

KUDUwave™

thinking out the booth

User Manual

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Introduction

Purpose of this Manual

This manual provides instructions for use and describes the various functions and the features of the KUDUwave. It also describes how all the technologies involved in the KUDUwave's function work in conjunction.

This manual is not intended as a method to train KUDUwave operators to be healthcare professionals or to act as such. An operator may not act as a professional unless qualified to do so.

Medical Purpose

The medical purpose of the KUDUwave is to assist in testing the behavioral auditory responses of a patient and to determine hearing thresholds which will assist in diagnosis of hearing impairments.

Patient Populations

The KUDUwave is suitable for testing all patient populations, regardless of gender, age, weight, general health or ethnicity other than the following:

- very young children (suitable for ages 3+)
- patients with physical or mental disabilities that prevent them from signaling a response to a test audio tone presented to them.

During testing, patients should be calm and comfortable and free from distraction.

Device Description and Application

The KUDUwave is a mobile audiometer which provides compliant testing outside a certified sound room. The KUDUwave uses built-in sound attenuation and active noise monitoring to achieve this while including all the functions found in a typical audiometer.

The KUDUwave is suitable for open air testing in areas free from excessive noise. It must be kept dry and free from dust for reliable, safe operation. The KUDUwave is a highly sensitive and technically complex device that should be treated with care. We highly recommend that you use the robust, shock-absorbing, carry case to transport your device. Mark the package as FRAGILE when it is in transit.

Frequent Usage

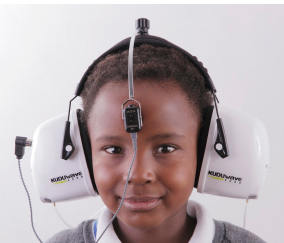
The KUDUwave is suitable for continuous, regular use. Analysis of all its functions confirms that there is no risk to either the operator or patient. These functions are detailed within this document and include measures to minimise any potential risk.

Applied Parts Details



The following parts are defined as “applied parts” in accordance with BS EN 60601-1:

Ear Inserts: The Left and Right Ear Inserts will be positioned in the outer ear by the operator. They do not carry any electrical, chemical or mechanical energy and contain no metallic parts, and facilitate the delivery of sound energy to the patient’s ears.



Bone Vibrator: The bone vibrator is positioned against the patient’s forehead by the operator. From this position it can be used to deliver sound energy to the patient’s cochlea. The KUDUwave uses a certified bone vibrator from Radioear.

Operator Training Requirements

Basic Requirements

The operator must be a trained healthcare professional (typically an audiologist, hearing aid acoustician, general practitioner, ENT, nurse or audiometrist) or a practitioner who has been trained in audiometry. The operator must be able to read and communicate fluently in English and/or the primary language of the patient.














Training and Certification Requirements

eMoyo provides online training for both facilitators and operators of the KUDUwave. Visit the link below to view the online KUDUwave Academy. The operator will receive a certificate of completion after successfully completing their training.

<https://sites.google.com/emoyo.net/kuduwave-academy/home>

Description of Symbols

The following important symbols are used on the KUDUwave and its accessories:

Symbol	Description
	Manufacturer, eMoyoDotNet (Pty) Ltd, 179 Beyers Naude Drive, Johannesburg, South Africa
	EC Authorised Representative, PSF Medical BV, Marten Messweg 8, 3068AV Rotterdam, The Netherlands
	Symbol for CE Mark with Notified Body Number. Conforms to Medical Device Directive 93/42/EEC.
	Symbol designating Type B Applied Parts according to BS EN 60601-1.
	Caution. Indicates the need for the user to consult the instructions for use for important cautionary information such as warnings and precautions that cannot, for a variety of reasons, be presented on the medical device itself.
	Consult instructions for use. Indicates the need for the user to consult the instructions for use.
	Single use only.
	Serial number.
	Batch code. Indicates the manufacturer's batch code so that the batch or lot can be identified.
IP20	Ingress protection.
	Keep Dry. Indicates that the medical device needs to be protected from moisture
	Temperature limit. Indicates the temperature limits to which the medical device can be exposed safely.
	Humidity limit. Indicates the range of humidity to which the medical device can be safely exposed.
	Fragile, handle with care. Indicates a medical device that can be broken or damaged if not handled carefully.

Getting Started

Get to know your KUDUwave™

All KUDUwave devices have the following capabilities:

- Pure Tone Air Conduction Testing
- Active Noise Monitoring
- Automated and Manual Testing
- Testing Protocols
- Patient Management and Medical Record Suite
- Telemedicine Enabled

Your KUDUwave can be one of the following configurations, which determines what tests it can perform and extra features it may have.

KUDUwave™ Prime	KUDUwave™ Plus	KUDUwave™ Pro
Screening	Screening	Screening
-	Diagnostic (Bone Vibrator Included)	Diagnostic (Bone Vibrator Included)
-	-	Monitoring of Ototoxicity
-	-	Extended High Frequency (up to 16kHz)

KUDUwave™ Serial Number

The unique serial number is clearly marked on the bottom of the KUDUwave headset. Serial number information is required when contacting customer support and booking calibrations.

Unpacking the KUDUwave™ Hardware

The KUDUwave is packaged in a robust, shock-absorbing case designed to protect it during transportation. Inspect the case for signs of any damage and notify your supplier immediately if any signs of mechanical or physical damage are found.



