

EDITORS OF THIS ISSUE

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ABSTRACT

The Inium platform in Oticon Alta and Nera offers a range of directionality modes to accommodate for the specific needs and preferences of hearing instrument users. These are designed to provide optimal listening conditions in the various situations encountered by the individual listener on a daily basis. This means that the instrument, depending on highly individual needs, must be able to shift between modes for “open”, environmental listening to more focused settings that helps by emphasising the source of interest in front and by suppressing the noise from behind.

Directional listening can assist nature

One of the well-documented ways of improving speech understanding in noisy environments is the use of directional microphones. Directional microphones use the small delay in time between the two microphones on each instrument to reduce noisy inputs coming from different directions from that of the source or direction of interest. However, using the directional response also has drawbacks in certain situations: they are prone to wind noise, can have a roll-off at low frequencies and compromise spatial and contextual awareness. This is exactly why the “true” directional response is not used all the time and why multiple modes, which automatically adapt, are needed.

Examples of smart adaptation to both personal and situation-specific parameters are:

- Switching the instrument to the omnidirectional setting in windy conditions
- Adding compensation for the loss of low-frequency gain in full directional mode for users who suffer from low-frequency loss
- Choosing an omnidirectional or less directional mode when inputs come from different directions.

Free Focus - offering directional modes for different personal needs and price points

Free Focus is the "listening concept" for directional microphones in Oticon Alta (Free Focus Premium) and Nera (Free Focus Advanced). Free Focus defines the range of microphone focus modes programmed into the instrument.

Not everyone prefers the same response from a hearing instrument. Even if a directional microphone provides a more focused listening experience, a listener may prefer a more open sound and less "assistance" from the instrument.

This is why Free Focus extends the opportunities to match individual needs for directional 'assistance', providing several focus modes to choose from when programming the instrument.

With our Premium instruments, a broader range of microphone focus modes are available, allowing better optimisation of the directional performance for each user in his or her challenging situations.

Depending on key characteristics in the sound environment, the appropriate microphone focus mode is selected by the instrument in order to provide the best listening experience.

Free Focus Premium

Encompasses five focus modes; Optimised Omni, Speech Focused, Split directional, Full directional, and Full directional with low frequency (LF) enhancement.

Free Focus Advanced

Encompasses four focus modes; Optimised Omni, Split directional, Full directional, and Full directional with low frequency (LF) enhancement.

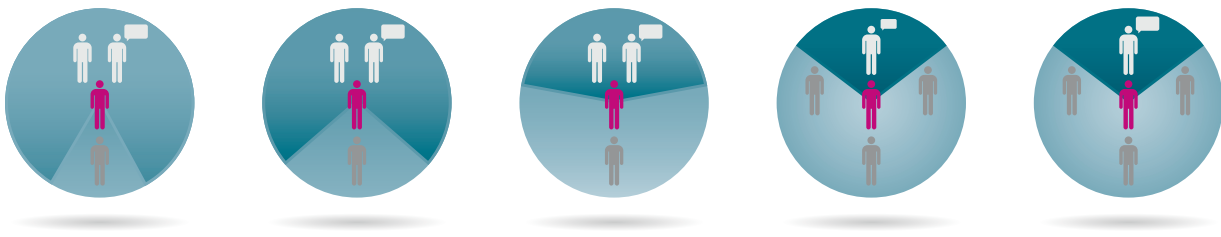


Figure 1 - The five Free Focus modes in Free Focus Premium. From left: Optimised Omni, Speech Focused, Split directional, Full directional, and Full directional with LF enhancement.

