Measure

User Manual

Auditdata

1 Introduction

1.1 Welcome to the Fitting System

The Measure Fitting System contains all the functions required to perform audiometry, real ear measurements, speech mapping, and testing of hearing instruments when required. The system operates within the NOAH framework and you can use it simultaneously with the proprietary hearing instrument fitting systems of your choice. In addition, the Measure Fitting System includes a stand-alone database operating independent of NOAH.

Measure supports the HIMSA IMC2 protocol. This allows you to do automated Real Ear fittings using MeasureProbe Measurement Module and IMC2 certified Fitting Modules.

You may choose to acquire all parts of the system right from the beginning, or to start with one or more of the individual components and add more as required.

1.1.1 The individual components

The individual components are:

- Otoscopy (A part of Video Otoscope Unit).
- AUD for Audiometry (Forms part of the Fitting Unit).
- REM for Real Ear Measurement (Forms part of the Fitting Unit).
- SM for Speech Mapping (Forms part of the Fitting Unit).
- HIT - Hearing Instrument Test Unit (Forms part of the HIT Unit).

No matter which constellation you have chosen, the system has been constructed to maximise ease of use and safe handling.

The basic hardware units

The basic hardware for the audiometer and the real ear measurement system is the Fitting Unit. The Fitting Unit can be placed on the desktop or mounted to a wall. The transducer plugs and sockets on the Fitting Unit have been colour-coded for easy connection of the transducers. There are no buttons on the unit, so all handling takes place from your computer keyboard.

The HIT Unit is an independent hardware unit and that has been designed to either fit in with the Fitting Unit, or it can be placed in an entirely different location.

1.1.2 The Measure program

The Measure Software program acknowledges that users are different and therefore offers ample assistance to new users, while allowing more proficient users to take full advantage of advanced features, enabling users to set up the system to fit their personal work routines and preferences.

If you are using the software as a NOAH module, always select clients and edit client data from NOAH. The client import/export functions in Measure are only for use, when Measure is operated [as a stand-alone unit](), or if you [export specific NOAH clients]() for fittings outside the office.

Acquaint yourself with Measure

To get quickly up to speed, start with using the basic features, and add the various setting options as you grow accustomed to the system.

The main parts of the screen are the following:

The Navigation pane to the left

Further to providing information, the left-hand pane forms a navigation list, which reflects the main modules of the program, that is, **Otoscopy,Audiometry**, **Real Ear Measurements**, **Speech Mapping**, **Tympanometry Tasks** and **Hearing Instrument Test**, and their sequence of use. The navigation pane can be expanded to show a list with Types of Visits. You can customise this list to suit your own work routines. Read more about this in the section "Ways to increase efficiency".

Workflow control

If enabled in Settings, the top panel shows the Workflow control with a list of available workflow support setups. Workflows can be customised by adding a sequence of steps represented by the necessary measurements, helping you to easily follow the company defined test protocols.
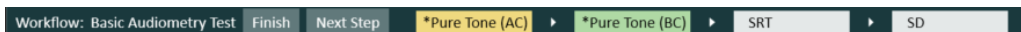
Note: The Types of Visits functionality will be disabled after you activate workflow support. See the detailed description of how to set up the workflow support in the section Configuring Workflow Support.

The display area

The display area in the central part of the screen shows the dashboard with client information or measurement front pages, according to your current selection in the Navigation pane. When a client has been selected, this area offers a quick overview of the currently selected client's treatment history, enabling you to continue where you left in an earlier session.
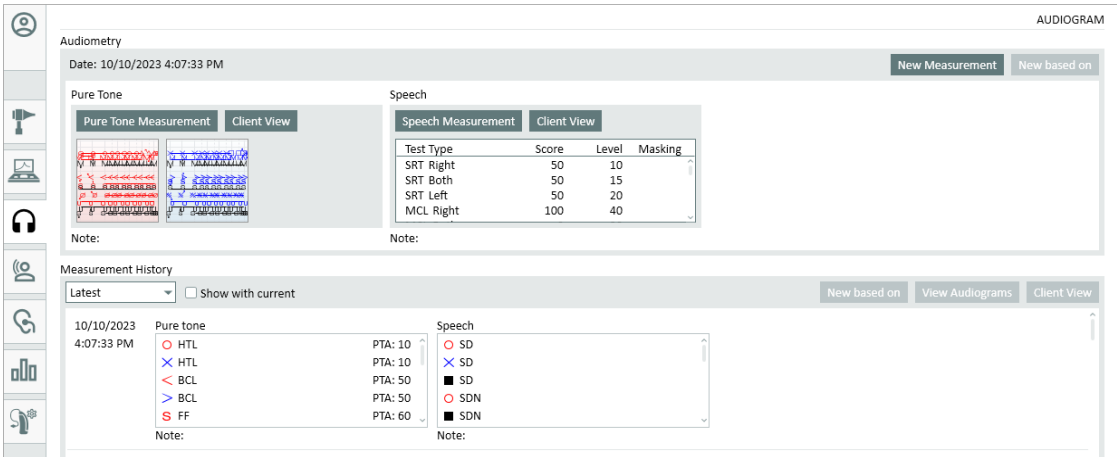
The Audiometry Measurement Front page

The measurement workspace

When you select a function on the task list, such as pure tone audiometry, it will open in a new, enlarged window, which provides you with a well-organised and dedicated workspace for the current measurement. Also, the fact that measurements take place in a separate window ensures that you are reminded to save data, as you need to close the window to proceed to the next task.
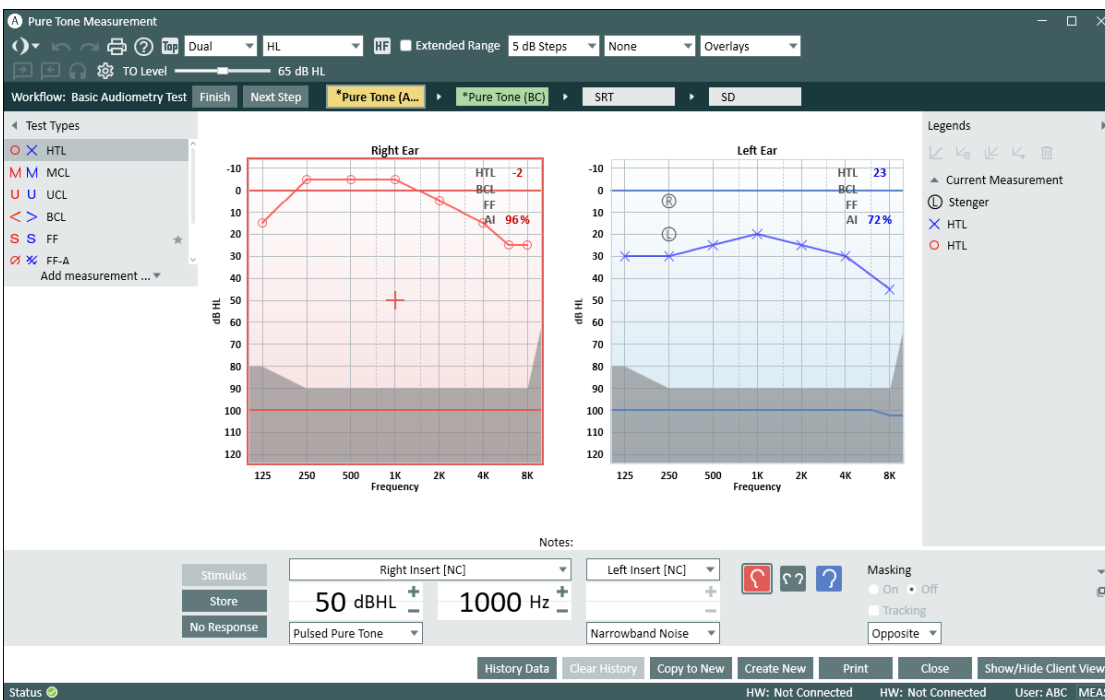
Measurement workspace - Pure Tone Audiometry

Set-up panels along the workspace

Along the top and sides of the workspace you will find expandable menu panels, which contain the set-up options for the workspace (see the above illustration). The current settings will appear directly from the layout of the workspace, such as Single or Dual Audiogram View, or they will be indicated on the surface of the setup panel, even when closed (as seen in the top bar). Another example of this could be the audiogram symbols appearing on the closed panel to the left, indicating the legends for the right and left pure tone audiogram curves. When the panel is open, the full legend with time, input level, signal type, etc. is displayed.

See also the Set-Up and Editing options for the individual measurements:

[Set-Up and Editing for Otoscopy](#)

[Set-Up and Editing for Pure Tone Audiometry](#)

[Set-Up and Editing for Speech Audiometry](#)

[Set-Up and Editing for Real Ear Measurements](#)

[Set-Up and Editing for Speech Mapping](#)

[Set-Up and Editing for Hearing Instruments](#)

1.2 Ways to increase efficiency

Measure has been created with a view to provide an efficient and comfortable workspace for new as well as experienced users. This has been done by selecting useful start options and a flexible set-up system which can be customised.

1.2.1 Starting with Measure

From the start, Measure comes with a selection of default Types of visits set-ups to support and unify the work routines of a large group of users. This is reflected in the sequence of tasks that you find in the Navigation pane in the left-hand side of the program.

This means that while you are getting accustomed to the program, you do not need to make many changes to the set-up. Just select the Types of visits list which complies with the current session (see below). You can then concentrate on carrying out the daily fitting tasks with your client.

The sequence on the list is a suggestion only. You may choose to open the tasks in a different sequence.

1.2.2 Types of Visits selection

In the default set-up, you can choose between a few types of visits. The selection box is found in the Navigation Pane to the left, right under the name of the currently selected client. When you select a different visit, the tasks on the panel below the selection box will change to comply with the new visit.
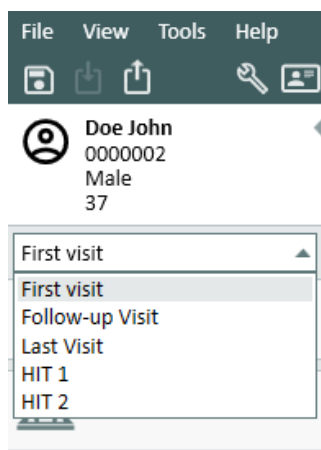
Note: If you change a visit during a session, the Check-list icons (see below) will reset.

1.2.3 Customise Types of Visits

You can create customised Types of Visits lists that support individual measurement sequences, e.g. for different users at the clinic who share a work station, or for different types of clients or visits. You can also copy settings from one Fitting System on to other PCs.

See the detailed procedure in the description of the Settings option on the **Tools** menu.

1.2.4 Customise the individual tasks and test settings

When you open a task, all the measurement settings required for typical tasks and for the individual tests have already been made. This allows you to start measuring as soon as you have selected a test. In order to optimise this, you can customise the settings of both the overall task and of the individual tests within the task.

See the detailed procedure in the description of the Settings option on the **Tools** menu.

1.3 Using Help

1.3.1 Intended audience for the present instructions

As the Measure Fitting System is intended for use by hearing healthcare professionals, this help text assumes that you are acquainted with the related terminology and with normal procedures and safety requirements for handling audiometric equipment with clients. To some extent, examples of procedures and precautions are mentioned throughout the text, but this Help file should not be considered a text book on either audiometry, hearing instrument fitting, or hearing instrument testing.

1.3.2 Help file typing conventions

Refer to the chapter "Help file typing conventions" for a description of the text formatting used. Understanding the text formatting will assist you in locating and interpreting the given information more easily.

1.3.3 How to find help quickly

To access the Measure Help file, click ⊘ on the top toolbar.

In order increase efficiency, when finding information:

Use the Table of Contents

- The Table of Contents appears in the pane to the left of this text. If the pane is not visible, click the **Show** button in the top left corner of the top bar. Use the Table of Contents to locate the subject you are looking for and click the relevant line. This may open a sub-menu. When selecting one of the items on the sub-menu, the topic explaining the subject will open.

Use the Search option

- In the Help menu there are separate **Contents** and **Index** items. When you click either of them, you get to the same window. There you can find the **Search** field.

Use the Index

- Click the **Index** tab in the top left row of tabs. A Keyword entry field and a list of keywords now appear below the button. Type the keyword you are looking for. In the list below, the current closest match will be highlighted, so you may not need to type out the full keyword. When a relevant keyword appears in the list, click it to open the corresponding explanation.

Press F1 in the Measure program - get Context Sensitive Help

- While working in Measure, press **F1** on your keyboard, if you need help for the part of the program that you are currently using.
  This will open the Help system, displaying help information for that part of the program.

Find your way back

- Return to the previous topic by clicking the **Back arrow** in the top left-hand corner of the Help screen.
- Use the **ALT + TAB** keys consecutively to return to Measure without closing help.
- Close this Help system by clicking the **Close** button in the top right-hand corner of the Help window.

1.4 Help file typing conventions

Below you will find a table describing the text formatting that we have used in this help file.

Understanding the text formatting will assist you in locating and interpreting the given information more easily.

Formatting	Type of information
ALL UPPERCASE	Acronyms, for example REM

Formatting	Type of information
	Key names, for example: SHIFT
Bold	Buttons, menu names, windows, or fields that you are instructed to click with the mouse
Italics	New terms, emphasis Placeholders, for example: Type *password*
"Quotation marks"	Chapter titles. References to other places in the help file Quotes Description of graphical icons, for example the "Eye" icon in legends
• Bulleted list	Alternative options, or other unordered list
1. Numbered list	Suggested procedure
Note:	Important instructions to be noted

Note: Please note that information in this help file is subject to change without notice.

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2 Settings and Selections

2.1 The Menu Bar
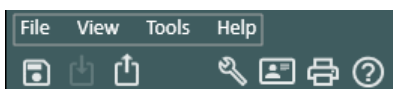
The menu bar provides an ordered overview and easy selection of the most used controls in the Measure Fitting System. Most of the controls can alternatively be activated by means of shortcut icons or tabs throughout the program. See below for a detailed explanation of the individual menus and controls.

2.1.1 The File menu
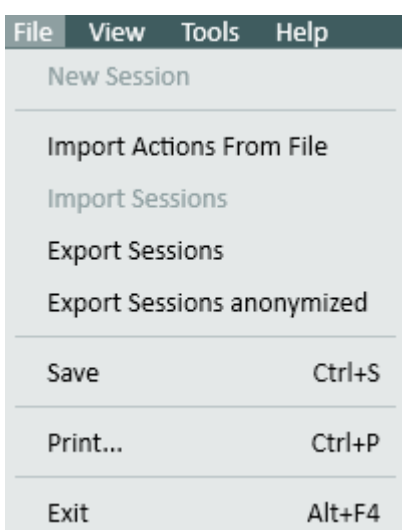
The **File** menu contains actions related to the client file. The availability of the individual options depends on whether you are working under NOAH or using Measure Fitting System as a stand-alone system.

New Session

This option is only available in Measure stand-alone mode. It allows you to close the session with the current client and start a new one. When you click **New Session** with a client selected, and the system contains unsaved data, you will be prompted to save the data (that is, export them to the client's file). If you answer **Yes**, the **Save As** dialogue will open, ready for you to save the file. See more in the section ["Create a new client record"](#).

Note: If you are working under NOAH, choose **Save** (if required) and **Exit** to close Measure Fitting System. Then create a new client in NOAH, and open Measure from NOAH with the new client selected.

Import Actions From File

This option allows you to import actions saved in a separate file into the session series of the currently selected client. For example, this could be relevant if you usually work under NOAH in a network system and have been on a home visit for an audiometry session or hearing

instrument fitting. The procedure for this is described in the section "Working with NOAH data in stand-alone mode" in the topic **Client Information**.

Import Sessions

Like New Session, this option is only available in Measure stand-alone mode. Use **Import Sessions** to open the data of a previously registered client. This is similar to opening a client in NOAH, except that in stand-alone mode all client data are located in files (in XML format) and not in a database. See more in the section "Open previously recorded client data" in the topic **Client Information**.

Note: You should always start a stand-alone session with a previously registered client by importing (opening) the client's data. Otherwise, it will be cumbersome to store the measurement data in the same file afterwards. (See "Import Actions from File" above, if this becomes relevant).

Export Sessions

This option allows you to store client data in an XML file. This is the way to save data, when you are working inMeasurestand-alone mode. It can also be used to save data from NOAH in a local file on your PC, before you are going on a house-call. See more in the section "Working with NOAH data in stand-alone mode" in the topic **Client Information**.

Export Sessions anonymized

Use this option to store only client measurement data - without any personal details.

Save

This option is only available, when working with Measure Fitting system under NOAH. Use the **Save** option on the file menu, or the equivalent **Save** button found in measurement workspaces, to save your work. The data will be saved in the NOAH database. See also "Export Sessions" above.

Print

The **Print** option gives access to printing (and saving) of reports on demographic client data, audiogram data, real ear measurement data or speech mapping data.
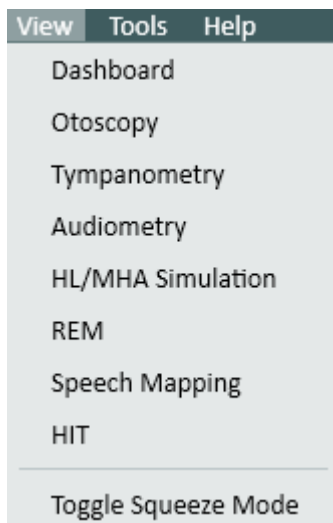
See the topic "Print Options" for further information.

Exit

Use the **Exit** option to leave and close Measure Fitting System. If unsaved data are present in the system, you will be prompted to save before closing.

If you are working under NOAH you will return to NOAH's Session Browser.

2.1.2 The View menu

The **View** menu gives access to all the measurement front pages in the system as well as the Dashboard, which provides a general overview of the sessions for the currently selected client.

The last option on the menu, **Toggle Squeeze Mode**, is an equivalent to clicking the triangle in the top right-hand corner of the Navigation pane: It either unfolds or collapses (squeezes) the Navigation pane. In the unfolded mode, apart from selecting individual tasks on the tabs, you can also select a different Task List with pre-selected tasks for the current session or situation.

2.1.3 The Tools menu
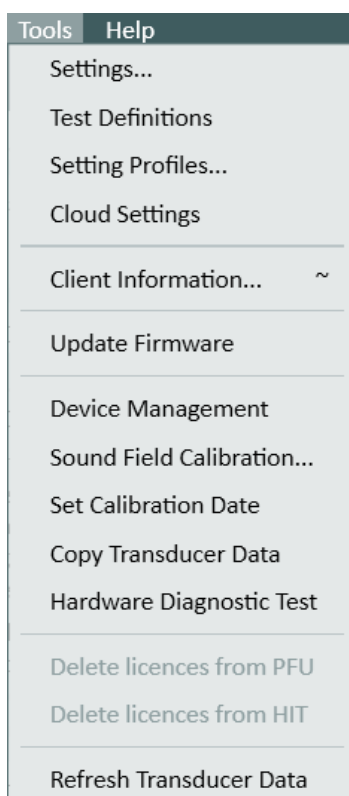
The **Tools** menu allows you to customise a wide range of settings throughout the system and to create specific profiles for the user settings. See the separate sections Settings and Setting Profiles for further information.

In the **Test Definitions** menu, you can create and manage pre-configured measurements based on the tests available in the system. See the Test Definitions section for more details.

Further you can open the **Client Information** window from this menu, for viewing or editing client and hearing instrument data. This is an equivalent to clicking the **Client** icon on the uppermost tab on the Navigation pane.

Finally, this menu gives access to updating the firmware and performing a sound-field calibration as well as setting a calibration date.

Settings

A wide selection of settings is available for you to customise your Measure Fitting System. These settings can be made on three levels: **System, Workstation,** and **User.** For a complete description of these options, see the separate topic 2.2 Settings.

Setting Profiles

You can create individual Setting Profiles for different users, and for each Setting Profile you can define an individual set of User settings. This is particularly useful, if several persons share the same work station and have different preferences. They can then each set up a personal profile. When opening the system, they only need to select their own Setting Profile in order to work with the user settings of their preference. For a complete description of this, see the separate topic Setting Profiles.

Note: If you are working under NOAH, the selected NOAH profile will also become the selected profile in Measure, and it cannot be changed into another Setting Profile.

Test Definitions

Select **Test Definitions** to open the **Test Definitions** window with pre-configured measurements based on the test types for the following modules: **Audiometry**, **Real Ear Measurement**, **Speech Mapping** and **HIT**. For detailed description, see the Test Definitions Overview topic.

In addition, you can create custom workflows to guide you through the necessary measurements in steps. Finally, enable password protection for restricting access to the test definitions set up in the application.

Client Information

Use the **Client Information** selection to open the **Client Information** window from the menu, for viewing or editing client and hearing instrument data. This is an equivalent to clicking the **Client** icon on the uppermost tab on the Navigation pane or the **Client** icon on the Tool bar. If you are working under NOAH, only the lower half of the **Client Information** window (which contains local data) can be edited from within Measure. See a detailed description of the **Client Information** window in the topic "Client Information".

Update Firmware

Measure will automatically detect if a new firmware is available when connected to the fitting system. It is possible to update the firmware separately for the Audiometer and for the HIT box. Use this option to update the firmware of the Measure Fitting System manually.

Note: The power supply must be plugged in to update the firmware. Do not turn off or disconnect the fitting system whilst it is updating.

Device Management

Here you can view **Connected devices** and their **calibration data**.

The Connected devices section displays a list of all connected devices - both activated and not activated - including a serial number and name for each.

Sound Field Calibration

Use this option to calibrate the free field loudspeakers for audiometric use with a Probe Insert microphone, a free field calibration tool, or an SPL-meter. Select this option and follow the instructions on the screen. For more information on **Sound Field calibration** refer to the **Instructions for Use** document.

Set Calibration Date

The availability of the option to set a new calibration date in the [calibration data](#) of a transducer or microphone depends on your type of license agreement. Please refer to the section ["Setting Date of Calibration"](#) for further information.

Copy Transducer Data

This option allows to transfer the data from the old transducer to a new one if there is a need to replace a defect transducer cable.

Hardware Diagnostic Test

This option is shown in the **Tools** menu if the Hardware Diagnostic Test is enabled through **Tools > Settings > General > Common**. When selecting this option from the Tools menu, the Hardware Diagnostic Test dialog opens and you can start the test.

Refresh Transducer Data

You can use this option to refresh transducer calibration data. The old data will be replaced by the relevant one for the transducer you have selected.

2.1.4 The Help menu
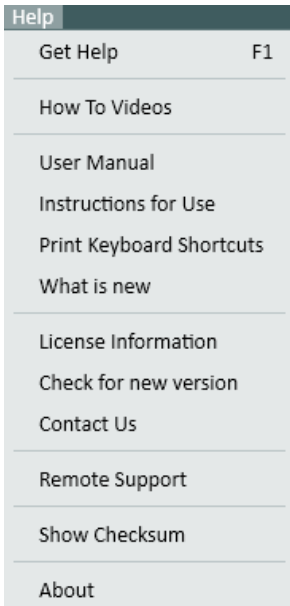
Use the **Help** menu to get access to Help on how to use the Measure system.

The **Help** menu in Measure also contains license information, a shortcut to check for an updated version of Measure, and contact information. The field **About** contains specific information about the current version of Measure.

Get Help

The **Get Help** menu item is a shortcut to Help on the part of the Measure system that you are currently working with. Instead of opening the **Help** menu and selecting **Get Help**, you can press the keyboard button **F1**.

Throughout the menus, keyboard shortcuts are stated next to the menu item, where available.

User Manual

Click **User Manual** to open a printable Measure user manual.

Instructions for Use

Click **Instructions for Use** to open a printable Measure IFU document.

Print Keyboard Shortcuts

Use this option to open a printable document with the list of all keyboard shortcuts in your Measure system.

What is new

Click **What is new** to open a printable document describing new features added to the current version of the product.

License Information

License data

The **License Information** menu item opens a dialogue box showing address information for the current office, the licenses for the Measure system (that can optionally be grouped by *Serial Number* or by *Module*) and their expiry date as well as connected devices and their calibration data.

Contact your local distributor for an extension of your licenses.

Import license

When you have received the new license file, save it on a disk drive and note the location. Then open the menu item **License Information** in Measure and click the **Import** button. Use the browse function to navigate to the location of the license file and select it. If you receive a printed license code, click the **Enter Code** button instead of **Import** and enter the license key, then click **OK.**

Note: If a license has expired, the corresponding system parts will be unavailable or have limited functionality, until a new license has been obtained.

Distributor License

As a distributor you can use your distributor's license to temporary enable the following functionalities (password protected):

- Local Calibration.
- Changing Calibration Date.
- Using transducers without activation (this is not for users. Users can use only activated transducers).

After starting Measure with user license, you can load a distributor's license using standard license import functionality of the **License Information** window. The distributor's license is not stored on the user's side, so all functionalities specific for distributors become automatically unavailable by restarting Measure.

Calibration Data

In the lower half of the dialogue box a similar list provides an overview of the calibration data for the system.

Note: It is recommended to observe the dates for the next calibration to ensure safe and reliable operation of the system. Transducers with an outdated calibration cause a warning message to be shown in the application status bar.

Check for new version

Click **Check for new version** to see whether or not a new version of Measure is available from the Internet. **Note:** The link to download a new version will only appear for mandatory updates.

For non-mandatory updates, please visit the Auditdata website.

Contact Us

This function requires that the work station is connected to the Internet, as it will open the Auditdata A/S homepage, which has a selection for Contact. This selection gives you the option to write an e-mail message to Auditdata A/S, or to look up detailed contact information by scrolling further down on the page.

Remote Support

Click **Remote Support** to download and install TeamViewer. You can use it to receive support help from Auditdata.

Show Checksum

Click **Show Checksum** to detect possible errors in the data transmission.

About

The **About** box provides detailed information about the hardware connected and the version of the program currently installed. It also states the copyright information for the system.

2.2 Settings

Use the **Settings** option on the **Tools** menu to open the **Settings** window.

This window containing a wide selection of Settings options, which enable you to customise the settings, **Types of Visits** and workflows according to personal preferences and/or different types of clients.

2.2.1 Setting Levels

Settings can be defined on three different levels:

System Settings	General settings for the entire clinic or department.
Workstation Settings	Specific settings for the individual workstation.
User Settings	Settings according to individual user preferences. User settings will be stored in the currently selected User Setting Profile.

The setting level of each option is stated in the top right-hand corner of the option.

Using Setting Levels

System Settings

System Settings are settings that should usually be the same for all workstations and users in a clinic or department. For example, this could be lay-out of reports or default measurement set-ups.

A good way to ensure this would be to determine the System settings on one workstation and then copy these settings to all the other workstations. See export and import of Settings in the Setting Profiles description.

Workstation Settings

Workstation Settings are settings customised to the individual workstation. For example, if you have a workstation which is shared by several users, you can set it up to open the "select user profile" dialogue box, every time Measure is opened (in stand-alone mode, as the selected user in NOAH will automatically also become the selected user in Measure).

User Settings

User Settings are settings that may vary according to individual user preferences such as the sensitivity setting of the operator microphone (according to the user's normal speech level) or individual display setting preferences.

2.2.2 Settings Options

General

The section **General** contains selections valid for the entire system or large parts of the system.

Network

The system administrator can set each workstation up to use system settings from a location on the network, instead of using the internal settings on the local machine.

The settings options are:

- The **Update settings from network** check box: If this check box is selected, the following selections can be made. If the check mark is cleared, local settings will be used.
- In **Network settings path** you can enter a network path or click **Browse** to locate the Settings files on the network. You can also specify a URL as a direct link to the settings file if the settings are shared over the Internet. The **Clear** button can be used to clear the network path from the box.
- In **Settings to update** you can use check marks to select that System settings, Workstation settings, User settings and the License file should be read from a network location, when Measure is started.
- If the check box **License file** is checked within "Settings to update", you should place the license file in the same folder on shared network location, where you have placed the file with settings. The license file must be with the **.license** extension. Whenever the license file is updated, it will be applied to every workstation in the department.
- If a file on the specified network path is not available (for example, no file with the specified name or no network connection) a warning to the user is shown in the status bar, and the local settings and license file (if available) on the workstation will be used instead.

The **Disable update settings and test definitions from the Cloud** option allows you to stop synchronizing your Measure settings, test definitions and workflows with the cloud. This setting is password protected.

As mentioned in the **Settings** window, the changes made to the network settings will take effect at next start of Measure.

Common

The **Common** settings comprise the option to auto-select the last used profile or be prompted for choice of user profile at each start-up (see also Workstation Settings above), and to allow the system to check for new versions of Measure at each start-up.

Click the **Set the password to access the settings** option to password protect the settings so that another user is not able to access the settings and make system changes. When exporting the settings, the password will be also included in the xml file (in the encrypted view).

If you check the **Enable transparent Noah module,** standalone Measure will start Noah automatically if Noah is installed on your computer.

Check **Enable devices' calibration countdown warnings** to activate countdown warnings for device calibrations. You can set the notification period up to 365 days before the calibration due date.

Data collection

You can choose to send anonymized statistics used to analyze and continuously improve customer experience. This option can be turned off at any time.

If the work station is connected to the Internet, enable the **Automatically check for a new version** option to allow the system check for the latest software from the Auditdata website (only applicable to mandatory updates). If a newer version is found, follow the instructions on the screen to download a new version. There will also be a warning message in the Status toolbar when a new software version is available.

In many dialogue boxes throughout the system you have the option to check mark the choice: "Do not show this dialogue again". Use the **Reset Warnings** button, if you want Measure to show all the hidden warnings again.

In the **Hardware Diagnostic Test** settings, activate the test which is intended for hardware malfunctions. Once enabled, the test will appear under the **Tools** menu.

From **Common** settings you can also import, export or set to default Curves styles defined for measurements.

The **Reset all settings** option resets your current settings to the default settings specific for the language/country selected in the **Language** settings.

Database

In the **Database** section, specify the local path to your stand-alone database.

Language

Select your preferred language for the program user-interface and on-line Help. You will need to restart Measure for this setting to take effect.

Client Information

In the **Client Information** section you can define what client information to show on the uppermost tab in the Navigation pane.

From the **Title bar information** section you can set to see the client's name, client number, NHS number and birthday in the top title bar on all windows of Measure.

In the **Additional Client Fields** section, you can customise the four text fields to show the appropriate client information on the main window.

Also, you can customise the label of four of the text fields in the Additional Client Information part of the **Client Information** window.

Workflow and Types of Visits set-up

This is one of the central set-up option in Measure.

Enable the workflow support utility by selecting the corresponding check box. Now you can create custom workflows with the system defined tests which are to be completed one by one. The workflows can be started from the top panel of the main screen. Activating workflow support disables all the **Types of Visits** functionality.

As an alternative, you can define the individual **Types of Visits** which can be selected from the Navigation Pane.

When you open the Workflow selection, the current **Types of Visits** are shown. With the buttons to the right, you have the option to:

- Add a new type of visit (see below).
- Delete the selected type of visit.
- Edit the selected type of visit (see below).
- Set the selected type of visit as the default type to be shown at start-up.
- Move the selected type of visit up in the list.
- Move the selected type of visit down in the list.

If you select **Add**... or **Edit**... a new dialogue box will open, allowing you to customise a new or selected type of visit. The same dialogue will open, irrespective of whether you want to add a new list or edit a current list, but it will be empty in case of a new list.

For each Group you have a list of Available tasks. You can move these tasks to the Selected tasks list and vice versa by means of the **Arrow** buttons placed between the lists.

You can select a task in the Selected tasks list and move it up or down by means of the buttons to the right of the list.

Click **OK**, when you have set up all the required Groups in the same way.

Note: If no tasks are selected for a specific Group within a Type of Visit, the corresponding tab on the Navigation pane will be left empty, when you select that Type of Visit.

To show only test types that you selected for the REM and Speech Mapping modules in the workflow, enable the option **Show only the REM/SM test types that are included in the current workflow.**

In the **Enable modules** section you can configure which modules to display in the Measure Navigation pane. The modules that you have not selected, will be removed from the Navigation pane and also from the Fast Switch control in every module.

Measurement

In the **Calibration Duration** setting, you can configure how long a transducer calibration is valid after activation.

You can specify whether the **Control Panel** in measurement modules should be placed at the bottom or at the top of the measurement workspace.

Link with on-top panel allows you to link the detached **Control Panel** with the measurement window in the on-top diagram mode for all modules.

Reporting

In **Reporting**, you can customise the layout of your reports.

The settings allow you to insert your company logo and define a different set of headers (top of the page) for the first page and for the remaining pages in the report. Also, you can select whether to print a screenshot from the current measurement or a full report.

CD and Media Files Folders

Use **CD and Media Files Folders** settings to add folders with external sound files to be used in **Speech Mapping** and **Speech Audiometry** modules. This will allow you to use external sound files that are not provided by the system. Special calibration is needed for these sound files.

Further, you can set the calibration value for the CD you are using.

Please refer to the **Instructions for Use** document to get more information on calibration of the CD material.

Key Mapping Manager

With the help of **Key Mapping Manager** you can customise the keyboard shortcuts in Measure to configure the system to your needs. Select a module tab and use the keyboard to set up the relevant commands.

Loudspeaker Selection

In the **Loudspeaker selection** section, you can define speakers to be used for each of your modules. In the **Puretone**, **Speech**, **REM**, **Percentile**, and **SM** set up, you can choose your

preferred input. For each input type, define whether to use left, right, left and right, or middle speaker. For **Percentile**, the loudspeaker option is already predefined by the selection made in the **SM** set up and cannot be changed except for the particular side to be used. You can choose either left, right, or middle speaker. If you select **SPDIF**, middle speaker cannot be used with it.

The selected loudspeaker should have a valid calibration in order to produce correct levels during measurements. If no calibration is found, a warning will appear in the status bar. It is not possible to start measurements if an uncalibrated loudspeaker is selected.

The **Play Windows sounds through speakers** option allows you to play Windows sounds through the Measure speakers. By default, this option is disabled.

To compensate the individual room acoustics during REM and SM measurements, select the **Room Equalization in REM** checkbox. This will adjust the measurement signal and allow you to avoid measurement errors. Stored equalization method is used in the fitting system.

SPDIF output

Besides the amplified speaker outputs and the line-outputs, the Fitting Unit allows two-channel optical connection to an external amplifier. The so called SPDIF output can be selected in the speaker selection. You need to use an optical TOSLink connector cable to connect the SPDIF output to a commonly available external amplifier with TOSLink optical input.

In the **Loudspeaker selection** section, SPDIF can be selected for the **Pure tone**, **Speech**, **REM**, and **SM** modules. You cannot use middle speaker if SPDIF is specified. It is also possible to perform sound field calibration of SPDIF for the right and left speaker by going to **Tools** > **Sound Field Calibration**.

GDT

To access GDT settings, navigate to **Tools menu > Settings > GDT**.

It is possible to enable the generation of a print report in GDT mode by selecting the corresponding option. Any report available in the Audiometry module can be generated.

Ambient Noise Monitoring

ANM Setup

In this tab, you can configure general ANM settings.

Enable Ambient Noise Monitor to measure ambient noise turns continuous ambient noise monitoring on or off.

Enable ANM indication in the module displays the ambient noise status icon on the module screen between graphs. The ANM icon turns green for acceptable levels and orange for excessive levels in real time.

Show ANM dialog automatically on the module start displays the ANM dialog in on-top mode when the Audiometry module starts.

In **Microphone**, choose which microphone to use for ambient noise measuring.

ANM Default values

You can select one of three standard values (ISO, ANSI, OSHA) to be used as allowed levels per frequency. These values are available as defaults.

- **Add:** Create a custom values set.
- **Delete:** Delete a custom values set.
- **Set As Default:** Make the selected set the default.

Details

Default values for transducers and headphones are displayed here. These values are editable only in the custom set.

NOTE: If you change the default maximum permitted ambient noise, restart the software for the new settings to take effect.

When the user has changed the default maximum permitted ambient noise levels in settings, the user will need to restart the application for the settings to apply.

Audiometry

In the **Audiometry** section you can make general settings for audiometric functions.

Default Views

Use the **Default Views** settings to define whether the dispenser and client should see diagrams in dB HL or dB SPL scale in Pure Tone, and whether the default view in Speech Audiometry should be shown graphically or numerically.

Controls

In **Audiometry - Control Settings** you can select the following settings:

- **BSA (British Society of Audiology) mode:** Select whether the BSA mode should be disabled, enabled and use standard symbols, or enabled and use BSA symbols. When using BSA symbols, you can store both masked and unmasked symbols in the same session.
- **Keep Extended Range Enabled:** If the **Extended Range** check box has been selected in the Audiometry display, the Extended Range mode will be on, until another frequency is selected.
- **Pure Tone Stimulus Presenting:** Either set the presentation of pure tone stimuli to **Manual Mode**, that is, presenting a stimulus for as long as the key is pressed, or **Duration Mode**, that is, presenting a stimulus for a specified period, for example 1.5 second, each time a stimulus is started.
- **Auto Present:** Specify the period after which the stimuli will be automatically presented if you press and hold the key.

