series 205 equipped with “Agility Select”, the ECO start/stop function is deactivated in the “Sport Plus” transmission mode. The ECO start/stop function can be reactivated using the ECO start/stop button!

Note

If the ignition remains off for more than four hours, then the next time the engine is started, the transmission mode “C” is engaged and the ECO start/stop function is active again.

A/C operation with ECO start/stop function

Due to its networking with the climate control system, the ECO start/stop function is automatically deferred when the interior temperature drops below the set value. The air conditioning prevents the engine from being stopped until the preselected interior temperature is reached. If the interior temperature increases above the preselected value during subsequent stops, the air conditioning does not request a forced engine start in order to save energy and the refrigerant compressor is not activated (unless there is a risk of the windows fogging up). This can result in a reduced cooling output while the engine is stopped if the outside temperature is high.

If this is not desired, the ECO start/stop function must be deactivated by pressing the ECO start/stop function “ECO Off” button.

Standard logic of the climate control with ECO start/stop function (model series 212, 204, 205, 172, 176, 246)

The air conditioning blocks the ECO start/stop enable signal after ignition ON until the interior target value is almost reached. Subsequently, the ECO start/stop enable signal is not revoked again, with the exception of a **fogging situation**, in which the ECO indicator remains permanently green.

The blower reduction at engine stop has a factor of 0.8. At outside temperatures of approx. 25°C and above, the climate control is assisted by 100% recirculated air when the engine is stopped.

Climate control logic with ECO start/stop (model series 222, 231, 166)

The air conditioning blocks the ECO start/stop enable signal after ignition ON until the interior target value is almost reached.

Subsequently the ECO start/stop enable signal is revoked when the engine is stopped if:

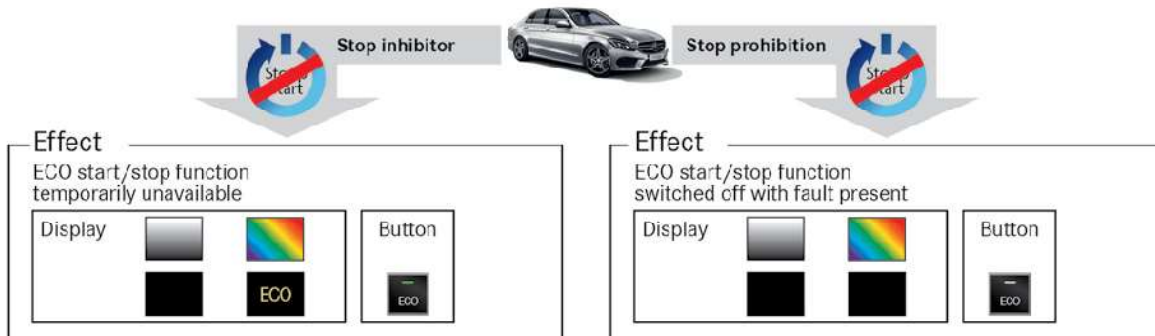
- The evaporator temperature rises (threshold 17°C coded)
- The minimum stop duration has elapsed (40 s coded)
- Fogging situation

Engine starts. Stop is disabled until the vehicle has stabilized again. At outside temperatures of approx. 25°C and above, the climate control is assisted by 100% recirculated air when the engine is stopped.



Agility Select selector lever

P54.26-0157-00



P15.00-2272-00

Display concept

Description

- System state of the vehicle which necessitates a temporary stop prohibition.

Examples of stop inhibitors are:

- Outside temperature too low
- On-board electrical system voltage too low

Description

- System state which results in a temporary or permanent shutdown of the system.

Examples of system errors are:

- A breakdown in communication with a relevant system
- A defect in the electrical system switchover

Stop inhibitor

System state of the vehicle which temporarily inhibits the automatic shutoff of the engine: No ECO indicator (monochrome IC display) or yellow ECO indicator (color IC display).

If the engine is not switched off automatically despite correct operation, this does not necessarily mean that there is a fault. There are system-related demands which require the engine to be running and therefore necessitate a stop inhibit.

For example, the engine is not switched off when the hood or the driver door are open or the seat belt buckle is not fastened.

A functioning on-board electrical system has priority over the stop function. The engine is not switched off, for example, when a large number of consumers are active so that any subsequent undervoltage and consumer shutoff can be indicated to the driver. A stop inhibitor in the on-board electrical system is not automatically a fault.

Stop prohibition

System state of the vehicle in which a fault relevant to the ECO start/stop function is found in a control unit involved in the function, and an engine stop is prohibited.

This results in the deactivation of the ECO start/stop function for the entire driving cycle. The ECO indicator is not visible in the instrument cluster and the LED in the ECO button is off.

Stop prohibition system analysis

Diagnosis of the ECO start/stop function is always performed from the Function/ECO start/stop function home screen.

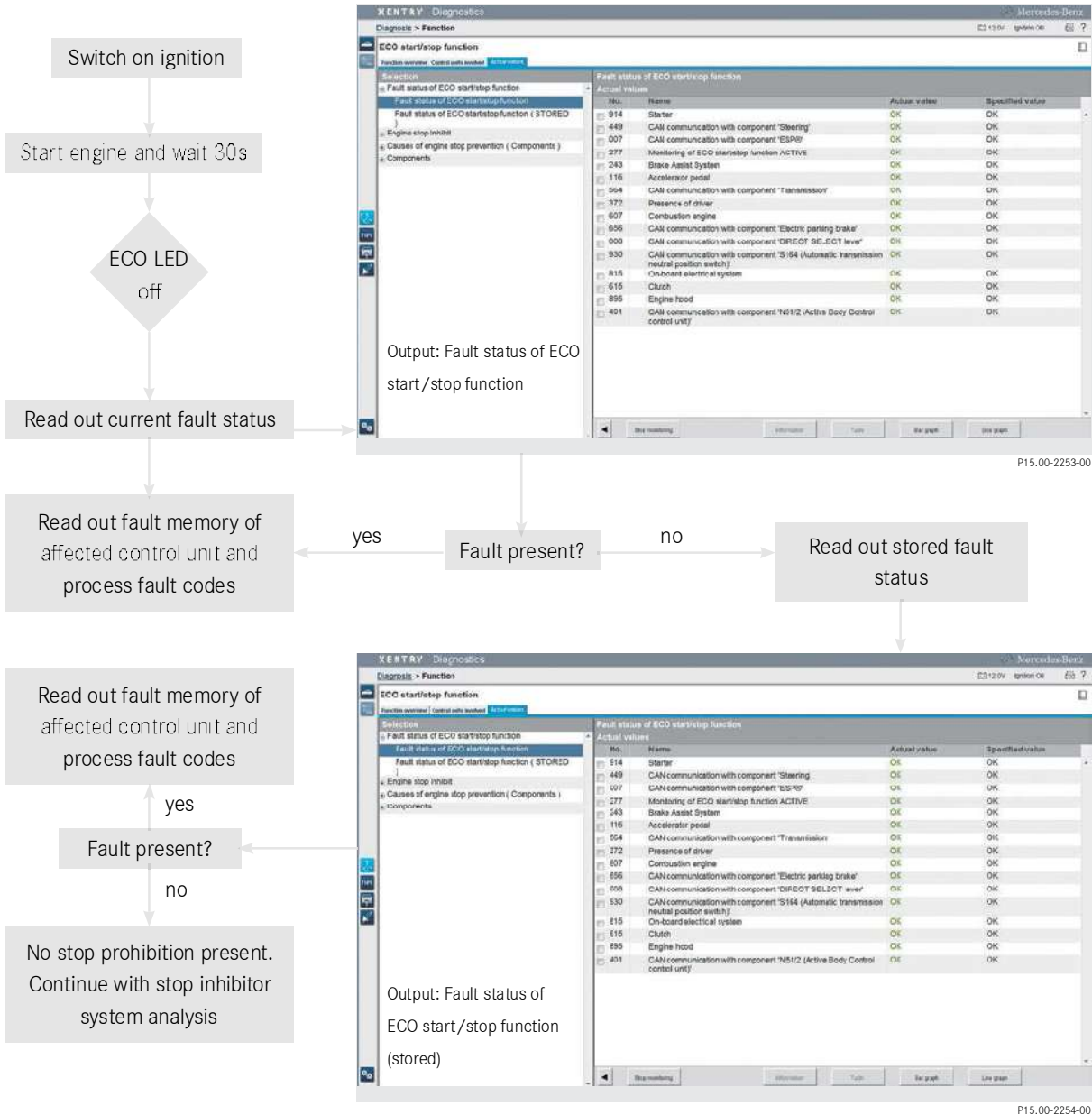
The checklist (OF15.40-P-3000-01A) should be used to assist with diagnosis.

