

# Field Study News

## FlexControl

### Frequency-specific volume adjustment

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#### Abstract

Ever since hearing instruments were first introduced on the market, volume controls have played a key role. However, "louder" does not necessarily mean "clearer." With the innovative FlexControl, based on the Spice platform, Phonak enables hearing instrument users to adjust their devices to make them "more audible" and "clearer" for the first time.

An independent study involving 16 experienced hearing instrument users investigated the benefits of FlexControl compared with a conventional volume control in various listening situations. The results show that frequency-specific volume adjustment present additional advantages over standard volume controls, in that it offers greater clarity and audibility, is more comfortable, produces a better sound and deals more effectively with ambient noise.

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#### Introduction

Giving end users the option to control the volume on their hearing instruments is the oldest and best-known way of adapting instruments to suit individual requirements according to the listening situation (Cox and Alexander, 1991). While the first hearing instruments featured a small analog volume wheel (poti) for altering volume, this was replaced in later models by programmable operating elements. Over the course of time, new solutions were developed to enable end users to control volume interactively. These solutions included the binaural synchronization of user inputs as well as learning algorithms. However, all of these approaches have one thing in common: only the general volume could be changed, regardless of the user's actual needs.

The new premium hearing instruments of the Phonak Spice Generation feature FlexControl, a new kind of algorithm that fulfills these needs. Depending on the degree of hearing loss and the SoundFlow automatic settings, the automatic programs offer a volume change function that is dependent on the user's hearing loss and is thus frequency-specific. It also allows the program's SoundCleaning options (e.g. NoiseBlock, EchoBlock or microphone settings) to be

adjusted. Therefore in a restaurant environment, for instance, where users need to understand their conversational partners better, FlexControl makes it possible to adjust the gain dependent on the frequencies and, among other things, increase the intensity of the beamformer to direct the hearing focus more strongly on the conversational partner. An independent study compared FlexControl with a conventional volume control in a laboratory as well as in everyday situations.

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#### Test subjects and methods

16 experienced hearing instrument users with moderate to severe hearing loss took part in the study. After their medical history was noted, the test subjects were fitted binaurally with Phonak Ambra microP hearing instruments. A comparison of FlexControl and a conventional volume control was carried out by the test subjects in the laboratory, in three sessions with approximately one-week intervals. Half the subjects started by evaluating FlexControl, while the other half evaluated the conventional volume control. The groups then swapped devices from session to session. The test subjects were first presented with various sound samples (quiet situation, speech, speech in background noise, and music), during which they had to select their preferred settings for either FlexControl or the traditional volume control in each case. During this process, the subjects were asked about the optimal clarity / audibility as well as the optimal sound quality / comfort. In the next stage, the chosen settings for FlexControl and the traditional volume control for each sound sample were compared directly with each other by means of a paired comparison. In the everyday life situation, the hearing instruments only had the automatic SoundFlow program enabled. For this test the subject had to analyze either FlexControl or the conventional volume control in terms of the improvement in clarity and audibility or sound quality and comfort in various listening situations, and to record in a questionnaire the degree of hearing assistance and usefulness offered by the devices.

## Results

The results corroborate previously evaluated laboratory data which show that FlexControl performs better than a conventional volume control under all listening circumstances (Nyffeler, FSN 2010).

The results of the paired comparison revealed a preference for the new FlexControl over the conventional volume control in all of the sound situations tested (Fig. 1A). FlexControl was particularly preferred in situations involving background noise. This trend appears to be fairly stable across all three sessions (Fig. 1B). Only in the music situation are both types of volume control rated as approximately equal.

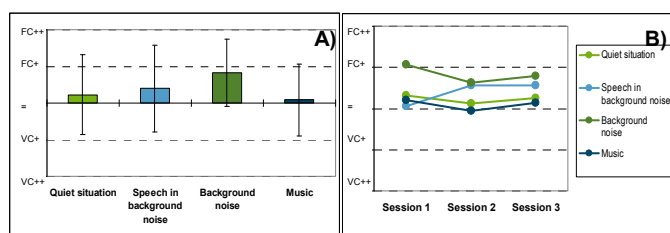


Fig. 1: A) Overall results of the comparison between FlexControl and a conventional volume control, B) Results of the comparison over the course of the three sessions. FC++: FlexControl considerably better; FC+: FlexControl better; =: both controls rated the same; VC+: conventional volume control better; VC++: conventional volume control considerably better.

