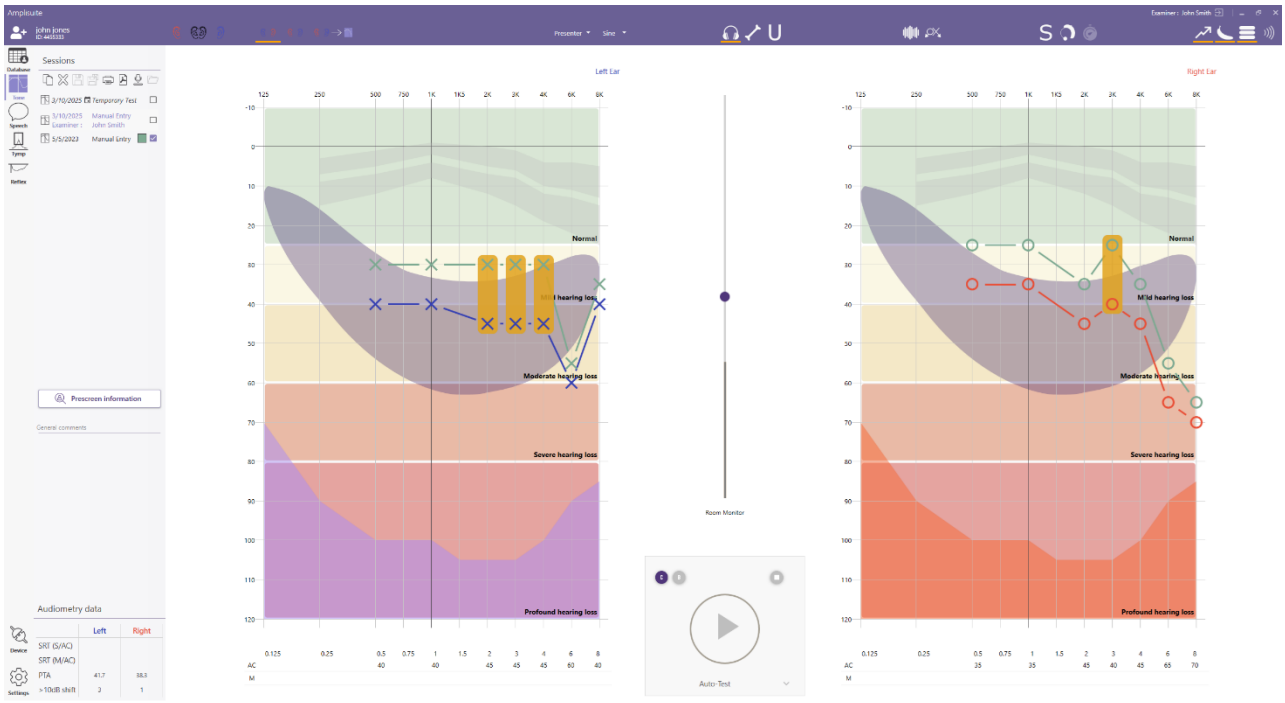
Amplisuite

Instructions for use



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ABOUT THIS MANUAL

READ THIS OPERATING MANUAL BEFORE ATTEMPTING TO USE THE INSTRUMENT.

This manual is valid for the Amplisuite (version 2.2).
This product is manufactured by:

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1. Introduction

1.1. Thank you

Thank you for using Amplivox Amplisuite. Amplivox Amplisuite is a software application that allows results to be uploaded from an Amplivox instrument to a computer via a USB port or conduct tests (automatic or manual) using appropriate devices, viewed graphically and then printed. Amplisuite can be used with audiometers and immittance systems.

Amplisuite is easy-to-use software, that can work as a standalone software or can be integrated into different EMR systems such as Otoaccess and Noah databases.

Please note: Results can only be uploaded from Amplivox audiometers that incorporate the PC compatibility feature.

1.2. Intended applications

The software is intended to be used as an accessory with compatible hearing testing devices to manage audiometric data.

Amplisuite software can display audiometric test results from the screening audiometer models 116, 170, PC850 and ModelOne, as well as the diagnostic instruments 240, 260, 270, 270+ and Anova. The results that can be uploaded include air conduction thresholds (AC THL), uncomfortable loudness levels (ULL)*, bone conduction levels (BC), masked thresholds (AC and BC) and speech score percentage vs. levels*. Amplisuite can show up to 10 test results at once to make test comparison easier. It also calculates several commonly used indicators such as:

- PTA (Pure Tone Average, customizable calculation),
- SRT (Speech Recognition Thresholds, customizable calculation, single- and multi-syllabic)
- PHL (Percentage Hearing Loss)
- NILH (Noise Induced Hearing Loss) values

As well as suggesting commonly used categorisations in occupational health based on recommended calculations like:

- PULHHEEMS
- Fire Service Categorisation
- HSE

Test subject and test details can also be entered in the software via the computer or database and then printed with the audiogram data.

*** -** these results can only be uploaded from Amplivox audiometers that incorporate these features.

Tympanometric and acoustic reflex tests saved in the memory of the Otowave Tympanometers can be transferred to a PC via an infrared adaptor (Otowave 102) or a USB connection (Otowave 102-C, 202 & 302), and then viewed using Amplisuite Tympanograms and reflex traces (both Ipsilateral and Contralateral in the case of the Otowave 202 & 302) can then be displayed in greater detail than on the screen of the Otowave. All the data and traces from both ears are presented on a single screen, allowing easy comparison. Additionally, results may be classified according to the Jerger scheme and the entire record may then be printed or saved to PDF.

1.3. Disclaimer

Amplisuite's basic version is available as freeware, provided by Amplivox for use with supported Amplivox audiometers and tympanometers. However, **additional software features are available for purchase**.

Amplivox provides no warranty (implied or otherwise) and is not liable for any consequences of its copying or use on third-party computers. By downloading and/or running the Amplisuite software, the user accepts these conditions.

The selection of additional features is covered by a paid license. By purchasing, downloading, installing, or using this software, the user agrees to the following terms and conditions:

No Warranty

Amplivox provides this software "as is" without any warranties of any kind, either expressed or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, or non-infringement.

Limitation of Liability

Amplivox shall not be liable for any direct, indirect, incidental, special, or consequential damages arising out of the use or inability to use the software, even if advised of the possibility of such damages. This includes but is not limited to damages for loss of data, loss of revenue or profit, or business interruption.

License and Usage Restrictions

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Software Updates and Support

Amplivox may, at its discretion, provide updates or patches to the software. However, Amplivox is not oblige to provide technical support or updates unless specifically agreed upon in the software license agreement.

Acceptance of Terms

By purchasing, downloading, or using the software, the user acknowledges that they have read, understood, and agreed to be bound by these terms. If the user does not agree to these terms, they must cease using and uninstall the software immediately.

2. Amplisuite Installation

2.1. Pre-installation notes

2.1.1. PC and system requirements

The PC-requirements are as follows:

- Processor: 1 GHz or faster, one or multi-core
- RAM: 1 GB or more
- Available hard disk space: minimum 1 GB
- Resolution: minimum 1378 x 768
- Graphics device: DirectX 9 with WDDM 1.0 or higher driver
- Available 2.0 or 3.0 USB Port

2.1.2. Operation system compatibility

Amplisuite is supported on the following Microsoft Operating Systems:

- Windows 10
- Windows 11

2.2. Installation

2.2.1. General

Installation is a straightforward process, but the steps must be carried out in the correct order. To ensure you are familiar with the instructions please read this user manual before commencing installation.

During Amplisuite installation you may select which of the following versions will be installed on your PC

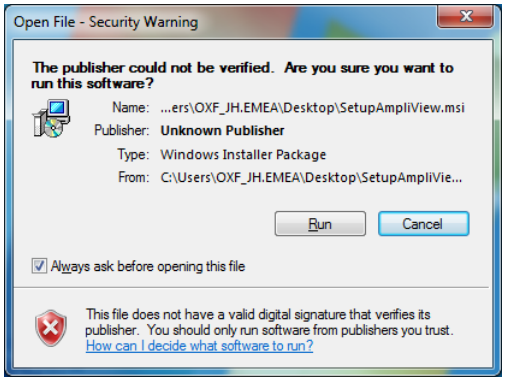
- Stand-alone modules
- Noah modules
- OtoAccess modules

Please note: that when Noah or OtoAccess are being used, this software has to be purchased separately from Amplisuite

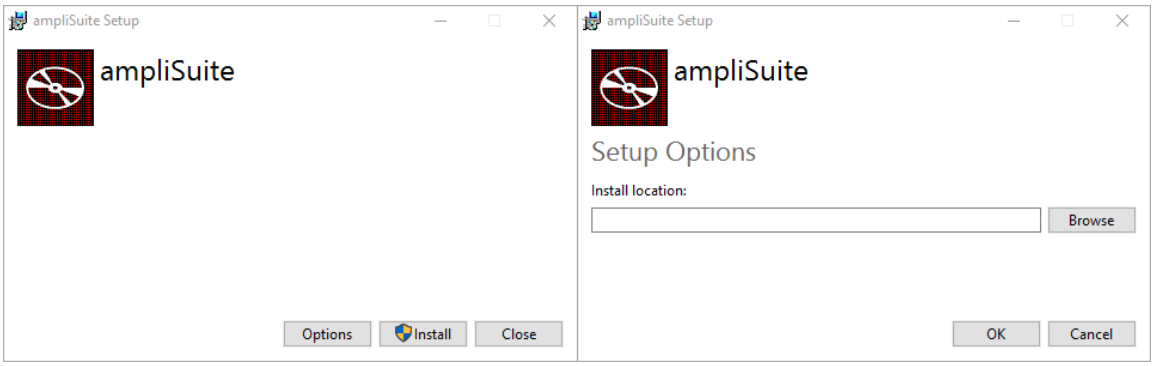
2.2.2. Amplisuite installation package (Stand-Alone Module)

Run ampliSuiteInstaller.exe:

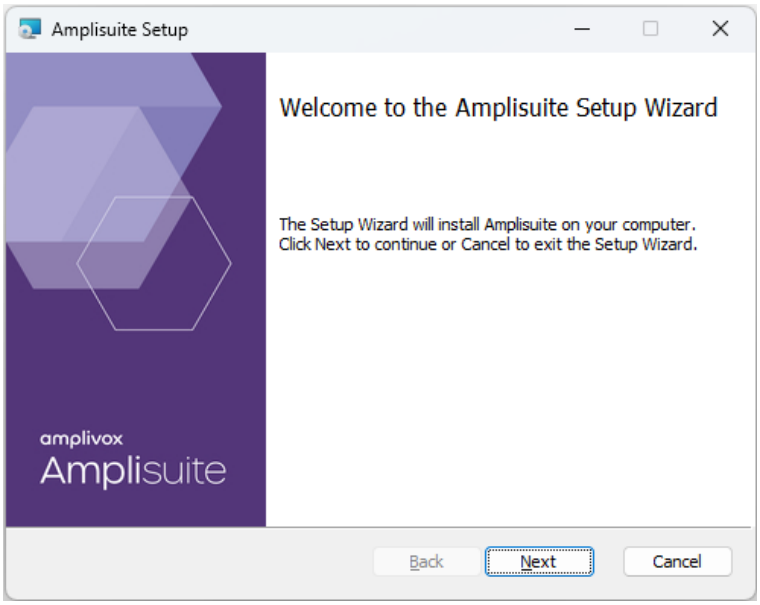
Select **Run** to any security warnings that are displayed:



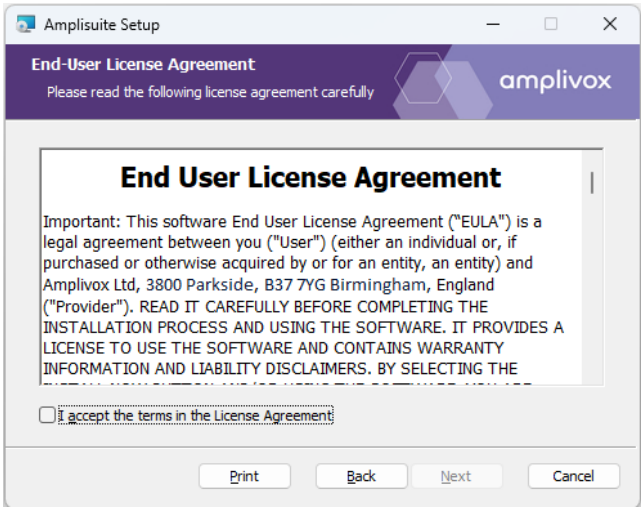
If desired, change the installation location by **Options**. Select **Install** on the welcome screen to proceed with the installation:

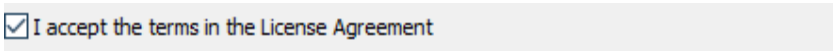


Select **Next** to proceed with the installation:

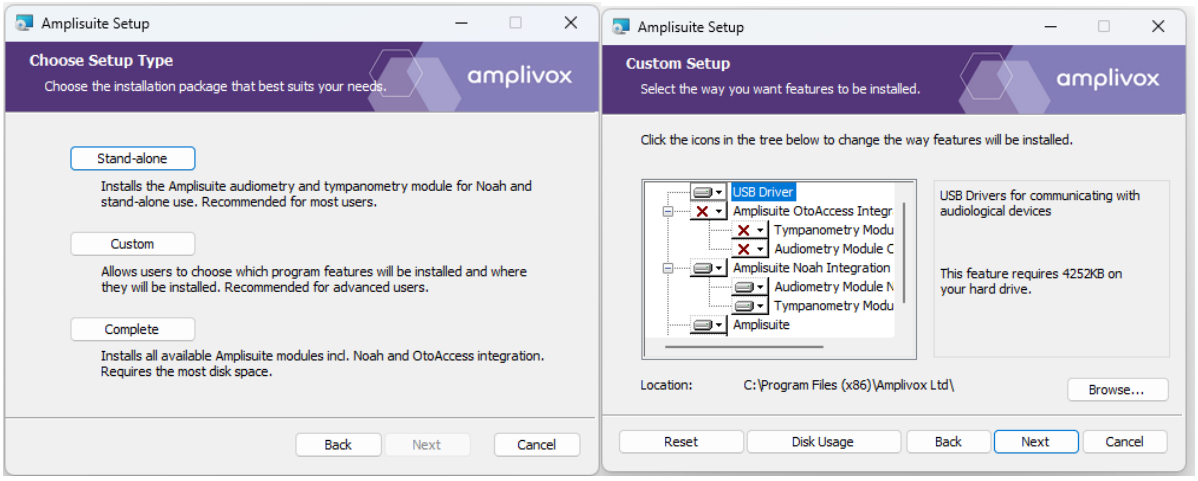


Read carefully the **end user license agreement**. If you agree with it, select checkbox next to "I accept terms in License Agreement" text and select **Next**. If you don't agree with the Agreement, select **Cancel** to stop software installation. You can print End-User License Agreement using the Print Button.



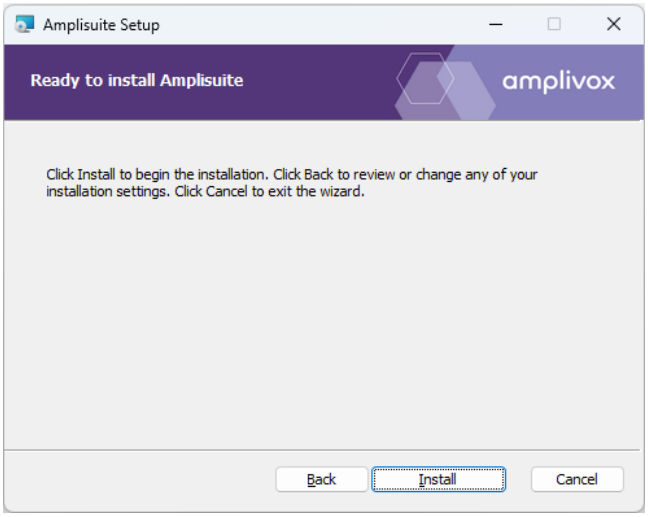


Choose one of the **setup types**. If you select **Stand-alone** or **Complete**, both audiometry and tympanometry modules, as well as Amplivox USB drivers will be installed. Select Custom to manually select what modules you want to install. **Stand-alone Setup** is recommended for most users.

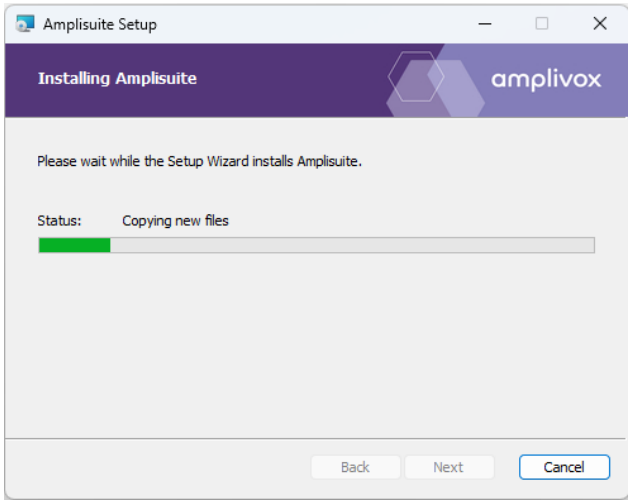


Please note: Noah and Otoaccess must be installed **before** the ampliSuite modules are installed. When installing Amplisuite together with Noah or Otoaccess, please refer to the operating manual of Noah for further installation information.

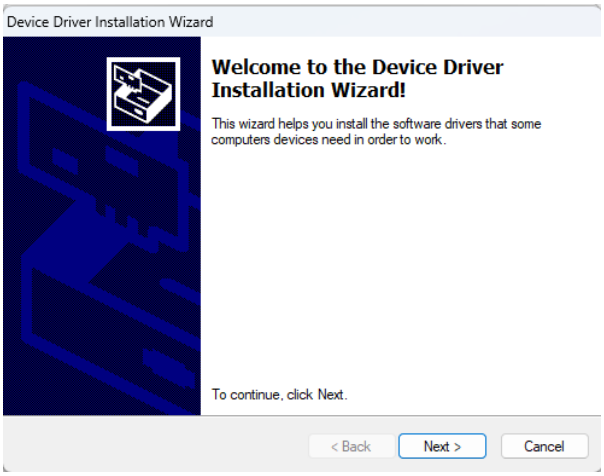
Select **Install** to proceed with the installation:



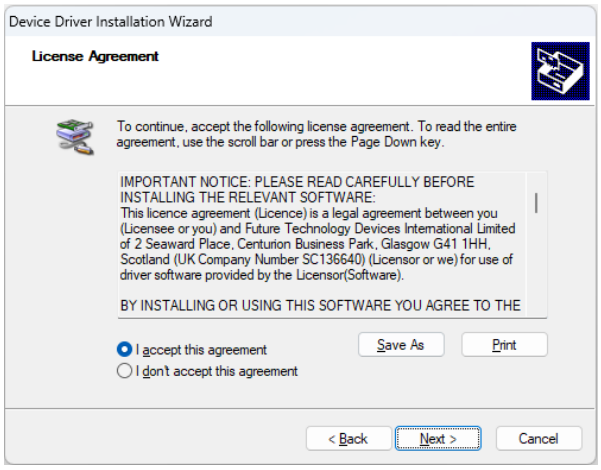
Amplisuite installation will then commence:



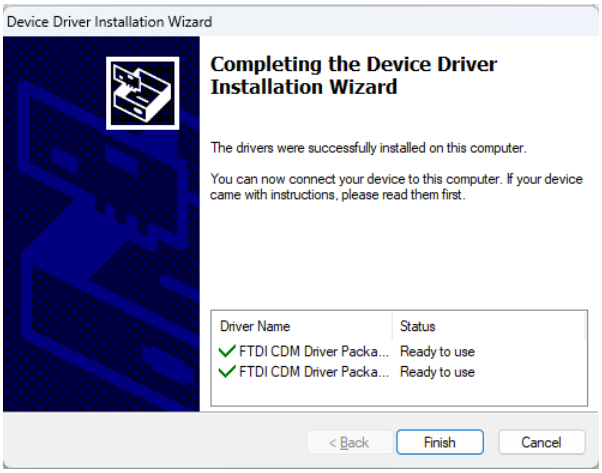
At some point during the installation process installer will ask for installing USB drivers for Amplivox devices (audiometers and tympanometers) – on the window click Next:



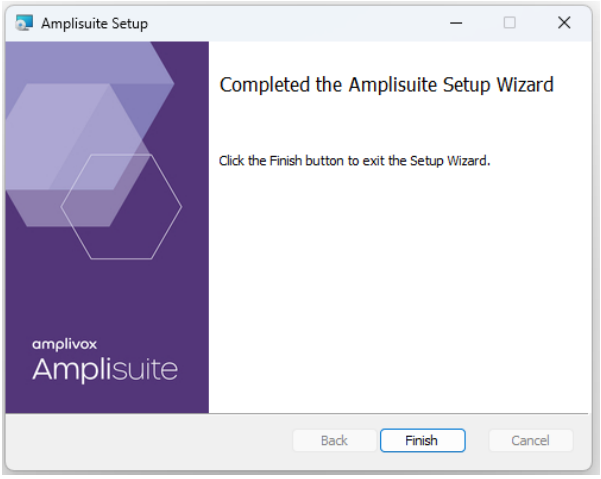
Read carefully the **license agreement** for drivers installation. You will be given option to save the license as text file somewhere on your hard drive. To agree – select **I accept this agreement** radio option and click **Next**.