The system analysis is basically divided into the analysis of **stop prohibitions** and **stop inhibitors**.



ECO start/stop function home screen

P15.00-2274-00



Note

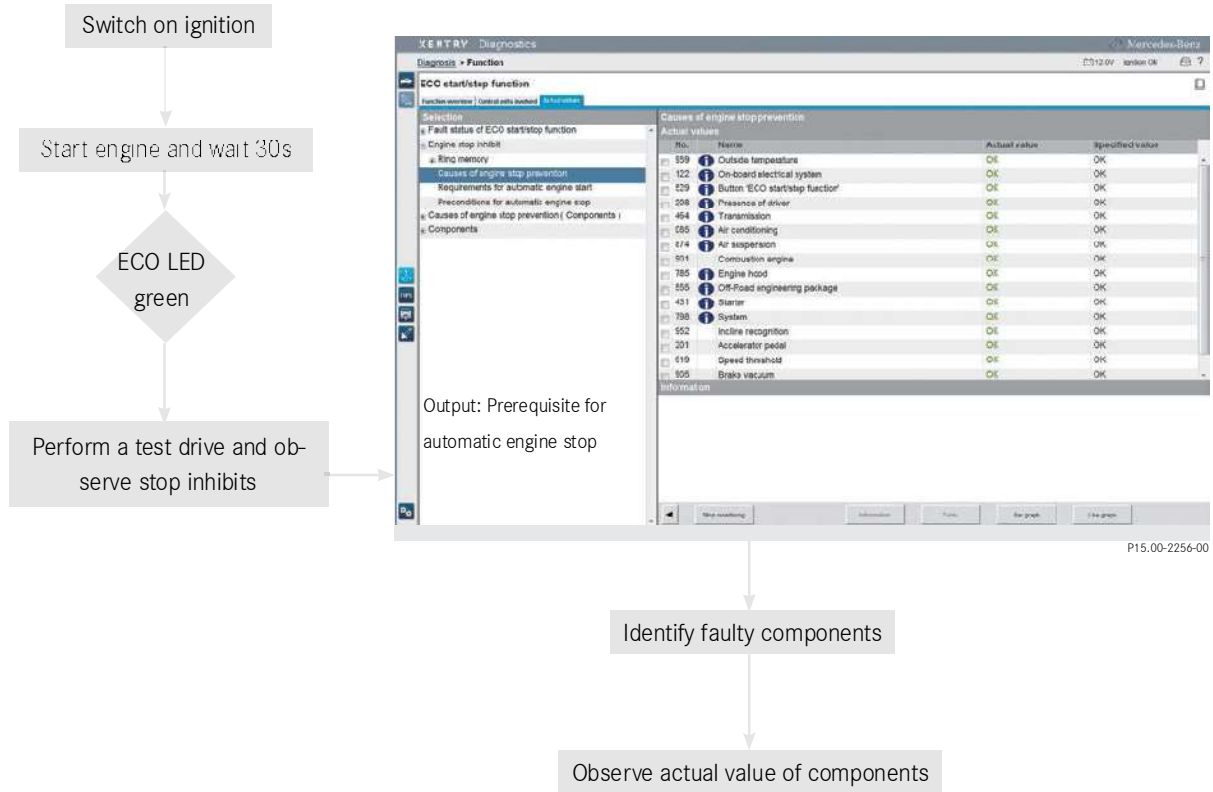
The fault status of the ECO start/stop function indicates the current fault status of the individual systems. If one of the values here is set to "NOT OK", the fault codes of the affected control unit must be read out. Any faults present must be processed.

Note

The fault status of the ECO start/stop function indicates the most recently occurring fault in the individual systems. First, the kilometer reading must be checked to verify that the fault matches the current problem. If one of the values here is set to "NOT OK", the fault codes of the affected control unit must be read out. Any faults present must be processed.

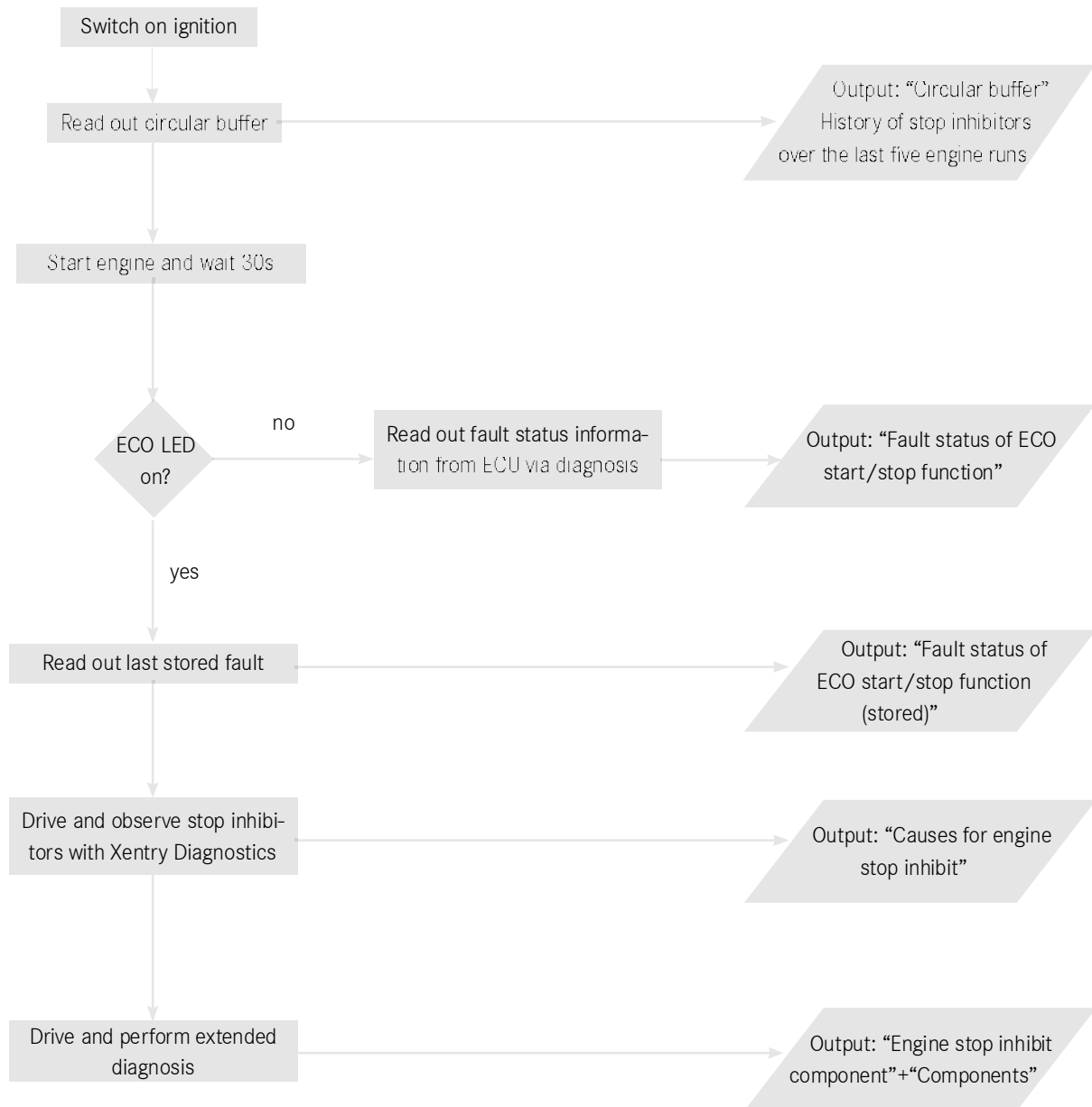
Stop inhibitor system analysis (manual selector) (ECO start/stop indicator green)

An inoperative ECO start/stop function, despite a green indicator, in vehicles with manual transmissions should be analyzed as described below.



