Genie Medical CI
Fitting Guide

Genie
MEDICAL CI

oticon
MEDICAL

Contents

Introduction

Genie Medical CI fitting software is a professional tool that has been designed to work with Neuro 2 sound processors connected to the CI-Link Programming system. Full training is required before starting to use the software.

Please note that there are separate Instructions for Use of the CI-Link Programming System.

"Note:" indicating a note/tip

"Caution:" indicating potential hazard that could result in temporary injury or hospitalisation to the user if not avoided.

The statements of this instruction manual are believed to be true at the date of publication. The pictures are not contractually binding. Availability of the products depend on the local registration.

Oticon Medical (▟ NEURELEC) reserves the right to make changes to the design, characteristics and models without prior notice. The only warranty Oticon Medical (▟ NEURELEC) makes is the express written warranty extended on the sale or rental of its products.

Note:
Importation of patient files non compatible with the version of your fitting software may alter integrity of clinical data and decrease device effectiveness.

Caution:
Be sure to use the latest calibration file while doing a Neuro 2 fitting.

Caution:
Be aware that your fitting software may stop working without notice. Keep this in mind when you are fitting a device. The fitting software device may stop functioning, for instance, in the event of a mains power supply failure.

Caution:
Special care should be exercised in fitting a cochlear implant as there may be a risk of generating a painful sensation for the patient.

Caution:
The patient should be continuously monitored during the fitting session.

Icons used in the GM CI fitting software

Patient: Access to all parameters needed to create a patient file

Search: Search for a patient file in the database using patient information such as name, date of birth or implant serial number

Connect: Connects a sound processor to the fitting software

Antenna selection: Feature that allows the user to calculate the optimal amount of RF energy required to power the implant, taking into consideration skin thickness.

Detect: Detects and reads the contents of the sound processor

Measure: Measurement tools for assessing the functioning of the implant and the auditory nerve

Impedance: Measures electrode impedances to assess the quality of electrode/tissue contact and to check which electrodes are inside the cochlear. Impedance values are expressed in Ohms Ω
► ► ► Start the impedance measurements. The red arrow measures impedances on the right side, the blue arrow measures impedances on the left side, and the black arrow measures impedances on both sides simultaneously

Evoked Compound Action Potential (ECAP): Telemetry function: to elicit a peripheral electrical potential in response to electrode stimulation. In cases of uncomfortably loud sensations, the skip button can be used to stop testing the current electrode and skip to the next electrode [Skip]

Stapedius reflex: Allows measurement of the stapedius reflex threshold (the point at which the muscle that controls the stapes contracts in response to a loud sound).

Fitting: Adjustment tools for parameters associated to patient MAPs

Single tone: Calibrated tone burst stimulation for T and C levels measurement

T level: Level of electrical stimulation expressed in SD that the patient considers barely audible

C level: Level of electrical stimulation expressed in SD that the patient considers as loud but comfortable

Electrical Dynamic Range (EDR): Difference between C level and T level, expressed in nC because it is a combination of the amplitude and the duration of the electrical pulse

Threshold manager: Parameters that allow the user to optimise the fitting;

Sweep: Allows a check of loudness perception across electrodes to ensure that all electrodes are perceived at a similar loudness. This measurement can be repeated indefinitely using the repeat button ⟳ and can sweep at levels between 0 and 120% of the T-C range

Interpolate: Calculation of T and C levels for electrodes between two or more selected electrodes

Switch: Switch between T and C levels

Smooth adjustment: Mode in which adjustments of T and C levels are applied in a smooth manner around the borders of the selection to prevent introduction of abrupt jumps in the profiles

Estimate T levels: Sets T levels at a certain percentage of C levels

Electrode symbol

Live mode: Starts stimulation according to the selected MAP and input source. Stimulation can be started individually.

Increase/decrease: Adjusts selected levels

Live stimulus monitoring: Monitors potential electrode activity without initiating implant stimulation

Amplitude: Sets the amplitude (intensity) of electrodes in the map (SA units)

Automatics: Access to directionality and noise reduction features

Program/MAP manager: Assigns MAPS to sound processor programs;

Save (lock) the selected MAP for future use (prevents further changes to the MAP)

Erase a MAP from the patient database

Coding Strategy: Access to electrode stimulation strategy settings

Compression: Access to Input Dynamic Range (IDR) and compression settings

Frequency distribution: Allows alteration of the frequencies allocated to each of the 20 electrodes. The frequency range is from 187.5Hz to 7937.5Hz.

Programming: Access to parameters for programming the sound processor

Buttons and Indicators: Options for selecting button and LED functions

Side information: Left or right

Print

Side linking: Make adjustments unilaterally or bilaterally

Keyboard shortcuts

Globally available

TAB	Navigate between controls
ESCAPE	Stop stimulation/clear thresholds/electrode selection
F1	Show this fitting guide
ALT+F4	Exit application
Ctrl+M	Start/stop Live stimulus monitoring

Connect

F12	Connect sound processor(s)

All Objective Measurements (Impedance, ECAP, Stapedius reflex)

F6	Start/stop objective measurements on Right ear
F8	Start/stop objective measurements on Left ear

Evoked Compound Action Potential (ECAP) Measurement

⇐ and ⇒	Move between electrode results
⇑ and ⇓	Move between neural responses
DELETE	Delete selected neural responses

Stapedius Reflex Threshold (SRT) Measurement

⇐ and ⇒	Move electrode selection Left or Right
SHIFT + ⇐ and SHIFT + ⇒	**Extend/reduce electrode selection**

All fitting views

F6	Start/stop live mode on Right ear

ECAP Expanded Neural Response Dialog

CTRL+ Page Up/Down	Zoom in/out in small steps
Page Up/Down	Zoom in/out in big steps
CTRL+⇑/⇓/⇐/⇒	Move zoomed window
CTRL+ENTER	Show the enlarged neural response in full screen
⇑/⇓	Change the selection of neural response
DELETE	Delete the selected neural response

Thresholds – Physical and Audiometric

CTRL+A	Select all electrodes
ENTER	Change selection from T to C and vice versa
SPACE BAR	Start/stop the tone stimulation
SHIFT+ENTER	Extend current T or C level selection to both T and C levels
CTRL+SHIFT+T	Calculate T as percentage of C (configured in settings)
CTRL+I	Interpolate between selected T or C levels

⬆ and ⬇ Increase/decrease thresholds by one step

CTRL+⬆ and CTRL+⬇ Increase/decrease thresholds by multiple steps (configured in settings)

⬅ and ➡ Move the selection between electrodes

CTRL+⬅ and CTRL+➡ Jump the adjustment selection to the next sweep electrode

SHIFT+⬅ and SHIFT+➡ Extend/reduce current selection to include more/less electrodes

CTRL+SHIFT+⬅ and CTRL+SHIFT+➡ Toggle between Left and Right sides

CTRL+F7 Start/stop Single Tone stimulation

CTRL+F8 Start/stop Sweep ➡ (from apical to basal electrodes)

CTRL+F6 Start/stop Sweep ⬅ (from basal to apical electrodes)

Compression

⬆ and ⬇ Increase/decrease values

⬅ and ➡ Move the selection Left/Right

ENTER Move selection between compression Knee point and IDR Low values
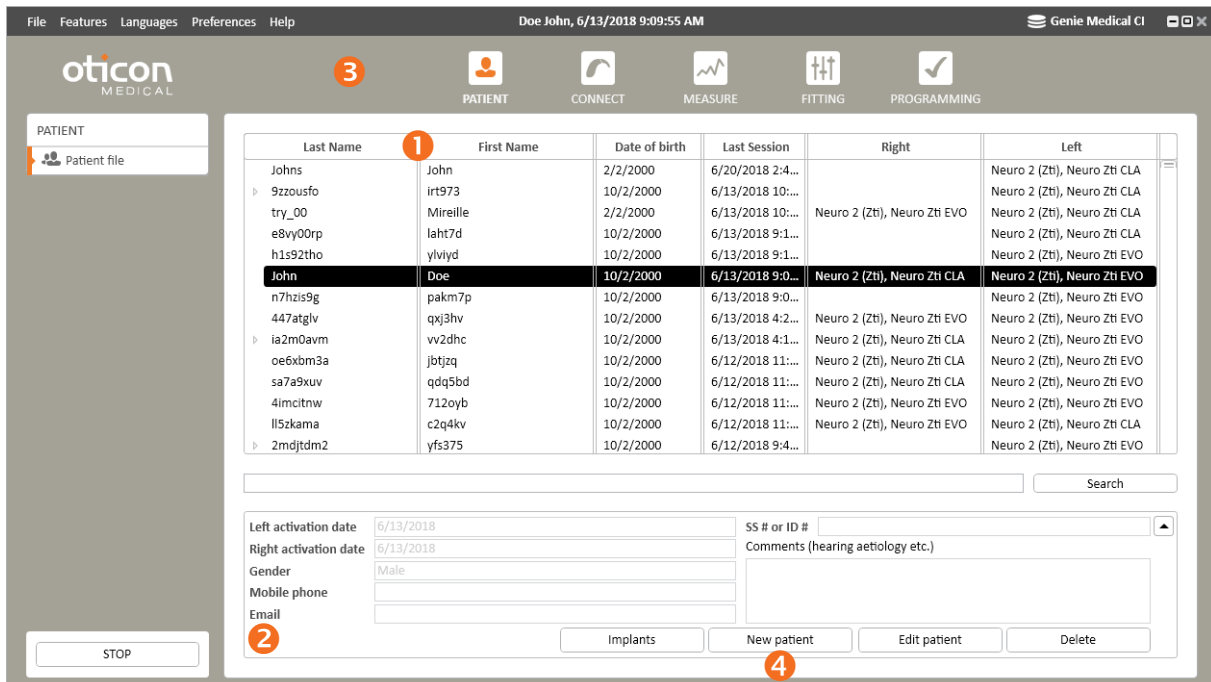
Programming

There are no keyboard shortcuts

End Session

CTRL+P Print session report

Genie Medical CI fitting

Important: This part of the document outlines the various menus and tools accessible in the fitting software when using the latest generation Neuro 2 sound processor.

Patient step

❶ **Patient list:** Provides information on the patient, the date of the latest fitting session, and the type of sound processor and implant the patient is using.

The Search function allows the user to search for patients using recorded information such as last name or date of birth.

Note: Previous fitting sessions can be accessed by clicking on the arrow next to the patient's Last Name:

❷ **Patient information:** Provides more detailed information on the selected patient

❸ Main navigation steps representing a typical fitting flow

❹ **New patient:** Creates a new patient file in the database. Fields marked with a red frame are mandatory.

5 Implants: Manage implants for the patient

- **New implantation:** Add an implant and specify all relevant information (type, serial number, implantation date, number of inserted electrodes)
- **Explant:** Register an explantation
- **Edit:** Modify entered implant data

Connect step

1 Name and ID of the selected patient

2 Information regarding the implant:
- Implant serial number
- Number of inserted electrodes

Information regarding the processor is presented once connected:
- Type
- Serial number
- Firmware version

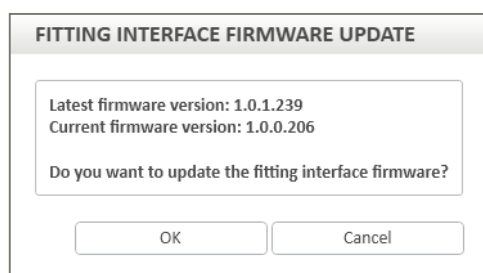**3** **Connection status:** Coloured bar indicating whether the processor is connected

Green: The instrument is connected

Grey: The instrument is not connected

4 **Detect:** Gives information about the connected sound processor. Once detected, the user can choose to reset the processor or update the processor firmware from the Features menu.

5 **Connect:** Establishes communication between the implant and the sound processor. The user is given the option of optimising the antenna implant communication at this stage and to select the appropriate antenna type.
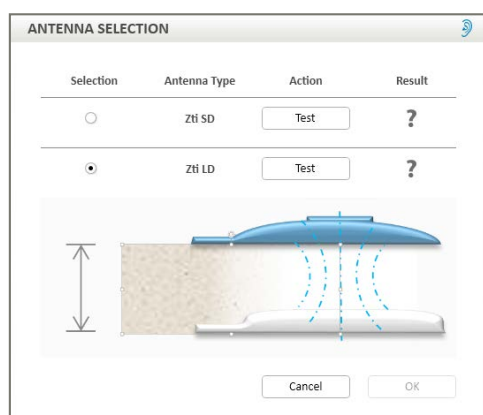
Note: If the fitting interface firmware is not up to date, an update will be requested when connecting. The update only takes a few minutes.

FITTING INTERFACE FIRMWARE UPDATE

Latest firmware version: 1.0.1.239
Current firmware version: 1.0.0.206

Do you want to update the fitting interface firmware?

| OK | Cancel |

Note: For more information, please refer to the section "Fitting Interface Firmware Update" page 47.

When needed, the user will get the opportunity to change antenna and re-optimise the antenna implant communication when the processor is used in live mode.

It is also possible to change antenna and optimise power manually by clicking on the antenna icon:

ANTENNA SELECTION

Selection	Antenna Type	Action	Result
○	Zti SD	Test	?
⊙	Zti LD	Test	?

| Cancel | OK |

Antenna selection:
By pressing the "Test" button for the physically connected antenna type, the power optimisation process is performed and it is checked whether that antenna type can be used or not.

Antenna type:
2 types have been designed in order to maximise the power efficiency of the CI system:
– LD antenna (Long Distance) mainly used for adult patients
– SD antenna (Short Distance) mainly used for children or adults with very thin skin

Following the antenna test you will see one of 3 result indications:

✔ Recommended antenna ✔ Appropriate antenna ✖ The antenna/magnet combination cannot be used

Note: In cases where you see the message that antenna selection is not possible, the following steps are recommended:

1. Make sure you have used the right antenna type for the test (SD or LD)
2. Make sure that the antenna is placed directly over the implanted part and that the magnet has the proper strength to hold the antenna comfortably in place
3. Replace the Neuro 2 antenna cable
4. Replace the Neuro 2 sound processor
5. Restart Genie Medical CI

If all these steps have failed, please contact Oticon Medical

NB. Make sure you run a new antenna selection every time you change antenna or magnet strength.

