

ReSound Smart Fit AutoREM guide

ReSound Smart Fit fitting software offers automatic real ear measurement (AutoREM) functionality. AutoREM is an integrated feature within ReSound Smart Fit so verifying hearing aid fittings with real ear equipment can be done within the software.

Gain is automatically adjusted at the time of the measurement. Once the measurements are completed, you can select to have AutoREM apply the customized gain to the hearing aid programs for a more precise match to the prescriptive targets.

ReSound Smart Fit AutoREM offers:

- Selection to specify **open fitting**: This selection allows the measurement to account for the electroacoustic characteristics of an open fitting. Open fittings allow low frequency gain to escape the ear canal. Specifying an open fitting prevents ReSound Smart Fit from identifying the reduction of low frequency gain as unsuitable and, in turn, providing too much low frequency gain to try to correct the issue.
- Selection to specify the measurement program before performing REM: This allows the hearing care provider to select the program to use for the measurement within the AutoREM wizard, rather than using the active program upon entering the feature. This allows for more flexibility without having to exit or restart the AutoREM wizard. The adjustments that result from measuring in the chosen program can then be applied to all fitted programs.
- Support for new test stimuli: New pure-tone and speech stimuli included to allow for assessment of audibility based on the goals of the test and varying protocols.

ReSound Smart Fit AutoREM functionality also offers the integration of the Inter Module Communication protocol 2 (IMC2). IMC protocol 2 allows direct communication between ReSound Smart Fit and REM modules through Noah.

Compatibility Specifications

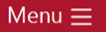
Utilizing the new AutoREM features and REM equipment manufacturers in ReSound Smart Fit 1.2 requires Noah Version 4.8 (or higher).

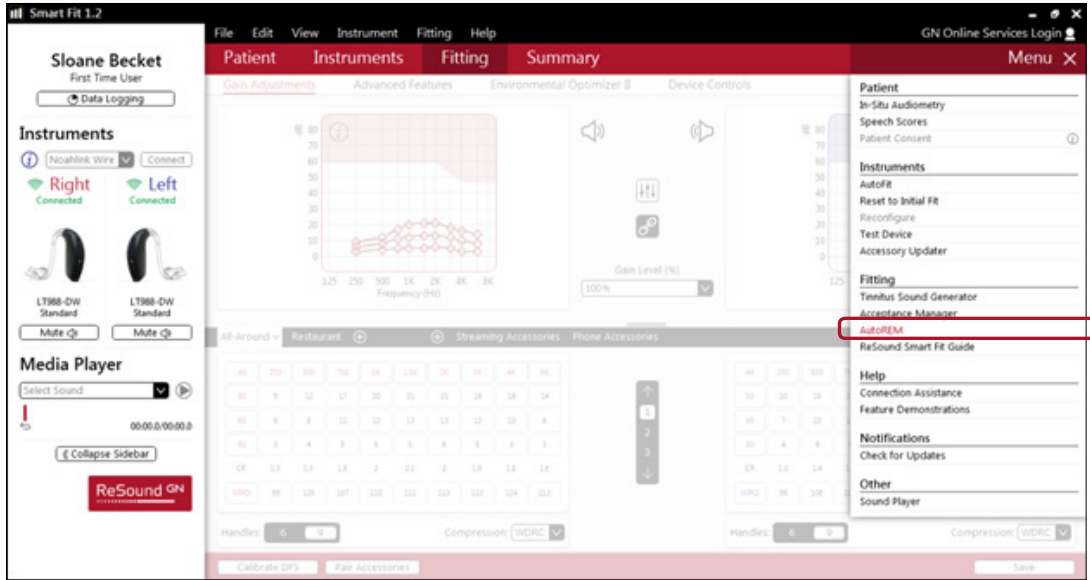
There are currently three compatible real ear systems:*

Manufacturer	Module Name	Version
OTOmetrics	OTOSuite	4.82.00
Interacoustics	Callisto Suite	2.9.0
MedRx	Avant REM	3.2

*Manufacturer and module compatibility is subject to change. Please contact customer support for the latest information.

