

3PASS *flex*: New background noise simulation system for multi-microphone arrangements

3PASS *flex* is HEAD acoustics new simulation system for measuring the speech quality performance in the presence of background noise. It is particularly suited for testing multi-microphone systems, microphone arrays or beamforming microphones in real world conditions where multi-point noise simulation with flexible microphone and loudspeaker arrays is required. 3PASS *flex* reproduces any previously recorded sound field at distinct microphone positions that is representative of the typical use case. Therefore, the system is perfectly suited for evaluating how well a product performs under true-to-reality background noise conditions. As more and more applications from car hands-free systems and In-Car Communication (ICC) systems to televisions, conference systems and even Internet of Things (IoT) devices and home automation systems offer multi-microphone solutions, 3PASS *flex* is the ideal solution for testing various systems.

High flexibility for precise positioning of microphones and loudspeakers

High flexibility is a main feature of 3PASS *flex*. Depending on the measurement object, the new system enables for a customizable number and location of microphones and loudspeakers. In this way, users can place measurement microphones near the product microphones or - in the case of development - near positions planned for the future. In motor vehicles, for example, the interior is usually very small and the possible loudspeaker positions are limited. This makes the multi-point noise simulation method provided by 3PASS *flex* the most appropriate solution because it can simulate spectral content and phase of a car noise correctly at multiple points in space.

User-friendly and automated digital equalization of the system

Automated digital equalization of the whole system can easily be realized via the intuitive user interface of the *flex* version of 3PASS (3-dimensional Playback of Acoustic Sound Scenarios). Each loudspeaker as well as each microphone is selectable for precise calibration, equalization and level adjustment. Thus, 3PASS *flex* ensures a highly accurate spatial sound-field reproduction including exact level and spectral reproduction of the pre-recorded noise field. Besides the 3PASS *flex* software, the system requires the mobile front end SQuadriga II and a flexible microphone arrangement for sound recordings and system equalization. Furthermore, the measurement front end *labBGN* is required for equalization and background noise playback. The communication quality analysis software ACQUA may control 3PASS remotely via TCP/IP connection or a specific remote control cable.

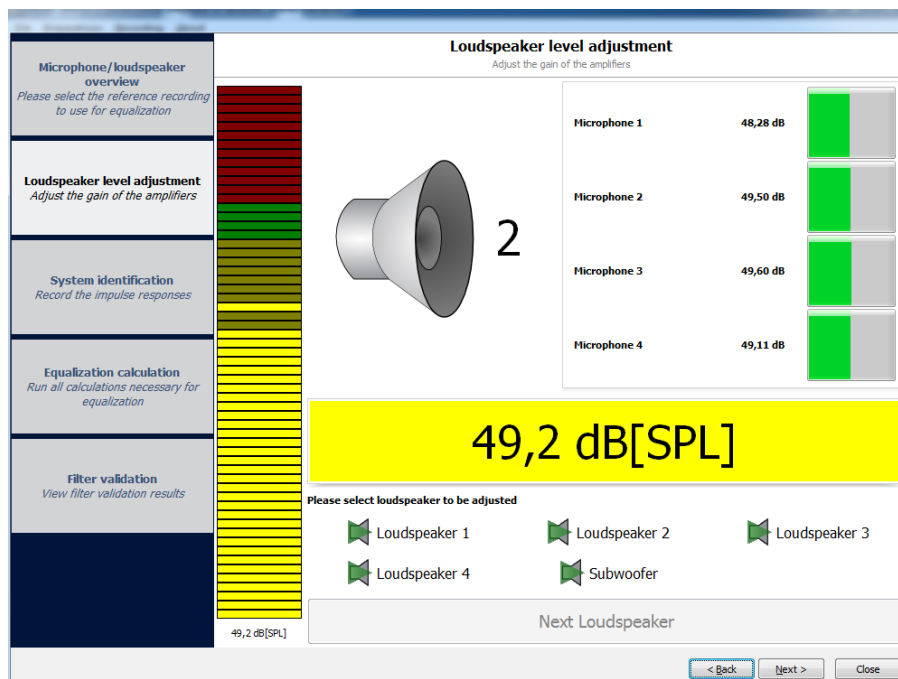
3PASS *flex* complies with international standards

HEAD acoustics 3PASS *flex* complies with the new Annex F of the ITU-T standards P.1100 and P.1110, P.1120, P.1140 (Annex B). The first two standards of the international standardization body ITU-T specify speech quality requirements for narrowband respectively wideband hands-free terminals in motor vehicles. P.1120 specifies super-wideband and fullband hands-free communication in vehicles whereas P.1140 specifies narrowband and wideband emergency call systems in vehicles.