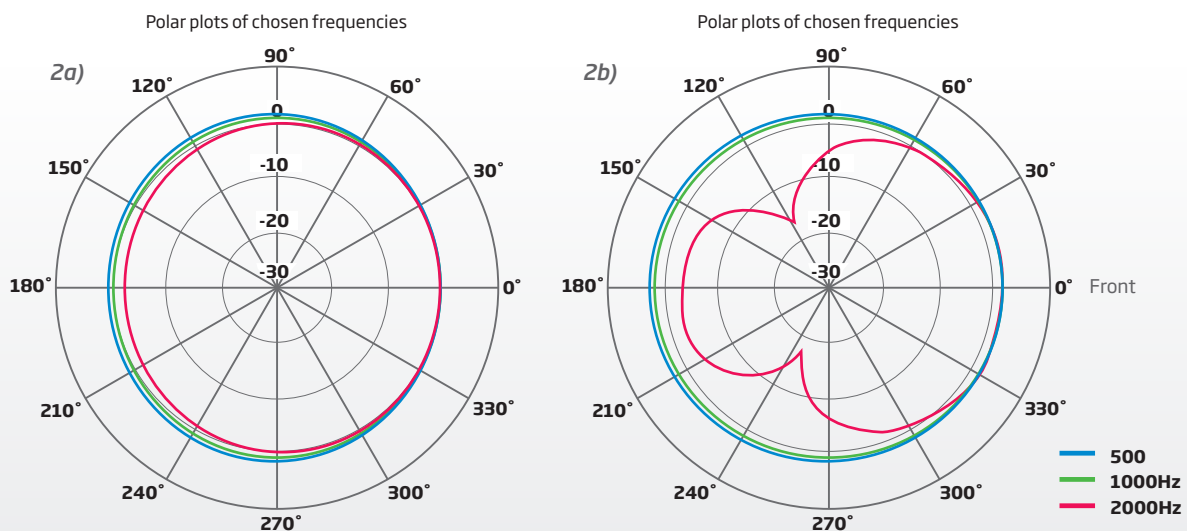


Figure 2 - The two surround modes in Free Focus. Optimised Omni (2a) is an omnidirectional mode with slightly enhanced frontal emphasis compared to its predecessor, Front Focus. Speech Focused (2b) is a light directional mode with a high cut-off between directional and omnidirectional mode at 1880 Hz. Both polar plots are measured in free field.

The Surround modes - Optimised Omni and Speech Focused

Free Focus Premium offers two surround modes: Optimised Omni and Speech Focused. The prescribed personal profile determines the most appropriate mode for the user's needs and preferences. Optimised Omni is an omnidirectional mode with slightly enhanced frontal emphasis compared to its predecessor, Front Focus.

Speech Focused is a light directional mode with a high cut-off between directional and omnidirectional mode at 1880 Hz. This keeps the lower frequencies omnidirectional, allowing environmental inputs from all directions and high frequencies in a more directional mode, to enhance the focus on the source of interest positioned in front of the listener. Free Focus Advanced does not offer the Speech Focused option.

The Surround mode is active in quiet and moderately noisy environments.

Directional modes - Split, Full and Full directional with LF enhancement

Free Focus features three directional modes. Split directional mode is a mix between omnidirectional and directional modes: the lower frequencies are omnidirectional, high frequencies are directional. This follows the same principle as the Speech Focused, but with a lower cut-off, at 1250 Hz, enhancing the directional effect. Split directionality is applied in moderately noisy to noisy environments.

Full directional and Full directional with low frequency enhancement are the two directional modes in Alta and Nera. The Full directional mode enables full focus on the source positioned in front of the hearing instrument user while attenuating noise coming from behind the listener. For hearing instrument users with moderately severe to profound hearing loss, the roll-off of

low frequencies means that the users will lack the loudness that the low frequencies attribute with. This is why the full directional mode was not previously recommended to this user group, for which loudness is of great importance. The full directional mode with LF enhancement adds gain in low frequencies to make up for the loudness loss, allowing the moderately severe to profound group to get the same focus option as other users.

The importance of offering multiple microphone modes

As part of an external study with Oticon Alta, the benefit of the two surround modes was examined¹⁾. The results of the speech understanding tests performed in the laboratory showed that the majority of participants were able to use the help from the more directional Speech Focused mode to achieve better performance on the lab test. However, when asked which mode (or which personal profile with one or the other mode prescribed as part of it) they preferred, half preferred Optimised Omni and half preferred Speech Focused, unrelated to performance. YouMatic and personal profiles take these preferences into account when prescribing personal profiles and surround microphone mode.

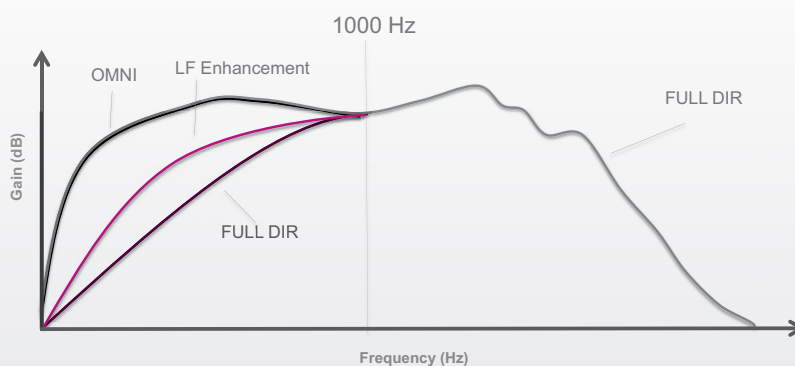


Figure 3 - Low frequency gain in different directional modes. Full directional with LF enhancement provides extra gain for the low frequencies to restore the loudness sensation which is compromised when using a full directional mode.

1) Weile, J.N., et al., A Broader Look at Performance and Personalization in Hearing Aid Fittings. Hearing Review, 2013. September.

People First

People First is our promise
to empower people
to communicate freely,
interact naturally and
participate actively