❻   Selection of sound processor for offline fittings

Note: Where there is a difference between the settings in the patient database and in the sound processor, Genie Medical CI will ask you which to use. It is recommended to use the settings from the sound processor.
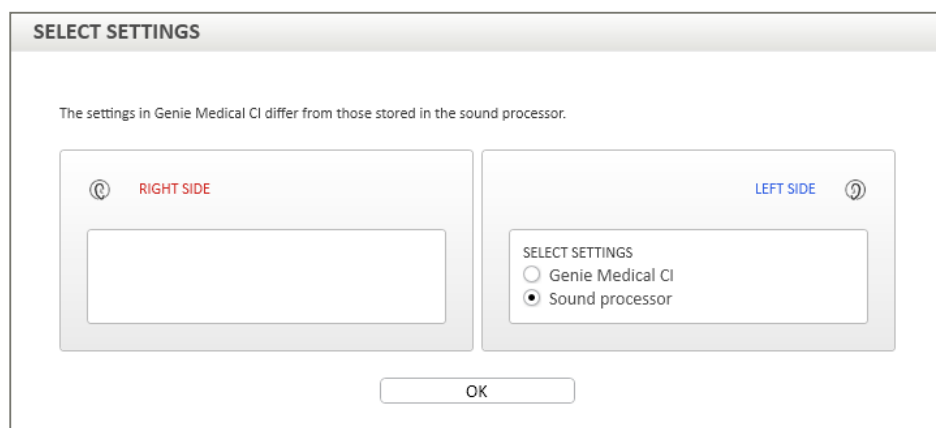
Firmware update: It is recommended that firmware updates be made when available, so patients can benefit from the latest developments from Oticon Medical.
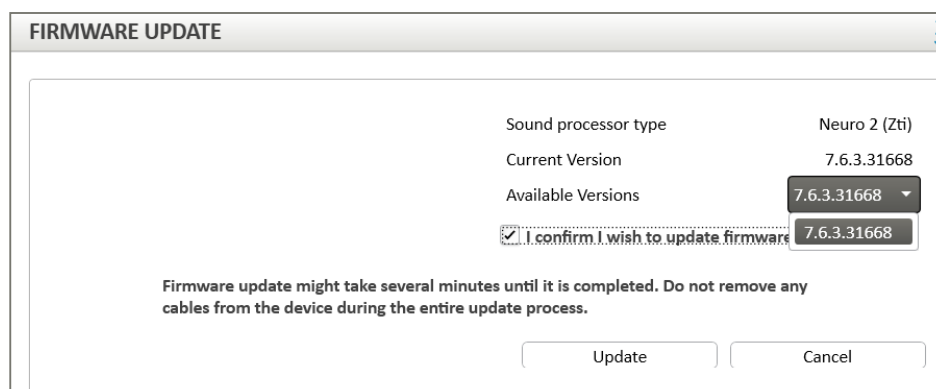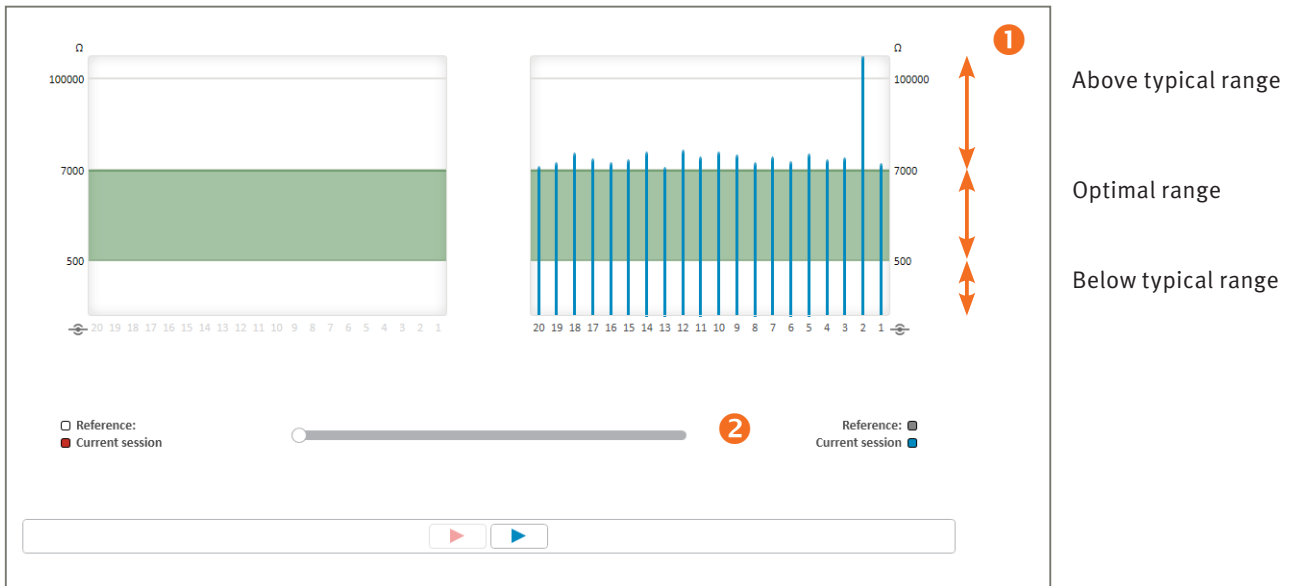

Note: Firmware updates are not done automatically by Genie Medical CI, but it is strongly recommended that the user conducts an update when prompted by the software.

Measure step

Impedances

Impedance measurements can be performed on one side at a time.

❶ **Impedance range:**
- 500 Ω to 7 kΩ: Optimal range for stimulation
- ‹ 500 Ω: Impedance below typical range (if zero, it indicates a short circuit)
- › 7 kΩ: Impedance above typical range (if very high, it indicates an open circuit)

Note: The impedance test results are available as green/red indications in the electrode tables in e.g. the thresholds views.

Note: If an electrode is out of the optimal range it can still be used, but it is recommended that you consider deactivating it.

❷ **Compare measurements slider:** a timeline slider allows comparison of the current impedance measurements with those of previous sessions. Drag the slider back in time (to the left) to overlay historic results.
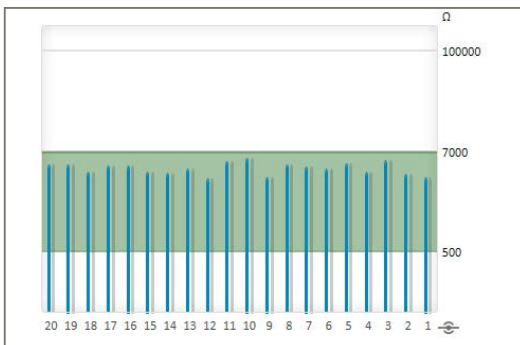
Note: In case the impedance measurement fails:

1. Ensure that the antenna is placed correctly over the implant and repeat the measurement
2. Check that the processor and cable are correctly functioning
3. Check that the implant has previously been associated with the Neuro 2 sound processor
4. Perform the test with another sound processor

If, after all these steps, it is still not possible to record impedance measurements, it is recommended that you contact your local clinical support or Oticon Medical customer service.

Neuro ECAP®

Principle

The Neuro ECAP function lets you measure the electrophysiological responses of the auditory nerve. These measures are called ECAP (Evoked Compound Action Potential) and are measured using the Neuro cochlear implant system and Genie Medical CI software. An electrode will stimulate the nerve through electrical impulses, while another electrode of the Neuro Zti® implant will record the resulting electrical activity.

A typical ECAP consists of a triphasic waveform with a small positive peak (P1) followed by a negative trough (N1) followed by a positive peak (P2).
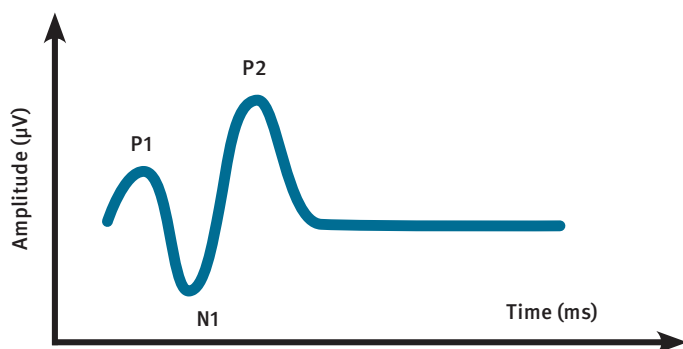

The amplitude of the ECAP is defined as the absolute difference (in µV) between N1 and P2. This amplitude usually increases with the magnitude of the stimulating current because more nerve fibres are contributing to the response as the stimulus level is increased.

Principle of Measurement with Neuro ECAP

In order to remove the artefact generated by the electrical stimulation, a masker-probe technique using an anodic biphasic pulse has been developed according to the following principle:
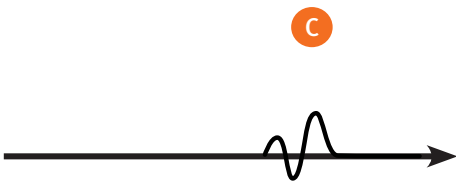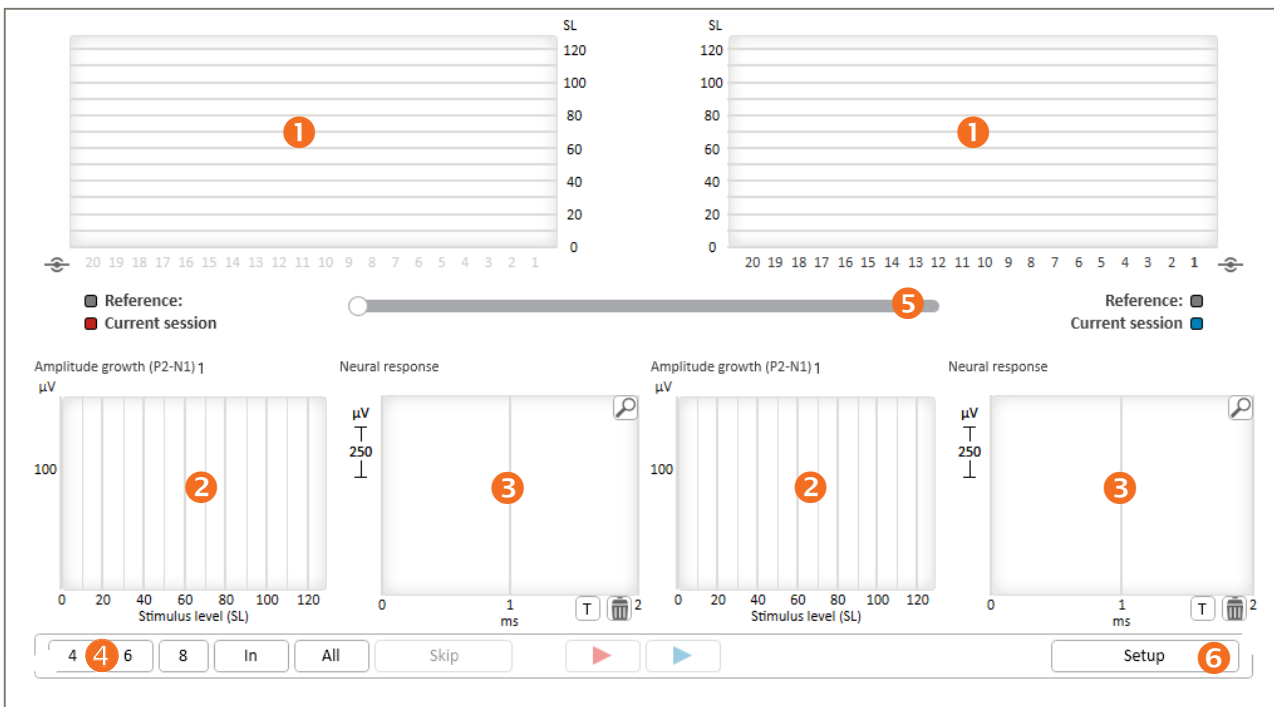
• Generation of N masker-probe
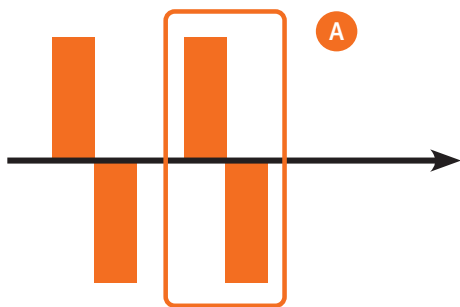
- Storage of the N masker-probe
- Average of the N masker-probe and selection of the second averaged artefact A from the masker
- Generation of N probe

B
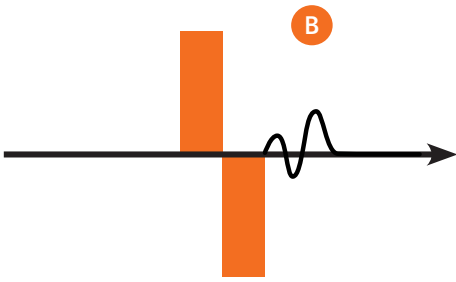
- Storage of N probes
- Average of the N probes
- C= B-A

C

ECAP

1 ECAP thresholds overview

A Select or deselect electrodes to test by clicking or Ctrl-clicking the electrode numbers.

B These graph symbols indicate the final ECAP test results:

'^' indicates that no ECAP responses were detected up to this stimulus level

'v' indicates that ECAP responses were detected down to this stimulus level

'•' indicates that the ECAP threshold is estimated to be at this level

Note: By clicking a result symbol, the corresponding amplitude growth and neural responses are displayed.
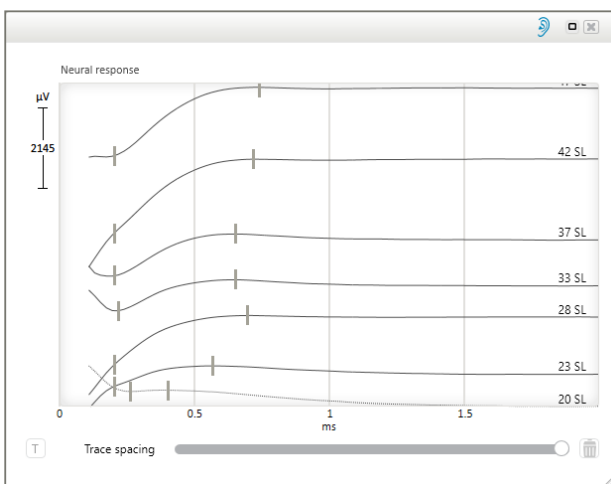
The 'Trace spacing' adjustment allows you to separate or overlap the neural response traces.

The following shortcuts let you optimise the enlarged neural response view area:

- Using the mouse:
    - CRTL + Scroll up/down: zoom in/out
    - Double click the Scroll button: zoom out to original display
    - CTRL + right click + drag: mark the area of interest to zoom in
    - Right click + drag to move the zoom area
- Using the keyboard
    - CTRL + Page Up/Down: zoom in/out in small steps
    - Page Up/Down: zoom in/out in big steps
    - CTRL + ↑/↓/←/→: move zoomed window
    - CTRL + ENTER: show the enlarged neural response in full screen
    - ↑/↓: change the selection of neural response
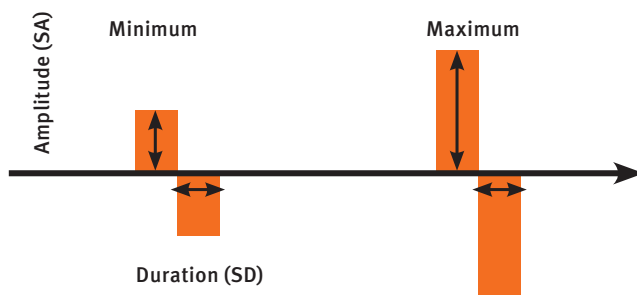   - DELETE: delete the selected neural response

2 **Growth function:** Displays the ECAP growth function, i.e. the amplitude of the ECAP as a function of the stimulus level.

3 **Neural response:** Displays actual ECAP responses averaged over a number of stimuli.
Click the magnifying glass icon in the neural response graph to enlarge the display.

4 Automatic ECAP measurements:

- Measurements are automatically conducted in a sequence that has been predefined in the setup

4	6	8	In	All	Skip	▶	▶		Setup

Pressing one of the leftmost buttons will quickly select the corresponding number of electrodes to be measured from the total number of inserted electrodes, or the user can select all electrodes. It is possible to perform measurements one side at a time.

5 Slider allows comparison of current ECAP thresholds with thresholds found in previous sessions.

6 Setup allows modification of ECAP parameters.

Setup: The stimulus amplitude (SA) and stimulus duration (SD) of the biphasic anodic pulse can be modified by changing the minimum and the maximum (see diagram below).

During the ECAP stimulation, the Neuro Zti implant is stimulating using monopolar stimulation.