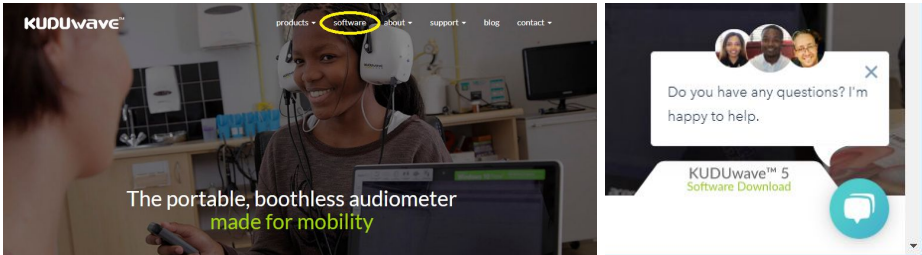
Packaging Checklist

Please check that all items listed below are received in good condition. If any items are missing or damaged, immediately notify your KUDUwave™ distributor.

- The KUDUwave headset
- Three meter long twisted KUDUwave dual USB cable
- USB patient response button
- Radio Ear Bone vibrator with metal headband attached to the KUDUwave black headband with a screw (Plus and Pro configurations only)
- Calibration certificate
- Two sound tubes with bronze ear tip couplers, attached to the KUDUwave
- Spares (6 sound tubes and 1 brass connector)
- Starter pack of eartips

Software Installation

If your KUDUwave controller PC was professionally configured by eMoyo, all the necessary software will already be installed. Should this not be the case, or should you wish to install the software on more than one computer, please visit the KUDUwave website (www.kuduwave.com). Click on the software link either on the top bar or on the tab in the right hand corner.



KUDUwave 5.1.8.0 Software

Fill in the form below to download the latest KUDUwave Software.

First name

Last name

Email*

KUDUwave Serial Number

We use the contact information you provide to us in order to update you on your software, products and services. You may unsubscribe from these communications at anytime.

[Download](#)

Complete the form, download the software from the provided link and run the the install file.

Use the chat function in the bottom right hand corner of your screen to chat to us live if you need help.

Software Launch



You should find this KUDUwave 5 shortcut on your PCs desktop. Alternatively you can find KUDUwave 5 under programs in your start menu. Click the icon to launch.

Warning: The KUDUwave 5 software must be launched with administrator rights in Windows 7, 8 and 10. To do this right click on the KUDUwave 5 icon and select “Run as administrator”.

Software Language

The software is currently available in English, Spanish, French, Portuguese, Bahasa and Dutch.

Preparing the Test Environment

It is essential that the test environment is as quiet as possible in order to ensure test compliance and that the patient is not disturbed. The KUDUwave software will indicate if ambient noise is too loud and is disrupting the test. The test environment should be free from any distractions that may disturb either the operator or the patient as these may result in incorrect test results.

Preparing and Positioning the Patient

The patient should be seated in the test environment near to the test computer but should not be able to view the the computer screen. Care should be taken to ensure the patient is comfortable so as to minimise distractions.

If the patient is unable to sit, care must be taken to ensure they are positioned in as comfortable and relaxed a position as is possible. Patients who are notably anxious should be calmed and reassured before testing.

Preparing the KUDUwave™ Equipment

Connecting the KUDUwave™

Plug the larger USB plugs into the USB ports of the PC. Plug the smaller plugs into the corresponding ports of the KUDUwave headset.



The KUDUwave will indicate the right side with a red light and the left side with a blue light when powered. You will now be able to begin testing. If the device is not plugged in, it will not be possible to proceed to testing until the device is properly connected.

Ensure that the cables are positioned out of the way so that they are not tripped over or tangled. For safe storage and to extend the lifespan, please wind the USB cables in large loops when returning to the case for storage.

Device Drivers

KUDUwave is a plug and play device and all drivers will automatically begin installing when KUDUwave's USB cables are plugged into a PC. If the device is plugged into a different USB port on the same computer for the first time, then some drivers will be installed again. Please wait until Windows notifies you that the drivers have been installed successfully.

Warning: If you launch the KUDUwave software before the drivers were installed, the KUDUwave software will prompt you that it could not find the device, even though the device is plugged in. Contact Support should the drivers still not find the device.

Ear Inserts

Ear tips must be firmly attached to the plastic tubes using the brass couplers. Ear tips are intended for single use and should be disposed of as medical waste after testing. eMoyo will not be held liable for any complications if eartips are reused.



USB Patient Response Button

Connect the USB cable of the response button to either one of the ear cup USB ports, or into a third USB port in the PC. A light will pulse (come on and switch off again) if connected correctly.



Positioning the KUDUwave™ Headset

When not in use, place the headset on a stable surface. Cleaning and disinfection can be done with cleaning wipes which are intended for cleaning plastics, that comply with EN1276.

1



Although there are a number of ways to position the KUDUwave correctly on the patient's head, the following technique is recommended:

Step 1: Initial Position

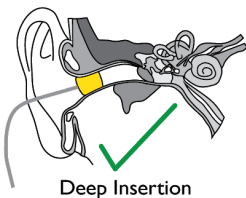
Gently place the KUDUwave headset on the patient's head, resting just above both ears. Ensure the headset is positioned correctly i.e. the left ear cup must be on the patient's left hand side and vice versa.