Note

This is the only way to diagnose a fault in the clutch switch, for example.



Note

The diagnosis steps shown indicate the maximum scope at the copy deadline

Note

The diagnosis scope available in Xentry for the ECO start/stop function varies for different model series and variants.

There is a fault in the system only if:

- There is an entry in the fault status of the ECO start/stop function
- A system error in the entire driving cycle is entered as a stop inhibitor

For an initial analysis the circular buffer of the start/stop function should be read out.

i Note

The circular buffer can give only an initial indication of the affected system. For a more accurate analysis of the cause, a test drive must be performed.

i Note

For a supporting analysis of the ECO start/stop function, the diagnosis tree for the ECO start/stop function can be used.

Read out circular buffer



Circular buffer

The circular buffer stores the stop inhibitors from the last five driving cycles.

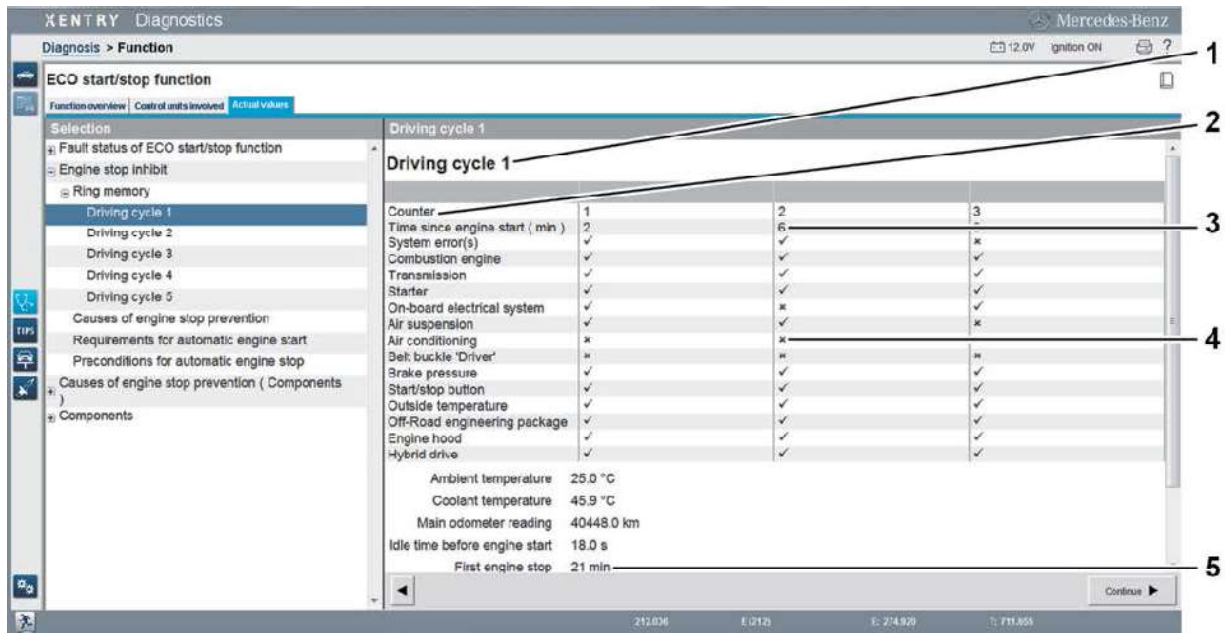
It saves the first seven stop inhibitors of each driving cycle. (Exception CRD3: Here, the first 15 stop inhibitors for each of the last three driving cycles are stored).

The circular buffer does not begin to record within a driving cycle until the basic vehicle-related requirements for the ECO start/stop function are satisfied (e.g. 18 km/h speed threshold exceeded).

If a stop inhibitor does not occur in a driving cycle, then no entry is made in the circular buffer. This means that, for example, between driving cycle 1 and driving cycle 2 in the circular buffer there may have been several other driving cycles in which a stop inhibitor did not occur.

“Driving cycle 1” is always the last driving cycle performed in which a stop inhibitor occurred.

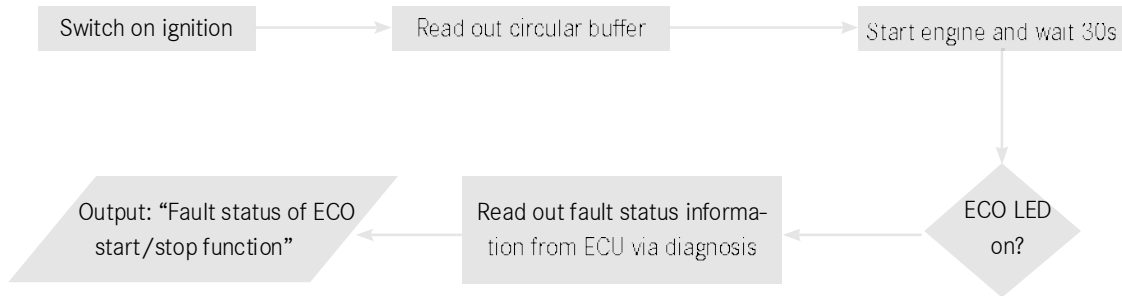
The values of the current driving cycle can only be read out when the driving cycle has ended! This requires an ignition cycle with engine run-on.



P15.00-2266-00

- 1 A driving cycle commences at engine start and ends after ignition off. Driving cycle 1 is always the last driving cycle performed in which a stop inhibitor occurred.
- 2 The counter shows the sequential number of the stop inhibitor in this driving cycle. Between two stop inhibitors there may be one or more successful engine stops. These are not identifiable.
- 3 Time in minutes after the commencement of the driving cycle at which the stop inhibitor occurred.
- 4 The stop inhibitors are marked with a cross.
- 5 Time after the commencement of the driving cycle at which the first successful engine stop was performed. If there were no engine stops in the entire driving cycle, the value is set to "255 min"!