Verifying a fitting with AutoREM

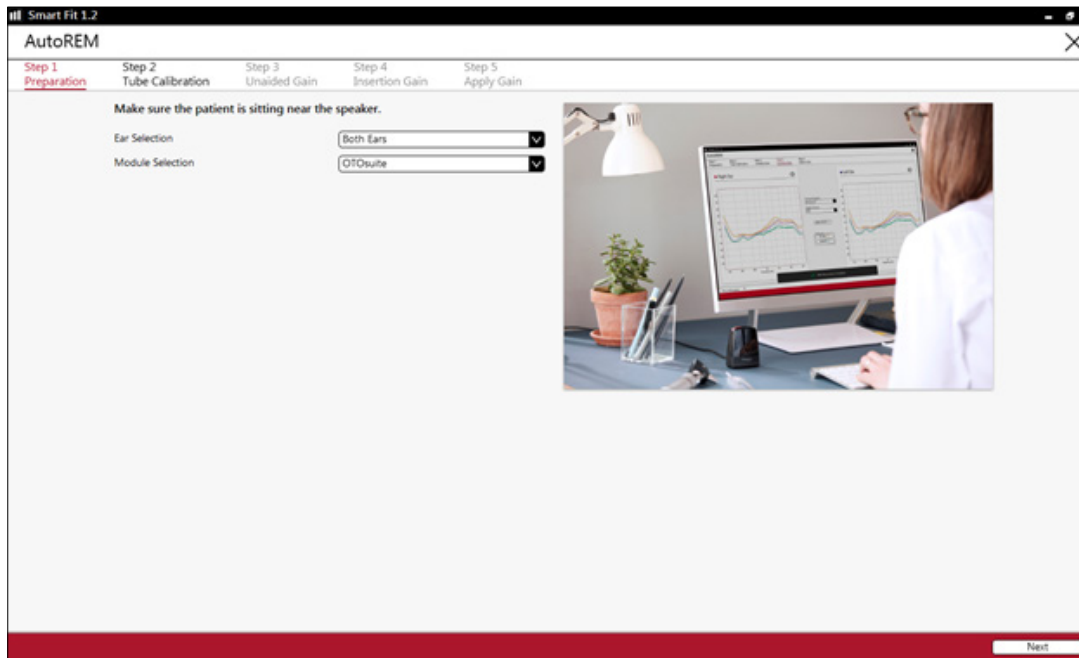
The hearing aids must be connected in ReSound Smart Fit prior to opening the AutoREM wizard. AutoREM can be accessed from the hamburger menu **Menu**  on the upper right side or through Fitting → Tools in the top menu.



Once in the AutoREM wizard, follow steps 1 through 5.

Step 1: Preparation

Select the ear to be measured and REM module to be used from the available menus. Use the Next button in the lower right of the screen to advance through the steps.



Step 2: Tube Calibration

Complete probe tube calibration. Place the module on the patient's ear while they are facing the speaker. Fold the probe tube over and place the tube opening in front of the microphone. Use the calibrate button in the center of the screen to begin the measurement.