2

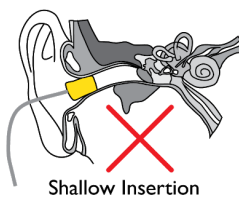


Step 2: Insert Eartips

Squeeze and roll the foam tip down to its smallest diameter using your thumb and index finger. Pull the ear by the pinna (up and back in adults and down in children) and insert the foam tip into the ear canal. Ensure that the ear tip is fully inserted. Hold the ear tip in position while the memory foam expands to fill the ear canal. This will ensure that the eartip sits firmly in place. A loosely fitted ear tip or shallow insertion will result in testing inaccuracy.



Deep Insertion



Shallow Insertion

Yellow eartip inserts are intended for most ear canal sizes while beige eartip inserts are intended for very small ear canals (i.e. children).

Warning: Improper selection or insertion of eartips may affect test results.

Step 3: Final Position



The headset can now be lifted and placed over the patient's ears. Ensure the ear cups are supported by the headband and do not hang on the ears. Care must be taken not to dislodge the ear inserts from the patient's ear canal.

It is important to lift the left and right ear cups slightly in turn to visually confirm the ear inserts are still correctly positioned. Make sure that the tubing is not tangled under the cups. The tubing should loop out under the cups towards the front of the ear to avoid tangling and or bending.

Step 4: Bone Vibrator Positioning



If the bone vibrator is to be used, the metal headband must be adjusted and placed over the patient's head. Ensure that it is positioned carefully on the patient's forehead, in line with the middle partition between the eyebrows or in line with the centre between their eyes.

Warning: Bone vibrators are calibrated to a specific KUDUwave. They are **not interchangeable** between KUDUwaves. Swapping of bone vibrators between devices may result in inaccurate testing. If you are unsure about which bone vibrator should be used with your KUDUwave please check its calibration certificate or alternatively contact eMoyo support.

Step 5: Patient Response Button

The Patient Response Button must be placed in the patient's hands. Ensure that the cable does not become tangled or damaged. The patient must keep their finger on the button and be ready to press it when a sound is played. The patient must be told to press the button as quickly as possible and then let go of the button.

Remote Testing

The KUDUwave can easily and safely be used for remote testing over local and internet connections.

To test remotely:


1. The trained operator starts the KUDUwave 5 software application on his or her local personal computer.
2. A connection is made to a KUDUwave headset connected to a remote personal computer.
3. The remote personal computer is specified using its unique IP address.
4. A trained facilitator can then fit the KUDUwave headset on the patient.
5. The operator can proceed with the test.

Both the operator and facilitator need to complete the eMoyo KUDUwave training.

Getting Started with the KUDUwave™ Software

Practitioner Details



Run the KUDUwave 5.0 application by double clicking on the  icon on your desktop or start bar, and enter your details to continue. These details will appear on all reports and audiograms. You can also select your language of choice. Press enter or click the “Go” button to move forward.

KUDUwave™

Details to appear on reports

Full name

Name of professional association

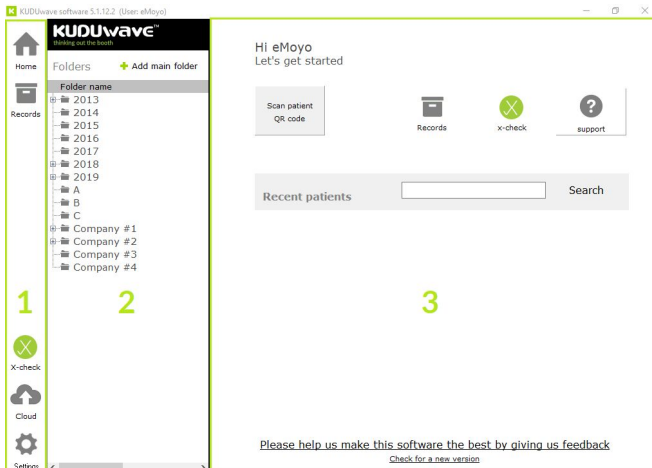
Registration number

Go English ▾

Home Page

Your Portal to Patient Management

The home page appears as below with 3 main sections.



1. System Menu

Here you have access to:

- Home *(return to the home page)*
- Records *(return back to the folder you were busy with)*
- X-check *(built in automated calibration verification tool)*
- Cloud *(synchronization of data to eMoyo cloud storage)*
- Settings *(backup data, personalise your reports and more)*

2. Folder Management Pane

Folders can be created and managed here. Organise your patient files and make record retrieval quick and easy.

It is recommended to organise patients either under alphabetical folders, organisation / company names or according to the date (month/year) they were tested.

See more examples on the KUDUwave help desk at:
helpdesk.kuduwave.com/software/folder-management

3. Data View Pane

A series of quick links are made available for your convenience.

- Scan QR codes *(for quick retrieval of patient data)*
- Records *(return back to the folder you were busy with)*
- X-Check *(built in automated calibration verification tool)*
- Support *(navigates to our website to contact the support technicians)*
- Search *(filter through your recent patients listed below the search tool)*

Give us your feedback

Help us improve the KUDUwave by giving us your feedback.

In the software is a link to a short 5 min survey, where you can let us know how you are experiencing your mobile audiometer and its accompanying software. We'd appreciate your feedback so we can improve your KUDUwave experience.

[Please help us make this software the best by giving us feedback](#)

[Check for a new version](#)



Or contact us through our website : www.kuduwave.com.