- **Inversion of Control:** Use this option to see the pure tone audiogram upside down in the same way as in SPL views, with the lowest value at the bottom, and to invert the function of the UP and DOWN ARROW keys for selection of tone and masking levels.
- **Auto-store threshold values:** Automatically store threshold values of each frequency.
- **Switch to next frequency after store:** The system will automatically switch to the next frequency defined in the Test Frequencies list after a measurement is stored.
- **Silent mode:** Present the stimulus when the mouse is over the **Stimulus** button, without clicking.
- **Allow frequency change during stimulus:** Allows you to change the frequency in Manual mode without interrupting the stimulus signal. The signal is interrupted, when you change the level while the Allow level change during stimulus checkbox is deselected.
- **Allow level change during stimulus:** Allows you to change the volume level in Manual mode without interrupting the stimulus signal. The signal is interrupted, when you change the frequency while the **Allow frequency change during stimulus** checkbox is deselected.
- **Show Masking Level:** The masking level will be shown in the audiogram for the side where masking is introduced. The symbol is a red or a blue square respectively.
- **Stop signal when switching to another application:** Stops the stimulus signal during audiometry when you switch to a different application.When you return to the application, the signal will resume.
- **Switch off masking when changing frequency in pure tone:** Stops the masking signal when changing frequency during audiometry.

Measurement Standard

Use the drop down box to select which standard to use for Speech audiometry.

PTA/CPT

In **PTA/CPT** you can select frequencies to calculate the pure tone average.

PTA: Pure tone average is the arithmetical average out of the hearing thresholds measured at the frequencies specified in this dialogue. (E.g. 500, 1000, 2000 Hz).

CPT-AMA: Council on Physical Therapy - American Medical Association has provided a table to calculate weighted percentage of hearing loss based on threshold measurements out of four frequencies (500, 1000, 2000, 4000 Hz). [JAMA 119: 1108-1109, 1942]

If relevant, you can use the South Korea specific formula to calculate PTA.

Select the **Enable CPT** checkbox to display the CPT along with the PTA.

Severity

You can set custom upper limits for various degrees of hearing loss. Tailor these settings by editing, deleting existing layers, or adding new ones.

To add a new layer, click **Add** to the right of an existing layer. A blank field will appear below it for customization.

Talk Over

For **Talk-Over**, only Left Operator Microphone is available.

In the **Default Talk Over Level**, preset a default level for talk over. After finishing the testing and closing the session, the TO level will be reset to the default value specified in this field.

Enable the **Start Talk Back with Talk Over** option if you want talk back to start automatically when you start talk over.

Enabling **Talk Back is on when application is started**, launches Talk Back automatically when you run Measure.

Select **Press and hold for Talk Over** to start Talk Over when pressing and holding either the **Talk Over** button or the corresponding short cut.

Monitoring

The Monitoring settings allow users to disable Masking in the Monitoring headset.

Speech Measurement

In **Speech Measurement** settings, you can:

- Enable displaying a 500 Hz frequency mark on the tone audiogram opened with the **Show Tone Audiogram** button.
- Enable using percentage decimals for speech score results.

If you select the **Equivalent Free Field** option, the **Speech Audiogram Mode** will be automatically changed to 'dB SPL' and cannot be changed. When 'dB HL' is selected in the Speech Audiogram Mode - the difference between SPL and HL measurement levels will be 20 dB for IEC, Norway, Sweden and 12,5dB for ANSI. In case the language is set to Japanese, the HL-SPL correction value is set to 14dB.

For scoring of word phonemes for CDs with word list schemes, you can choose:

- **Number of Correct** – score the word by selecting the correct number of phonemes using the number boxes below each phoneme.
- **Each Phoneme** – score individual phonemes in the word by selecting the tick boxes below each phoneme.

You can also set the CD player to ignore the calibration track and just show the audiometry tracks on your CD.

Only Left Operator Microphone can be used during speech testing.

Normative Curves

In **Normative Curves** settings you can create your own normative curves or change the existing ones to fit in with speech CDs used for speech measurements. So you can use normative curves that are not delivered with the system as defaults.

Click the **Add** button to create a new normative curve. The new curve is created based on the current active curve. Then you can add or change values of the normative curve manually:

curve name, curve units (either dB HL, or dB SPL), points, Hearing Loss and Discrimination Loss. The added curve can be set as a default. The active curve is shown in the speech audiogram. You can also delete curves from the Speech Test normative Curves list.

Client Response

Specify the color for the client response indication.

REM

In the REM section you can make general settings for Real Ear Measurement functions.

Display Settings

In **Display Settings**, use the **Fall Rate Max** option to set the delay and step size at which the maximum value of the FFT curve should fall during measurements. The effect is only visible, if FFT is selected as one of the active Overlay types.

In the **VU Meter** option, set the location of the level marker on the VU meters that are shown above the measurement diagrams.

In **Curve Smoothing**, you can enable 3 pins per octave smoothing to have a smoothed curve without sharp angles and, for 24 pins per octave view, choose a number of points to be used for smoothing REM and Speech Mapping measurement curves.

Choose **Show REUR with REOR** to have the REUR/REUG curve always visible when REOR/REOG test type is selected. It will be possible to hide this curve by clicking the eye icon in the Legends panel.

In the **Live REAR/REIG curve in REM** drop-down list, choose the type of curve to be used in Real Ear Measurements.

Select the **Automatically show REAR/REIG curve for a new measurement** option if you want to show REAG curve along with REIG curves in Real Ear Measurements. If this option is off, the REAG curve automatically will be hidden in Gain view and only REIG curves will be shown.

Select **Peak Curve Averaging** to minimize random signal fluctuations.

Clear **Enable single measurement result per test type in SM** to turn off multiple curves in SM.

Clear **Enable fitting on 24 pins per octave** to hide targets and base audiogram on all views for all test types in REM and SM.

Under **Room Equalization**, select if you want to perform equalization only once per session for the REM and SM measurements.

Target Settings

Select the check box, if you want Measure to automatically calculate the target curve (as selected in Presets - Target Rule).

In the **Input Level** section, choose one target curve or three target curves to be calculated on the measurement diagram. If you choose to use three target curves, additional controls

become available below the section for entering a low, a medium and a high gain value. Select **Show only one target curve during measurement** to have only one curve visible.

In the **Curve Style** section, you can customize color and style of the target curve.

HIT

In the HIT section you can make general settings for Hearing Instrument Test Unit functions.

Measurement Settings

In **Measurement Standard**, you have the option to select either the ANSI S3 22 or the IEC 60118-7(2005) standard.

In **HIT Graph Layout Aspect Ratio**, choose horizontal or vertical layout. The selected layout will consistently appear in generated reports.

Presets

In the **Presets** section you can make changes to the preset default settings for the REUR and RECD measurements, for the target fitting rules in the REM module, as well as for the **Hearing Loss/Master Hearing Aid** simulation functionality.

Standard REUR Presets

For the REUR measurement you have the option to modify the preset REUG values of standard REUR curves or create new ones. These curves are available for selection in the REM measurement workspace, if a measured REUR cannot be made available.

Average RECD

For the Real Ear to Coupler Difference (RECD) method of Real Ear Measurements, measurement difference values can be set up for available presets, or new measurement presets created.

Target Rule

For the target fitting rules you can specify the default target rule to be preset, and for the individual rule selected, you can then specify the default settings for each prescription.

For a DSL-based target rule, a dialogue box with advanced settings can be opened with the **Advanced** button. For an explanation of DSL parameters, please refer to the DSL®m[i/o] Application Programming Interface Technical Support Documentation on the [DSL m[i/o]](#) website.

Select the **Default for automatic target calculation** check box at the bottom of the dialogue box, if you want these settings to be used as default for automatic calculation of the target curve.

HL/MHA Simualtion

The **Hearing Loss/Master Hearing Aid(HL/MHA)** simulation module is designed to provide counselling for both hearing impaired people and their relatives.

Otoscopy

In the **Camera Settings** you can specify the default camera for Video Otoscopy in Measure.

2.3 User Setting Profiles

To open the dialogue box for User Setting Profiles in order to set up individual user profiles, select **Setting Profiles** from the **Tools** menu.

In this dialogue box you also have the option to import or export settings for the System, Work Station or User individually or as a set.

2.3.1 Profiles management

In the Profiles management part of the dialogue box you have the option to create a new user profile or to copy or delete an existing profile.

Create New Profile...

The **Create New Profile** option allows you to create a new user profile from scratch or as a copy of one of the current profiles.

Copy Profile...

The **Copy profile** option works in almost the same way: click **Copy profile**, select a name for the new profile and select the current profile to copy.

Delete Profile

To delete a profile, select the profile from the **Present Profiles** list and click the **Delete profile** button. You will be prompted to confirm that you want to delete the profile.

2.3.2 Settings management

Import Settings...

The **Import Settings** option allows you to inherit the settings from another Measure Fitting System. In order to use this option, you must first export the settings from the other Measure system (see below) and move them to your file system, for example on a USB memory stick.

You may choose to import System Settings, Workstation Settings, and User Settings all together or individually.

To import the settings, click **Import Settings** and browse to the location of the setting file to be imported. Select the desired options in "Sections to import" and click **OK** to import the settings.

Note: Choose the same option in "Sections to import" as in the choices made when exporting the settings.

Export Settings...

The **Export Settings** option allows you to export the current settings of your Measure Fitting System to be used in another Measure Fitting System, e.g. by saving them to a USB memory stick or a network drive.

To do so, select **Export Settings** and browse to the desired destination for the export file. Select the desired options in "Sections to export". Then click **OK** to export the settings.

2.4 The Toolbar

The **toolbar** is found immediately below the menu bar. It contains shortcut icons to different points in the Measure program.

The Toolbar - shown for Measure in Stand-Alone mode (**Save all** is disabled)

The toolbar has been divided into sections of which the first section contains icons for opening and storing client files. The following section contains shortcuts to the Settings menu, Client Information window, Print (Reports), and Help respectively.

Save All	This icon is an equivalent to the **File** menu item Save. It is only available, when working under NOAH. In stand-alone mode, use **Export Sessions** instead (see below).
Import	This icon is an equivalent to the **File** menu item Import Sessions. It is only available, when working in stand-alone mode. Under NOAH, use the Open Session item on NOAH's File menu instead (see below).
Export	This icon is an equivalent to the **File** menu item Export Sessions.
Show Settings	This icon is an equivalent to the **Tools** menu item Settings....
Client Information	This icon is an equivalent to the **Tools** menu item Client Information.
Print (Reports)	This icon is an equivalent to the **File** menu item Print.
Help	This icon is an equivalent to the **Help** menu item Contents.
Talk Over	Enables you to talk to the client through your microphone. For more information, refer to the TO/TB Control section.
Talk Back	Enables your client to talk to you through the client microphone. For more information, refer to the TO/TB Control section.
Talk Over/Talk	The panel for adjusting TO, TB, and Monitoring levels in a quick way.

Back Settings	For more information, refer to the [TO/TB Control](#) section.

See the list of the default [Keyboard Shortcuts](#), if you prefer to use the keyboard instead of the mouse for frequently used actions.

2.5 Navigation Pane

The Navigation pane with Types of Visits lists is located on the left-hand side of the Measure program window.

In the default set-up the tabs on the Navigation pane reflect the test measurements sequence in a typical series of sessions. You have a wide variety of set-up options to select from in the [Settings menu](#), enabling you to customise the current type of visit to your preferences, or to set up new, selectable visit type to support specific types of client session.

2.5.1 Open the Navigation Pane

You can collapse all panes in the Measure Fitting System to save space. If the Navigation pane is collapsed, that is, only shows icons, click the small triangle at the top of the panel, if you want to expand it. You will now also see the individual tasks that are available for selection on the tabs, in accordance with the currently selected visit type (see Task List Selection Box below).

2.5.2 Client tab

The first tab from the top is the Client tab. When a client has been selected, this tab displays the name and selected key data of the client.

The client tab does not form part of the editable task lists. When the client tab is selected, you see the Dashboard with the client's session list and history in the Display area to the right of the Navigation pane.

- If you want to see detailed client data, click the **client** icon on the client tab. This will open the detailed [Client Information](#) window.

2.5.3 Types of Visits Selection Box

The Types of Visits selection box is found below the Client tab. Use this selection box to select the visit type that you want to use for the current session. As mentioned above, you can create and select different customised Types of Visits to meet personal preferences and/or specific types of client sessions. Read more about customising in the description of the [Setting options](#).

Note: If you change the visit type during a session, the Check-list icons (see [below](#)) will reset.

2.5.4 Measurement tabs

The measurement tabs have a large measurement icon in the left side.

- If you want to open the front page of the measurement in question, click the **measurement** icon.
  The front page gives access to further options, including the possibility to start a new

measurement or to base it on a previous measurement. Also, you may choose to go directly to Client View from this page. To see more about the individual front pages, follow the link:

[Measurement front pages](#)

- If you want to open a specific task and go directly to the measurement workspace for that task, click the name of the task on the measurement tab. This will for a short moment open the relevant front page, giving you time to recap earlier measurements and notes, but after a few seconds the workspace will open automatically, ready for you to select a test. If data from an earlier measurement are displayed, you can click the **Copy to new** button, if you want to continue on the basis of this measurement. Or click **Create New** to start a completely new measurement.

2.5.5 Using the Types of Visits

The sequence on the selected Types of Visits list is a suggestion only. You may choose to open the tasks in a different sequence, if that makes sense in the current situation.

Check-list icons

During a session Measure will assist you in keeping track of, which tasks you have carried out with the current client.

If more than three tasks are listed on a Types of Visits tab, the visited ones will move out of sight, and the next task will be seen as the uppermost task on the list. In this way, all tasks you may want to use on the current tab will become visible in the list as you go along. In order to unfold the full list, click the **triangle** inside the tab. To close it again, click the **triangle** once more.

If you open and close a measurement task without saving data, a warning icon will show up at the left-hand end of the program [Status bar](#). Saving as you go along is particularly relevant if you are using Measure as a NOAH module. When using Measure as a stand-alone unit, all data should be exported to the client's file in one step at the end of the session.

Note:

- The Check-list is only valid for the ongoing session, that is, all the check marks will be reset, when you close the session, or if you select a different Types of Visits list during the session.

- For more information on check-list icons, refer to [Section 1.2.5](#).

2.6 Workflow Control

Workflow control is found on the top panel of the application's main page. It is only displayed if enabled under **Tools** > **Settings** > **General** > **Workflow**. Activated workflow support is an alternative to the Types of Visits, hence the latter functionality will be disabled in the system UI.

A Measure workflow is a set of measurement steps represented by the tests with pre-configured stimulus, level, frequencies... The application has built-in workflows which you can use without making any changes, or you can create your custom workflows to meet the needs

for a defined test protocol or a measurement session. Detailed information on workflow setup is described in the Workflow section.

2.6.1 Starting Workflow

Use the drop-down box to select an active workflow, since only one workflow can be active at a time. You can then see all the steps associated with it. Click **Start** to get directed to the module for the measurement. Measure colours the workflow steps according to their state so that you can easily track your workflow progress. Steps with an asterisk denote a mandatory step.

- Yellow - Incomplete
- Green - Done
- Red - Skipped mandatory step
- Dark Grey - Active Step
- Blue - Not Done

If you are done with the measurement, click **Next Step** to proceed with the next one.

2.6.2 Finishing Workflow

If the workflow is not finished, you can change any measurement within it. Once you click **Finish**, no further actions are possible.

2.7 Measurement Front Pages

When you click an icon in the Navigation pane (as opposed to clicking one of the task names on the expanded Navigation Pane), the corresponding Measurement Front page will open in the Display area to the right of the Navigation pane.

2.7.1 General contents

All measurement front pages in the Measure Fitting System use the same basic layout:
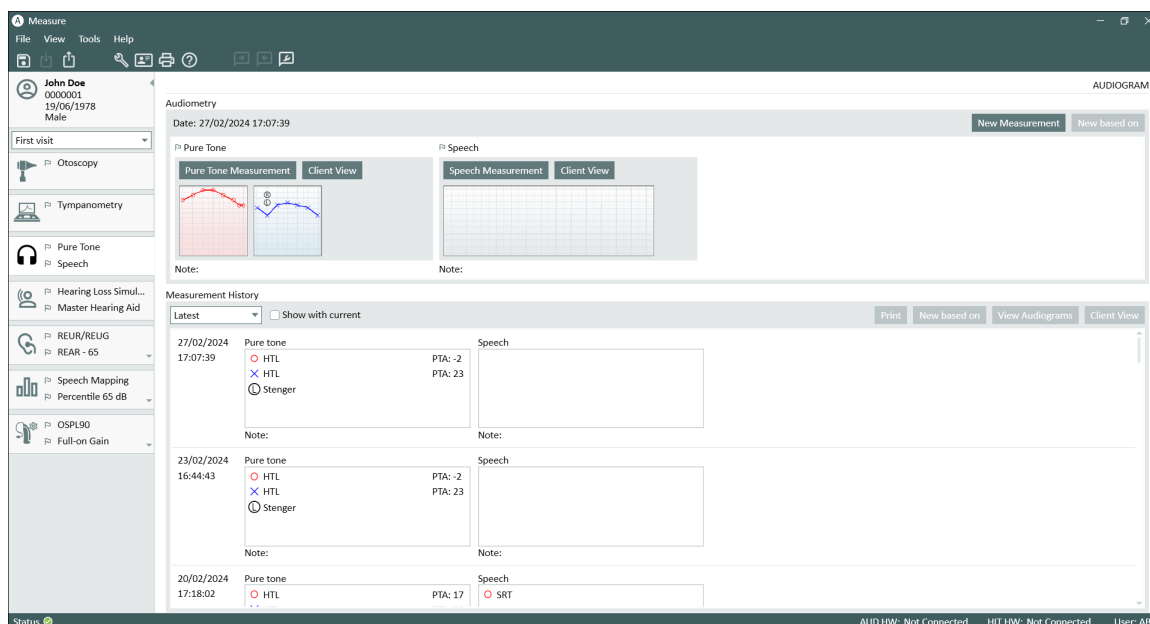
At the top the name of the front page is stated, and in the upper half of the page, the Measurement display pane, you see thumbnails of the measurement charts available, with buttons for selection. If previous measurements exist, the latest one will be shown here.

In the lower half, labelled **Measurement History** you see a list of historic measurements. If several measurements are available, you can scroll down the list by means of the scroll bar in the right-hand side of the Measurement History list.

2.7.2 The Measurement display pane (Here showing Audiometry)

Immediately above the measurement thumbnails you find a button for selecting the displayed measurement.

The measurement thumbnails work on a "**WYSIWYG**" (What You See Is What You Get) basis, which means that they indicate what you will get, when you click the button and proceed to the measurement workspace:

- If earlier measurements are displayed in the thumbnails, you will be allowed to view, but not modify, the displayed measurements.

- If blank thumbnails are displayed, there are no previous measurements of the selected type for the current client. In that case, the workspace will open, ready for measurement, when selected.

In the top bar of the Measurement display pane, you see two buttons: **New Measurement** and **New based on**.

New Measurement

If previous measurements are available, you can use the **New Measurement** button to blank the measurement display. When you select the measurement, the workspace will be ready for starting new measurements in empty diagrams, but still for the selected client.

Below the thumbnails you see a **Note** field. If a note has been entered from the workspace during an earlier measurement, it will be shown here. This **Note** field will also be blank when you select **New Measurement**.

New based on

If you want to work with the earlier measured data instead, click **New based on**. The system will make a copy of the old data, and when you proceed to the measurement workspace, you can continue working with the copy of the old data. This button is equivalent to the **Copy to New** button, which will be available in the workspace, when you open historic measurement data.

2.7.3 The Measurement History pane

The Measurement History pane contains basic data of earlier recorded measurement data for the current client.

- If you want to see the measurement of a set of data, leave the mouse over the set of data for a short moment and a measurement screen with the results should appear.

  A number of fields and buttons are available for handling of history data.

- Use the selection box **Latest/Oldest** to sort the historic data with the Latest data first - or with the Oldest data first on the list.

- Check-mark the field **Show with current**, if you want to display the historic data as "shadow curves" side-by-side with the current data.

- The button **New based on** allows you to continue measurements based on the historic data.

- The button **View** [selected measurement type] (in this case View Audiograms) opens the historic data in the Measurement workspace for viewing only. **Note:** Instead of using the **View** button, you can select a desired Audiogram and simply double-click with a mouse to open it in the Measurement window.
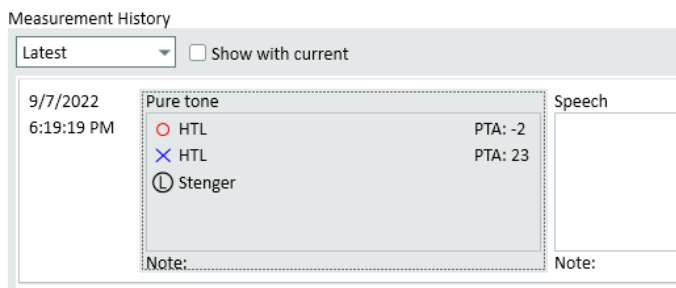
- Use the last button, **Client View**, to display the selected measurement data to the client on the client monitor (if an extra monitor is available for this purpose).

The Dashboard front page has its own layout and is described in the individual chapter.

2.8 Measurement Workspace

2.8.1 Workspaces in Measure

All measurements in Measure occur in separate windows. To support a consistent workflow, they can only be opened one at a time. You can minimize the workspace window, if for some reason you want to view the Measure main window, but you cannot make other selections in the main window until you have closed the current measurement window.

Note: You can resize any measurement window to your preference and when you open this window next time, Measure will remember the exact size and position of this window.

If you close a measurement window without saving the data, information about this will appear as a warning in the left-hand end of the Status panel on the Measure main window. Also, if an unsaved measurement is needed as a basis for a subsequent measurement, you will be prompted to save it at that time, to ensure that you are always working with valid data.

2.8.2 Opening the measurement workspace

If you click the icon of a measurement tab, you will open the corresponding Measurement Front page. On the Measurement Front page you have the option either to view a previous measurement, continue working on the basis of a previous measurement, or to start a new measurement with a blank diagram. To continue from the front page, make selections if required and click the button for the relevant measurement. See Measurement Front pages for a detailed explanation.

If you click a task name on a tab, the relevant measurement workspace will open directly, ready for measurement.

You can also switch between measurement workspaces by clicking the arrow next to the list icon located at the left of the top bar panel and by selecting the appropriate module.
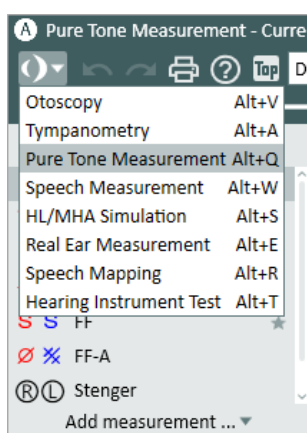
2.8.3 The general layout

All the measurement workspaces are very similar in layout, so when you have got acquainted with one measurement workspace, you will know where to look for the general settings options

and information in the remaining workspaces.

The diagrams and top/side panels

The diagram or diagrams take up the central workspace and are surrounded by expandable panels containing setting options or information (see the illustration and texts explaining the numbered items below). A detailed explanation to the function of the individual parts may be found in the description of the Settings and Selections for each Measurement Workspace.

The panel for selection of **Test Types** is found in the top left-hand side of the workspace **(1)**.

The options for the view settings are found in the **Top bar** panel **(2)**. The legends of the measured curves - with space for notes - are found in the **Legends** panel **(3)** on the right hand side of the workspace.
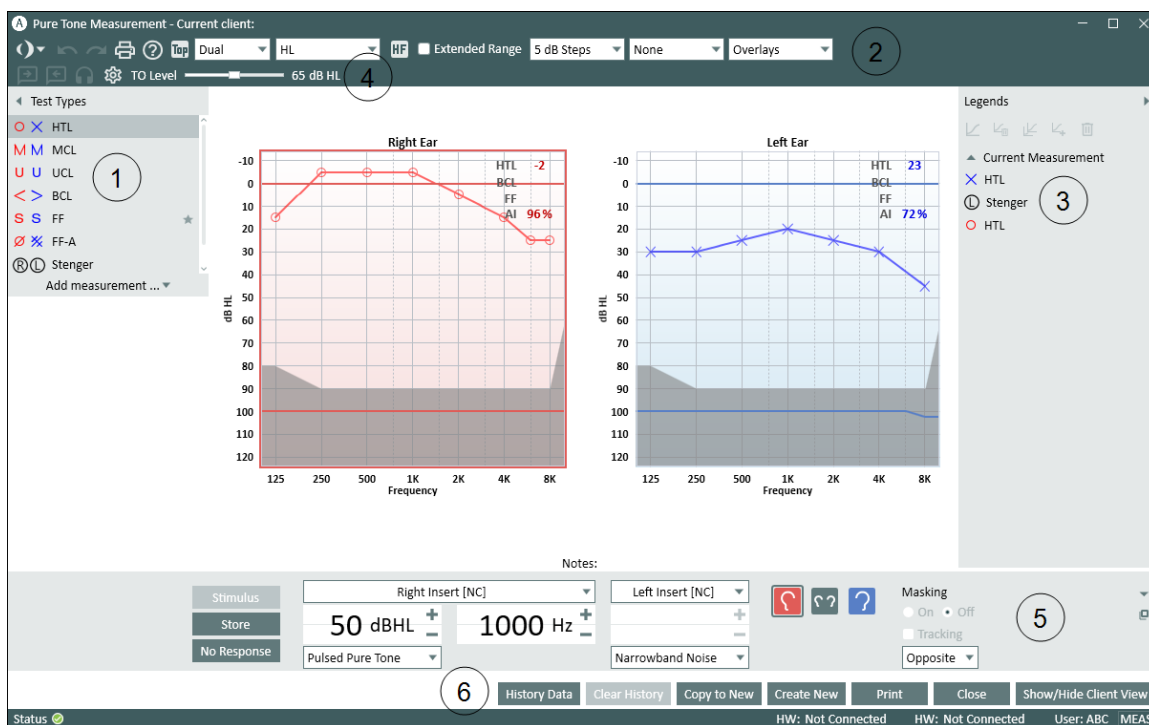
The Audiogram measurement workspace
- see the surrounding text for an explanation to numbered items

Adjust TO/TB and Monitoring levels from the **Top bar** panel **(4)**.

All the control settings and activation buttons for the measurements can be accessed from the **Measurement Controls** panel **(5)**. Also, you can get a detached copy of the Measurement

Controls panel by clicking the **Detached Measurement Controls panel** icon ⬚ in the top right-hand corner of the Measurement Controls panel. To close the detached Measurement Controls panel again, either click the same icon once more, or click the red **Close** icon in the top right-hand corner of the detached Measurement Controls panel.

Below the Measurement Controls panel you have the **Lower area (6)** with buttons for handling measurement data.

At the bottom of the window you will find the **Status bar**. In the left-hand end you can see current Status messages. Click the **Status** icon to get further information about the current measurement status and possible error messages. In the right-hand end a toggle button, **MEAS/NAV**, shows if a keyboard action will currently work on the measurement settings (such as Start Stimulus) or on navigation (such as opening a panel) and writing notes. When you are in Navigation mode, the Measurement Controls panel signal selections will be dimmed to show that they are currently unavailable. Click the **MEAS/NAV** button to toggle between the modes.

Use the links below to get information about settings used in the individual Measurement workspaces. The first section "Set-Up and Editing for Pure Tone Audiometry" contains the most detailed information.

Links to individual Settings and Selections:

[Set-Up and Editing for Otoscopy](#)

[Set-Up and Editing for Pure Tone Audiometry](#)

[Set-Up and Editing for Speech Audiometry](#)

[Set-Up and Editing for Real Ear Measurements](#)

[Set-Up and Editing for Speech Mapping](#)

[Set-Up and Editing for Hearing Instruments](#)

2.9 The Status Bar

The status bar forms the bottom edge of the Measure program. It shows alerts and current system status.

2.9.1 Alerts

In the left-hand side of the status bar you will receive information about action that needs to be considered during the current session, but which may not interfere with your current work.

As opposed to this, if a decision is required immediately, for example if you try to delete a REUR curve that forms part of present REIG calculations, you will get a message on the screen, which must be answered before you can continue.

As more than one warning may be presented during use, the status bar will display the latest error and the latest warning or alert.

Alert types

An error is shown as a red circle with a white **X** inside, and an alert or warning is shown as an exclamation mark or as a green callout. Click on the alert to see more details.

If no current alerts are present, the field will look like this (when clicked):
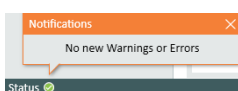
Typical warnings

Typically, a warning will appear, if you try to close a module without saving, if a measurement cannot be conducted within limits, for example due to excessive noise in the room, or if a required hardware part is either unplugged, missing or not functioning correctly.

Reacting to an alert

If you want to see all current alerts, click the large notification button in the left-hand end of the status bar. A list of notifications will show up. If a suggestion for a remedy to the situation is available, it will be stated here. You can also see what time the occurrence was registered.

The alert will remain in the status bar, until you either close the session or remedy the situation mentioned (for example, if you are notified that an action was not saved, the alert will disappear when you click **Save** (only enabled if you are working under [NOAH](#)). If a transducer was unplugged during measurements, this will issue a warning, and the measurement is interrupted. After reinsertion, the system will need approximately 5 seconds to re-initialize.

Hide/delete alerts

If you do not want a specific error message to be shown on the status bar, you can click the triangle in the top right-hand corner of the open message to collapse it, or click the x beside the triangle in order to delete the message.

2.9.2 System status

In the right-hand end of the Status Bar of the main Measure window and the measurement windows, the current connection status of the different hardware units is displayed: Connected, Not connected, Firmware Update; Busy (during hardware initialization). For example: HIT HW: Connected. To the far right, the current user is stated.

2.10 Print Options

2.10.1 The Print option on the File Menu

The **Print** option on the **File Menu** gives access to printing (and saving) of reports on demographic client data, audiogram data, real-ear measurement data, speech mapping data, and hearing instrument test data. Additionally, you can print PDF forms which include client information and measurement data. It is also possible to create your custom PDF forms.

Upon selection, a dialogue box opens that allows you to select the required types of record and to add a comment to the print. The data in the report is compiled at the time you press print, and therefore the comment will not be saved here for later viewing. But you can save a copy of the report including the comment. See the option "Preview" below.

To continue, click either the **Preview**, **Print** or **Close** button:

- Select **Preview** to preview the layout and contents (for one of the selected reports only). From this window you also have access to the page layout setup and to saving the report in Word and PDF formats. **Note:** An excel format is not currently supported.

- Select **Print..** to open the Print menu and print the report.
- Select **Close** to leave the Print dialogue box without any action taken.

You can set up the layout of the reports in the **Settings** option found in the **Tools** menu.

2.10.2 Printing from Measurement workspaces

In the measurement workspaces you find a Print icon in the Pre-Settings top panel, and a corresponding **Print** button at the bottom of the work space.

When you click on either of these, you will get a print according to your selections in the **Settings** dialog box on the **Tools** menu.

Depending on the report type, the print report options may include:

- Client data (Social Security number, client ID, name and address)
- Enabled header
- Report data settings
- Action date (select Pure Tone and Speech Audiograms by the date of their creation)
- Use for Noah fast data view
- Comment

In the Audiometry section, you can choose between 4 types of reports: Client report, SISI report, Audiometry report and Audiometry report with Big PT Audiograms.

3 Hardware Diagnostic Test

3.1 Hardware Diagnostic Test

With the Hardware Diagnostic Test, you can check your Fitting and HIT units for any hardware malfunctions.

In order to start using the test, navigate to the **Tools > Settings > General > Common** and enable the test.
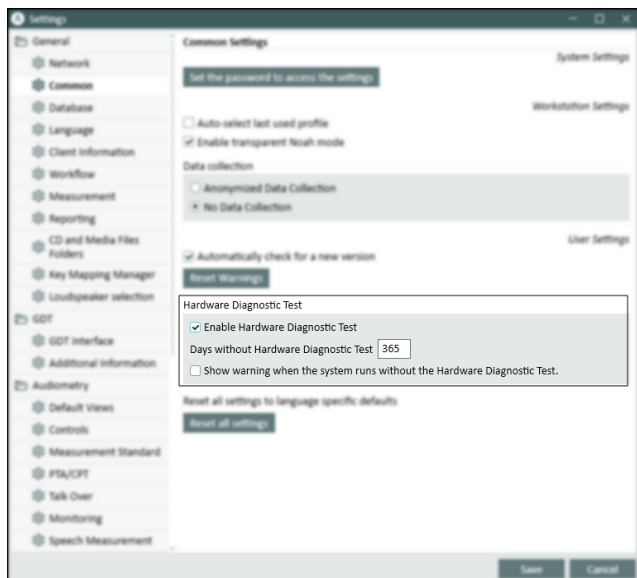
In these settings you can also specify how often to run the test and decide if you want to be notified to perform the diagnosis of your hardware.

Once the test is activated, a new menu item appears under **Tools** menu.
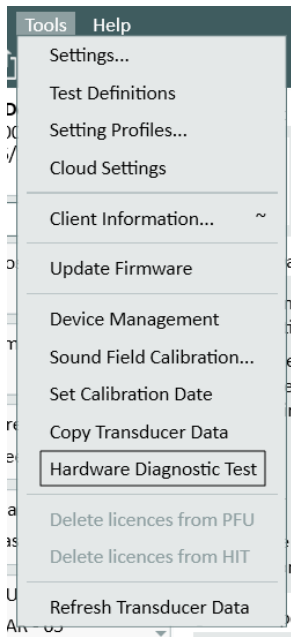
Click the menu item to open the Hardware Diagnostic Test dialog and click the **Start New Test** button to run the test. You will then select the device and outputs/inputs you want to test.

Note: You must unplug all transducers to run the test, otherwise you will receive an error message.

When you select at least one input and output, click the **Start test** button. It is recommended to select all plugs for testing at least once a year.

If the test result is ok, you will see the status **Passed**. If the test fails, you will see the status **Check failed**.

In addition, you can print the results of your testing by clicking the **Print report** button.

4 Test Definitions

4.1 Test Definitions Overview

Test definitions are pre-configured measurements that you can create for every test type available in Measure. Go to **Tools** > **Test Definitions** to open the Test Definitions window. Here, navigation tabs on the left represent the main modules in the application.
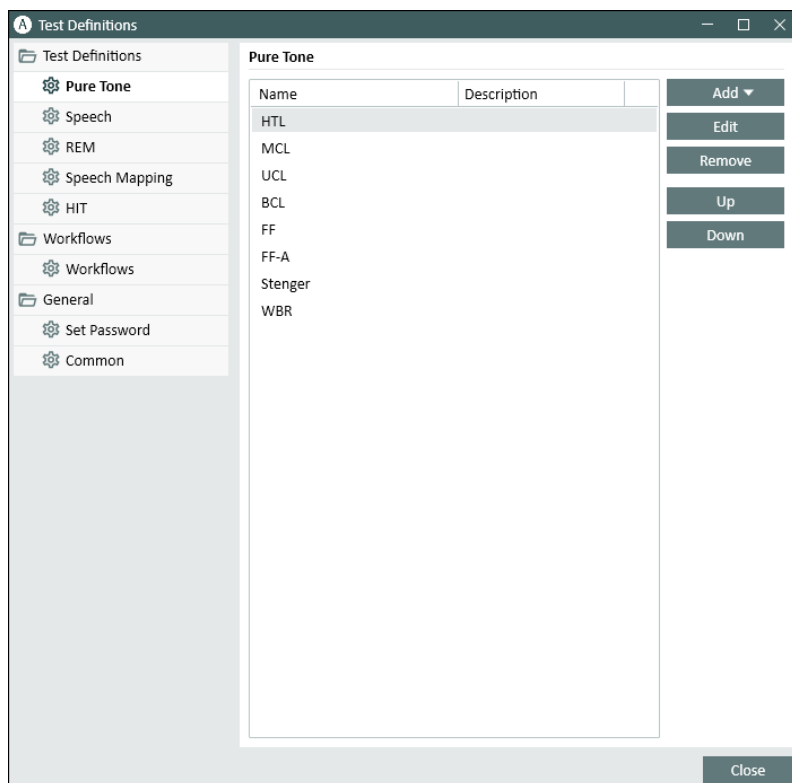
4.1.1 Adding a new test definition

To add a new test definition:

1. Select a required module.
2. Click the **Add** button from the right-hand panel.
3. Depending on the module, select the test type for the new definition.
4. Provide name and description, then specify all measurement details.
5. Click **OK** to complete the procedure.