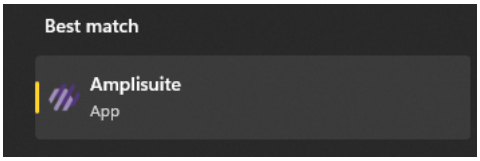
On the summary screen you will be able to review which drivers were installed. Click **Finish** to close the driver installer and finalize this process.



Amplisuite installation will continue until complete. Select **Finish** after it ends. And close the entire installer after successful installation.



To start Amplisuite , select **Amplisuite** from the start menu or the **Amplisuite** icon on the desktop. Or from your Electronic Medical Records (EMR) system (Noah or OtoAccess).



The Amplisuite Software can also be started by double-clicking on the **Amplisuite.exe** file.

2.2.3. USB driver installation

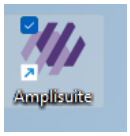
Please note: Make sure that no device is connected to your computer while installing the drivers.

The USB driver installation is part of the Amplisuite installation package. After Amplisuite has been successfully installed, the last window shown will offer the installation of the USB drivers. Select **Finish**.

The installation of the latest drivers is not required if the latest version of the USB drivers are already installed. For example, if an Amplivox instrument has previously been connected to the PC, performing the installation again is not necessary.

3. Amplisuite

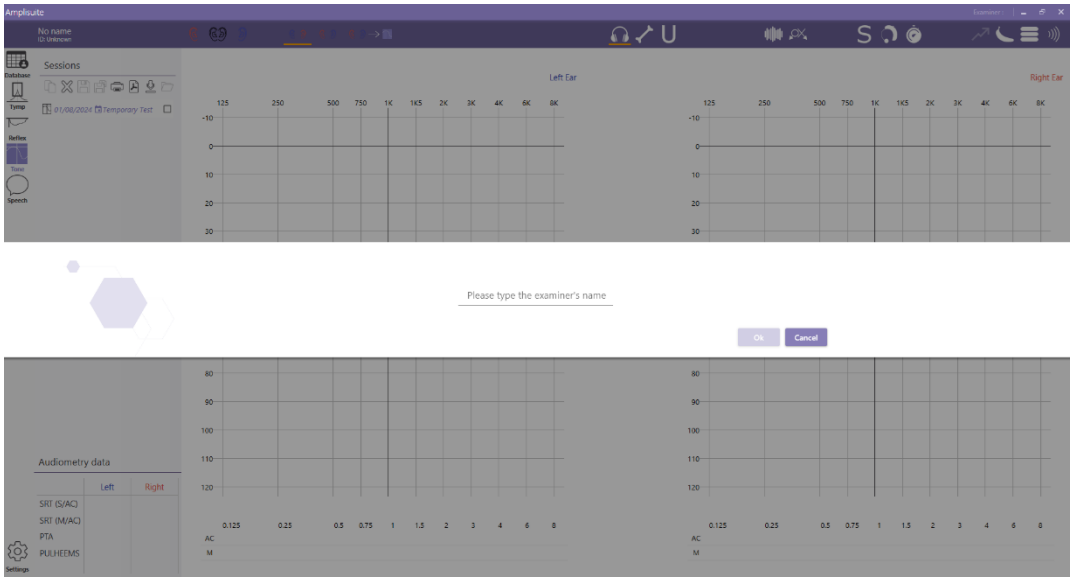
3.1. Starting Amplisuite (Stand-Alone Module)



Open Amplisuite by double-clicking on the shortcut icon on the desktop. The Suite will start in the tone audiometry module.

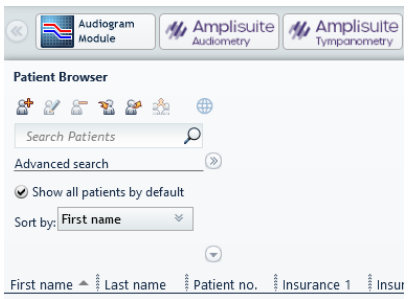
3.1.1. First startup (unlicensed)

During your first startup after installation you will be asked to type in examiner's name. Please type in examiner's name and press **Ok** to start using the application.



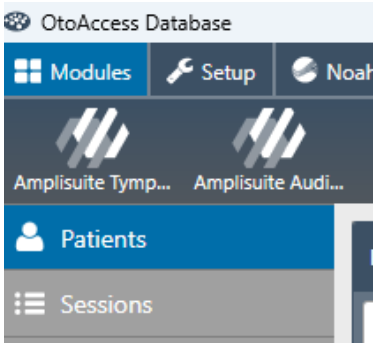
Information about the Examiner will be used on printout and within session management to record which examiner did the examination. You can change that information at any point in time by clicking on the examiner name visible in the upper right corner of the application (right beside minimize icon) and editing the information provided there.

3.2. Starting Amplisuite (Noah Module)



If you use Amplisuite with your Noah database, open the database first, select a patient and then open the desired module from the Noah toolbar.

3.3. Starting Amplisuite (OtoAccess Module)

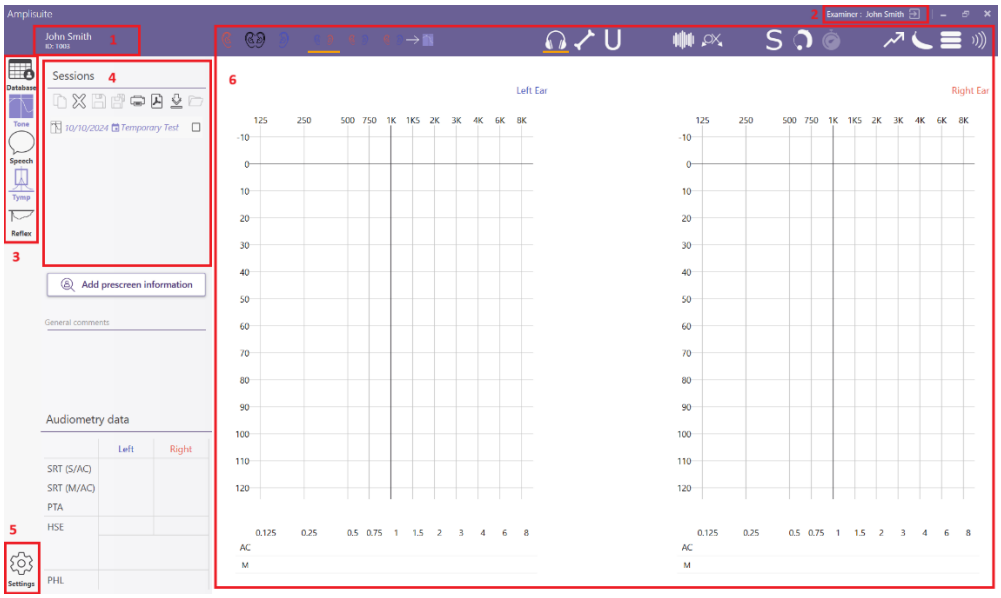


If you use Amplisuite with your Otoaccess database, open the Otoaccess database first, select a patient and then open the desired module from the OtoAccess toolbar.

3.4. General functions and common elements

3.4.1. UI overview

Amplisuite UI has some commonly used elements that are visible always, regardless of the selected module, which consists of (1) subject/patient details, (2) examiner details, (3) module selection sidebar, (4) session list for selected subject/patient, (5) settings, (6) module specific UI.

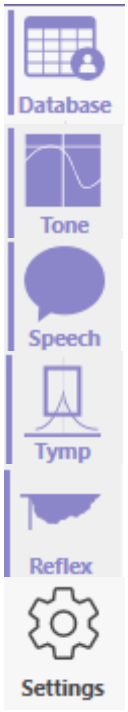


(1) – subject/patient details shows currently selected subject record by showing name, surname and unique identifier;
(2) – examiner details shows currently selected examiner by showing name and surname;
(3) – module selection sidebar shows all available modules to switch between them;
(4) – session list will show list of all saved and temporary sessions (both audiometry and tympanometry) related to the selected subject by showing the icon of a session type, date of the session, what input method was used to storing the session (manual, auto-test or downloaded from the device);
(5) – settings button allows you to open and configure settings for the application;
(6) – module specific UI will show options available for specific modules – which will be described in the respective chapters;

Detailed description of each of those elements functionalities is described in respective sections of this manual.

3.4.2. Switch between modules

In case that several modules are available the module can be switched by selecting the corresponding icon in the left-hand side of the screen.



To access the database module, select the **Database** icon.

To access the tone audiometry module, select the **Tone** icon.

To access the speech audiometry module, select the **Speech** icon.

To access the immittance module, select the **Tymp** icon.

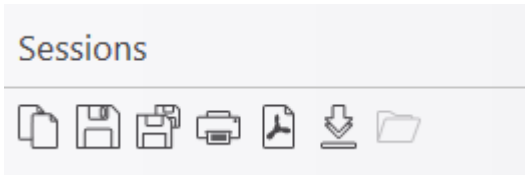
To access the reflex module, select the **Reflex** icon.

To access settings for the application, select the **Settings** icon

The selected module will be highlighted by colour and a line at the left of it.

3.4.3. Session management

3.4.3.1. Saving a test



To save a test, please use one of the following saving options described below.

Please note: When using stand-alone module without Database license all results are removed after closing Amplisuite.

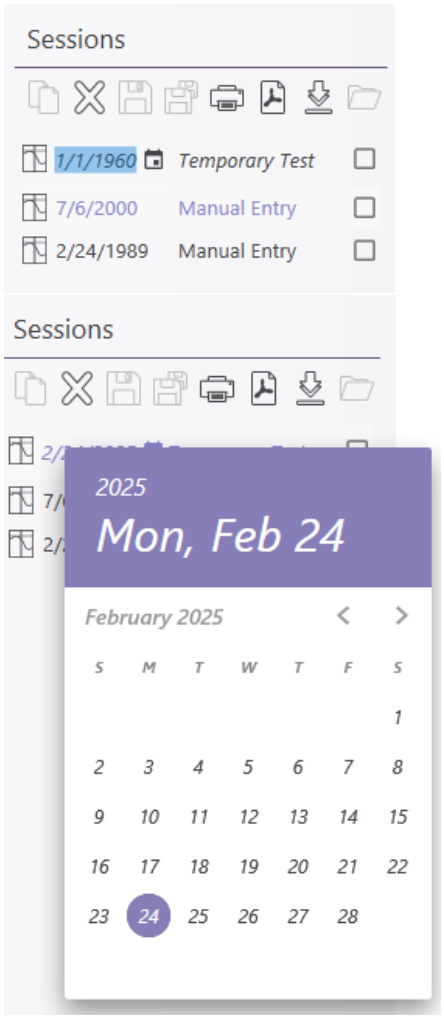
Save – saves the current session

Save All- saves all open and unsaved sessions to the database

Copy – Copy the current session to temporary test (function accessible only in audiometry module)

Please note: As soon as you save a test it can no longer be edited.

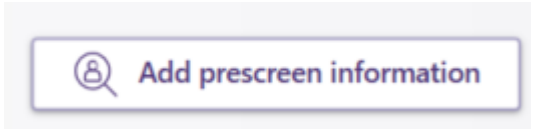
3.4.3.2. Changing session date



You can change the session date manually by pressing date in the session list, or you can select date by pressing the calendar icon.

Please note: You can't change a saved session date.

3.4.3.3. Adding prescreen information



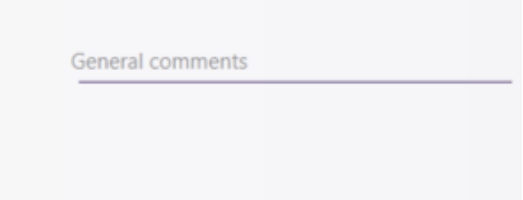
You can add prescreen information about **currently selected session** by clicking this button.

Prescreen information contains:

- Otoscopy results for each ear (abnormal/normal)
- Wax presence/absence for each ear
- Information whether questionnaire was performed/not performed
- Comments

All of this information will be included in printout.

3.4.3.4. Adding session comments

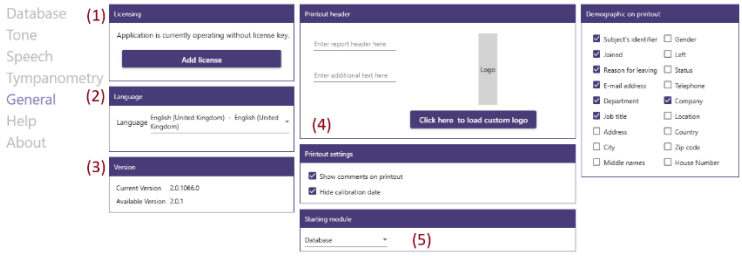


Bellow session list there is a comment section. Click the field to add a comment to the currently selected session.

Added comments will also be displayed on the printout.

3.5. General Amplisuite settings

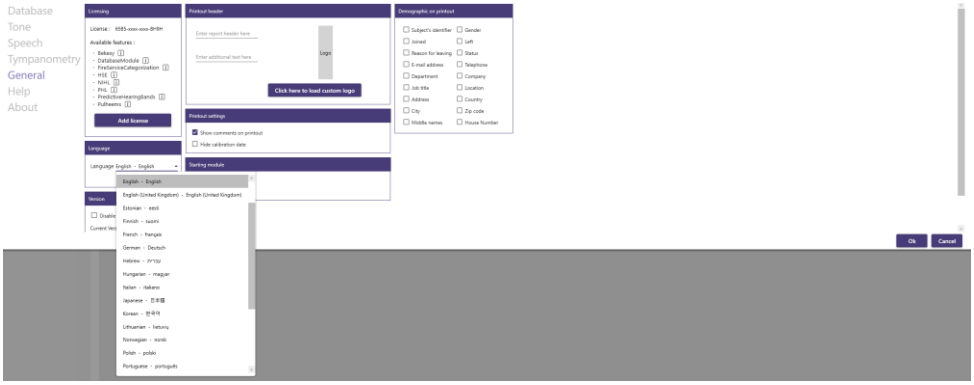
In order to perform general configuration of Amplisuite – select **Settings** in the lower left corner of Amplsuite. A popup will open with all available Amplisuite settings. Select **General** tab to find main configuration options, which consists of (1) licensing, (2) language, (3) version, (4) printout configuration and (5) starting module option.



3.5.1. Change the language and region settings

Please note: Changing language also amends the regional settings which correspond to date and time format.

Click on the dropdown within **Language** section in General Settings Tab.



The following languages are available to use in the Amplisuite:

- Chinese (中文),
- English,
- Estonian (eesti),
- French (français),
- German (Deutsch),
- Hebrew (עברית),
- Hungarian (magyar),
- Italian (italiano),

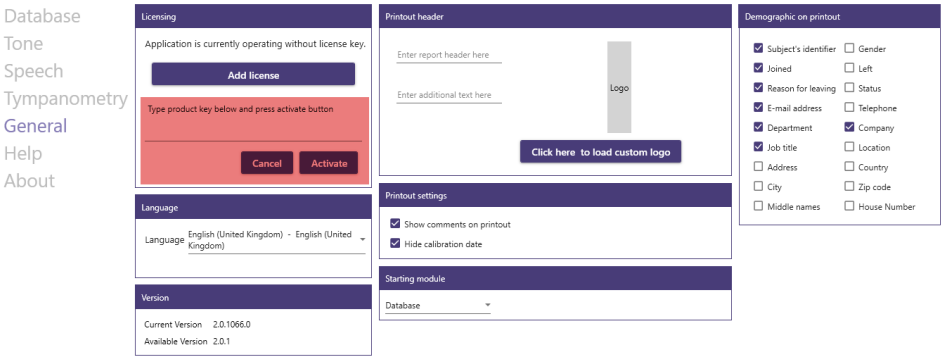
- Japanese (日本語),
- Kazakh (қазақша),
- Korean (한국어),
- Lithuanian(lietuvis),
- Polish (polski),
- Portuguese (português),
- Russian (русский),
- Serbian (srpski),
- Spanish (español),
- Turkish (Türkçe),
- Thai(แบบไทย),
- Vietnamese (Tiếng Việt).

Select the language you would like to use Amplisuite in and confirm the change by clicking **OK**. Amplisuite will require a restart for the changes to take place.

3.5.2. Activate license

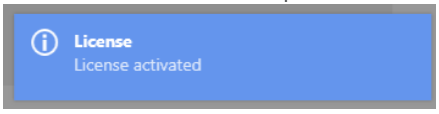
Please note: Since Amplisuite version 2.1 – Amplisuite will offer certain functionalities only when you have license key activated. This section describes how to activate license if you already have the key. If you do not have the key – please reach out to Amplivox representatives in order to get one.

By default, Amplisuite on the first startup will run in version without any licensed features. In order to activate license – click on **Add license** button within Licensing section in General settings tab. New input field will be shown. Copy and paste valid license key and confirm by clicking **Activate.**

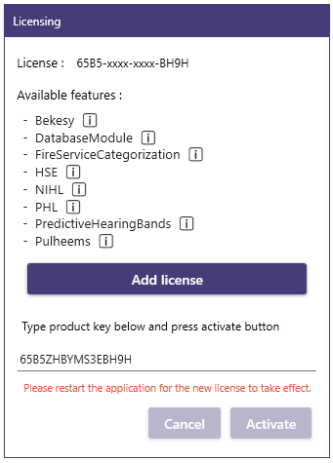


If the license activation is successful, two things will happen:

Notification toast will be shown in the bottom right corner of the application informing you that the activation has been completed successfully:



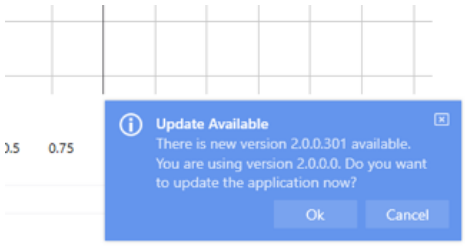
Licensing section will update – it will show details about features unlocked by the license and a message will be shown instructing user to restart the application in order to fully take advantage of the new features.



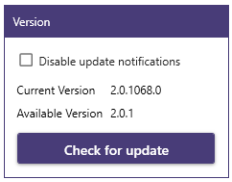
Hovering the cursor on the i icon will indicate the expiry date for the relevant feature.

3.5.3. Update Amplisuite and check for updates

If there is new Amplisuite version available information will be displayed in bottom right corner. Select **Ok** to proceed with Amplisuite update, or select **Cancel** to keep using current version.



You can also do this manually as well by checking the Version section in General settings tab. You can also disable update notification.