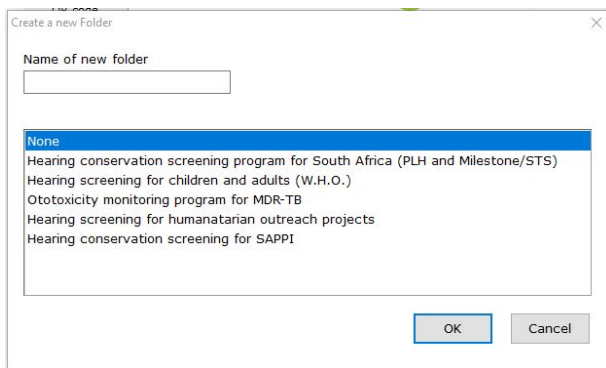
Working with Folders


Management of folders is done within the Folder Management Pane



Creating Folders and Subfolders

To create a folder click:  **Add main folder**

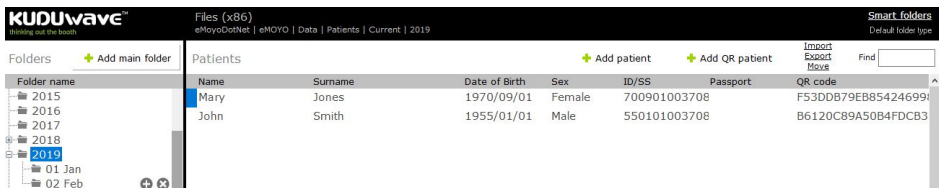
Enter the name of your folder in the space provided. Select a smart folder setting if you wish to use this feature. Learn more in the [Smart folder section](#). Select "OK" to save.



Patient details will only be displayed, if the folder they fall under is selected. Once a folder is selected, a subfolder can be created by clicking the  icon next to its name.

Access a folder by clicking on the folder name. Double click on the folder name or click on the  icon to view subfolders. To hide subfolders, double click again on the folder icon or click on the  icon.

Selecting a folder or subfolder will display its contents in the right hand pane.



Name	Surname	Date of Birth	Sex	ID/SS	Passport	QR code
Mary	Jones	1970/09/01	Female	700901003708		F53DDB79EB854246991
John	Smith	1955/01/01	Male	550101003708		B6120C89A50B4FDCB3

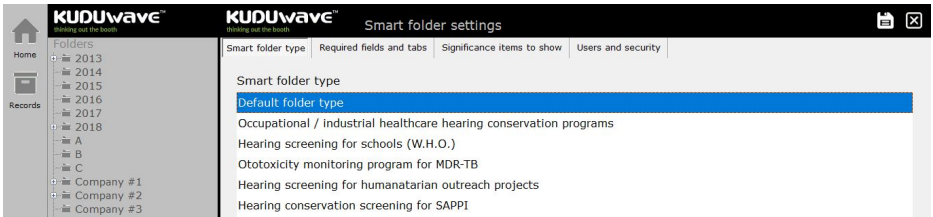
Smart Folders

The KUDUwave uses multiple criteria (OSHA, SANS, WHO etc.) to develop testing protocols and assistive interpretations of results. The KUDUwave also uses these criteria to separate which test protocols are most needed and used by a particular industry.

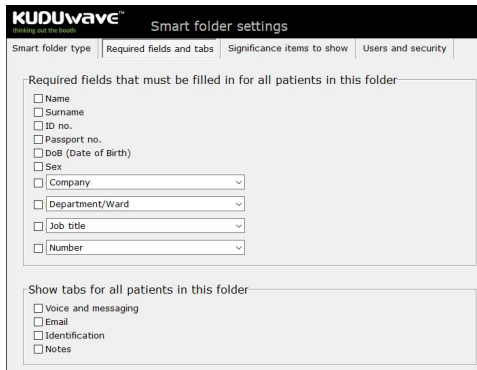
To streamline the process of choosing which tests need to be done with which patients, you can change the default settings of the folder. Change the smart folder type by selecting the folder and click on “Smart folders” in the top right hand corner.



Under the “Smart folder type” there are six available smart folder configurations, each with their own user interfaces and pre-selected tests for all patients in this folder. Select one option.



Under “Required fields and tabs”, you can customise the selected smart folder type by selecting which details you want to make required fields. These fields will be required to be filled in before any tests can be conducted.

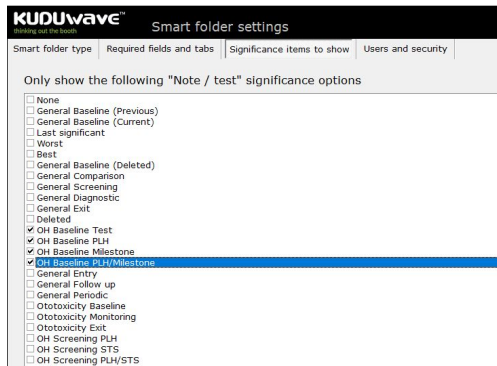


If you are not in the occupational health sector you can change the last four field names to relate to a

hospital or school setting.