Read out fault status of ECO start/stop function

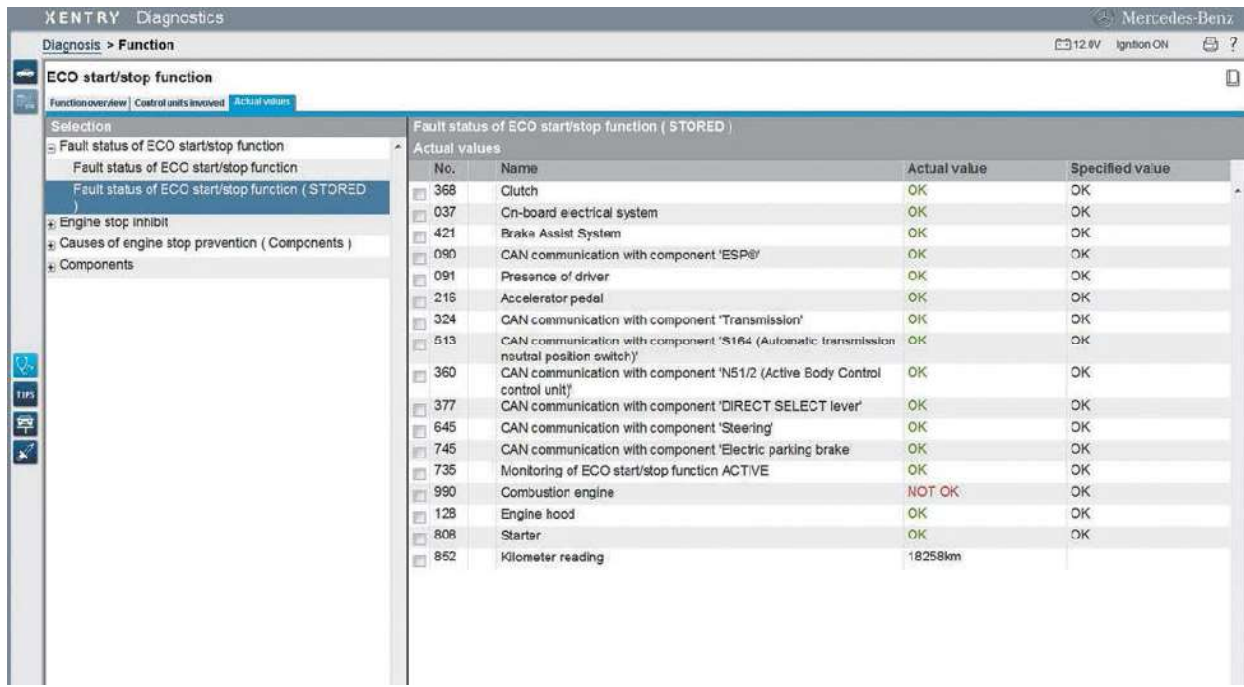
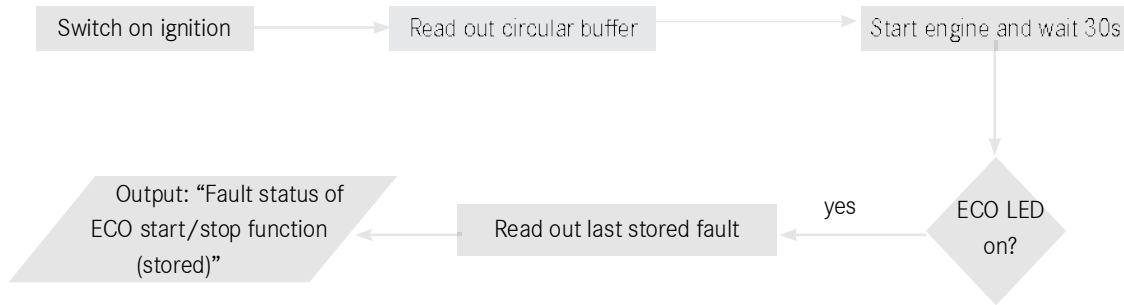


The screenshot shows the XENTRY Diagnostics interface with the 'ECO start/stop function' selected. The 'Actual values' table is displayed, showing the status of various components.

No.	Name	Actual value	Specified value
914	Starter	OK	OK
449	CAN communication with component 'Steering'	OK	OK
007	CAN communication with component 'ESP®'	OK	OK
277	Monitoring of ECO start/stop function ACTIVE	OK	OK
243	Brake Assist System	OK	OK
116	Accelerator pedal	OK	OK
564	CAN communication with component 'Transmission'	OK	OK
372	Presence of driver	OK	OK
607	Combustion engine	OK	OK
656	CAN communication with component 'Electric parking brake'	OK	OK
008	CAN communication with component 'DIRECT SELECT lever'	OK	OK
930	CAN communication with component 'S164 (Automatic transmission neutral position switch)'	OK	OK
815	On-board electrical system	OK	OK
615	Clutch	OK	OK
895	Engine hood	OK	OK
401	CAN communication with component 'N51/2 (Active Body Control control unit)'	OK	OK

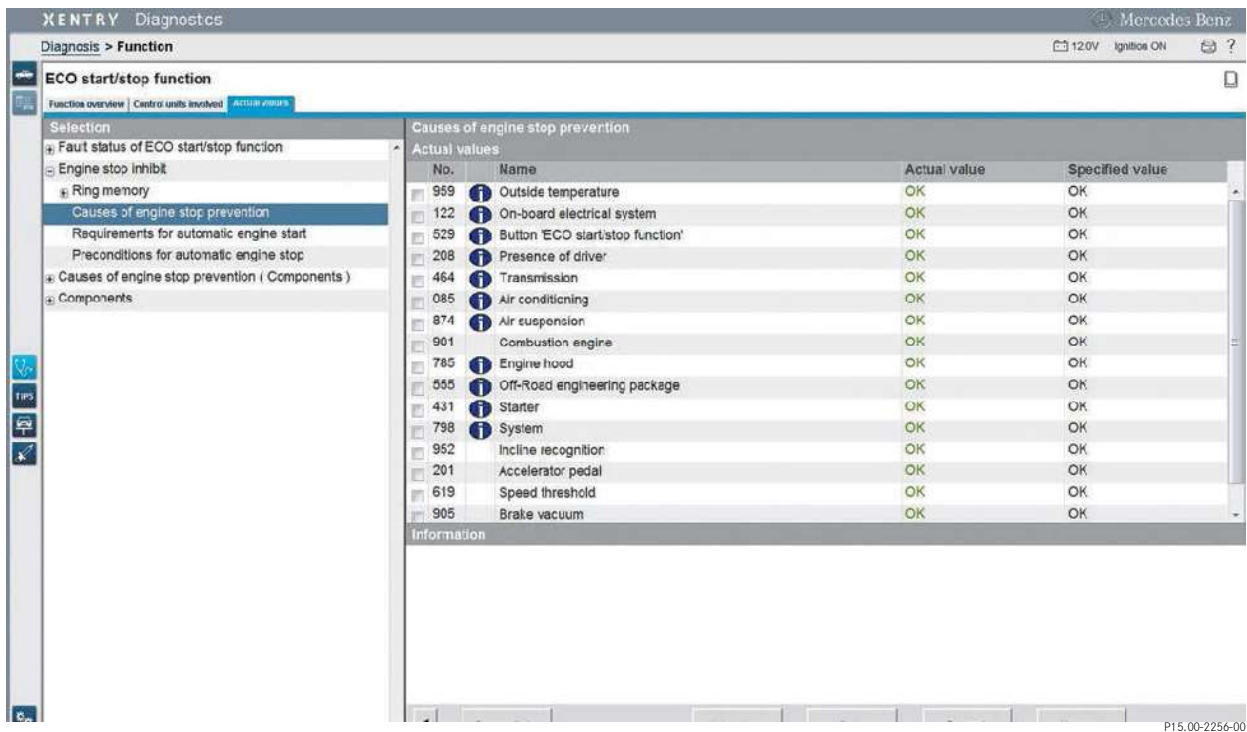
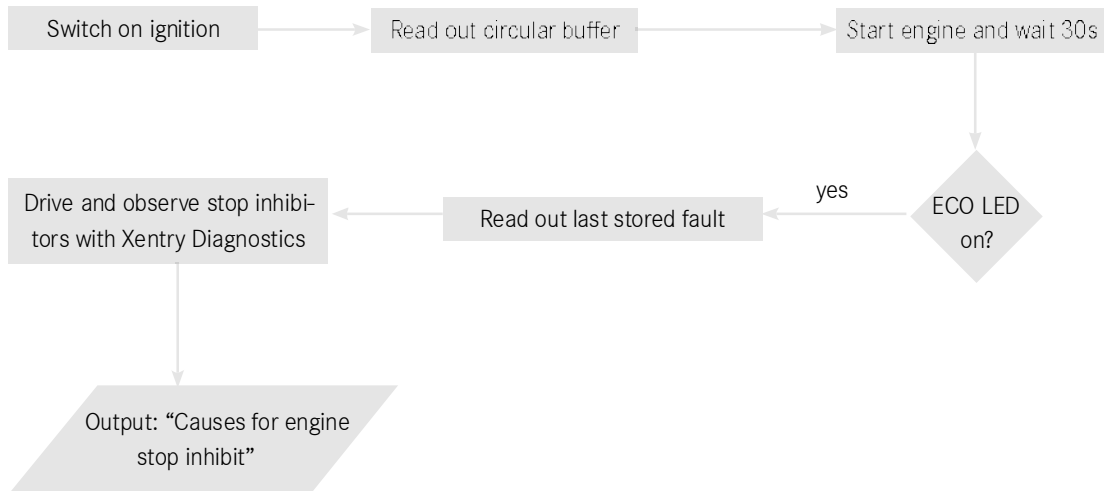
P15.00-2253-00

The fault status of the ECO start/stop function indicates the current fault status of the individual systems. If one of the values here is set to "NOT OK", the fault codes of the affected control unit must be read out. Any faults present must be processed.