❶ ECAP recording settings: It is possible to change the following parameters:

- **Samples per measurement:** The more samples the more precise the ECAP will be but the longer it will take to get the recording.
- **Recording electrode:** The default recording electrode is n-1.

❷ ECAP threshold search settings: The search will be conducted using stimulus amplitudes between Min and Max in the indicated steps on each selected electrode.

Note: ECAP recordings sometimes require high stimulation levels. It is the user's responsibility to define stimulation levels so that they are not generating discomfort for the patient. ECAP recordings can be taken intraoperatively during the implant surgery under general anaesthetic.

Note: ECAP thresholds can only be used as an indicator for fittings as no correlation between ECAP and subjective fitting levels has yet been demonstrated. It is recommended that the user verifies the accuracy of the fitting thresholds and comfort levels using an additional behavioural method in order to make sure that the perceived stimulation is not too loud for the patient. If the stimulation level is too high for the patient it will cause discomfort, and the high current spread may be detrimental to listening.

Stapedius

The stapedius reflex measurement is used intraoperatively to stimulate electrodes at varying stimulus levels while visually observing the movements of the stapedius muscle under the microscope. A sufficiently strong stimulation will typically generate a visible muscle contraction – a stapedius reflex.


❶ Thresholds view showing T and C values of the selected map. Select the electrodes to stimulate by clicking the electrode numbers.

❷ Stimulation parameters.

❸ Possibility to change the default parameters according to the user preferences.

Note: The use of a tympanometer in continuous monitoring mode also allows you to monitor the contraction of the stapedius muscle and can be done post-operatively. Be careful to prevent over-stimulating the patient. The stimulus levels that trigger the acoustic reflex may be above the maximum comfort levels reported by the patient.

Note: The sound processor LED will flash during the impedance measurement.

Fitting step

Thresholds
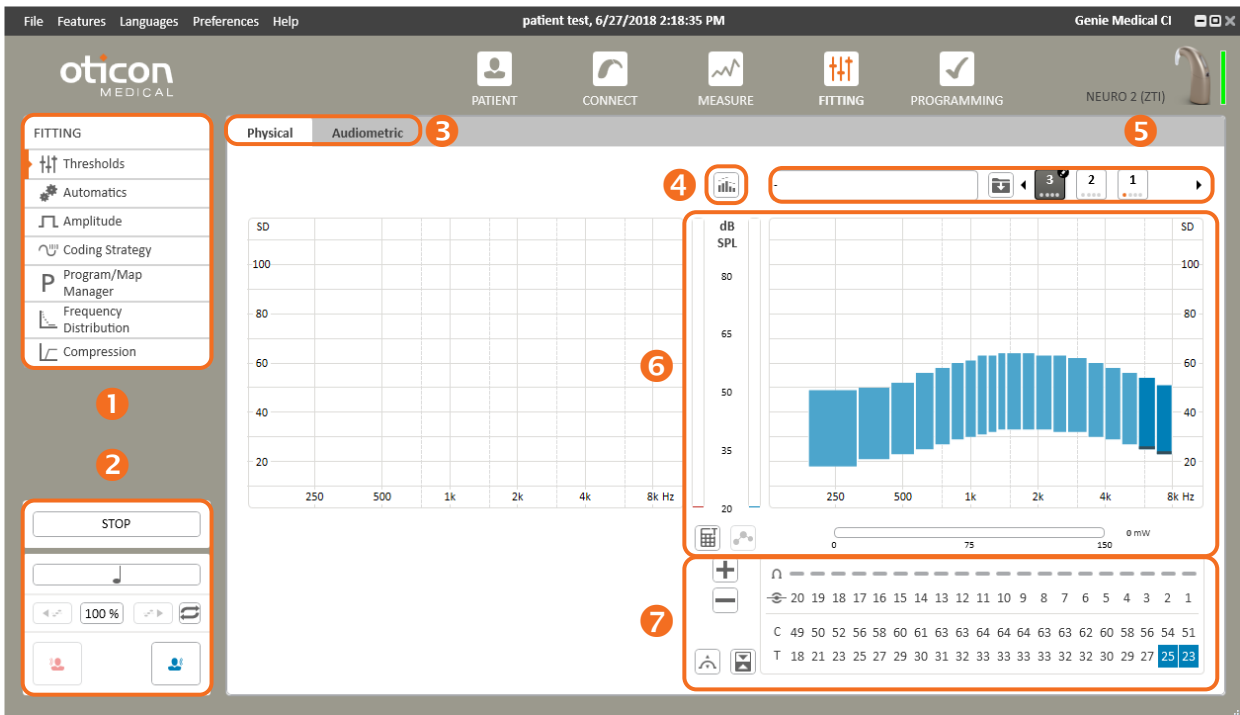
1. **Fittings tools:** Access to fitting parameters
2. **Stimulation controls**
3. **Fitting views**
4. **Overlays**
5. **MAP Selector**
6. **Fitting graph**
7. **Fitting panel**

Fittings views ❸

Two fitting views are available
- The classic "physical view". **Physical view** supporting electrode enabling/disabling and adjustments
- The unique "audiometric view". **Audiometric view** supporting direct adjustment of standard freefield audiometric frequencies as well as freely selectable frequency ranges.
  NB. In the audiometric view, the smooth adjustment mode is automatically activated.

Overlays ❹

Live Stimulation Monitor lets you monitor sound levels and the stimulation that would occur if you switch to Live mode. Stimulation is not activated and the patient will not hear anything. It allows you to:

- Check the sound level reaching the patient's ears.
- Check a fitting (adult or child) and to check the level of stimulation of each electrode in real time.
- Check the externals are working (e.g. the cable, the antenna and the microphone), and to help troubleshoot any device malfunction and frequency response.

Stimulation controls ❷

STOP **Stop stimulation:** Stops any ongoing stimulation. Alternative: Press ESC key
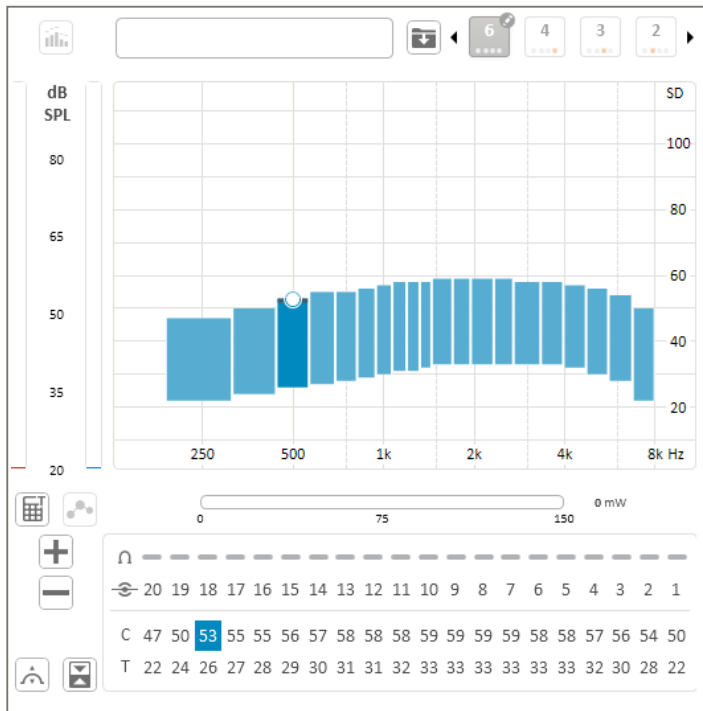
Ongoing stimulation is indicated by circles in the graph at the level of stimulation.

♩ **Calibrated stimulation:** Starts stimulation of the selected electrode(s) at the selected T or C level(s)

Note: The stop button is available in every view, and stops any kind of stimulation, including ECAP or stapedius reflex stimulation.

◀▪▪ |100%| ▪▪▶ 🔁 **Sweep**

Starts stimulation of selected electrodes in sequence in either direction at the specified % level of the electrical dynamic range (between T and C levels). A single sweep is conducted at a time. To run the sweep repeatedly, activate the repeat button 🔁

Select the electrodes to sweep in the top (electrodes) row of the table.

You can at any time during the sweep use the mouse to select and adjust T and C values of one or more of the electrodes being swept.

Use ⟵ and ⟶ to move your T/C selection between sweep electrodes.

Use CTRL+⟵ and CTRL+⟶ to move the whole sweep electrodes selection.

Note: The sound processor LED will flash during the sweep stimulation.

Live Mode

Starts stimulation for the right or left ear based on live audio from the sound processor and/or the Streamer using the selected MAP.

Note: The sound processor LED will flash green every 7 seconds while stimulating in Live Mode.
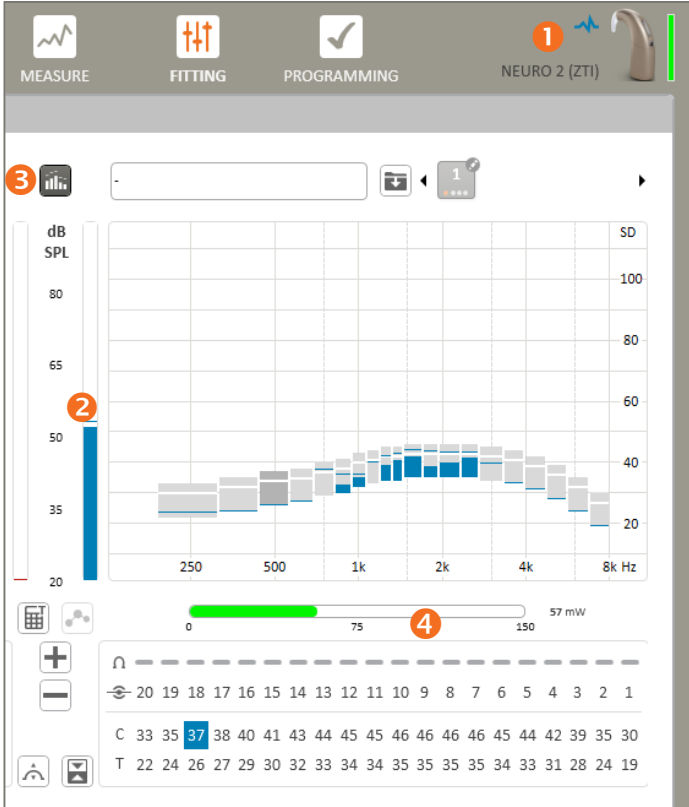
❶ Stimulation indicator

Stimulation ongoing. Stimulation can be either calibrated stimulation, sweep or live sound received via the sound processor microphones.

Stimulation ongoing. Stimulation is based on a combination of streamed audio and live sound received via the sound processor microphones.


Stimulation ongoing. Stimulation is based on streamed audio only. The sound processor microphones are muted from the Streamer.

2 Input sound level meter (dB SPL)

3 Live stimulus monitoring: Visualise live mode stimulation without starting stimulation (use to check sound source frequency distribution etc.)

4 Power meter to monitor current requirements of program

Note: If the antenna becomes disconnected from the implanted part at any point during stimulation, the stimulation will stop and the following message will appear:

STIMULATION ERROR	
Connection error between sound processor and implant	
	Ok
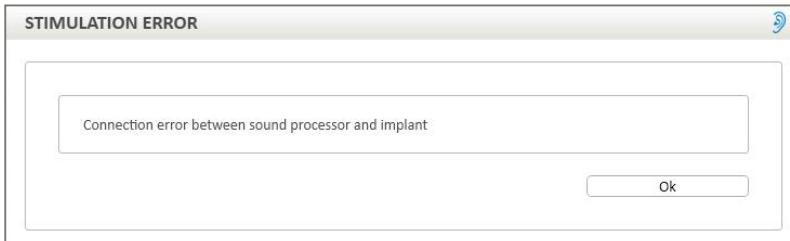
Note: During Live Mode the LED on the processor flashes green once every 7 seconds

Input sound level meter shows the input sound level in dB SPL allowing you to objectively monitor the environmental sound level, e.g. live speech levels, during the fitting process.

You can use the sound level meter to verify microphone functionality. In quiet, the level is typically around 30-40 dB SPL. Whistle or clap your hands and check the response.

MAP selector **5**

Select a MAP by clicking the MAP icon.

A little pen beside the MAP number indicates that the MAP is in edit mode. You can keep fine tuning it as long as you like. The red dot indicates the program to which the MAP is assigned (in the example, MAP 5 is assigned to program 1).

You can right click any map icon in the MAP selector to get access to the MAP assignment manager from which you can e.g. select alternative input sources like T-coil or assign the MAP to a program slot.

Save the selected MAP. **Note:** Do not explicitly save a map unless you want to protect it from future changes. All MAPs are automatically saved when you end the session. Trying to change a saved MAP will cause a copy to be created to which the change will be applied.
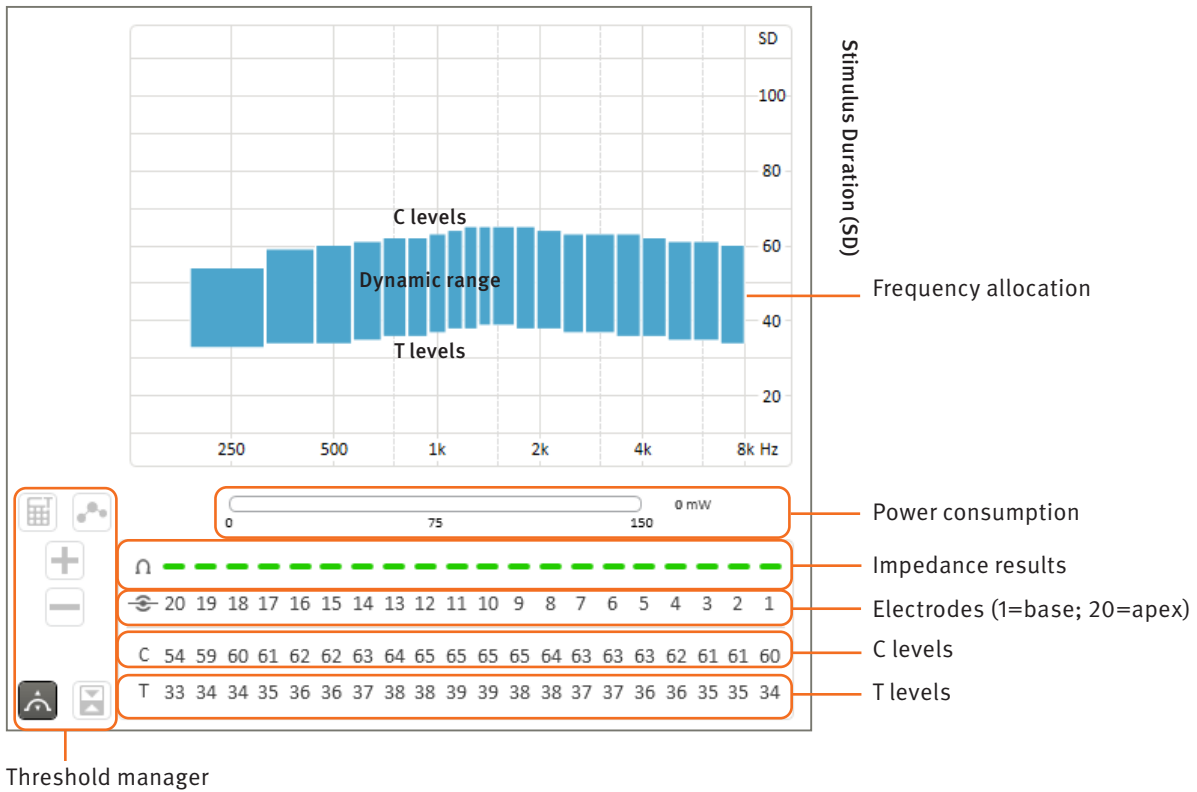
Name the selected MAP

Monitoring of audio streamed from the Streamer

It is possible to test audio streaming functionalities in live mode exactly like if the patient is wearing the Neuro 2 on batteries.
- Make sure that the streamer is correctly placed around the neck of the patient
- Make sure the smartphone is paired via Bluetooth w/ the streamer
- Launch the live mode in Genie Medical CI
- Initiate audio streaming from the smartphone
- Select the audio streaming by pressing the AUX button at the side of the streamer
- Genie Medical CI indicates when audio streaming is active, as well as, input sound level and stimulus monitoring (see indicators on page 21) like for any other audio source
  - By default, the streamed audio is mixed with environmental sounds picked up by the sound processor microphones
  - To monitor the streamed audio only, remember to mute the sound processor microphones by simultaneously pressing and holding the volume up and down buttons on the streamer for two seconds

Note: For monitoring audio, start and stop audio streaming from the streamer rather than from the connected external audio source (e.g. the mobile phone).