<input checked="" type="checkbox"/> Hospital	<input checked="" type="checkbox"/> School
<input checked="" type="checkbox"/> Ward	<input checked="" type="checkbox"/> Grade
<input checked="" type="checkbox"/> Room	<input checked="" type="checkbox"/> Class
<input checked="" type="checkbox"/> File no	<input checked="" type="checkbox"/> Scholar no

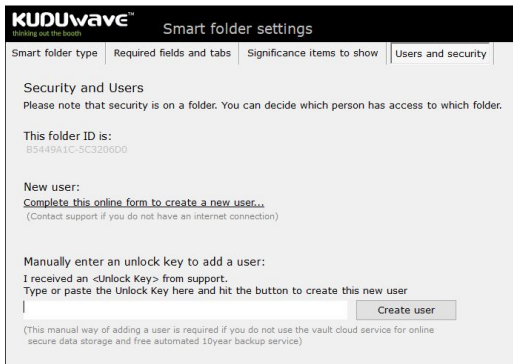
Under “Significance items to show”, you can select the labels which are available to use for the tests generated in this folder.



The screenshot shows the 'Smart folder settings' interface with the 'Significance items to show' tab selected. It displays a list of significance options with checkboxes. The 'OH Baseline PLH/Milestone' option is selected and highlighted in blue.

Significance Item	Selected
None	<input type="checkbox"/>
General Baseline (Previous)	<input type="checkbox"/>
General Baseline (Current)	<input type="checkbox"/>
Last significant	<input type="checkbox"/>
Worst	<input type="checkbox"/>
Best	<input type="checkbox"/>
General Baseline (Deleted)	<input type="checkbox"/>
General Comparison	<input type="checkbox"/>
General Screening	<input type="checkbox"/>
General Diagnostic	<input type="checkbox"/>
General Exit	<input type="checkbox"/>
Deleted	<input type="checkbox"/>
OH Baseline Test	<input checked="" type="checkbox"/>
OH Baseline PLH	<input checked="" type="checkbox"/>
OH Baseline Milestone	<input checked="" type="checkbox"/>
OH Baseline PLH/Milestone	<input checked="" type="checkbox"/>
General Entry	<input type="checkbox"/>
General Follow up	<input type="checkbox"/>
General Periodic	<input type="checkbox"/>
Ototoxicity Baseline	<input type="checkbox"/>
Ototoxicity Monitoring	<input type="checkbox"/>
Ototoxicity Exit	<input type="checkbox"/>
OH Screening PLH	<input type="checkbox"/>
OH Screening STS	<input type="checkbox"/>
OH Screening PLH/STS	<input type="checkbox"/>

Under “Users and security”, you can contact eMoyo by completing the online form, to setup folder security providing restricted access to particular folders.



The screenshot shows the 'Smart folder settings' interface with the 'Users and security' tab selected. It displays instructions for setting up folder security and a form to create a new user.


Security and Users
Please note that security is on a folder. You can decide which person has access to which folder.

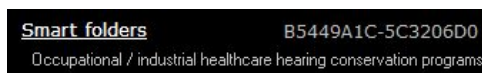
This folder ID is:
B5449A1C-5C3206D0

New user:
[Complete this online form to create a new user...](#)
(Contact support if you do not have an internet connection)

Manually enter an unlock key to add a user:
I received an <Unlock Key> from support.
Type or paste the Unlock Key here and hit the button to create this new user

(This manual way of adding a user is required if you do not use the vault cloud service for online secure data storage and free automated 10year backup service)

Click the save icon  to save changes. The folder type will be displayed at the top right hand corner of your screen.



The screenshot shows a black box with white text displaying the folder type and ID.

Smart folders B5449A1C-5C3206D0
Occupational / industrial healthcare hearing conservation programs

How to use the MDR-TB Screening Smart Folder

This folder specifically caters for the MDR-TB set-up in South Africa, but can be applied to other projects across the world.

Which tests can I perform in this folder type?

- Extended high frequencies with the KUDUwave Pro™.
- Incorporates questionnaires for the patient, including records of which medication the patient is currently receiving.
- Automatically continues with the test after the questionnaire is completed.
- Assistive Interpretation done after testing and any indication of ototoxicity is highlighted in a report.

How do I start testing?

1. After adding a patient to the smart folder, click on +Note/Test to open a new test.
2. This next menu will appear for you to select the relevant test you want to perform. (Baseline/Initial, Monitoring or Exit, depending on the patient and where they are in the program stages) You can return to the normal interface by clicking on the button "Select a new Test / Note / Interpretation / Notification" in the top left corner. Once you click on a button, the automatic testing sequence will begin:
 - Questionnaire / Form
 - Test
 - Assistive Interpretation
3. At any point during the test you can manually take over by clicking on pause.
4. Save after each step.

The screenshot shows a software interface with a green header bar containing the text "Select a new Test / Note / Interpretation / Notification" and a close button (X). Below the header, the interface is organized into sections:

- First visit (Preferably before potentially ototoxic medication is administered)**
 - Not yet on medication:** A flow of three buttons: "Complete baseline form" (grey), "Do baseline test" / "Enter baseline test" (white with grey border), and "Interpret Baseline" (grey).
 - Already on medication:** A flow of three buttons: "Complete initial form" (grey), "Do initial test" / "Enter initial test" (white with grey border), and "Interpret Initial" (grey).
- Follow-up visits (Regular comparison tests as per protocol)**
 - Screening today:** A flow of three buttons: "Complete monitoring form" (grey), "Do monitoring test" (white with grey border), and "Interpret Monitoring" (grey).
- Exit visits (As per protocol after the ototoxic medication was stopped)**
 - Exit:** A flow of three buttons: "Complete exit form" (grey), "Do exit test" (white with grey border), and "Interpret Exit" (grey).