The fault status of the ECO start/stop function indicates the most recently occurring fault in the individual systems. First, the kilometer reading must be checked to verify that the fault matches the current problem. If one of the values here is set to “NOT OK”, the fault codes of the affected control unit are read out. Any faults present must be processed.

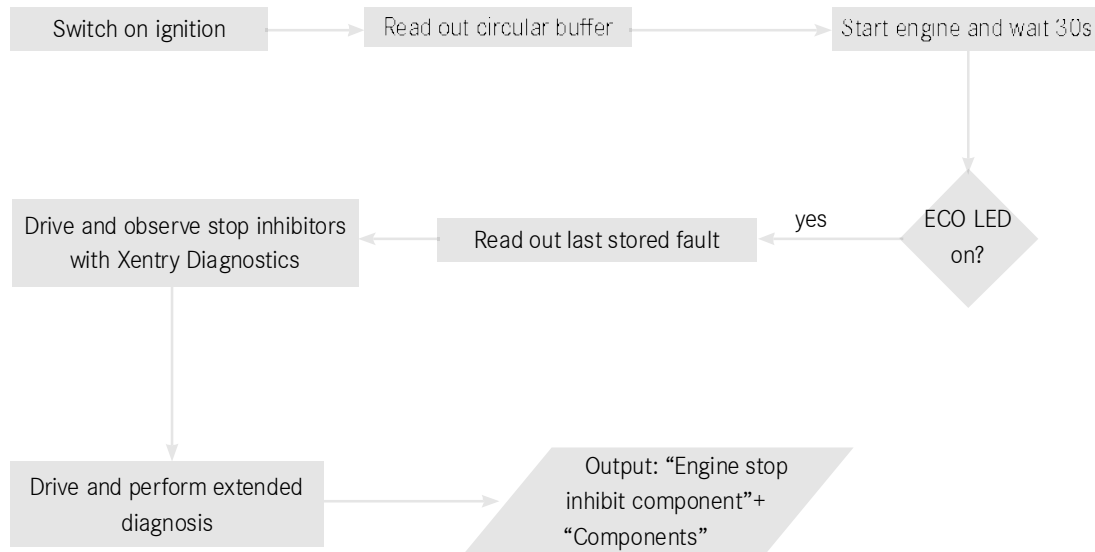
Read out causes for engine stop inhibit



The current stop inhibitors in the driving cycle can be identified under “Causes for engine stop inhibit”. This view is active only during a test drive.

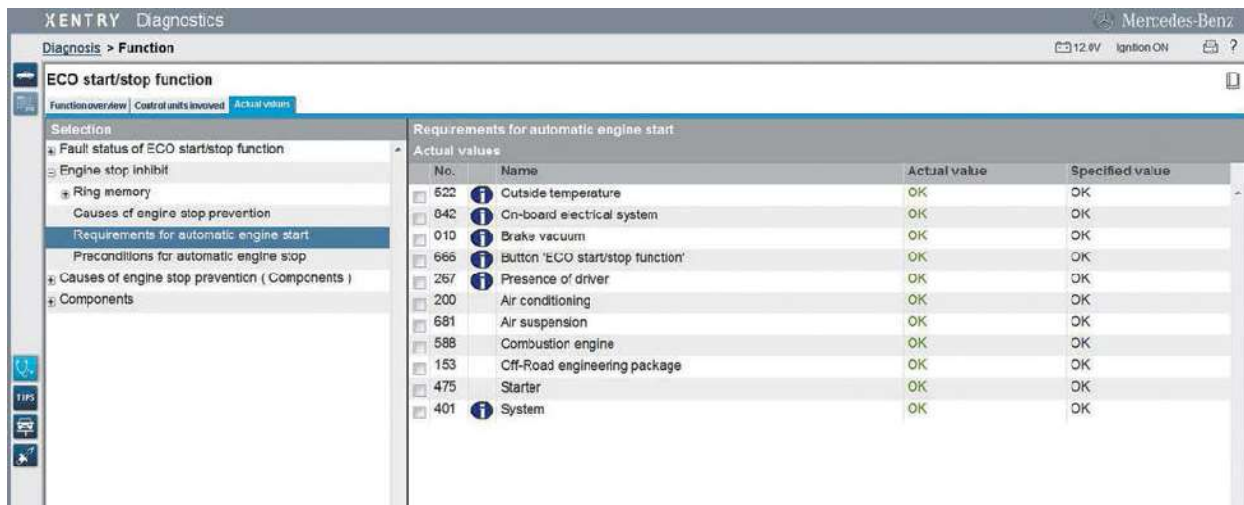
Note

If either the engine or the air conditioning system is identified under “Causes for engine stop inhibit”, continue to a more accurate diagnosis under “Engine stop inhibit (components)”. For all other components the actual values of the component in question can be analyzed under “Components”.



The requirements for the automatic engine start are only used in the event of problems related to an implausible engine start while the engine is at automatic engine stop.

Otherwise these values indicate the same as the “Causes for engine stop inhibit”.



P15.00-2257-00

Extended diagnosis via “Engine stop inhibit (components)” and “Components”

Note

If the engine, the air conditioning or the on-board electrical system is identified under “Causes for engine stop inhibit”, continue to a more accurate diagnosis under “Engine stop inhibit (components)”. For all other components the actual values of the component in question can be analyzed under “Components”.

Engine stop inhibit (components)

Read out causes for engine stop inhibit (combustion engine)

The screenshot shows the Xentry Diagnostics interface for the 'ECO start/stop function'. The left-hand navigation pane is expanded to 'Causes of engine stop prevention (Combustion engine)'. The main area displays a table of 'Actual values' for various engine parameters.

No.	Name	Actual value	Specified value
309	Diesel particulate filter	OK	OK
276	Inside temperature of control unit	OK	OK
184	Warm-up phase	OK	OK
666	Fuel temperature	OK	OK
618	Coolant temperature	OK	OK
849	Engine control system	OK	OK
441	NOx storage catalytic converter	OK	OK
325	Oil temperature	OK	OK
633	Rail pressure	OK	OK
588	SCR catalytic converter	OK	OK
528	Fill level of fuel tank	OK	OK
892	Ambient pressure	OK	OK
119	Thermal management	OK	OK
429	Coolant temperature at engine start	OK	OK
648	Engine diagnosis	OK	OK
765	Engine start	OK	OK

P15.00-2258-00

“Causes for engine stop inhibit (combustion engine)” lists the individual potential causes related to the engine. If a component is identified here, the diagnosis can be continued under “Components”.

Requirements for automatic engine start (combustion engine)

The screenshot shows the Xentry Diagnostics interface for the 'Requirements for automatic engine start (Combustion engine)'. The left-hand navigation pane is expanded to 'Requirements for automatic engine start (Combustion engine)'. The main area displays a table of 'Actual values' for various engine parameters.