Please note: Amplisuite will be restarted during version update. Please save or print all your data before you start it.

3.5.4. Configure starting module

By clicking a dropdown within **Starting Module** section in General settings tab you can select which module will be the first one to show when application is started (Database, Tone, Speech, Tymp or Reflex).

Please note: If your Amplisuite version contains Database feature – you will also be able to use this section ensure that users will need to login before using Amplisuite by selecting **Start with login screen** option.

3.5.5. Printout configuration

From here, you can also add and edit the printout headers, upload a custom logo and configure which additional information should be shown on printout (comments, calibration date and demographics data about the subject).

4. Database module

4.1. General

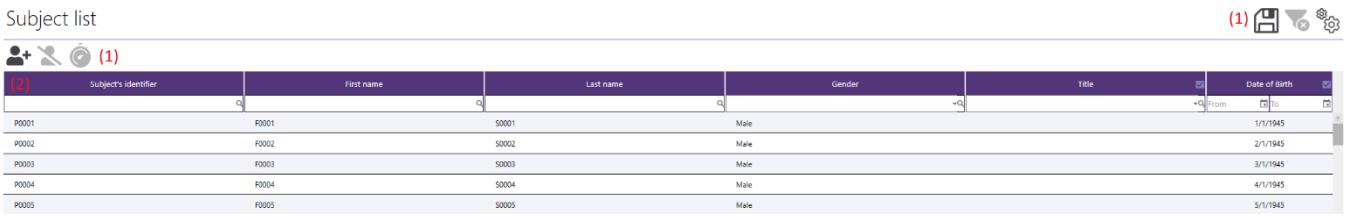
Database module allows you to manage information about your test subjects/patients by storing detailed information about them as well as searching and filtering for people matching specific criteria.

Please note: Database module has licensed and unlicensed version. Below you can find detailed comparison between Database module functionalities available with or without license with this feature.

Functionality	Unlicensed Database	Licensed Database
Subject management	Add, Edit, Delete, Search, Export	Add, Edit, Delete, Search, Export
Data retention	All data is lost on application closure	Data is stored permanently
Examiner/User management	Single examiner with editable name	Role Based access management
Device verification log	Device verification reminder only	Device verification log available permanently

4.1.1. Database UI Overview

Main database UI elements consists of (1) options menu and (2) tabular view of stored data.



Options menu allows you several basic operations described as below:

Add new subject to the database

Remove currently selected subject from the database

Perform automatic test on the selected subject

Please note: That option is only available when device which supports automatic test is connected.

Clear all currently applied filters to your view

Export currently filtered data to .csv file

Please note: That option is only available for administrator users.

Allows you to choose columns visibility.

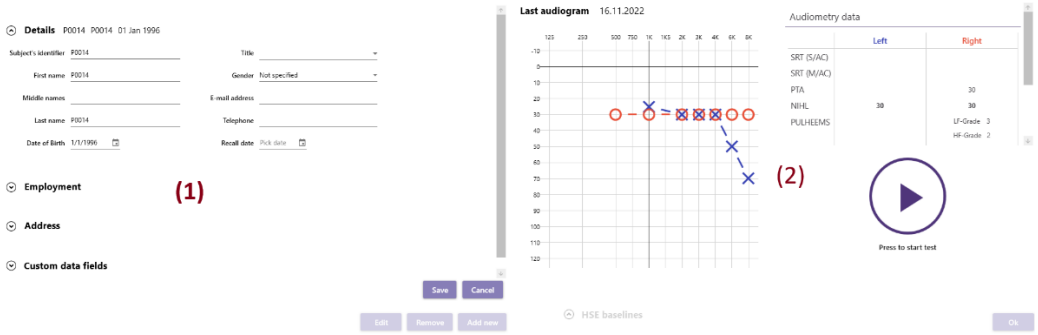
4.2. Subject/Patient management

4.2.1. Add Subject (Patient) Details

To create new subject you can use one of three available entry points:

1. In Database module: click on the "*Add new subject*" icon above the database table
2. In any module: click on the "*Add new subject*" icon beside the subject name and surname in the top bar
3. Within subject detail popup: click "*Add new*" button visible on the subject details view

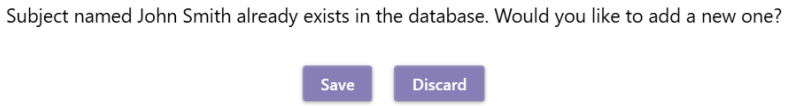
Regardless of the method - the subject details form will then be displayed, which consists of two main elements – (1) subject details form and (2) audiology summary from the last test.



To add new subject – click **Add New** button on the bottom, fill appropriate subject detail and select **Save.**

Please note: Adding new subject requires mandatory fields – *First name, Last name, Date of Birth* and *Subject's Identifier*. Additionally, *Subject's Identifier* needs to be unique. These rules are enforced and validated by the application – adding a new subject without these criteria met will not be possible.

Whenever you will add new subject that would have the same combination of *First Name, Last Name* and *Date of Birth* – Amplisuite will recognize that it might be a potential duplicate and will ask for confirmation whether you really are trying to add new record.



4.2.2. Edit Subject (Patient) details

To edit existing subject – first make sure you have selected correct person (by verifying their name is presented in the top left corner of the application). Then click on the subject name and select **Edit**. The subject details form will then be display with details of the selected subject.

To edit data – click **Edit** button on the bottom, fill appropriate subject detaild and select **Save.**

4.2.3. Remove subject (Patient) record

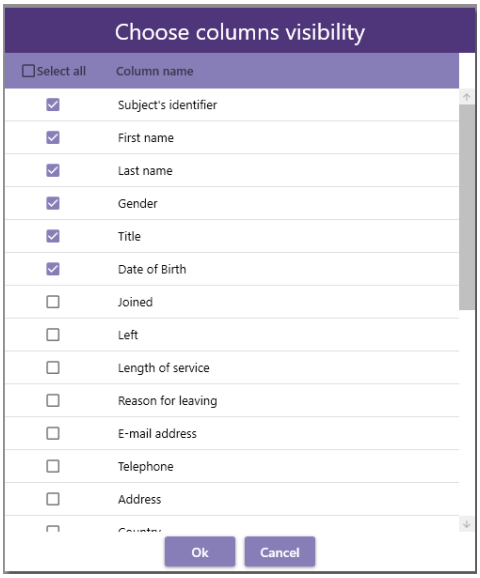
To remove subject record you can either (a) click on the subject name in upper left corner of the application (if you have selected the correct person) or (b) double-click on the appropriate person on the tabular view in Database module. Within subject detail form that will be shown – choose **Remove** button on the bottom of the subject details section. You will be asked to provide a reason for this operation.

After providing in the reason and confirming with **Ok** selected record will be removed.

Please note: To help ensure that no data is lost by mistake – Amplisuite keeps removed records in its database and allows administrators to review deleted records and either remove them permanently or restore them back.

4.2.4. Configure columns visibility within Database module

Click on the cogwheels icon on the top-right corner of the main section to see list of all available fields.



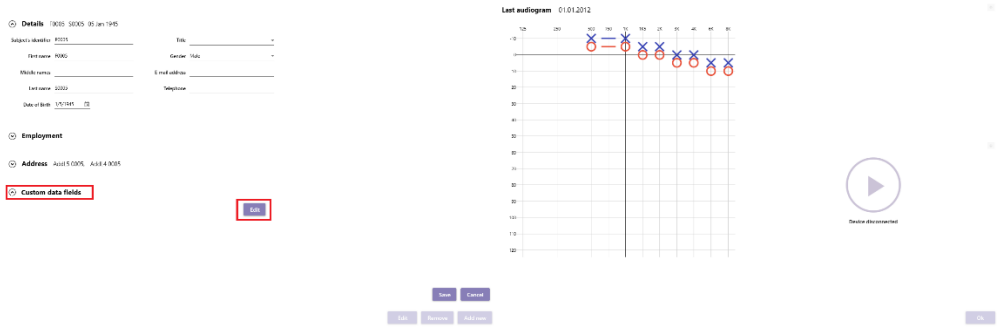
To show/hide selected columns in the Database view simply select the checkbox beside the name of the field. You can also select all/deselect all by clicking the respective option within the top bar of this view.

Please note: *Subject's identifier, First name, Last name, Gender, Title* and *Date of Birth* are visible by default. Changing this setting will change it for all users and will be remembered until further change.

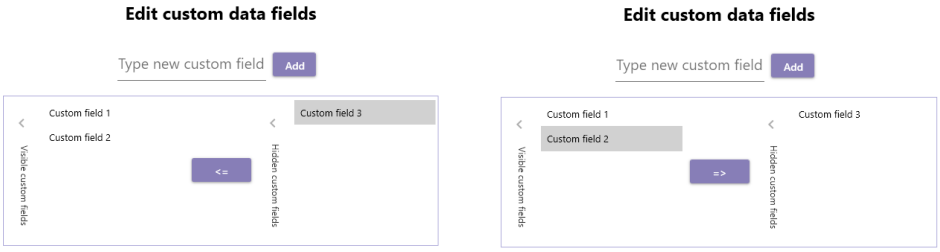
4.2.5. Manage Custom Data Fields for subject records

Please note: Only users with administrator privileges are able to use that functionality.

Beyond predefined information that can be stored within subject record Amplisuite gives the ability to configure any number of customized fields that can store additional information. Custom data fields can be managed when editing or adding a new patient. In order to do that you need to expand **Custom data fields** header and click **Edit** button below



This will open custom data fields manager that gives you the ability to add new custom field and manage visibility of all available custom fields.

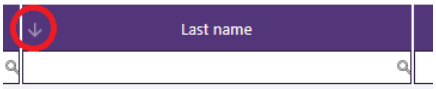


To add a new custom field provide its name in the appropriate field and click **Add**. In order to show/hide custom fields you can select respective fields from the list below and click the arrow to move between Visible and Hidden custom fields lists.

Visible custom fields will be presented on subject details view. It will also appear in the Database main module as an available column to be shown and filtered by.

4.2.6. Sorting subject records

Clicking on the column name within Database module view will result in sorting it ascending or descending within current view. This will be indicated by upward/downward facing arrow beside the column header.



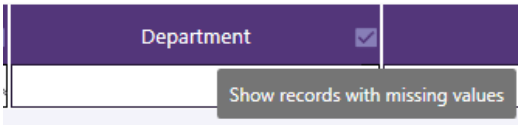
If the field used for sorting is:

- a text field – it will be sorted alphabetically
- numerical field – it will be sorted from largest to smallest or smallest to largest
- date field – it will be sorted chronologically

4.2.7. Searching and filtering subject records

Database module provides ability to search and filter entire database. The way searching and filtering works vary depending on the type of the data stored within that field, however the general rules are:

- Unchecking the checkbox beside the column header will hide records with missing values for this field



- Searching by multiple fields will result in joint filter meeting *all* criteria (so searching for John in *First Name* and Smith in *Last name* at the same time – will result in people that are named *John Smith* only)
- Text fields (like *First name* or *Last name*) can be searched or filtered by typing in text you want to search for – the results will be filtered for records that contain any value that contains provided text (i.e. typing *John* would find records that contain both *John* or *Johnson*)
- Dropdown fields (like *Company, Job Title* or any custom field created by the user) can be searched or filtered by selecting one or many options from the available values
- Date range (like *Date of Birth* or *Last test*) and numerical fields (like *PHL* or *PTA*) can be searched or filtered by providing *From* and *To* dates to define the desired range

4.2.8. Exporting current view

You can export currently filtered results to .csv file by clicking the floppy disk icon on the top-right corner of the main section. You will be asked to choose location and name for the exported file. After confirming with **Save** button .csv file containing currently filtered records will be created in the desired location.

Please note: Only users with administrator privileges are able to use that functionality.

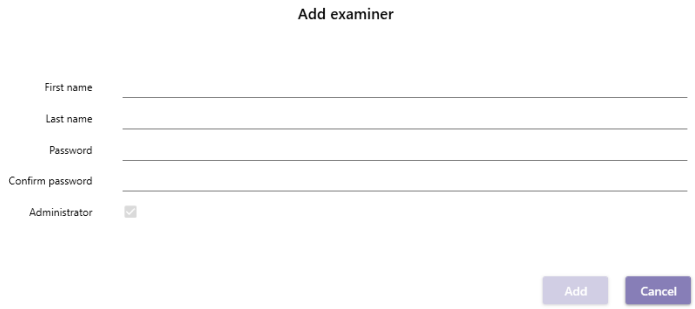
4.3. Examiner (User) management

Please note: Following chapter is only applicable to licensed version of Database module. For unlicensed version examiner management is simplified (see 3.1.1).

Database licensed feature provides two main functionalities – allowing to configure multiple different examiner profiles and introducing distinction between administrator and regular users (examiners) improving security of the application. Below you will find detailed instructions for each of these functionalities.

4.3.1. Creating first Examiner

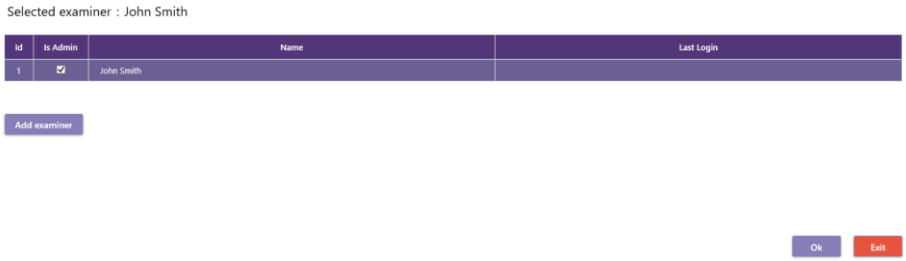
On first startup after activating license with Database feature unlocked, before you will be able to use the application in any way, you will be prompted to create first administrator examiner account.



After providing *First name* and *Last name* you will be able to confirm creation by clicking **Add** below.

Please note: Although password is optional – we *highly recommend* protecting every examiner account with administrator privileges with password to ensure appropriate security throughout the course of application usage.

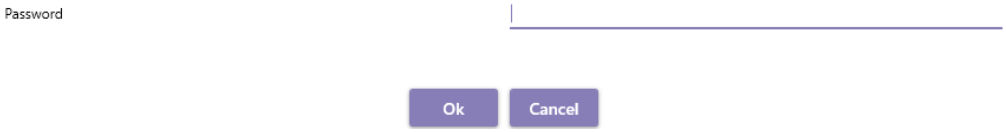
After confirming this operation – examiner selection screen will be shown.



4.3.2. Selecting examiner account and logging in

From the examiner selection screen select examiner you want to operate Amplisuite (indicated by updated name and surname above the table) and confirm using **Ok.**

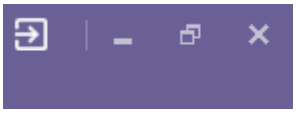
If the selected examiner account is password protected – a follow-up prompt will request to provide password.



After providing correct password and confirming with **Ok** application will start with full Database functionality.

4.3.3. Logging out

To log out click on the logout icon next to the examiner name and surname in the upper right corner of the application (right beside the minize icon).

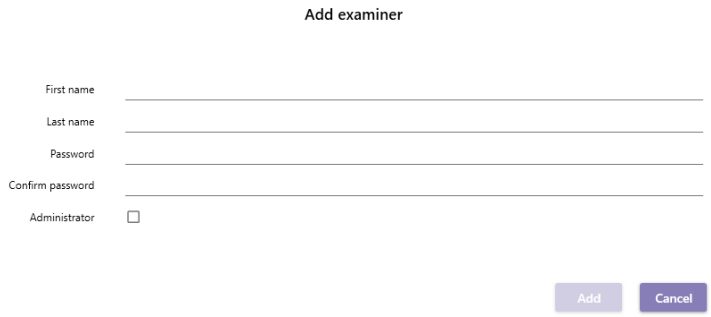


Examiner selection screen should show up and successful logout will be indicated by header **Selected examiner: None**.

4.3.4. Adding new examiner

Please note: Only users with administrator privileges are able to use that functionality.

From the examiner selection screen (which can be invoked by clicking the name and surname of the examiner visible in the upper right corner of the application) you can create new examiner accounts by clicking **Add examiner** button visible below examiner list.



Process of creating new examiner accounts is similar to creating the first one – the only difference is that every subsequent examiner account can be created with or without administrator privileges by selecting or unselecting appropriate option within examiner creation screen.

4.3.5. Removing examiner

Please note: Only users with administrator privileges are able to use that functionality.

From the examiner selection screen you can remove existing examiner accounts by right clicking on the examiner you plan to remove and select appropriate option from the context menu.

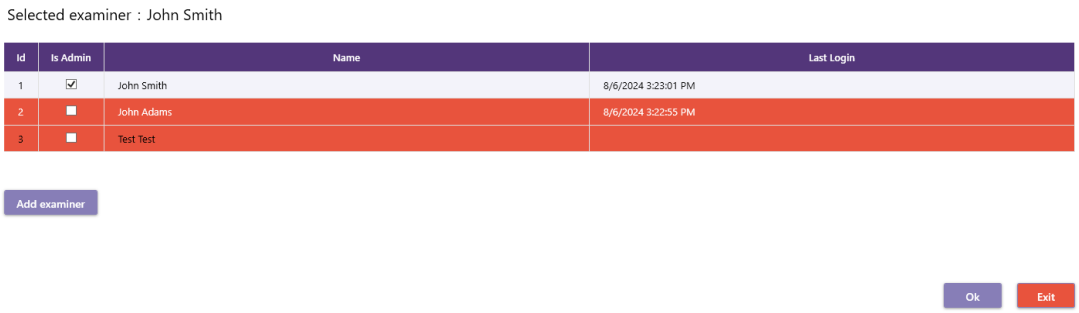
Removed examiner will disappear from the list.

Please note: To help ensure that no data is lost by mistake – Amplisuite keeps removed examiner accounts in its database and allows administrators to review deleted examiners and either remove them permanently or restore them back.

4.3.6. Revert examiner removal or permanently remove examiner

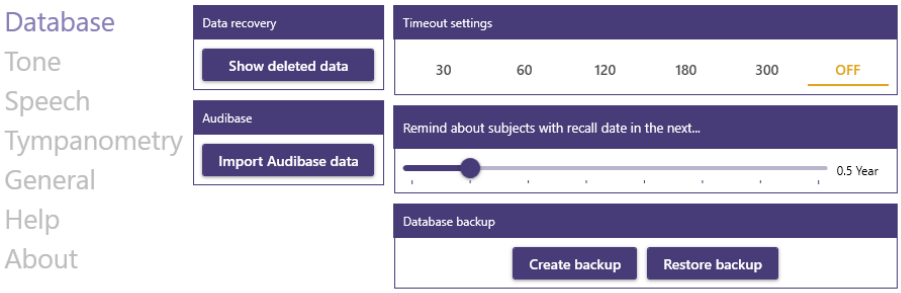
Please note: Only users with administrator privileges are able to use that functionality. Additionally this operation is only available when *Show deleted data* option in Settings is turned on.

When *Show deleted data* option in Settings is turned on, examiner selection screen will also show examiner accounts that were previously removed. Those accounts will be highlighted in red.



Right clicking on a deleted examiner account will show a context menu presenting two available operations – *Revert deletion* or *Delete permanently*.

