TECHNIQUE

What you Need to Understand about ABS -Anti Lock Braking Systems

As safety becomes increasingly more important, even for motorcycles, more and more models are equipped with the Antilock Braking System (ABS). In addition to ABS, attention is being placed on Combined Brake Systems (CBS), that link the brake circuits to best distribute the brake forces between the front and rear wheels.

ABS Enhanced –with electronic Combined Brake System (eCBS) for motorcycles

Combined Brake Systems (CBS) are controlled mechanically or electronically. The mechanical type is not widely used as it requires specially designed brake components. In addition, the mechanical type is not able to cover certain braking conditions. In contrast, "Electronic Combined Brake Systems" (eCBS) are using conventional master cylinders and callipers and are able to optimize the brake performance to the particular driving situation.

For increased driving safety, especially on large and heavy motorcycles, Bosch has developed ABS enhanced which includes eCBS. With a weight of 1.6 kilograms and a volume of 1.2 litres, this Antilock Braking System is one of the smallest and lightest worldwide.

Characteristics

ABS enhanced is available as a two-channel system for active pressure build up at the rear wheel, or as a three-channel system for active pressure build up at both wheels.

For the eCBS function, additional valves and up to four pressure sensors are integrated into the ABS hydraulic unit. Therefore, the configuration of the ABS can be applied to the specific motorcycle characteristics.

Rider benefits

- Improved ABS performance u Optimized brake force distribution through eCBS
- Excellent vehicle stability during braking with significant reduction in stopping distance
- eCBS switches off automatically at low speeds so there is no impact on the handling of the motorcycle in tight curves
- Intelligent Rear-wheel Lift-up Mitigation
- Improved comfort due to value-added functions such as Traction Control and Hill Hold Control

ABS enhanced allows the motorcyclist to enjoy a safe and more comfortable ride by efficiently distributing the rider's braking force between the front and the rear wheel –

independent of which brake is activated. Measuring the rider‘s brake input and other parameters such as the speed, the system calculates the optimal brake force distribution in every braking situation.

ABS enhanced improves the motorcycle stability and helps to shorten the stopping distance, even in case of panic braking with only the rear brake applied by the rider. This is how inexperienced riders can safely achieve maximum deceleration.

In addition, ABS enhanced reduces suspension pitch. This minimizes inappropriate chassis reactions/motions and physical limits during braking can be utilized better.

ABS enhanced features special software adaptations and different driving mode settings, e.g. sport or comfort mode. In addition, the system enables value added functions such as Traction Control and Hill Hold Control. The eCBS and ABS function can be switched off.

Rear-wheel Lift-up Mitigation
For some bikes, rear-wheel lift-up during emergency braking is almost inevitable due to the significant dynamic wheel-load changes. To counteract this effect, Bosch has developed the Rear-wheel Lift-up Mitigation function. ABS enhanced uses the information of the integrated pressure sensors in addition to the wheel speed sensor signals to judge the state of the vehicle at any time. If the ABS control unit detects that the rear wheel is about to lift up during braking, it adjusts the pressure in the front brake circuit to recover rear-wheel grip.

Hill Hold Control
Hill starts are not always easy, particularly when the motorcycle is heavy. The optional Hill Hold Control function prevents the motorcycle from accidentally rolling backward. Based on information from a longitudinal- acceleration sensor, Hill Hold Control identifies if the motorcycle is on a slope and at a standstill. After the rider has released the brake, the function automatically keeps the brakes applied for a moment. The rider can then start off without rolling backward.

Chassis Systems Control ABS base/ABS plus–Antilock Braking Systems for motorcycles

Referring to the Bosch Antilock Braking System (ABS) for motorcycles assists the rider while braking in critical driving situations. The system prevents wheel lock-up and ensures bike stability as well as optimal deceleration while braking. ABS therefore significantly reduces the risk of falling and reduces stopping distance.

Rider benefits:

- Product design specific for motorcycles, meets highest demands regarding box volume and weight
- Fits all vehicle classes, including small bikes and scooters
- High vibration resistance
- Increased comfort through excellent brake lever feel
- Intelligent Rear-wheel Lift-up Mitigation

Bosch, the pioneer of ABS development, has offered Antilock Braking Systems for motorcycles since 1994. Based on decades of experience, Bosch sets a new benchmark for motorcycle riding safety with the generation 9 of ABS for motorcycles.
Characteristics
In the past, Antilock Braking Systems for motorcycles have typically been carried over from passenger cars, with little adaptation to motorcycle requirements. However, generation 9 of ABS base and ABS plus has been specifically designed to fulfil the motorcycle size and weight requirements. Compared to ABS generation 8, box volume and weight were reduced by half and the ABS software algorithm was modified to match

the newly downsized hardware. The optimized control of the electric motor for the return pump results in enhanced brake lever feel and improved noise behaviour.

ABS base and ABS plus fulfil strict requirements regarding vibration resistance as the magnet valve coils and the printed circuit board are mounted directly on the hydraulic unit.

Operating principle
Speed sensors at both wheels register the rotational speed. If a wheel risks locking due to intense braking or slippery road conditions, the ABS hydraulic unit reduces the braking pressure applied by the rider and controls the wheel speed as well as the vehicle deceleration. This preserves the gyrostatic effect of the wheel and keeps the bike stable, even on varying surfaces. This is how the rider can safely achieve the shortest possible stopping distance.

The generation 9 ABS systems are modular and scalable. They also feature a dedicated control strategy for each vehicle class, such as cruisers, sport bikes, scooters or mopeds. ABS base, the basic ABS version for motorcycles, offers proven protection against the locking of the wheels during braking and is suitable for all powered two wheelers with hydraulic front- and rear-wheel brakes. ABS plus, in addition, contains an integrated pressure sensor to fulfil the highest demands in the detection and mitigation of rear-wheel lift-up. ABS plus enables enhanced vehicle stability during extreme stopping manoeuvres. This makes it especially suitable for high performance bikes such as sports and super sport bikes.

Rear-wheel Lift-up Mitigation
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While ABS base provides a basic protection against rear-wheel lift-up, ABS plus offers enhanced rear-wheel lift-up protection using the information of the integrated pressure sensor in addition to the wheel-speed sensor signals to judge the state of the vehicle at any time. If the ABS control unit detects that the rear wheel is about to lift up during braking, it adjusts the pressure in the front brake circuit to recover rear wheel grip.