The accuracy and reliability with which the test subjects selected their preferred settings for FlexControl and volume controls over the three sessions were slightly fluctuating with the average reliability value of  $r \sim 0.64$ . This means that the test subjects were evidently able to program similar or same settings with the help of FlexControl or volume control, in order to achieve maximum intelligibility or the best possible sound quality. Here, too, the music situation is distinguished by a somewhat greater range of variation in the settings.

After each comparison, the test subjects were also asked to give a reason for their assessment (Fig. 2).

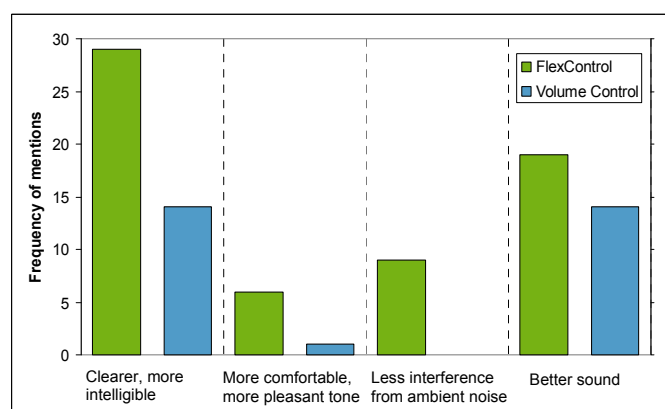


Fig. 2: The number of times various reasons were mentioned for the test subjects' preference for FlexControl or the conventional volume control.

It clearly showed that FlexControl is able to offer greater hearing assistance due to better clarity and audibility. They

reported that listening situations were more comfortable offering a more pleasant sound with the use of FlexControl, and background noises were described as less intrusive. Better sound quality (e.g. not so harsh, fuller in tone) with FlexControl was also more positively rated than conventional volume control.

The assessments of everyday listening situation where a sound signal was presented in quiet as well as in noise in quiet FlexControl achieved better ratings than the conventional volume control when the aim was to obtain the best possible audibility and clarity (Fig. 3 A and B).

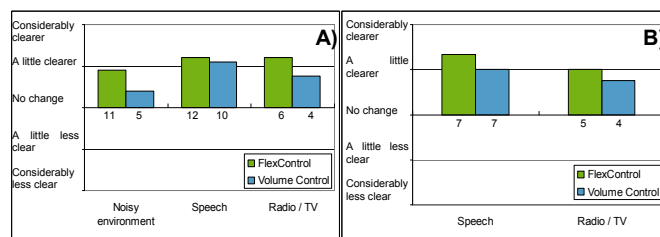


Fig. 3: Assessments of the volume controls in everyday situations. A) with an additional source of background noise, B) without any additional sound source. The figures underneath the bars correspond to the number of assessments.

## Conclusion

The results gained using the paired comparison method show a systematic preference for FlexControl over a conventional volume control in all four of the sound situations tested. FlexControl offers hearing instrument users the opportunity to adjust the settings of their instruments to suit their actual needs, in a way that is easy and also much better than before.

However, this does not mean that FlexControl is a partial substitute for the necessary and important work carried out during a hearing instrument fitting by a hearing care professional. The better a hearing instrument is fitted, i.e. the better placed all relevant and important sounds are within the user's hearing range, the less necessary it will be to perform simple volume adjustments. This in turn improves the ability of FlexControl to meet the changing time- and situation-specific hearing requirements of the user directly within their actual listening situation.

## References

- Cox RM and Alexander GC, 1991. Preferred hearing aid gain in everyday environments. *Ear Hear* 12(2):123-6
- Nyffeler M, 2010. Individualizing automatic performance. *Field Study News* September

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