- As a patient enters the MDR-TB monitoring program (i.e. it is their first visit to the clinic), an initial / baseline form, test and assistive interpretation must be recorded.

- If the patient has already completed their baseline test (for example he was first tested a year ago), manually enter these results into the KUDUwave database by clicking: Enter baseline / initial test.
NOTE: You cannot perform a Monitoring or Exit test until the patient's full history is manually entered into the system.
- Once the manually recorded results are saved in the database, you can continue on to the monitoring test.
- When the patient arrives for their next follow-up visit, complete the monitoring form, test and interpretation.
- Once the patient is ready to exit the program, complete the exit form, test and interpretation.

How to use the Occupational (Industrial) Healthcare smart folder

Using this smart folder type simplifies the method of testing to identify early hearing loss and to calculate measures for compensation.

Which tests can I perform in this folder type?

- Milestone Baseline & STS Screening (Standard Threshold Shift)
- PLH Baseline, Screening and Exit (Percentage Loss of Hearing)
- A combination of both Milestone & PLH Baselines or STS & PLH Monitoring

How do I start testing?

1. After adding a patient to the smart folder, click on +Note/Test to open a new test.
2. This next menu will appear for you to select the relevant test you want to perform. The test will begin automatically when you click on a button. You can return to the normal interface by clicking on the button "Select a new Test / Note / Interpretation / Notification" in the top left corner.
3. At any point during the test you can manually take over by clicking on pause.
4. Save the test once it is completed.

The screenshot shows a software window titled "Select a new Test / Note / Interpretation / Notification". It contains two main sections for selecting tests:

Collect baseline tests

- PLH (ZA) baselines: Do 1st, Do 2nd, (Do 3rd), Enter manual, Interpret
- Milestone baselines / Audiometric zero: Do 1st, Do 2nd, Enter Manual, Interpret
- Combine PLH (ZA) and Milestone baselines: Do 1st, Do 2nd, (Do 3rd), Enter Manual, Interpret

Collect entry/screening/follow-up/periodic/exit PLH (ZA) and STS monitoring tests

- PLH (ZA) screening: Do, Interpret
- STS monitoring: Do, Interpret
- Combined PLH (ZA) screening and STS monitoring test: Do, Interpret

If you want to collect a baseline result, select the type of test from the top section:

Collect baseline tests					
PLH (ZA) baselines:	<input type="button" value="Do 1st"/>	<input type="button" value="Do 2nd"/>	<input type="button" value="(Do 3rd)"/>	<input type="button" value="Enter manual"/>	<input type="button" value="Interpret"/>
Milestone baselines / Audiometric zero:	<input type="button" value="Do 1st"/>	<input type="button" value="Do 2nd"/>		<input type="button" value="Enter Manual"/>	
Combine PLH (ZA) and Milestone baselines:	<input type="button" value="Do 1st"/>	<input type="button" value="Do 2nd"/>	<input type="button" value="(Do 3rd)"/>	<input type="button" value="Enter Manual"/>	

- Complete two baseline tests, or even a third if you suspect the patient is malingering.
- Click "Interpret" to use the assistive interpretation tool.
- Manually enter the baseline results of the patient if they were tested before, but are new in the KUDUwave database.

If you want to collect a follow up result, select the type of test from the bottom section:

Collect entry/screening/follow-up/periodic/exit PLH (ZA) and STS monitoring tests		
PLH (ZA) screening:	<input type="button" value="Do"/>	<input type="button" value="Interpret"/>
STS monitoring:	<input type="button" value="Do"/>	<input type="button" value="Interpret"/>
Combined PLH (ZA) screening and STS monitoring test:	<input type="button" value="Do"/>	<input type="button" value="Interpret"/>

- If the patient already has a baseline result in the database, continue to complete the follow up test (screening /monitoring).
- Click "Interpret" to use the assistive interpretation tool.

How to use the School Screening Smart Folder

This folder is a solution for mass screening of children, to quickly identify those who need help early on. The automatic test is designed to be efficient, sweeping four frequencies between 25 dB HL and 90 dB HL.

Which tests can I perform in this folder type?

- Pure tone test which finds thresholds from 25 - 90 dB HL at 500Hz, 1kHz, 2kHz and 4kHz.

How do I start testing?

1. After adding a patient to the smart folder, click on +Note/Test to open a new test.
2. This next menu will appear for you to start the automatic test. You can return to the normal interface by clicking on the button "Select a new Test / Note / Interpretation / Notification" in the top left corner.
3. At any point during the test you can manually take over by clicking on pause.
4. Save the test once it is completed.



How to use the Humanitarian Screening Smart Folder

This folder is designed to screen masses efficiently and effectively. The quick automatic test sweeps through 5 frequencies between 25dB HL and 90dB HL.

Which tests can I perform in this folder type?

- Pure tone test which finds thresholds from 25 - 90 dB HL at 500Hz, 1kHz, 2kHz, 4kHz and 8kHz.

How do I start testing?

1. After adding a patient to the smart folder, click on +Note/Test to open a new test.
2. A similar menu as the school screening smart folder above will appear for you to start the automatic test. You can return to the normal interface by clicking on the button "Select a new Test / Note / Interpretation / Notification" in the top left corner.
3. At any point during the test you can manually take over by clicking on pause.
4. Save the test once it is completed.