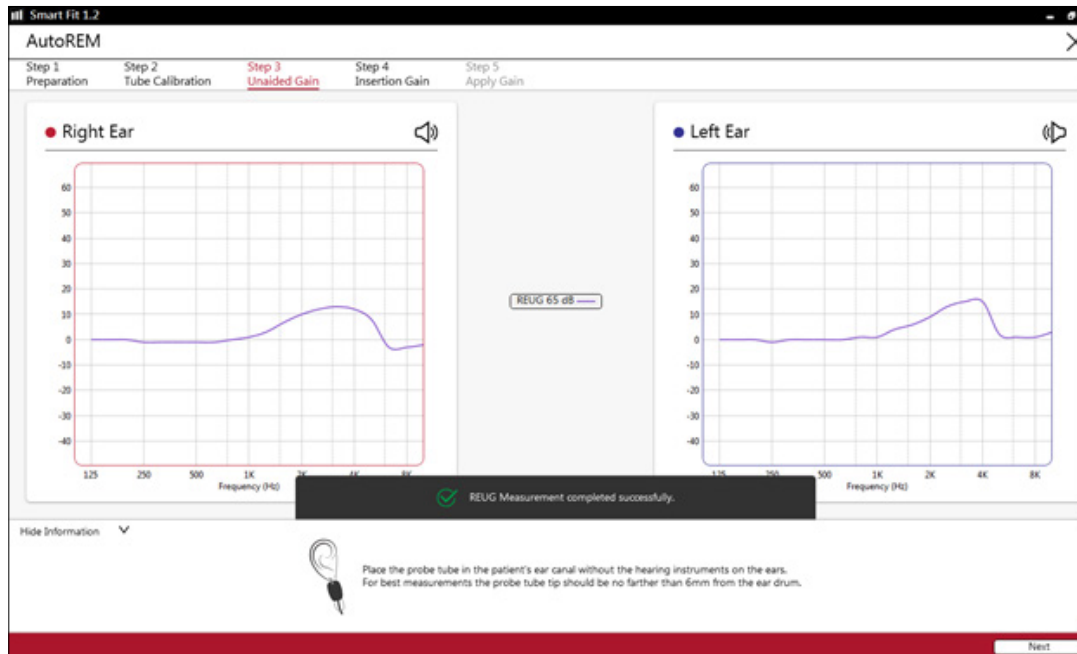
Step 3: Unaided Gain Measurement

By measuring the sound pressure level of the open ear canal near the tympanic membrane, the real ear unaided gain (REUG) can be determined. The REUG is a measurement of the resonant peak of the patient's open ear without a hearing aid inserted. The resonant peak is the boost in high frequency sounds as a result of the combination of the pinna, the concha and, most influential, the external ear canal. Each ear has its own unique resonant peak. When real ear measurements are not collected, we are relying on an average resonant peak that may be very different from the patient's actual response. In short, the REUG is obtained in order to provide a reference for the real ear insertion gain (REIG) measurement used with several prescriptive formulas.

In order to complete REUG measurement:

1. Place the probe tube in the ear canal (without the hearing aid inserted) with the end of the tube at appropriate distance from the intertragal notch (i.e., within 5 mm of the eardrum).
2. Place patient at appropriate distance and azimuth from the loudspeaker.
3. Click the REUG 65 dB button in the center of the screen.

The average adult will have a primary peak around 2650 Hz with a secondary peak in the 4000 - 5000 Hz range¹, but will vary according to the physical characteristics of the patient's ear.



Step 4: Insertion Gain Measurement

When a hearing aid or earmold is placed in the ear canal, the open ear gain is altered. Fitting prescriptive formulas attempt to compensate for the loss of natural gain by applying a certain amount of insertion gain. This requires measuring the sound pressure level of an input sound with the hearing aid inserted in the patient's ear. That measurement is used to determine the real ear aided gain (REAG). The appropriate insertion gain is then calculated by subtracting the unaided gain (REUG) from the aided gain (REAG).

In order to complete REAG measurement:

1. Select:

A. **Type of fitting**, open or closed.

Open fitting selection should be used when a dome or mold with a large vent is coupled to the hearing aid. Use **closed fitting** for custom products or hearing aids coupled to earmolds with medium vents and smaller or no venting.

B. **Program** to be measured.

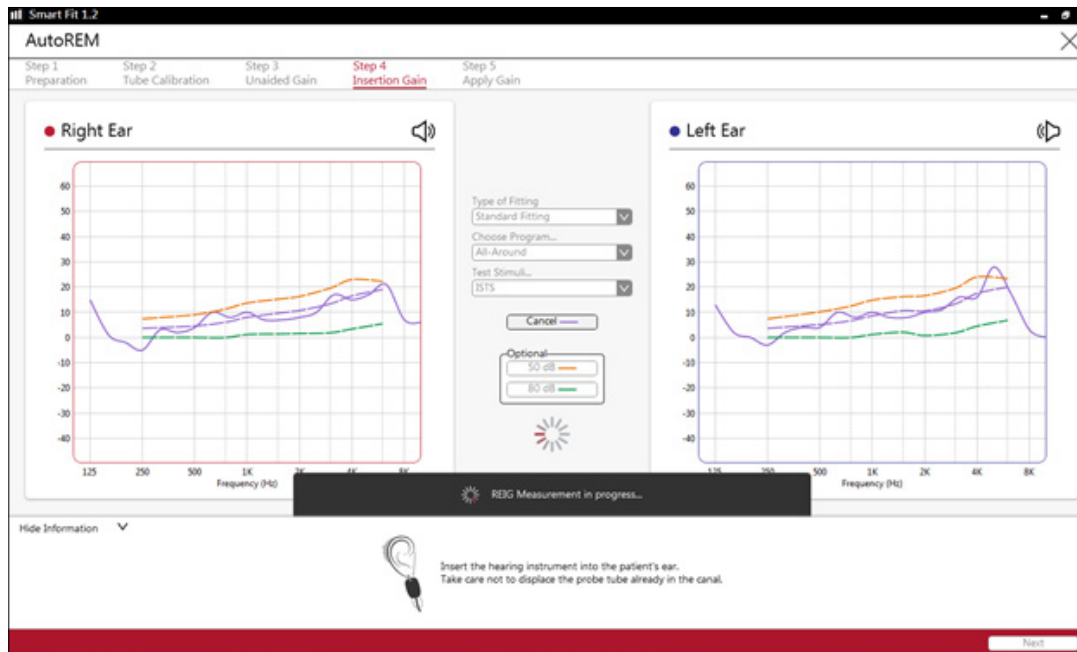
Any of the fitted programs can be used in addition to the REM program. The REM program is a simulated program that uses omnidirectional microphones and all advanced features are set to off.