4.4. Setting options for Database module



Database tab in **Settings** contains following sections:

(1) Data recovery – option to show/hide records that has been deleted (see 4.2.3) in order to review it;
(2) Audibase – option to import Audibase export .csv file into Amplisuite in order to migrate data from Audibase;
(3) Timeout Settings – allowing users to configure security measure to automatically log out currently selected Examiner after certain period of time;
(4) Reminder about subjects with recall date in the next… – allowing users to configure a reminder to keep ahead of upcoming retests for subjects that require follow ups;
(5) Database backup – giving the option to create and restore backup of the database;

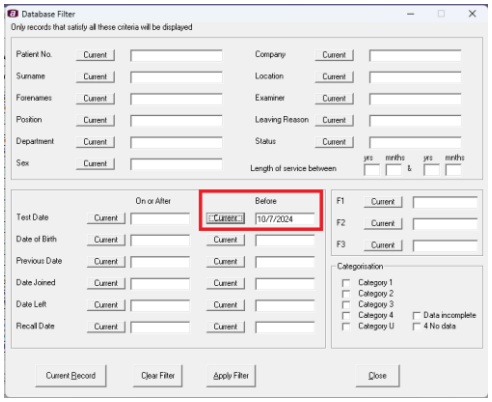
4.4.1. Show deleted data

To help ensure that no data is lost by mistake Amplisuite keeps all removed data (examiner accounts, subject records and test sessions) as hidden. Administrators are given the option to show/hide deleted data which further gives them the option to restore previously deleted data or remove it permanently. In order to show deleted data simply click **Show deleted data** button within Data recovery section.

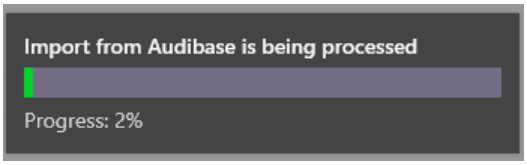
All deleted data (examiner accounts, subject records and test sessions) will be highlighted with red colour.

4.4.2. Import data from Audibase file

Please note: By default, .csv export from Audibase contains only latest session result for each patient. In order to export file with all historical data you need to filter your records by test date and include all tests before current day (example below).



By clicking **Import Audibase data** button you will be prompted to localize the .csv file to import. After selecting and confirming file path – Amplisuite will try to import selected file to its database. Operation progress will be indicated by a toast notification with progress bar in the bottom right corner of the application UI



Depending on whether import was successful or not – appropriate toast notification will indicate its status.

This operation will create new subjects based on the Audibase patient data and assign all test sessions related to those subjects/patients accordingly.

4.4.2.1. Import logic

Amplisuite will try to recognize if it already has subject that matches patient data from the import file by comparing following fields:

Audibase patient field	Amplisuite subject field
Pat No	Subject's Identifier
Forenames	First name
Surname	Last name
Date of birth	Date of Birth

If all of the above fields will match an existing subject record in Amplisuite database – software will recognize this as an already existing subject record thus new record will not be created and all sessions assigned to this patient in source file will be assigned to this existing subject record.

Furthermore, Amplisuite will also try to recognize if it already has test session records that matches data from the source file by comparing following fields:

Audibase session field	Amplisuite session field
Pat No	Subject's Identifier
Last Test	Date
Time of Test	Time

If all of the above data will match an existing session record in Amplisuite database – software will recognize this is an already existing session record assigned to the right subject and it will **ignore this record**.

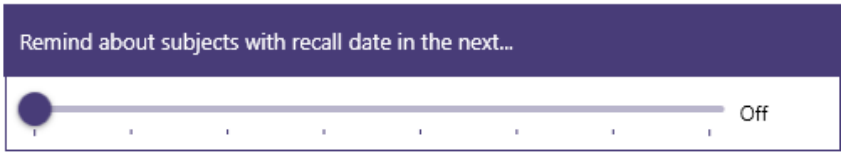
Please note: When comparing data for duplicates – Amplisuite will compare source file with all available data (including deleted but not removed permanently).

4.4.3. Timeout configuration

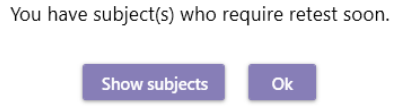
This setting allows establishing a security policy of automatic logout after specific idle time (in seconds). For example – by selecting 30, if any examiner logged into Amplisuite will not be active in any way – application will automatically log them out and present examiner selection screen.

4.4.4. Reminder about subjects with recall date in the next…

Amplisuite with database allows users to set a date for each subject which can serve as a reminder when to schedule a retest. In the database settings – user can use slider to set up a time interval which will be used to check if there are subjects who are having recall date set in the next specified period of time. By moving the slider left to right you can modify the interval – from **Off** to **3.5 years**.



After changing the value in this setting for any interval – on every startup Amplisuite will run a background check for subjects that have recall date in the specified time in the future. If there will be at least one record matching this criteria – it will show a pop-up informing users about this fact.



Clicking **Show subjects** will automatically load Database module with appropriate filters to show all subjects that have upcoming recall dates.

4.5. Troubleshooting Database

PROBLEM	CAUSE	SOLUTION(S)
I have imported Audibase file but some records haven't been imported	• Data structure in the source file might be broken • Amplisuite could ignore some records as duplicates • Check that you have specified todays date in Audibase as the point from which you want all sessions to be included before.	• Review the source file to check for data mismatch • Review deleted data in Amplisuite to see if there are any potential duplicates within it

I have tried to import Audibase file but Amplisuite cannot open it	• Source file is in read-only state (potentially opened in another window) • Source file is invalid due to using different data structure or other issues	• Review the source file to check for data mismatch • Perform a fresh export from Audibase and try again
I cannot restore database backup	• Database backup file is corrupted • Database backup file was created by newer Amplisuite version	• Make sure you are using latest Amplisuite version
Not all database functionalities are available in my Amplisuite version	• Your license might not contain Database feature or it might expired • Your examiner account might not have administrator privileges	• Make sure you are using examiner account with administrator privileges • Review your license in General Settings tab to check if it still contains valid Database feature

5. Audiometry Module

5.1. General

The audiometry module allows you to review audiometric test results (**Tone** and **Speech**), perform automatic or manual audiometry tests and compare current test results with previous sessions.

The audiometry module can be used with the following Amplivox Audiometers: 116, 170, PC850, 240, 260, 270, 270+, ModelOne and Anova.

To access the module, select the tone or speech audiometry icon.

5.2. Tone Audiometry Module

5.2.1. Start auto test

Amplisuite Audiometry module can be used to run automatic test using following Amplivox Audiometers:

- PC850
- Otosure
- ModelOne

5.2.1.1. Start Auto Test with OtoSure or PC850

To start Auto Test using Otosure or PC850 – locate the stopwatch icon on the toolbar and click it.

Amplisuite will open a new window with a dedicated application that will conduct the auto test software.

For more information about the how to conduct a test with the Otosure or PC850 audiometer please refer to your instrument manual.

5.2.1.2. Start Auto Test with ModelOne

Upon connecting ModelOne to the PC through USB - Tone module interface will expand to include several new options available only when ModelOne is connected. These options allow (1) modify presenting tone for manual tests, (2) monitoring room noise and controlling the acceptable noise level and (3) automatic test control panel.

Expanding automatic test controls gives you following options:

Selecting a test type to perform (Computer or Békésy)

Please note: Option to run Békésy might not be visible - it requires license.

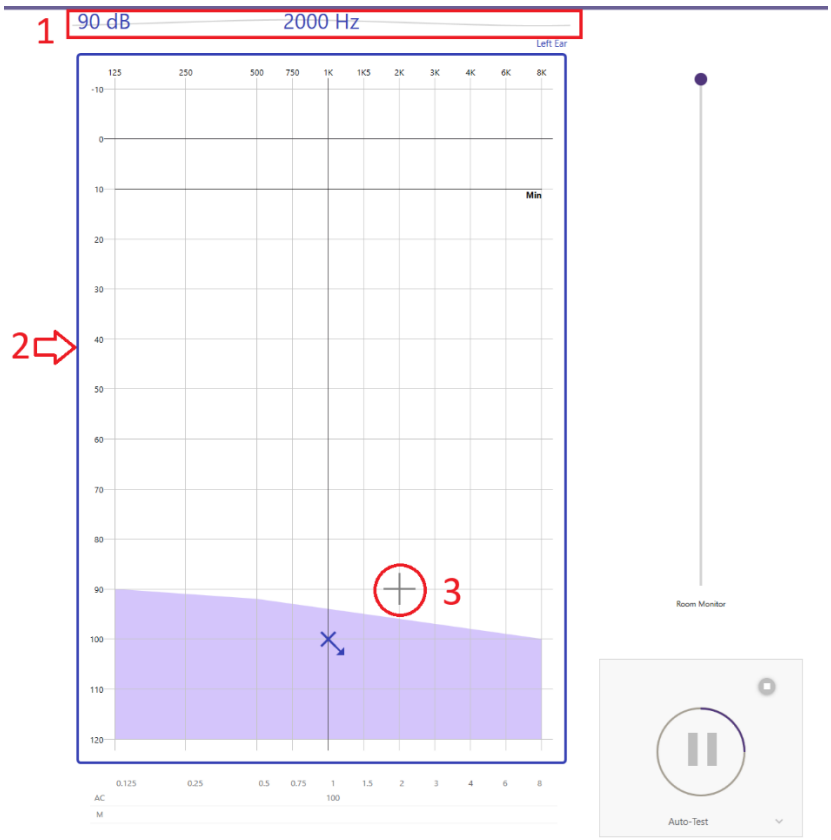
Starting/pausing the test

Ending the test early

Please note: Auto Test using ModelOne uses predefined procedures to execute the test. Administrators can change these presets in Settings after connecting ModelOne (refer 7.1.3).

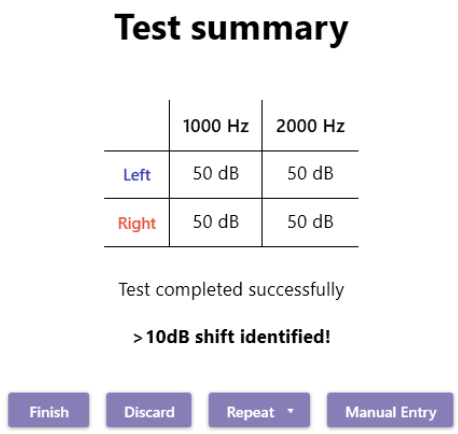
By following UI elements you can monitor the test progress by verifying (1), (3) is the signal presented (flowing wave with signal strength and frequency used or the cross showing currently presented tone)

and (2) test subject response (highlighted by blue/red border shown around audiogram for appropriate ear).



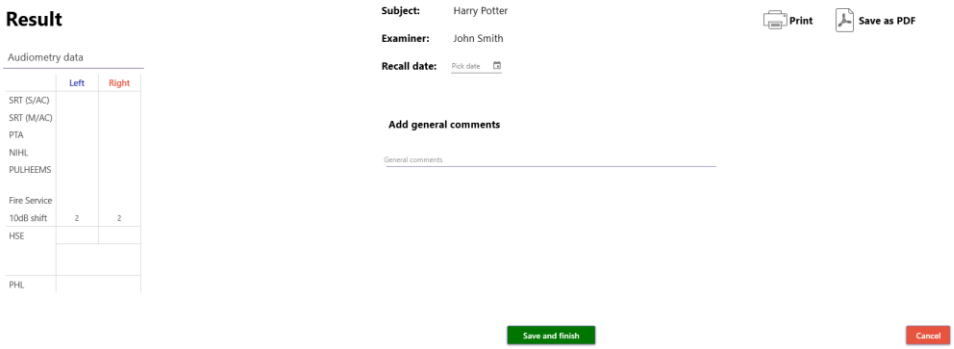
After completing or ending the test early – a summary of auto test will be shown to inform the user about:

- Test results
- Presence of any errors or no responses for specific frequencies
- Any abnormalities detected (depending on your configuration)



User can choose how to process these results - finish the test without any additional actions, discard current test results, repeat the test (removing any stored data and restarting the test automatically) or accept current test results and fill in gaps manually.

Upon finishing the test – additional summary is given containing information about test subject name, examiner name, automatically calculated audiometry indicators (as defined in the settings) and ability to add general comments, printing out the results, saving them to PDF and save them within Amplisuite.



5.2.2. Perform manual test from PC

Using ModelOne – Amplisuite offers ability to perform manual test using PC to control the test. This can be done using expanded UI interface when ModelOne is connected.

5.2.2.1. Select presenter

Choose one of the available options to present stimuli using dropdown shown in the tool bar:

Presenter	Holding down space or left-click mouse will **present** a sound in headphones.
Interrupter	Sound will be presented continuously – holding down space or left-click mouse will **interrupt** presenting the sound in headphones.

Choose one of the available modes of stimuli to present:

Sine	Presented stimuli would be constant
Pulsed	Presented stimuli would be pulsating (presented and paused in quick successions)
Warble	Presented stimuli would be modulated

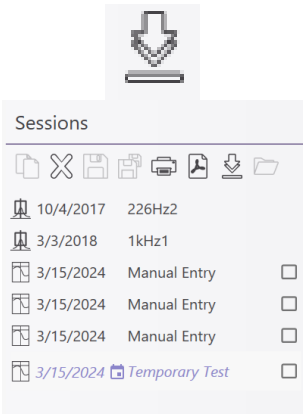
Pulsed + Warbled	Presented stimuli would be modulated and pulsating (presented and paused in quick successions)

5.2.2.2. Present stimuli

Mouse:	Use the mouse to move the cursor to the desired frequency and level.	Hold left button mouse to present (or interrupt) the stimuli with desired frequency and strength.	Monitor test subject response by observing the active ear audiogram – when test subject would respond, the chart will be highlighted with appropriate colour (blue/red).
Keyboard:	Use the arrow keys to move the cursor to the desired frequency and level.	Hold Space to present (or interrupt) the stimuli with desired frequency and strength.	Monitor test subject response by observing the active ear audiogram – when test subject would respond, the chart will be highlighted with appropriate colour (blue/red).

To store data – follow the manual entry data guidance in 5.2.5.

5.2.3. Download results from device



Download the current record displayed on the device to the PC (AC, BC and if available speech SRT).

As soon as a test is downloaded and selected, the result will be shown, and further details can be found in the session panel.
Several sessions can be uploaded into Amplisuite and be opened through the session panel.

Please note: When using Anova – you will also have an option to select one or more tests from the internal memory within device.

5.2.4. Copy data points from previous session

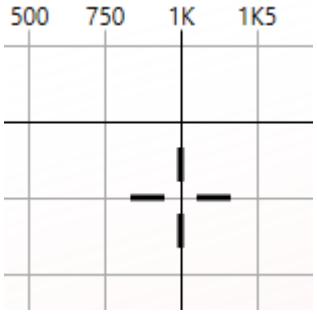
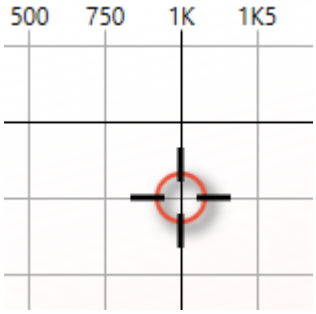
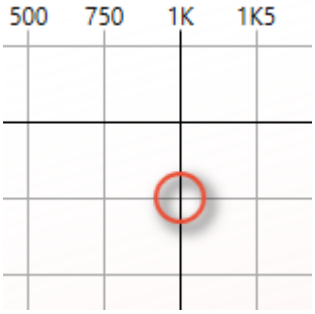
Copy currently selected test results to temporary test.

By switching to temporary session afterwards these results can be reviewed and modified manually as a new session.

5.2.5. Manual entry of data

There are different options to enter test data. Data can be plotted directly into the graph using the mouse or the keyboard, or the **Manual Entry Table** below the audiogram.

Select the desired ear and test method (AC, BC, UCL, FF, (un)masked, NR and Aided) to start plotting data.

			
Mouse:	Use the mouse to move the cursor to the desired frequency and level.	Double-click left and store the test point.	Right-click at any level of the frequency to delete the test point again.
Keyboard:	Use the arrow keys to move the cursor to the desired frequency and level.	Hit the Enter-key or S-key on the keyboard to store the test point.	Hit the Delete key on the keyboard at any level of the frequency to delete the test point again.

As soon as the point has been entered, the table below the graph will show the equivalent value.

Manual Entry Table: Click in the table below the graph to enter the corresponding level of the selected frequency. The top row represents the Air or Bone conduction values, whereas the second row represents the masking values, if any exist.

	0.125	0.25	0.5	0.75	1	1.5	2	3	4	6	8
AC	0	20	35		50		55		55		65
M											M

Please note: The data shown in the table below the graph, plotted or deleted is always equivalent to the selection (AC, BC, UCL, FF) made in the toolbar. If air conduction is selected, no bone data can be deleted and vice versa.

5.2.5.1. Ear Side Selection

The ears to be displayed can be selected in 3 different ways:

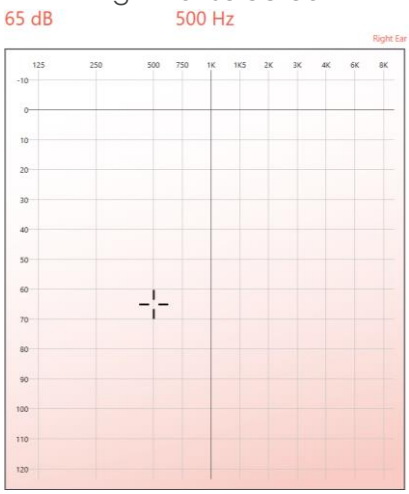
- **Mouse:** Double-click on the audiogram of the ear side to be tested (only possible when an audiogram for each ear is shown)
- **Keyboard:** Select **R** for right ear, **L** for left ear and **B** for binaural
- **Icons in Toolbar:**

	Right ear selected Left ear selected	One ear will be shown at a time and can be changed using the left, right or binaural ear icons in the control panel. The current selected ear will be highlighted with an orange line below.

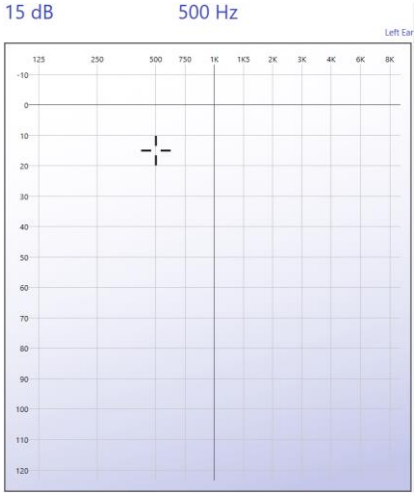
Binaural selected

The selected ear will be highlighted in red (right ear) or blue (left ear) or and the cursor will show in the graph area.

Right Ear selected



Left Ear Selected



5.2.5.2. Select plot type

In the toolbar, select the corresponding icon of the graph that shall be plotted. The following selection is possible:

Air Conduction (AC): Select this icon to plot the air conduction.

Bone Conduction (BC): Select this icon to plot the bone conduction.

U-Threshold (UCL/ULL): Select this icon to plot the uncomfortable loudness threshold.

Sound field (FF): Select this icon to plot the sound(free) field threshold.

5.2.5.3. Select plot options type

After selecting plot type you can also specify additional options to plot on the graph – including masked, no response and/or aided.

Masking: Select this icon in addition to AC or BC to mark a masked threshold.

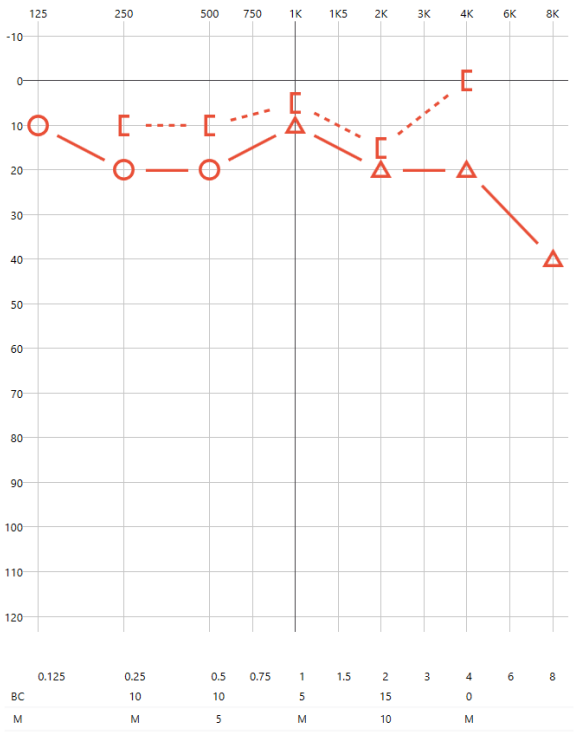
Not heard/no response (NR): Select this icon in addition to AC or BC to mark a no response frequency.