Working with Patients

Add and manage your patient data within the Patient Interface. The patient interface will appear when a new patient is created or by double clicking on the patient file in the data view pane of home page.

Adding a New Patient

To create a new patient, first select or create the folder under which the patient should be stored, then click **+ add patient** . This will open the Patient Interface where you can add the patient's details in the Patient Data Pane (4). Any test data can be previewed in the Test Data Pane (5). To edit patient details, select the field by clicking in the field and enter the new information. All new tests will have the corrected information.

Patient Example (38yr Male) export all data of this patient
delete this patient

Patient details 31E72CT6KCP54F90A2DF378355682C0

Name: Patient, Surname: Example
 ID no.: 123456789, Passport no.:
 Date of Birth: 1980/01/01, Sex: Male
 Company: Default, Department: Department
 Job title: Job, Number: 1


History + Note / Test

Date and time	Significance	Type
4		

No clinical notes. Click on "+ Note / Test"

5

Tips:

- Click the tab key to quickly navigate between fields.
- After entering a South African ID number, the date of birth, age and gender will automatically be populated.
- Folder names are assumed to be company names, and subfolders as job titles. These fields will be automatically populated with these details. Correct them if need be and the option will become available in the drop down menu for each patient which is added later. To delete an item from a drop down menu, select it, and then click the "X" icon.
- To refresh click 

Company:  Department/Ward: 
Hospital / Clinic / School Ward / OPD / Grade

Job title:  Number*:
Job title / Bed / OPD room / Class Employee no / File no / Scholar no

Additional Details

There are four additional tabs within the Patient Data Pane.

Voice and Messaging

KUDUwave™ software allows for SMS and/or voice communication, here is where you will add the details.

Add the phone numbers in the fields provided*. Select “Add another” to add additional numbers, to remove press “Delete”.

***Note:** Include **country and area codes** with telephone numbers. **Do not add +** before the country code.

Patient details	
Name	2AB81FED009A4F878338CAC9A604102F
Voice and messaging	Email Identification Notes
Mobile numbers for voice calls, text messages and notifications	
Add another	Delete
082 123 4567	Mobile
021 321 7654	Work
	Home

Email

Email addresses linked to your patient can be stored here. Select the Email tab to add email addresses. Select “Add another” to add additional email addresses, and “Delete” to delete email addresses.

Patient details	
Name	2AB81FED009A4F878338CAC9A604102F
Voice and messaging	Email Identification Notes
Email addresses for messages and notifications	
Add another	Delete
email@domain.com	Work

Identification

Occasionally, you will need to add additional identity numbers for verification such as employee ID, Social Security or medical insurance details. Here is where this can be done. Select Identification to add additional types of identity details for the patient.

Add the identity details to the relevant field provided, or click “Add another” to add additional forms of identification, and “Delete” to remove them.

Patient details	
Name	2AB81FED009A4F878338CAC9A604102F
Voice and messaging	Email Identification Notes
Identification numbers	
Add another	Delete
	ID / SS Issued by country:
	ID / SS number
	Medical Scheme Number
	Medical Scheme Name
	My Patient file number

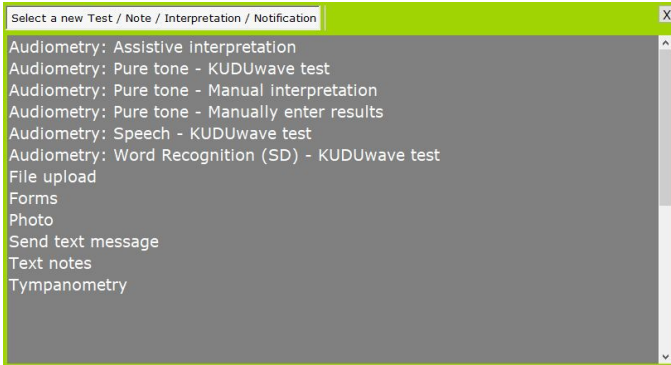
Notes

Notes relating to the patient's demographics can be added under the Notes tab. Notes regarding tests are discussed later.

Patient details	
Name	2AB81FED009A4F878338CAC9A604102F
Voice and messaging	Email Identification Notes
More text notes on demographics of patient	
<div style="border: 1px solid #ccc; height: 100px;"></div>	

Notes and Tests

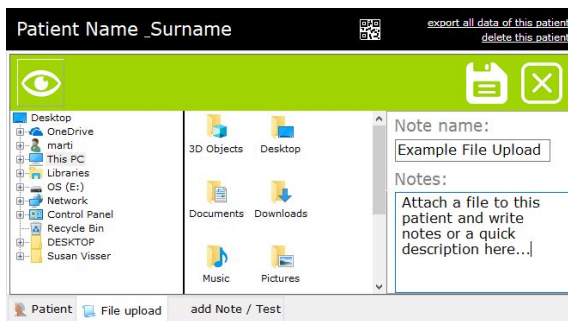
KUDUwave™ software bundles notes and tests within a single function. To add a new note or test click on **+ Note / Test** to get access to the following options:



All audiometry listed items are discussed in the [“Working with clinical tests”](#) section. Request the Tympanometry User Manual to find out more about this added feature of the KUDUwave.