4.1.2 Configuring test definitions

For each test, you can specify test name, its description and a shortcut for quick access. Start editing an existing definition or create a new one to open the configuration window. Depending on the selected module, the editor includes one or several tabs with settings.

Pure Tone

General

For the individual pure tone measurements you can specify:

- Test type
- Aided/Unaided condition
- transducers and signal types to use for signal, masking and 2 Channel mode
- side for masking and 2 Channel.

There are four possibilities for stimulus interruption:

- **Stimuli when pressed** – stimulus presented only when the stimulus button is pressed.
- **Start/stop when pressed** - stimulus is off initially and switches on/off each time the stimulus button is pressed.
- **Interrupt when pressed** – stimulus is on and interrupted only when the stimulus button is pressed. **NOTE:** The stimulus is also switched off when the talk over function is active, and when switching to another application.

Level Preselection option allows you to preselect the Start level, the Reset level and the Reset mode (Relative or Absolute) for pure tone audiometry.

If **No Level Preselection** is selected, the cursor will be placed at Start Level when pure tone measurement window opens or when the ear side changed.

If Level Preselection is set to **Relative Reset**, the system will calculate the next selected frequency start level according to the following rule:

- Level of last stored result minus the **Reset Value**. If there is no previously stored threshold, then the cursor will use the Start Level when changing to the next frequency.
- If Level Preselection is set to **Absolute Preselection**, the system will always place the cursor at the Reset level for next frequency after stored threshold. If there is no previously stored threshold, then the cursor will stay on the current level when changing to the next frequency.

Use the **Masking** selection box on the right to switch to **2 Channel** view.

For HTL and BCL test types, it is possible to define the number of point repetitions for identical thresholds. This means that a point can only be stored if a stimulus was presented minimum X times for the same frequency and level.

To modify the number of repetitions, check the box **Minimum point repetitions for threshold**, increase or decrease the number with the respective controllers (-/+) and click OK. Restart Measureto save new settings.

Frequencies

Under **Frequencies** you determine at which frequencies you want to perform the pure tone audiometric tests.

Use the **Arrow** buttons between the **Available** and **Selected** lists to place the relevant frequencies in the Selected list. If required, change the sequence of the frequencies by selecting a frequency and move it with the **Up** and **Down** buttons.

Note: If needed, you can include several instances of the same frequency to your test frequencies list.

Curve Styles

Curve styles for Pure Tone and Speech can be set in two different places. It is also possible to set it in the **Settings** > **Audiometry** section. For each Test (HTL, MCL, UCL, TEN), Transducer and Measurement method (Aided/Unaided test) combination, you can configure curve styles. You can also change the curve line color, line style (solid, dotted, or dashed) and the curve symbol for right, left and both (binaural) sides. In the **Curve Symbol** section, you can specify symbols for marking the curve points.

Rules

Select frequencies that must be measured during the test. If a required frequency is not measured, Measure will display a warning message on saving the measurement. Detailed information will also be displayed in the Assistant Panel on the right side.
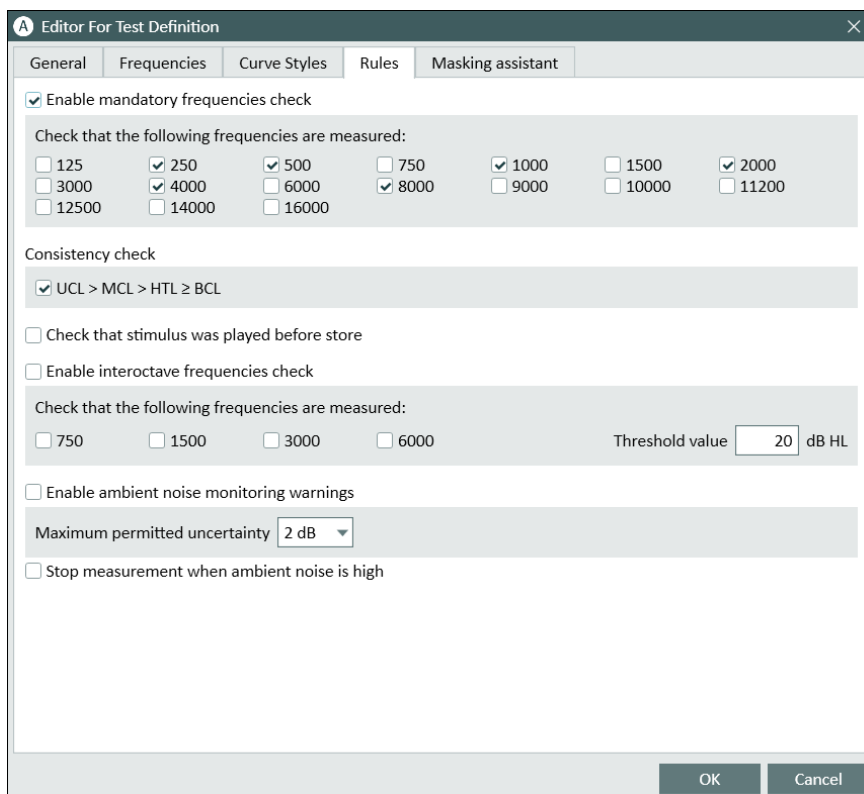
You can either change the test so that the criteria is followed or add a reason why the criteria cannot be fulfilled.

In **Consistency check**, you can check whether the threshold levels comply with the following rule: UCL > MCL > HTL ≥ BCL.

Similar to mandatory frequencies check, a warning message in the Assistant Panel is displayed if the rule is not followed.

Check that stimulus was played before store will display a warning message if you store a result without having played a stimulus.

Enable interoctave frequencies check will turn on warnings that interoctave frequencies should be measured if the threshold difference between the 500, 1000, 2000, 4000 and 8000 Hz neighbor frequencies are higher than X (20 dB by default, modifiable in the field Threshold value).

Enable ambient noise monitoring warnings displays a notification in assistant panel when ambient noise exceeds maximum permitted levels. Maximum permitted levels can be configured in settings.

Maximum permitted uncertainty: choose the permitted accuracy of the measurement. If 2 dB is chosen, the maximum permitted ambient noise level remain as defined by maximum permitted levels. If 5 dB is chosen, the limit level is increased by 8 dB.

Stop measurement when ambient noise is high prevents storing a measurement point if ambient noise levels exceed maximum permitted levels. If disabled, warnings will still be shown for the user's information, but the measurement will not be stopped.

In BCL test definition settings, **Check BC is required on the second ear** will recommend to make a BC measurement on the second ear when a certain rule is fulfilled.

Masking assistant

Here you can enable an automatic masking functionality which will instruct you if the threshold level obtained would require masking for the contralateral ear for HTL and BCL test types. Masking levels should be set automatically depending on the test level applied.
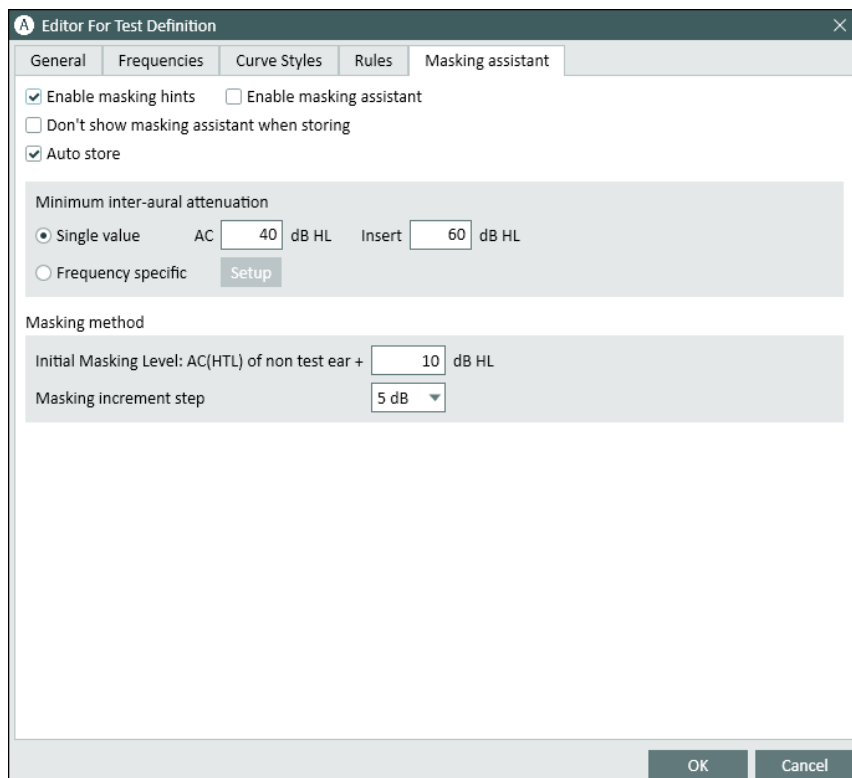
Masking assistant editor for HTL

At the top of the widow, you can configure the following settings:

- **Enable masking hints** (enabled by default): masking recommendation for a certain frequency will be shown on a diagram and the Masking Assistant panel on the right.

- **Enable masking assistant** (disabled by default): this will enable automatic masking functionality.

- **Don't show masking assistant when storing** (disabled by default): masking assistant will be disabled during measurements but users can start automatic masking for each hint from the Masking Assistant panel separately afterwards.

- **Auto store** (enabled by default): a point will be stored automatically after the masking algorithm was executed.

In the **Minimum inter-aural attenuation** section, you have 2 options in **HTL**:
- Single value (insert single value for all frequencies)
- Frequency specific (click Setup to open a window where a user can specify values for each frequency from 125 to 16kHz)

In **BCL**, it is possible to insert Single value only.

In the **Masking method** section, you can configure Initial Masking level of a non-test ear and

increment step (5 dB by default).

Masking assistant editor for BCL

In **BCL**, a user can also set an **Air Bone Gap** parameter and configure **Occlusion effect** (the occlusion effect is considered so the masking level is increased on the next frequencies: 250Hz; 500Hz; 1kHz).

Speech

General

For the individual speech measurements you can select:

- Test type
- Aided/Unaided condition
- transducers and signal types to use for signal, masking, and Dichotic mode
- side for masking

Also, you can specify that the masking signal from the CD should be used, when available. It is also possible to select the default Speech CD to be used with the test type.

In **Masking presentation**, choose *Continuous* to get continuous masking sound or *Synchronized* to have the masking sound to synchronize with the speech material.

In the *Other settings* block, you can specify the Step Level for all test types and disable 50 % calculation for SRT.

For CDs with word list schemes, you can select a word presentation mode in the **Word Scoring** tab, define a pause between words, choose a word counting mode, and enable usage of phonemes. You have the following counting options for continuous word presentation:

- **Correct and Incorrect** – words omitted during your classification will not be scored.
- **Only Correct** – words omitted during your classification will be scored as incorrect.
- **Only Incorrect** – words omitted during your classification will be scored as correct.

If the speech test requires more items than present in one test list, enable the **Automatically continue to next word list** option. This will automatically load the next test list and the user can continue testing without deleting the percentage score.

Curve Styles

Curve style selection is similar to the one described for **Pure Tone**.

Masking assistant

For SRT, SD, SD-A, you can configure the following settings:
- Enable masking hints - masking recommendation for certain test levels will be shown on a diagram and the Masking Assistant panel on the right.
- Minimum inter-aural attenuation (single value only).

REM

General

For the individual REM measurements you can set signal type and transducer, and select the input signal level. You can also specify view preferences for the REM module: view mode and type, FFT spectrum settings and the frequency resolution as a number of pins.

For the REIG test types, you can also enable **Open Fitting** and the **Use Coupler** option.

The Advanced selection of **Time Constant** is used in the FFT calculation. It affects how irregular peaks of a speech signal are reflected on the FFT, that is, whether they will be shown or smoothed away.

- **Long Term (125 ms)** selection is typically used for static signals such as white, pink or speech noises.
- **Live Speech (62.5 ms)** selection is typically used for dynamic signals such as live speech or music.

In the **LTASS Calculation Time** field you can set the calculation time for all ICRA and ISTS signals.

Additionally, you can provide a number of steps for Step Level and define UCL Limiter.

Curve Style

In this tab, you can configure curve styles and colors for each test set.

Target Assistant

Here you can enable target hints and set up maximum allowed deviation from the targets in SPL and Gain views for Aided test definitions when measuring REAR/REIG. Target assistant is also available for SM test definitions. Detailed information will also be displayed in the Assistant Panel on the right side of the measurement window.

Speech Mapping

General

In the **Speech Mapping** section, you can modify or set up new Speech Mapping tests.

Further to sound file, transducer, coupler use option, room equalization option, and input level, you can also:

- Enable percentile measurement.
- Set up the duration of loop playing, and the timing for snapshots of the curves to be taken during the signal presentation. If snapshot times have been preset, Measure will automatically store a curve on the screen for each of the snapshot times.
- Define view settings.
- Select curve style for the LTASS, Peak, Percentale/Snapshots curves.

NOTE: Snapshots are disabled for percentile test types.

Click on the **Advanced** tab to get access to the settings where you can:

- Choose a time constant to be used in the FFT calculation.
- Set percentile values.
- Define what curves will be visible during the measurement.

NOTE: View settings are not available for the hearing loss simulation test types.

The **Other** tab allows you to specify the quantity of dB steps for Step Level and set UCL Limiter.

HIT

For the HIT measurement tests you can change:

- Signal type.
- Level accuracy in dB (select a higher number for a less accurate, but faster measurement).
- Pins per octave (select fewer pins to obtain a less detailed, but faster measurement).
- Start frequency, Hz (for measurements where it is possible to change the frequency range for the measurement).
- End frequency, Hz (for measurements where it is possible to change the frequency range for the measurement).

Also, you can configure a Free Style test that supports both broadband signals and signals from the Sound Library. This test type can be used to run tests for the 2cc coupler from the HIT module.
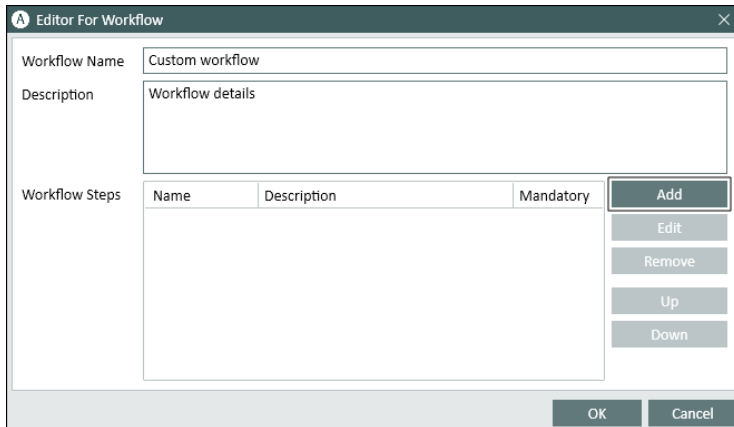
4.2 Configuring Workflow Support

4.2.1 Adding a new workflow

Select the **Workflow** tab in Test Definitions to view existing workflows in Measure.

Use the buttons on the right to add, edit or delete the workflow entries from the list. To add a workflow:

1. Click **Add** to open the **Editor for Workflow** window.
2. Enter the workflow name and description. Then click **Add** to proceed with the first step.

3. In the **Editor for Workflow Step** window, enter the step name and description.
    - If using the "Open External Link" step type, instead of the description, enter the URL to an external file.
    - Select the corresponding check box to make it mandatory, set its recommended duration and then specify the test type it will be used for.
4. Click **OK** to save the step.

Add as many steps as you need in a similar manner and then restart Measure to apply the changes. The workflow will be displayed on the top panel of the application and inside every Measure module.

NOTE: The workflow support must be activated under **Tools** > **Settings** > **General** > **Workflow**.

4.3 General Options

The **General** tab includes additional settings related to test definitions.

4.3.1 Password Protection

Open the **Set Password** tab and select **Use Password** to activate password protection for test definitions and workflow support set ups. This will protect your configuration against unauthorized access.
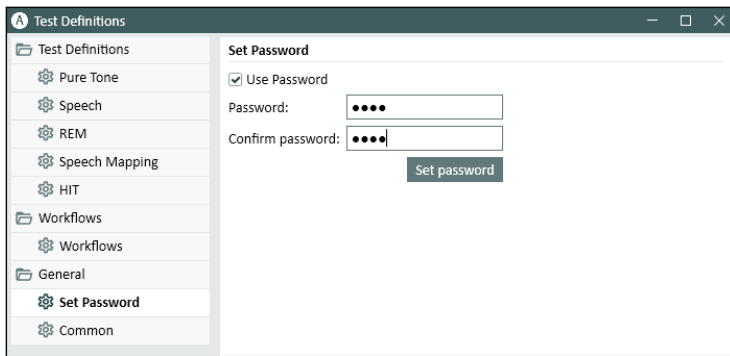
4.3.2 Common

The **Common** section allows a system administrator to set up each workstation up to use the test definition settings from a location on the network, instead of using the internal settings on the local machine. It is also possible to specify a direct URL link to a file with settings shared over the Internet.

NOTE: You can provide the URL link to a zip archive with the settings. The archive must have the .zip file extension.

Select **Update test Definitions from network** and then enter the settings path. Clicking **Reset Test Definitions** will reset your settings to default ones.

5 Client Data

5.1 Dashboard

The Dashboard is the first one you see when you enter Measure.

Click **Ok** to select a user. The **Client List and Data** window will open. Here you have access to all existing clients and all the sessions of every client. Also you can add a new client, edit, or delete an existing client.

When a client has been selected, this page gives you a complete picture of the treatment history for the currently selected client, including key client data, the treatment history, hearing instrument selection and the latest actions within each tasked performed with the client.

Together, this gives you a complete overview of the client and enables you to continue from the point where you left at from the last appointment.

- To open this Dashboard at a later stage, click the **Client** tab in the Navigation pane - that is, the tab in the top left-hand corner of the program window.

- To open the [Client Information window](#) instead, click the **Client** icon on the Client tab - or select **Client Information** from the **Tools** menu.

5.1.1 Using the Dashboard

From the Dashboard you can perform different actions:

View Session List details

The treatment history is shown graphically in the shape of a scrollable session list at the top of the Display area. Here all the individual sessions, either made within the NOAH framework or saved in one client file (in Measure stand-alone mode) respectively, will appear as small thumbnail icons in chronological order.

- To view details of an earlier session, hover with the mouse pointer on the session you want to study. After a moment the view will appear.
  Note: If you want to open a measurement from an earlier session, select the relevant Measurement front page from the Navigation pane. In the Measurement history list found in the lower half of the Measurement front page, scroll to the session of interest and click **within the session**. Then click the **View [measurement]** button above the **Measurement History** section to view the measurement in the measurement workspace.

View details of the latest Measurement diagram

- Hover with the mouse pointer on the thumbnail you want to see in an enlarged and more detailed view. After a moment the view will appear.
  Note: If you point with the mouse to a curve in the thumbnail, you will see the name of the curve displayed as a ToolTip (small label) instead.

Open Client Data or a Measurement Front page

- To open either the **Client Information** window or a front page with the latest measurement view displayed, place the mouse over the relevant **headline** on the Dashboard. The background color will change to blue, indicating that it is selectable. Click the **headline** to open the front page. This function is identical with clicking the corresponding icon on the Navigation pane.

5.2 Client Information

Whenever a client has been selected, the **Client Information** window displays the detailed personal data of that client.

5.2.1 Open the Client Information window

Editing Client Information

- To open the **Client Information** window, click the **Client** icon next to the name of the client. It is found inside the Client tab, at the top of the Navigation pane. Alternatively, select **Client Information** from the **Tools** menu.

If no client has been selected, this will be indicated on the tab instead of a name.

- If you want to open a blank client file for a new client in Measure stand-alone mode, click the above-mentioned icon while no client is selected. See the description of the Client Information Fields further below.

5.2.2 Working with NOAH client data

If you are working within the NOAH framework, the upper half of the Client Information data sheet will be shaded. It cannot be edited from Measure, since it contains data entered from NOAH.

- If you want to change data that are entered from NOAH, close Measure and return to the **File [Client Register]** menu of NOAH to find and select the client. Click the **Edit** menu, then click **Edit client**. Click **Work with client** and open the Measure module from within NOAH.

- If you want to create a file for a new client, also close Measure and revert to NOAH. Open the **File** menu in NOAH and click **New Client**. Fill in the client data. Click **Work with client** and open Measure from within NOAH.

- In the lower half of the **Client Information** window you see two tabbed pages, **Additional Client Information** and **Hearing Instrument Description**, which can be edited from within Measure. See the sections Additional Client Information and Hearing Instrument Description below.
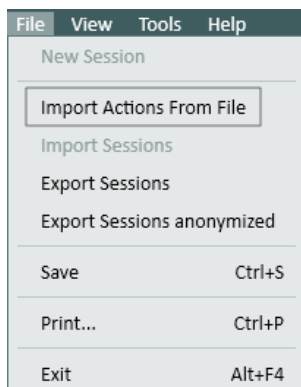
5.2.3 Working with Client Information using a stand-alone database

By default, Measure includes a stand-alone database for storing clients' data. You can change the directory path for the database from **Tools** > **Settings** > **General** > **Database**. Run Measure

and in the Search Client dialogue box select an existing client or add a new one. Alternatively, you can import all the client data by using the **Import** option.

Note: Ensure you regularly backup your database by copying the database file and saving it to the backup repository.

To import measurements for the client, go to **File** > **Import Actions from File**.

If you decide not to use the stand-alone database, Measure will work in a stand-alone mode.

5.2.4 Working with Client Information in Measure stand-alone mode

If you are working with Measure in stand-alone mode, the entire client's personal data must be entered in this Client Information window. You can enter all known data when creating the new client file, and if required, you can add more data at a later state. An exception to this is the field **Created Date**, which is automatically filled in, when the record is created.

When you start a session with a client, always import the client data from file, before you start measuring. In case of a new client (while working in Measure Stand-alone mode), you may want to start with creating the new client information. The procedures are as follows:

Open previously recorded client data

- If you want to import previously recorded client data from file, open the **File** menu, and then click **Import Sessions**. Navigate to the client's file and select it. Then click **Open**. The selected client's key data will now be visible on the Client Tab, and an overview of the previous session with the client is given on the Dashboard.

Create a new client record

- If you want to create a record for a new client, click **New Session** on the **File** menu (if another client is currently selected). Select **Client Information** from the **Tools** Menu, or click the **Client** icon on the client tab in order to open the **Client Information** window. Then enter the client's data and click **OK**. (See a further description of the Client Information fields below.) The client's name will now appear at the top of the Client Tab. Continue to work with the client.
  If you forget to enter the data of a new client when starting Measure as a stand-alone program (with no client selected), the **Client Information** window will automatically open

for entry of data, when you finish the session and select **Export Sessions** to store the clients data. It is not possible to store data in a client file, unless at least the client's name has been entered.

5.2.5 Working with NOAH data in stand-alone mode

If your NOAH system is not placed on a portable computer (for example, if you are working with a network version of NOAH) and you have to go visiting a client, you can export the NOAH data to Measure before you go, then import the new data when you get back, and save them to NOAH as a new session.

Do as follows:

1. Select the client in NOAH, and then open Measure as a NOAH module.

2. In Measure select **Export Sessions** from the **File** menu. In the **Save As** message box, create a file name for the client and click **Save**. Then close Measure and NOAH.

3. At the client visit, open Measure as a stand-alone program (for example, click the **Start** button in the left-hand end on the Windows status bar, then select **All Programs** and locate Measure on the program list).

4. Select **Import Sessions** from the **File** menu and import the client's file. The name of the client should now appear on the Client tab in the top left-hand corner.

5. Perform measurements as required.

6. Finalise the session by exporting the data: Select **Export Sessions** from the **File** menu, find the name of the client's file and select it. Then click **Save**. When you are prompted whether or not you want to overwrite the file, make sure that you have selected the correct file, then click **Yes**.

7. Back at the office, connect your portable computer to the network as usual and open **NOAH**. Select the client and open as a NOAH module.

8. Select **Import Actions from File** from the **File** menu. Locate the correct client file and click **Open**. The session will now be opened in Measure.

9. Select **Save** from the **File** menu to save the data in the NOAH database. A list displaying the available sessions will appear. Select the session in question (probably the latest), and click **Save**. The session will be saved as a new session in NOAH.

Note: Even if you had imported an earlier session that was originally created in NOAH, and then clicked **Save**, it would be saved as a new session. You cannot overwrite earlier sessions in NOAH.

5.2.6 Client Information Fields - Personal Data

The names of the data fields in the upper half of the **Client Information** window can to some extent be customised from the [Settings Menu](#). In the default setup, **Client Information** consists of name, address, contact information, birth date, insurance data, general practitioner, and the date of creation of the record. Fields that are not self-explanatory are described below:

Date of Birth and Creation Date

For entry of **Date of Birth** and **Creation Date** respectively, calendars are available.

- For entry of a **Date of Birth**, click the calendar icon next to the entry field to open the calendar. Then select the appropriate birthday (this year). Finally, click inside the entry field and correct the year of birth.
- The **Creation Date** will automatically be set to today's date, when you create the record.

5.2.7 Additional Client Information

In the lower half of the **Client Information** window you find space for **Additional Client Information** on the first of two tabs. The other tab contains [Hearing Instrument Description](#) (see below).

If you want to enter additional client information, you should always do so directly in this window, irrespective of whether you are working under NOAH or using Measure as a stand-alone unit.

The individual fields are:

Age

This field cannot be edited. The age of the client appears automatically here, when a date is available in the Date of Birth field in the upper half of the window.

Client Note

Here you can enter additional information about the client.

Client Notification

In this field you can enter information that you want to be alerted to, when you open the client's file; for example: "Client is extremely sensitive to noise" or "Prefers to pay in cash".

E-mail

In this field you can enter the e-mail address of the client. If required, you can rename this field from the **Settings** menu and use it for other purposes.

Work phone

In this field you can enter an additional work phone number. If required, you can rename this field from the **Settings** menu and use it for other purposes.

Mobile

In this field you can enter the mobile phone number. If required, you can rename this field from the **Settings** menu and use it for other purposes.

Blank field

In this custom field you can enter additional information. You can name it and set it up from the **Settings** menu.

Client Picture

If the client permits, it may be useful to keep a photo of him or her with the file.

Save a digital photo of the client on an accessible PC drive. From the **Client Information** window, click **Browse** to locate the drive, where the picture was saved. Select the name of the picture file and click **Open**.

To remove the photo again, click the button **Clear**.

5.2.8 Hearing Instrument Description

Additional Client Information	Hearing Instrument Description		
☐ Use the same setup for both ears			
Right		**Left**	
HI Name	Stardust2	HI Name	Stardust2
HI S/N	00001	HI S/N	00001
HI Style	BTE ▼	HI Style	BTE ▼
Vent Size	Vent None ▼	Vent Size	Vent None ▼
Compression Speed	Fast ▼	Compression Speed	Fast ▼
		OK	Cancel

Use this tab in the **Client Information** window to enter information about the current hearing instrument or instruments of the client, including serial number. These data will also be accessible from the **Target** set-up window in the Real Ear Measurement task.

Be careful to fill in the **Hearing Instrument** data correctly, as it will be used in the Real Ear Measurement calculations in the system.

If the check-box **Use the same setup for both ears** is selected, you will only need to fill in the data once, even for a binaural fitting. If the data are different for the two hearing instruments, click the check-box to remove the mark, and fill in the correct data for both instruments.

5.2.9 OK or Cancel

When you have entered the Client Information, click **OK** to work with the client. At this point, the data only exists in Measure, when working in stand-alone mode. You still need to export the client information and measurement data to the client's file, when you finish the session.

If you want to discard the data you just entered, click **Cancel**.

5.2.10 Saving or exporting client data

If you are working with Measure as a stand-alone unit, you can import client and measurement data from a file and export them back there, including the new data, after the session.

Note: In stand-alone mode, Measure uses import from and export to files instead of opening and saving files. The difference between saving and exporting is that saving a session to an existing file would overwrite that file, deleting any earlier session data, whereas, when you import a file at the start of the session and then export the data to the client file at the end of the session, the latest session data will become appended to the file, thereby keeping the entire client history intact.

  As Measure works with a file system in stand-alone mode, you can make a new file for each session with the client, if you wish, but in that case you will not be able to compare with historic data in Measure. Therefore it is usually best to import the old client data at the start of the session and export them to the same file after the session.

Note: When exporting, be careful not to overwrite another client's file! In any case, a daily backup procedure is much advised, when working with client data.
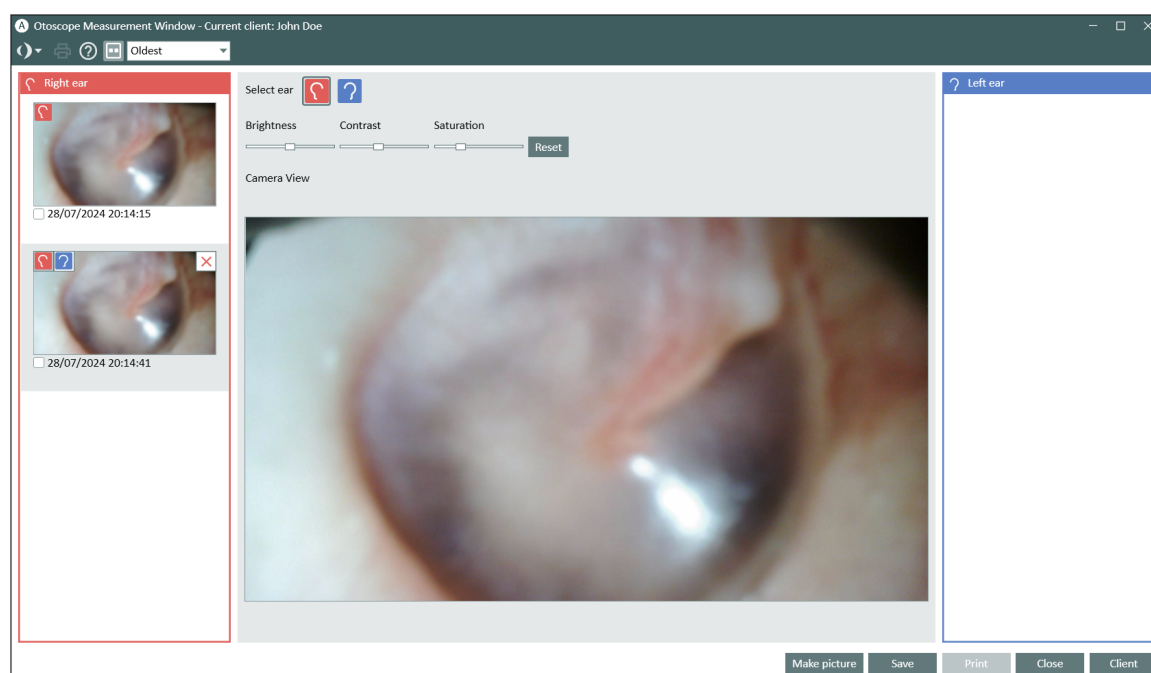
6 Video Otoscope

6.1 Set-Up and Editing for Otoscopy

The Video Otoscope is a high quality medical product which is designed to examine the auditory ear canal of the human ear.

In order to select the camera to be used in your otoscopic examination, go the **Tools menu > Settings > Otoscopy > Camera Settings**.

In Measure, there is a separate Otoscopy module that allows users to view, annotate and store pictures in NOAH by using any Video-Otoscope connected via USB to the PC. To enable the Video Otoscopy module, navigate to the **Tools > Settings > General > Workflow** and select "Otoscopy".

To start a new otoscope session, select the Otoscopy module from the left navigation pane and then click the **Otoscopy** button. The Otoscope Measurement Window opens. Alongside the view pane, it has video/image controls that allow you to manipulate the rendering quality. At any point, all adjustments can be **Reset** to default.

You can select between a single mode (a user view only) or dual mode (a user and a client view) by clicking the **Show image** button( ).

To capture an image, do the following:

1. Connect the Video Otoscope via USB cable to your computer or laptop.
2. Switch the video otoscope on using the **ON/OFF** button located in the centre of the circular button.
3. Select the ear side.

Direct the otoscope onto the ear and click the **Take picture** button or the **P** button on your keyboard. Alternatively, you can use the foot pedal available or press the capture button on the video otoscope. Captured images are immediately shown in the side panel starting with the oldest one. Choose Latest from the dropdown at the top to have newer pictures to be shown on the top.

Note: You can capture and save a maximum of 40 images (the number may vary depending on the camera resolution).

4. For the captured image, you can change the ear side by placing the cursor over the image and selecting the right or left ear icon.
5. You can remove an image by selecting it and clicking the **X**. Adding notes for the images is only available when opening the picture in on-top mode.

Note: The **Save** button is only available if you run the Measure under Noah. If you run Measure in the standalone mode, the images made with the otoscope will be saved when you export the client data. Refer to the [Client Information](#) section for more information on exporting client's data.

To view previously saved images, click **View Otoscope Session** from the Measurement History section. You can also view images on an external monitor (if available).

Printing images

Select an image and click the **Print** button. The date and time when the picture is created will be also printed on the image.

To choose several pictures, select multiple checkboxes or press Shift and left click anywhere on each picture.

Setting shortcuts

You can set the main shortcuts for the otoscope through **Settings > General > Key Mapping Manager > Otoscope**.

7 Cloud

7.1 Cloud

7.1.1 Auditdata Cloud

Auditdata Cloud is a solution that allows you to publish and update Measure settings, test definitions, and workflows to all Measure installations from a central point, ensuring consistency in the way audiologists operate across your organization. You can also publish new or update existing reports for all Measure installations to avoid manually copying files for every PC.

After you obtain a Cloud license, you need to enter the license code under **Help** -> **License Information** to enable the cloud-based updates.

7.1.2 Audiometer Administration

On the Auditdata Cloud website, click **Audiometer Administration** to find all the Measure Cloud settings in one place.

Settings

This section contains the following options:

- **Cloud Settings Enabled** - enable to update Measure settings from the cloud
- **Cloud Test Definitions and Workflows Enabled** - turn on this option to update Measure test definitions and workflows from the cloud

If enabled, Measure will check for updates every time you start the application. If the cloud-based settings differ from the local ones, the update will take place.
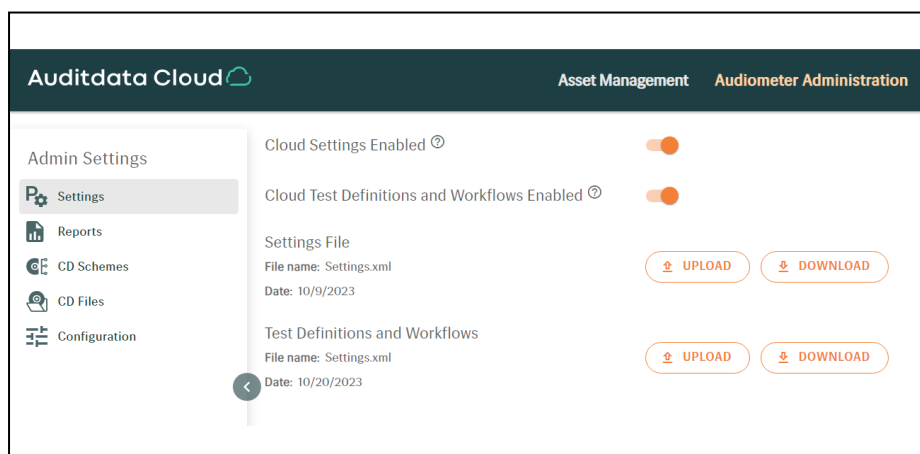
Uploading files with settings to the Cloud is easy:

1. Go to **Tools** > **Cloud Settings**.
2. Select the type(s) of settings you want to export and click **Export to cloud**.
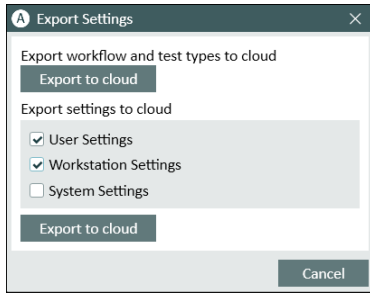
3. Enter your login and password for Auditdata Cloud website and click **Login**.

4. The system will inform you that the export was successful.

Alternatively, you can upload data via Auditdata Cloud website.

