Mercedes-Benz Intelligent Drive

November 2013
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All-Round Protection: Mercedes-Benz Intelligent Drive

- Traffic Sign Assist with Wrong Way Alert
- Active Blind Spot Assist
- DISTRONIC PLUS with Steering Assist
- Night View Assist Plus
- PRE-SAFE® Brake with Pedestrian Detection and Urban Braking Function
- PRE-SAFE® PLUS
- 360° camera
- Active Parking Assist
- PRE-SAFE® Impulse
- ATTENTION ASSIST
- COLLISION PREVENTION ASSIST
- Active Lane Keeping Assist
- BAS PLUS with Cross-Traffic Assist
- Adaptive Highbeam Assist Plus
Fusion of Comfort and Safety
Networking Sensors – More Protection

- **Multi Mode Radar**
  - 80 m range / opening angle 16° and
  - 30 m range / opening angle 80°

- **Stereo Multi Purpose Camera**
  - 500 m range, with 3D capability over a range of 50 m / opening angle 45°

- **Long Range Radar with Mid-Range Scan**
  - 200 m range / opening angle 18°
  - 60 m range / opening angle 60°

- **Ultrasonic Sensors**
  - 1.2 m / 4.5 m range

- **Short Range Radar**
  - 0.2 m–30 m range / opening angle 80°

- **Near/Far Infrared Camera**
  - 160 m range / opening angle 20°
Scale Model Sensor Ranges
Collision Prevention Assist Plus

Proximity Warning
Activation if distance between vehicles is too short

- Visual warning if distance between vehicles is under 0.8s
- 30 - 250 km/h on vehicles ahead

Forward Collision Warning
Activation upon danger of collision (e.g. inattentive driver)

- Visual and audible warning approx. 2.6s before collision
- 7 - 250 km/h on moving or stopping vehicles
- 7 - 80 km/h on standing vehicles

Adaptive Brake Assist
Activation upon danger of collision if driver brakes

- Situation adaptive braking support
- 7 - 250 km/h on moving or stopping vehicles
- 7 - 80 km/h on standing vehicles

Autonomous Brake
Activation upon danger of collision if driver brakes

- Autonomous braking
- 7 - 105 km/h on moving or stopping vehicles
- 7 - 50 km/h on standing vehicles
ATTENTION ASSIST

• System evaluates driver steering behavior and large number of further signals
• Active 60 - 200 km/h
• Driver can select standard or sensitive mode
• Audible and optical warning upon increasing signs of drowsiness or inattentiveness
• Always on after ignition, even if turned off before
Warning of Drowsiness or Inattentiveness as Standard Feature

ATTENTION ASSIST

• Special ATTENTION ASSIST menu in instrument cluster
  • Displays current Attention Level
  • Displays trip duration since last break
  • Indicates when system is passive (e.g. < 60 km/h)
• Audible and optical warning upon increasing signs of drowsiness or inattentiveness
• Suggestion of nearest rest areas in navigation
Side Wind Assist

- Driver support upon occurrence of strong side wind (gusts)

  - Functionality:
    - Detection of side wind (gusts) with the ESP sensors
    - Dynamic control of singled sided braking as used in Active Lane Keeping Assist
    - FYI: Vehicles equipped with Magic Body Control use suspension for Side Wind Assist
    - Reduction of lane errors and yaw rate, improvement of straight path of vehicle
    - Reduction of steering effort in strong wind gusts and storms
Enhanced Adaptive Cruise Control

DISTRONIC PLUS

• Supports the driver in keeping vehicle at desired distance to vehicle ahead
  • Even in stop & go traffic
• Highly dynamic system characteristics
  • When switched from E → S
• System monitors lead vehicle and its lead vehicle in own and adjacent lanes
  • More dynamic response in passing maneuvers (blinker feature)
  • Quicker response to vehicles cutting in
• Maximum deceleration increased to 5 m/s²
• System can be activated without lead vehicle
  • Car starts after driver confirmation
• No acceleration after loss of lead vehicle before
  • Exits of highways,
  • Roundabouts, T-intersections
• Suppression of passing on the wrong side (where applicable)
Comfortable Lateral Support

DISTRONIC PLUS with Steering Assist and Stop&Go Pilot

- System now provides longitudinal and lateral support from 0 to 200 km/h
  - Comfortable lateral support by steering interventions, even in curves
- Lateral support based on lane markings and surrounding vehicles
  - Detected by radar and 3D stereo camera system
  - 60 - 200 km/h: system follows lane markings only
  - Stop&Go Pilot at speeds below 60 km/h: additional intelligent consideration of leading and surrounding vehicles, especially in absence of clear road markings
- Icon indicates system activity
- Hands off-detection:
  Warning if there is no steering input by the driver
  Deactivation of lateral support upon further driver inactivity
Enhanced Capabilities upon Unintended Lane Change