Aided: Select this icon in addition to AC, FF or UCL to mark a aided threshold.

5.2.5.4. Masking

Masking values can be added in two different ways. Either, the masking button in the toolbar is selected together with the AC or BC function, or the **Manual Entry** table is used to manually add the masking values.

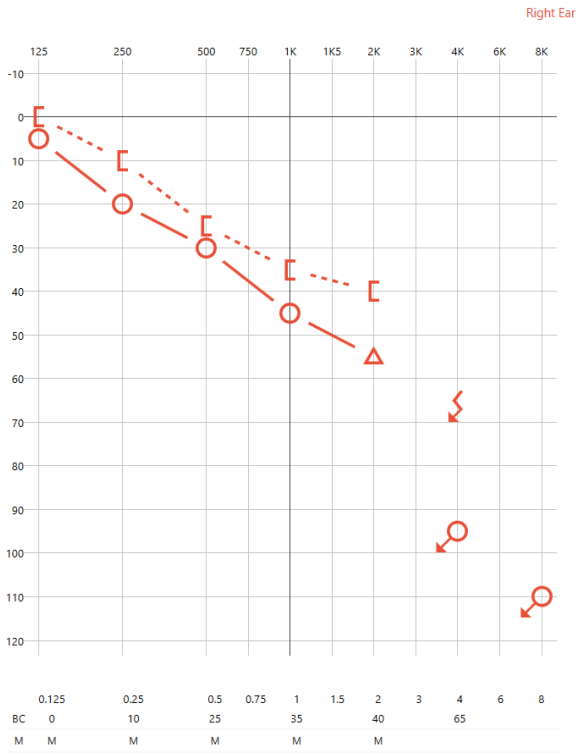
When masking is used, but the actual masking value is unknown, the table will show an **M** to indicate masking was active. If the masking value is known, a number will show in the second row of the table.



5.2.5.5. No Response

In the case where the test subject did not respond to the test signal, the symbol of **no response** (NR) can be added to the audiogram.

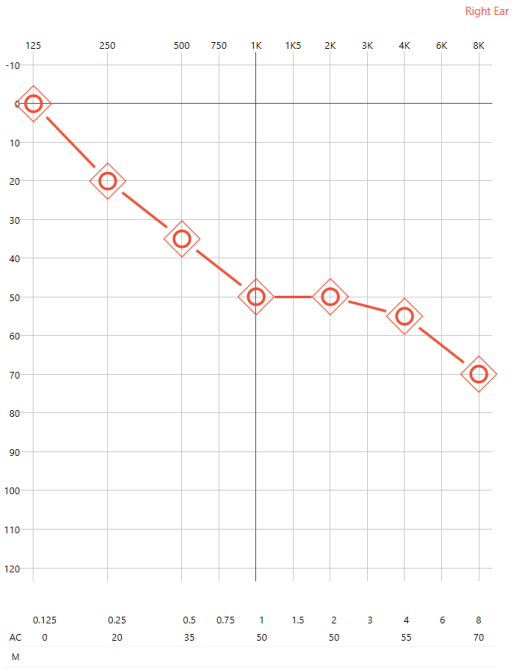
Select the NR button in the toolbar together with the AC or BC function to mark the level as not heard.



5.2.5.6. Aided

In the case where the test subject was tested with his hearing instrument on, the symbol of **Aided** can be added to the audiogram.

Select the aided button in the toolbar together with the AC, UCL U or FF S function to mark the level as aided.



5.2.5.7. Delete plot point

In case a test point was placed incorrectly and should be removed, it is possible to delete a test point. Select the threshold that should be removed (air or bone) and move the mouse over the corresponding level, ideally the test point, to be deleted.

To delete the point, select the **delete** button on the **keyboard** or click the right button on the **mouse**.

5.2.6. Provide additional information for the session

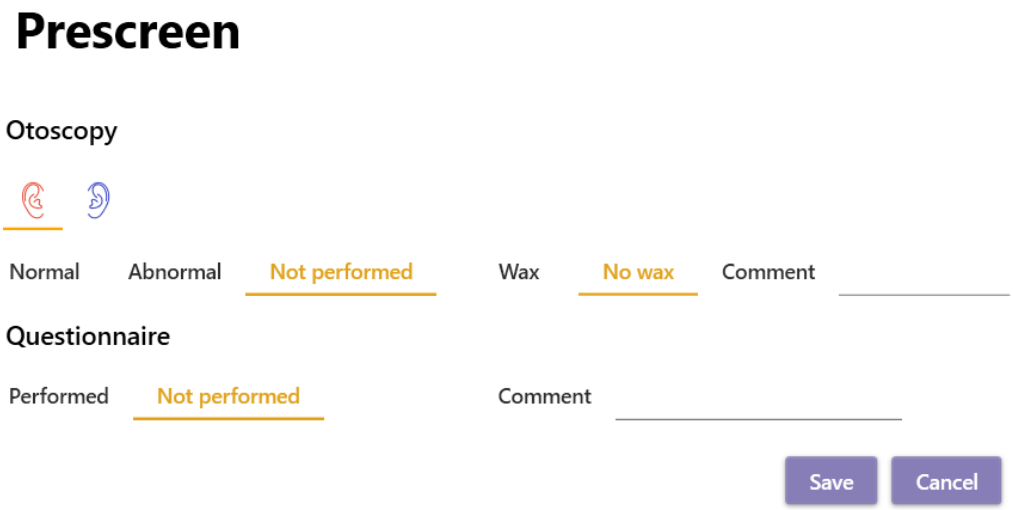
Alongside audiograms and tympanograms Amplisuite can store additional information about a test session. This includes (1) general comments and (2) prescreen information (containing information about otoscopy results, presence of wax and information about any questionnaire conducted before the test).

5.2.6.1. Add or edit prescreen information

To add prescreen information click the button present below the session list. Color and state of the button indicates whether any data can be added or edited.

Add prescreen information	Prescreen information is not added for this session but can be added.
Edit prescreen information	Prescreen information has been saved to current session and it can still be edited.
Prescreen information	Prescreen information has been saved to selected session and it can't be modified.
Prescreen information	Currently selected session does not contain any prescreen information and it can't be modified.

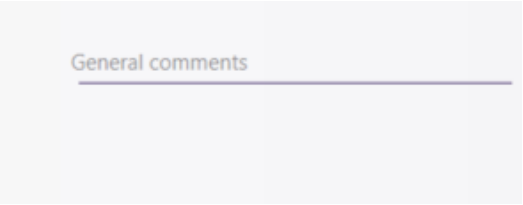
If prescreen information can be added or edited – after clicking this button a pop-up will appear with available options:



Otoscopy results and information about wax presence can be stored for each ear separately by selecting appropriate ear on this view. Information about questionnaire and comments are not specified for each ear.

All prescreen information will also be present on printout.

5.2.6.2. Add general comment



Bellow session list there is a comment section. Click the field to add a comment to the currently selected session.

Added comments will also be displayed on the printout.

5.2.7. Save session

To save current session to memory – click one of the available floppy disk icons above the session list.

Save – saves the current session

Save All- saves all open and unsaved sessions to the database

5.2.8. Delete session

In order to delete selected session you need to click the X icon above the session list and confirm the operation by providing a reason for this operation.

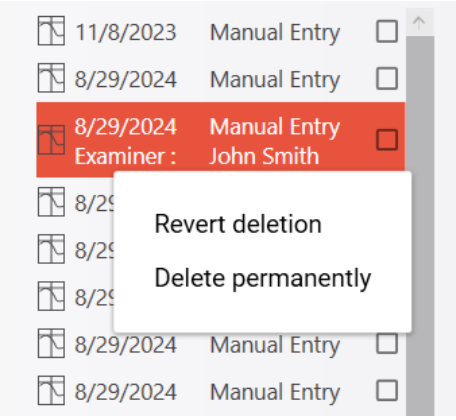
Deletes currently session

Data deleted this way are not permanently removed – they can be reviewed by users with administrator permissions and restored or permanently remove from the software.

5.2.9. Revert session deletion or delete permanently

Please note: Only users with administrator privileges are able to use that functionality. Additionally this operation is only available when *Show deleted data* option in Settings is turned on.

When *Show deleted data* option in Settings is turned on, session list also show all test sessions that were previously removed. Those sessions will be highlighted in red. Right-click on selected session to open up a context menu allowing you to either revert the removal or delete it permanently from the software.



5.2.10. Printout (print or PDF storage)

Print Results	Selecting the print icon in the control panel will print the currently displayed test.
Store Result as PDF	Selecting the PDF icon in the control panel will store the current displayed test as a PDF.

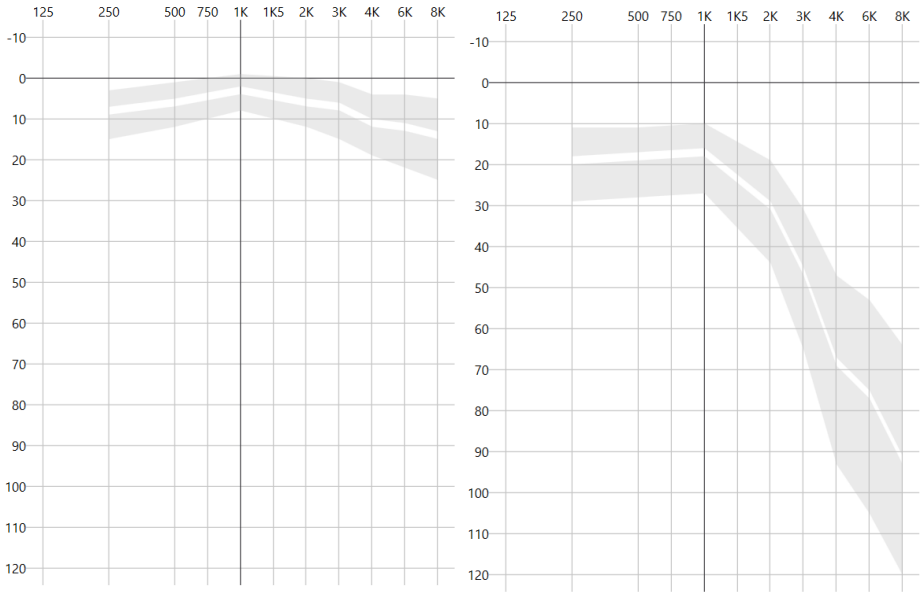
When printing or creating test PDFs you can also use few configuration options to modify your printout document. These options include:

- Show/hide counseling overlays (speech banana, hearing levels)
- Show/hide Multi- and Single-syllabic norms
- Show/hide selected baselines
- Showing the results in audiogram only, audiometry data table only or both

5.2.11. Show/hide counseling overlays

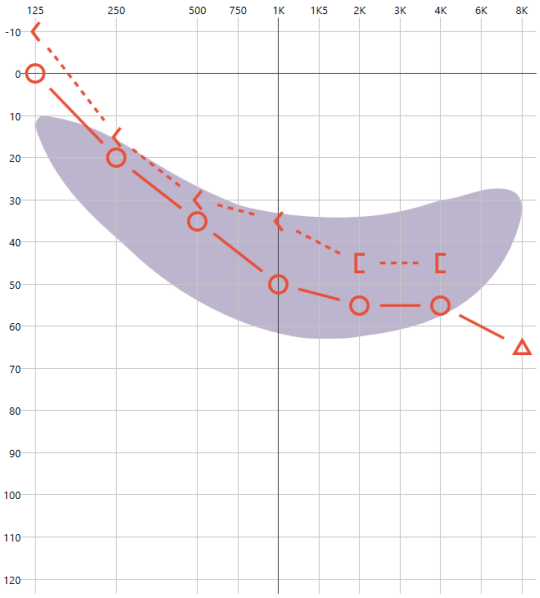
It might be desired to use additional explanation tools to help the test subject better understand their hearing threshold.

Predictive Hearing Bands: Will show predictive hearing bands (norms) based on test subject's age and gender (must be above 18 years old and gender needs to be specified).

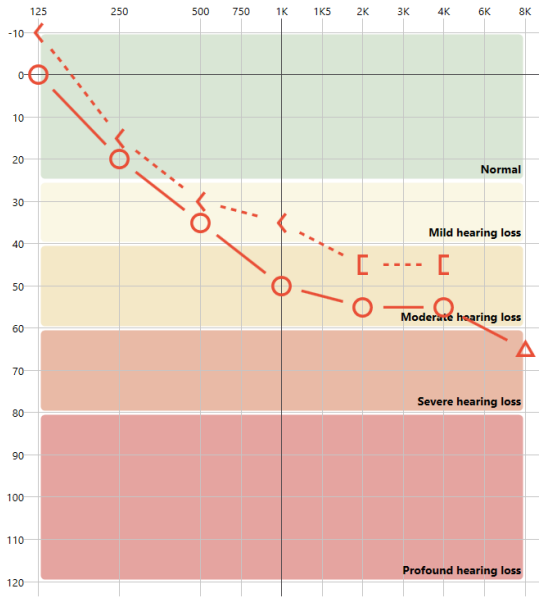


If either of those criteria are not met – icon will be highlighted on red as an indicator that predictive hearing bands cannot be shown for selected subject.

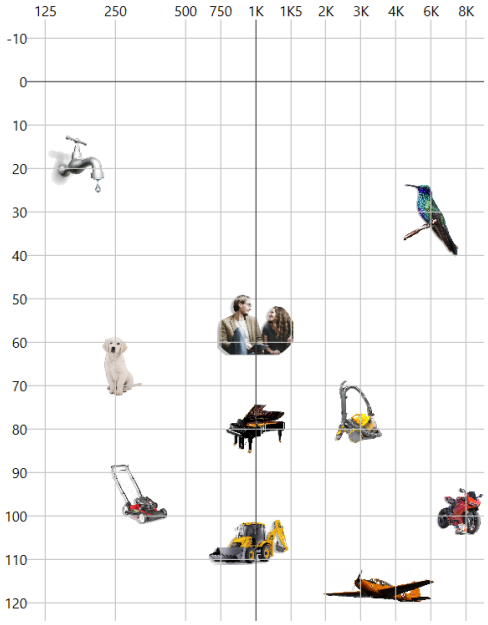
Speech Banana: Will show the speech area as it is selected in the settings.



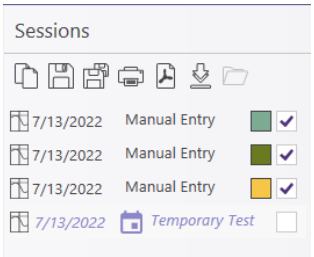
Hearing Levels: Will show the degrees of hearing loss based on the World Health Organization's (WHO) recommendation.



Decibel Scale Images: Will show example pictures of real-life example objects that generates sound at specific frequencies/loudness to help visualize what kind of sounds might be affected by subject's hearing loss.

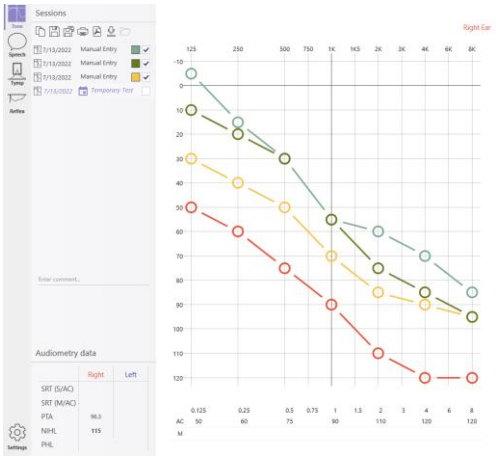


5.3. Baseline comparison



Measurements obtained for the same test subjects can be overlapped and displayed at the same time for review purposes.

To show several charts at once, select the check box next of the test you want to display. The selected thresholds will be shown in a different color to allow a differentiation of the different measurements. Corresponding color will be displayed next to the selected test.



Please note: You can show up to 10 tests at once. If you select more then 10, the first selected test will be deselected.

Please note: If you are using HSE indicator – you will be able to select only single test to compare. Selected test will also be the basis for calculating HSE category that requires historical data.

5.3.1. Audiometry Data calculation

Audiometry data

	Left	Right
SRT (S/AC)	3	30
SRT (M/AC)	20	22
PTA	65	60
NIHL	**65**	**60**
PULHEEMS	LF-Grade 4 HF-Grade 3	LF-Grade 4 HF-Grade 3
Fire Service	H5 Level	H5 Level
>10dB shift	2	
HSE	CAT 3	CAT 2
	CAT4 No data Unilateral HL No	
PHL	63.5%	

An automatic audiometry calculation takes place when adding air conduction values and will be visible for each ear in the **Audiometry Data** table, shown below the audiograms. Amplisuite supports automatic calculations for commonly used indicators including:

- **PTA** (Pure Tone Average, customizable calculation),
- **SRT** (Speech Recognition Thresholds, customizable calculation, single- and multi-syllabic)
- PHL (Percentage Hearing Loss)
- NILH (Noise Induced Hearing Loss) values

As well as suggesting commonly used categorisations in occupational health based on recommended calculations like:

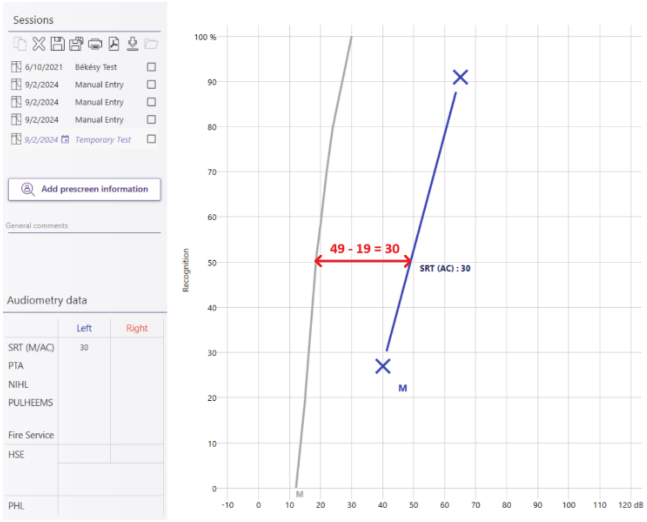
- PULHHEEMS,
- Fire Service Categorisation
- HSE
- >10dB shift

More detailed information about methodology used for calculating these are described below.

Please note: PTA and SRT indicators are available to all Amplisuite users. PHL, NILH, PULHHEEMS, Fire Service Categorisation, >10dB shift and HSE are available with appropriate licenses.

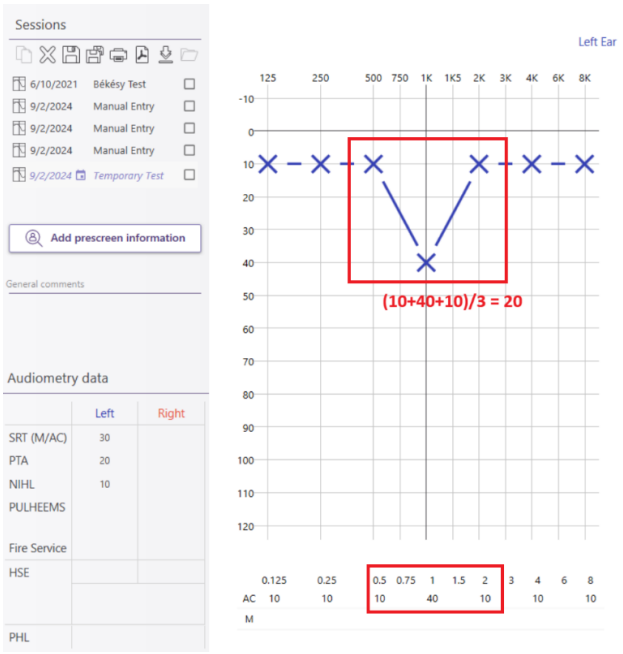
5.3.1.1. Speech Recognition Thresholds (SRT)

Value of SRT is calculated separately for single- and multi-syllabic signals as well as for each ear. Value for SRT is derived from lowest level where 50% recognition of speech was identified and compared against the 50% recognition level based on the norm curve (norms can be modified in settings).