1. Click **UPLOAD** for the Settings or Test Definitions and Workflows.
2. In the pop-up window, either:
• Drag and drop desired files from your desktop or file manager
• Click the frame and select the files you want to upload from your PC
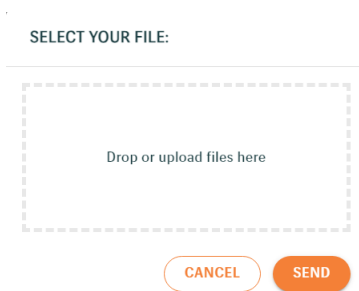
3. Then click **SEND** to complete the procedure. The file will appear with its name and upload date below.

You can always download files with settings from the Cloud for backup or testing purposes. Use the **Download** buttons for that.

Reports

Auditdata Cloud Reports allows you to maintain Measure reports from one place. You can upload reports to the cloud in the .rdlc, .pdf and .doc formats. The .pdf and .doc files require mapping files with the .map extension.

If enabled, Measure will download reports (if needed) when starting up. You can find them in the Measure application under a separate Cloud Forms tab.

CD Schemes and CD Files

To upload CD Schemes to Auditdata Cloud:

1. Turn on the option **Cloud CD Schemes Enabled**.

2. Drag and drop selected files. Alternatively, you can click the frame and select the files on

your PC.

3. Click **Send**.The files will be added to zip archives automatically.
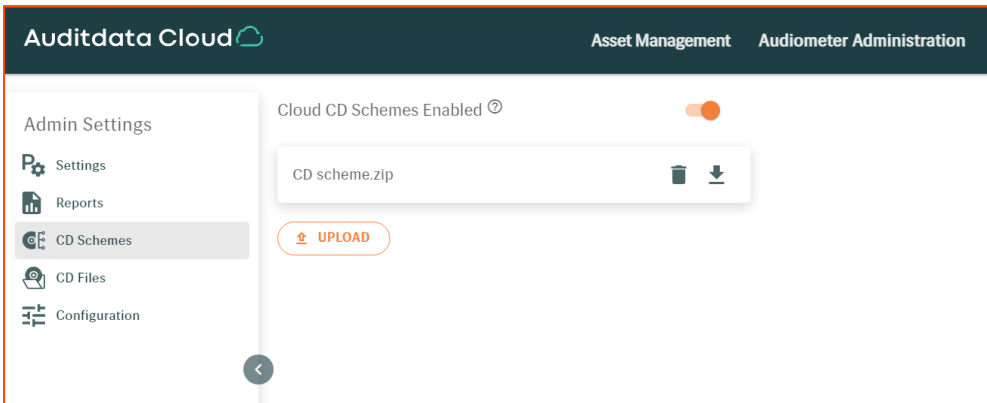
Note: for CD Schemes, only the .xml file name extension is supported.

To upload CD Files to Auditdata Cloud, follow the same steps described above in the CD Files section.

To add new CD Schemes or CD Files to media files folders in Measure:
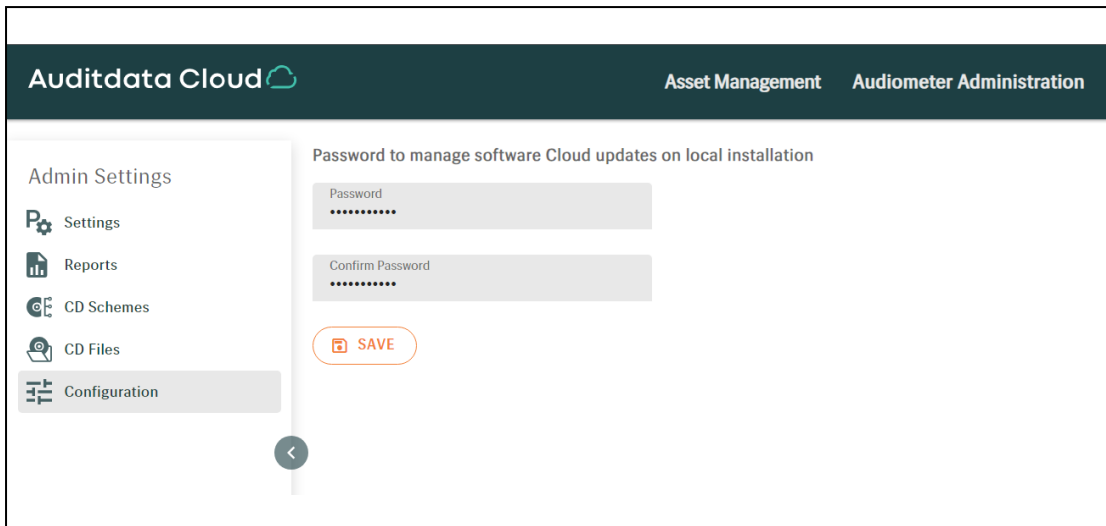
1. Go to **Tools** > **Settings** >**CD and Media Files Folder** and click **Add**.
2. Enter disc name, enable Cloud CD Folder, specify a folder path and choose a scheme from a dropdown list.
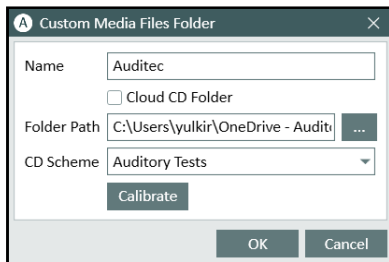
3. Click **Save**.

Configuration

The default password for managing Auditdata Cloud updates on the local installation is *primuscloud*. You can also generate your own password if needed.

This password is used to restrict access to the **Disable update settings and test definitions from Auditdata Cloud** setting under **Tools** > **Settings** > **General** > **Network**. This option is turned off by default, so that the local users cannot disable the cloud update.

This restriction does not apply to the Cloud Reports.

Hardware Self-Test in Auditdata Cloud

Asset Management functionality in Auditdata Cloud now allows storing Hardware Diagnostic Test files.

With the activated Analytics license, users are able to access the results of their hardware testing via **Asset Management > Units > Details**.

8 Tympanometry

8.1 Displaying Tympanometry Data

When the Tympanometry Module is enabled, the last available Tympanometry graph is displayed on the Dashboard.
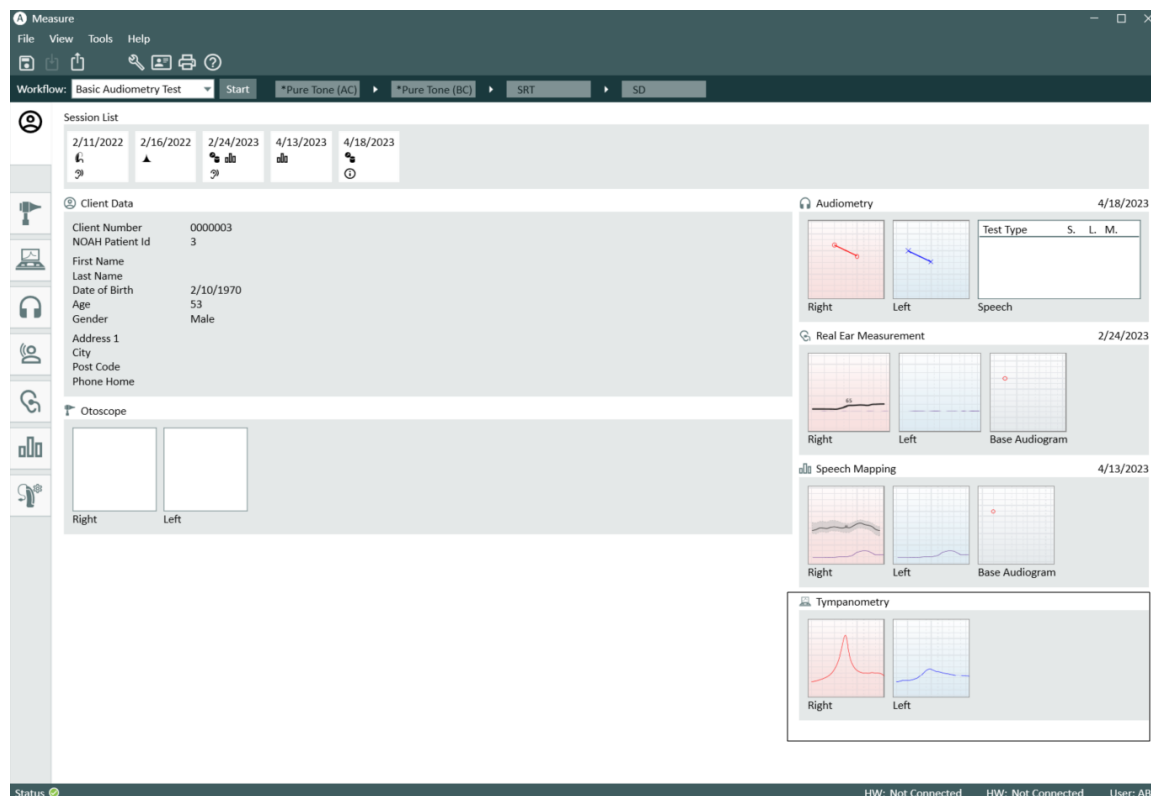
Measure **Tympanometry Tasks** module allows displaying tympanometry measurement results from NOAH.

The module will only display data if you run Measure under NOAH. This module is designed to help user follow the workflow by reviewing test results and analysing data, without the ability to conduct any tympanometric measurements in Measure.

Select the **Tympanometry Tasks** module from the left navigation pane to view the client's full measurement history. Measure supports displaying the following types of Impedance measurements stored in Noah:
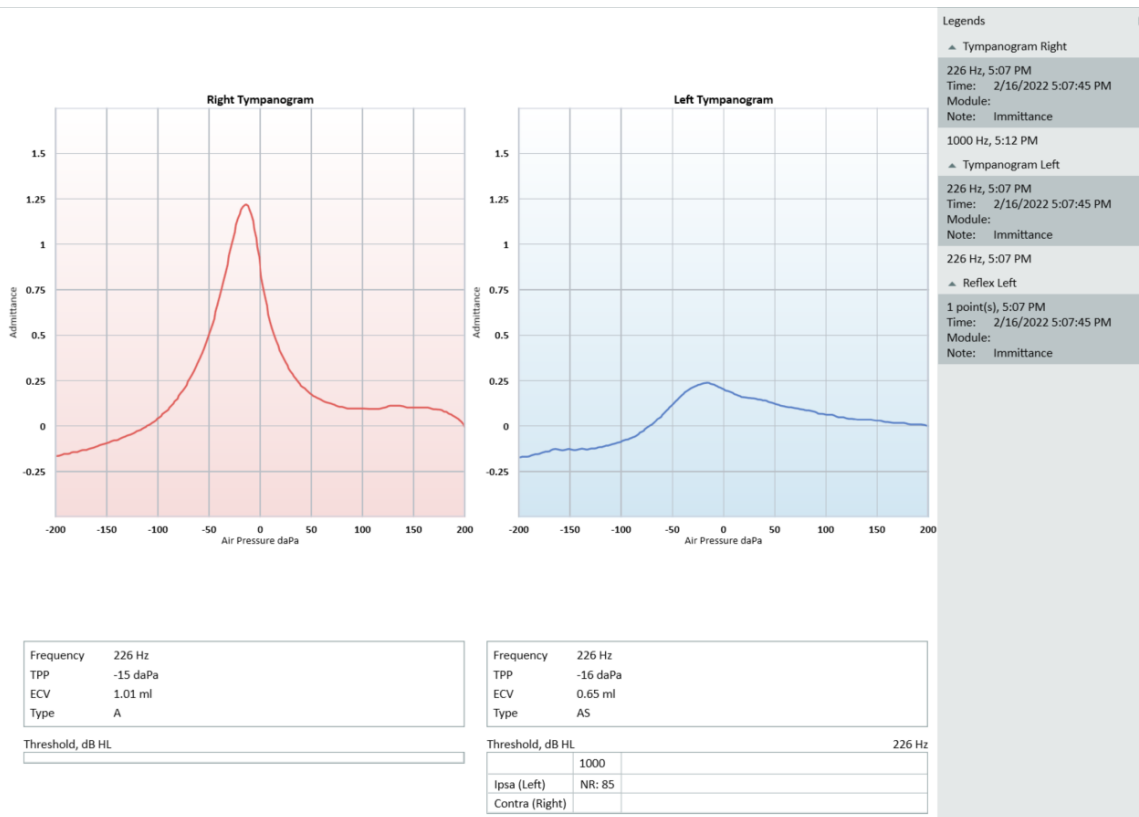
- Tympanometry measurements
- Reflex measurements

Note: Reflex decay and latency tests are not supported.

Use the drop down list in the upper-left corner to sort the measurements by date. Double click the measurement to open it for a more extensive review. Or click the measurement once and then press the **View** button in the upper-right corner of the screen.
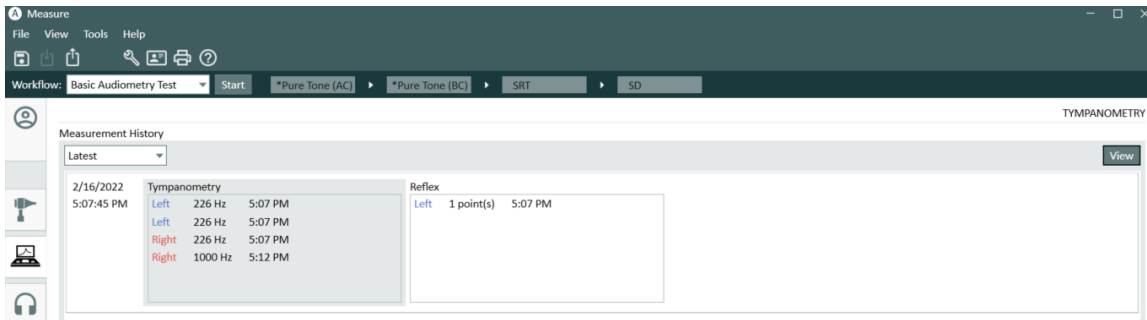
The Tympanometry Measurement Window opens with detailed graphs and tables. If collected data contains Tympanometry measurement results, Measure will display tympanograms for each ear. Below the graphs, you can view such test details as: Probe frequency, TPP (tympanogram peak pressure), ECV (ear canal volume) and type.

Available Reflex test results are displayed right below the Tympanometry data. Here you can view the acoustic reflex thresholds (both ipsi and contralateral) which are given for each available frequency.

Frequency	226 Hz
TPP	-15 daPa
ECV	1.01 ml
Type	A

Threshold, dB HL

Frequency	226 Hz
TPP	-16 daPa
ECV	0.65 ml
Type	AS

Threshold, dB HL		226 Hz
	1000	
Ipsa (Left)	NR: 85	
Contra (Right)		

Legends

The Legends panel can be collapsed or expanded by clicking the triangle in the upper right corner.

It displays the four available measurement groups: Tympanogram Right, Tympanogram Left, Reflex Right and Reflex Left. Each group contains additional details for all the measurements taken on a selected date:

- Probe frequency (tympanogram only)
- the number of points measured (Reflex test only)
- time of the measurement
- module name where the measurement was taken
- notes

Click the measurement you are interested in to view its details. If a group does not have measurements, it will not be displayed in the Legends.

Printing test results

Click the **Print** button to print out the tympanograms and the tables, stamped with the name and key data of the client.

Setting shortcuts

You can set the shortcut for opening the Tympanometry module through **Settings > General > Key Mapping Manager > Navigation**.

9 Hearing Loss Simulator and Master Hearing Aid

9.1 Set-Up and Editing for Hearing Loss Simulator and Master Hearing Aid

The **Hearing Loss/Master Hearing Aid(HL/MHA)** simulation module is designed to provide counselling for both hearing impaired people and their relatives.

With hearing loss simulator, an audiologist can demonstrate the effects and consequences of hearing loss to patient's relatives. Master hearing aid functionality is intended to show the effect of the hearing aid amplification mainly to the client with hearing problems and/or client's relatives.

To enable the **HL/MHA** module, navigate to **Tools > Settings > General > Workflow** and select the **Hearing Loss Simulator and Master Hearing Aid** checkbox from the **Enable modules** menu.

Note: Since simulation sessions within the **HL/MHA** module are used for counselling purpose only, no thresholds will be saved after you complete the demonstration.

9.1.1 Setting Up Hearing Loss Simulator

As in any other Measure module, most of the changes to settings that you can make in this view are only temporary, unless you store them permanently by selecting the **Save as default preset for the current test type** option in the **Measurement Settings** dialogue box. You can also make permanent changes to the set-up from the [Settings menu](#). The local setting options within the **HL/MHA** module are:

Top bar in measurement window

The Pre-settings in the HL/MHA top bar are:

- **Step Level** allows adjusting the input level in steps of 1 dB, 2 dB or 5 dB correspondingly.
- **Informative Overlays** drop down contains the overlays identical to those found in [Informative Overlays in REM.](#)

Left-hand panel

In the **Test Types** panel, you can switch between the Hearing Loss Simulator and Master Hearing Aid.

The **Media Player** panel is similar to the [Media Control Panel described for Speech Audiometry](#) with the following exceptions:

- The **CD** tab contains only one control button under the track list - **Calibrate CD**.
- The **Sound Library** tab includes the **Select Sound File** option that allows you playing sound files from your computer. The only control button on this tab is **Recording....**

Editing of curves

The base audiogram will show an HTL curve if measured. Right click the curve to add a new point to it, copy the curve to the other side, or reset the audiogram (CTRL+R).


Measurement Controls panel

The **Measurement Controls** panel located below the diagrams is where you change measurement conditions for the simulation. Besides ear selection, there is also the **Simulation** button to start the session.
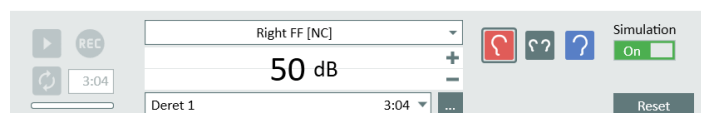

Preset options for speech audiometry

Click the **Change** button in the lower left corner to open the **Measurement Settings** dialogue box, where you can change the preset type of transducer, set the level of compensation, and specify the start level for the test signals. You can save your settings from the **Measurement Settings** dialogue box or from the Settings menu.
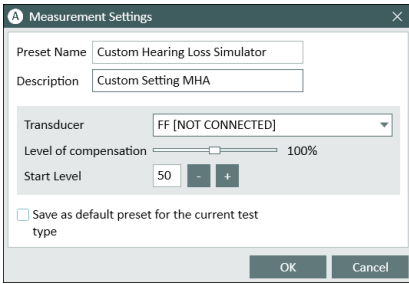
9.1.2 Setting Up Master Hearing Aid

Select the **Master Hearing Aid** test type from the **Test Types** panel to open the measurement window. Local settings are similar to those described for the Hearing Loss Simulator, except that there are no **Informative Overlays** for this test type.
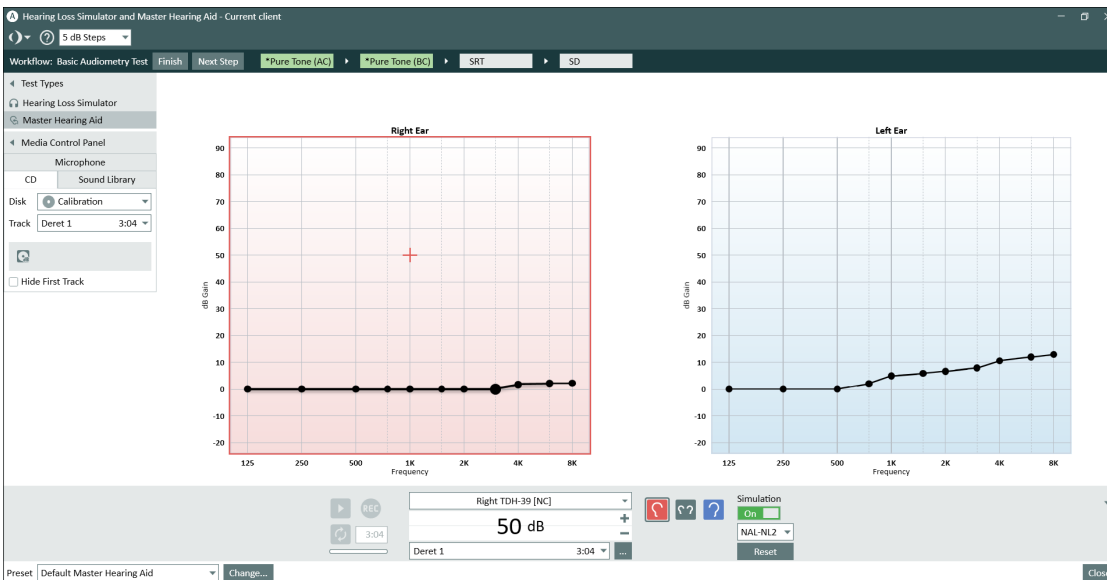
Another difference from the Hearing Loss Simulator is the possibility to specify the target curve.

9.1.3 Performing Hearing Loss Simulation

1. Select **Hearing Loss Simulator** from the top left-hand panel.
   Note: Make sure you have an HTL audiogram of the patient available.
2. Ensure that the input settings in the **Measurement Controls** panel are set according to your preferences. To specify further measurement settings, click the **Change** (Preset) button to the left of the **Measurement Controls** panel.

3. From the **Media Player** > **CD** tab, choose the file you want to play or select your preferred file from the **Sound Library**. You can also use the microphone for the signal input.
4. Specify transducer.
5. Click the **Start** triangle to the left of the **Measurement Controls** panel to present the selected sound file. The sound file will now be played as would be heard by the listener with a normal hearing.
6. Click the **Simulation** button to the right of the **Measurement Controls** panel. Patient's relatives will hear the simulation of the sound as would be heard by the listener with a hearing loss (as in the specified audiogram). This way they can understand what the patient with hearing problems experiences in their daily life.

9.1.4 Demonstrating Master Hearing Aid

The general procedure for the Master Hearing Aid functionality is very similar to the Hearing Loss Simulation described in the previous section. After specifying your preferred sound file, select the target curve from the lower right-hand corner of the control panel. The target curve will be calculated based on the specified audiogram. When presenting the sound file to the patient, click the **Simulation** button. The sound will now be played and simulated as if the patient was wearing a hearing instrument, with the specified amplification shown on the graph.

10 Pure Tone Audiometry

10.1 Pure Tone Test Options

With Measure, you can perform a wide range of pure tone tests.

Audiometry front page

To go to the Audiometry front page with further options for selection, click the icon to the left on the Audiometry tab in the Navigation pane.

Preset Pure Tone tests

The following test definitions are available:

Test	Link to test description	
HTL	Hearing Threshold Level	Establish the minimum level at which the client can detect the presence of a pure tone signal 50% of the times it is presented.
MCL	Most Comfortable Loudness	Establish the level that the client finds most comfortable.
UCL	UnComfortable Loudness	Establish the level that the client finds uncomfortable.
BCL	Bone Conduction Level	Use a bone conductor vibrator to establish the threshold level at which the client can detect the presence of a pure tone signal 50% of the times it is presented.
FF	Free Field	Establish the minimum level at which the client can detect the presence of a pure tone signal 50% of the time it is presented, using loudspeakers.
FF-A	Free Field - Aided	Establish the minimum level at which the client can detect the presence of a pure tone signal 50% of the time it is presented. This test is made with the hearing instrument in place and turned on.
WBR	Weber Test	A quick screening test used with the Bone conductor to help determine the type of hearing loss.
TEN	Threshold Equalizing Noise Test	The TEN test considered the gold standard to check for "dead regions" in the cochlea. The TEN(HL) test CD can be obtained directly form Brian C. J. Moore

Test	Link to test description	
		at the University of Cambridge in UK.
SISI	Short Increment Sensitivity Index	SISI is designed to test the ability to recognise 1 dB increase in intensity during a series of bursts of pure tones presented 20 dB above the pure tone threshold for the test frequency. It can be used to differentiate between cochlear and retrocochlear disorders as a patient with a cochlear disorder will be able to perceive the increments of 1 dB, where as a patient with a retrocochlear disorder will not.
Stenger		A test used to investigate a unilateral functional hearing loss, generally used to confirm whether the HL is non-organic unilateral. Stenger test is performed right after ordinary pure tone audiometry.
Automated Audiometry		Automated air conduction test based on the Hughson-Westlake ascending method of threshold testing (up 5 dB, down 10 dB).

Transducers

The system can use the following types of transducers:

Type	Description
TDH-39	Circumaural audiometric headset.
HDA-200*	Circumaural audiometric headset up to 16000 Hz equipped with Peltor cups.
HDA-280	Supra-aural audiometric headset up to 8000 Hz.
HDA-300*	Circumaural audiometric headset up to 16000 Hz equipped with Peltor cups.
DD45	Supra-aural audiometric headset up to 8000 Hz.
DD65*	Circum-aural audiometric headset up to 8000 Hz equipped with Peltor cups.
DD65v2	Circum-aural audiometric headset up to 8000 Hz equipped with Peltor cups (improved version of DD65).
DD450	Circumaural audiometric headset up to 16000 Hz equipped with Peltor cups.
ER-3A*	The original model of insert earphones developed by Etymotic Research Inc. Consists of shoulder mounted transducer coupled to the ear canal by means of a sound tube attached to a connecting nipple and then to an eartip tube, which runs through a foam eartip.
ER-3C	The next generation of insert earphones virtually identical to the

Type	Description
	original ER-3A earphones at all audiometric frequencies.
Insert Earphone	An earphone whose transducer is connected to the ear via a sound tube, usually fitted with a foam eartip that is placed into the ear canal.
B-71	A bone vibrator (also called an oscillator) to be placed on the mastoid or forehead when conducting bone conduction threshold testing.
Loudspeakers	Loudspeakers for free-field testing.

* The headphones have been discontinued by supplier.

10.2 Set-Up and Editing for Pure Tone Audiometry

When you are working in a measurement window, you have a wide selection of settings options. The changes to settings you can make in this view will not be saved when the window is closed. If you want to make permanent changes to the set-up, do so from the Settings menu. It is recommended to customise your settings before you start a test.

The local settings options within the Pure tone audiometry task are:

Top bar in measurement window

Presettings for the pure tone audiometry view

Informative Overlays in audiograms

Settings for Talk Over, Talk Back, and Monitoring

Left-hand panel

Test Types

Right-hand panels

Legends and editing of curves

Assistant panel

Measurement Controls panel (below diagrams)

Measurement Notes

The Measurement Controls panel

Always-on-Top panel

Pure Tone Audiometry Controls

Use Extended Range safely

Settings for masking and Channel 2

Lower area

[History Data](#)

[Client View of audiograms](#)

10.2.1 Presettings for the pure tone audiometry view

The top bar with presets is found at the top of the Pure tone Audiometry window.

Selections on the Top bar

General

- Click the **list** icon to the left of the pre-settings panel to open the list of all available modules. Select a module you want to move to. The current window will close and a selected one will open.
- Click **Undo** to cancel the last action.
- Click **Redo** to regret an "Undo" action.
- Click **Print** to open the Print menu.
- Click **Help** to open the Help function.

View

- Click the **Top** icon to open an extra measurement diagram which will remain on top of the other windows until closed, e.g. for use with a fitting program. If required, you can minimize the main Measure program while working with the On-Top Diagram.
- Select **Dual** in order to display two audiograms side by side for Right and Left ear respectively.
- Select **Single** in order to see only one audiogram and have curves for both ears appear in this chart. **Note:** The Single/Dual view is remembered after Measure restarts.
- Select **HL** to see amplitude levels displayed along the vertical axis in terms of dB HL (Hearing Level). This is the default setting for pure tone testing. In this view the graph shows normal hearing at the top, and severe losses at the bottom of the scale.
- Select **SPL** to see amplitude levels displayed in terms of dB SPL (Sound Pressure Level). In this view the values have been recalculated from dB HL into dB SPL, and the vertical scale has been flipped upside down, so that normal hearing is shown at the bottom, and severe losses appear at the top of the graph.
- Select **Dynamic Range** to see a Dynamic Range graph showing percentages along the vertical axis.
- If no HTL or UCL have been measured, the Dynamic Range will be established on the basis of the HTL for normal hearing and a predicted UCL based on the HTL.
  The graph will show two flat curves, where the HTL values represent 0% and the UCL represent 100% of the dynamic range.

- Click the **HF** (**HI/Standard Range**) icon to extend the high frequency range on the horizontal axis to 16 kHz. Click the icon again to switch to a graph showing the standard audiometric frequency range of 125 Hz - 8 kHz along the horizontal axis.
- Select **Extended Range** to test at levels beyond 95 dB SPL.

In all the views the horizontal axis displays frequencies in terms of Hz.

Step Level

- Select **1 dB, 2 dB, or 5 dB Steps** if you wish to adjust the input level in steps of 1 dB, 2 dB, or 5 dB correspondingly.

UCL Limiter

- Select **None** if you do not wish to receive a warning, when you try to present a stimulus at a level beyond the UCL level for the current client. This level will be calculated automatically on the basis of the HTL levels, unless a measured UCL curve is available.
- Select **UCL** (from the range +10 to -15) if you wish to receive a warning, when you try to present a stimulus at a level at or beyond the UCL level for the current client.

The UCL limiter should not be confused with the Extended Range. For a better understanding of the UCL Limiter function, first enable the Overlay: UCL Disabled Area and then try to vary the selections and see what happens. Also, try presenting signals below and above the selected limit (preferably with no client present).

10.2.2 Informative overlays in audiograms (in the top bar)
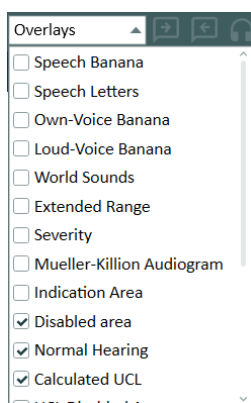
A number of informative overlays are available to provide further information about the current workspace. They may come in handy, when you are counselling clients about their hearing loss and its remediation.

The overlays available for pure tone audiometry are:

Overlay	Description
Speech Banana	The range of frequencies and levels within which most of the speech energy occurs at normal speech level.
Speech Letters	The speech sounds of normal conversation for the chosen language of the application (English, Danish, Italian, Spanish or other), distributed graphically in the speech are according to their

Overlay	Description
	respective frequency and intensity.
Own-Voice Banana	The range of frequencies and levels at which an average adult man hears his own voice.
Loud-Voice Banana	The range of frequencies and levels within which most of the speech energy occurs at an elevated speech level.
World Sounds	Examples of different, well-known sounds from the environment. Click a symbol to present the corresponding sound example to the client.
Extended Range	The measurement range beyond 100 dB SPL.
Severity	The range of frequencies and levels showing various degrees of the hearing loss - from mild to profound.
Indication Area	Adds an indication area of 30 dBHL from 500 to 4000 Hz to the audiogram.
Mueller-Killion Audiogram	The Mueller Killion Audiogram is based on the count the dots audiogram.
Disabled Area	The area within the audiogram that is not available for the selected transducer and measurement.
Normal Hearing	Normal hearing represents an intensity equal to the threshold sensitivity of the normal ear at each frequency.
Calculated UCL	The system automatically calculates UCL values on the basis of the HTL values. Calculated UCL values are only available, as long as no UCL has been measured.
UCL Disabled Area	The area that falls beyond the calculated or measured UCL level.
Indicators	Shows/hides warnings on the graph.
PTA	The Pure Tone Average for HTL, BCL, and FF will be visible in the top right-hand corner of the audiogram when measured. **Note:** The values will only be shown if thresholds are saved at 500 Hz, 1000 Hz, and 2000 Hz.
CPT	Hearing loss ratio according to the CPT-AMA table. **Note:** The values will be only shown if thresholds are saved at 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz.
AI	Articulation Index. The AI is used to predict speech intelligibility. An articulation index of 100% means that all speech can be understood and 0% means that no speech can be understood.
Dead Region	Dead region is used for the TEN test. Dead regions are regions in

Overlay	Description
	the cochlea with no or very few functioning inner hair cells.
Masking Level	The masking level will be shown for the side (or sides) on the diagram where masking is introduced.
20 dB HL Line	A line at the level of 20 dB HL.
14 dB HL Line	A line at the level of 14 dB HL.

10.2.3 Settings for Talk Over, Talk Back, Monitoring

Talk Over, Talk Back, and Monitoring Icons

Talk Over:

Click the **Talk Over** icon ⬚ to activate this function (enabling you to talk to the client through your microphone). The icon will be highlighted to show that it is active. Your voice will be presented in the selected transducers.

Note: If the **Talk Back** icon is highlighted at the same time as Talk Over, the Start Talk Back with Talk Over function is active in the **Settings > Audiometry > Talk Over/Back**.

Talk Back:

Click the **Talk Back** icon ⬚ to activate this function (enabling your client to talk to you through the client microphone). The client's voice will be presented in your headphones.

Monitoring:

Click the **Monitoring** icon 🎧 to activate this function (enabling you to monitor the stimulus signal through your headphones).

Note: The Talk Over and the Monitoring function cannot be active at the same time. Talk Over will gain prevalence over Monitoring, if both are selected.

Measurement Setting panel

To adjust the TO/TB or Monitoring level, click the Measurement Settings icon ⚙ and use the sliders to adjust the required level.
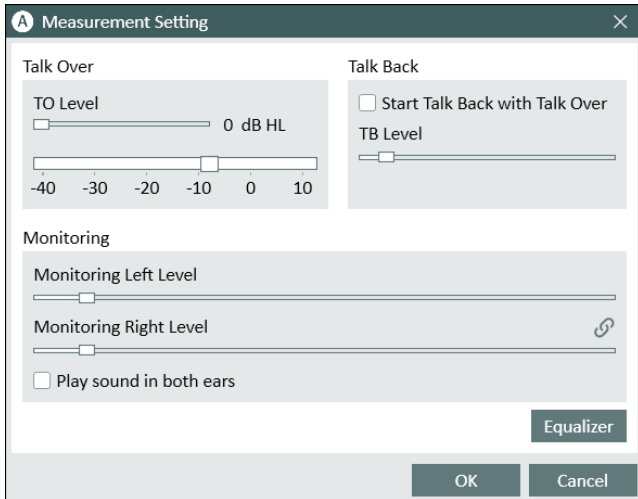
TO Level is always displayed in the top panel to the right of the Measurement Settings icon ⚙. This allows you to adjust the TO level quickly (if applicable) without the need of re-opening the panel again.

TO Level adjustment is shown in dBHL. To make the **TB Level** lower, move the slider to the left and move the slider to the right to make the level higher. The same controls apply when adjusting the monitoring levels.

The input level into the TO circuit can be observed on the VU meter, located below the TO level control. The sensitivity of the input stage is adjustable by using the little slider button alongside the VU meter.

Sensitivity is adjusted correctly if the VU meter bar does not turn yellow. To allow watching the input signal or correcting the sensitivity without opening the setup window, a similar VU meter with integrated sensitivity slider is visible beside the Audiogram grids.

Enable the **Start Talk Back with Talk Over** option if you want talk back to start automatically when you start talk over.

NOTE: If your hearing is similar on both ears, first click the chain icon between the sliders. This will allow you to move both sliders simultaneously.

To route single-sided signals to both sides of the monitor headset, check the box **Play sound in both ears**.

Monitoring equalizer

Click **Equalizer** to improve sound quality by fine-tuning specific frequencies.
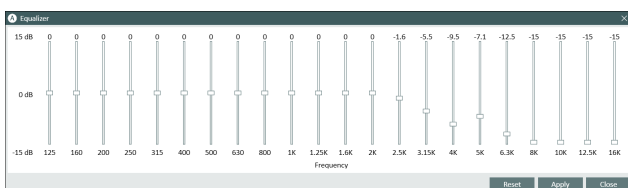
Drag the frequency sliders up or down to increase or decrease the volume of a frequency in dB. Click **Reset** to reset settings for a headset default.

10.2.4 Test Types (to the left)

The Test Types panel is found in the top left-hand side of the measurement workspace. Click the triangle to open or close the panel. Use the Test Types panel to select the current test type.
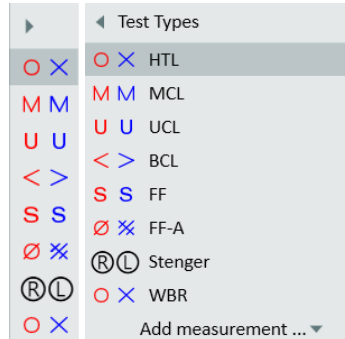
The Test Types panel in its closed (left) and opened state (right) respectively.

You can create three additional measurements for each test type (maximum value is 4 except for SISI and Stenger) by selecting the **Add measurement** button.

Once three measurements for a test type are created, the test type becomes disabled (grayed) and a max reached message is shown.

