

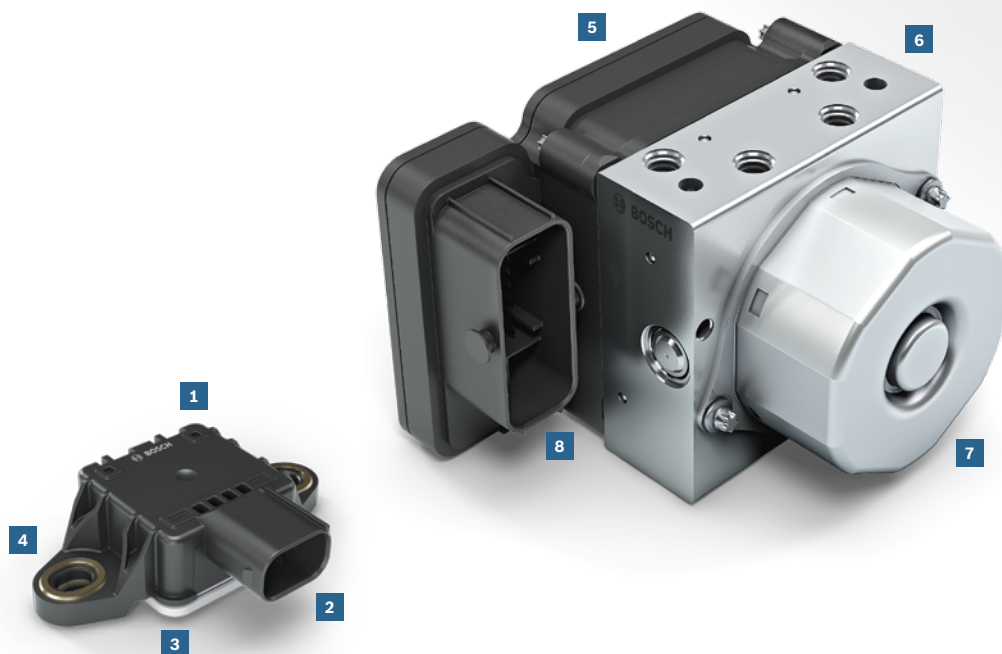
Active safety systems

Motorcycle stability control (MSC) enhanced



BOSCH

Invented for life



Product benefits

- ▶ Improved stability in all riding situations based on lean- and pitch-angle-dependent brake control, even at steep lean angles
- ▶ Optimized brake force distribution through eCBS
- ▶ More efficient power transmission, especially on difficult, slippery road surfaces
- ▶ Reduced risk within the physical limits
- ▶ Dynamics and riding pleasure remain unchanged

Vehicle segments

- 1 Sensor housing
- 2 Connector
- 3 Lid
- 4 Bush
- 5 MSC control unit
- 6 Hydraulic unit
- 7 Motor
- 8 Connector



67% all-in-one safety

of all accidents in Germany that are caused by two-wheelers and occur in curves **could be positively influenced by MSC**.

Source: GIDAS database (2001–2009)

MSC is the **world's first "all-in-one" safety system for two-wheelers** and makes riding as safe as possible.

Task The technical basis of the motorcycle stability control (MSC) is the ABS 9 enhanced system. When braking on a curve, MSC reduces the two-wheeler's tendency to return to an upright position. It adapts the braking force between the front and rear wheel, providing the safest deceleration possible. The MSC also reduces the risk of "lowsiders". These accidents occur when the rider brakes too hard on a curve and the wheels are no longer able to transfer enough side force onto the road. MSC can detect the risk of a lowsider and applies the braking pressure needed to ensure the best possible braking performance.

Function MSC uses an array of sensors to register the riding dynamics of the two-wheeler. Wheel-speed sensors measure the rotational speed of the front and rear wheels, and the inertial measurement unit measures the vehicle's acceleration and angular rate more than 100 times per second. The MSC system offers two kinds of control, both of which depend on the vehicle's lean and pitch angles: brake control and traction control. Brake control improves stability and braking effectiveness in all riding situations. By analyzing the sensor data, the difference in speed between front and rear wheels, and other parameters specific to the two-wheeler such as tire size, tire shape, and sensor location, the MSC control unit calculates the physical limits of brake force. If MSC detects that a wheel is starting to lock, it activates the pressure modulator in the hydraulic brake circuit. This lowers the brake pressure and then builds it up again within a fraction of a second, resulting in exactly as much brake pressure as is necessary to keep each wheel from locking and to minimize braking distance. Traction control regulates the maximum engine torque so that driving force is efficiently transferred to the road, even on variable or slippery road surfaces. The eCBS (electronic combined brake system) function ensures optimum distribution of brake force at all times – even when the rider mistakenly uses only one of the two brakes, or brakes with too much force.

Value-added functions MSC offers a whole range of safety functions. Drag torque control counteracts critical situations that arise when driving torque suddenly increases or drops. MSC detects the lean angle and the risk of traction loss, and instantly computes the best possible values for acceleration and braking. The wheelie control function regulates the engine torque, preventing the front wheel from lifting uncontrollably, while ensuring maximum acceleration. The rear-wheel lift-up control function keeps the rear wheel on the road by reducing the maximum brake force on the front wheel. This maintains riding stability and braking distances. The hill hold control function continues to hold the brake pressure constant after the rider has released the brake, which prevents the vehicle from rolling back unintentionally. The off-road control function allows optimum braking performance on unpaved roads without any restriction on riding dynamics and pleasure. The slope dependent control function detects the danger of the rear wheel lifting up on a downhill and adjusts the brake pressure to keep it on the road. When riding uphill, this function optimizes braking control to shorten braking distance.