5.3.1.2. Pure Tone Average (PTA)

PTA calculation is a simple average of hearing thresholds for selected test frequencies. By default – 0.5, 1 and 2 kHz are selected. They can be modified in settings (Tone tab)



5.3.1.3. Noise Induced Hearing Loss (NIHL)

NIHL is calculated as simple average of hearing thresholds at 2, 3 and 4kHz frequencies. If this indicator is greater or equal to 25dB – the result is bolded to highlight it. This metric corresponds to the OSHA definition of calculation a standard threshold shift.

5.3.1.4. PULHEEMS

PULHEEMS is a holistic system of grading one's physical and mental fitness used by Britain's armed forces. PULHEEMS stands for – Physiquie, Upper limbs, Lower limbs, Hearing, Eyesight, Mental function and Stability.

Amplisuite indicates category for hearing evaluation of these norms and they are calculated in the following way. Each ear is categorized separately with two grades – for low (LF-Grade) and high frequencies (HF-Grade). One of the five available categories is assigned to each ear.

Low frequency grade is calculated as comparison between the normative table and sum of hearing thresholds at 0.5, 1 and 2kHz frequencies.

High frequency grade is calculated as comparison between the normative table and sum of hearing thresholds at 3, 4 and 6kHz frequencies.

5.3.1.5. Fire Service Categorization

This indicator is used mainly by UK Fire Services. Fire Service Categorization stems from PULHEEMS but it is calculated differently and contains one additional measure (speech frequency) which is being used for classification.

Fire Service Category is a scale of 5 possible options (H1, H2, H3, H4, H5) and it is calculated as a comparison between norms and three distinctive indicators:

- Sum of low frequencies thresholds (0.5, 1 and 2 kHz)
- Sum of high frequencies thresholds (3, 4 and 6 kHz)
- Sum of speech frequencies thresholds (2, 3 and 4 kHZ)

These indicators are compared with normative table as follows and appropriate category is assigned.

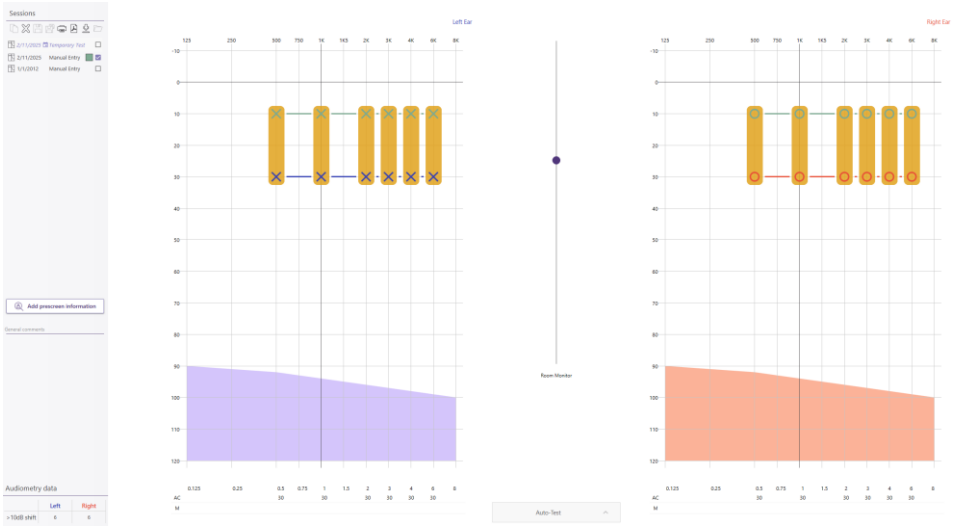
Level	**Low frequency sum**	**High frequency sum**	**Speech sum**
H1	≤ 45 dB HL	≤ 45 dB HL	≤ 35 dB HL
H2	≤ 60 dB HL	≤ 80 dB HL	≤ 60 dB HL (no value > 25 dB HL)
H3	≤ 80 dB HL	≤ 120 dB HL	≤ 90 dB HL (no value > 40 dB HL)
H4	≤ 120 dB HL	≤ 150 dB HL	≤ 120 dB HL
H5	> 120 dB HL	> 150 dB HL	> 120 dB HL

5.3.1.6. >10dB shift

>10dB shift is a simple metric based on HSE guidelines hat require a retest whenever a patients hearing has more than 10dB loss of hearing on any frequencies compared to previous test results (or baseline).

In Amplisuite it is shown as a number (between 1 to 11) representing amount of frequencies that matches the following criteria:

- we have data for this frequency both in current and in compared test (previous or baseline)
- there is >10dB worse hearing result in them



Which means that in the example above – we have 6 frequencies that are showing loss of hear of >10dB and might indicate that a retest should be executed.

5.3.1.7. Health, Safety and Environment categorization

Please note: HSE indicator is based on normative ranges taking gender and age into account. Therefore HSE will be calculated only for test subjects which contains information about gender and at least 18 years old.

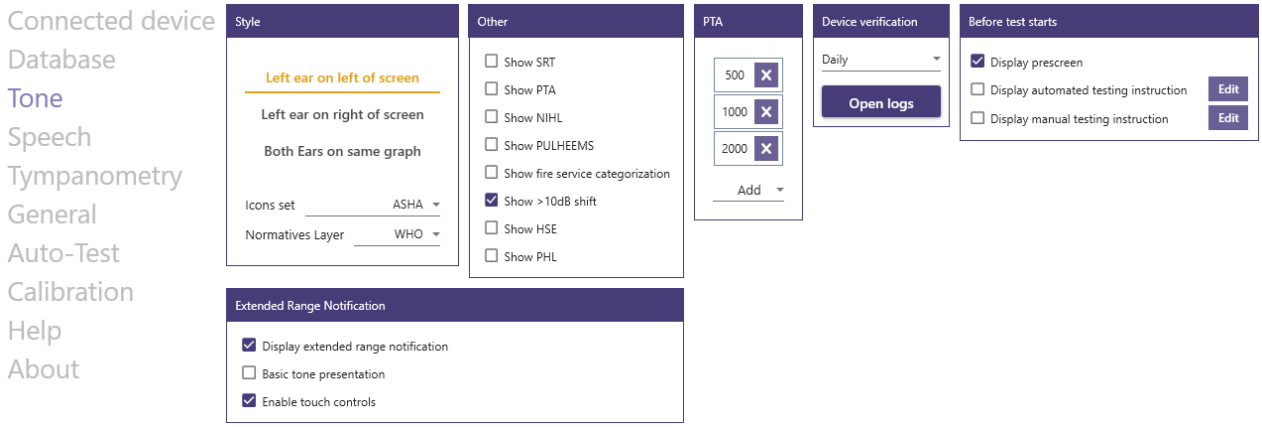
HSE is a four-scale categorization scheme based on age- and gender-specific norms. Amplisuite will calculate these categories based on HSE guidelines and mark each ear as well as both ears hearing loss as Category 1, 2, 3 or 4. Amplisuite will also indicate if unilateral hearing loss is identified.

Please note: HSE indicator is complex. In order to learn more how it is calculated – please refer Appendix 4 from *Controlling noise at work. The Control of Noise at Work Regulations 2005 Guidance on Regulations.*

5.3.1.8. Percentage Hearing Loss (PHL)

PHL is calculated based on Republic of South Africa Government Gazette No. 422 instruction. In general – it takes each individual hearing threshold for all of the following frequencies (0.5, 1, 2, 3 and 4kHz) for both ears individually and compares these results with pre-defined norms to estimate the percentage hearing loss on each frequency and then sums it up to provide a one result.

5.3.2. Settings options for Tone module



5.3.2.1. Style settings

Using style settings user can modify:

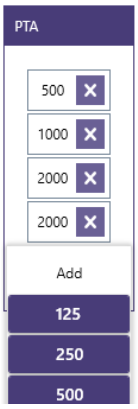
- Which ear would be displayed on which side
- Choose available icon sets representing thresholds on the audiogram from following options:
  - ASHA (US)
  - Australia
  - BSA (UK)
  - Hongkong
- Choose available normative layers for hearing loss grading from following options:
  - BSA
  - WHO

5.3.2.2. Other (indicators)

User can select which indicators to calculate and present in Audiometry Data table and on the printout from all available indicators.

Please note: Some of the indicators might be greyed out and inactive – indicating that these features are not covered by currently active license key.

5.3.2.3. PTA Frequencies

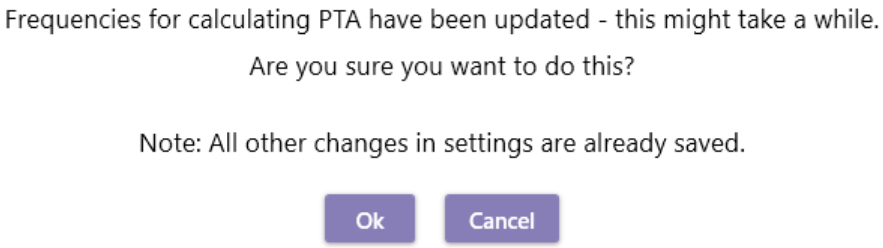


Amplisuite offers to calculate the PTA (Pure Tone Average) which is shown in both the Tone and Speech Audiometry Module.

The frequencies used for the PTA calculation can be customized. In the dropdown menu, select all frequencies that should be part of the PTA calculation. To add a frequency select the **Add** button, then select the frequency. To delete a frequency from the calculation, click on the cross next to it.

It is possible to have the same frequency selected several times for the PTA calculation (e.g. 500, 1000, 1000 and 2000 Hz). By default, the 500, 1000, 2000 Hz are selected for the PTA calculation.

Since adding or removing frequency from PTA calculation will result in recalculation for all records – change in this setting will require additional confirmation when you try to save settings.



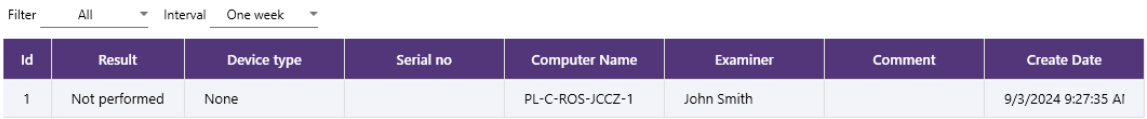
After clicking *Ok* progress bar will appear in lower-right corner of the application informing you of the operation. When progress reach 100% a notification will also be shown informing that the PTA has been recalculated for all records.

5.3.2.4. Device verification

Device verification setting allows you to set up a reminder to help ensure device verification takes place as well as review the device verification log – which can be used to check the historical results of device verification and ensure the best practice is followed.

To set up a reminder – open the dropdown and select one of the available interval in which device verification reminder should be shown to the users (available options: daily, weekly, bi-weekly).

Device verification log is available only for users with administrator permissions. To open it up – simply click the button *Open logs*.



In this view you can filter the log by time interval (*One week*, *One month*, *Three months, Six months, One year, Two years, Five years*) as well as by *Connected device, Current computer, Current examiner*. You can also export logs into .csv file by clicking *Export logs* button on the bottom of the window.

5.3.2.5. Before test starts

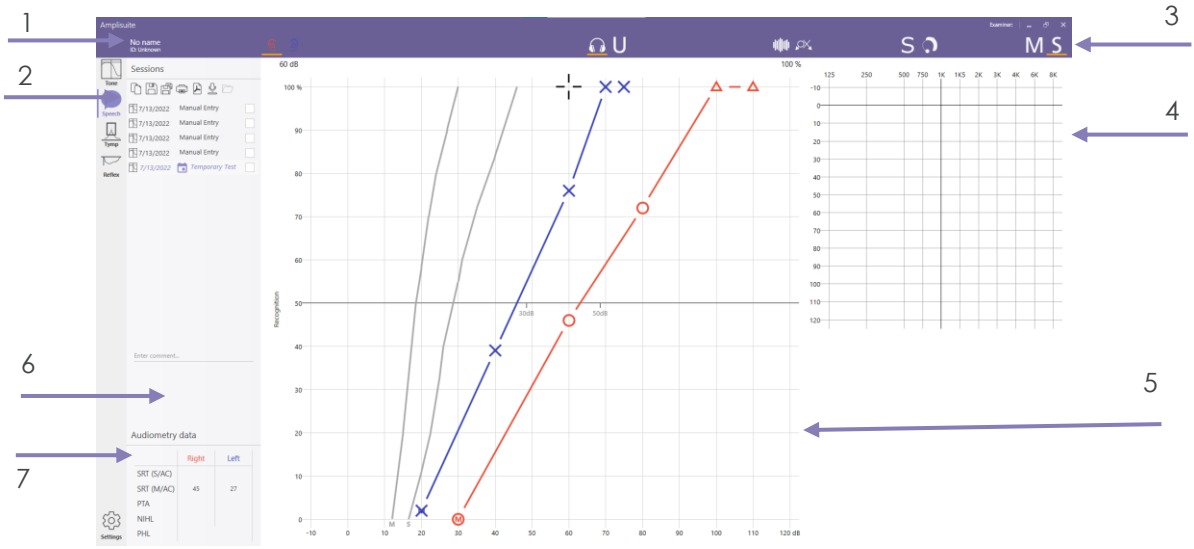
Using this group setting you can define additional steps that would be invoked every time before starting the test using Amplisuite (this affect both Auto Tests and manual tests controlled by Amplisuite). Here you can:

- Show prescreen information before any test starts (which reminds the examiner to fill in additional information before conducting the test);
- Edit and decide to display automated testing instruction (shown before starting automated test using any device that supports that function)
- Edit and decide to display manual testing instruction (shown before presenting first signal using PC-controlled device that supports that function)

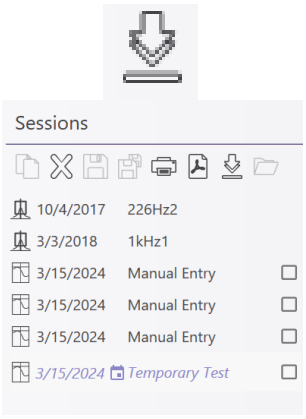
5.4. Speech Audiometry Module

5.4.1. General

The speech audiometry module consists of **(1)** test subject and examiner information, **(2)** session list, **(3)** speech audiometry toolbar, **(4)** tone audiograms for the left and right ear, **(5)** speech audiogram, **(6)** comment section and **(7)** audiometry data table.



5.4.2. Download results from device



Download the current record displayed on the device to the PC (AC, BC and if available speech SRT).

As soon as a test is downloaded and selected, the result will be shown, and further details can be found in the session panel.
Several sessions can be uploaded into Amplisuite and be opened through the session panel.

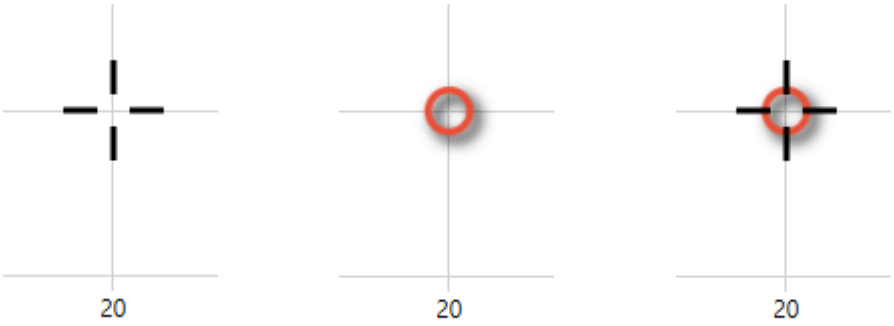
5.4.3. Copy data points from previous session

Copy currently selected test results to temporary test.

By switching to temporary session afterwards these results can be reviewed and modified manually as a new session.

5.4.4. Manual entry of data

Data can be plotted directly into the graph using the mouse or the keyboard. Select the desired ear and test method (AC, BC, UCL, (un)masked and NR) to start plotting data.



Mouse:	Use the mouse to move the cursor to the desired frequency and level.	Double-click left and store the test point.	Right-click at any level of the frequency to delete the test point again.
Keyboard:	Use the arrow keys to move the cursor to the desired frequency and level.	Hit the Enter-key or S-key on the keyboard to store the test point.	Hit the Del-key on the keyboard at any level of the frequency to delete the test point again.

As soon as the point has been entered, the table below the graph will show the equivalent value.

5.4.4.1. Select ear

Active ear can be selected by keyboard (push **R** for right ear, **L** for left ear) or by icons on toolbar (clicking on the selected ear icon)

Right ear selected

Left ear selected

One ear can be selected at a time. Currently selected ear will be highlighted with an orange line below.

5.4.4.2. Select single- or multi-syllabic thresholds

In the toolbar, select the correct icon of the graph to be plotted. The following selection is possible:

Single Syllabic: Select this icon to plot the single syllabic threshold.

Multi Syllabic: Select this icon to plot the multi syllabic threshold

5.4.4.3. Select plot type

In the toolbar, select the corresponding icon of the graph to be plotted. The following selection is possible:

Air Conduction (AC): Select this icon to plot the air conduction.

U-Threshold (UCL/ULL): Select this icon to plot the uncomfortable loudness threshold.

Sound field (FF): Select this icon to plot the binaural sound(free) field threshold.

5.4.4.4. Select plot options type

In addition to the selection of AC, BC and UCL, masking can be activated. It is also possible to mark no response and aided.

Masking: Select this icon in addition to AC or BC to mark a masked threshold.

Not heard/no response (NR): Select this icon in addition to AC or BC to mark a no response frequency.

Aided: Select this icon in addition to AC, FF or UCL to mark a aided threshold.

Please note: The data shown in the table below the graph, plotted or deleted is always equivalent to the selection (AC, FF, UCL) made in the toolbar. If the air conduction is selected, no sound field data can be deleted and vice versa.

5.4.4.5. Masking

Select the masking button in the toolbar is selected together with the AC function to add a masked threshold.

5.4.4.6. No Response

In the case where the test subject did not respond to the test signal, the symbol of **no response** (NR) can be added to the audiogram.

Select the NR button in the toolbar together with the AC function to mark the level as not heard.

5.4.4.7. Delete a Test point

In case a test point was placed incorrectly and should be removed, it is possible to delete a test point. Select the threshold that should be removed (air or bone) and move the mouse over the corresponding level, ideally the test point to be deleted.

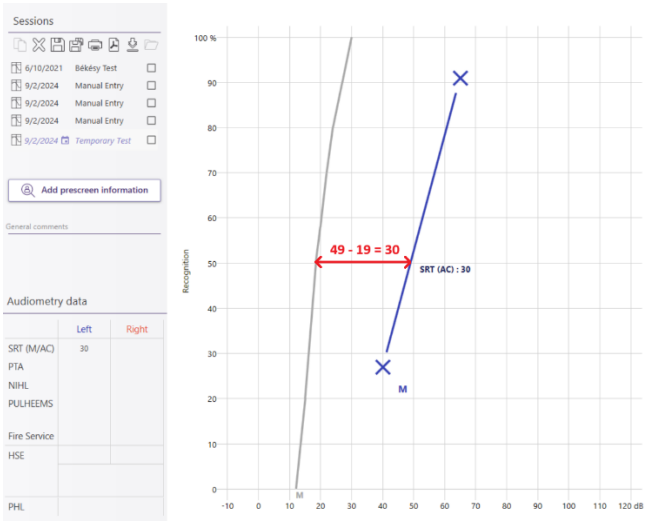
To delete the point, select the **delete** button on the **keyboard** or click the **right button on the mouse**.

5.4.5. SRT calculation

Audiometry data

	Right	Left
SRT (S/AC)	52	32
SRT (M/AC)	28	33
PTA	41.3	51.3
NIHL	**46.7**	**53.3**
PHL	37.7%	

An automatic audiometry calculation including SRT values, takes place when adding both single- and multi-syllabic thresholds values and will be visible for each ear in the **Audiometry Data** table, shown below the audiograms.
The SRT is the lowest level where a 50 % recognition was found and compared against the norm. It is calculated separately for single syllabic and multi syllabic thresholds.