Note: When a test type is added from the Add measurement drop-down menu, it will be auto selected.
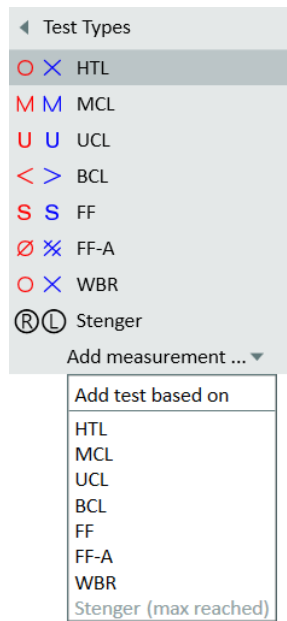
You can also define the primary measurement by clicking the star icon to use the curve in other modules, i.e. target calculation in REMs.

Or right-click directly on the curve to set the main test type:
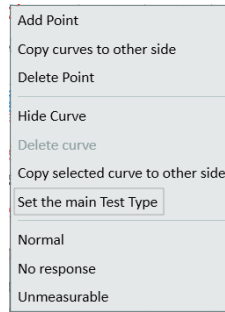
The start settings for the test will be set automatically in accordance with the selections in the **Test Definitions** menu. This means that usually you do not need to change any settings before you can start measuring. You can also make a temporary custom change to your test by right clicking it and selecting **Edit test definition**.

See more about the individual test types in the section: ["Pure Tone test options in Measure"](#).

10.2.5 Legends and editing of curves (to the right)

The Legends panel provides a total specification of each curve in the audiogram. It also allows you to edit the curves.

When the panel is closed, each measured curve is indicated on the surface of the panel by means of its audiometric symbol and color. An explanation to these symbols is found in the "Audiometric Symbols" legend.

- Click the < icon to open the panel.

Inside the panel you see a line of icons at the top of the Legends panel, followed by a list of all the available curves in the audiogram. The legend for the currently selected curve is highlighted by a darker background color. At the bottom of the legend area for the currently selected curve, you see two more icons.
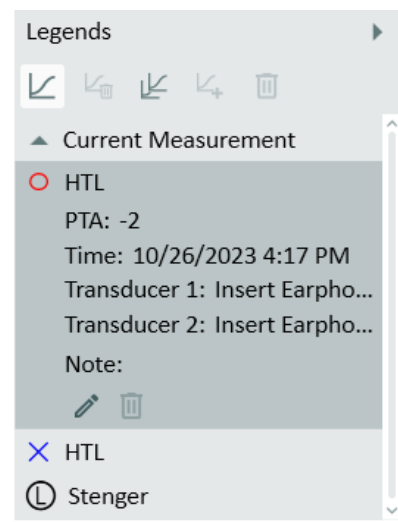
Selecting a curve

- Select a curve either by clicking the curve in the legend or by clicking a point on the curve in the audiogram. Clicking a point on the curve will automatically select the corresponding test on the Measurement Controls panel.

The curve legend

For each measured curve the legend informs of:

PTA: The calculated pure tone average for the curve. As opposed to the other data, this value is not saved with the session. It is calculated on the basis of the current PTA settings in the

Measurement Controls panel.
Time: A time stamp which shows, at what time the curve was measured. (See also Historic curves).
Test type and ear.
Transducer model used for stimulus signal.
Transducer model used for Masking or Channel 2 signal.
Note: Click at the *Type notes here* space. A space for writing a short note now appears next to the text **Note:**. This note will replace the above data as tool tip when you point to the corresponding curve in the diagram. The note will be saved with the curve.

Icons for curve editing in the Legends

These icons are found at the top of the Legends panel.

- To hide a selected curve, click the *Show/Hide selected curves* ⬉ icon. The curve will disappear from the display, and the legend will appear dimmed. To show a hidden curve again, select the curve description for the dimmed curve in the legend and click the ⬉ icon. Alternatively, you can select/clear the checkbox *Show/Hide curve*, to the right of the legend's first line.
- To delete a selected curve, click the icon ⬉ .
- To copy selected curves from one side to the other, click the icon *Copy selected curve* ⬉ .
- To copy a selected historical curve to the current measurement, click the *Copy historical curve* icon ⬉ . This icon becomes active only if a historical curve has previously been shown as a shaded curve in the measurement.
- To delete all curves at a time, click the icon *Delete all curves* 🗑 .

Icons for editing of single points on the curve are available at each curve legend. See below.

Icons for editing single points on the curve

These icons are found at the bottom of the selected curve legend.

- To edit a selected point on the curve, select the point on the curve and click the **"Pen"** (**"Edit point"**) icon. You now get access to a small menu allowing you to mark the selected point "Normal", "No response", or "Unmeasurable".
- To delete a selected point on the curve, select the point on the curve and click the **Delete point** icon.

As an alternative to using the icons in the legends panel, if you right-click a point on a curve in the audiogram, you open a small menu which allows you to perform the same editing - plus the options to add a point to the curve without measuring and copy curves to the other side.
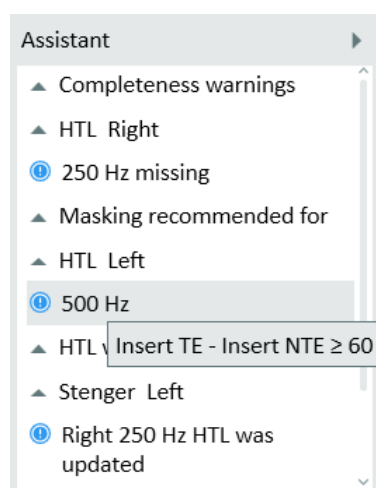
```
Add Point
Copy curves to other side
Delete Point
Hide Curve
Delete curve
Copy selected curve to other side
Set the main Test Type
Normal
No response
Unmeasurable
```

Note: If a point on the curve is marked as "No response" or "Unmeasurable", it will be bypassed by the curve that connects the valid audiogram points.

10.2.6 Assistant panel

The assistant panel provides warnings concerning the quality of audiograms and masking recommendations.

To enable masking assistant, go to **Tools > Test Definitions**, choose an HTL or BCL test set, go to the **Masking assistant** tab and check the box **Enable masking assistant**. Relaunch Measure for the change to be applied.

```
Assistant                          ▶
▲ Completeness warnings
▲ HTL  Right
ⓘ 250 Hz missing
▲ Masking recommended for
▲ HTL  Left
ⓘ 500 Hz
▲ HTL ⌐Insert TE - Insert NTE ≥ 60
▲ Stenger  Left
ⓘ Right 250 Hz HTL was
   updated
```

Point your mouse to a certain frequency to see which rule has been implemented.

Rules

1. HTL:
   a. AC TE – AC NTE ≥ IA
   b. AOBG: AC TE – BC NTE ≥ AOBG

      ABG: AC TE – BC TE ≥ ABG

2. BCL
   a. BC TE - BC NTE ≥ IA

Term	Definition	Comments
TE	test ear	
NTE	non-test ear	
AC	Air conductor transducer	
Insert	Insert transducer	
IA	interaural attenuation	IA can be a single value or frequency specific. To learn how to configure IA, refer to 4.1.2 Configuring test definitions
AOBG	air opposite bone gap	difference between BC NTE and HTL TE
ABG	air bone gap	difference between BCL TE and HTL TE
BC	bone conduction	

10.2.7 The Measurement Controls panel

Using the Measurement Controls panel

The Measurement Controls panel is located below the audiograms. This is where you change measurement conditions, start test signals and store points for the ongoing measurement in the chart.
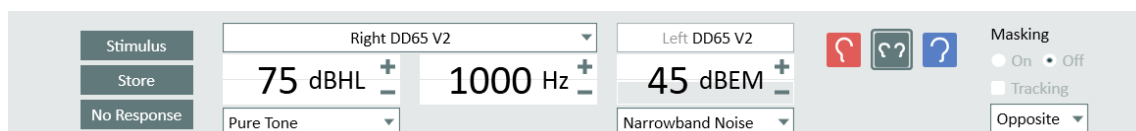
Click the **down arrow** in the top right of the measurement panel to collapse the panel or the **up arrow** to expand the panel again.

Using the Measurement Controls panel with AuditBase System

You can access the Measure Measurement Controls panel directly from AuditBase System once you have a full installation of Measure running on your PC. When the Measure Measurement Controls panel is opened from AuditBase, you will find the following differences and limitations compared to the Measurement Controls panel you see in Measure:

- Switch between Pure tone and Speech measurements using the arrow buttons.
- Choose the test type (HTL, MCL, UCL, Automated testing, etc.) in the drop down list using the white arrow buttons.
- Masking tracking feature is active.
- Binaural measurements cannot be stored in AuditBase - they can be performed via the Measurement Controls panel but will not be stored in AuditBase.
- The UCL Limiter is not available in the AuditBase-Measure control panel.

Measurement Notes

Just above the Measurement Controls panel (see below) you find another field for entry of notes for the current pure tone audiometry session. It is possible to enter more than one line of text.

- Click inside the field at **Type notes here** to make a text cursor show up. Then enter the text.

The note will be saved with the current session and will also be visible below the diagram on the Audiogram front page.

You can also add notes to the individual curves. This was described in "Legend and editing of curves" above.

Always-On-Top Panel

If you click the **Detached Panel** button ▣ in the right-hand end of the Measurement Controls panel, a detached copy of the panel will appear on the screen. This panel will always remain on top of other applications. To close it again after use, click the **X** in the top right-hand corner of the detached panel.

Use Extended Range safely

Always take care not to expose the client to unwanted high sound level pressures. If you try to test at levels beyond 99 dB SPL, a warning text will appear on the screen. You must then click the **Extended Range** button to get access to the extended range.

Note: Remember to de-select the Extended Range setting as soon as it is no longer needed, as the Extended range will stay enabled when the ear side is switched or the frequency is changed.

When the **Extended Range** check box on the Top bar panel is selected, a red field will show up at the centre.

Pure Tone Audiometry Controls

In the default setting, the display will open in the standard pure tone audiogram mode, showing audiograms for right and left ear, with frequencies along the X-axis and dB HL along the Y-axis.
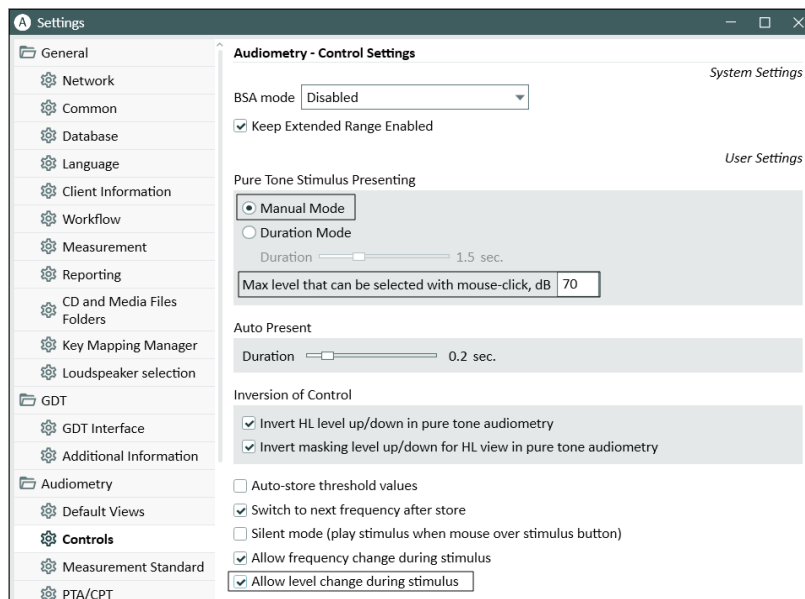
Stimulus

Click to present or stop the stimulus selected for each test type or press the SPACEBAR on the keyboard.

It is also possible to present the stimulus and adjust the dB level with a mouse by placing the mouse pointer to a desired level and clicking and holding down the left mouse button.

To present a tone with the mouse, do the following:

1. Go to **Tools > Settings > Audiometry > Controls**.
2. Select **Manual Mode** in the **Pure Tone Stimulus Presenting** section.
3. Ensure that **Allow level change during stimulus** is enabled.

4. Set the maximum level to present a stimulus when you use a mouse (by default, it is set to 70 dB), like it is shown in the image below:

5. Click **Save** and open a new PT measurement.
6. Right-click the test type, click **Edit Test Definition** and ensure that **Stimuli when pressed** is selected from the Interrupter field.
7. Select a test type, a transducer and a signal type. Put a mouse pointer to the level you specified in the Settings and start moving the mouse up and down by holding down the left mouse button. Pulling the mouse cursor down with the left mouse button pressed will get you to higher levels.
8. The Stimulus is playing without any interruptions. **Note:** The frequency level does not change when you move the mouse pointer left and right.

Store

Press **S** on the keyboard or click **Store** on the Measurement Control panel to mark a point on the audiogram.

No response

Click to store no response to mark the point in the audiogram.

Transducer Selection

The current selected transducer is shown under the Level selection, which can be changed directly from here. Click the drop-down arrow on the right hand side to open the list of available transducers and switch to another one. In case the transducer set as default is not connected to the board, it will be shown with a [NOT CONNECTED] tag after the transducer name.

Signal Type Selection

Use the drop-down list to select the stimulus signal you wish to use.

When a pulsed signal is presented into a client's headset, the indicator in the Transducer's selection field will blink red after you click **Stimulus**.

Frequency and Level Selection

To select the start frequency and level, use the "+" and "-" buttons alongside the Level and Frequency values shown in the centre of the Measurement Controls panel. Alternatively, you can use the arrow keys on the keyboard: UP ARROW and DOWN ARROW to change the levels, and LEFT ARROW and RIGHT ARROW to change the frequency. You can also click on the relevant point in the audiogram.

You can set the cursor to move in a specific frequency sequence within the audiogram. To set this function, do the following:

1. Open **Settings > Audiometry > Controls** and check the option "Switch to next frequency after store".
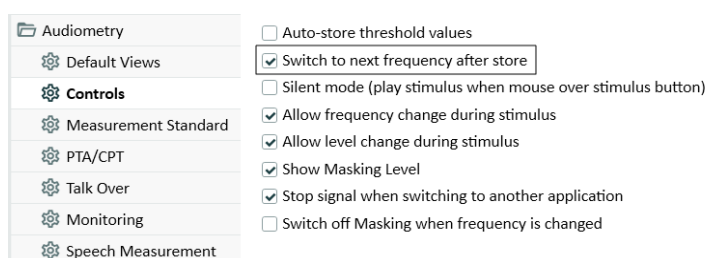
2. Now go down to **Tools > Test Definitions > Pure Tone**, edit the test definition and, in the Frequency tab, select the frequency you want to test for the desired test type and order the sequence using the up and down buttons.
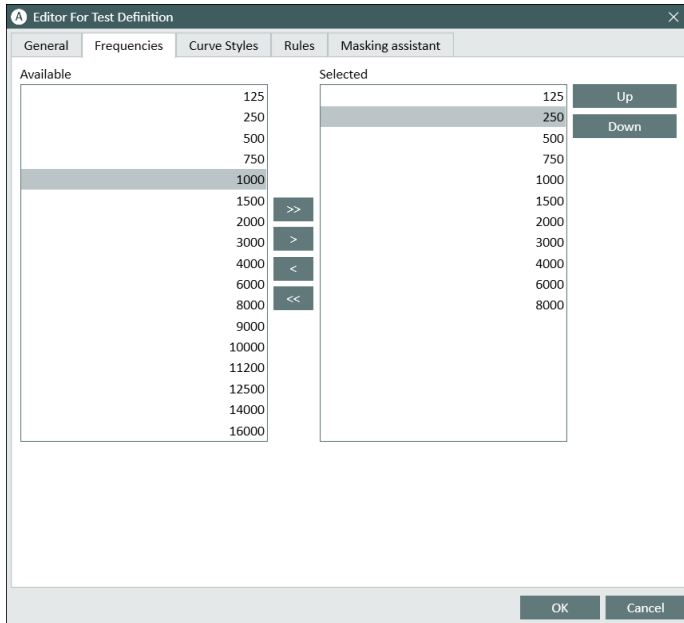
3. Click **OK**.
4. Open the Pure Tone Measurement window, the cursor will start on the first frequency set up in the sequence. After saving the threshold, the cursor will automatically jump to the next frequency in the same order specified in the Test Frequencies settings before (e.g. 4000, then 125, then 1500, etc. as indicated on the above image).

The cursor will also move along the frequencies specified in the **Tools > Test Definitions > Pure Tone** when using the keyboard, but with a minor difference. When pressing the right arrow, the cursor will move right within the frequency range set in the Settings but in the ascending order (in our example, 125, then 500, then 750, etc).

Ear selection

To select a test ear, click the **Right Ear**, **Both Ears** or **Left Ear** symbol in the left-hand end of the panel - or click in the Right or Left audiogram.

Settings for masking and Channel 2

Masking

Click the **On** button below the title Masking to start the masking stimulus. You may set the masking level using the "+" and "-" buttons to the left of the ear symbols. You can change the type of masking noise by clicking the arrow showing the **Noise type** selection box below the

masking level setting. To disable masking again after the test, click the Masking button **Off**. Masking levels are displayed either in dbSPL (when retSPL = 0) or in dbEM (effective masking). Effective masking means it is efficient enough to mask the corresponding stimulus level.

On the measurement panel, the masking transducer is shown under the Level on the left hand side. This can be changed by clicking the drop-down arrow on the right hand side to open the list of available transducers and switch to another one.

After masking is applied, you can see the masking values (for AC and BC tests) in the table for each ear (under the audiograms).

Note: If there is no measurement with the masking, empty HTL and BCL will be shown.

The masking values will be also shown in the table on the audiometry reports.

Channel 2

Settings for the two channel audiometry can be selected when editing the test definition under **Tools** > **Test Definitions**.

Select 2 Channel in the dialog box and specify the appropriate signal type and transducer. Also, set the default level and masking side. It is possible to select the following stimuli for 2 Channel: Pure Tone, Pulsed Pure Tone, White Noise, Narrowband Noise, Pulsed Narrowband Noise, Speech Noise, Warble, Pulsed Warble.
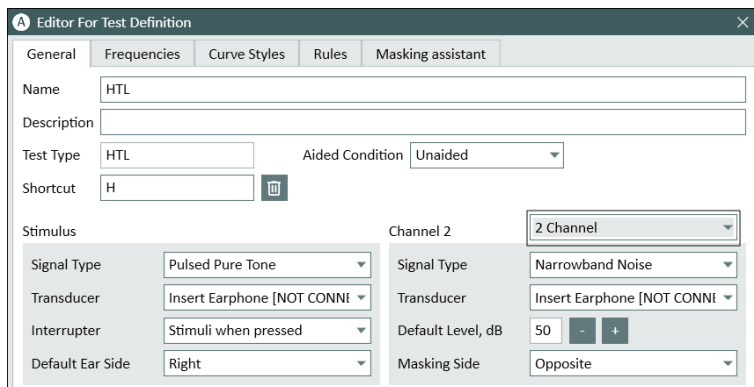
The controls for Channel 2 appear on the right side of the Measurement Controls panel as Stimulus 2 in the same place as the masking controls.

You can choose to lock the stimuli presentation, so stimulus 2 is presented simultaneously with stimulus 1, by checking the box Locked or you can operate the stimuli by separate stimulus buttons (Stimulus and Stimulus 2).

You can choose to let the stimulus level for Channel 2 follow the changes of the stimulus level for channel 1 by checking the box Tracking.

You can choose to present the channel 2 stimulus in the Same, Opposite or Both sides.

10.2.8 Further Settings Options

See [Settings - Audiometry](#) for further settings options, such as Keep Extended Range Enabled, Inversion of Control, BSA Mode and others.

Dichotic Tests

To start a dichotic test, select Both Ears from the Measurement Controls panel. The dichotic test settings will appear instead of Masking settings.
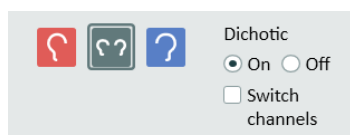
By default, the second channel sound will be played in the left ear and first channel in the right; you can quickly switch the channels by enabling the **Switch channels** option.

Procedure

1. Select both ears mode.
2. Select a transducer.
3. Turn on dichotic test and press **Start** to begin the test.
4. Enable **Switch channels** and start the measurement again. Now masking will be played to the right ear and stimulus to the left ear.

Note: UCL test type becomes inactive if dichotic tests are enabled.

10.2.9 Lower Area

The Lower Area consists of buttons that work on the entire Pure Tone task. Similar buttons are found in the measurement windows for REM, Speech Mapping, and HIT.

The fields and buttons are:

History Data

This button opens the repository with data sets from the client's fitting history. You can use these curves to compare with or to replace the current curve set. You cannot import single curves at this point.

1. To select an old curve set for comparison or replacement, click the button **History Data**. Then click the relevant **curve set** in the History Selection window. **Note:** you can select more than two curve sets for comparison.
2. Either: click the button **OK** to import the curve set as shaded "shadow curves" for comparison with the one in the display - or: Click the button **Copy Session** to import

audiometric data from the old session.

Note: A warning will appear at this point, as this action will cause the old data to overwrite the current data.

Clear History

If you have imported an old curve set as "shadow curves" for comparison, click the button **Clear History**, to remove the historic curves from the display. This will only remove the curves from the display, not delete the old curves in the file or database system.

Note: You will not be able to clear history if you have selected **Copy Session**.

Save

- Use this button to save the measurement data in the NOAH or Measure database.
  This button is not active, if you are using Measure as a stand-alone unit. In that case, export the entire session to the client's file, before you close the session.
- If you are viewing an earlier measurement, there will be no **Save** button. Instead, you will find the button **Copy to New** (see below).

Copy to New

- Earlier measurements (that is, not from the same date) cannot be edited directly. If you are viewing such data in the measurement workspace, the **Copy to New** button will be available in the Lower Area below the Measurement Controls panel instead of the **Save** button.
  Click the **Copy to New** button in order to create an editable copy of the measurements. The time stamp of the measurements will change to today's date and time, and you are now able to perform new measurements. In most of the tests, performing a new measurement will overwrite the old curve. If other tests are dependent on that curve, a warning will also appear that these curves will be deleted. At that point you have the option to click **OK** to continue with the measurement or to click **Cancel** in order to cancel the measurement and keep the previous curves.

Note: When trying to edit the existing curve, a warning message is displayed where you can choose to edit a copy of that measurement, or to start a new measurement.

Print

- Use the **Print** button to obtain a print of the diagrams shown in the current measurement task, stamped with the name and key data of the client.

Close

- Use this button to close the Pure Tone Audiometry window and return to the main screen. If unsaved data are present in any of the pure tone audiometry tests, a warning will appear in the status bar.

Show/Hide Client View (of audiograms)

A dedicated Client View is available, if you have an extra monitor screen for the client connected to your computer. If not, this button is not selectable.

In the dedicated Client View of the audiometric tests, the overlays described earlier in this section can serve as good tools to illustrate your explanations.

- Click the button **Show/Hide Client View** to turn the Client View display on or off. If you have installed a separate monitor for the client, the Client View will automatically appear on this monitor.

See more about general use of the Client View in ["Using Client views"](#).

10.2.10 Hughson-Westlake Method

The Hughson-Westlake, or the so called 'up 5 dB -down 10 dB' is the modified Hughson-Westlake technique as the original method has been changed slightly.

The threshold is defined as 2 out of 3 (or 3 out of 5) correct responses at a certain level in a 5 dB increase and 10 dB decrease test procedure.

To perform audiometry using this method, do the following:

1. Open the test definition for the **Pure Tone** module.

2. In the **Stimulus** section choose **Auto Present** from the **Interrupter** drop-down list.

3. Click **Ok** to save the setting.

4. Perform Audiometry as normal using the key board - press and hold the up or down button to present a stimulus.

10.3 TEN Test

The TEN (HL) test CD is used for diagnosing dead regions in the cochlea. Much of the work into dead regions has been conducted by Professor Brian C.J. Moore of the Department of Experimental Psychology at the University of Cambridge, UK The CD must be purchased separately for use directly from the university.

Note: Further information about how to obtain the test material can be found under https://www.psychol.cam.ac.uk/hearing/cds-for-diagnosis-of-dead-regions-in-the-cochlea-2013-ten-hl-and-ten-er3

If dead regions are present, it can have important impact for fitting hearing aids and predicting its benefit. When a patient has a dead region, there may be little or no benefit from hearing aid amplification for frequencies well inside the dead region (Moore 2009).

Procedure

The TEN Test is performed according to the methods described by Brian Moore. Please refer to your TEN Test CD for more information.

1. Select HTL test and conduct Pure Tone audiometry as normal.
2. Select the TEN test type.
3. Select the TEN (HL) CD from the media player panel.

4. Select the Calibration CD icon ⬚ from the media panel.
5. Select the calibration track from the calibration dialog box and select **Start calibration**. Adjust the calibration tone using the '+' and '-' buttons so the VU meter is around 0.
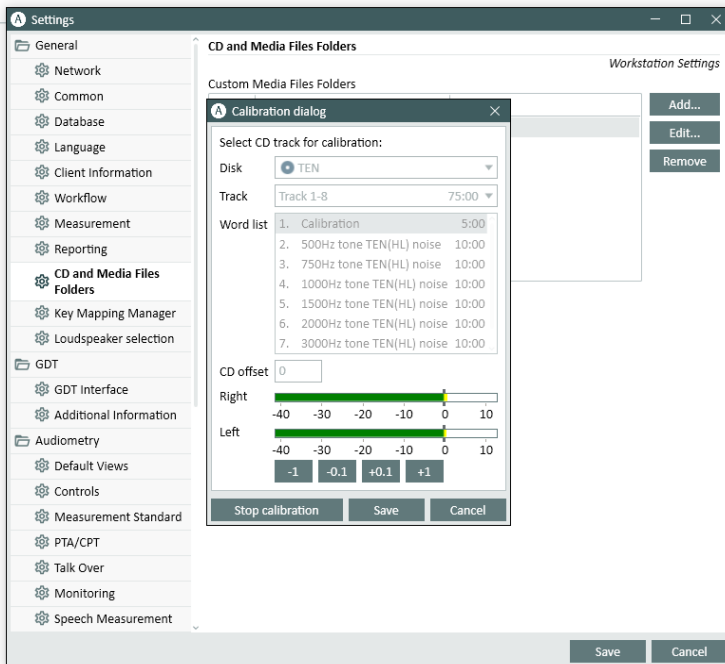
6. Click **Save**.
7. Select 2 dB steps change from the top panel.
8. Select the ear you wish to test.
9. Switch the TEN (HL) noise on from the control panel to present the masking noise in the same ear.
10. Measure the masked threshold of each ear from 500 Hz till 8000 Hz, using tracks 2-8 of the CD.
11. Switch the Autolevel functionality on. This will automatically set the TEN (HL) noise level to 70 dB where HTL is lower than 60 dB. If the HTL is between 61 dB and 80 dB, the TEN (HL) noise level will automatically set to HTL +10 dB. Where HTL is between 81 dB and higher, the TEN (HL) noise will automatically set to
    90 dB.
12. Conduct the normal masking procedure for pure tone audiometry.

The criteria for diagnosing a dead region at a specific frequency are:

1. The Masked threshold is 10 dB or more above the TEN level.
2. The Masked threshold is at least 10 dB or more above the audiometric (absolute) threshold.
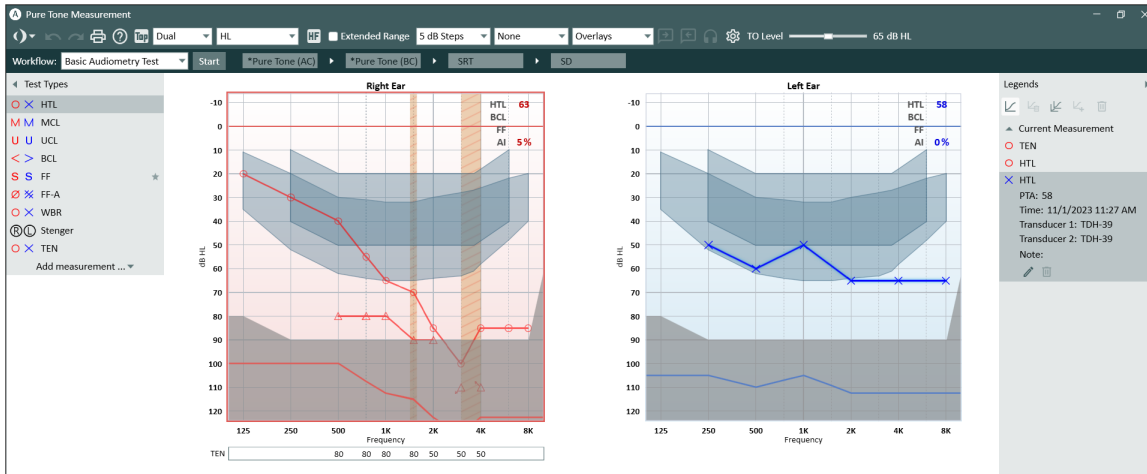
The circles show the audiometric (absolute) thresholds. The "TEN" symbols show masked thresholds measured for TEN with a level of 70 dB HL. The TEN (HL)-test criteria for a dead region are met at 1500 Hz, 3000 Hz, and 4000 Hz (Right side).

Having the dead region overlay selected, will highlight the dead regions on the audiogram.

10.4 SISI Test

SISI is designed to test the ability to recognise 1 dB increase in intensity during a series of bursts of pure tones presented 20 dB above the pure tone threshold for the test frequency. It can be used to differentiate between cochlear and retrocochlear disorders as a patient with a cochlear disorder will be able to perceive the increments of 1 dB, as where a patient with a retrocochlear disorder will not.

Procedure

1. Select the **HTL test** and conduct the normal Pure Tone measurement.
2. Select **SISI test** and then choose the headset you want to use for the SISI test.
3. Right click SISI test and select **Edit test definition** to adjust the SISI settings to your preference. The default settings are shown below.
   NOTE: Setting the test to 1 dB increment is considered to be a classical SISI test. If a patient is able to hear these increments and scores high, it is likely to be the cochlear damage. You may also choose 0 dB, 2 dB, or 5 dB increments.

4. Instruct the client.
5. Select the Carrier tone.
6. Click **Present** to manually present an incremental practice tone. You can present as many practice tones as you want.
7. Click **Stop** and Select start to begin the automatic test. The automatic test is set as default of 20 presentations at 1 dB increment.
8. The results are calculated and shown in the tables under the graphics.

10.5 Automated Audiometry Test

Measure automated air conduction test (Auto Test) is based on the Hughson-Westlake ascending method of threshold testing (up 5 dB, down 10 dB). After configuring the test under **Tools** -> **Test Definitions**, you can begin automated testing by pressing the **Start** button in the **Pure Tone** module. The test will run until completed or interrupted (by pressing the **Stop** or **Pause** buttons).

Using the patient's response, Measure applies the configurable Hughson-Westlake protocol to provide a reliable, accurate, and time-efficient hearing assessment. For more information on this technique, see the *Hughson-Westlake Method* topic in the [Set-Up and Editing for Pure Tone Audiometry](#) section.

Test Configuration

Similar to manual testing, Measure **Auto Test** contains a range of parameters that can be configured to suit user preferences. To start the configuration:

1. Go to **Tools** > **Test Definitions** > **Pure Tone** and then add the definition for the test.
2. The **General** tab settings are the same as for other Audiometry tests, with a few exceptions - there are no Masking settings and the interrupter is always set to **Stimuli when pressed**.

3. Select the **Frequencies** and **Curve Styles** tabs to add required frequencies and configure curve color and symbols. These settings are the same as for all other Audiometry tests.
4. The **Auto Test** tab contains the following test-specific settings:

- **Threshold determination** - threshold can be defined as **2 out of 3** or **3 out 5** correct responses at a certain level
- **Initial descending step, dB** - initial decrease in tone intensity if the first tone is heard. Used to define the first time the patient does not hear the tone (after the patient has provided one or more responses at that frequency).
- **Initial ascending step, dB** - initial increase in tone intensity to obtain the first response if the first tone is not heard
  Note: You do not use these tone presentations when you are calculating whether the patient heard the signal.
- **Descending step, dB** - the amount by which intensity decreases with each step
- **Ascending step, dB** - the amount by which intensity increases with each step
- **Minimum level, dB** - the threshold defining a stopping point for a test
- **Fixed-length tone, ms** - check to present a fixed-length tone (in milliseconds)
- **Randomize tone length between, ms** - if fixed-length tone not checked, the sound will present for a random length (in the defined range of milliseconds)
- **Interval between tone, ms** - define the interval between tone presentations
- **Disable response button after tone ends, ms** – if the client presses the response button after the specified amount of time, it will be ignored
- **Enable end-of-test signal** – the signal will be played upon test completion

Click **OK** to complete the configuration and restart Measure to apply the changes.

Procedure

1. Open the **Audiometry** module and select the automatic test type.
2. Click the **Start** button to begin the automated testing. You can pause the test or stop it by clicking the **Stop** and **Pause** buttons.
3. Thresholds will be saved according to the patient response and using the Hughson-Westlake technique. The **Stimulus**, **Store** and **No Response** buttons are disabled during test or when the test is paused.
4. If there is no consistency in patient's hearing the tone at a certain frequency, the threshold cannot be determined and is marked as **Unmeasurable**. Furthermore, if the patient does not respond to any tone presentations, the point is marked as **No Response**.

10.6 Stenger test

Stenger test is used to investigate a unilateral functional hearing loss to confirm whether the HL is non-organic unilateral. It is performed right after ordinary Pure Tone audiometry.

The test is designed to start at 10 dB HL above the threshold on the good ear and 10 dB below thethreshold on the "poorer" ear. The pure tones are presented simultaneously on both ears. The test person should respond to stimuli in whatever ear the tone is heard.

The principle of Stenger states that a person will only hear the louder of two identical tones presented to both ears at the same time.

Test Configuration

Go to **Tools** -> **Test Definitions** > **Pure Tone**, then choose **Add** > **Stenger test** and configure the definition for the test.

Procedure

1. Select the **HTL** test and conduct the normal Pure Tone measurement for both ears.

    Stenger is recommended if the audiogram is completely flat, the thresholds keep moving up and down, or the audiogram shows a large hearing loss, but the patient does not have any problems hearing you when you speak. Application of the Stenger test is only indicated if the threshold difference between the good and the bad ear is equal or larger than 30 dB.

2. Select **Stenger** test.

    The default frequency is 1000 Hz (defined in test definition), but it is possible to change frequency.

    At the selected frequency, the level is automatically set to 10 dB above the HTL (+10dB SL) on the good ear and 10 dB below (-10 dB SL) on the poor ear. The "poorer" ear is defined and selected automatically as the one that has a lower HTL. The first preselected frequency will be the one where the difference between HTLs for the two ears is at least 30 dB.

    All tested frequencies and the output of the Stenger test will be displayed in the table to the right of the Audiogram.

3. Present stimuli simultaneously on both ears.

    -   If the tested person responds to the signal applied, the test result is negative on the selected frequency. HL must be considered organic.

    -   If the tested person does not respond or answers that the tone is heard in the poorer ear, the result is positive. HL must be considered to be non-organic.

        To document the positive Stenger, click **No Response** – two symbols for bad and good ears' test levels are shown on the graph connected with a vertical dashed line.

    The Stenger test results and the CIL (Contralateral Interference Level) applied are listed in the table for tested frequencies.

Stenger Test results

Frequency, Hz	250	500	1K	2K	4K
Positive		X			
Negative	X				
CIL, dB	5	0			

4. Save measurement.

Stenger test results can be shown or hidden in the printable audiogram report. To print the report, click the Print icon 🖶 on the measurement panel.

You will get a print according to your selections in the Settings dialog box in the Tools menu. For more information, see Print Options.

11 Speech Audiometry

11.1 Speech Test Options

With Measure you can perform a wide range of speech-audiometry tests.

The following default test definitions are available:

Test	Definition	Description
SRT	Speech Recognition Threshold	Establish the loudness level at which the client responds correctly to at least 50% of the word presentations.
MCL	Most Comfortable Loudness	Establish the loudness level that the client finds most comfortable.
UCL	UnComfortable Loudness	Establish the loudness level that the client finds uncomfortable.
SD	Speech Discrimination	Establish the percentage of correctly repeated words. **Note:** For numeric view there are 3 separate data entries - SD, SD (2), and SD (3) allowing to specify score, level, and masking for every data entry.
SD-A	Aided Speech Discrimination	The same test as above performed with a hearing instrument in place and turned on. Compare with the unaided test to determine the improvement.
SD-SF	Speech Discrimination with Sound Field	The same test as **SD** performed with sound field loudspeakers.
SDN	Speech Testing in Noise	Unaided speech discrimination test taken in background noise.
SDN-A	Aided Speech Testing in Noise	Aided speech discrimination test taken in background noise.
Quick SIN	Quick Speech-in-noise test (only available in English and Spanish)	Provides a quick way for clinicians to quantify a patient's ability to hear in noise. The test may be presented via loudspeaker, insert earphones, or TDH earphones. The QuickSIN CD is required.