Fitting graph and Fitting panel ❻ ❼

Physical view

Frequency allocation

Power consumption

Impedance results

Electrodes (1=base; 20=apex)

C levels

T levels

Threshold manager

Electrode selection:

Click or drag over T and C values in the table or in the graph to select. Levels are expressed in Stimulus Duration (SD).

T and C level selections are indicated by dark bars and even darker markers at the bottom or top of the electrode bars, e.g.:

C level selected
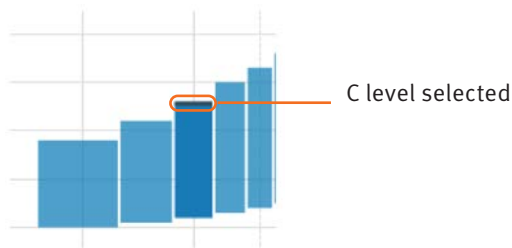
Note: It is possible to select more than one electrode at once to modify several T or C values. Selecting all 20 electrodes will allow global T and C level adjustment.

Note: The speed of C level increments is limited during stimulation when using the mouse for safety reasons. The maximum steps per second can be configured in Preferences.

Dynamic range: The difference in nC between T and C levels is known as the Electrical Dynamic Range (EDR).

Stimulus Duration scale: T and C levels are expressed in Stimulus Duration (SD), which is energy coding by time and can be adjusted in steps of 1 SD between 10 and 115 SD. The default starting point for initial electrode activation is 10 SD for T level and 15 SD for C level. For reference, 1 SD corresponds to 1µs.

Frequency allocation: Each electrode is represented by a rectangle covering its allocated frequency range on the horizontal axis. This allocation can be changed in Frequency Distribution.

Electrodes: Each numbered column corresponds to an electrode. Electrode 20 corresponds to the most apical electrode (low pitch) and electrode 1 to the most basal (high pitch).

Activate/deactivate an electrode by double clicking the electrode number.

Impedance results: Based on the most recent impedance measurement, green indicates that the impedance is within the optimal range. The electrode should be functioning according to specification and should deliver normal stimulation. Red indicates that the impedance is outside the optimal range, either too low or too high and the electrode may, therefore, not behave predictably.

How to select electrode levels
It is possible to select several T, C or T&C values for simultaneous adjustment.
Selected T and C values are marked red or blue.
Select the T and/or C row headers to select all T and/or C values.
Clicking electrode numbers can be used to select both T and C values.
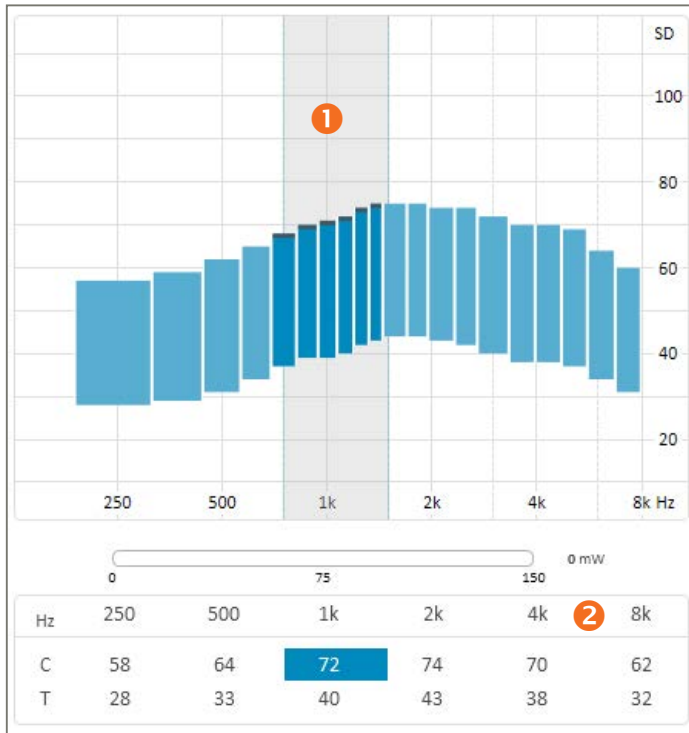
How to change a selection
The selection can be moved using the keyboard: ⟵ ⟶ and Enter and Shift Enter.

Unselect by clicking the graph area outside the electrode bars or use ESC.

Note: The LED on the processor flashes green following the actual pulsating during Single Tone stimulation and Sweep.

Audiometric view

In the audiometric view, selection and adjustments can be performed based on sound frequencies rather than electrodes. The audiological table allows direct selection and adjustment of T, C or T&C levels corresponding to audiometric frequencies. Genie Medical CI will automatically select the relevant electrodes for stimulation and perform smooth adjustments according to the electrodes frequency allocation defined by the MAP.

①   Selected frequency band relating to e.g. a selected audiometric frequency

②   **Audiometric table:** For selection of T and C values for audiometric frequencies

The T and C values in the table cells are the mean values of the corresponding electrodes. The T and/or C values can be adjusted in steps of 1 SD between 10 and 115 SD.

How to select audiometric values
It is possible to select several T, C or T&C values for simultaneous adjustment.
Selected T and C values are marked red or blue.
Select the T and/or C row headers to select all T and/or C values.

How to change a selection
The selection can be moved using the keyboard: ⟵ ⟶ and Enter and Shift Enter.

Threshold Manager

Calculates T levels based on C levels. Available in Physical mode only. T is calculated as a percentage of C. The percentage is configurable in Settings. Keyboard shortcut: Ctrl-Shift-T

Toggles between T and C levels. Keyboard shortcut: Enter

Smooth adjustments mode. Whilst in this mode, any level adjustments you make will be applied in a softer way that aims to avoid introducing abrupt level changes in the overall T and/or C level profile(s). The adjustment is most effective on centre electrodes and less effective on electrodes near the boundary of the selected electrode group or frequency range.

Note: Not only the selected electrode(s) will be adjusted. Adjacent electrodes will be slightly adjusted as well. Do not use smooth adjustments mode if you wish to have no effect on neighbouring electrodes.

In the Physical thresholds view, Smooth adjustment takes effect only when two or more consecutive electrodes are selected.
In the Audiometric thresholds view, Smooth adjustments mode is active by default and works with any selection.

Note: Activating smooth adjustment mode does not in itself smooth out the T or C profiles. On the contrary, it aims at preserving already established electrode-to-electrode level differences by applying successive adjustments in a softer manner.

Interpolation function. Available in Physical mode only. Provides a quick way to estimate T and/or C values of non-tested electrodes or to smooth the T and/or C level profile(s). Select the two or more T, C or T&C values that you want to interpolate between (using Ctrl+click), and click the interpolate button.
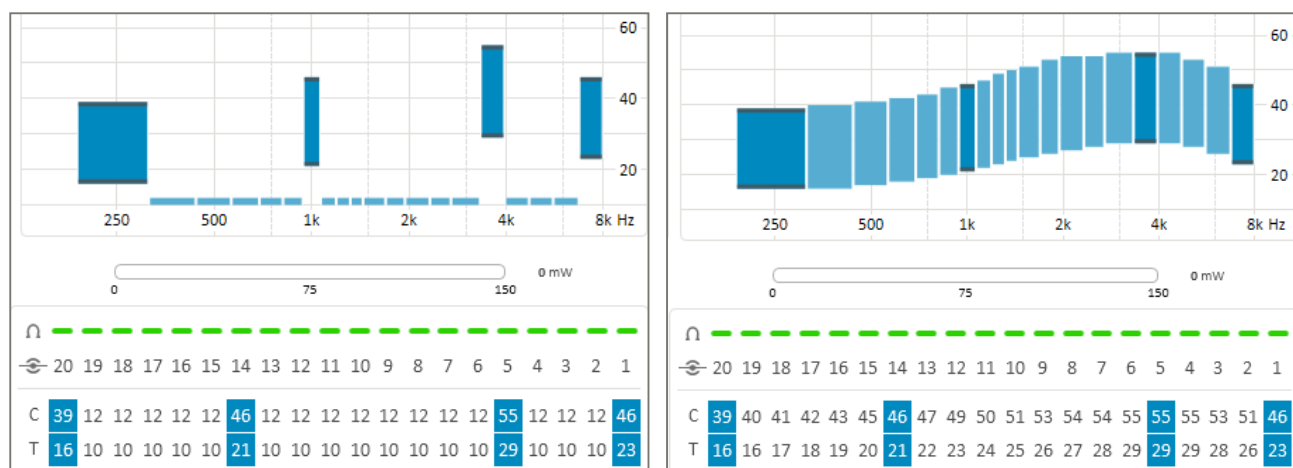
Note: To select T and C levels, click between the T and C values in the graph or click on the electrode number in the threshold table.

Increase/decrease the selected T/C levels

Link/unlink parameter adjustments between right and left ear. Available in Audiometric mode and for tools such as Coding strategy and Compression. Applies to bilateral fittings only.

Automatics

Controls automatic sound preprocessing features such as directionality and noise suppression:

Directionality	Auto (Tri-mode) ▼
Surround Mode	Opti Omni ▼
Voice Track	Off ▼

The directionality and noise suppression settings do not apply during audio streaming. The controls are replaced by the following indications:

+ 🎙️ Audio is being streamed from the Streamer only. Applies to Live and Live Stimulus Monitoring modes.
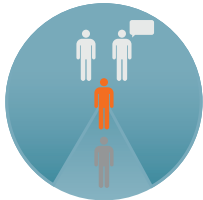
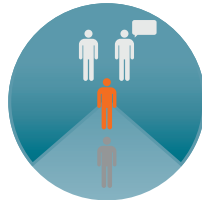+ Both streamed and environmental audio are present.

Directionality

Directionality offers different degrees of background noise suppression by varying the focus on sounds coming from the front:
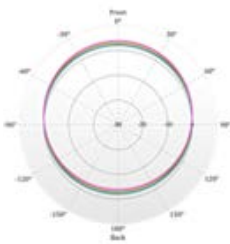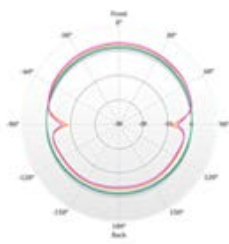
Surround modes		Directionality modes	
72% in daily use		20% in daily use	8% in daily use
Optimised Omni	Speech Omni	Split Directionality	Full Directionality
No spatial and spectral selectivity	No spatial and spectral selectivity in LF	Directional in HF, Omni in LF	Directional in all spectrum
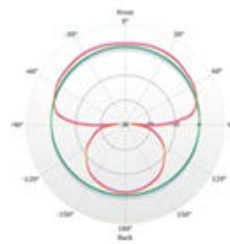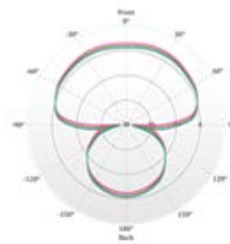
Auto (Tri-mode): Automatically selects the directionality mode that provides the best Signal-to-Noise Ratio from Surround, Split directionality or Full directionality.

Auto (Dual-mode): Automatically selects the directionality mode that provides the best Signal-to-Noise Ratio from Surround or Split Directionality.

Voice track

The voice track is a noise reduction algorithm allowing the attenuation of stationary (constant) noise without altering audiometric performance. It works by calculating the noise level over a given time period (noise estimator). This estimator gives a spectral profile of the noise which is subtracted from the analysed signal before stimulation. This function has the advantage of not altering low level tonal and voice audiometry.

This feature can be adjusted to remove more or less of the background noise.

Amplitude
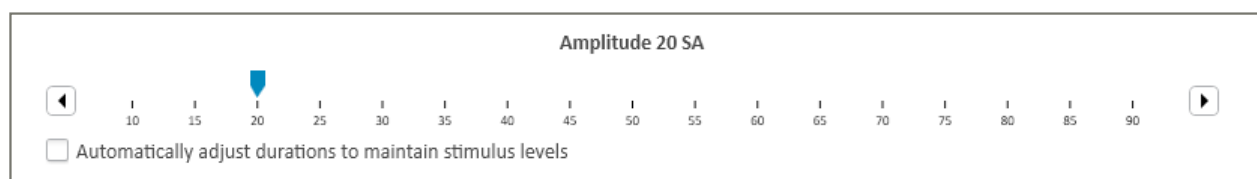
The Stimulation Amplitude (SA) is a fixed pulse amplitude that is common to all electrodes. It can be altered in the fitting parameters and adapted to each patient.

Any change to the stimulus amplitude will affect the perceived loudness. It is, therefore, important to re-measure T and C levels after any change is made unless the 'Automatically adjust durations to maintain charge' box is ticked (see note). The value of the intensity is expressed in SA and can be changed in 1 SA steps from 10 to 90 SA. SA is a linear adjustment. 90 SA corresponds to 2mA, thus 45 SA corresponds to 1mA.

Note: It is possible to maintain the same level of delivered charge when changing the Stimulus Amplitude, by ticking the "Automatically adjust durations to maintain charge" box. In this case, increasing or decreasing the amplitude will automatically reduce or increase the T and C levels to maintain the same level of overall charge and thereby loudness.

It is still advisable to re-check some T and C levels after adjusting amplitude, even if you tick the box to maintain loudness charge. The new charge may be slightly different from the previous due to system resolution limitations and duration and amplitude variations.

SA changes are limited while stimulating for safety reasons. The maximum adjustment speed can be configured in Preferences.