C. **Stimulus** to be used during the measurement.

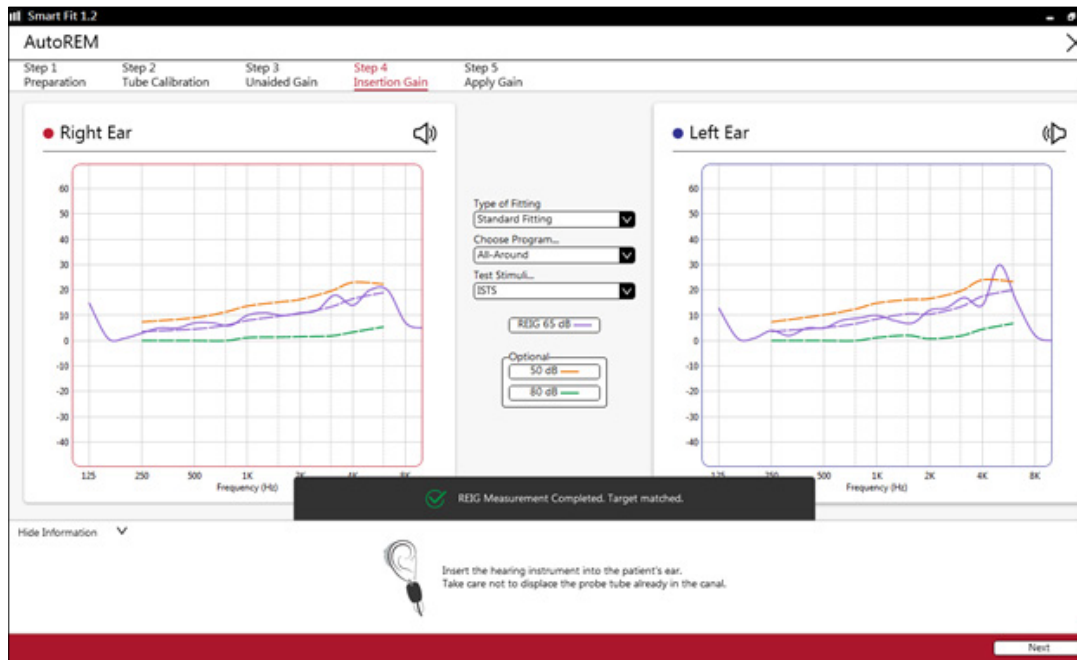
- Place the hearing aid into the ear while keeping the probe tube in place.
- Click the REIG 65 dB button in the center of the screen to start the measurement. The gain will be adjusted automatically to meet target. Three attempts or less will be made.



Controls will be grayed out when the measurement is in progress.



This image shows the REIG measurement completed and the target automatically matched.

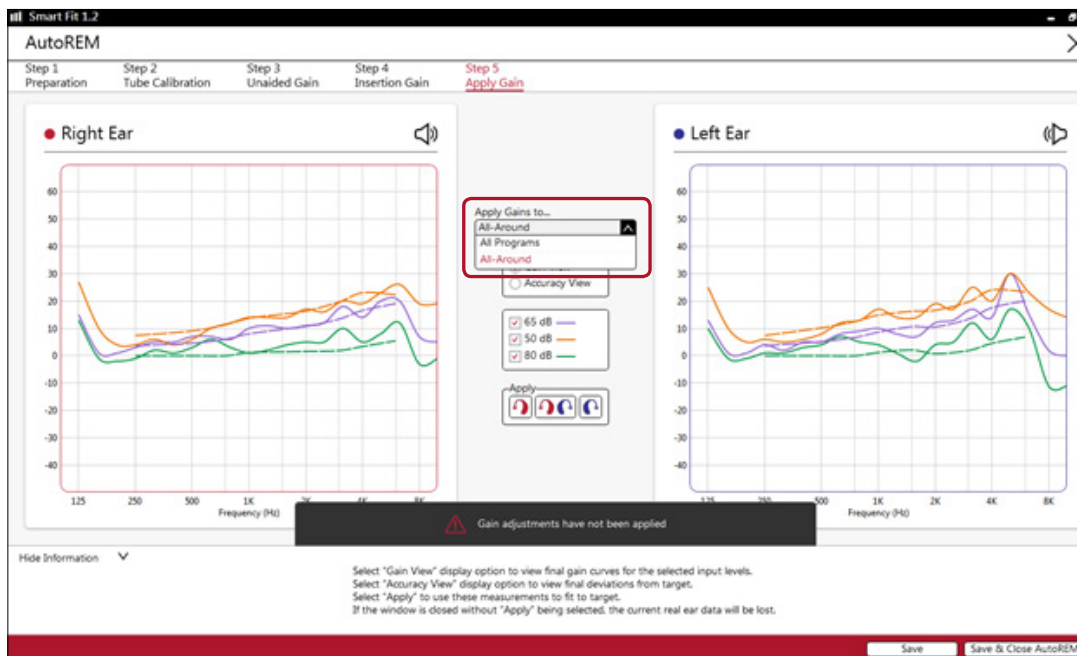


Optional: Additional measurements can be made at soft (50 dB) and loud (80 dB) input levels. All three input levels are adjusted during the initial 65 dB input measurement; therefore, those measured with soft and loud inputs will not be adjusted again.