Active Lane Keeping Assist

- Haptic warning and active intervention by single side braking if driver leaves lane unintentionally
  - Intervention on solid lines standard
  - Intervention on broken lines only in case of an imminent collision due to
    - Parallel traffic in or outside of blind spots
    - Passing vehicles
    - Oncoming vehicles
  - Interventions displayed in the instrument cluster
- Intelligent assessment of surroundings by fusion of data from radar and 3D stereo camera
- Driver can select standard or adaptive mode
- Speed range: 60 - 200 km/h
- Driver can always override by steering, braking or accelerating
Situation Adaptive Lateral Driver Support

Fusion of Comfort and Safety – Differentiation of DISTRONIC PLUS with Steering Assist versus Active Lane keeping Assist

- Normal Driving
- Steering Assist
  - Activated by driver
  - Steering wheel activity
- Vibration of Steering Wheel
- Single Side Braking
  - Driver inattentive
  - No steering wheel intervention

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Situation Adaptive Braking Assistance at Junctions

BAS PLUS with Cross-Traffic Assist

- Intelligent situation assessment and adaptive braking support by radar and 3D stereo camera:
  - Optical and audible warning
  - Enhances the driver's braking input, if necessary to full emergency braking
  - Activation of PRE-SAFE®
- Now also detects crossing traffic
  - cars, motorcycles, bikes, pedestrians
- Speed range
  - BAS PLUS in own lane: 7 - 250 km/h
  - Cross-Traffic Assist:
    - Own vehicle: 7 - 72 km/h
    - crossing traffic: max. ½ own speed
PRE-SAFE® Brake
with Pedestrian Detection and Urban Braking Function

Visual and acoustic warning

BAS PLUS: boosts inadequate braking by the driver as appropriate to the given situation

PRE-SAFE® Brake: autonomous braking when the driver fails to respond

Detection of pedestrians in the area in front of the vehicle
Autonomous Braking Support

**PRE-SAFE® Brake**

**with Pedestrian Detection and Urban Braking Function**

- Detection of pedestrians as well as slower moving, stopping or standing vehicles ahead by fusion of data from radar sensors and 3D camera
- Visual and audible warning
- At any time if driver reacts: BAS PLUS situation adaptive brake support up to full emergency brake if necessary
- **PRE-SAFE® Brake**: autonomous braking for collision avoidance or mitigation if driver does not react
- **Speed range:**
  - Pedestrian Detection and Urban Braking Function: 7 - 72 km/h
  - Collision avoidance up to more than 50 km/h
  - Support on slower moving vehicles: 7 - 200 km/h
Occupant protection in case of impending rear-end collisions

PRE-SAFE® PLUS

Detection of an impending rear-end collision

Activation of PRE-SAFE®

The vehicle's brakes are locked
Occupant protection in case of impending rear-end collisions

**PRE-SAFE® PLUS**

- Multi-Purpose radar sensor in rear bumper monitors rear traffic
- Detection of imminent rear-end collision
  - Activation of rear hazard-lights with high frequency (5Hz) to warn vehicle in the back
  - Activation of PRE-SAFE® to reduce risk of (neck) injuries
- Additionally if car is standing still, that is if driver brakes or activates HOLD function, car has stopped behind another car in DISTRONIC PLUS Stop&Go mode, car is in "P" or in "N" or parking brake is activated
- Locking of brakes
  - Reduction of forward acceleration and therefore occupant load / injury risk and reduction of risk of secondary collision
Traffic Sign Assist with Wrong Way Alert

- Detection and display of speed limit signs
- Additional detection of no-passing signs and various additional information
- Red alert and audible warning in "Do-Not-Enter" situations
  - Currently available in Germany only
- Signs detected by multi purpose camera
  - Plausibility checks by using navigation data
Adaptive High Beam Assist Plus

- Optimized illumination of the road
  - In Germany only approx. 20% of all drives are at night, but approx. 40% of all accidents with fatalities or serious injuries occur at night
- Multi purpose camera detects other vehicles in the range of the high beam
- System blanks out relevant vehicles in own lane or opposite lane
- System active at speeds above 30 km/h
  - if it is dark, light switch is in position AUTO and high beam lever turned on
- Dimming of light beam at roadside
  - if highly reflective road signs are detected
Parking with Intelligent Drive