No.	Name	Actual value	Specified value
573	Engine diagnosis	OK	OK
929	Exhaust: temperature downstream of TWC [KAT]	OK	OK
547	Coolant temperature	OK	OK
156	Rail pressure	OK	OK
710	SCR catalytic converter	OK	OK
562	Engine stop duration	OK	OK

P15.00-2259-00

The requirements for the automatic engine start (combustion engine) contain information when the engine restarts prematurely after an automatic engine stop.

Read out causes for engine stop inhibit (air conditioning)

The screenshot shows the XENTRY Diagnostics interface for a Mercedes-Benz vehicle. The main window displays the 'ECO start/stop function' with a sub-section for 'Engine stop inhibit: Air conditioning'. A table lists the following components and their status:

Abbreviation	No.	Name	Actual value	Specified value
AAC - Air conditioning (N22/1)	454	Permissible deviation between the actual temperature of the temperature sensors in the air vents and the specified temperature for enabling of the automatic engine stop	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	645	The outside temperature is too high.	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	968	The ECO start/stop function is deactivated.	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	388	There is a risk of sudden fogging of the windshield and side windows	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	950	NOT INITIALIZED	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	423	Cooling in vehicle interior	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	911	Diagnosis	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	182	Coding 'ECO start/stop function' is deactivated in control unit 'N22/1' (Climate control control unit).	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	110	Data transfer error	NOT ACTIVE	NOT ACTIVE
AAC - Air conditioning (N22/1)	859	The temperature measured at component: 'Evaporator' is too high.	NOT ACTIVE	NOT ACTIVE

P15.00-2260-00

“Engine stop inhibit (air conditioning)” lists the individual stop inhibitors within the air conditioning system.



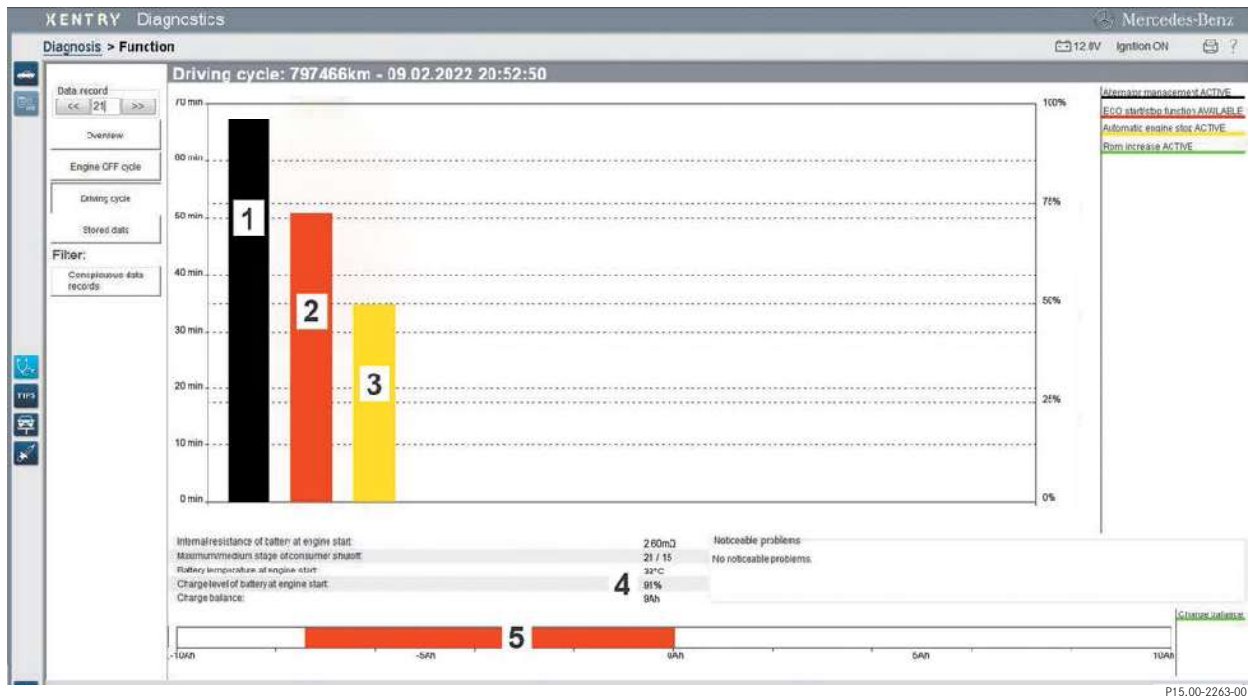
Diagnosis via the on-board electrical system data is to be performed when the circular buffer lists the on-board electrical system as the cause of the stop inhibit.

OK driving cycle with ECO start/stop function available and active



- 1 Alternator management active after a short time. Normal state!
- 2 ECO start/stop function is available for the entire driving time.
- 3 Automatic engine stop active for approx. 2 min, e.g. at traffic lights
- 4 Battery state of charge (SOC) normal (~80%)
- 5 Positive charge balance

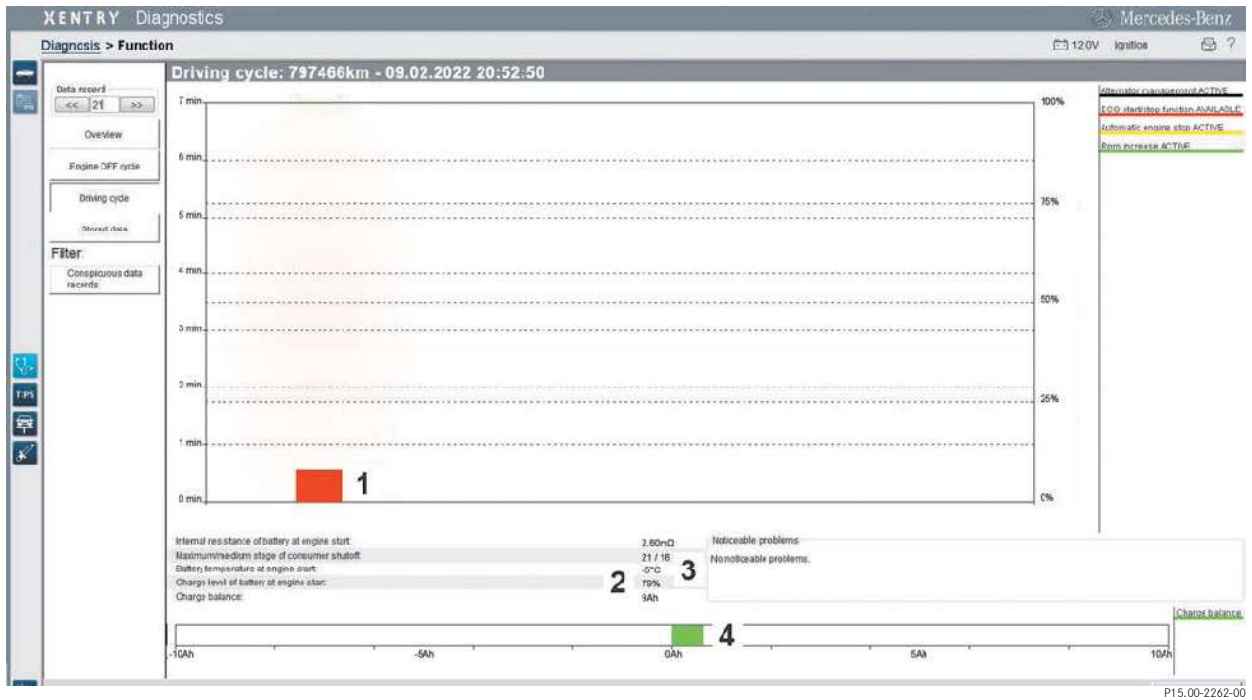
Driving cycle with many consumers active, ECO start/stop function is intermittently unavailable



- 1 Alternator management active after a short time
- 2 ECO start/stop function is not available for the entire driving time
- 3 Automatic engine stop active for approx. 20 min
- 4 Battery charge at engine start very good (91%)
- 5 Negative charge balance

Diagnosis of ECO start/stop function via actual values of electrical system data

OK driving cycle with ECO start/stop function available and active



- | | |
|---|---|
| 1 ECO start/stop function is available for only a short time. | 3 Low outside temperature at engine start |
| 2 Battery charge at engine start good (~80%) | 4 Slightly positive charge balance |

“Components” lists the actual value groups of the various components. The current status for each component is shown. This can be an indication of the ultimate cause of the stop inhibit.