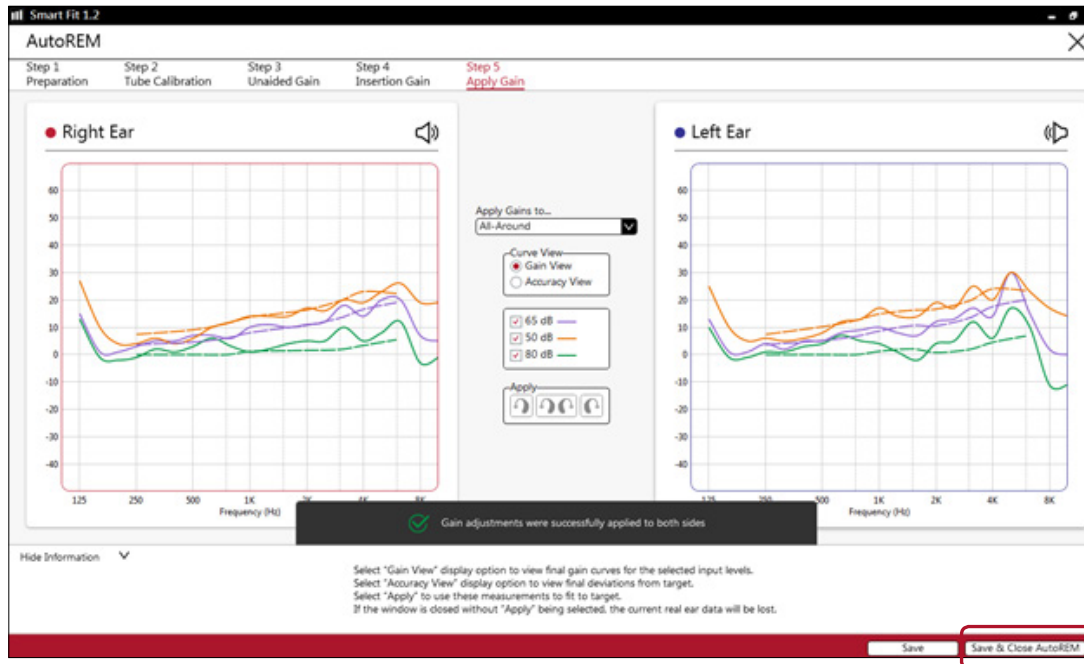
Step 5: Apply Gain Adjustments

To apply the adjusted gain to the fitted settings:

1. Select which program(s) to apply the adjustments. Adjustments can be applied to all programs or the one used for the measurement.
2. Select which ear to apply the adjustments. (This selection will immediately apply your changes. Afterwards, you will see a confirmation message.)



3. Select **Save & Close AutoREM** to return to the Fitting screen.



AutoREM streamlines the process of conducting real ear measurements (REM), making the process faster and more convenient. The automatic target-matching removes the variability of manually matching targets.

An internal study found that hearing care professionals spent less time verifying gain settings with AutoREM when compared with conventional REM.² Furthermore, the same study found less variability when targets were automatically adjusted versus manually adjusted. Patients will be fit with truly customized gain settings, adjusted for their ears, rather than relying on predetermined averages. These customized settings allow for a more accurate starting point for the fitting and potential for increased satisfaction. Ultimately, AutoREM provides for a fast and reliable way to verify hearing aid settings, putting the patient on the road to a more positive amplification experience.

References

1. Hawkins, D., Mueller, H. (1992). Procedural considerations in probe-microphone measurements. In Mueller, Hawkins, Northern (eds.): Probe Microphone Measurements: Hearing Aid Selection and Assessment. (pgs. 67-80). San Diego, CA: Singular Publishing Group Inc.
2. Koehler, E.D., Kulkarni, S. (2014, October 1). Fast and Easy Fitting and Verification with Integrated Real ear Measurement. Hearing Review. Retrieved from <http://www.hearingreview.com>

Manufacturer according to FDA:

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