Transducers

The same types of transducers as for the pure tone tests are available for [speech testing.](#)

11.2 Set-Up and Editing for Speech Audiometry

As for pure tone audiometry, most of the changes to settings that you can make in this view, are only temporary and will not be saved with the session. If you want to make permanent changes

to the set-up, do so from the [Settings menu](#).

The local settings options within the Speech audiometry task are:

Top bar in measurement window

[Presettings on the speech audiometry top bar](#)

[Informative Overlays in speech audiograms](#)

[TO/TB/Monitoring settings](#)

Left-hand panels

[Test Types](#)

[Media Control Panel](#)

Right-hand panels

[Legends and editing of curves](#)

[Assistant panel](#)

Measurement Controls panel below diagrams

[Speech Audiometry Controls](#)

[Settings for masking](#)

Bottom area

See the description of History Data and Client View in ["Set-Up and Editing for Pure tone Audiometry"](#).

11.2.1 Presettings on the speech audiometry top bar

Selections in the top bar


General

- Click the **list** icon to the left of the pre-settings panel to open the list of all available modules. Select a module you want to move to. The current window will close and a selected one will open.
- Click **Undo** to cancel the last action.
- Click **Redo** to regret an "Undo" action.
- Click **Print** to open the Print menu.
- Click **Help** to open the Help function.

View

- Click the **Top** icon to open an extra measurement diagram which will remain on top of the other windows until closed, for example for use with a fitting program. If required, you can minimize the main Measure program while working with the On-Top Diagram.
- Click the **Show Tone Audiogram** icon to enable the display of the client's pure tone diagram to the right of the current measurement diagram.
- Select **1 dB**, **2 dB**, or **5 dB Steps** if you wish to adjust the input level in steps of 1 dB, 2dB, or 5 dB correspondingly.
- Click the **Input Source (Microphone/Media Player**) icon if you want to use the Operator microphone as input source for the tests. Click the icon again to switch to Media Player mode and to use sound examples via the Media Control Panel in your PC as input source for the tests.
- Click the **Point Details** icon to open the properties dialogue box for the point currently selected on the measurement diagram. Use the **Print** option to print out the point details.

11.2.2 Informative overlays in speech audiograms (in the top bar)
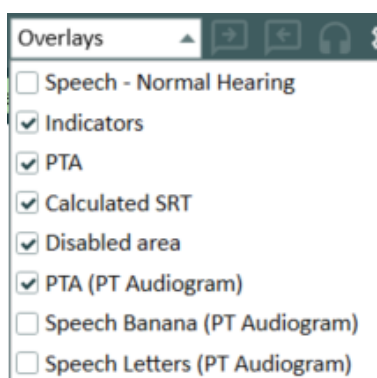
A number of informative overlays are available to provide further information about the current workspace. They are useful when counselling clients about their hearing loss.

The overlays available for speech audiometry are:

| Overlay	
Speech - Normal Hearing	Curves showing the normal performance-intensity function. The curve to the left displays the normal speech awareness function, and the curve to the right displays the normal word recognition function.
Indicators	Shows/hides warnings on the graph.
PTA	When selected, the calculated values of the PTA for HTL, BCL and FF will be shown in the upper right-hand corner of the measurement diagrams.
Calculated SRT	The system automatically calculates SRT values on the basis of already measured points.
Disabled area	This overlay indicates by means of grey shading the area

Overlay	
	that is not available for testing with the current measurement set-up and the selected transducers.
PTA (PT Audiogram)	The Pure Tone Average for HTL, BCL, and FF will be visible in the top right-hand corner of the displays, when measured.
Speech Banana (PT Audiogram)	The range of frequencies and levels within which most of the speech energy occurs at normal speech level.
Speech Letters (PT Audiogram)	The speech sounds of normal conversation, distributed graphically in the speech area according to their respective frequency and intensity.

Talk Over (TO)/Talk Back (TB)/Monitoring settings

The TO/TB/Monitoring settings are similar to the ones found for pure tone audiometry. See the description of the TO/TB/Monitoring settings in "Set-Up and Editing for Pure Tone Audiometry". There is an additional option found only in the Speech Audiometry module.

Gap In Noise Testing

When performing the Gap In Noise test, selecting **Both CDs Sound Chan. monitoring** will allow the tester to hear the beeps referring to the gaps in between the noise during testing via the monitoring headset.
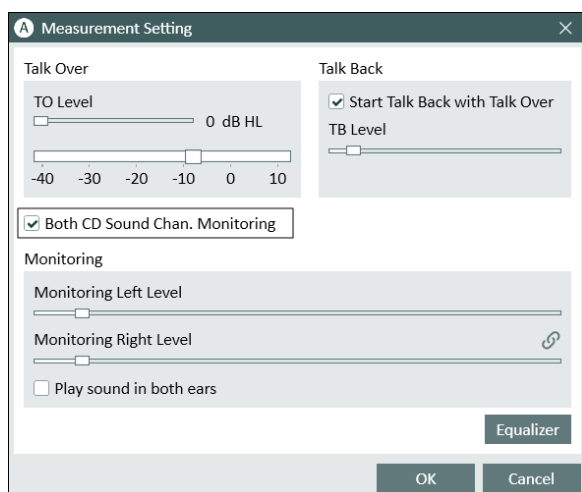
11.2.3 Test Types

The **Test Types** panel is found in the top left-hand side of the measurement workspace.

- Click the triangle to expand or collapse the panel. Use the **Test Types** panel to select the current test type.

You can create three additional measurements for each test type (maximum value is 4 except for Knaster test) in the same way as for Pure tone audiometry. Please refer to section "Test Types in Pure Tone Audiometry".

The start settings for the test will be set automatically in accordance with the selections in the **Test Definitions** menu. This means that usually you do not need to change any settings before you can start measuring. You can also make a temporary custom change to your test by right clicking it and selecting **Edit test definition**.

See more about the individual test types in the section: "Speech test options in Measure".
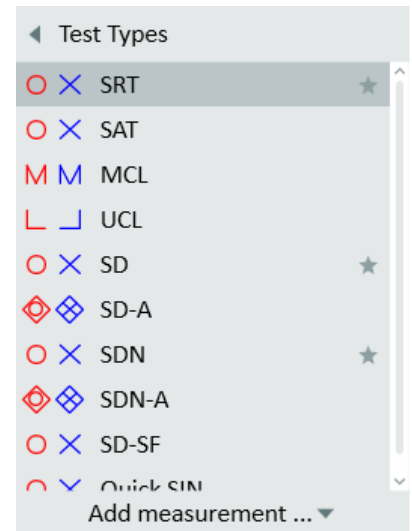
11.2.4 Media Control Panel

If the Media Control panel is collapsed, click an arrow (>) in the top to open it. From this panel you can control the stimulus presentation.

Selections on the Media Control Panel

CD tab

Select disk:

- If you have more than one CD-drive in your computer, click the triangle of this selection and select the drive that contains your Audio CD.

   Note: The CD you last used will be remembered by Measure for every test type by default.
- Or you can use your own sound files added in the **CD and Media Files Folders** settings.

Select track:

- Click the triangle of this selection and select the track that contains the word-list or sentences you wish to use for the speech test.

   The current selection will be shown below the selection box and
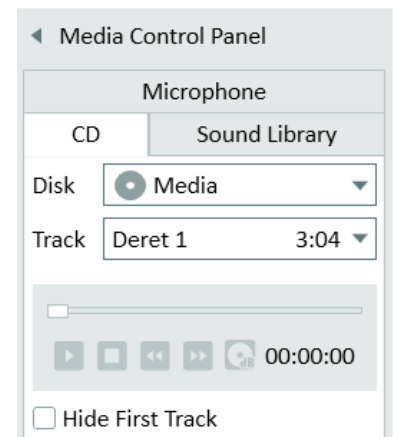
reflected on the Measurement Controls panel.

Note: If a word list scheme is provided for your CD, word lists will be shown instead of tracks. Below the list of word lists, the system will show tracks for the selected word list.

Progress bar:

- This bar cannot be edited. It shows the progress of the track that is currently playing.

Control buttons: Play/Pause - Stop

- When the CD is idle, the first button displays a triangle for Start. Click the **Play** button to start the speech material list at the selected track. The button now transforms into a **Pause** button (in the shape of two vertical bars). Click the **Pause** button, if you want to pause the list temporarily and continue from the same point a bit later.

- Click the **Stop** button (the second button on the row, displaying a square), if you want to stop the speech-material presentation and return to the start of the track.

- **Note:** Instead of using the **Play** and **Stop** buttons in the Media Control panel, you can use the **Start** and **Stop** buttons on the Measurement Controls panel or the **SPACEBAR** to start or stop the presentation.

Calibrate CD

CD calibration can be done not only in the system settings but also directly in the speech measurement module.

Select a CD or sounds folder from the Disk drop-down menu and click the **Calibrate CD** button to start CD calibration.

Perform calibration with selected speech CD or your own sounds folder and save it.

The calibration is stored linked to a specific speech CD which will help you to avoid calibrating the CD each time you are switching between different CDs.

 Note: The calibration can be different for each CD.

Fast Forward and Back Buttons

For the CDs that do not have any scheme, the **Fast Forward** and **Back** buttons are available on the **CD** tab. With every click on either of these buttons, you will move one second forward or back on a track.

As an alternative, you can use the slider to move to a specific place on a track.

Sound Library tab

Sound:

- Click the "..." button to open the sound library and select the desired sound example. The selection is reflected on the Measurement Controls panel.

Progress bar:

- This bar functions as for the CD option (see above).

Control buttons Play/Pause - Stop

- These buttons (a triangle and square respectively) work as for the CD option (see above).

Loop enable/disable:

- Use this button (recycling arrows) to make the sound signal repeat until stopped manually.

Duration of looped playing:

- This field shows the duration of the selected sound file.
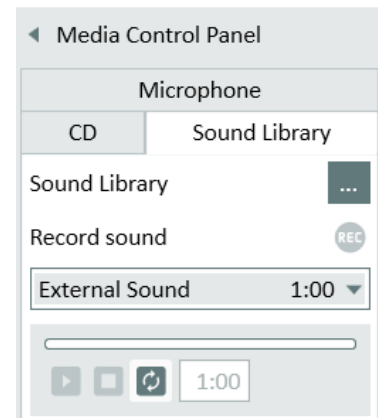
Record:

- Use the **Record** button to record a sound sample from one of the microphones connected to the system. Max. duration is 1 minute and only one sample can be stored. When recorded, the sample will become available for selection from the Sound library.

Collapse the Media Control Panel:

- To collapse the Media Control Panel, click the triangle in the top right-hand corner. The current settings will become visible on the closed panel.

Mic tab

This tab switches the Microphone on automatically. **Note:** The Microphone icon in the top bar functions in the same way.
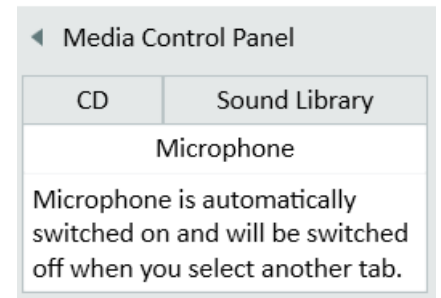
11.2.5 Legends and editing of curves

The Legends panel to the right of the audiograms, below the **Test Types**, is basically constructed in the same way as for the pure tone audiometry task. It provides a total specification of each curve in the audiogram. It also allows you to edit the curves. Read more about editing of curves in pure tone ["Legends and editing of curves"](#).

Note: Unlike pure tone measurements, the context menu of a speech measurement point has the **Show point details** command. This command will open the **Point Details** dialog box where you can see properties of the measurement point.
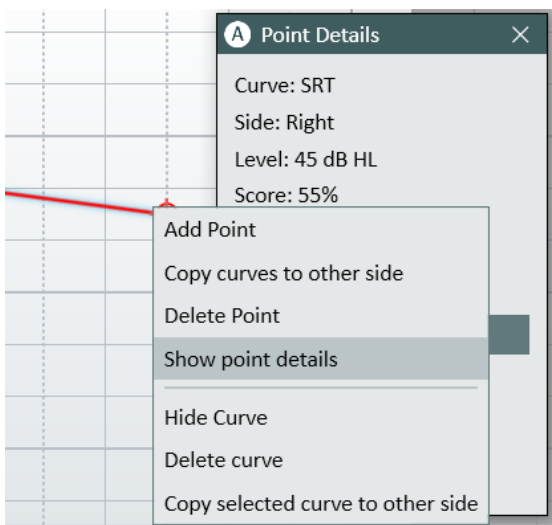
The curve legend

For each measured curve the legend informs of:

Test type, transducer, and ear.
Time: A time stamp which shows, at what time the curve was measured. (See also Historic curves).
Transducer model used for stimulus signal.
Transducer model used for masking signal.

> A space for writing a short note now appears next to the label "Note". This note will replace the above data as tool tip when you point to the corresponding curve in the diagram. The note will be saved with the curve.

11.2.6 Assistant panel

The assistant panel provides recommendations on missing frequencies and masking.

To enable masking hints, go to **Tools** > **Test Definitions** > **Speech**, choose an SRT or SD test set, go to the Masking assistant tab and check the box **Enable masking hints**. Relaunch Measure for the change to be applied.

Point your mouse to a certain frequency to see which rule has been applied.

Rules

1. SRT

   Rule checks if these conditions are both true:

   a. PL TE - SRT NTE < IA

      for SPL: PL TE - SRT NTE - ANSI cor (IEC, Japan, Sweden, Norway) ≥ IA)

   b. PL TE - Best BC NTE < IA

      for SPL: PL TE - Best BC NTE - ANSI cor (IEC, Japan, Sweden, Norway) ≥ IA)

2. SD

   SRT TE – SRT NTE > IA

   for SPL view / HL view: SRT TE – SRT NTE - ≥ IA

Term	Definition	Comments
TE	test ear	
NTE	non-test ear	
PL	presentation level	
Best BC	minimum BC threshold value in Pure Tone	
ANSI cor	ANSI correction or other applied standard for SPL view calculation	Values: Ansi cor = 12,5 dB IEC = 20 dB Sweden = 20 dB Norway = 20 dB Japan = 14 dB
IA	interaural attenuation	IA can be a single value or frequency specific. To learn how to configure IA, refer to 4.1.2 Configuring test definitions

11.2.7 The Measurement Controls panel

Using the Measurement Controls

The Measurement Controls panel is located below the audiograms. This is where you change measurement conditions, start test signals, score client responses and store points for the ongoing measurement in the chart. It resembles the Measurement Controls panel for pure tone testing, but contains a number of speech-test specific functions.

Always On Top Panel

If you click the **Detached Panel** button [icon] in the right-hand end of the Measurement Controls panel, a detached copy of the panel will appear on the screen. This panel will always remain on top of other applications. To close it again after use, click the same button once more, or click the **X** in the top right-hand corner of the detached panel.

Measurement notes

As for the pure tone audiometry task, you find a field for entry of notes for the current speech audiometry session just above the Measurement Controls panel (see below). It is possible to enter more than one line of text.

- Click inside the field to make a text cursor show up. Then enter the text.
  The note will be saved with the current session and will also be visible below the diagram on the Audiogram front page.

You can also add notes to the individual curves. This was described in "Legends and editing of curves" above.

Start

Click to start presenting the first word of the wordlist selected.

Stop

This will stop the test.

Store

Press **S** on the keyboard or click **Store** on the Measurement Controls panel to mark the point in the speech audiogram.

Speech Audiometry Controls

The current selected transducer is shown at the top of the Measurement Controls panel. Click the drop-down arrow on the right hand side to open the list of available transducers and switch to another one. In case the transducer set as default is not connected to the board, it will be shown with a [NOT CONNECTED] tag after the transducer name.

To select the start frequency and level, use the "+" and "-" buttons alongside the Amplitude value shown in the left side of the Measurement Controls panel. Alternatively you can use the arrow keys on the keyboard: UP ARROW and DOWN ARROW to change the amplitude. You can also click on the relevant point in the audiogram.

To select a test ear, click the **Right Ear, Both Ears, or Left Ear** symbol in the left-hand end of the panel to select a test ear.

Note: If a word list scheme is provided for your CD and use of phonemes is enabled in the Measurement Settings, the phoneme buttons will appear between the audiogram and the Measurement Controls panel, during the test.

Phoneme Scoring

In the **Tools** > **Settings** > **Audiometry** > **Speech Measurement** set up, you can choose how you wish to score by the Phoneme Scoring. For more information, please refer to [Audiometry Speech Measurement Settings](#).

Each Phoneme

This setting allows you to score each phoneme individually in a word. After selecting the correct phonemes, select the middle counter button **S** to score the word and move on to the next word.

Number of Correct

This setting labels each phoneme with numbers starting from 1 and ending with the number of phonemes in the current word. In this case, you can directly click the button with the number equal to the number of correctly responded phonemes, instead of scoring every phoneme of the word.

Settings for masking

- If masking is required, click **On** next to the title Masking.
- If you want the masking level to follow the test level at a given off-set, select Tracking.
- Choose the ear which the masking signal apply to: **Opposite, Same**, or **Both**.
- Then set the masking level by means of the adjacent + and - buttons.
- Use any sounds from the Sound Library for masking.
- Perform the **SRT** measurement at the required levels using masking.
- Remember to adjust the masking level if required, when adjusting the test level.
- When you click **Store**, the masked value will replace the corresponding unmasked value (if any) on the chart.
- Disable masking again after the test by clicking **Off** next to the title Masking.
- **Note:** Masking cannot be selected during the MCL and UCL tests.
- **Note:** Masking will always be on the same side for SDN and SDN-A.

Dichotic Tests

To start a dichotic test, select Both Ears from the Measurement Controls panel. The dichotic test settings will appear instead of Masking settings.

Note: Control panel for masking and dichotic tests is displayed after you select **On**.
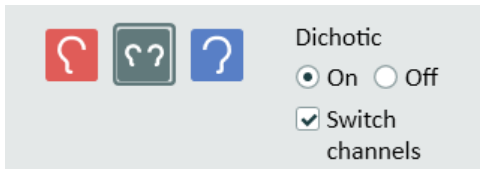
By default, masking will be played in the left ear and stimulus in the right, you can quickly switch the channels by enabling the **Switch channels** option.

Note: For these tests, a CD is required.

Procedure

1. Select both ears mode.
2. Select a transducer.
3. Insert CD and select the correct CD from the media panel.
4. Select the calibration track and calibrate the CD till the VU meter is 0.
5. Turn on dichotic test and press **Start** to begin the test.
6. Score the CD as normal.
7. Enable **Switch channels** and start the measurement again. Now masking will be played to the right ear and stimulus to the left ear.

Note: If you select Sound Library (from the Media Control panel) or the Microphone icon from the top bar, the dichotic function will automatically become inactive.

11.2.8 PTA Values in the Numeric View

PTA Values (for HTL, BCL and FF) measured in Pure Tone are shown if you select the Numeric View mode (right under the numeric table).

	Right - dB HL			Binaural - dB HL		Left - dB HL		
	Level	Masking		Level		Level	Masking	
SRT	10			15		20		
SAT								
MCL	40			30		35		
UCL	30			40		35		

	Score	Level	Masking	Score	Level	Score	Level	Masking
SD	90	10		100	10	80	10	
SD-A	90	50		100	50	80	50	
SD-SF								

	Score	Level	S/N	Score	Level	S/N	Score	Level	S/N
SDN	10	10		0	10		20	10	
SDN-A	10	50		0	50		20	50	
Quick SIN									

HTL (dB HL) 10 10   BCL (dB HL) 50 50   FF (dB HL) 60

11.2.9 Lower area

The buttons on this line are similar to the ones found in the pure tone audiometry task. Their function has been described in the pure tone section: "Lower area".

11.2.10 Save, Print and Close

These three buttons, placed in the lower area below the Measurement Controls panel, work on the entire Speech Audiometry view, and are similar to the ones found in the Pure tone audiometry task.

For a description of all the buttons and selections in that area, see the section "Lower Area" in "Set-Up and Editing for Pure Tone Audiometry".

11.3 Quick SIN Test

Difficulty with hearing in background noise is a common complaint among hearing aid users. Therefore, the measurement of SNR loss (signal-to-noise ratio loss) is important because a person's ability to understand speech in noise cannot be reliably predicted from the pure tone audiogram. The Quick SIN test was developed to provide a quick estimate of SNR loss. A list of six sentences with five key words per sentence is presented in four-talker babble noise. The sentences are presented at pre-recorded signal-to-noise ratios which decrease in 5-dB steps from 25 (very easy) to 0 (extremely difficult). The SNRs used are: 25, 20, 15, 10, 5 and 0, encompassing normal to severely impaired performance in noise. For more information please refer to the Etymotic Research's QuickSIN[TM] Speech-in-Noise Test manual, version 1.3.

Procedure

1. Open Speech Measurement window, add the **Quick SIN** test type from **Add measurement….** .
2. Select the **Quick SIN Disk** from the media control panel.
3. Select a word list from the drop down menu.
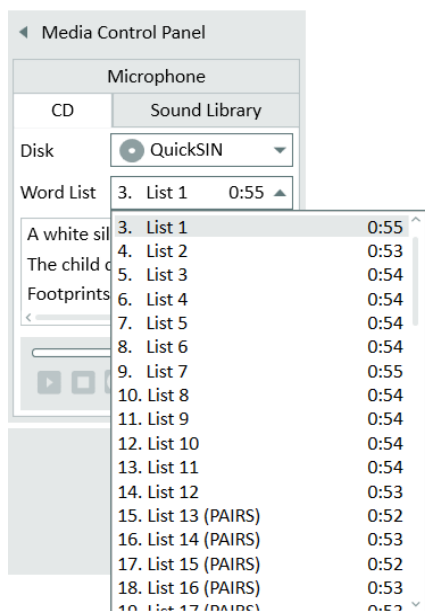
4. Instruct the patient to repeat the sentences and try to ignore the noise that they will also hear through the headphones.
5. Press **Start** to begin the test.
6. The number of words underlined must be repeated back by the client.
7. Score the correct number of underlined words using the numbers 1-5.
8. When the 6 sentences are scored, a total SNR score will be calculated automatically.

Note: The CD you last used for the **Quick SIN** test type will be remembered by Measure.

12 Real Ear Measurements

12.1 REM Options

With Measure, you can perform the classical range of real ear measurements: **Unaided, Occluded** and **Aided** Response as well as **Insertion Gain.**

You can toggle between SPL and Gain view to see the response measurements in gain view. For the unaided, occluded and aided response measurements, the corresponding gain is calculated as the difference between the output response at the eardrum and the input response measured just outside the ear canal.

- Click the **REM** icon on the REM tab in the Navigation pane to open the Real Ear measurement front page with further options for selection. Then click the button **Real Ear Measurement** to open the REM Measurement workspace.

The following default test definitions are available:

Test	Link to test description	Description
REUR/REUG	Real Ear Unaided Response	Difference in dB, between SPL at the measurement point and test signal level, across frequencies in an unoccluded (open) ear canal.
RECD Freefield RECD Insert	Performing REM in the HIT Unit	If your Fitting System includes a test chamber, this instruction shows you how to combine real ear measurements with coupler measurements.
REOR/REOG	Real Ear Occluded Response	SPL across frequencies in the occluded ear canal with a hearing instrument in place and turned off.
REAR/REIG	Real Ear Insertion Gain Real Ear Aided Response	Either the Aided Gain (REAG) or the Insertion Gain (REIG) are displayed. The REIG is the difference in dB between the Aided Gain and the Unaided Gain. **Note**: You must select in the pre-settings whether you want to display REAR or REIG measurement in the Gain view.

The **LTASS** (Long Term Average Speech Spectrum) curves are measured and used as a result for speech signal stimulus during REM tests.

Note: Some test curves are calculated based on data from earlier tests. Tests that lack data for their calculation will be dimmed on the Test Types panel, indicating that they are currently unavailable.

12.2 Set-Up and Editing for Real Ear Measurement

As in the **Audiometry** module, most of the changes to settings that you can make in this view are only temporary and will not be saved with the session. If you want to make permanent changes to the set-up, do so from the [Test Definitions menu](#). Temporary changes of the default settings are stored as Customised settings. These setting can be recalled from the **Preset** selection box for further use in that test. The local settings options within the Real Ear Measurement task are:

Top bar in measurement window

[Presettings in the REM top bar](#)
[Informative Overlays in REM](#)

Left-hand panels

[Test types](#)

Right-hand panels

[Legends and editing of curves](#)

Measurement Controls panel below diagrams

[REM Measurement Controls panel](#)
[Measurement Notes](#)
[Always on Top panel](#)
[Target Settings](#)
[Change Preset options for REM](#)

Lower area

See the description of History Data and Client View in ["Lower Area"](#).

12.2.1 Pre-settings in the REM top bar

Selections on the Pre-settings panel
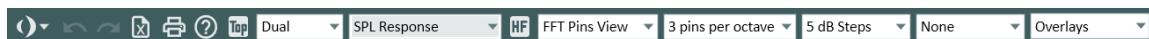
General

- Click the **list** icon to the left of the pre-settings panel to open the list of all available modules. Select a module you want to move to. The current window will close and a selected one will open.
- Click **Undo** to cancel the last action.
- Click **Redo** to regret an "Undo" action.

- Click **Export to Excel** to export measurement data to an XML file and then view the data in an external tool, i.e. Excel. The data are exported in two separate files, one for left and one for right ear.
- Click **Print** to open the Print window.
- Click **Help** to open the Help function.

View

- Click the **Top** icon to open an extra diagram window, which will remain on top of other opened program windows. This diagram is a replica of the full-size measurement window. You can start/stop measurements directly from **On-top Diagram** without opening the Measurement Controls (for example while making adjustments in the hearing instrument fitting program). Here you can also change dB Level, Stimulus type, or ear side and all these changes will be reflected on the main Measurement Controls pane. Also if you measure or delete curves in this view, the action will be mirrored on the full-size measurement window. After use, close the On-Top Diagram by clicking the **X** icon in the top right-hand corner.
- Select **Dual** in order to display two diagrams side by side for Right and Left ear respectively.
- Select **Single** in order to see only one diagram and have curves for both ears appear in this chart.
- Select **SPL Response** to see amplitude levels displayed in terms of dB SPL (Sound Pressure Level). This is the display used for response measurements.**Note:** If you select **RECD Freefield** or **RECD Insert** test types, you will automatically switch to the SPL Response View (even if another view was previously selected for other test types).
- Click **Coupler SPL View** to see amplitude levels displayed in terms of dB SPL (Sound Pressure Level) in the 2cc coupler. This is the display used for response measurements in the HIT Unit.
- Select **SPL Input** to see the input SPL signal measured by the reference microphone.
- Select **Dynamic Range** to see a Dynamic Range graph showing percentages along the vertical axis.
  This option is only available, if a pure tone threshold has previously been measured. If no UCL has been measured, the Dynamic Range will be established on the basis of a predicted UCL.
  The graph will show two flat curves, where the HTL values represent 0% and the UCL represent 100% of the dynamic range. Use this window to see how well the current fitting utilises the dynamic range available to the client. No measurements can be performed in this view.
- Select **Gain** to see gain values, that is, the difference between input and output sound pressure levels and between the REAR and the REUR curves respectively. This is the setting for Gain measurements.
- Select **Gain & Response** to see the SPL and the gain at the same time. If the Dual view is selected, only one ear side is shown.
- Select **Match to target view / Response** to turn on a view for a selected ear that displays the response (SPL) of the measured signal along with the target (or HA transition curve) on a diagram.

- Select **Match to target view / Gain** to turn on a view for a selected ear that displays the difference of the measured value and the target (or HA transition curve) as a 0-line on a diagram.
- Select **Input & Output** to see the input and the output at the same time. If the Dual view is selected, only one ear side is shown.
- Click the **HF** (**HI/Standard Range**) icon to extend the high frequency range on the horizontal axis to 16 kHz. Click the icon again to switch to a graph showing the standard audiometric frequency range of 125 Hz - 8 kHz along the horizontal axis.

Spectrum

The effect of these settings is only visible, if FFT has been selected in the [Overlays](#) panel.

- Select **FFT Pins View** to see the FFT spectrum visualized with pins during the measurement.
- Select **FFT Bars View** to see the FFT spectrum visualized with wider bars during the measurement.
- Select **FFT Curve View** to see the FFT spectrum visualized with a curve.
- Select **3 pins per octave** to display the FFT spectrum for 3 pins per octave.
- Select **24 pins per octave** to display the FFT spectrum for 24 pins per octave.
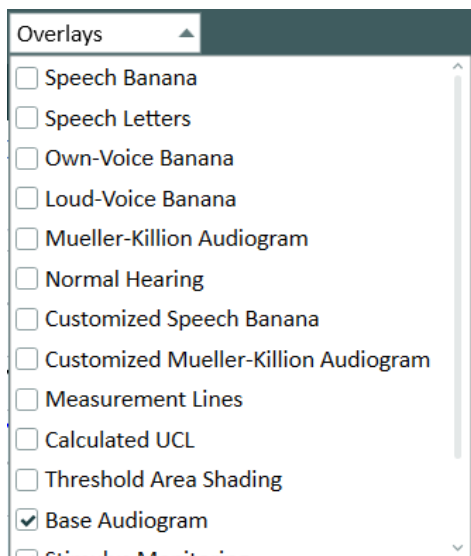
Step Level

- Select **1 dB, 2 dB, or 5 dB Steps** if you wish to adjust the input level in steps of 1 dB, 2dB, or 5 dB correspondingly.

UCL Limiter

- Select **None** to deselect the UCL limiter, which serves to protect the client from excessive sound pressures during the test.
- Select **UCL** (from the range +10 to -15) to activate the UCL limiter, when the UCL level is reached.

12.2.2 Informative overlays in REM

Overlays ▲
☐ Speech Banana
☐ Speech Letters
☐ Own-Voice Banana
☐ Loud-Voice Banana
☐ Mueller-Killion Audiogram
☐ Normal Hearing
☐ Customized Speech Banana
☐ Customized Mueller-Killion Audiogram
☐ Measurement Lines
☐ Calculated UCL
☐ Threshold Area Shading
☑ Base Audiogram

A number of informative overlays are available to provide further information about the current workspace. Also, they may come in handy, when you are counselling clients about their hearing loss and its remediation.

The overlays available for real ear measurement are:

Overlay	
Speech Banana	The range of frequencies and levels within which most of the speech energy occurs at normal speech level.
Speech Letters	The speech sounds of normal conversation, distributed graphically in the speech area according to their respective frequency and intensity.
Own-Voice Banana	The range of frequencies and levels within which most of the speech energy of one's own voice occurs at normal speech level.
Loud-Voice Banana	The range of frequencies and levels within which most of the speech energy occurs at loud speech level.
Mueller-Killion Audiogram	The Mueller Killion Audiogram is based on the count the dots audiogram.
Normal Hearing	Normal hearing forms the baseline for hearing loss assessments.
Customized Speech Banana	A customized range of frequencies and levels within which most of the speech energy occurs at normal speech level.
Customized Mueller-Killion Audiogram	The Mueller Killion Audiogram is based on the count the dots audiogram and is customized depending on the audiogram.
Measurement Lines	This shows exact values and difference between two points on the selected curve. Select a curve and move the lines to see the values.
Calculated UCL	The system automatically calculates UCL values on the basis of the HTL values. Calculated UCL values are only available, as long as no UCL has

Overlay	
	been measured.
Threshold Area Shading	In Response view, the area above UCL and below threshold is highlighted in grey for better visibility.
Base Audiogram	The base audiogram will show HTL, MCL, and UCL curves if measured.
Stimulus Monitoring	This option displays the Input (Reference) dB, Output (Probe) dB, and the gain for broadband signals.
Cursor Lines	Cursor Lines show level and frequency of a mouse position.
Indicators	Shows/hides warnings on the graph.

Note: When working in Gain mode, only the following overlays are available: Measurement Lines, Stimulus Monitoring, Cursor Lines and Indicators.

12.2.3 Legends and editing of curves

The Legends panel on the right side of the screen provides a total specification of each curve in the audiogram.

Click the triangle to open the panel.

Click the name of the test type to highlight the curve and see the detailed information.

The curve legend

For each measured test type, the legend will show the following information:

The test type. This data will also be shown as tool tip, when you point to the corresponding curve in the diagram.

SII: Speech Intelligibility index. Displayed as a percentage of the available and usable speech for a user in the current setting.
Time: The date and time the curve was measured. (See also Historic curves).
Transducer model used for stimulus signal.
RMS: The RMS value of the output signal as measured at the ear drum of the client.
Stimulus: The type of the input stimulus for the measurement.
Level: The intensity of the input stimulus for the measurement.
2cc Coupler: This line is only shown if the HIT box was used.
Note: Click the *Type notes here* found in the curve legend for the selected curve. A space for writing a short note now appears next to the text "Note". This note will replace the test type name as tool tip when you point to the corresponding curve in the diagram. The note will be saved with the curve.

Speech Intelligibility Index

Speech Intelligibility Index (SII) is another form of AI. Its aim is to measure and estimate the available and usable speech information for a specific hearing loss in the different frequency regions of the audiogram. Having the SII of 50% does not mean the listener understands 50% of the speech. It means that about 50% of speech cues are audible and usable in a given setting.

The SII is calculated only when HTL is available and is automatically displayed in the Legends panel.

Note: The SII can be calculated only if you select **ISTS**, **ICRA**, or **Speech noise** signal types.

The SII values will be also displayed in the REM and SM reports.

Assistant panel

In Match to target view, the assistant panel provides warnings if the maximum allowed deviation is exceeded.

To set up the maximum allowed deviation from the targets for in SPL and Gain views for Aided test definitions, go to **Tools** > **Test Definitions** > **REM**, select the needed test definition and open the tab **Target assistant**. Select **Enable target hints** and, if needed, choose which frequencies will be checked. By default, hints work for all frequencies. Frequencies can be included/excluded with the help of checkboxes. Clear a checkbox for a certain frequency to turn off warnings for this frequency.

12.2.4 Test Types

The Test Types panel is found in the top left-hand side of the measurement workspace.

- Click the arrow to expand or collapse the panel. Use the Test Types panel to select the current test type.

Mouse over a test type to see a Visibility eye icon. Click an eye icon to show or hide the curve of the selected test type. It is possible to compare two or more test curves by selecting them in this panel.
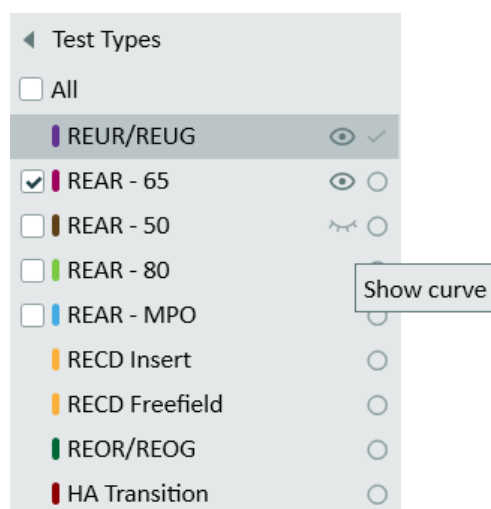
The start settings for the test will be set automatically in accordance with the selections in the Test Definitions menu. This means that usually you do not need to change any settings before you can start measuring. If a test relies on data from an earlier test on the test types list, which has not been measured, the test will be unavailable. See more about the individual test types in the section: "REM Options in Measure".

12.2.5 Measurement Controls panel

Measurement Notes

In the same way as for the audiometry task, this field immediately above the Measurement Controls panel can be used, if you want to add a note to the current real-ear session with the client.

- Click inside the field to make a text cursor show up. Then enter the text. The note will be saved with the current session and will also be visible below the diagram on the Real Ear Measurement Front page. You can also add notes to the individual curves. See "Legends and editing of curves" above.

Using the Measurement Controls panel

The Measurement Controls panel is located below the diagrams. This is where you change measurement conditions and start test signals for the ongoing measurement. It resembles the Measurement Controls panel for audiometric testing, but contains a number of specific functions for real ear measurement. Click the **down arrow** in the top right of the measurement panel to collapse the panel or the **up arrow** to expand the panel.
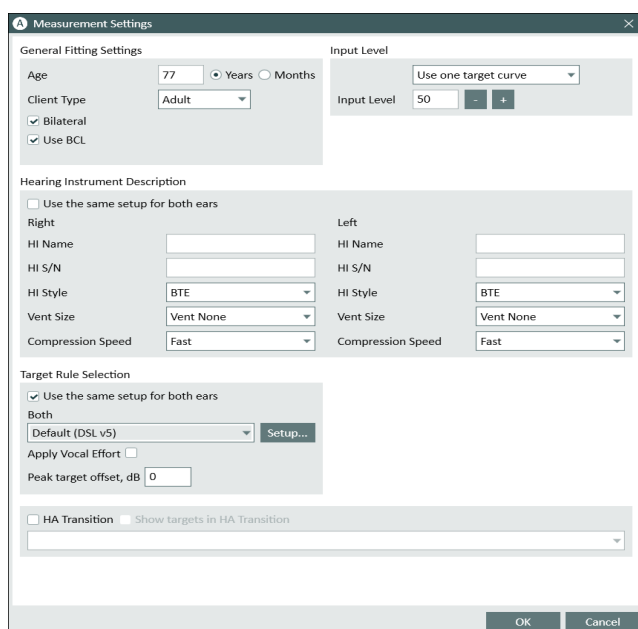
The procedure for operating the Measurement Controls panel for real ear measurements has been described in the ["Real Ear Unaided Response Test"](#).

