WIDEX®
The World Leader In
100% Digital Hearing Technology™

SENSO PLUS C9+ BTE

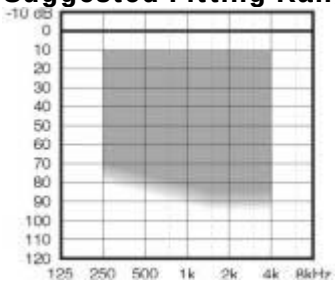
Fully Digital Directional BTE

- 3 channel DSP with
- Loudness Mapping
- Sound Stabilizer™
- Speech Enhancement
- Speech Intensification System™
- In-Situ Sensogram Fitting System
- Automatic Feedback Management
- Directional Microphone

Recommended for:

- Mild to severe hearing losses.
- All configurations of hearing loss including ski-slope, sloping, flat and reverse slope losses.
- People who desire a fully automatic aid with no manual controls.

Suggested Fitting Range



The SENSO C9+ is a 100% digital hearing aid with a dedicated DSP (Digital Signal Processor) utilizing over 20 bit representation of the signal (maximum bit depth is 32 bits) and 32 kHz sampling frequency.

SENSO C9+ offers all the SENSO+ advantages:

- 3 channel Compression with adjustable crossover frequencies to maximize fitting flexibility.

• Loudness Mapping to compensate for recruitment.
• Sound Stabilizer™ for smooth gain transition.
In-Situ Sensogram fitting to increase accuracy of fit.
• Automatic Feedback Manager to minimize feedback.
• Speech Enhancement Algorithm to increase listening comfort and ease in noise.
• Speech Intensification System™ offers additional focus on speech signals in noisy environments.
• Expansion processing to minimize microphone noise.
• Extended Input Dynamic Range to allow input levels of up to 100 dB SPL without saturation/distortion.
• Automatic Output Control (AOC) to ensure low distortion at high output levels.
• Highly efficient DDD digital output amplifier to achieve long battery life (415 hours from a size 13 battery) and high MPO (125 dB SPL).
• Low battery beep-tone indicator to alert battery replacement is needed.
• Separate A/D converter for inductive input to allow equalization for microphone response and adjustable sensitivity.
• Anti-hum filter to minimize line noise (i.e.-60Hz interference).
• High immunity against interference from most digital cellular phones.
• Compatible with the majority of Direct Audio Input (DAI) Systems.
• 3 position M-MT-T switch.
• Available with a mini-hook and in 8 colors.

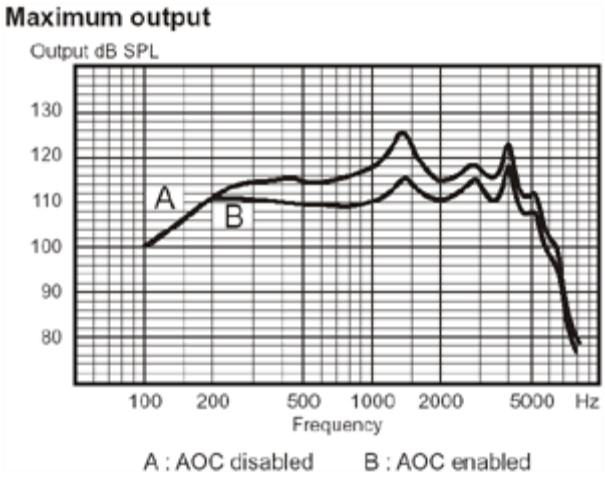
Technical Data (ANSI S3.22-1996)

		2cc Coupler
OSPL90:	Peak	125 dB SPL
	HF Average	118 dB SPL
Battery Drain (st. by)		0.6 mA
Battery Drain (typical)*		0.65 mA
Battery Type 13 Zn-Air (270 mAh)		415 hours
Telecoil TLS**		+ 2 dB
Harmonic Distortion		1%
IRIL (GSM/DCS interference level)		15/25 dB SPL

* Under conditions specified to mimic Ref. Test Gain.

** A telecoil input of 100 mA/m will equal a microphone input of 70 dB SPL.

AOC (Automatic Output Control) is an output limiting compression circuit that eliminates distortion from saturation. It can be turned on (=factory setting) and off from the programming devices.



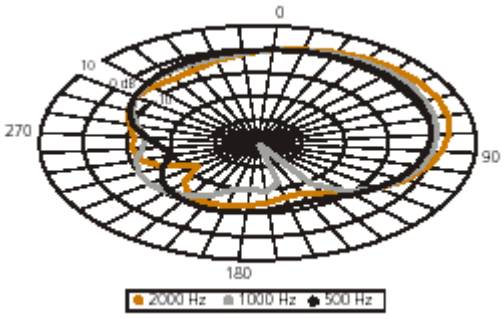
A: AOC disabled B: AOC enabled

Measurements

The advanced signal processing algorithms used in SENSO+ make results of direct conventional measurements variable and difficult to interpret. Special considerations are necessary in making these measurements.

For quality control and service purposes, a special test mode has been defined that allows inspection of the electroacoustic integrity of the hearing aid's components. The test mode can be accessed from both the LP2 Programmer and the Compass software.

