

Press release

Vibracoustic launches series production of switchable three-chamber air spring system

Darmstadt, 27 February 2018. To resolve the issue of the conflicting objectives of comfort and driving dynamics, Vibracoustic has developed switchable air springs with a three-chamber concept. By switching individual air chambers on and off by means of intelligent controls, the air springs can be set to four different stiffness levels depending on the driving situation. This makes driving more comfortable or dynamic, as well as safer.

Many car drivers look for comfortable driving behavior as well as high driving dynamics in their car. Air springs can make this possible, for one reason because they keep the vehicle at a constant level, regardless of the weight of load of the vehicle. In higher vehicle classes, air springs are typically used on all four wheels, as considerable emphasis is often placed on high comfort here. To resolve the issue of the conflicting objectives of comfort and driving dynamics here, Vibracoustic has developed switchable air springs. This enables the stiffness of the springs to be altered during the trip to specifically influence vehicle handling. Switchable air springs from Vibracoustic with a three-chamber concept are used in the new SUV range of a German premium manufacturer. Four different stiffness settings are thus possible depending on the driving situation and requirements.

Air springs consist of a pot filled with pressurized air and a rolling piston with a mechanical connection to the axle. A bellows and piston which form the active area for the pressurized air is located between the two components. In the case of switchable air springs, Vibracoustic divides the pressurized air into three chambers. With the aid of valves, these chambers can then be switched on or off to alter the air volume. The greater the volume available, the softer the springs, and the lower the air volume, the stiffer the springs. In this way, the three chambers can be combined so that the required spring properties are achieved, from comfortable to highly sporty. In current Vibracoustic applications, the stiffness of the springs can be practically doubled, from very soft to extremely stiff, over four gradients.

For the switching strategy of the valves, Vibracoustic can provide the basis and offer support to automotive manufacturers for the configuration. The switch valves can be set to either manually switchable or automatically switched depending on the application. Switchable means that the driver manually selects their desired driving mode, such as a sports or comfort mode. In contrast, switched air springs are directly involved in the driving dynamics. Switched air springs can thus reduce the rolling motion of a vehicle during cornering, for example, by switching off one or two chambers by means of the valves depending on the driving situation, and thus applying a stiff setting to the spring. Another scenario is to use a switch to reduce the pitch of the vehicle structure during braking while driving straight. The control unit takes account of longitudinal and lateral acceleration as well as the steering wheel angle, amongst other things, and in addition to the spring rate, also controls damping and vehicle level.

The switch valves that control the flow rate also play an important role with regard to the new air springs. The engineers at Vibracoustic developed a valve that is specially tailored to the requirements of three-chamber systems. The switching times then need to be short enough to enable switching in the first place, for example. The opening also needs to be adequately sized. However, the developers also minimized switching noise using a membrane, to ensure that it is not perceptible by drivers or passengers in the vehicle. This feature can play a role in the case of electric vehicles where there is no noise or vibration from the combustion engine to cover this type of noise.

In the future, Vibracoustic will also provide switchable air springs in dual-chamber systems. While these systems can only offer two different stiffness levels, the corresponding regulation also enables effective roll stabilization. Vibracoustic thus also aims to meet customer demands for improved comfort and driving dynamics in mid-range vehicles.

Vibracoustic is the leading supplier of vibration technology solutions for the global automotive and commercial vehicle industries. The company which was created from the joint venture TrelleborgVibracoustic recorded a turnover of approximately 2 billion euros in 2016. With around 10,000 employees in 43 locations across 19 countries, Vibracoustic develops and produces drive and chassis components which reduce vibration and noise. For more information, visit www.vibracoustic.com

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