Coding Strategy

The coding strategy implemented in a sound processor defines how sound is transformed into electrical stimulation and distributed to the various active electrodes.
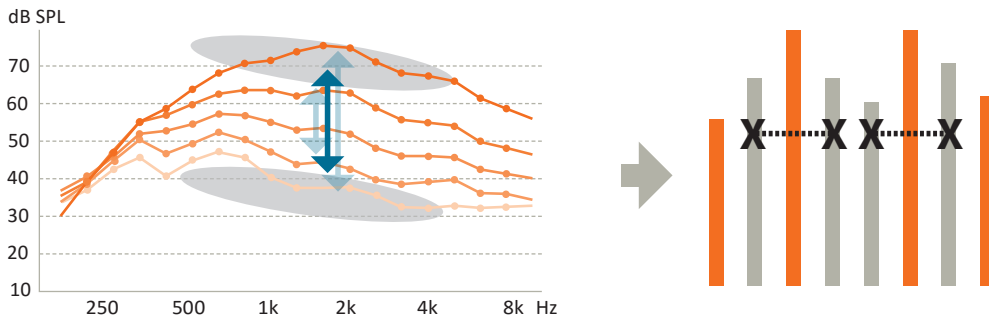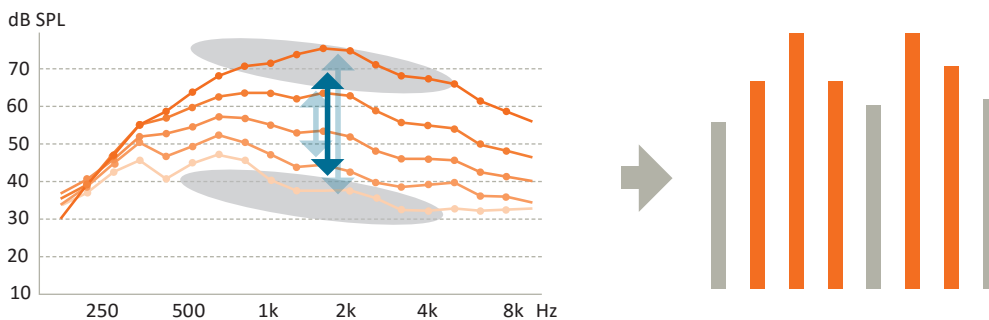
MPIS CAP

The MPIS CAP strategy (Main Peak Interleaved Sampling) is a multiband spectral extraction strategy coupled with Coordinated Adaptive Processing: An automatic backend multiband compression function (Voice Guard). A pre-selected number of electrodes are stimulated per acquisition frame. An anti-crosstalk function has also been implemented to minimise interaction between electrodes (so two adjacent electrodes cannot be stimulated at the same time). An environment detection system drives CAP features: Directionality, wind noise reduction and Voice Guard.

This strategy is mainly recommended for patients in whom neural survival is thought to be limited.
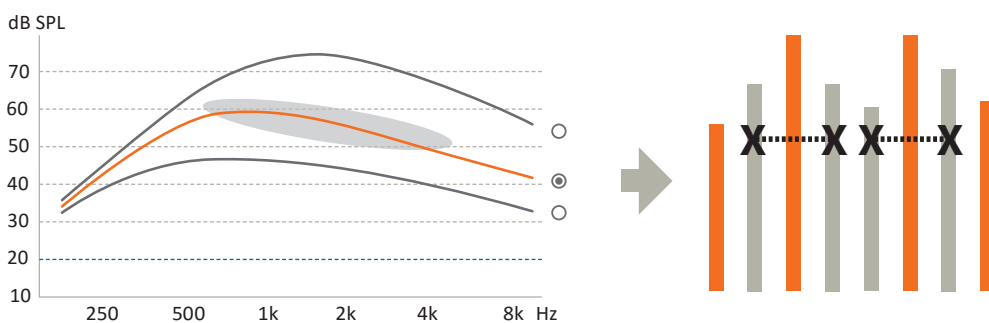

CRYSTALIS CAP

The Chrystalis coding strategy is a multiband spectral extraction strategy coupled with Coordinated Adaptive Processing: An automatic back end multiband compression function (Voice Guard) and stimulation of a selected number of electrodes per acquisition frame. Stimulation of adjacent electrodes together with an enhanced high pitch frequency filtering mechanism is applied to provide as much information as possible to the patient. An environment detection system drives CAP features: Directionality, wind noise reduction and Voice Guard.

## MPIS XDP

The MPIS CAP strategy (Main Peak Interleaved Sampling) is a multiband spectral extraction strategy which has a multiband compression function (XDP). A pre-selected number of electrodes are stimulated per acquisition frame. An anti-crosstalk function has also been implemented to minimise interaction between electrodes (so two adjacent electrodes cannot be stimulated at the same time).

CRYSTALIS XDP

The Chrystalis coding strategy is a multiband spectral extraction strategy which has a multi band compression function (XDP). A pre-selected number of electrodes are stimulated per acquisition frame. Stimulation of adjacent electrodes together with an enhanced high pitch frequency filtering mechanism is applied to provide as much information as possible to the patient.
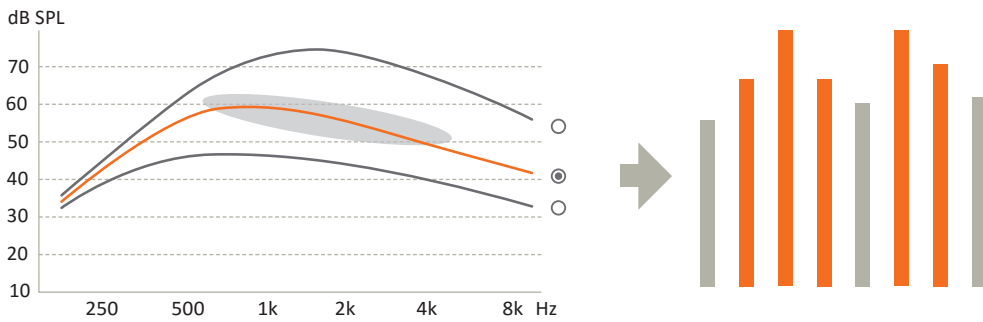
Max stimuli per frame: Selects the maximum number of electrodes (n) that can be stimulated within each frame out of the total number of active electrodes (m), otherwise known as an n-of-m strategy.

Stimulation rate: The default (and recommended) stimulation rate is 500 Frames/s. This value can be changed if required to one of the following rates: 250, 286, 333, 400, 500, 667, 1,000 Frames/s

Note: The software may occasionally need to automatically adjust the stimulation rate to accommodate the selected dynamic range (stimulus durations for C values) or the n-of-m strategy. You will be informed of any such changes.

Program/MAP manager

A   Program Manager:

B   Current session's MAPs and session notes

C   Previous sessions' MAPs and session notes

A **Program Manager:** The Program Manager provides an overview of the programs/MAPs assigned to the 4 program slots in the sound processor.
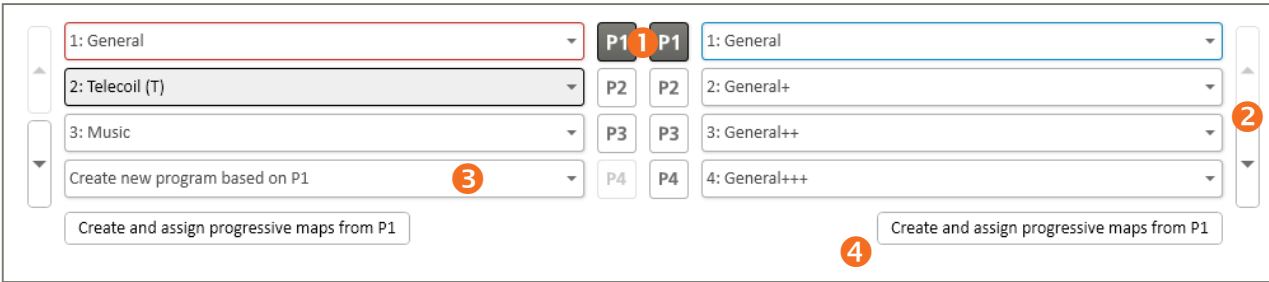
1 **Program selector:** Select the program/MAP to be used as a starting point for creating special programs and progressive programs/MAPs

2 Move the selected program up or down in the program sequence

3 Create new program based on P...

Creates a new program (and MAP) based on the currently selected program

The new program/MAP is optimised to better suit the listening situation by modifying certain parameters:

- Telecoil: 100% of the input comes from the Telecoil
- M/T: A mix of Microphone and Telecoil (the ratio can be adjusted in the Auxiliary Input Manager)
- Music
  - Changes the following Automatics settings:
    - Omni Directionality: Opti Omni
    - Voice Track: OFF
- Comfort in noise
  - Changes the following Automatics settings:
    - Tri Mode: Speech Omni
    - Voice Track: Medium
- Conversation in noise
  - Changes the following Automatics settings:
    - Full Directionality
    - Voice Track: Medium

Note: These settings changes are suggestions only. The settings can be modified subsequently.

4 Create and assign progressive MAPs from P...

Based on the selected program/MAP, progressive programs/MAPs are created to support the initial habituation phase. The MAP in the selected program will be moved to P1. Then three progressive MAPs will be assigned to P2, P3 and P4 respectively.

Each progressive MAP contains an increase in T levels of 1 SD and C levels of 2 SD from the previous one.

Note: The progressive MAPs will be created based on the MAP in the selected program. Make sure to carefully select the right program before pressing the button.

B Current session's MAPs and session notes
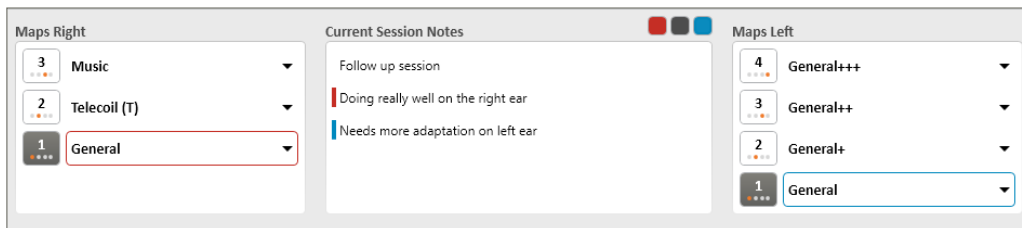
Click a MAP icon or name field to open the dialog:

Combined label,
source and description

Name indicating
the use of the MAP

Further notes

Auxiliary
Input Selector

Save the MAP (no further
changes possible)

Program assignment   Delete the MAP
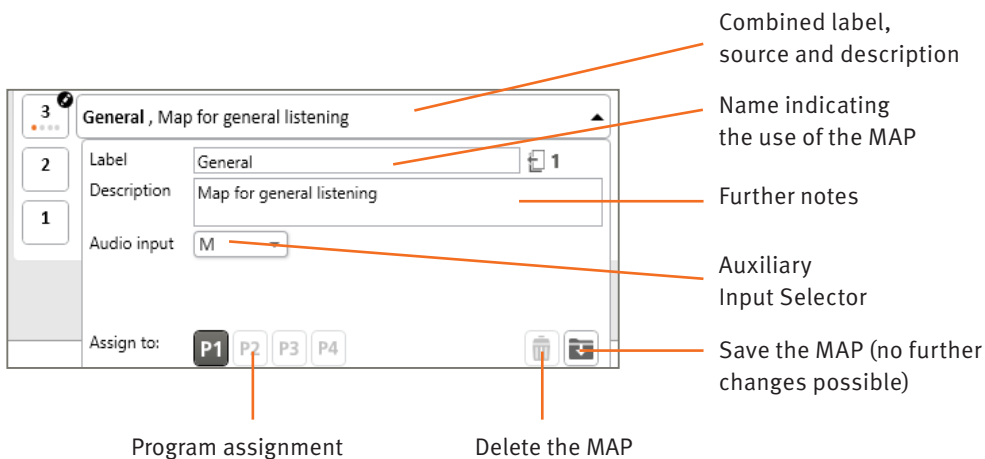
Auxiliary Input Selector: Allows changing the audio input to Telecoil or M/T and to set the mixing ratio (the louder it is, the louder the microphone perception is relative to the telecoil).

Note:

 A little pen beside the MAP number indicates that the MAP is in edit mode – can be freely edited

 Indicates from which parent MAP the new MAP has been created

C **Previous sessions' MAPs and session notes:** Shows the session history and the MAPs that were created or assigned to sound processor programs in that session.

Note: In case you want to use a MAP from a previous session, first move it to the current session by selecting the "Add to current session" option.
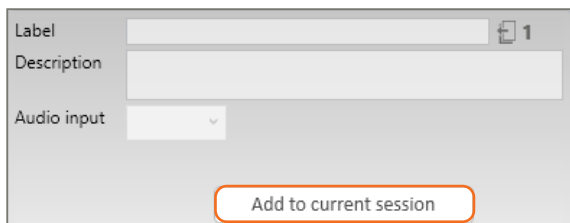
Frequency distribution

The frequency distribution defines the frequency band covered by each active electrode. The sound spectrum is divided into 64 contiguous frequency bins. Each electrode is assigned a set of contiguous frequency bins.

The frequency band of each electrode is graphically represented by a horizontal bar.

Frequency scale (Hz): Frequencies are expressed in Hertz (Hz on a linear axis ranging from 188Hz to 7938Hz in steps of 125Hz.

Apply standard distribution: Use this function to redistribute all frequencies to the active electrodes. Especially useful when several electrodes are disabled.
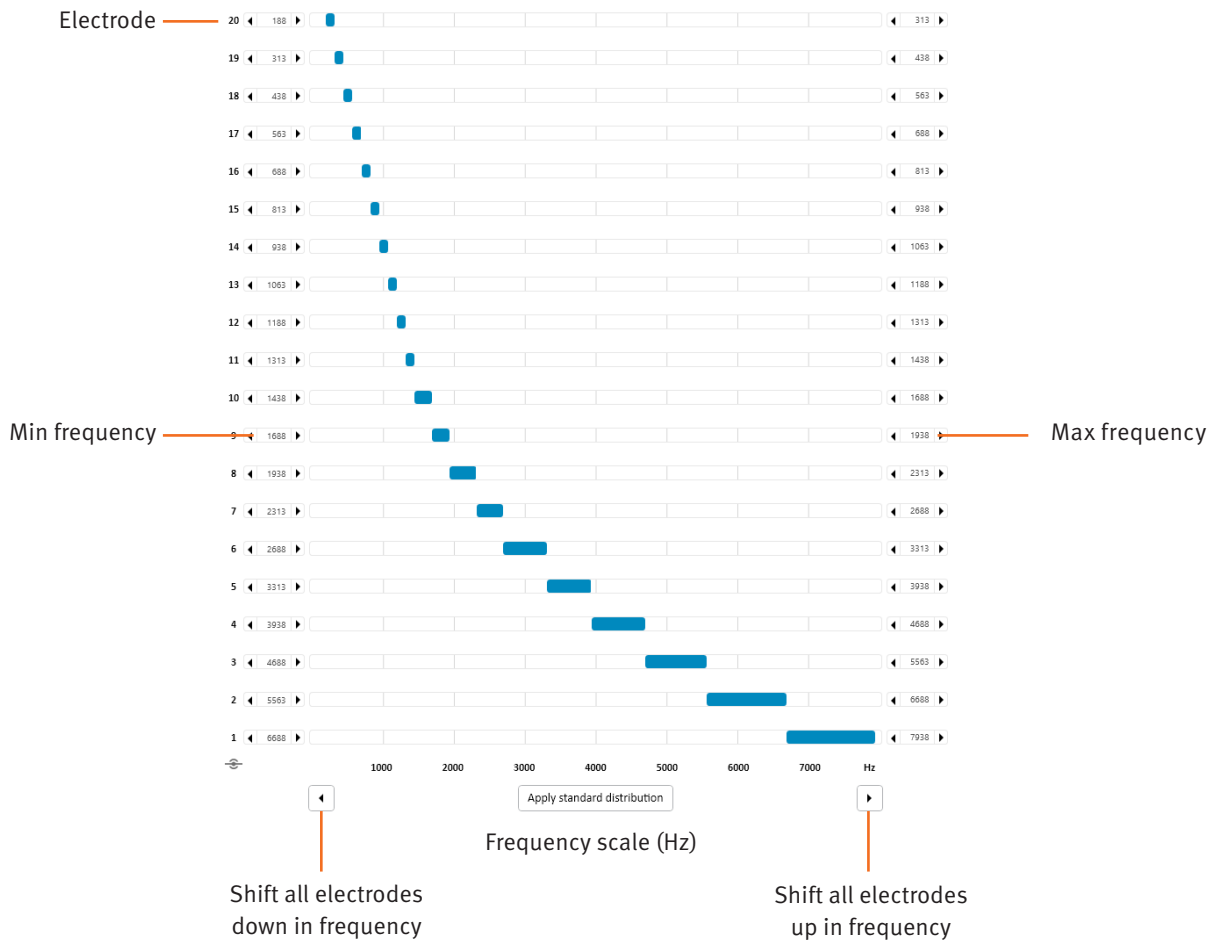
The default distribution ("Standard distribution") is linear at the lower frequencies and logarithmic at high frequencies, to mimic normal cochlea frequency selectivity (Bark Scale). This distribution is suitable for the vast majority of cases.