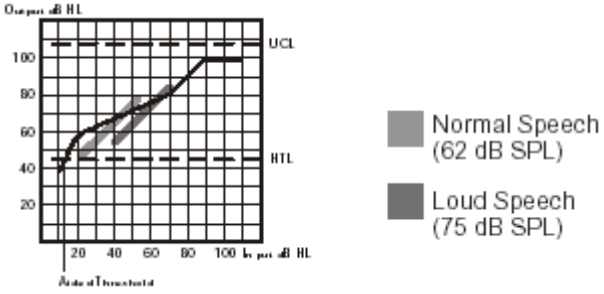
SENSO+ Directional



The signal processing algorithms in the SENSO+ work in synergy with a dedicated directional microphone. In addition to providing a comparable signal- to-noise ratio (SNR) improvement as a dual microphone system1, the low compression kneepoint of the SENSO+ allows wearers to hear sounds coming from behind without switching between microphones2.

Compared to a two microphone system, the dedicated microphone is more stable, as it does not rely on close matching between microphones.

Loudness Mapping

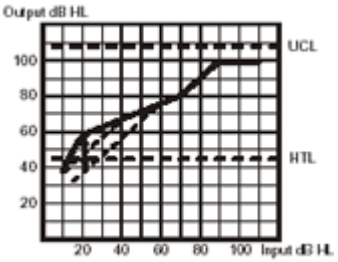


Loudness Mapping uses an advanced automatic volume control function to provide audibility and comfort for most sounds. Compared to linear hearing aids, soft sounds are amplified more, providing a lower aided threshold; and loud sounds are amplified less, reducing listening strain. The widest possible range of sound is preserved within the wearer's narrow dynamic range.

Unlike typical WDRC systems, which use fast regulation time to achieve a nonlinear gain function, Loudness Mapping uses long adaptive regulation time and allows an almost linear reproduction of speech. This maintains the temporal and spectral fine-structure and keeps intelligibility and clarity of reproduction at the highest level, while keeping amplification of environmental noise at a minimum.
Loudness Mapping works independently in all three channels. Amplification of sounds in one channel will not influence amplification in the other channels.

Sound Stabilizer™
In traditional automatic hearing aids, fast gain adjustment is used to adapt to intensity changes in the environment. However, fast gain adjustment often causes annoying effects, which seriously degrades listening comfort and speech comprehension. Slow gain adjustment eliminates these effects, but under some conditions they may introduce silent periods if the intensity changes too rapidly. Sound Stablizer™ applies dynamic control of the regulation times. This yields steady gain in stable environments and rapid gain adaptation to drastic changes in the acoustic environment. Amplification reduced after a loud noise, for instance, will quickly return to ensure audibility for soft sounds.

Automatic Feedback Manager



SENSO+ is equipped with an Automatic Feedback Manager in each of the three frequency channels. It determines how much gain is possible without feedback and limits the maximum gain accordingly. This will not influence amplification of normal speech sounds.

The Automatic Feedback Manager can be adjusted manually to control the kneepoint of the input-output function. This affects gain for the very soft sounds. It can be used to help new wearers to acclimatize to hearing soft sounds again with reduced amplification initially. This process is described in our programming manuals.

Speech Enhancement
One of the main difficulties for hearing aid wearers is understanding speech in noise. The Speech Enhancement algorithm uses a patented speech detection function which performs a statistical analysis of the incoming signal in each of the three frequency channels. With the speech enhancement algorithm, SENSO+ emphasizes the frequency regions which hold the most speech and attenuates the frequencies dominated by noise.

Speech Intensification System™
This system further increases the focus on speech reproduction in the most difficult listening situations, by adding cross-channel analysis to the results of the speech enhancement algorithm. This means that the final output of the hearing aid will not only depend on the signal-to-noise ratio in each channel alone, but also across the 3 channels and their relative importance to speech understanding. The total sound spectrum is considered in the adjustment of each channel.
For wearers who desire additional comfort in noise, this feature can be disabled.

Extended Input Dynamic Range
Distortion can result when the input signal exceeds 85-95 dB SPL. Some hearing aids alleviate the situation with the use of input compressors. But this may compromise the intensity relationship of the input. In SENSO+ the input stage

has been designed to accept input levels of 100 dB SPL without saturation and distortion.

DDD – Direct Digital Drive
The 100% digital output stage increases the output efficiency compared to class B output amplifiers. This allows higher maximum output than otherwise possible with the small hearing aid receivers.
This efficiency also translates into lower power consumption. Battery life of around 415 hours can be expected from a size 13 ZincAir cell. Distortion is kept to a minimum and sound clarity a maximum.

Low Battery Beep-Tone Indicator
This system alerts the wearer when the battery is near exhaustion. Clear audible beep tones at a level equivalent to a 70 dB SPL input are produced when it is time to replace the cell.

Telecoil
The telecoil and the microphone in SENSO+ have separate A/D converters. This allows filtering of the inductive input without any analog pre-amplifiers. That is why SENSO+ can offer both equalization of the telecoil response, so that it has the same sensitivity as the microphone, and an anti-hum filter to reduce interference from the line input.

The sensitivity of the telecoil is adjustable. This will enhance the benefits from the telecoil when used with weaker inductive loop systems.

Programming
All SENSO+ hearing aids can be programmed with the small hand-held LP2 programmer and the HI-PRO interface with the NOAH compatible COMPASS software. Please refer to the programming manuals for details.

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