Combustion engine

The screenshot shows the XENTRY Diagnostics interface for the 'ECO start/stop function'. The 'Actual values' table for the 'Combustion engine' is as follows:

Abbreviation	No.	Name	Actual value	Specified value
MED40	437	Engine speed	600 1/min	
MED40	681	B11/4 (Coolant temperature sensor)	61.75°C	
MED40	334	Engine oil temperature	-48.00°C	
MED40	873	Inside temperature of control unit	-48.00°C	
MED40	725	Ambient pressure	0.00hPa	
MED40	354	Rail pressure (actual value)	300.0bar	
MED40	196	B37 (Accelerator pedal sensor)	0%	
MED40	511	S40/3 (Clutch pedal switch)	NOT ACTUATED	
MED40	107	S40/5 (Start enable clutch pedal switch)	OFF	
MED40	101	S9/1 (Brake light switch)	NOT ACTIVE	
MED40	287	Fill level of fuel tank	20.0L	
MED40	098	Battery voltage	13.0V	
MED40	056	Stratified operation with catalytic converter heating	NOT ACTIVE	

P15.00-2247-00

Supplemental restraint system

The screenshot shows the XENTRY Diagnostics interface for the 'ECO start/stop function'. The 'Actual values' table for the 'Supplemental restraint system' is as follows:

Abbreviation	No.	Name	Actual value	Specified value
ORC166	278	S68/3 (Driver belt buckle restraint system switch)	Belt tab INSERTED	
ORC166	520	Resistance value of electric circuit of component 'S68/3 (Driver belt buckle restraint system switch)'	100.00Ω	[80.00 .. 210.00], [320.00 .. 480.00]

P15.00-2248-00

Brake system

The screenshot shows the XENTRY Diagnostics interface for the 'ECO start/stop function'. The 'Actual values' table for the 'Brake system' is as follows:

Abbreviation	No.	Name	Actual value	Specified value
ESP212	423	Brake pressure	1.2bar	[-6.0 .. 150.0]
ESP212	813	Steering wheel angle	3.2°	[-600.0 .. 600.0]
ESP212	624	Signal 'HIGH' of component 'S9/1 (Brake light switch)'	NOT ACTUATED	NOT ACTUATED, ACTUATED
ESP212	899	Signal 'LOW' of component 'S9/1 (Brake light switch)'	NOT ACTUATED	NOT ACTUATED, ACTUATED
ESP212	176	Wheel speed at left front axle	1.3km/h	[0.0 .. 250.0]
ESP212	300	Wheel speed at right front axle	1.5km/h	[0.0 .. 250.0]
ESP212	159	Wheel speed at left rear axle	1.2km/h	[0.0 .. 250.0]
ESP212	288	Wheel speed at right rear axle	1.3km/h	[0.0 .. 250.0]

P15.00-2249-00

Read out actual values of "Components"

Air conditioning

The screenshot shows the 'Actual values' tab for the 'Air conditioning' function. The table below lists the components and their current values.

Abbreviation	No.	Name	Actual value	Specified value
HVAC_212	845	Relative air humidity	0.00%	
HVAC_212	214	Temperature of windshield	0.00°C	
HVAC_212	368	Dew point	0.00°C	
HVAC_212	995	Dew point	12.00°C	
HVAC_212	555	Relative air humidity	0.00%	
HVAC_212	960	Ambient temperature currently measured by dew point sensor	0.00°C	
HVAC_212	447	D14 (Outside temperature sensor)	25.00°C	[-40.00 .. 30.00]
HVAC_212	416	Refrigerant pressure	9.00bar	[0.00 .. 35.00]
HVAC_212	285	Power consumption of component 'A9 (Refrigerant compressor)	0.00A	[0.00 .. 1.00]

P15.00-2250-00

On-board electrical system

The screenshot shows the 'Actual values' tab for the 'On-board electrical system' function. The table below lists the components and their current values.

Abbreviation	No.	Name	Actual value	Specified value
Rear SAM	556	Charging current or discharge current at battery	-2.00000kA	
Driver-side SAM	480	N72/1s50 (ECO start/stop function button)	Button NOT OPERATED	
Driver-side SAM	416	F32k1 (Decoupling relay)	CLOSED	
Driver-side SAM	993	Request for function 'Battery switchover'	ACTIVE	

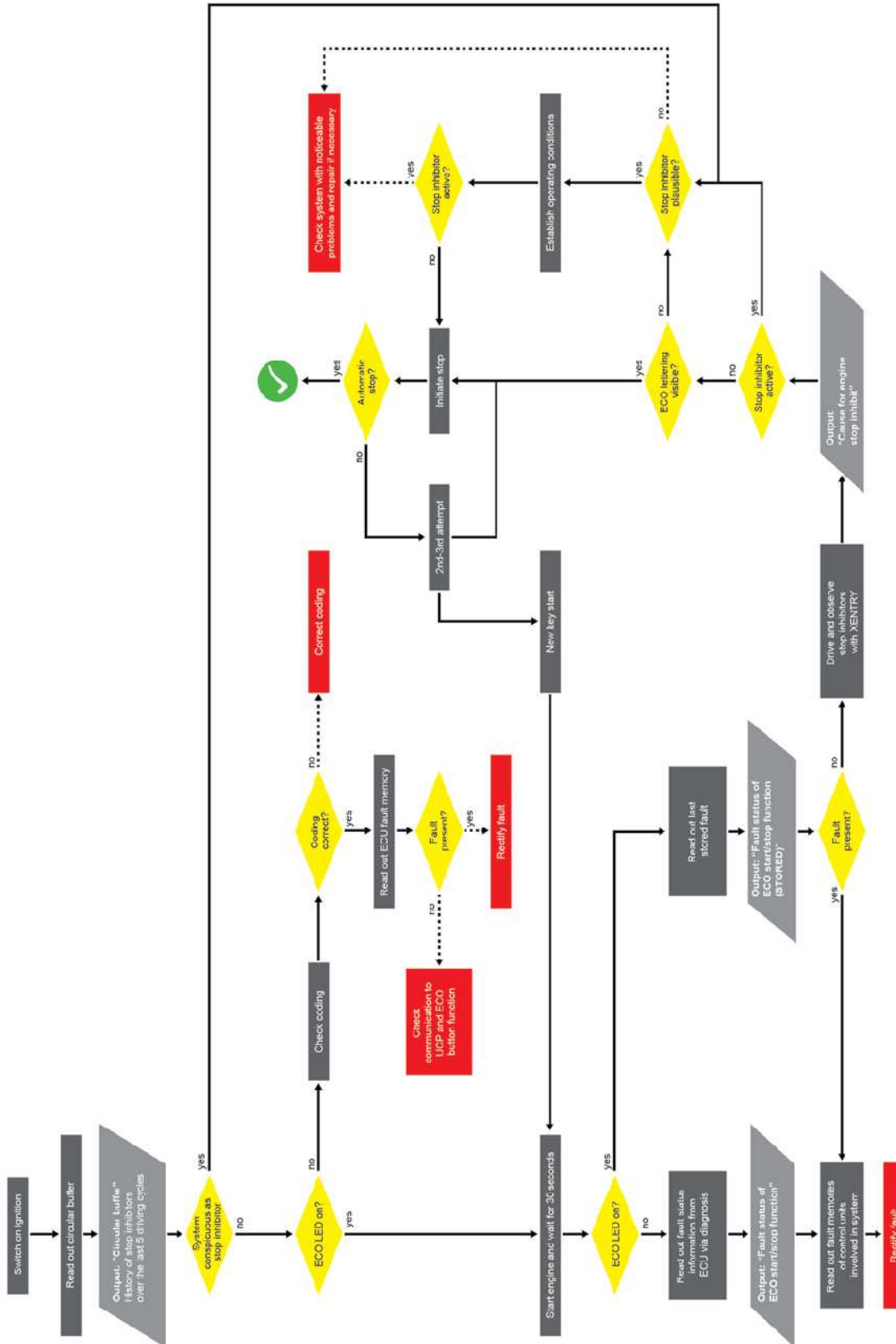
P15.00-2251-00

Engine hood

The screenshot shows the 'Actual values' tab for the 'Button 'ECO start/stop function'' function. The table below lists the components and their current values.