Frequency adjustments: The "‹" and "›" buttons present on each side of the screen allow you to adjust the Min and Max frequency values for a selected electrode using the mouse. Neighbour electrodes will also be adjusted to avoid frequency gaps and overlaps.

Global frequency shift: The "‹" and "›" arrows at the bottom of the screen are used to move the overall frequency distribution in steps of 125 Hz.

Compression

Oticon Medical uses a multi-band back end compression system (rather than front end Automatic Gain Control (AGC) to ensure that sound information is preserved undistorted along the sound processing chain.

Voice Guard	Auto ▼			
	LF	1k	2k	HF
Kneepoint	Auto	Auto	Auto	Auto
IDR Low	23	23	23	23
				dB A

The back end compression system operates in four compression bands as shown in the table columns.

IDR Low – 0% EDR

The IDR Low represents the input sound level in dB SPL that will produce an electrical stimulation at 0% of the Electrical Dynamic Range (EDR). This corresponds to the lower level of the Input Dynamic Range (IDR) causing stimulation at the T level.

The overall microphone operating range extends from 23 dB SPL to 113 dB SPL and the low-level IDR can be adjusted from 23 to 35 dB SPL.

Knee points – 75% EDR

The knee point represents the input sound level in dB SPL that will produce an electrical stimulation at 75% of the Electrical Dynamic Range (EDR). This is the compression knee point. Stimulation above the 75% level will be compressed to avoid discomfort.

Four sets of predefined compression settings are provided:
- Custom – customisable knee point (linear compression by default)
- Quiet – optimised for quiet sound environments
- Medium – optimised for medium loud sound environments
- Loud – optimised for loud sound environments

Voice Guard	Custom ▼			
	LF	1k	2k	HF
Kneepoint	76	76	76	76
IDR Low	23	23	23	23
				dB A

Voice Guard	Quiet ▼			
	LF	1k	2k	HF
Kneepoint	52	52	47	41
IDR Low	23	23	23	23
				dB A

Voice Guard	Medium ▼			
	LF	1k	2k	HF
Kneepoint	61	61	57	50
IDR Low	23	23	23	23
				dB A

Voice Guard	Loud ▼			
	LF	1k	2k	HF
Kneepoint	70	70	66	58
IDR Low	23	23	23	23
				dB A

Standard presets: The compression presets for Quiet, Medium and Loud have been designed to ensure that 95% of speech is kept below the compression knee point for sounds at 50, 60 and 70 dB SPL respectively. These are fixed and cannot be modified.

Custom: The default compression setting for Custom is linear compression (no compression knee point). However, the knee point value can be modified independently in each frequency band, resulting in customised compression settings.

Voice Guard – Auto: When using Voice Guard in Auto mode, it constantly analyses the sound environment and the compression knee points are dynamically adapted to provide optimal settings in all sound environments in real time.

Voice Guard	Auto ▼			
	LF	**1k**	**2k**	**HF**
Kneepoint	Auto	Auto	Auto	Auto
IDR Low	23	23	23	23
				dB A

Note: Voice Guard – Auto is only available with CRYSTALIS CAP and MPIS CAP coding strategies.
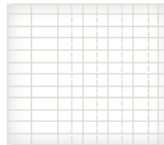
Programming
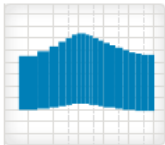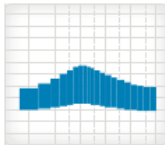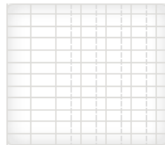
End session

❶ **Program options:**

Start with last used program when powering the sound processor on. Otherwise, it starts in P1.

Ignore remote program changes deactivates program changes from the Streamer. Audio streaming and volume control are still possible.

❷ Enable/disable the use of the streamer

Note: Battery life could be reduced if the streamer function is enabled.

❸ Streamer serial number fields for use with streamers in linked mode only. Linking is optional and typically not recommended.

Note: Please refer to the ConnectLine tool regarding the procedure to link the sound processor to the streamer.

It is possible to link a second streamer to the sound processor, however, the Primary streamer will always have the priority if both streamers are switched on.
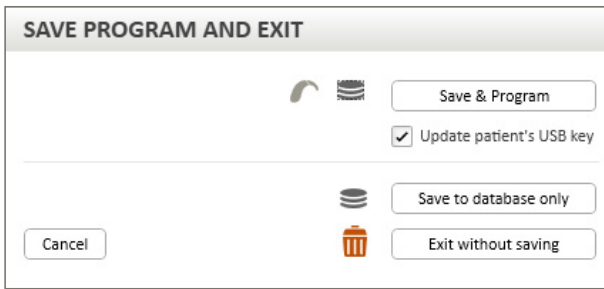
End session gives options of where to save the program: In the sound processor, in the database and on the patient's USB memory stick (the default choice of USB can be configured in Settings).

Buttons and Indicators

This window allows you to manage which of the controls presented in the Instructions for Use of the Neuro 2 sound processor section are accessible to the patient.

Push Buttons
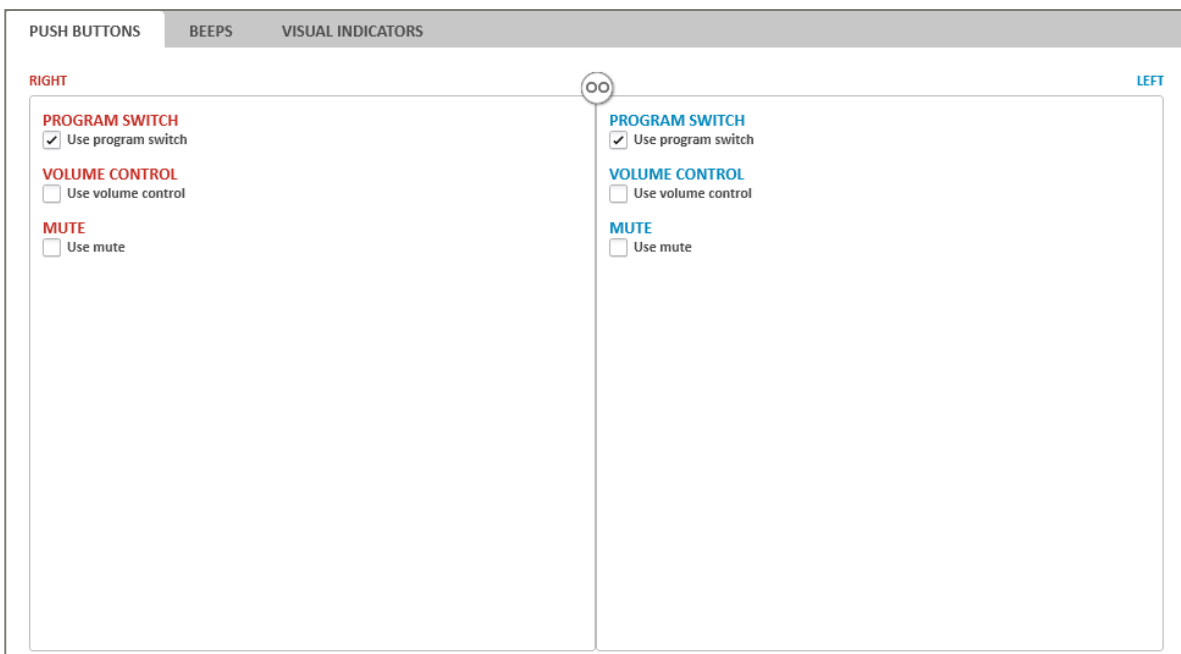
The dual push button functionality can be configured according to patient needs:

- Program Control (Program switch) – allows the user to change between the available programs
- Volume Control – allows the user to adjust the sound volume (shifts the post-processing compression function so that loudness perception can be changed within the T and C levels)
- Mute – allows the user to temporarily mute all sound from the sound processor without having to turn it off or remove the antenna from the implant.

It is recommended that the operation of the button is kept as simple as possible.

Beeps
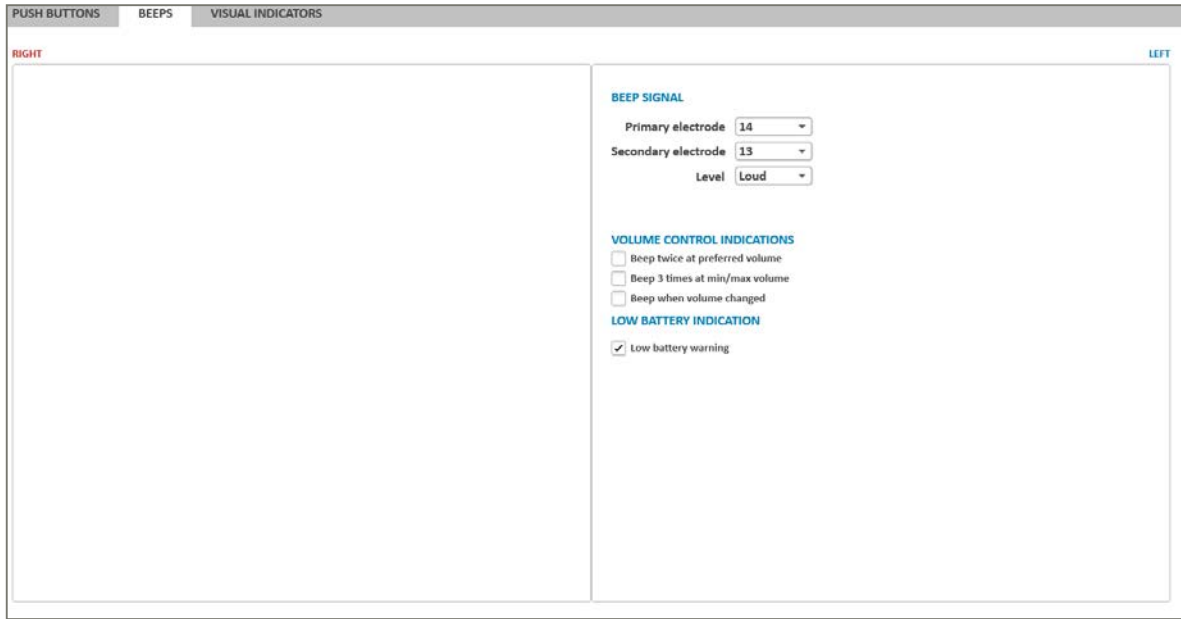
Beeps are used as notifications for the patient about various events and as feedback to button presses.

Select the electrodes and stimulation level to be used for generating the beeps.

Beeps are always presented when:
● The antenna is correctly placed on the implant (single beep)
● When the user changes to another program (number of beeps varies according to program number)
● The battery is out of power and the sound processor will turn off (3 beeps)

Configurable beeps:
● Volume Control Indicator - when the volume is adjusted
● Low Battery pre-warning – when the battery will soon run out of power

Visual Indicators
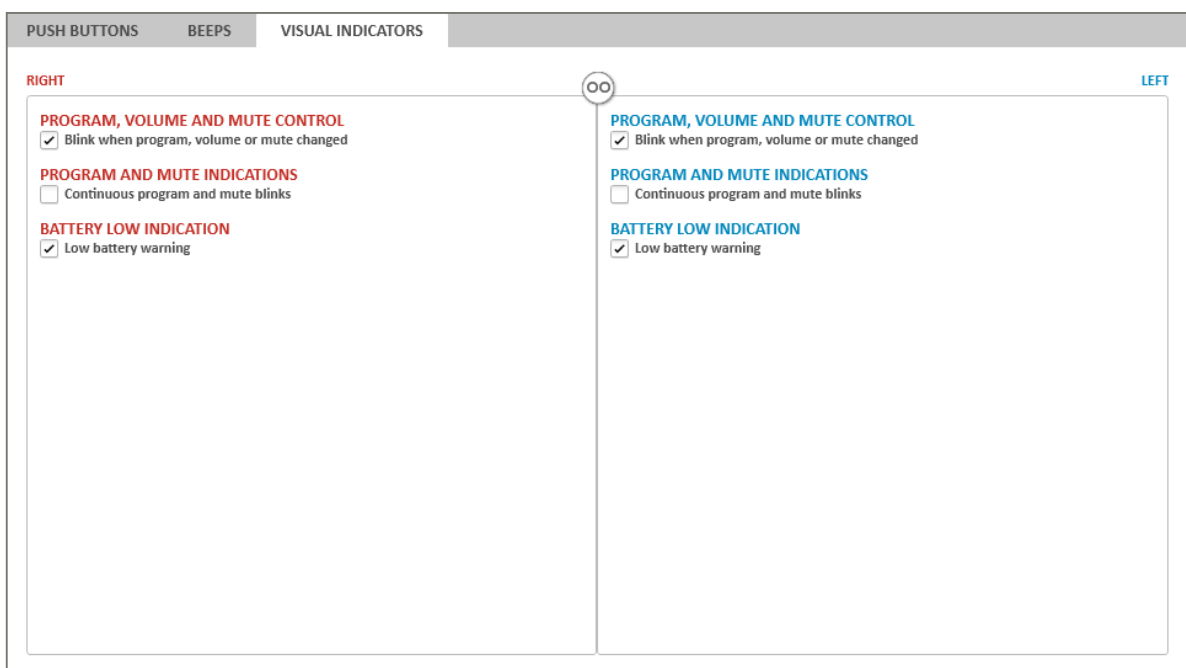
Visual indicators notify the user or carer about various events and as feedback to button presses.

Visual indicators are always given:
- When the processor is booting up
- As a response to self-check functions
- When the antenna is placed on or removed from the implant.

Configurable indicators:
- When the push button is used to adjust volume, program or mute
- Repeated indication of current program/mute state – to allow parent, caregiver or teacher to monitor if the processor is powered on and what program the user is listening to
- Low battery pre-warning – helps caregivers to notice a power low condition.

ConnectLine tool
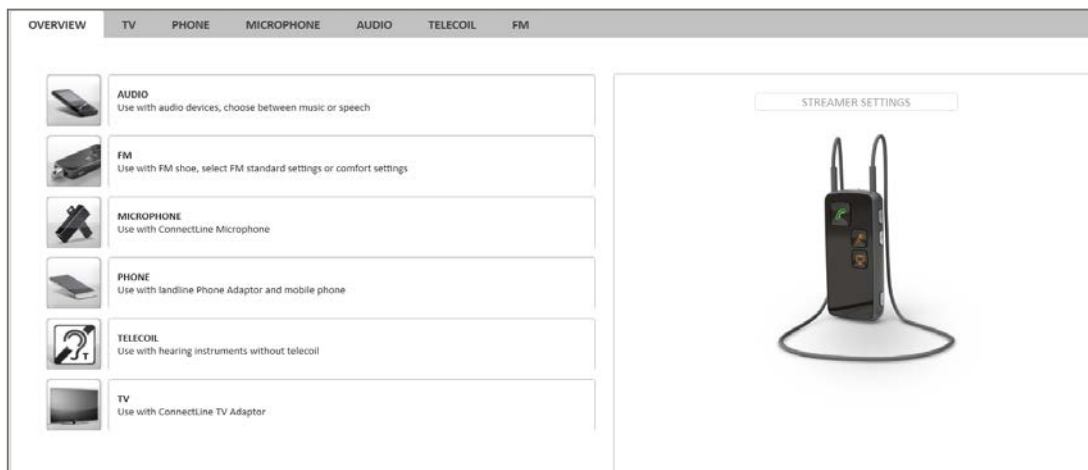
The Overview tab describes ConnectLine solutions for selected sound processors. Each ConnectLine Solution is indicated by an icon. A short text next to the icon explains which dedicated ConnectLine application is required to make use of the ConnectLine solution. By clicking on an icon or text of any ConnectLine application it is possible to navigate through the whole ConnectLine Tool. The Streamer Settings Tool can be accessed from here.