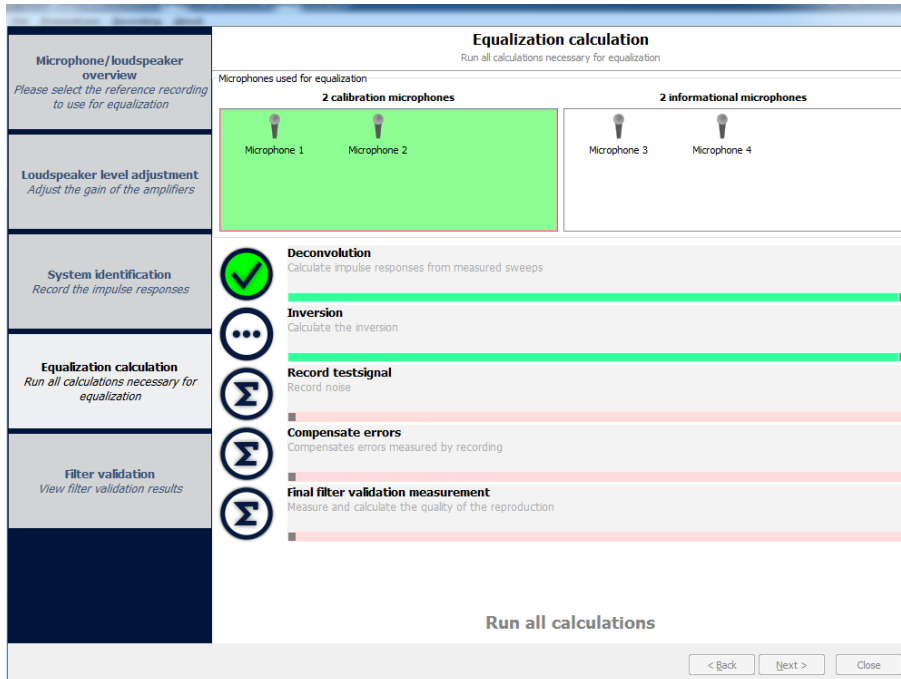
About HEAD acoustics – Telecom Division

HEAD acoustics was founded in 1986 and has been involved in noise and vibration, electroacoustic and voice quality testing since its inception. HEAD acoustics is based in Herzogenrath, Germany, with affiliates in France, Great Britain, Japan, South Korea and USA as well as a world-wide network of representatives. The Telecom Division of HEAD acoustics manufactures telecom test equipment and provides consulting services in the field of speech and audio quality. Moreover, HEAD acoustics closely co-operates with DECT Forum, ETSI, ITU-T, 3GPP, TIA, CTIA, GSMA and other standardization bodies with regard to the development of quality standards for voice transmission and speech communication. In many partnership projects, HEAD acoustics has proven its competence and capabilities in conducting tests and optimizing communication products with respect to speech and audio quality under end-to-end as well as mouth-to-ear scenarios.

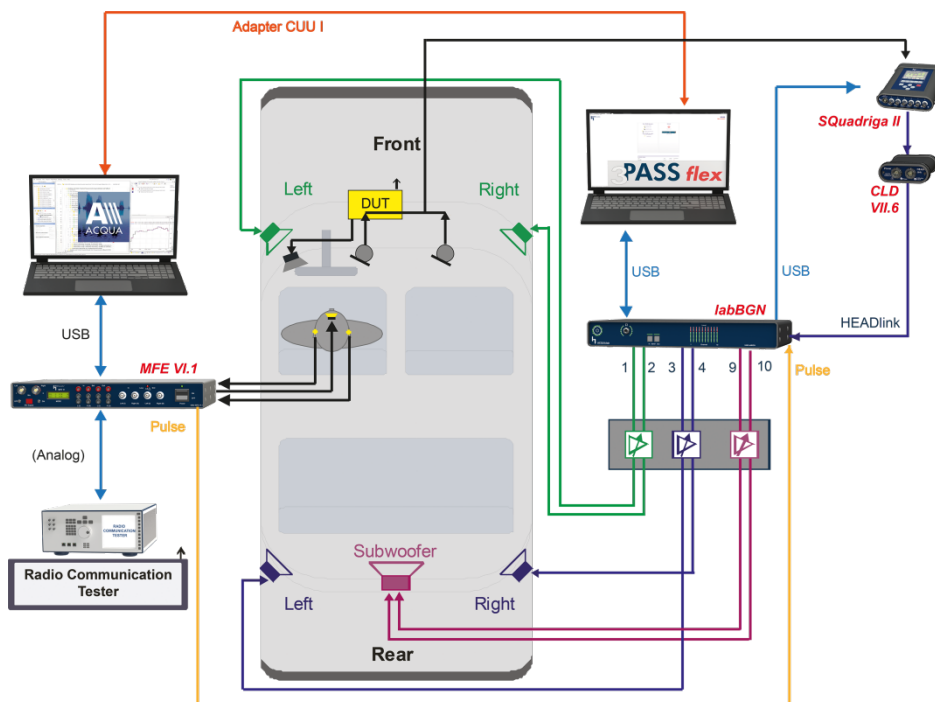
Images



3PASS *flex* enables digital and accurate level adjustment of each loudspeaker in the system. A colored level indication bar simplifies the procedure.



Before digital equalization, the arranged microphones can be categorized into calibration or informational microphones.



Measurement setup as required for testing multi-microphone car hands-free systems. The setup includes the noise simulation software 3PASS flex, the communication quality analysis system ACQUA, an artificial head measurement system such as the HMS II.3, the measurement front ends MFE VI.1, labBGN and Squadriga II as well as microphones, loudspeakers, a subwoofer, and power amplifiers.