Abbreviation	No.	Name	Actual value	Specified value
Driver-side SAM	480	N72/1s50 (ECO start/stop function button)	Button NOT OPERATED	

P15.00-2252-00



Diagnosis tree

Known fault profiles and information on the diagnosis and repair of the ECO start/stop function are listed below.

Group 07:

- The engine control unit performs a diagnostic routine shortly after engine start. Various functions, such as the self-adjustment function, are checked internally. For this function to complete, it is necessary for the engine to operate at idle for approx. 45 seconds with the vehicle stationary. The diagnostic routine is then completed and the stop function is activated. If the vehicle is driven on the freeway, for example, immediately after engine start, the stop with 45 s idling does not occur. Because of this, the stop function can remain inactive over a longer period of time. The diagnostic routine is reactivated in the engine control unit at every ignition sequence. If an ignition sequence is interrupted manually with the key, the process will be repeated in the next driving cycle. A special case exists in vehicles with engine 271 (EVO). The stop function is initially activated immediately after engine start. After a short time, the stop function is suppressed again as the diagnostic routine commences. When the diagnostic routine has finished, the stop function is reactivated after approx. 45 seconds with the vehicle stationary and idling.

Group 14:

- In vehicles with engine 607 the regeneration process of the diesel particulate filter constitutes an additional stop inhibitor. When regeneration processes are aborted prematurely, the stop function is not available. The ECO start/stop function does not operate again until the regeneration process has been completed successfully.
- The ECO start/stop function is not enabled if the load state of the diesel particulate filter is > 150%.

Known fault profiles and information on the diagnosis and repair of the ECO start/stop function are listed below.

Group 25:

- In vehicles with manual transmission, damage to the electrical feed lines of the clutch pedal switch or incorrect fastening of the switch can interfere with the ECO start/stop function.
- In model 246 with manual transmission, damage to the ground cable on the upper clutch switch (S40/3) can shut down the ECO start/stop function. No faults are stored. The green LED in the ECO button lights up; the ECO symbol in the instrument cluster is displayed. Repair the damage in accordance with repair method AR00.19-P-0100A using a solder connector AR00.19-P-0100-09A.



P25.20-2072-00

Damage to the ground cable on the upper clutch switch



P25.20-2073-00

Damage to the electrical feed lines of the clutch pedal switch

Group 27:

- The ECO start/stop function is inoperative following replacement of the auxiliary oil pump. The ECO start/stop function has a fault. The cause could be the automatic transmission. The following fault is logged in the transmission control: U113800 - Communication with the electric oil pump control unit at the transmission has a malfunction. Remedy: Check whether the wrong auxiliary oil pump was installed and exchange it for the correct component if necessary.

Group 54:

- In vehicles without additional battery, voltage fluctuations can cause slight flickering in halogen lamps (primarily the brake lights). This applies only for vehicle models which previously had an additional battery installed.
- In vehicles without additional battery, the steering can stiffen when the engine stops. (Not in the A-Class, B-Class, GLA and CLA; these models are less sensitive to voltage dips). No faults are logged. The engine restarts when the steering is turned.
- In models 166, 176 and 246, the ECO start/stop function is suppressed until the battery capacity (SOC) is >80%. It is then recharged for a further 15 minutes. Only then is the stop function reactivated! At ignition OFF/ ON, the recharge time is interrupted and the stop function is activated directly at >80%. The recharge time can be shortened by new SCN coding of the rear SAM.
- The battery tests should be performed using the MIDTRONICS tester in Taxi mode! The internal resistance of the battery must be checked. If the battery still has a high current drain after charging for a long time, then it may have to be replaced.
- The battery sensor must be checked using the Xentry Diagnostics system as described in TIPS.
- Important for vehicles in stock! Battery care procedures stipulate charging via the jump-start connection point every 6 weeks.

Group 83:

- If there are permanent stop inhibitors in the air conditioning system and the actual values are OK, the codings for the A/C system must be checked (characteristic for hot countries, YES/ NO, evaporator temperature limit for automatic engine stop, A/C operating mode during automatic engine stops, COMFORT or STANDARD).

References to published TIPS documents**Group 15.30:**

- ECO start/stop, no stop function possible (stop inhibitors), fault codes (FC) 90B2 and 90B9
- ECO start/stop function intermittently inoperative

Group 54.10:

- ECO start/stop function intermittently inoperative
- Engine start/stop inoperative or engine starts up at random or 12 V on-board electrical system voltage too low
- Vehicle does not perform automatic engine stop
- Start/stop function, engine does not stop
- Start/stop intermittently inoperative - Stop inhibitor in on-board electrical system

Group 54.18:

- ECO start/stop inoperative, gearshift recommendation inoperative

Questions for fault rectification

Tick as appropriate and comment if necessary

Is the green LED in the ECO button constantly lit?

- Yes
 No

If no:

- Was the ECO button pressed beforehand?
 Was it possible to switch the LED back on with the ECO button?

Was the ECO symbol in the instrument cluster visible? (Monochrome display)

- Yes: There are no stop inhibitors.
 No: There is a stop inhibitor.

Was the ECO symbol in the instrument cluster visible? (Color display)

- Yes
 Green: There are no stop inhibitors.
 Yellow: There is a stop inhibitor.
 No: System is switched off or there is a fault in the start/stop function.

Was the ECO symbol in the instrument cluster -
continuously not visible or yellow?
not visible or yellow multiple times?
not visible or yellow for a short time?
not visible or yellow once for a long time?
not visible or yellow multiple long times?

- Yes No
Yes No
Yes No
Yes No
Yes No

Have all the required operator events for the automatic stop been performed?

Manual transmission:

Selector lever at "N", clutch pedal not operated, brake pedal depressed sufficiently hard and $V < 8$ km/h
Fulfilled Not fulfilled

Automatic transmission:

Selector lever at "D" or "N", brake pedal depressed sufficiently hard, accelerator pedal not operated and $V = 0$ km/h
Fulfilled Not fulfilled

Other:

Driver seat belt fastened?
Driver door closed?
Engine hood closed?

- Yes No
Yes No
Yes No

Abbreviations

CRD3

Engine OM651 with engine control unit CDID3

DPF

Diesel particulate filter

ECO

Engine cut off

EPS

Electronic power steering

HPS

Hydraulic power steering

IBS

Intelligent battery sensor

KI

Instrument cluster (IC)

KLA

Automatic air conditioning (AAC)

LED

Light-emitting diode

OBF

Upper control panel (UCP)

ME

Gasoline engine control unit

MOPF

Facelift

MSG

Engine control unit (ECU)

SEB

Voltage dip limiter

SG

Control unit (CU)

SAM

Signal acquisition and actuation module

SOC

State of charge

ZÖP

Auxiliary oil pump

A

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