Some settings can be adjusted for each audio input, as follows:

- Streamer loudness: Adjusts the streamed signal, making it softer or louder. The signal from the sound processor micro-phones is not affected.

  Note: The streamer loudness is applied when streaming with sound processor microphone muted only.

- Microphone attenuation: Adjusts the level of the sound processor microphones relative to the streamed signal, which is useful when environmental sounds interfere. Tooltips show the actual range for the sound processor family being fitted. When set to 0 dB, the microphones will be set to the same level as in live mode without streaming.

  Note: The streaming loudness and microphone attenuation settings applied when testing the streamer during fitting are those programmed in the sound processor, not those defined in the fitting software. Program the sound processor and reconnect if needed.

The Phones settings are automatically activated when the sound processors are cordlessly connected to a cell phone, or to a landline phone using the ConnectLine Phone adapter.

The Mic Level is automatically activated when the microphone and the Streamer is paired. When set to 0 dB, the microphones will be set to the same level as in live mode without streaming.

The audio settings are automatically activated when the sound processors are cordlessly connected to a Bluetooth stereo device (computer or MP3 player). They are also activated when the client is listening to an audio device which is joined to the Streamer by cable.
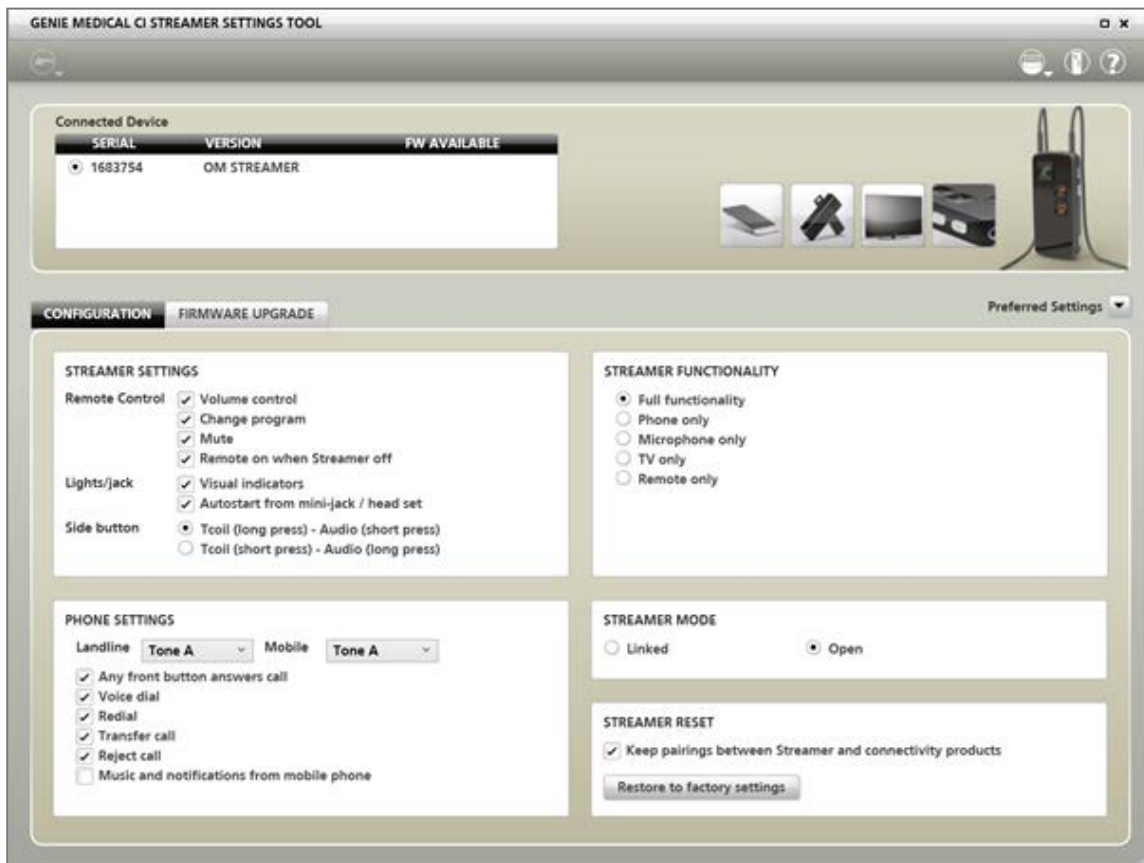
The Telecoil is integrated in the Streamer. The settings are activated when the functionality is activated on the Streamer.

The FM settings are activated when a universal FM receiver is plugged into the Europlug on the bottom of the Streamer. Only one FM receiver is needed to stream the FM signal.

Streamer Settings

Use Streamer Settings to upgrade Streamers and to configure Streamer.

Connect one or more Streamers to the computer via a USB cable.

In Genie Medical CI you can access Streamer Settings from ConnectLine tool in programming menu.

How to connect Streamer to a computer

Required: Micro USB cable

1. Insert the large plug of the USB cable into a USB port on the computer
2. Insert the other plug into Streamer

When Streamer Settings is open, the dialogue Help to connect Streamer will appear. If you do not wish to see the dialogue again uncheck Always show this on startup in the lower left corner.

To have Genie Medical CI show the dialogue again, click the icon in Streamer Settings toolbar.

The Configuration Tab

Streamer has a lot of features and connectivity options. In order to give the best possible user experience and meet individual user needs, the main functions can be enabled and disabled here.

Streamer settings

When a Streamer is connected, changed settings are saved directly into the Streamer.

Set the Volume button to control volume, program or the mute function in the sound processor. Programs in the instrument cannot be changed while streaming.

Turn the front lights on or off. If they are off, the light on top of Streamer remains on when charging.

Configure the built-in Telecoil and audio streaming to be activated with a press on the button on the right side of the Streamer.

Streamer Functionality

Streamer can be dedicated to be used for: TV only, Phone only, Microphone only or Remote only. When a Streamer is dedicated for a specific use, only the relevant front buttons function.

Streamer Mode

There are two modes for Streamer:

- **Open:** The Streamer is not linked to the sound processor.
- **Linked:** The Streamer is linked to the sound processor in Genie Medical CI so the user has a private access to the sound that is streamed to its sound processor.

 Note: Linking Streamer with the sound processor

Linking of the Streamer is done in the Programming screen. Enter the Streamer serial number in the Primary (or Secondary) Streamer field next to the Read Serial Number button.

Finding the Streamer serial number

Streamer: The serial number can be found behind the back shell and on the Streamer packaging label.
Demo Streamers have no serial numbers.

Streamer Reset

The Streamer can be restored to factory settings but retain pairings to external devices. All previous configurations will be cleared. If the Streamer is linked, the link to the sound processor will always be kept.

Phone Settings

For some sound processors, different ringtones can be chosen for landline and mobile.

The following phone features can be turned on or off on Streamer:

Redial: press Phone button for two seconds to redial number

- Voice dial: apply a short press to the Phone button to activate voice dial
- Reject call: press volume up or down button to reject an incoming call
- All front buttons answer call: use any front button to answer an incoming call
- Music and notifications from mobile phone: the sound processor beeps when the client receives a text message, calendar reminder, etc. If the client plays music or sounds on the phone, it is received in the sound processors automatically.

Favourite Settings

To save time, you can establish favourite settings for reuse. Instead of configuring settings one by one for each session, apply favourite settings and change if necessary.
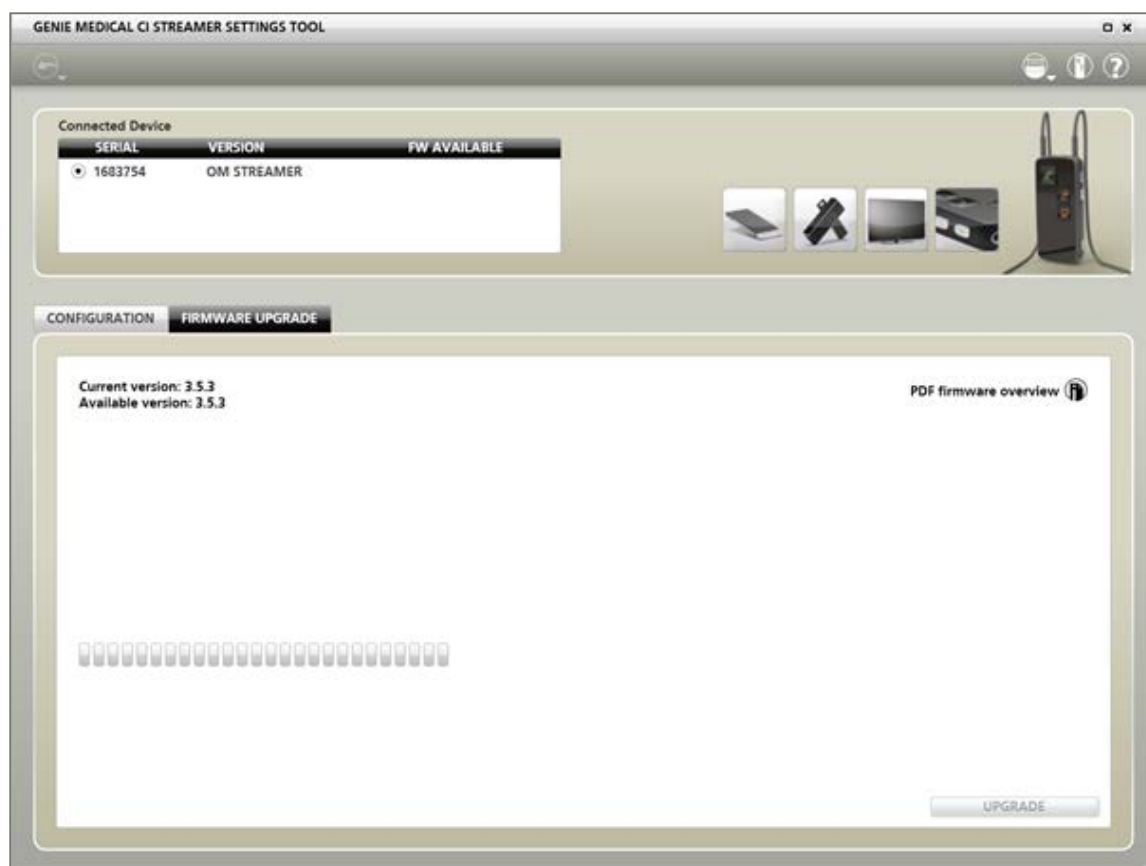
Print

It is always possible to print an overview of the current settings.

Click the [icon] icon in the Streamer Settings toolbar.

Select Print Preview to see it on the screen before printing. Select Print to print right away.

Upgrade Streamer Firmware

Upgrade Streamer firmware by means of the Firmware Upgrade tab in Streamer Settings. You can access Streamer Settings from the Tools menu in Genie Medical CI.

When to upgrade

The Firmware Upgrade tab indicates to which version you can upgrade; just below is an overview of ConnectLine and Streamer functions for each version.

Before upgrading

Upgrading can take up to 20 minutes for Streamer. You can use your computer and Genie Medical CI in the meantime but to make sure that the process is not interrupted, do as follows:
- If the Streamer is flat, charge it before upgrading
- Do not disconnect the USB cable during the upgrade
- Do not let your computer go into standby or shut down during the upgrade
- If you are using a laptop, run it on AC power during the upgrade

File

The File menu provides access to different options for managing patient files. The following options are available:

Patient export
Patient import
Anonymous patient export
Calibration file update
Exit
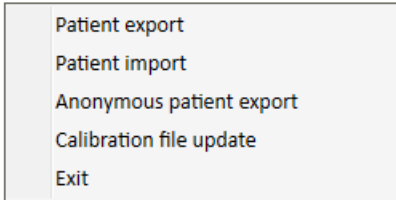
Patient Export: Allows you to export a patient file in a format only readable by Genie Medical CI
Patient Import: Allows you to import patient files from Neuro One and Neuro 2

Note: These functions are only available when no session is open.
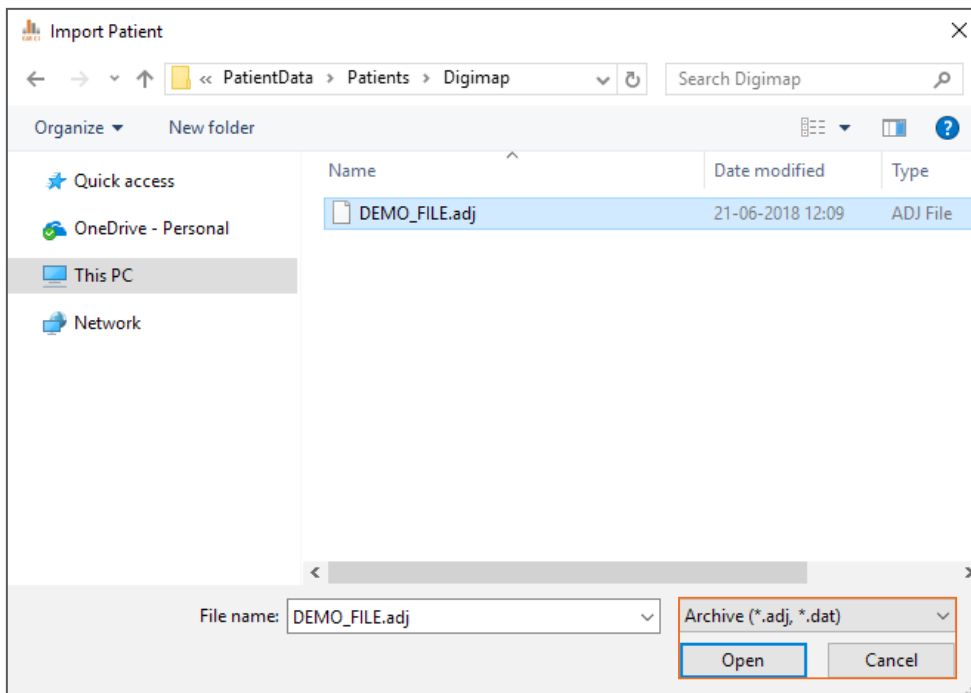
Patient Export

This function allows the user to export the patient file from the database to an external source, for example, a USB flash drive. Use the export function if you need to email the patient file.

Patient Import

If the patient's fitting is not present in the computer, this function allows the user to import the fitting file, for example, from a USB flash drive. To do this, click on "Patient import" and select where the patient file is located.

Note: If the data being imported is identical to a file already present in the local database, no upload will be performed.

Neuro One patient files can also be imported. The user will need to select the .adj file when importing these files.

Note: Importing a Neuro One patient file into Genie Medical CI may lead to some modifications in the fitting to make it Neuro 2/Genie Medical CI compatible.

Anonymous patient export

In order to preserve patient privacy, Genie Medical CI can export the patient fitting anonymously.

Calibration file update

The Calibration file is an essential tool for ensuring the system is functioning. Regular calibration update files can be downloaded from the Oticon Medical website.

Be sure to use the latest calibration file while doing a Neuro 2 fitting.