Ultrasonic Sensors for Parking Maneuvers
Automatically Maneuvers Into and Out of Parking Spaces

Active Parking Assist

- Display of sufficient parallel and perpendicular parking spaces at speeds below 35 km/h
  - Activation when driver puts car in reverse gear and confirms with "OK" on the steering wheel
  - System automatically measures on the right side, if blinker is activated, also on left side of the road
- Vehicle automatically backs into parking space
  - Automatic steering and braking
  - Shift of gear and acceleration by driver
  - Maximum speed limited to 10 km/h
- Automatic steering out of parallel parking spaces
  - If vehicle was parked automatically before
- Additional driver information by PARKTRONIC
Surround View for Parking and Maneuvering

360° Camera

- Supports in entering and exiting of parking spaces as well as low-speed maneuvering on or off road
  - Alignment in parking spaces, protection of damage by curbs or other obstacles
  - Trailer mode for easier connection of hitch
- System uses four digital cameras (front, rear, exterior mirrors) and fusion of data from ultrasonic sensors
- Display or various real and augmented views (e.g. bird view) in COMAND Display
  - Dynamic trajectories displayed in various optional views to offer additional support in maneuvering
  - Display of PARKTRONIC information for enhanced protection
- Activated either automatically by switching to reverse or manually
- View changes according to gear selection and stays on up to 30 km/h

![Bird view and rear view camera](image1)
![Bird view and side view front](image2)
![180° rear view](image3)

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Effective Warning of Pedestrians and Animals on or next to the Road

Night View Assist Plus

• Improved sensor technology:
  • Far Infrared Camera (heat image) as addition to the current Near Infrared Camera with active infrared light beams for brilliant picture
  • Detection of pedestrians approx. 160 m ahead, detection larger animals (deer, horses, cattle) approx. 100 m
• Enhanced warning function in specifically relevant situations (darkness, unlit roads, \( v > 60 \text{ km/h} \))
  • Automatic fade-in of the brilliant night view image and marking of detected pedestrians and animals in the instrument cluster
• Spotlight-functionality:
  • Pedestrians will be highlighted outside (the single person in the path of travel in the most critical position over the entire width of the road)
  • No animals, as their reaction is unpredictable
• Enhanced range of use:
  • System can be switched on manually at any time, e.g.
    • In darkness also on lit roads (e.g. in urban / suburban areas) pedestrians and animals will be marked clearly
    • In daylight, then with no marking, but display of surroundings ahead, makes sense e.g. if sun is low (dusk / dawn situations)
Effective Warning of Pedestrians and Animals on or next to the Road

Night View Assist Plus
Assistance Systems with Enhanced Performance

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Mercedes-Benz Intelligent Drive
... to be continued
Upgrade Inside: Intelligent Drive in the new C-Class

- Comfort and Safety at a level never seen before in a C-Class
- Warning before and specific support or even autonomous reaction in critical situations can avoid accidents or mitigate their severity to save lives
- Mercedes-Benz Intelligent Drive systems stand out through ...
  - High reliability and availability
  - Plausibility of warnings and interventions
  - Easily understandable HMI and display concepts
- Nevertheless: assistance systems have limits – the driver always stays responsible!

Interior of the 2014 C-Class

Introduction of Head-Up Display
Reduction of Injury Risk or Severity during Head-On Collision

PRE-SAFE® Impulse

• In an early phase of a crash, prior to impact-induced deceleration
• Belt moves front occupants in the opposite direction as the direction of impact and pulls them down in their seat
• At time of maximum stress during an accident, movement is reversed, thus allowing a controlled dissipation of energy
• Pre-acceleration and force limitation enable a temporary decoupling of occupants from the crash
  • This substantially reduces the risk of injury or severity of injuries during head-on collisions
Improved Protection for Rear-Seat Passengers

Beltbag

• In the event of a frontal impact, inflatable seat belt strap can reduce risk of injury to rear seat passengers
• Reduction of load on the thorax
• Multi-layered seat belt strap has tear seams and can be inflated up to approx. three times its width by cold gas
• Optimization with newly developed virtual human models rather than test dummies only
  • More realistic determination of benefit of sophisticated belt technologies
Active Anticipatory Suspension

MAGIC BODY CONTROL

- ROAD SURFACE SCAN detects and measures the road surface ahead using the stereo camera
- Suspension adapts to the respective situation in fractions of a second and can reduce body movement significantly
- ACTIVE BODY CONTROL largely compensates body movements of road unevenness
- Active up to 130 km/h
Thank You for Your Attention