Always On Top Panel

If you click the **Detached Panel** button in the right-hand end of the Measurement Controls panel, a detached copy of the panel will appear on the screen. This panel will always remain on top of other applications. **Note:** you can select the **Test Type** from the On Top Panel. To close the panel again after use, click the same button once more, or click the **X** in the top right-hand corner of the detached panel.

Target Settings

- Click the button **Target** to open the **Measurement Settings** selection box for specification of general fitting settings, input level, hearing instrument description, and target rule selection.

General Fitting Settings

Enter the client's age in years or months, client type, if the client is fitted with binaural hearing aids.

Input Level

This allows you to show one or three target curves at the same time. The three target curves can be adjusted based on the specified input level in dB. Target curves are displayed with a target level label for each of them. It makes it easier to differentiate between different curves on the graph.
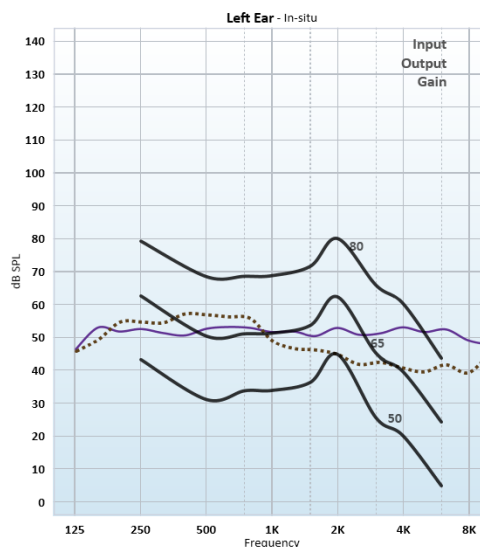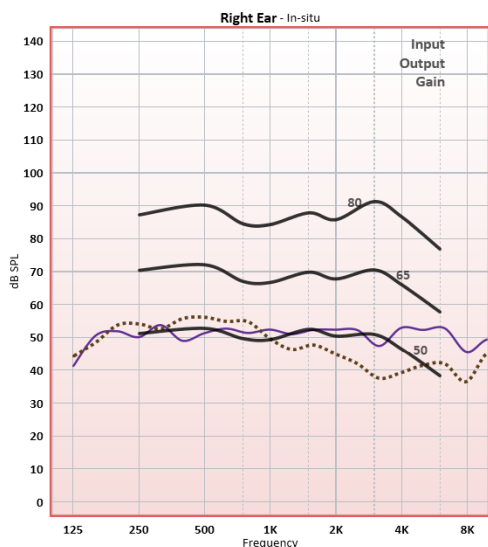
In case you want to provide a certain **Peak Target Offset** with your fitting, you may adjust gain targets accordingly. Specify the value in the **Peak Target Offset** field for the existing curve to adjust its level. The maximum value is 20.

Hearing instrument Description

Enter the hearing instrument's name, serial number (S/N), hearing instrument style and the ear mould vent size.

Note: The **Hearing Instrument Description** field can also be viewed and is available for data entry from the tab **Hearing Instrument Description** in the lower part of the Client Information window. Any data entered inside the Hearing Instrument Description field will be updated in both views.

Target Rule Selection

The check box allows the use of the same prescription rule set up for both ears.

There are six prescriptions rules available, DSL v5, NAL-NL1, NAL-NL2, 1/2 Gain, 1/3 Gain and Manual.

The manual selection allows you to enter target values individually. Select **Setup...** to enter values. Select either db SPL or dB Gain to enter New target values.

If NAL or DSL target rule is selected, press **Setup...** to enter more information as required by the prescription rule selected.

Note: Information in this tab must be entered correctly to ensure the correct target is prescribed according to the NAL and DSL prescriptions.

For the DSL target setup, you can choose to **Apply Vocal Effort**.

Peak target offset will adjust the target curve levels by the offset set in the **Settings**.

12.2.6 NAL-NL2 Speech-o-gram

The **Speech-o-gram** is only available for the NAL-NL2 prescription rule for Unaided Measurement types.

To display the Speech-o-gram, click **Target** (from the Measurement Controls panel) and select **Default (NAL-NL2)** rule from the Target Rule Selection. Then click **OK**. You will see the speech-o-gram appear which, you can program your hearing instrument to. Additionally, speech-o-gram will be displayed in the **Legends** panel as shown below.
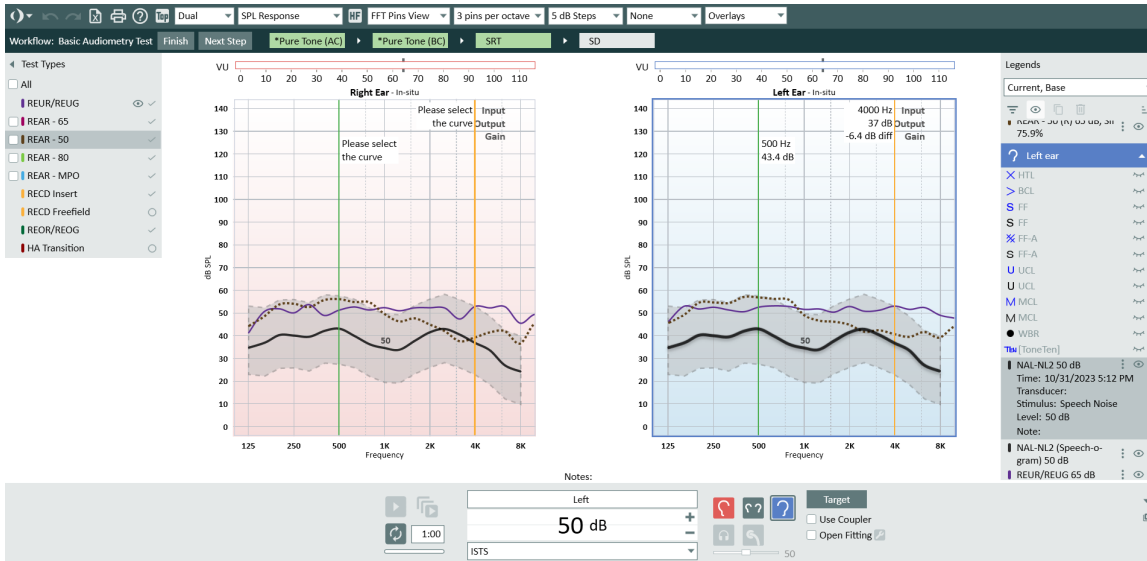
12.2.7 Lower Area

First on the left in the lower area (the area next to the Measurement Controls panel) you find the **Preset** options for real ear measurements. It is described in the following section.

The rest of the buttons on this line are similar to the ones found in the pure tone audiometry task. Their function has been described in the pure tone section: "Lower area".

Change Preset options for REM

- Select **Use Coupler**, if you want to perform REIG/REAR Real Ear Measurements of the hearing instrument in the test chamber. **Note:** Once selected, this option will be also enabled for every Aided Measurement.

  If you uncheck the **Use Coupler** option for any Aided Measurement, it will be also automatically unselected for other Aided Measurements.

  Under the **Stimulus** section, if you select **ISTS or ICRA** Signal Types, **LTASS** curve will be used for measurements and as a result for all test types during percentile analysis.

  For a stable result, you need to specify a minimum **Duration and Stabilization Time** of a signal in the set up of the corresponding test in **Tools** > **Test Definitions** > **REM**.

12.3 Probe Tube Calibration

Procedure

1. Open the REM module, select the ear or both ears and then click the **Calibrate** button

   [icon] to the right of the Measurement Controls panel.
   (Alternatively, try to start a measurement. You will then be prompted to make a probe tube calibration).

2. A dialogue box will now appear, the ear selection you have chosen in the Measurement panel will be selected by default. The date of the latest tube calibration is displayed if available.
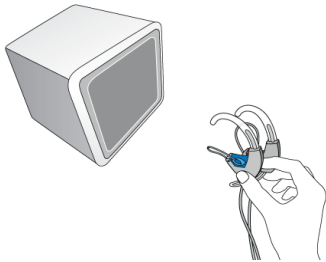
3. If both ears are selected, a dialog box will appear stating both probes should be kept together in front of one speaker. You may select the check box to prevent this dialog box from appearing again.

   Note: Please hold both probes as shown in the picture below at a distance where you expect the client's head would be.

4. Place the probe tube in the small gap on the probe microphone headset, so that the tip of the probe tube is very close to the measurement microphone.

5. Hold the probe microphone in front of the loudspeaker and click the **Start** triangle in the dialogue box.

6. Wait for the calibration signal to finalise.

7. If required, repeat the procedure for the other ear.

8. If you want to see a graph of the result, click the **down arrow** label for the window to expand. The measured curve must lie inside the green area. If not, examine the tube for blockages or mount a new tube, then repeat the measurement.

12.4 Real Ear Unaided Response Test (REUR)

This curve is to use it in the calculation of the [Real Ear Insertion Gain](#) - (REIG).

The real ear measurement diagrams always show frequencies along the horizontal axis.

In the default set-up, the measurement diagrams for the Unaided Response test will display levels in terms of dB SPL along the vertical axis.

If no REUR test is made, Measure will automatically use the standard Unaided Response curve instead for the following measurement types. The default selection is Adult.

12.4.1 Before the test

1. If this is the first real ear test with the current client, mount a new probe tube on the probe tube microphone.

2. Then click the **Calibrate** button in the right-hand end of the Measurement Controls panel (see below) and perform a [probe tube calibration](#).

3. Perform an otoscopic examination of the ear canal to ascertain that ear conditions are normal and that the ear canal is not clogged by cerumen or other matters.

4. Place the probe tube correctly in the ear canal of the client. Mark the insertion depth compared to the tragus of the client's ear.
5. Instruct the client and position the loudspeaker correctly for the test.
6. Make sure that ambient noise in the room is well below the intended test stimulus level.
7. Take a quick look to see that the settings and selections in the top and side panels of the measurement workspace are as you want them to be.

For more information, see "Set-Up and Editing for Real Ear Measurement".

12.4.2 A REUR test procedure

The Measurement Controls panel to be used for real ear measurements is located below the diagrams.
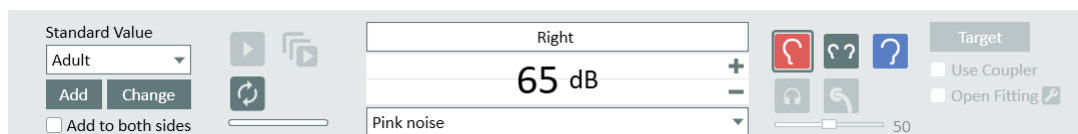
1. On the right-hand side of the Measurement Controls panel, open the **Target** / Client specific settings and check that they are correct for the client and selected hearing instrument. **Note:** If you change the target curve selection, Measure will recalculate the target curve based on the selection. This will be referenced in the Status bar: "Target curve was recalculated". Changes in fields that also appear in the Hearing Instrument part of the Client Information window will be updated automatically.
2. It is possible to adjust the Target curve level based on the **Peak target offset** value set in the Target Rule Selection section of the Measurement Settings. The maximum value for the peak target offset is 20 dB.**Note:** If the target curve cannot be calculated, an error message with an explanation of the problem appears in the status bar of the measurement workspace.
3. Make sure that REUR is selected as a test type on the Test Types panel in the top right-hand corner.
4. Select the ear that you want to test first: Click the "**Right Ear**", "**Both Ears**", or "**Left Ear**" symbol in the left-hand end of the panel.
5. Check from the central part of the Measurement Controls panel that the input stimulus type is the one you want to use for the test.
    NOTE: If you are conducting an open ear fitting, select **Open Fitting** in the left-hand side of the Measurement Controls panel.
6. Select the input level: Use the Level "**+**" and "**-**" buttons located at the centre of the Measurement Controls panel.
7. Start the test stimulus: Either press the SPACEBAR or click the **Start Stimulus** triangle button. During the test, all selection buttons will be disabled. Wait for the test to finish or interrupt the test by clicking the **Stop Stimulus** button. Activating the **Loop** button located below the **Start** button will allow to loop the measurement as long as the **STOP** button is not pressed.
8. If the curve looks as expected, continue to the next test.

9. If you return to this test and perform new REUR measurements after performing some of the following tests, the curves dependent on the REUR data will be recalculated according to the new curve.
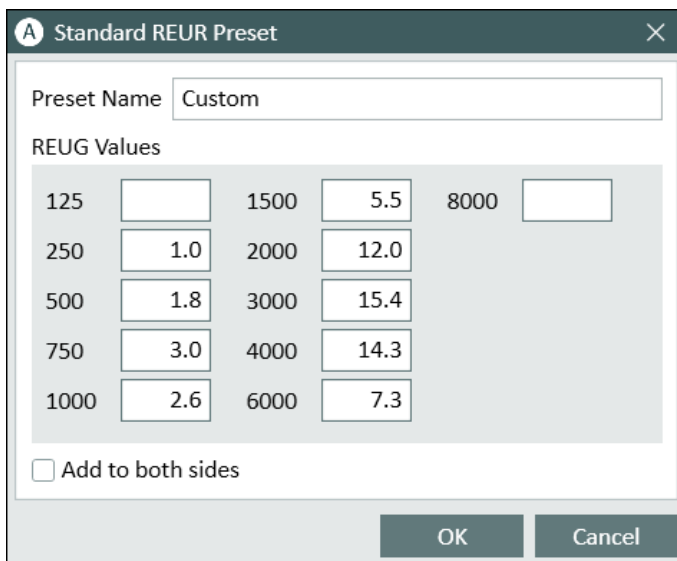
Note: Instead of running tests one by one, you can perform the aided tests in a consecutive sequence. Simply choose the tests with the checkboxes and click the **Start Measurement Sequence** button 🔲. You can also run the sequence button from the On-Top Diagram mode.

Manually entered values for REUG measurement

You can also add RECD measurement values manually to get a curve corresponding to those values. The same values can be applied to both sides.

Procedure

1. Select **REUR/REUG** test type.
2. On the left side of the **Measurement Controls** panel, select the **Standard Value** (by default it is Adult) and click the **Change** button.
3. In the **Standard REUR Preset** window, enter manually the values you have to the **REUG Values** fields. Select the **Add to both sides** option to draw the same curve for both sides and click **OK**.

As a result curves are drawn for both ear graphs and a new **Custom** preset is added in the **Standard Value** menu. The **Custom** preset keeps all the values you have entered.

12.5 Real Ear Occluded Response Test (REOR)

This task may be used to establish the Real Ear Occluded Response (REOR) for the client.

12.5.1 Before the test

1. Make sure that **Occluded Measurement** is selected as test type on the **Test Types** panel in the top right-hand corner.

2. Place the ear mould (with or without muted hearing instrument or ITE instrument) and the probe tube into the ear canal of the client. Be careful to place the probe tube correctly and at the same depth as for the Unaided Response measurement. If you have just performed the Unaided Response measurement, you may use the location of the marker on the tube to ascertain the correct insertion depth. Make allowance for the fact that the tube will this time be forced to follow the wall of the ear canal.
3. Instruct the client and position the loudspeaker correctly for the test.
4. Make sure that ambient noise in the room is well below the intended test stimulus level.
5. Take a quick look to see if the settings and selections in the top and side panels of the measurement workspace are as you want them to be.

For more information, see "Set-Up and Editing for Real Ear Measurement".

12.5.2 A REOR test procedure

The Measurement Controls panel to be used for real ear measurements is located below the diagrams.

1. Make input settings and selections for the test in the same way as explained for the Unaided Response test. If you want to compare the curve to the Unaided Response curve (in SPL view instead of in Gain view), select the same stimulus type and input level as you used for the Unaided Response measurement.
2. Start the test stimulus in the same way as explained for the Unaided Response test.
3. If the curve looks as expected, compare it with the Unaided Response curve and/or the input SPL curve. To use the input level as a baseline, shift to gain view (in the top bar of the measurement workspace).
4. If the curve looks unusual, repeat the ear canal inspection and check the probe tube. Carefully reposition the probe tube and hearing instrument assembly in the ear canal and repeat the measurement.

12.6 Real Ear Aided Response Test (REAR)

12.6.1 Using Aided Response curves for fitting and fine-tuning

This task may be used to establish the Real Ear Aided Response (REAR), that is, it states the amplified sound pressure level in the ear canal for a given input.

12.6.2 Before the test

1. Make sure that **REAR/REIG** is selected as a test type on the **Test Types** panel in the top right-hand corner.
2. Connect the hearing instrument to the fitting interface by means of the programming cord.
3. Use the fitting software to set the hearing instrument in REM measurement mode, unless you are sure that you are using a stimulus type that the hearing instrument will interpret as a speech signal (as opposed to noise). If in any doubt, consult your hearing instrument supplier about when and how to select this mode.
4. Place the unmuted hearing instrument and probe tube in the ear canal of the client, open the fitting module, turn on the hearing instrument and prepare for the measurement as explained for REIG measurements - except for the display mode setting (see next step).

5. Check that the settings and selections in the top and side panels of the measurement workspace are as you want them to be.

For more information, see "Set-Up and Editing for Real Ear Measurements".

12.6.3 A REAR test procedure

1. Use the Measurement Controls panel to make settings and selections for the test, in the same way as explained for the Unaided Response test.

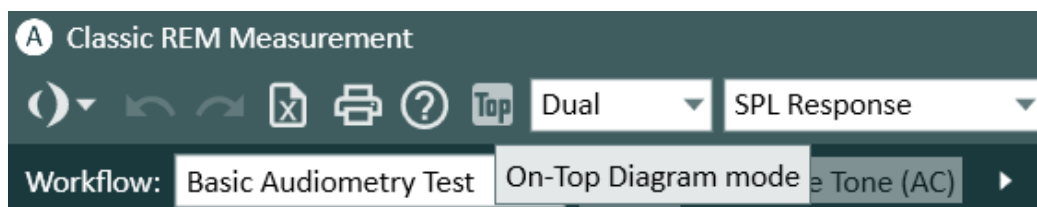2. Select the **loop** button to ensure the stimulus keeps repeating till stopped manually.
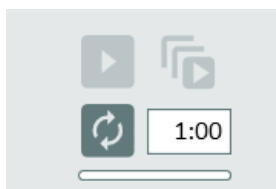
3. Select on top mode diagram mode option.

4. Arrange the hearing aid software and Measure screens.

5. Press any of the play buttons to start the measurement and make the necessary adjustment in the hearing aid software.

6. Measure an Aided Response curve in the same way as explained for the Unaided Response test. If required, make adjustments to the hearing instrument setting.

7. After each adjustment, measure a new Aided Response curve to see the result.
   To overwrite the curve, just start a new measurement in the same test. To measure a new curve for comparison with the first, select the next Aided Measurement test before measuring.

12.6.4 Save, Print and Close

These three buttons, placed in the lower area of the screen, work on the entire Real Ear Measurement view.

- Use the **Save** button to save the measurement data in the NOAH or Measure database. This button is not active, if you are using Measure as a stand-alone unit. In that case, export the entire session to the client's file, before you close the session.
- Use the **Print** button to obtain a print of the diagrams shown in the current measurement task, stamped with the name and key data of the client.

- Use the **Close** button to close the Pure tone Audiometry window and return to the main screen. If unsaved data are present in any of the pure tone audiometry tests, a warning will appear in the status bar.

For a description of the functions adjacent to the Save, Print and Close buttons, see "Lower Area" in the section "Set-Up and Editing for Real Ear Measurements".

12.7 Real Ear Insertion Gain Test (REIG) and Real Ear Aided Response (REAR)

The measurement diagrams for the Insertion Gain test should always display gain in terms of dB along the vertical axis. During Insertion Gain tests, the REUR forms the baseline, that is, 0 dB, for the Insertion Gain measurement.

To conduct **REIG** measurements, follow the same procedure to conduct Aided Measurements (refer to Real Ear Aided Response Test). Ensure that the display is shown in **GAIN**. To conduct REAR measurements follow the same procedure as described in Section 8.6 and change the display to show **SPL Response** and switch to the dB SPL scale.

12.8 Open Fitting Procedure

For Aided Measurement test types the **Open Fitting** option is available.

To start the Open Fit measurement, do the following:

1. Select the desired test type, i.e. **Aided Measurement 1** and enable the **Open Fitting** option.
2. Click the **Play** button to start the measurement. Follow the instructions on the dialogue box. The signal is detected from the left reference microphone.
3. A second dialogue box will appear once the initial measurement is done. Follow the instructions on screen to complete your measurement.

   Note: Measure will remember the calibration and will prompt you to make a new calibration only when the signal or sound intensity has changed.

4. If you wish to recalibrate at any time, press the recalibration symbol .

12.9 RECD Measurements

12.9.1 Background

RECD measurements are conducted using the HIT Unit. This is traditionally used to fit children with hearing aids.

There are two workflows where you can do RECD measurements. The **RECD Freefield** test type is used for adults which measures the RECD with free field speaker(s) and hearing aids (specified in the Measurements settings window). The **RECD Insert** is for paediatrics and measures the RECD with MeasureInsert Earphones without hearing aids.

Note: If no HIT unit is available, you can conduct RECD measurements for both of the above mentioned tests with the LS Mini speaker and the RECD air kit as well.

12.9.2 Procedure

1. Select the **RECD Freefield** or **RECD Insert** test you wish to use in the **Test Types** panel.
2. Click the **Start** triangle on the Measurement Controls panel and follow the instructions in the dialogue boxes now appearing.
3. If previous coupler or RECD measurements are available with Signal Type and dB Level identical to ones for the current measurement, then the **Reuse existing RECD** button will be active. You can either conduct a new measurement by clicking the **Start measurements** button or reuse the existing ones. **Note:** Stored coupler measurements can be reused for all clients, but the RECD measurements from the previous sessions can be reused only for the same client.

Note: If it is difficult to measure both ears, you can copy the measurement from one ear to the other. To copy the measurement to the other ear, right click the curve and select copy curves to the other side.

Note: If it is not possible to measure at the ear, instead of steps 2-6 above, use an average RECD curve. To do so, select the age-appropriate RECD curve in the left-hand side of the Measurement Controls panel and click **Add.**

Using Coupler

1. Select the test type that you want to perform next (REAR/REIG), and select the check box **Use Coupler** in the right-hand end of the Measurement Controls panel. The HIT speaker will be used for the coupler measurements.
2. Perform the remaining "REM measurements" (or "SM measurements") in the coupler in the same way as if you were measuring on the real ear of the client. The measured curves will also appear in the curve legend of the REM workspace. The measurement condition "HIT" will form part of the curve legend. **Note**: It is not possible to perform Open REM measurements in the test unit.

12.9.3 Manually entered values for RECD measurement

You can also add RECD measurement values manually to get a curve corresponding to those values. The same values can be applied to both sides.

Procedure

1. Select **RECD** test type.
2. On the left side of the **Measurement Controls** panel, select the **Average RECD** and click the **Change** button.
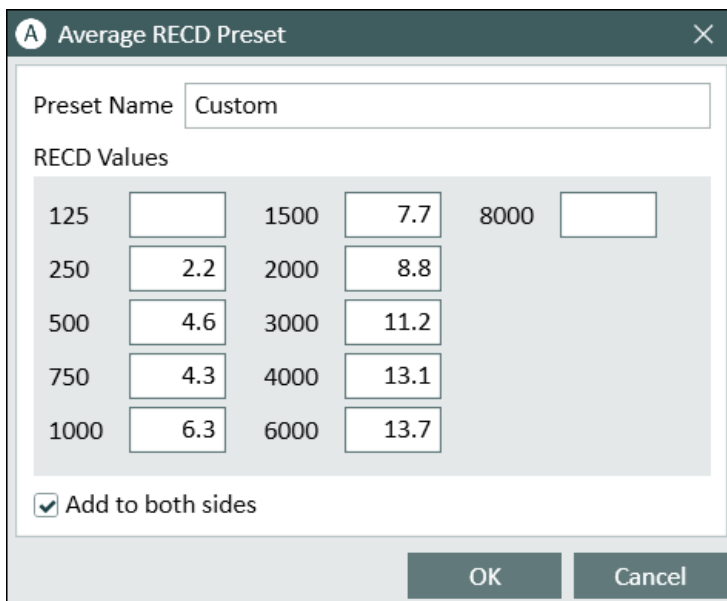
3. In the **Average RECD Preset** window, enter manually the values you have to the **RECD Values** fields. Select the **Add to both sides** option to draw the same curve for both sides and click **OK**.

As a result curves are drawn for both ear graphs and a new **Custom** preset is added in the **Average RECD** menu. The **Custom** preset keeps all the values you have entered.

12.9.4 Measurements with RECD air kit and LS Mini speaker

Sometimes you need to conduct RECD measurements in cases when no HIT unit is available. You can use the RECD air kit with the LS Mini speaker for this. This set up can be used to conduct the RECD Freefield or RECD Insert test types as described [here](#). You can also use it to perform coupler measurements. More details on coupler measurements you can find [here](#).

Note: The LS Mini speaker can only be used for the RECD measurements if both microphones of the RECD air kit are connected to it. To use the LS Mini speaker as a sound source for Real Ear Measurements, make sure that the LS Mini speaker is selected for the **REM** or **SM** module in the settings under **General** > **Loudspeaker selection**.

When used for RECD measurements, the LS Mini speaker needs to be placed in a horizontal position. You must place it vertically if you plan to use it as the REM speaker.

12.10 HA Transition

HA (hearing aid) transition functionality permits audiologists to obtain information about the patient's preferred audibility and use it to improve their experience when upgrading to a new device.

The solution provides the possibility to measure the output for G50, G65 and G80 input levels of the existing hearing aid and use this measure as and preferred setting compared with what a standard fitting algorithm (NAL or DSL) suggests.

This measurement can be done in coupler.

Test Configuration

Go to **Tools** -> **Test Definitions** > **REM/SM**, then choose **Add** > **HA transition** to configure the definition for the test.

In the section **Old HA Stimulus Levels**, it is possible to chose the number of measurements to run (up to 3) and predefine test signals and old HA stimulus levels in the range 40-100 dB.

Procedure

1. In the REM or SM module, select *HA Transition* test and press **Play** to start measurement. All preselected levels will run nonstop.

   Room equalization is performed only once prior to the first measurement.

   NOTE: the first test level to be performed is the first in the sequence in Test Definition.

2. Change the hearing aid(s) in the ear or in the HIT box to the new hearing aid(s) the patient are going to be fitted with.

3. Select the aided test type for fitting and press **Target** and select **HA Transition** to enable HA Transition from the Target setup. This will make HA transition curves visible instead of targets.

The system will search for HA transition curves in the past sessions and suggest using them.

Note: HA transition curve will also be used in Match to target view.

4. Perform aided measurement as usual to fit new HA to the previous HA outputs.

13 Speech Mapping

13.1 Speech Mapping Options

Speech Mapping provides the hearing care professional with a valuable tool to visualise the effects of amplification and signal processing, e.g. compression, noise reduction or directionality in an easy to comprehend way.

Speech Mapping overcomes the disadvantages and inaccuracy of classical Real Ear Measurement with modern, digital Hearing Instruments by using either live speech or recorded speech as the input.

Further to the classical REM measurements, the Fitting System also lets you show, how a hearing loss will influence the perception of real-life sounds and to visualise the current remediation of the loss by means of the chosen hearing instrument. The Speech Mapping option may be considered a kind of "free-style real-ear measurement", where you may choose to set up the test conditions that you find suitable for the situation. Speech mapping can assist you in evaluating and adjusting advanced hearing instrument features, such as directionality, noise cancellation, or speech in noise.

As you are free to set up your own tests, only the general function which may vary depending on the language you choose is outlined here:

Test	Description
Real Ear Unaided Response (REUR)	SPL, as a function of frequency, at a specified measurement point in the ear canal, for a specified sound field, with the ear canal unoccluded.
Speech Mapping	The sound pressure levels measured in the ear canal with a real ear measurement system when the operating hearing aid is in the ear. It is the REAR measurement using Live or Recorded Speech as the stimulus.
	In Speech Mapping the measured output signal of the Hearing Instrument in the ear canal is displayed in a Level-over-Frequency diagram. The peak output and the average output signals are displayed in high frequency resolution of 24 lines per octave, together with the hearing threshold and the UCL in the diagram. The hearing threshold and the UCL are transformed from the dBHL values into a SPL-O-Gram view. Also displayed is the speech-banana for speech in a normal effort, transformed with the Audiogram input. Speech Mapping can either use live speech, recorded speech or speech-like test signals, e.g. the ISTS.
	Note: Since Speech Mapping uses a resolution of 24 pins per octave, the result curves and targets cannot be compared to

Test	Description
	the results obtained with third octave filters (e.g. used in Classical REM).
Noise Reduction	This option can be used to test the Noise Reduction function of a hearing aid using white noise from the Measure library. The test shows the effectiveness in decibels of noise reduction over a given time period.
Directionality	This option can be used to prove the qualitative effects of directionality of a Hearing Instrument. After the first snapshot has been completed, turn the hearing instrument about 90 ° from the speaker. After the measurement is completed, the directional effect can be visualised by the difference between the two snapshot curves displayed.
Speech in noise	This option can be used to test the hearing aid benefit in noise by demonstrating speech audibility in the presence of a known white noise field.
ISTS Soft Speech	This measurement demonstrates the hearing aids' ability to make soft speech audible. The presentation is done with a 50 dB SPL input.
ISTS Conversational Speech	This measurement demonstrates the hearing aids' ability to make conversational speech comfortable. The presentation is done with a 65 dB SPL input.
ISTS Loud Speech	This measurement demonstrates the hearing aids' ability to make loud speech and loud sounds tolerable. The presentation is done with an 80 dB SPL input.
Percentile	This option represents speech mapping measurements with test signals compliant with the IEC 60118-15 standard. As compared to the previous standards, this test type is designed to represent normal speech, the International Speech Test Signal (ISTS), Long Term Average Speech Spectrum (LTASS), together with the procedures and the requirements for measuring the characteristics of signal processing in air-conduction hearing aids. These tests are already pre-set at 55 dB, 65 dB and 80 dB.

Frequency lowering measurement

Frequency lowering measurement compares two different hearing aid settings - with the activated Frequency Lowering and with the deactivated one. After making the test, results are displayed on a single graph, so that the user can compare two curves.

Settings for measurement

To start the measurement, please do the following:

1. Go to **Tools** > **Test Definitions** > **Speech Mapping**.
2. Create a test definition and add Frequency Lowering Test as its title or description.
3. Select the appropriate test signal in the **Sound** field. It can be either the **Female s** for higher frequencies or the **Female sh** for mid-to-high frequencies.

4. Select the **Use Coupler** check box.
   Note: You can also use Real Ear Measurement instead of coupler. This can be changed in the Measurement Settings section of the **SM Measurement** module or in Test Definitions.

5. Make sure the measurement duration is set to 35 seconds after the test signal has been selected.

6. Click **Save** to complete the set-up procedure.
   Note: Make sure that the snapshot is set to 20 seconds.

After required settings are saved, go to the **SM Measurement** module and select your preset in the Test Types top left-hand panel. You can also right-click your test and click **Edit test definition** to correct your settings if necessary.

Measurement procedure

To perform the test, follow these steps:

1. Make sure the frequency resolution is set to 24 pins per octave.
2. Connect the Hearing Instrument to the programming interface and run the fitting software in parallel to Measure. Use either the Dual View or the On-Top Diagram mode.
3. Program the Hearing Instrument to a given hearing loss and make sure the Frequency Lowering is deactivated.
4. Start the measurement by clicking the **Start** button.
5. Wait for 20 seconds until a snapshot is taken in the measurement. The snapshot window background will turn from white to grey.
6. Activate the Frequency Lowering in the Hearing Instrument again.
7. Wait until the measurement stops after 35 seconds.

After the measurement is done, two curves are displayed on the graph. The dotted curve shows the output spectra with the Frequency Lowering deactivated while the dashed curve displays the output spectra with the Frequency Lowering active.

The difference of the curves in the area from 2 to 8 kHz makes a shift from the higher to lower frequencies visible. This difference shows the lowering frequency range of the hearing instrument.

13.2 Set-Up and Editing for Speech Mapping

As Speech Mapping has fewer constraints than the conventional REM measurements, you are free to set up a wide range of measurement types.

The diagrams will show the sound spectrum with frequencies along the horizontal axis, and either dB SPL, dB Gain (Aided Gain or Insertion Gain), or percentages along the vertical axis, in accordance with the view selection in the top panel.

The local settings options within the Speech Mapping task are almost all identical with options found in other parts of the program. They are:

13.2.1 Top bar in measurement window

The Pre-settings in the SM top bar are mainly identical to those found in the Presettings in the REM top bar. With the following additions:

- **Insertion Gain** provides the gain the hearing instrument is delivering at the ear drum. It is the difference between REAG – REUG or REAR-REUR.
- **Percentile views:**
- **Percentile Gain** represents an estimated insertion gain or the coupler gain provided for a given percentile of the distribution of sound pressure levels in a one-third-octave band of the international speech test signal.
- **LTASS Gain** provides an estimated insertion gain or coupler gain provided for the long-term average speech spectrum of the international speech test signal.
- **Relative Percentile Gain** represents the percentile gain relative to the LTASS gain.
- **Relative LTASS Gain** represents the LTASS gain relative to the 65 dB input sound pressure level.

Overlays

Apart from the overlay Severity (of the hearing loss), the Overlays are identical to those found in Informative Overlays in REM.

13.2.2 Left-hand panel

Test Types

By default a number of test types are available. See a general description of the test types panel in Test Types (for audiometry) and a short description of the general test function in SM Options in Measure. See Test definitions to learn how to set up customised tests.

Media Control Panel

The Media Control panel is identical to the Media Control Panel described for Speech Audiometry, except that in Speech Mapping it offers the possibility to use Sound from disk and there is no Mic tab.

13.2.3 Right-hand panel

Legends

The Legends are similar to those found in [Legends and editing of curves](#) in REM. The difference includes the grouping (tree view) of curves for measurements: you are able to switch visibility of curves and their components.
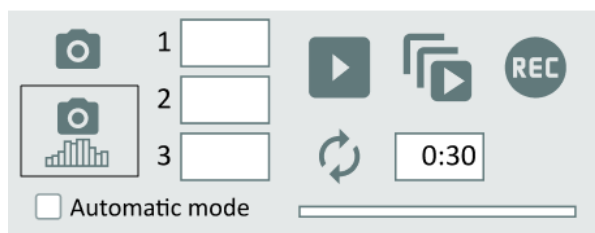
In addition, the legend will give the following information:

- Curve type (shown as tree view): Snapshot, Latest snapshot or LTASS.
- Peak and average RMS.
- Snapshot time.

13.2.4 Measurement Controls panel

The Measurement Controls panel is located below the diagrams and closely resembles the Measurement Controls panel from the REM tasks, except for the Snapshots function and the Lock Stimulus button.

The Lock Stimulus option allows you to manually disable auto-leveling when you perform measurements. This option does not work for REUR, Percentile.