Exit

This function closes Genie Medical. The user will be prompted to ensure the current fitting is saved to the patient database before closing.

Features

The Features menu provides the following sound processor management options:

Clear sound processor
Sound Processor Firmware Update
Fitting Interface Firmware Update
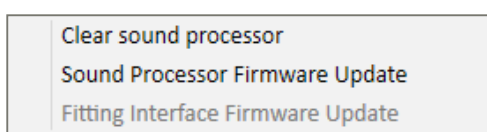
Clear processor

This option allows you to reset the connected sound processor, deleting all of its contents. The contents cannot be retrieved once deleted. If the contents are deleted in error, the programs will need to be downloaded again from the database.

CLEAR SOUND PROCESSOR?

Clear sound processor?

RIGHT SIDE

LEFT SIDE

☑ Clear sound processor

OK   Cancel
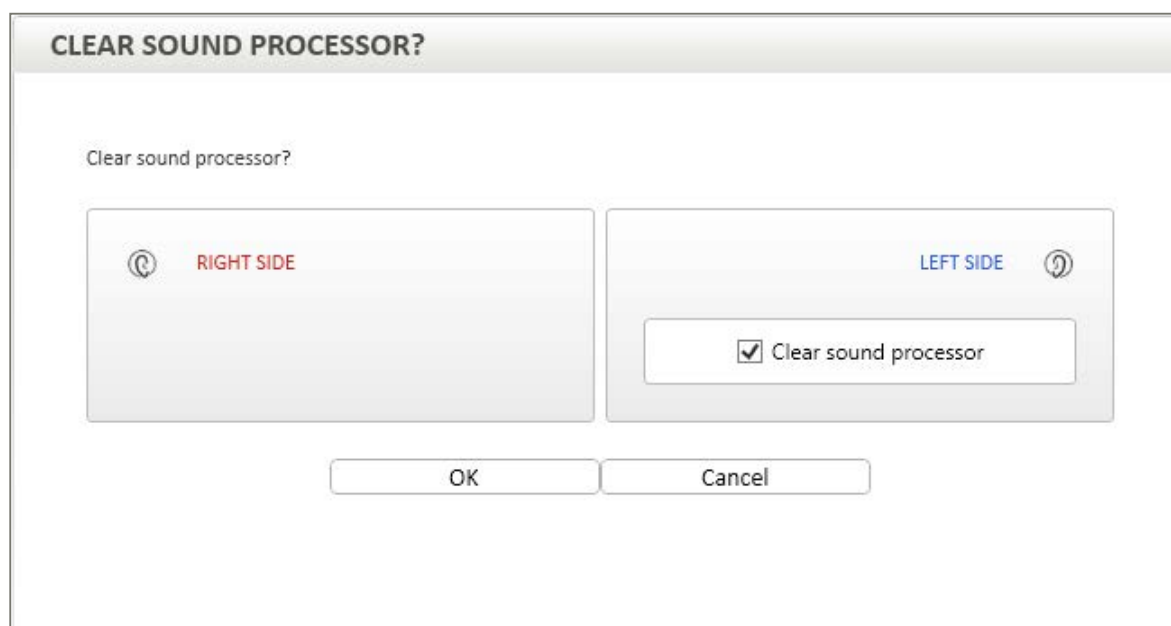
This procedure takes a few seconds and can only be performed on an already detected sound processor. Once the reset is complete, the sound processor is automatically disconnected.

Note: It is strongly recommended that the contents of a sound processor be cleared before saving files from a different patient.

Sound processor firmware update

Firmware updates, when available, are automatically offered by Genie Medical CI once the processor is connected.
If preferred, these updates can also be accessed after detecting the sound processor from the Features menu.

Fitting interface firmware update

When a new CI-Link firmware is available, you are advised to update it when pressing the "Connect" button.

The firmware update is also available in the "Features" menu when no processors are connected and allows the user to display the actual firmware version of the Fitting interface.

FITTING INTERFACE FIRMWARE UPDATE

Latest firmware version: 1.0.1.239
Current firmware version: 1.0.0.206

Do you want to update the fitting interface firmware?

OK   Cancel
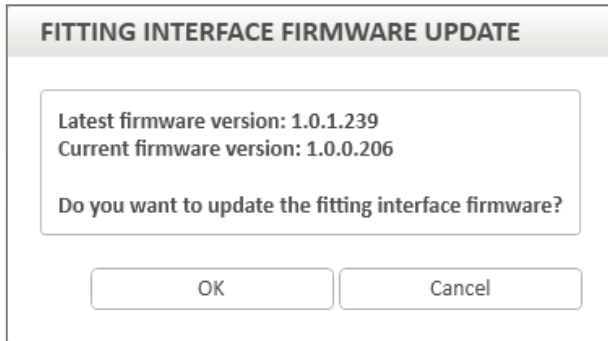
Once interface firmware update has been performed, a message indicates that the interface has been updated with the latest firmware.

FITTING INTERFACE FIRMWARE UPDATE

Current firmware version: 1.0.1.239

The fitting interface firmware is already up-to-date.

OK
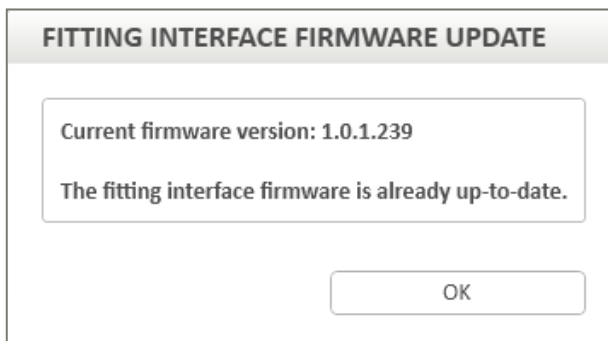
Note: once the firmware interface update has been performed, it is not possible to revert the manipulation. However, it is always recommended that the interface is programmed with the latest firmware.

Firmware interface update allows the audiologist to benefit from the latest improvement in terms of fitting performances.

Language

This function allows the user to select the software language.

Preferences

The Preferences menu offers access to different tabs for managing the current fitting:

General

① **Calculate T as a % of C:** The % used to calculate T from C when pressing: [icon]

Data Storage

The Data Storage tab allows the user to activate a shared database for storing patient files by ticking "Enable shared database".

Additionally, the shared database can be enabled using the server address and installing the shared database separately.

Stimulation

The calibrated stimulation parameters for single tone or sweep stimulation can be changed in this tab.

① Stimulation is pulsatile by default. You can redefine the duration of the tone bursts (ms stimulation) as well as the silence time (ms pause) between tone bursts.

Note: It is recommended that default stimulation values are used in most cases, however, a slower stimulation pattern may be considered in specific cases (for example, to overcome auditory nerve fatigue etc.).

② A sound indicator can be activated in the software to be audible when the electrodes are stimulated in single tone and sweep modes.

③ This feature gives you the option of setting a limit on how fast stimulus duration and stimulus amplitude can be adjusted while stimulation is ongoing. Adjustments are limited to the set number of steps per second to avoid sudden unintended changes in level. This ensures the stimulus remains comfortable for the patient.
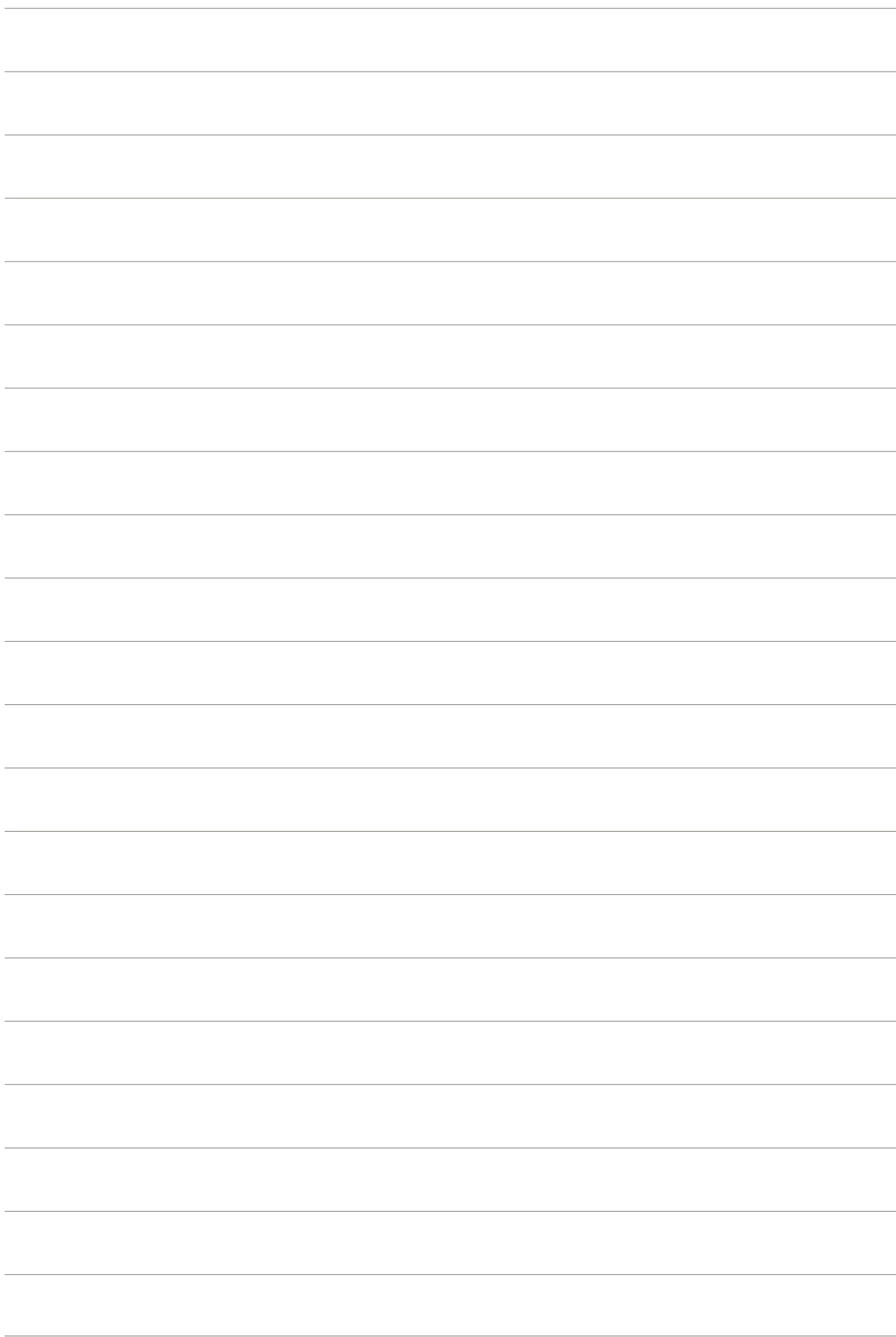
About

This provides information on the version of the fitting software and its associated calibration file.

Date of last review: 2019-11
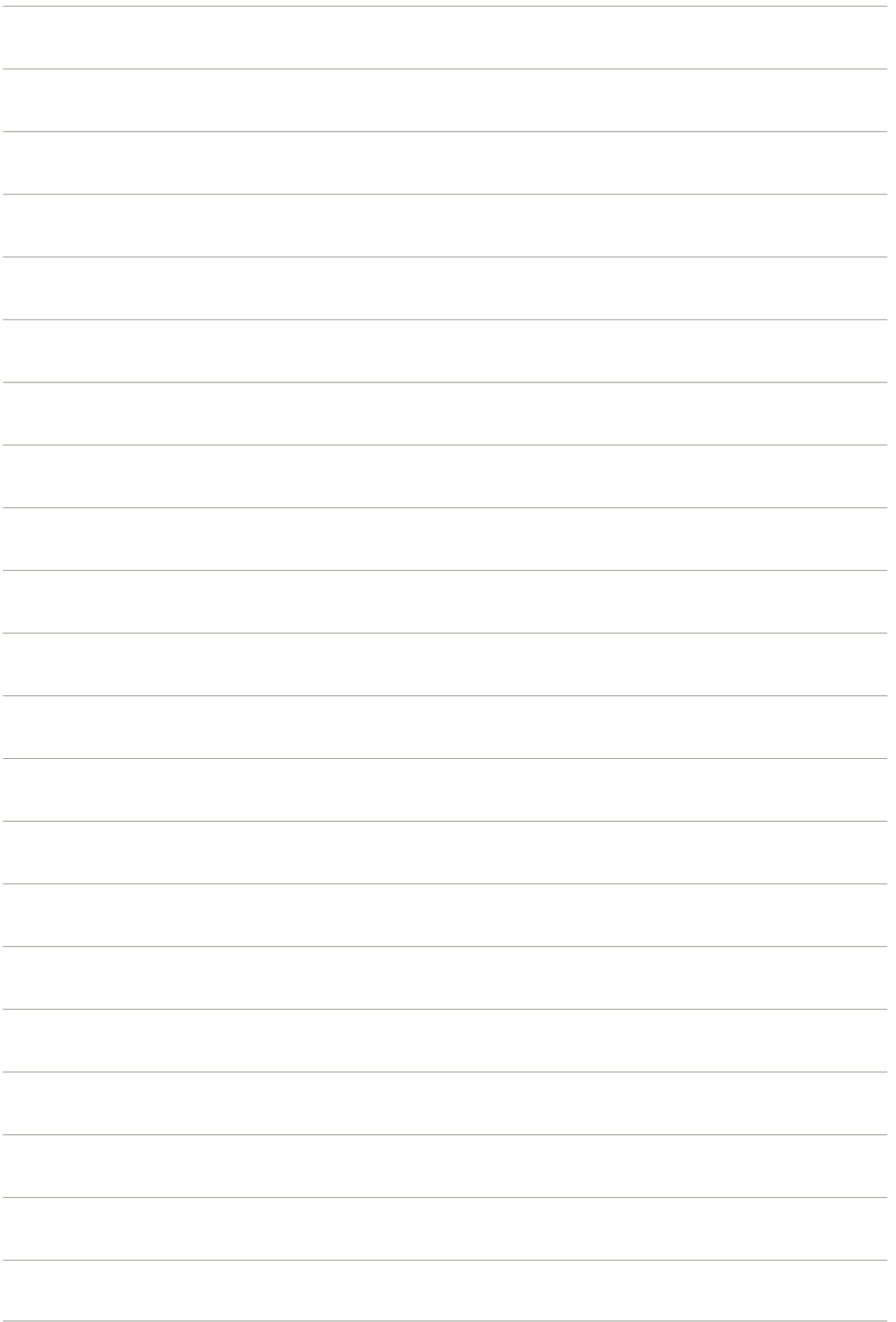
Because sound matters

Oticon Medical is a global company in implantable hearing solutions, dedicated to bringing the magical world of sound to people at every stage of life. As part of the Demant group, a global leader in hearing healthcare with 14,500 people in over 130 countries, we have access to one of the world's strongest research and development teams, the latest technological advances and insights into hearing care.

Our competencies span more than a century of innovations in sound processing and decades of pioneering experience in hearing implant technology. We work collaboratively with patients, physicians and hearing care professionals to ensure that every solution we create is designed with users' needs in mind. We share an unwavering commitment to provide innovative solutions and support that enhance quality of life for people wherever life may take them. Because we know how much sound matters.

Oticon Medical

NEURELEC
2720 Chemin Saint-Bernard
06220 Vallauris
France
TEL: +33 (0) 4 93 95 18 18 – FAX: + 33 (0) 4 93 95 38 01
info@oticonmedical.com

oticon
MEDICAL | Because sound matters

www.oticonmedical.com