Example of SRT calculations

Please note: SRT is calculated only when normative curves are enabled in settings. In this case the value is an expression of how much you need to turn up the level compared to normative data in order for the test subject to be able to repeat 50%.

5.4.6. Settings option for Speech module

Database
Tone
Speech
Tympanometry
General
Help
About

Norm curves

Phone norm				FF norm			
Single syllabic norm		Multi Syllabic norm		Single syllabic norm		Multi Syllabic norm	
dB	%	dB	%	dB	%	dB	%
16.5	0	12	0	16.5	0	12	0
20	11	15	20	20	11	15	20
22.5	20	18.5	50	22.5	20	18.5	50
25	33	20	58	25	33	20	58
26	40	22	70	26	40	22	70
30	55	24	80	30	55	24	80
31	60	27	90	31	60	27	90
35	72	30	100	35	72	30	100
40	84			40	84		
46	100			46	100		

☐ Show 50 % discrimination line

Display on the audiogram:

☐ Single syllabic norm
☑ Multi Syllabic norm

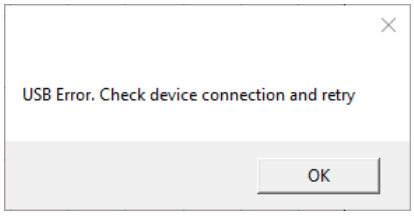
Using Speech setting tab you can:

- Customize norm curves for single- and multi-syllabic signals for both phone and free field
- Show/hide 50% discrimination line on the speech audiogram
- Show/hide Single- and Multi-syllabic norms on the speech audiogram

Please note: SRT is calculated only when normative curves are enabled in settings – hiding norms on audiogram will also remove SRT from Audiometry Data table.

5.5. Troubleshooting Audiometry

Please note: Refer to the installation & operating instructions provided with your instrument(s) for details of the data transfer operation and errors that could possibly occur. If a fault cannot be fixed, the operator is cautioned against repeatedly restarting the instrument.

PROBLEM	CAUSE	SOLUTION(S)
Instrument doesn't connect. 	• Device is not switched on • USB connection unstable	• Switch on /Restart device • Check USB connection in both instrument and PC • Ensure cable is in good working order • Reinstall device drivers
No data is transferred to PC.	• Specified location to store data is different than expected • Specified location to store data does not exist	• Review the store location in settings • Store LoadIt.exe in same folder as Amplisuite.exe
Text is outside the boxes on created PDF.	• Windows default PDF creator is uninstalled	• Install Microsoft Print to PDF, you can find on Microsoft website
SRT is not visible in Audiometry Data Table even though it is selected in Tone settings.	• Speech settings are configured in a way that does not show norm curves on audiogram	• Change Speech settings to show norm curves on the audiogram
Some indicators are not calculated in Audiometry Data table	• Subject does not meet required criteria (age and gender) • Test session does not have full data required for calculation (frequencies missing) • Historical data are not available	• Check for all potential missing information – make sure test subject age and gender is known, verify if all necessary frequencies have been tested and if there are any previous test sessions

6. Admittance Module

6.1. General

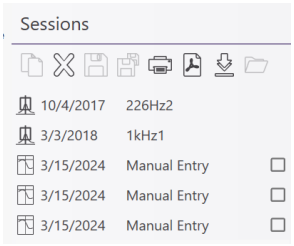
The admittance module allows you to review tympanometric **(Tymp)** and acoustic reflex test **(ART)** results. The admittance module can be used with all Otowaves 102,102-C, 202, 303 and 302+.

6.2. Common functions for Tymp and Reflex

6.2.1. Open Test result(s) from PC

Open from file

To review any test results which have been **DOWNLOADED** from any Tympanometer, select the **OPEN** icon in the control bar of Amplisuite.
Only one test at a time can be opened and imported into Amplisuite. As soon as a test is selected, the result will be shown and further details can be found in the session panel.



Several sessions can be uploaded into Amplisuite and opened through the session panel.

6.2.2. Download Results from device

After pressing **download** button two options will be displayed to select.

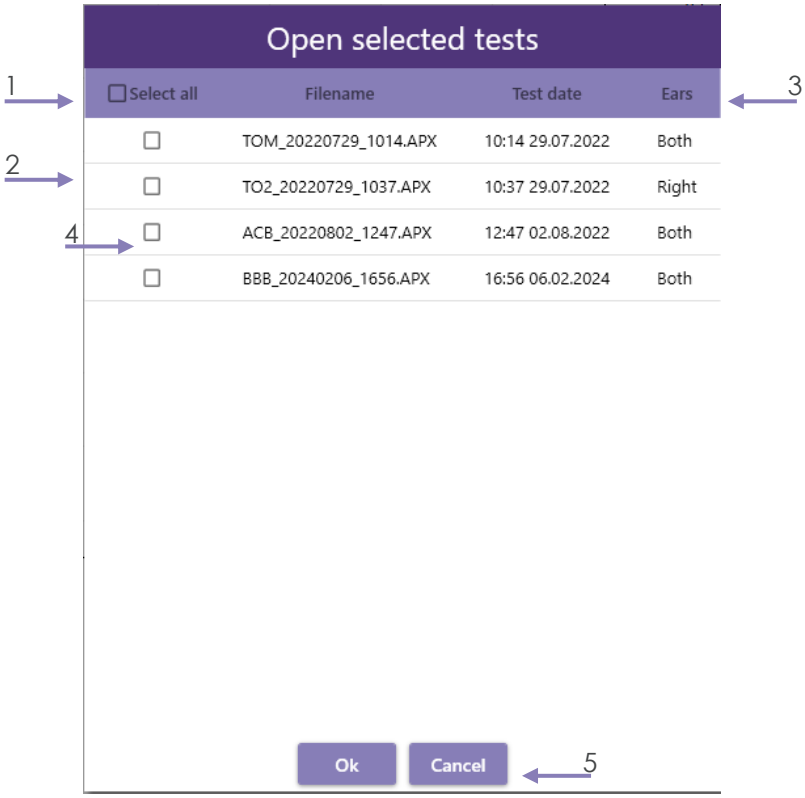
All Download all — All records stored on the device are transferred to the PC.

New Download new — Records stored on the device, which have not been sent yet, are transferred to the PC.

Please note: The option 'Download un-sent records from Tympanometer' is not supported on the Otowave 202 running firmware version prior to 1.0.0.043200.

After selecting one of the options new window will be displayed. It allows to add selected test to currently selected test subject.

Select all tests (1), list of downloaded tests (2), select column to sort (3), press checkbox to select test (4), press **Ok** to add all selected tests to the session, **Cancel** to close the window without any test added (5).



There are some slight differences in the download function using the Otowave 102 than either the Otowave 102-C, 202, 302 or 302+.

	102	102-C, 202, 302 and 302+
Transfer method	Infrared	USB
Special attention	If you can't find the Otowave 102 results after you've transferred them, look in **Control Panel > Infrared** for the location that files will be transferred to (under **Save received files here**). Note that this location will be retained until changed.	Before attempting to download test results, ensure that the Amplisuite & USB Device Drivers have been correctly installed.

Please note: Refer to the operating manual of your Otowave for further guidance and troubleshooting advice regarding the connections.

When downloading files from the 102-C, 202, 302 or 302+ unit, these files are automatically placed in the location specified in Amplisuite. The default location is the 'User Profile' within Windows. Typically, this will be **C:\Users\<user name>,** where <user name> is the name of the user account currently logged into Windows. This can be changed to any location you wish by setting the radio button to 'Specify Location', specifying a location of your choice and pressing '**OK**'.

Please note: If the specified folder does not exist, the transfer will not take place, though the transfer screen will appear to be normal. Ensure the specified location exists.

When downloading results from the 102 unit, a new folder containing the files will be created on the Desktop. Each Test subject's test is stored on the PC as a separate file within the **Amplivox** folder. If the Amplivox folder already exists on the PC, subsequent transfer sessions automatically create new

folders called **Copy 1 of Amplivox**, **Copy 2 of Amplivox** etc. To avoid excessive duplication of these folders, move the transferred files to a preferred location on the PC and then delete the **Amplivox** folder. Files have the extension **.APX** and they follow a specific naming convention:

- nnn_DDMMYYYY_HHMM.APX[1] (when the default date format is used on the Otowave 102)
- nnn_MMDDYYYY_HHMM.APX (if the date format was changed to **MM/DD/YY** on the Otowave 102 – see the product operating manual)

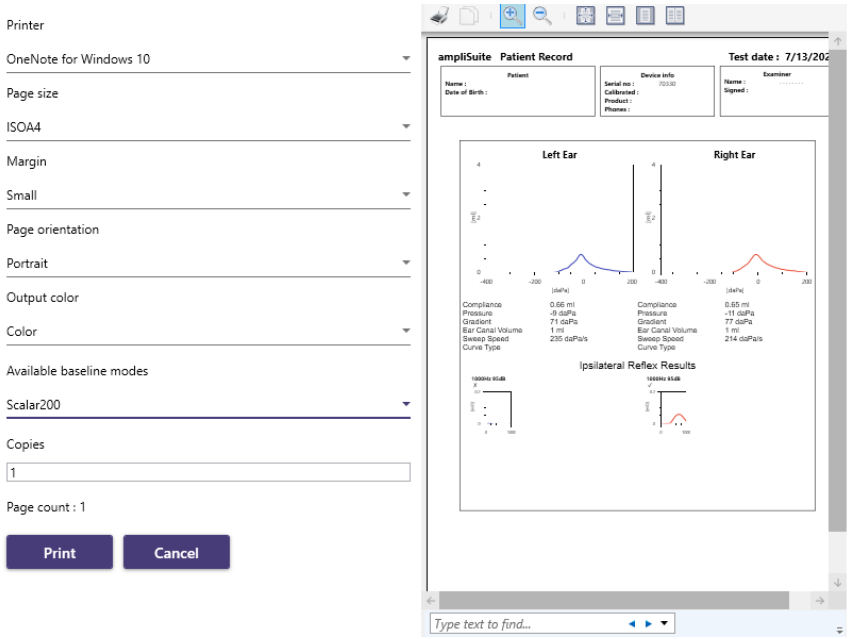
Please note: Sometimes it might be necessary to attempt to download the files a second or third time; this is due to limitations in the software supplied with Windows being unable to initiate communication properly with the Otowave 102.

6.2.3. Printing and PDF storage

Print Results — Selecting the print icon in the control panel will print the current previewed test.

Store Result as PDF — Selecting the PDF icon in the control panel will store the current previewed test as a PDF.

In both cases, when the print or the PDF button is pressed, a popup will show with print/PDF options. From here, you can select what baseline mode shall be shown on the printout.



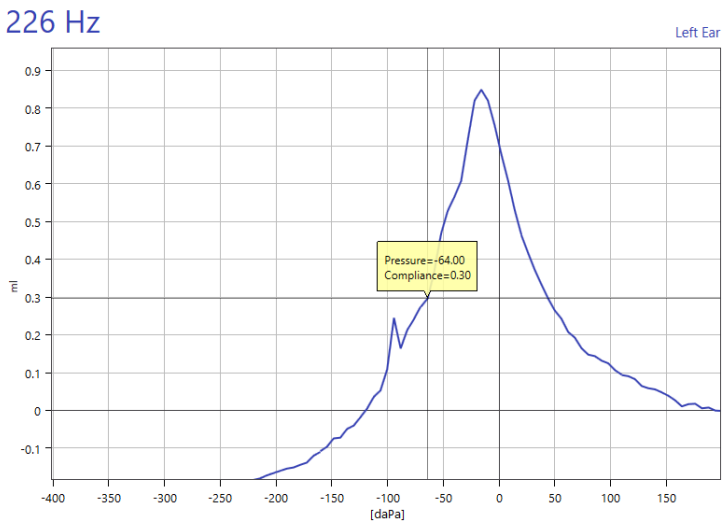
6.2.4. Zoom in and out

Any graph displayed in Immittance Module can be adjusted.

- Scroll in to zoom in
- Scroll out to zoom out
- Click mouse scroll wheel(mouse 3 button) to select and zoom
- Double click mouse scroll wheel(mouse 3 button) to change graphs back to default size

[1] nnn is either the initials entered when the test was saved in the database on the Otowave 102, or 'xxx' (lower case) if none have been entered yet (e.g. if it is the **Last Test** – see the Otowave 102 operating manual). DDMMYYYY (or MMDDYYYY) is the date of the test. HHMM is the time of the test

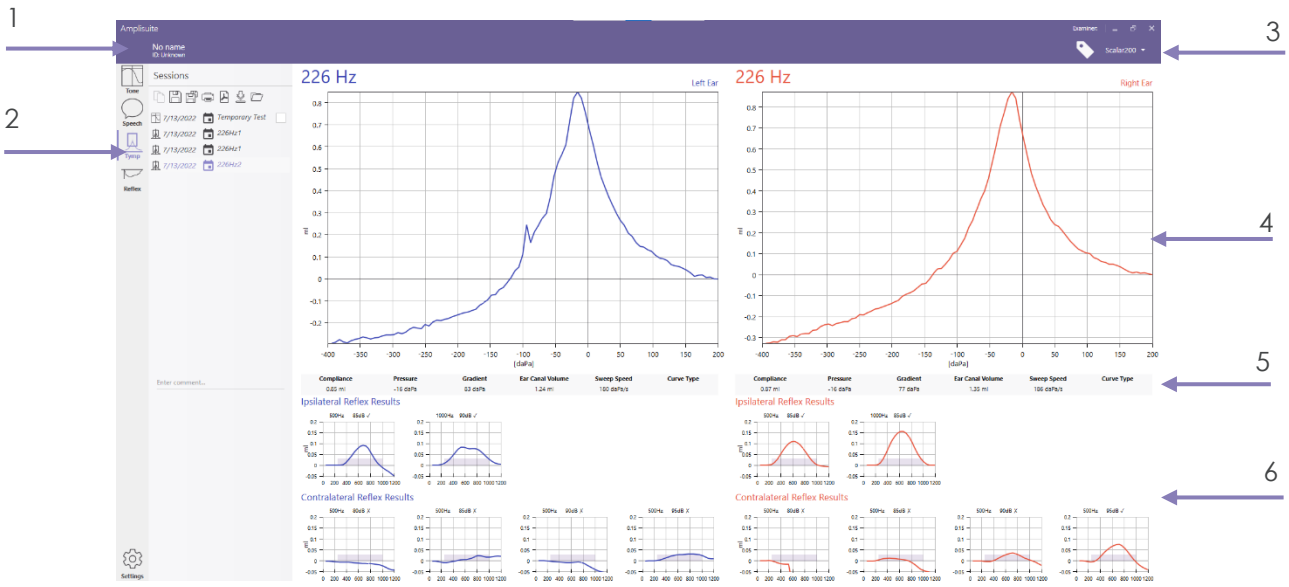
- Right click and hold to move graph
- Left click and hold to display specific point data



6.3. Tympanometry Module

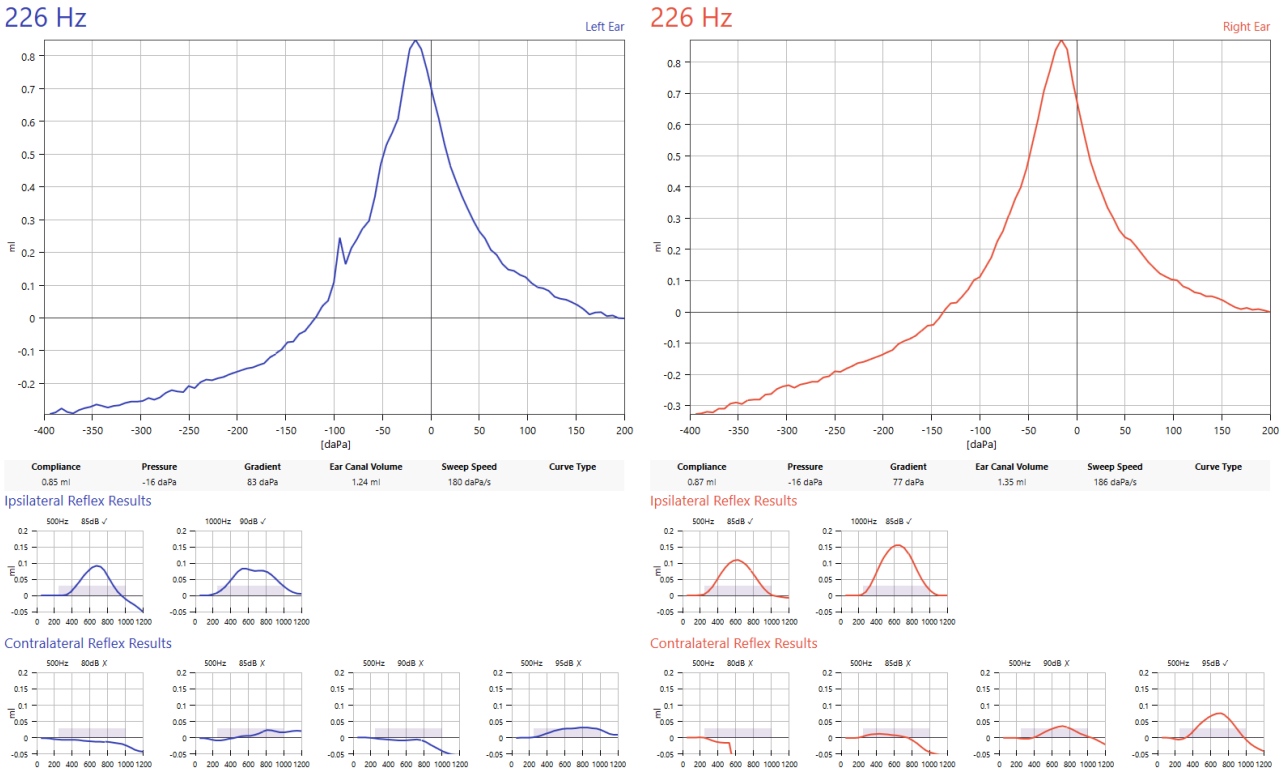
6.3.1. General

The tympanometry module consists of **(1)** test subject information, **(2)** session list, **(3)** toolbar, **(4)** tympanograms for the left and right ear, **(5)** test parameters for tympanometry and **(6)** the preview of ipsi- and contra-lateral test results (if available).



6.3.2. Tympanometric Test results

The graphs are similar to those shown on the Otowave.



On the tympanometry graphs, the option is given to show a normative box. This area is intended to help identify normal tymp curves, according to default or customised specifications. In the case that the peak of the curve falls into the normative area, the tymp is marked with a ✔ to identify a normal shaped curve.

Please note: Depending on the version of your Otowave, a normative box based on the BSA standards will be transferred with the test result to the PC. If you prefer to define your own normative boxes, please refer to chapter 6.5.

Below the tympanograms, the test parameter for the tymp curve shown are listed:

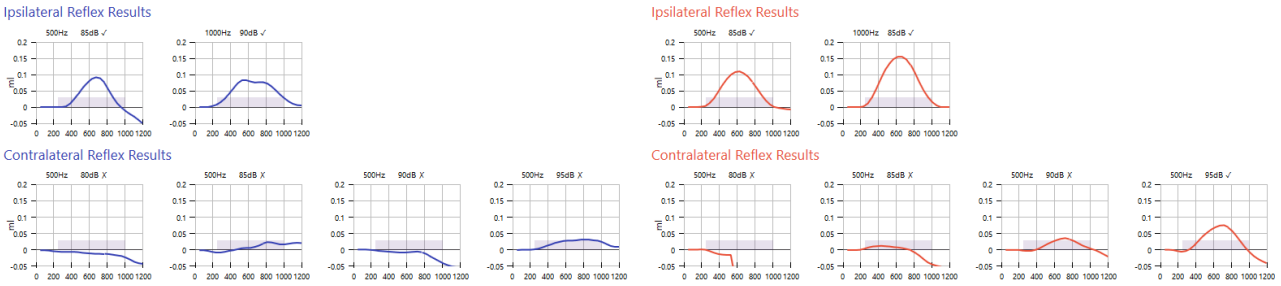
- **Compliance:** Peak of tympanogram in ml (226 Hz) or mʊ/mmho (1 kHz), representing the maximum compliance/admittance of the middle ear system[2]
- **Pressure:** Equivalent pressure point describing the compliance peak.
- **Gradient:** Width of tympanogram at 50% height
- **Ear Canal Volume:** Equivalent volume of the ear canal in ml
- **Sweep Speed:** Actual average sweep speed of the pump during the measurement
- **Curve Type:** Option to classify the tympanogram pattern based on the Jerger system (1970)[3]. Refer to chapter 6.3.3 for more detailed information on how to assign the classification.