Always On Top Panel

If you click the **Detached Panel** button in the right-hand end of the Measurement Controls panel, a detached copy of the panel will appear on the screen. This panel will always remain on top of other applications. **Note:** you can select the **Test Type** from the On Top Panel. To close the panel again after use, click the **X** in the top right-hand corner of the detached panel.
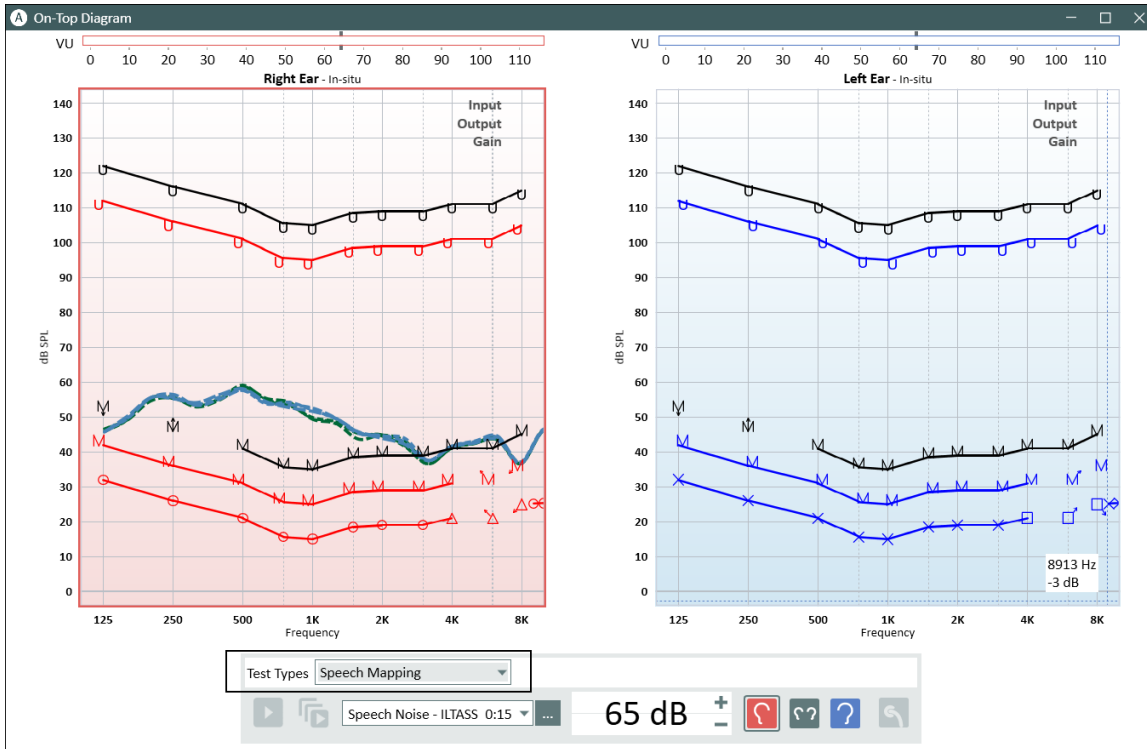
Target Settings

- Click the button **Target** to open the **Measurement Settings** selection box for specification of general fitting settings, input level, hearing instrument description, and target rule selection.

General Fitting Settings

Enter the client's age in years or months, client type, if the client is fitted with binaural hearing aids and whether you want that BCL added to the target curve calculations.

Input Level

This allows you to show one or three target curves at the same time. The three target curves can be adjusted based on the specified input level in dB.

Hearing instrument Description

Enter the hearing instrument's name, serial number (S/N), hearing instrument style and the ear mould vent size.
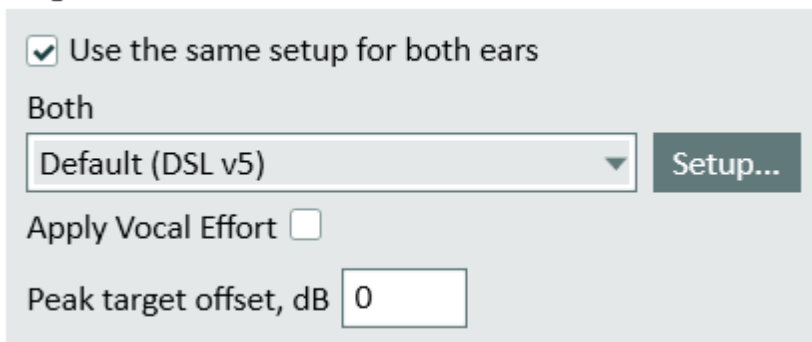
Note: The **Hearing Instrument Description** field can also be viewed and is available for data entry from the tab **Hearing Instrument Description** in the lower part of the Client Information window. Any data entered inside the Hearing Instrument Description field will be updated in both views.

Target Rule Selection

The check box allows the use of the same prescription rule set up for both ears.

There are six prescriptions rules available, DSL v5, NAL-NL1, NAL-NL2, 1/2 Gain, 1/3 Gain and Manual. For the DSL target setup, you can choose to **Apply Vocal Effort**.

13.2.5 Lower area

The buttons in this area are similar to the ones found in all other measurement tasks. Their function has been described in the Pure tone audiometry section: "Lower area".

Multiple curves for one measurement type

It is possible to create 90 measurements in total for all test types by pressing the **Start** button. There is a maximum limit of 10 curves per each test type. All the curves will be of a different colour for better recognition. Users can turn off multiple curves by selecting **Enable single measurement result per test type in SM** in **Tools** > **Settings** > **REM** > **Display Settings**.

13.3 Open Fitting Procedure

For Speech Mapping, Noise Reduction, Speech in noise and Default SM test types the **Open Fitting** option becomes active. The Open Fitting Procedure for Speech Mapping is the same as for the REM, so please refer to the section Open Fitting Procedure

14 Hearing Instrument Test

14.1 HIT Options

The Measure Hearing Instrument Test Unit offers standard tests according to IEC 60118-7:2005 and ANSI S3.22 (2009).

In the section [Set-Up and Editing for Hearing Instruments](#) you will find setup information for the tests, and in [Hearing Instrument Tests](#) you find an instruction in how to perform single or sequential tests.

14.1.1 Tests according to IEC 60118-7:2005

Control settings on the hearing instrument

The standard specifies the following control settings for the hearing instrument:

- The manufacturer shall specify the FOG (Full-On Gain) settings used for testing by providing test settings, a set of programmed settings or by reference to physical control settings and means to obtain Reference Test Settings.

- The hearing instrument shall be set to have the widest available frequency response range, the greatest available HFA*-OSPL90 and, if possible, the greatest HFA* - Full-On Gain. Where possible, the AGC function of AGC hearing aids shall be set to have minimum effect for all tests, except the last tests on the list below (specifically pertaining to AGC instruments). For these tests, the AGC function shall be set to have maximum effect. For the purposes of this standard, expansion shall be considered as a part of the AGC function.
  *) Definition of HFA (High Frequency Average): The average of gain or SPL in decibels at 1000, 1600 and 2500 Hz.

- Other adaptive features, such as some noise suppression, and feedback suppression systems etc., which may affect the validity of measurements made with steady-state pure tone signals, should be disabled.

A short-form of the further test conditions and tolerances for each test is stated in the following chart. For more specific information, refer to the specification from the manufacturer of the hearing instrument in question, and to the IEC 60118-7:2005 standard.

IEC Test Short-Form

Measurement type	Test set-up	Measurement results	Tolerances
OSPL90: *Output sound pressure level frequency response curve for an input sound pressure level of 90 dB*	Input: 90 dB SPL HI Setting: Set the Gain control to full-on	Maximum OSPL90 HFA-OSPL90	Maximum OSPL90: nominal value shall not be exceeded by more than 3 dB. HFA-OSPL90: within nominal value ±4 dB.

Measurement type	Test set-up	Measurement results	Tolerances
Full-On Gain: *Full-on acoustic gain response curve*	Input: 50 dB SPL HI Setting: Set the Gain control to full-on	HFA Full-on gain Maximum full-on gain	Average full-on gain: within nominal value ±5 dB. Maximum full-on gain: nominal value shall not be exceeded by more than 3 dB.
Reference Test Gain (RTG)	Reading from the Frequency Response field in HIT	Use this value as Reference Test Setting (RTS) of the gain control of the hearing instrument for the following measurements.	The HI gain that produces a HFA gain within **+**1.5 dB of HFA-OSPL90 - 17 dB, or, if not obtainable, full-on gain.
Frequency Response	Input: 60 dB SPL HI Setting: Gain control at RTS	Basic frequency response curve Bandwidth of the frequency response curve containing values **>** (HFA -20 dB) (determined as the Frequency Range).	HFA Output level (If the end frequencies fall beyond 200 and 5000 Hz respectively, they may be defined as <200 and >5000 Hz respectively.)
Harmonic Distortion	Input: 70 dB SPL at 700 and 800 Hz 65 dB SPL at 1600 Hz HI Setting: Gain control at RTS	Total harmonic distortion in % at the stated frequencies.	Nominal value in % plus 3 %. (If the specified frequency response curve rises 12 dB or more between any distortion test frequency and its second harmonic, distortion tests at that frequency may be omitted.)
Equivalent Input Noise: *(The internal noise generated by the hearing instrument itself)*	Input: 50 dB SPL and 0 dB SPL HI Setting: Gain control at RTS	Equivalent input noise = (total output noise SPL) minus (HFA gain for an input SPL of 50 dB)	The value shall not exceed the nominal value plus 3 dB.

Measurement type	Test set-up	Measurement results	Tolerances
Battery Current	Input: 65 dB at 1 kHz. HI Setting: Gain control at RTS	Current drain by the hearing instrument at the test settings.	Battery current shall not exceed nominal value plus 20%.
Induction *(Additional measurements for hearing aids having induction pick-up coil)*	Input: magnetic input of 31,6 mA/m HI Setting: Gain control at RTS Hearing instrument in T-position	HFA-SPLI (HFA-SPL for Induction coil) ETLS (Equivalent test loop sensitivity): ETLS = HFA-SPLI − (RTG + 60 dB).	The ETLS value shall not exceed the nominal value ±4 dB.
Full-On Gain (Induction) *(Additional measurements for hearing aids having induction pick-up coil)*	Input: magnetic input of −40 dB re 1 A/m (= 10 mA/m) HI Setting: Gain control full-on	HFA MASL (Maximum HFA magneto-acoustical sensitivity level): HFA output SPL for a magnetic field strength of −60 dB re 1 A/m (=1 mA/m), according to the formula: MASL = HFA Output SPL − 20 (dB))	The value shall not deviate from the nominal value by more than ±6 dB
AGC - Steady-State Input/Output Characteristics *(Additional measurements applying to AGC hearing instruments)*	Input: Input rising from at least 50 dB to 90 dB SPL, at 2 kHz (and if required, at 250 Hz, 500 Hz, 1 000 Hz, 4 000 Hz) HI Setting: Gain control at RTS	Measure acoustic coupler SPL over time; determine attack time from time plot of the envelope of acoustic output; then determine release time from time plot of the envelope of acoustic output	The measured curve and the nominal curve shall be normalized at 70 dB input SPL. The max. deviation at 50 dB and 90 dB input SPL shall not be greater than ±5 dB.
AGC - Dynamic Characteristics Attack- and release times	Input: Input alternating between 55 dB SPL and 90 dB SPL,	Measure acoustic coupler SPL over time; determine attack time from time plot of	The attack- and release time shall not exceed the larger of either ±5 ms or ±50 % of the nominal

Measurement type	Test set-up	Measurement results	Tolerances
(Additional measurements applying to AGC hearing instruments)	at 2 kHz (and if required, at 250 Hz, 500 Hz, 1 000 Hz, 4 000 Hz) HI Setting: Gain control at RTS	the envelope of acoustic output; then determine release time from time plot of the envelope of acoustic output	value.

14.1.2 Tests according to ANSI S3.22 (2009)

Control settings on the hearing instrument

The standard specifies the following control settings for the hearing instrument:

- The settings used for testing shall be specified by the manufacturer by providing either a test program, a set of programmed settings or by reference to physical control settings. For the purposes of the present ANSI standard, expansion shall be considered as part of the AGC function.

- The hearing instrument shall be set to have the widest available frequency response range, the greatest available HFA*-OSPL90 and, if possible, the greatest HFA*-FOG. Where possible, the AGC function of AGC hearing aids shall be set to have minimum effect for setting the gain control to RTS (see the chart below) and for all tests except the last tests on the list (specifically pertaining to AGC instruments). Other adaptive features such as some noise suppression and feedback reduction systems, etc., which may affect the validity of the measurements made with steady-state pure tone signals should be disabled. For the AGC tests, the AGC function shall be set to have maximum effect.

  *) Definition of HFA (High Frequency Average): The average of gain or SPL in decibels at 1000, 1600 and 2500 Hz.

A short-form of the further test conditions and tolerances for each test is stated in the following chart. For more specific information, refer to the specification from the manufacturer of the hearing instrument in question, and to the ANSI S3.22 (2009) standard.

ANSI Test Short-Form

Measurement type	Test set-up	Measurement results	Tolerances
OSPL90: *Output sound pressure level frequency response curve for an input sound pressure level of 90 dB*	Input: 90 dB SPL HI Setting: Set the Gain control to full-on	Maximum OSPL90 HFA-OSPL90	The maximum SPL shall not exceed that specified by the manufacturer plus 3 dB. The HFA-OSPL90 shall be within + 4 dB of the manufacturer's specified value.

Measurement type	Test set-up	Measurement results	Tolerances
Full-On Gain: *Full-on acoustic gain response curve*	Input: 50 dB SPL HI Setting: Set the Gain control to full-on	HFA Full-on gain	The HFA–FOG shall be within +5 dB of the manufacturer's specified value.
Reference Test Gain (RTG)	Reading from the Frequency Response field in HIT	Use this value as Reference Test Setting (RTS) of the gain control of the hearing instrument for the following measurements.	For a 60 dB input SPL, the setting of the gain control required to produce an HFA-gain within +/- 1.5 dB of the HFA-0SPL90 minus 77 dB, or, if not obtainable, full-on gain.
Frequency Response	Input: 60 dB SPL HI Setting: Gain control at RTS	Basic frequency response curve Bandwidth of the frequency response curve containing values > (HFA -20 dB). (Determined as the Frequency Range. The two intersection points are called f1 and f2).	Low Band 1.25 f1 or 200 Hz (whichever is higher) up to 2000 Hz: **+**4 dB High Band 2000 Hz to 4000 or 0.8 f2 Hz (whichever is lower): **+**6 dB
Harmonic Distortion	Input: 70 dB SPL at 500 and 800 Hz 65 dB SPL at 1600 Hz (or SPF-frequencies - please refer to the standard.) HI Setting: Gain control at RTS	Total harmonic distortion in % at the stated frequencies.	The total harmonic distortion shall not exceed the value specified by the manufacturer plus 3%. (If the specified frequency response curve rises 12 dB or more between any distortion test frequency and its second harmonic, distortion tests at that frequency may be omitted.)

Measurement type	Test set-up	Measurement results	Tolerances
Equivalent Input Noise: *(The internal noise generated by the hearing instrument itself)*	Input: 50 dB SPL and 0 dB SPL HI Setting: Gain control at RTS	Equivalent input noise = coupler SPL with the sound source turned off minus HFA gain for an input SPL of 50 dB.	The equivalent input noise level shall not exceed the maximum value specified by the manufacturer plus 3 dB.
Battery Current	Input: 65 dB at 1 kHz. HI Setting: Gain control at RTS	Current drain by the hearing instrument at the test settings.	The battery current for the above test conditions shall not exceed the maximum value specified by the manufacturer plus 20%.
Induction Coil Response *(Additional measurements for hearing aids having induction pick-up coil)*	Input: magnetic input of 31,6 mA/m HI Setting: Gain control at RTS Hearing instrument in T-position	HFA-SPLITS (HFA-SPL for an inductive telephone simulator) RSETS (Relative simulated equivalent telephone sensitivity) = HFA-SPLITS − (RTG + 60 dB).	The SPLITS value shall be within + 6 dB of the manufacturer's specified value.
AGC - Input-Output Characteristics *(Additional measurements applying to AGC hearing instruments)*	Input: Input rising from at least 50 dB to 90 dB SPL at 2 kHz (and if required, at 250 Hz, 500 Hz, 1000 Hz, 4000 Hz) HI Setting: Gain control at RTS	Measure acoustic coupler SPL over time; determine attack time from time plot of the envelope of acoustic output; then determine release time from time plot of the envelope of acoustic output	With the measured and specified curves matched at the point corresponding to 70 dB input SPL, the measured curve at 50- and 90-dB input SPLs shall not differ in output SPL from the curve specified by the manufacturer by more than + 5 dB.
AGC - Dynamic Characteristics Attack- and release times *(Additional*	Input: Input alternating between 55 dB SPL and 90 dB SPL, at 2 kHz (and if required, at 250 Hz,	Measure acoustic coupler SPL over time; determine attack time from time plot of the envelope of acoustic output; then	The attack and release times shall each be within + 5 ms or + 50%, whichever is larger, of the values specified by the manufacturer.

Measurement type	Test set-up	Measurement results	Tolerances
measurements applying to AGC hearing instruments)	500 Hz, 1000 Hz, 4000 Hz) HI Setting: Gain control at RTS	determine release time from time plot of the envelope of acoustic output	

14.1.3 Free Style Test

Free Style test allows users to perform testing with more flexibility and use the HIT module for hearing instrument fitting. The test type supports broad band signals (Sound Library), similar as used in SM module. It is possible to use measurement sequence and loop function.

To start using Free Style test, add it in **Tools** > **Test Definitions** > **HIT**.

14.2 Set-Up and Editing for Hearing Instruments

This section explains how to set up the hearing instrument and test unit for testing.

In the section HIT Options in Measure, you will find an explanatory list of the IEC 60118-7:2005 and ANSI S3.22 (2009) tests, and in Hearing Instrument Tests you find an instruction on how to perform the tests.

14.2.1 The HIT Unit

The HIT Unit can be controlled exclusively from the PC and keyboard, but it also features a single key, located on top of the test chamber, for quick activation of the next measurement after each hearing instrument adjustment during automated, sequential measuring.

Counted from left to right when seen from the back, the plug inlets on the back of the Hearing Instrument Test Unit are:

- DC connector (if you wish to connect the optional external power supply belonging to the system).
- USB connector for connection to the operator PC.
- Left programmer cable from the NOAHlink™ or HI-PRO.
- Right programmer cable from the NOAHlink™ or HI-PRO.
- Monitor headset for monitoring of the test signal.

Location of the hearing instrument in the test chamber:

- Locate the hearing instrument in the test chamber so that the axis of the reference microphone shall be orthogonal to the speaker axis and shall intersect it at the midpoint of the hearing instrument sound inlet port or port array. A line through the front and rear sound inlet ports of the hearing instrument shall coincide with the speaker axis. In the case of multiple front or rear entry ports, the line is passed through the midpoint of the port array. (Where non-directional hearing instruments are concerned, the ANSI standard is less strict with regard to hearing instrument orientation.)
- Care should be taken to avoid that coupler, reference microphone or other accessories affect the sound field in the vicinity of the hearing instrument.

- The inlet to the reference microphone shall be placed as close as possible to the hearing instrument reference point without touching it, that is, the distance from the centre of the diaphragm to the reference point shall be 5 mm ± 3 mm.
- In the case of BTE instruments, the tubing should have a length of 25 mm, and a diameter of ø 2 mm in accordance with IEC 60318-5.
- In the case of ITE and ITC hearing instruments, connect the hearing instrument to the (HA-1) coupler by means of putty.
- See the instruction from the manufacturer in the case of RIC (Receiver-In-the-Canal) instruments and hearing instruments with a thin tubing.

The below photo shows the correct placement of a standard, directional BTE hearing instrument and the accessories in the test chamber.
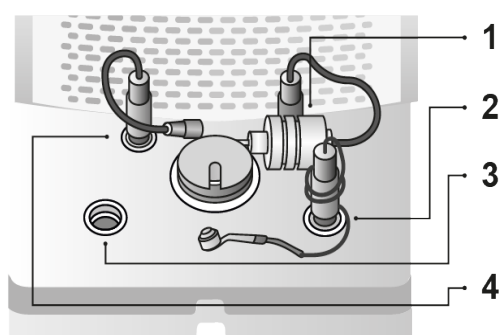
HIT Box   HIT Pro
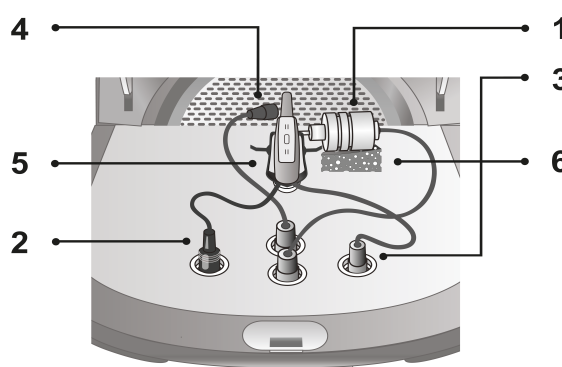
No	Name
1	Coupler microphone
2	Battery pill
3	HI Programmer
4	Reference microphone
5	Hearing aid holder
6	Coupler microphone holder

Note: There are two light indicators on the front panel of HIT Pro. The indicator on the right will light green if HIT Pro is connected to Measure. The indicator on the left will light red or blue, depending whether a hearing instrument for the right (red) or the left (blue) ear is selected for the fitting.

If you need to program the hearing instrument during use (by means of a connected NOAHlink™ or HI-PRO), connect the hearing instrument to the HI Programmer socket inside the test chamber by means of a programming cable.

Note: Do not use this socket for programming of a hearing instrument while it is being worn by a user!

14.2.2 Settings in the HIT tasks

As in most of the other measurement tasks, the changes to settings that you can make in this view, are only temporary and will not be saved with the session. If you want to make permanent changes to the set-up, do so from **Tools > Test Definitions > HIT**. Making consistent use of customised settings can save you the need to make any changes before you start a test.

If you have selected a Task List containing a series of HIT tests from the Navigation pane, the Measure HIT task offers you the option to run an automated, sequential test series containing the selected tests.

The local settings options within the Hearing Instrument Test task are:

Presettings in the HIT top bar

General

- Click the **list** icon to the left of the pre-settings panel to open the list of all available modules. Select a module you want to move to. The current window will close and a selected one will open.
- Click **Undo** to cancel the last action.
- Click **Redo** to regret an "Undo" action.
- Click **Print** to open the Print menu.
- Click **Help** to open the Help function.
- Click the **Top** icon to open an extra measurement diagram which will remain on top of the other windows, until closed.

View

- Click **HF** (HI/Standard Range) icon to extend the high frequency range on the horizontal axis to 16 kHz. Click the icon again to switch to a graph showing the standard audiometric frequency range of 125 Hz - 8 kHz along the horizontal axis.

Overlays

For the HIT tests only one overlay currently exists:

Measurement Lines	This shows exact values and difference between two points on the selected curve. Select a curve and move the lines to see the values.

Right-hand and left-hand panels

The two panels in the right and left hand sides of the measurement workspace, **Test Types** and **Legends**, work in the same way as all the other measurement displays, except that tests which will be included in a sequential test are marked with an icon on the Test Types panel. See [Set-Up and Editing for Real Ear Measurement](#) for general information.

Test Setup

The button **Setup** to the right of the Measurement Controls panel gives access to a dialogue for specification of the current hearing instrument and the test setup.

Measurement chart

Further to the legend, all essential measurement data and test results of the individual Hearing Instrument Tests are shown in the chart to the right of the measurement diagram.

OSPL90					
Max. SPL	91.4	dB at	1259	Hz	
HFA-OSPL90	90.1	dB			
Full-on Gain					
Max. Gain	2.9	dB at	282	Hz	
HFA-FOG	-0.4	dB			
Frequency Response					
HFA	59.9	dB			
Reference Test Gain	-0.2	dB			
Frequency Range	200	Hz -	7943	Hz	
Harmonic Distortion					
Distortion at 500 Hz	0.5	%			
Distortion at 800 Hz	1.6	%			
Distortion at 1600 Hz	0.9	%			
Equivalent Input Noise					
EIN Level	54.7	dB			

Measurement Controls panel

See the function of the Measurement Controls panel options in the [Hearing Instrument Tests](#) section.

Lower Area

In the Lower Area of the Measurement workspace you find the options **Configuration**, **Save**, **Print**, and **Close**, which work in the same way as for all the other measurement displays. See Set-Up and Editing for Real Ear Measurement for further information.

14.3 Hearing Instrument Tests

Hearing Instrument Tests in Measure can be performed either in accordance with the IEC 60118-7:2005 or the ANSI S3.22 (2009) standard. If you want to switch to the other standard, this is done in the Settings options on the **Tools** menu.

All the tests are outlined in the section HIT Options in Measure. If you need more precise instructions for the correct use and interpretation of the tests, please see the referenced standards.

14.3.1 Before the test

1. Make sure that the test you wish to perform has been selected as a test type on the **Test Types** panel in the top left-hand corner.
2. Place the hearing instrument in the test chamber and connect the relevant cables as explained in the section Set-Up and Editing for Hearing Instruments.
3. Set the hearing instrument controls as explained for the selected test in the section HIT Options in Measure.
4. To conduct HIT measurements up to 16 kHz, make sure that you connect an external power supply. A message will appear asking you to plug in the power supply.

14.3.2 Performing a single HIT Test

The Measurement Controls panel to be used for HIT test measurements is located below the diagram and chart.
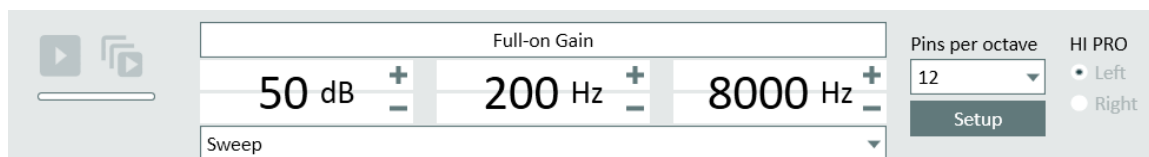
1. Check that the input settings in the Measurement Controls panel are as you want them to be.

2. In the right-hand side of the Measurement Controls panel, you also have the option to set number of pins per octave. As you can only perform pure tone sweep measurements in HIT, these selections only affect the speed and resolution of the measurement. If less pins per octave are selected, you will get a faster but also less detailed measurement result.

3. When you enter the HIT measurement screen, the **Test Setup** window opens automatically for you to specify the required hearing instrument description and setting. If

you want to change the settings at a later stage, click the button **Setup** to the right of the input setting options.

Note that if you have already entered Hearing Instrument data in the **Client Information** window, you can copy them into the Setup by means of the buttons "Copy client data for right (or left) HI".

4. If you are using on-line adjustment of the hearing instrument settings by means of the built-in programming connector, check that the correct HI-PRO (or NOAHlink) side has been selected in the right-hand side of the Measurement Controls panel.

5. Click the **Start** triangle to the left on the Measurement Controls panel. Follow the instructive dialogues, which may appear on the screen. When the measurement has finished, the result will be shown in the chart to the right of the diagram.

Note: It is possible to perform a measurement with the lid open as well as closed. For maximum reliability, always close the lid when possible.

14.3.3 Performing an automated, sequential HIT Test Series

1. Prepare the hearing instrument in the same way as for a single test above.
2. Select the **multiple Start triangle** button and select the **Start** triangle immediately above it.

   Note: The **multiple Start triangle** button is only active after HIT measurements are enabled under **Tools** > **Settings** > **General** > **Workflow**.

3. Follow the instructions on the screen.

14.3.4 Long Term Test

The Long Term Test in the HIT (Hearing Instrument Testing) Unit is designed to evaluate the performance and battery drain of a hearing instrument over an extended period. This test ensures that the hearing instrument can maintain proper functionality over time.

To perform the Long Term Test:

1. Make sure that the Long Term Test has been selected as a test type on the **Test Types** panel in the left-hand corner.
2. Place the hearing instrument in the HIT Unit and connect the relevant cables as explained in the section Set-Up and Editing for Hearing Instruments.
3. In the Measurement Controls panel, specify the duration of the test by entering the desired time into the time field. The test can be set to run for a minimum of 30 minutes up to nearly 24 hours.
4. Click the **Start Test** button or press space on your keyboard to begin the test. During the test, the graph will display two live-mode curves showing the dB SPL (Sound Pressure Level) output and the battery current.
5. If you need to end the test before the specified duration, click the **Stop Test** button.

15 Technical Information

15.1 Calibration

15.1.1 Setting Date of Calibration

Depending on your license agreement, you may have access to set a new date for microphone or transducer calibration. This may be required if you are a distributor (additional distributor's license is required) and have had devices in stock for some time.

To set a date for calibration:

1. Open the **Tools** menu and click **Set Calibration Date**.
2. In the **Intermediate Calibration** dialogue box, enter a valid password and click **OK**.
3. In the **Set Calibration Date** dialogue box:
   a. Choose the necessary device from the drop-down list and review its info.
   b. Choose a new calibration date by using the calendar control in the lower part of the dialogue box. **Note:** You cannot choose a date that falls before the current calibration date, nor dates more than six months after this date.
   c. You can also activate the transducer or keep it inactive by selecting or unselecting the **Activate device** option. By default this option is selected.
   d. Click **Save Date** to save the settings and exit the dialogue box.

15.1.2 Copy Transducer Data

You might need to transfer the data from one transducer to a new one if there is a need to replace a defect transducer cable. The Copy Transducer Data available from the Tools menu helps you to do that. To copy the data, do the following:

1. Plug the first transducer from which you want to copy the data to the Measure Fitting Unit. Select **Copy Transducer Data** from the **Tools** menu. Read the paragraph that appears in the dialogue box.

2. Click **Next** if you agree. Measure will detect the transducer plugged.

3. Now click **Next** to save the transducer's data.

4. Connect the target transducer and click **Next**.

16 Documentation

16.1 Further Documentation

For the Measure Fitting System the following documentation is available:

- Instructions for Use
- A User Manual for print-out
- An on-line Help system
- A Quick Installation Guide
- Marketing information brochures and papers

The three first-mentioned types of documentation can be opened and printed from the Measure Fitting System's Help Menu.

Contact our Marketing department or see our homepage: www.auditdata.com for further information on the many features and useful applications of the Measure Fitting System.

16.2 Default Keyboard Shortcuts

Below are the default keyboard shortcuts, but you can customise them according to your wishes.

Note: default shortcuts may vary depending on the language of the software.

Main Window

Close Module	Alt+F4
Generate Report	Ctrl+P
Get Help	IF1
Save All	Ctrl+S
Show Client Info	~

Navigation

Open Hearing Instrument Test	Alt+T
Open HL/MHA Simulation	Alt+S
Open Otoscopy	Alt+V
Open Pure Tone Measurement	Alt+Q
Open Real Ear Measurement	Alt+E
Open Speech Mapping	Alt+R
Open Speech Measurement	Alt+W
Open Tympanometry	Alt+A
Workflow: Finish	Ctrl+Shift+F

Workflow: Next step	Ctrl+Shift+N
Workflow: Start	Ctrl+Shift+S

Otoscopy

Close Module	Alt+F4
Decrease Brightness	LEFT
Decrease Contrast	DOWN
Decrease Saturation	PgDown
Delete picture	R
Help	F1
Increase Brightness	RIGHT
Increase Contrast	UP
Increase Saturation	PgUp
Print	Ctrl+P
Reset	Ctrl+R
Save All	Ctrl+S
Show\Hide Client View	F5
Take picture	P

Pure Tone Measurement Window

Automated Audiometry: Pause/Resume	Shift+R
Automated Audiometry: Start/Stop	Shift+A
Both Ears	B
Change Masking Side	Shift+M
Decrease Masking Level	PgDown
Decrease Stimulus Level	DOWN
Extended Range	E
Frequency Down	LEFT
Frequency Up	RIGHT
Help	F1
Increase Masking Level	PgUp
Increase Stimulus Level	UP
Left Ear	L
Lock Stimulus	Shift+L

Masking assistant: stimulus heard	Shift+H
Masking assistant: stimulus not heard	Shift+N
Monitoring Controls	Ctrl+M
No Response	N
Present Stimulus	SPACE
Present Stimulus 2	M
Print	Ctrl+P
Redo	Ctrl+Y
Right Ear	R
Save Action	Ctrl+S
Set Selected Test Type BCL	Ctrl+B
Set Selected Test Type FF	F
Set Selected Test Type FF-A	Ctrl+F
Set Selected Test Type HTL	H
Set Selected Test Type MCL	C
Set Selected Test Type Stenger	Ctrl+T
Set Selected Test Type UCL	U
Set Selected Test Type WBR	
Step Level of 1 dB	1
Step Level of 2 dB	2
Step Level of 5 dB	5
Store	S
Switch Panel	F4
Talk Back	F3
Talk Over	T
Toggle Client Window	F5
Track masking	K
Undo	Ctrl+Z

Speech Measurement Window

Both Ears	B
Change Masking	M
Change Masking Side	Shift+M
Decrease Level	DOWN
Decrease Masking Level	PgDown

Decrease Percentage Correct	-
Help	F1
Increase Level	UP
Increase Masking Level	PgUp
Increase Percentage Correct	+
Left Ear	L
Locked	K
Monitoring Controls	Ctrl+M
Print	Ctrl+P
Redo	Ctrl+Y
Right Ear	R
Save Action	Ctrl+S
Select Phoneme 0	0
Select Phoneme 1 / Set to 1 dB step	1
Select Phoneme 2 / Set to 2 dB step	2
Select Phoneme 3	3
Select Phoneme 4	4
Select Phoneme 5 / Set to 5 dB step	5
Set Selected Test Type MCL	Alt+C
Set Selected Test Type Quick SIN	
Set Selected Test Type SAT	
Set Selected Test Type SD	Alt+D
Set Selected Test Type SD 2	
Set Selected Test Type SD 3	
Set Selected Test Type SD-A	Ctrl+D
Set Selected Test Type SDN	Alt+N
Set Selected Test Type SDN-A	Ctrl+N
Set Selected Test Type SD-SF	
Set Selected Test Type SRT	F2
Set Selected Test Type UCL	U
Skip Word	RIGHT
Start/Stop Stimulus	SPACE
Store	S
Store Could not Test result	C

Store Did not Test result	D
Store No Response result	N
Switch Panel	F4
Talk Back	F3
Talk Over	T
Toggle Client Window	F5
Undo	Ctrl+Z

REM Measurement Window

Both Ears	B
Decrease Level	DOWN
Help	F1
Increase Level	UP
Monitoring	Ctrl+M
Print	Ctrl+P
Redo	Ctrl+Y
Save Action	Ctrl+S
Set Selected Test Type HA Transition	Alt+8
Set Selected Test Type REAR - 50	Alt+2
Set Selected Test Type REAR - 65	Alt+1
Set Selected Test Type REAR - 80	Alt+3
Set Selected Test Type REAR - MPO	Alt+4
Set Selected Test Type RECD Freefield	
Set Selected Test Type RECD Insert	
Set Selected Test Type REOR/REOG	Alt+O
Set Selected Test Type REUR/REUG	Alt+U
Start/Stop Stimulus	SPACE
Step level of 1 dB	Ctrl+1
Step level of 2 dB	Ctrl+2
Step level of 5 dB	Ctrl+5
Switch To Left Ear	L
Switch To Right Ear	R
Target Curve Dialog	Alt+G

Toggle Client Window	F5
Undo	Ctrl+Z

SM Measurement Window

Both Ears	B
Decrease Level	DOWN
Help	F1
Increase Level	UP
Left Ear	L
Lock Stimulus	Z
Make Snapshot	S
Monitoring	Ctrl+M
Print	Ctrl+P
Redo	Ctrl+Y
Right Ear	R
Save Action	Ctrl+S
Set Selected Test Type Directionality	Alt+2
Set Selected Test Type HA Transition	Alt+7
Set Selected Test Type Percentile 55 dB	Alt+6
Set Selected Test Type Percentile 65 dB	Alt+4
Set Selected Test Type Percentile 80 dB	Alt+5
Set Selected Test Type REUR/REUG	
Set Selected Test Type Speech in noise	Alt+3
Set Selected Test Type Speech Mapping	Alt+1
Set Selected Test Type Speech Mapping MPO	
Start/Stop Stimulus	SPACE
Step level of 1 dB	1
Step level of 2 dB	2
Step level of 5 dB	5
Toggle Client Window	F5
Undo	Ctrl+Z

HIT Measurement Window

Frequency Down	LEFT
Frequency Up	RIGHT
Help	F1
Level Down	DOWN
Level Up	UP
Print	Ctrl+P
Redo	Ctrl+Y
Save Action	Ctrl+S
Set Selected Test Type AGC Dynamic Characteristics	Ctrl+F5
Set Selected Test Type AGC Input/Output	F5
Set Selected Test Type Battery Current	F9
Set Selected Test Type Equivalent Input Noise	F8
Set Selected Test Type Frequency Response	F12
Set Selected Test Type Full-on Gain	F2
Set Selected Test Type Full-On Gain - Induction	F4
Set Selected Test Type Harmonic Distortion	F11
Set Selected Test Type Induction	F3
Set Selected Test Type OSPL90	Ctrl+F3
Setup (Test settings)	F7
Start Test Sequence	F6
Start/Stop Test	SPACE
Undo	Ctrl+Z

HL/MHA Simulation

Both Ears	B
Decrease Level	DOWN
Hearing Loss Simulator	H
Help	F1
Increase Level	UP

Left Ear	L
Master Hearing Aid	M
On/Off Simulation	S
Reset	Ctrl+R
Right Ear	R
Start/Stop Stimulus	SPACE
Step Level of 1db	1
Step Level of 2db	2
Step Level of 5db	5

Tympanometry

Help	F1
Print	Ctrl+P

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