Please note: The compliance and pressure value as well as the gradient are dependent on the position of the cursor in the Otowave unit before data transfer. When using the cursor function in the

[2] The maximum compliance occurs when the pressure in the middle ear cavity is equal to the pressure in the external auditory canal.
[3] J Jerger (1970). Clinical experience with impedance audiometry. Archives of Otolaryngology, 92 (4), 311-324.

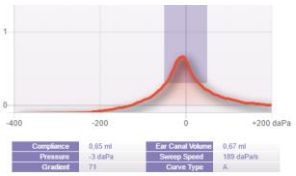
Otowave, re-defining the peak value of the tymp curve, the value for compliance, pressure and gradient are adjusted accordingly.

A small preview of ipsi and contralateral reflexes are shown below the test parameter. A review in more detail can be found in the ART module (refer to chapter 6.4). The reflexes are shown for all frequencies tested. When marked with a ✔, a reflex trace was detected, which was regarded as a valid reflex response by the Otowave. When marked with a x, a reflex trace was detected, but this was not regarded as a valid reflex response by the Otowave.

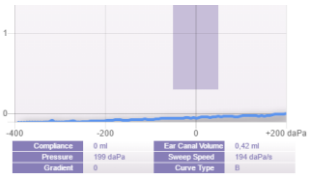


6.3.3. Assign curve type (Jerger)

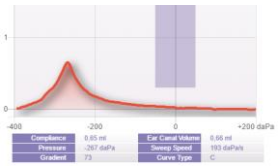
Amplisuite offers you the function to classify the tymp curves after the Jerger system. There are three main types of tympanograms according to Jerger, specified by the letters A, B, and C, as shown in the figure below.



Type A
Normal



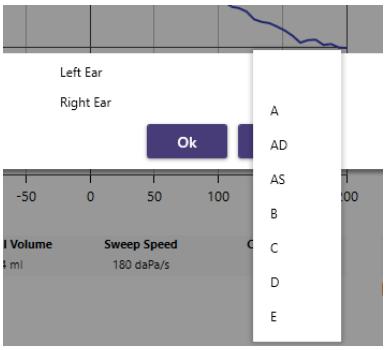
Type B
Middle ear pathology, such as fluid or infection behind the ear drum, hole in ear drum



Type C
Negative pressure in middle ear volume

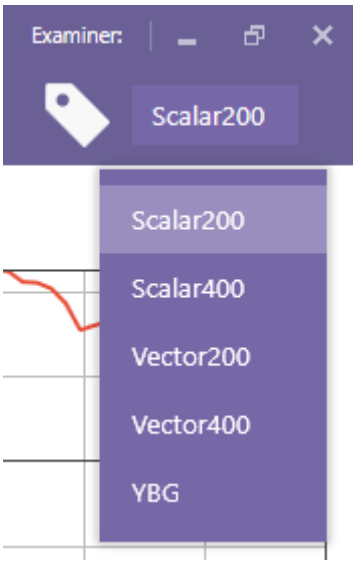
Amplisuite will in addition allow you further classification such as AD and AS, as well as D and E.

Selecting the tag icon  in the control panel will open a pop-up. From here, the categorisation for each ear takes place. Select the drop down to choose between the different tymp types.



6.3.4. Baseline mode

Select Baseline button in right side of the control bar to select tympanometry graphs baseline.

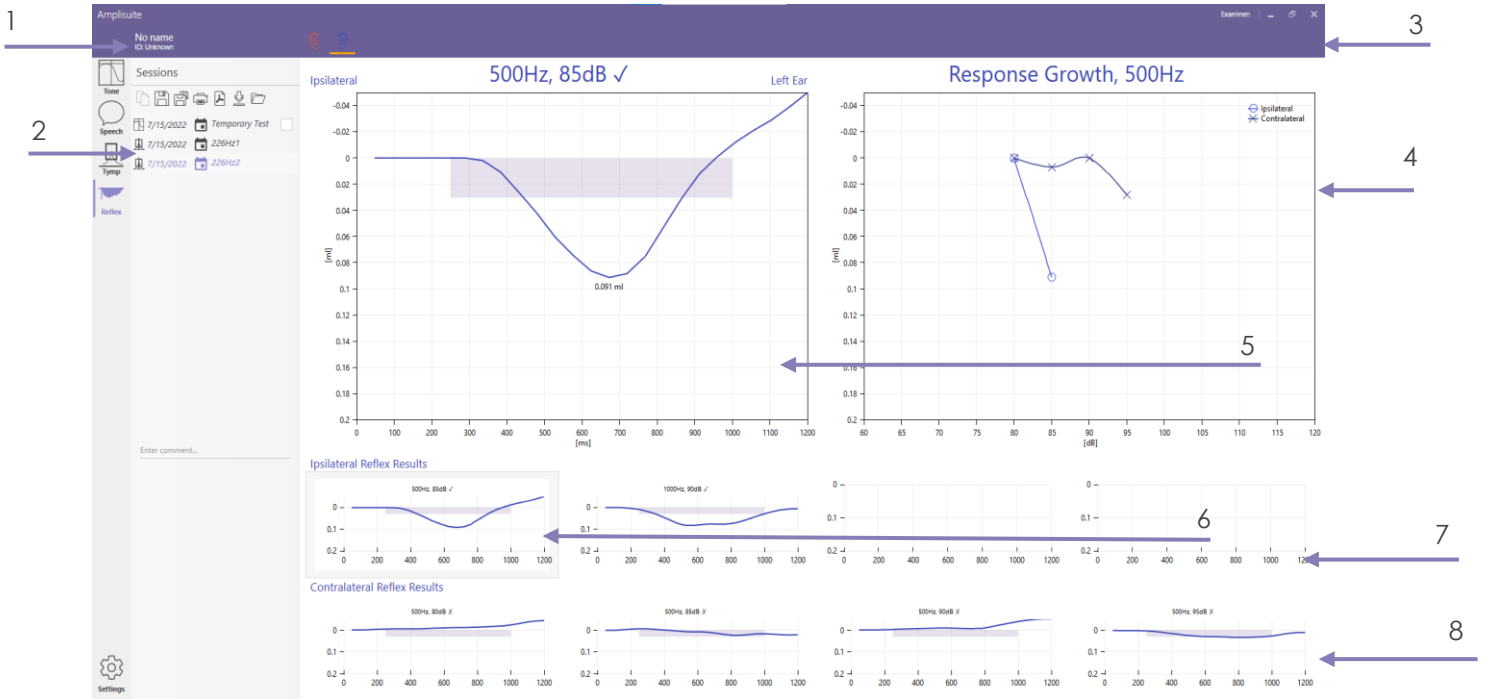


Scalar and vector mode	Changing the baseline mode from 2 and 4 scalar (226 Hz and 1000 Hz) or 2 and 4 vector (only 1000 Hz).
YBG curve	Show YBG graph (only available for 1000 Hz tests)

6.4. Acoustic Reflex Module (ART)

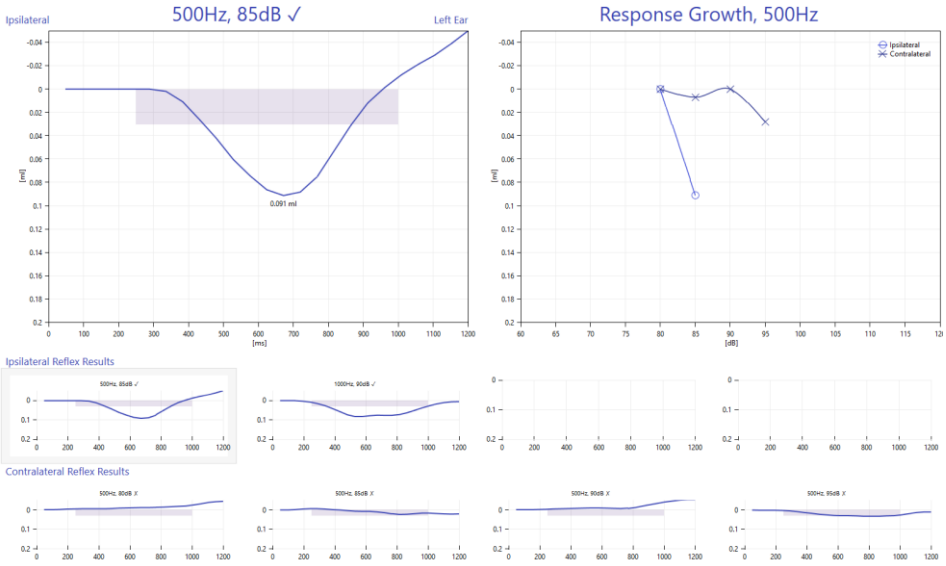
6.4.1. General

The acoustic reflex (ART) module consists of **(1)** subject information, **(2)** session list, **(3)** toolbar, **(4)** a reflex growth diagram for the currently selected ear, **(5)** reflex diagram based on the **(6)** selected reflex graph and **(7 and 8)** all available ipsi and contralateral reflex results.



6.4.2. Acoustic Reflex Test results

The graphs are similar to those shown on the Otowave.



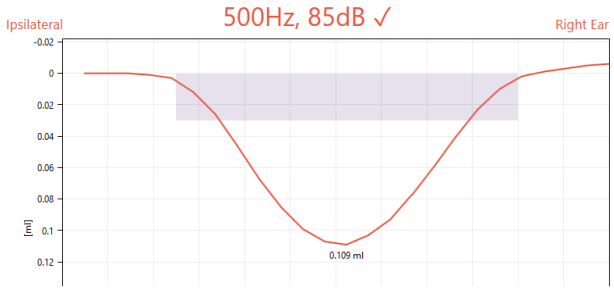
Right ear selected

Left ear selected

One ear will be shown at a time and can be changed using the selected ear icons in the control panel. The current selected ear will be highlighted with an orange line below.

To review a single graph in the detail view, select the specific reflex from the ipsilateral or contralateral results. The current selection will be highlighted with a purple frame.

When marked with a ✔, a reflex trace was detected, which is regarded as a valid reflex response by the Otowave. When marked with a x, a reflex trace is detected, but this was not regarded as a valid reflex response by the Otowave. The criteria to reach a pass can be shown visually in each of the graphs.



The criteria are shown in the form of a purple box in the reflex graph.
The height of the box is depending on the threshold criteria defined in your instrument.
The length of the box is given by the time the test signal is presented.
If the amplitude of the reflex reaches the height of the box as well as the contraction time meets the presentation time of the test stimulus, among other criteria, the reflex is considered a pass.

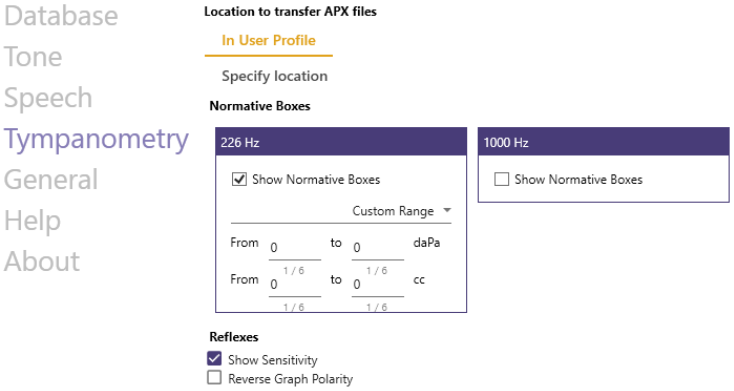
Please note: The box shown is depending on the version of your Otowave.

The reflex growth diagram[4] is shown for the current selected frequency. The ipsilateral plot is with an o for the right ear and an x for the left ear, whereas the contralateral side is marked with the opposite sign. The definition of contralateral is according to Katz, 2002[5].

[4] BH Sprague, TL Wiley, MG Black (1981). Dynamics of Acoustic Reflex Growth. Audiology 20: 15-40(1981)
GB Michael, LW Terry (1979). Acoustic-Reflex Growth and Loudness. JSLHR June, 1979

The acoustic reflex magnitude increases as the stimulus level increases. The peak magnitude of the reflex is plotted for each level tested, resulting in a reflex growth function.
The normal acoustic reflex growth function for pure tone stimuli shows that reflex magnitude increases linearly with the stimulus level[5].
This graph helps you quickly identifying the amplitude growth for the selected frequency.

6.5. Tympanometry settings



6.5.1. Specify storage location

When tests are downloaded to the PC, they are automatically placed in the location specified in Amplisuite. The default location is the **User Profile** within Windows, which is **C:\Users\<user name>**, where <user name> is the name of the user account currently logged into Windows.

This can be changed to any location you wish by setting the radio button to **Specify Location**. It is then required that you specify a location of your choice.

6.5.2. Normative Boxes

If desired, normative boxes can be shown in the tympanograms. This function is enabled by selecting the checkbox. There are 2 default normative boxes for 226 Hz, based on the recommendation of the BSA[6] (UK) or the ASHA[7] (US).

	BSA (UK)	ASHA (US)
Volume	0.3 to 1.6 cc	0.3 to 1.4 cc
Pressure	-50 to + 50 daPa	-150 to 50 daPa

If it is preferred to use user-specific normative areas, the **CUSTOM RANGE** option can be selected to define your own customised box.

6.5.3. Acoustic Reflexes

When **Show Sensitivity** is selected, the threshold line defined in the settings of your admittance meter (between 0.01ml and 0.5ml) will be shown in the reflex graph.

When **Reverse Graph Polarity** is selected, the reflex graphs are plotted downwards.

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[5] J Katz. Handbook of Clincal Audiology – Fifth Edition. Lippincott Williams & Wilkins, 2002
[6] British Society of Audiology. Recommended Procedure Tympanometry. 2013
[7] ASHA, Committee on Audiometric Evaluation. Guidelines for Audiometry Symbols. 1990

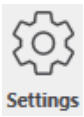
6.6. Troubleshooting admittance

Please note: Refer to the installation & operating instructions provided with your instrument(s) for details of the data transfer operation and errors that may occur. If a fault condition cannot be cleared, the operator is cautioned against repeatedly starting the instrument.

PROBLEM	CAUSE	SOLUTION(S)
Instrument doesn't connect. 	• Device is not switched on • USB connection unstable	• Switch on /Restart device • Check USB connection in both instrument and PC • Ensure cable is in good working order • Reinstall device drivers
No data is transferred to PC.	• Specified location to store data is different than expected • Specified location to store data does not exist • LoadIt.exe is stored in a different location	• Review the storing location in the settings • Store LoadIt.exe in same folder as Amplisuite.exe
Text is outside the boxes on created PDF.	• Windows default PDF creator is uninstalled	• Install Microsoft Print to PDF, you can find on Microsoft website.

7. Settings

7.1. General

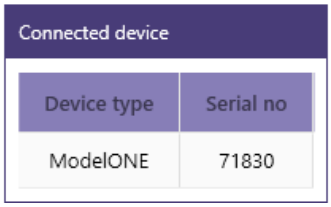


There are a number of configuration settings available in Amplisuite. To access these, Selecting the settings icon at the bottom of Amplisuite left sidebar. A popup will appear to allow you to change different settings.
Following tabs are available at all times: Database, Tone, Speech, Tympanometry General, Help, About.
Following tabs might be available when certain devices are connected: *Connected device, Auto-Test, Calibration.*

Please note: Settings dedicated to specific modules are described in more details within their respective sections.

7.2. Connected device

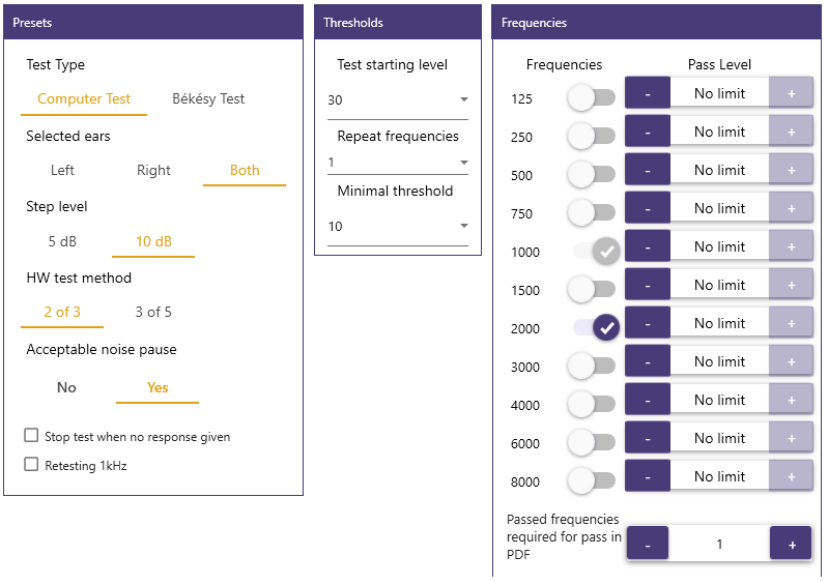
In Connected device section you can find information about currently connected devices.



7.3. Auto-Test (ModelOne only)

Please note: These settings are only visible when a ModelOne device is connected to the system you are configuring.

These configuration options allows you to customize and specify auto-test procedures using ModelOne.



7.4. Presets

Using these settings you can define presets used when conducting an Auto Test using ModelOne. This allows you to define:

- Which ears needs to be tested (Left, Right, Both)
- Should acceptable noise be paused during test (ModelOne automatically monitors room noise and can stop the test if background noise becomes too loud – this setting allows you to pause this and allow the test to continue)
- Should the test be stopped when no response is given
- Should the procedure retest 1kHz

Additionally, Computer Test and Békésy Test have their own specific customizations available:

- Computer Test
  - Step level
  - Test method
- Békésy Test
  - Peaks and valleys deviation
  - Reversals

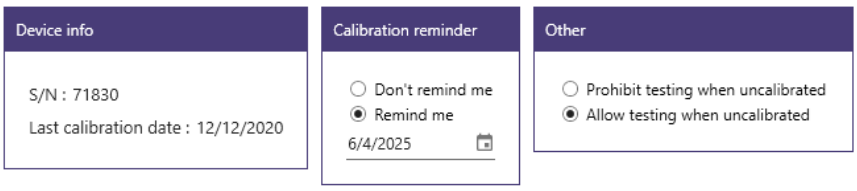
7.5. Thresholds

This group setting allow you to choose (1) test starting level, (2) whether the test should repeat frequencies if abnormalities are identified and (3) minimal thresholds.

7.6. Frequencies

Using this group setting you can select which frequencies will be included in Auto Test procedure as well as define the maximum threshold tested before no response is marked.

7.7. Calibration (ModelOne only)

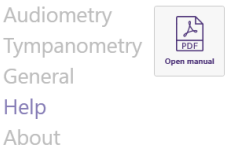


In the **Calibration** section you can find details about calibration of your device as well as configure:

- Calibration reminder
- Allowing/Prohibiting testing with an uncalibrated device

7.8. Help

Under **Help**, the Amplisuite manual is stored. The manual can also be opened from every screen, by pressing F1 key.



7.9. About

In the **About** section, you can find useful information about Amplivox. You can contact us directly via email or access our website.