File upload

It may be necessary to upload additional digital documents to your patients records such as; clinical notes or old audiograms. To do this, select “File upload” from the **+Note / Test** menu.



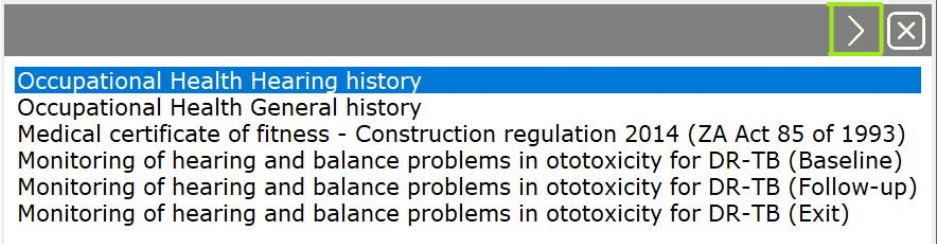
Browse to the file you would like to upload to the patient profile, select it, name it and provide some details about the file you are uploading.

Click the save icon  to upload the file.

Date and time	Significance	Type	Signed
2018/10/09 13:08	None	File upload - KUDUwave software Backup 20	

Forms

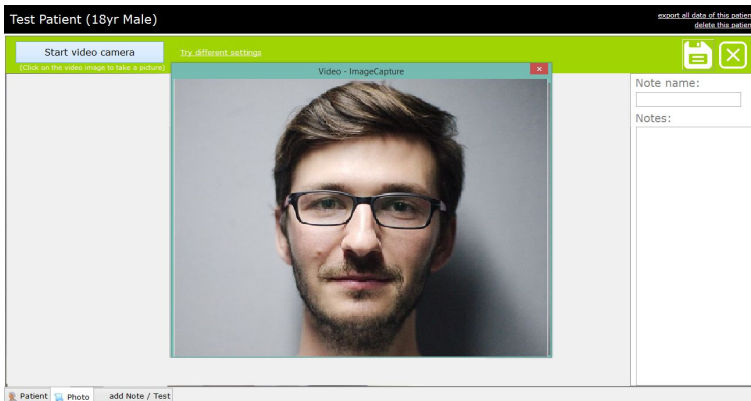
The KUDUwave software comes with built-in patient questionnaires to help supplement your test results. Click on any of the listed questionnaires, then click on the “Next” arrow to fill it in.



Photo


To take a photograph of the patient, select “Photo” from the +Note / Test menu. Your computer’s camera will automatically start.

If it does not, select  .



If the image is in black and white, select “Try different settings”. If you are happy with the image click anywhere on the image to take the photograph. You can make a note about the file upload in the “Note” field.

Click  to save. The photo will now be available in the patient profile.

Click  to cancel and go back to the patient profile

Send a Text Message

In order to send a text message from the system, you need to be connected to the internet. Contact eMoyo to set this feature up for you. First, select “Send text message” from the **+Note / Test menu**.

Patient Example (38yr) export all data of this patient
delete this patient



Home Records X-check Settings

Mobile number that includes the country code i.e. "27824400826" (No + or 00):

(160) Text message / SMS (Maximum 160 characters):



Patient Send text message add Note / Test

From the drop down menu, select the number to which you want to send a text message. This number would have been entered in the patient’s details under “Voice and messaging”.

Type your message and select  to **save and send**, or  to **cancel** the message. A record of the sent sms will be saved in the patient history.

Text Notes

Select “Text notes” from the **+Note / Test menu**. Enter the name of the note and enter the note text.

Select  to **save** or  to **cancel** the note. The note is saved in the patient history.

Patient Example (38yr) export all data of this patient
delete this patient

Home Records X-check Settings

Note name

Notes

Patient Text notes add Note / Test

Patient History

The Patient Data Pane also contains a panel called History. Here, all Notes/tests will be listed by date.

Patient Example (38yr)

Patient details 21E77C706CF54F98A2DF357B355682C0

Name

Name* Surname*

ID no. Passport no.

Date of Birth Sex

Company Department/Ward

Hospital / Clinic / School Ward / OPD / Grade

Job title Number*

Job title / Bed / OPD room / Class Employee no / File no / Scholar no

History + Note / Test

Date and time	Significance	Type
2018-03-01 17:02:42	None	Text notes - Text Note 2
2018-03-01 17:02:24	None	Text notes - Text Note 1

Exporting Patient Data

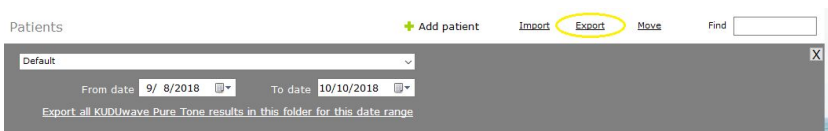
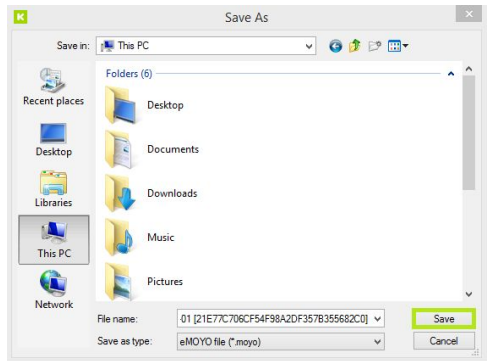
Exporting a Single Patient's Data

From within a patient profile, click on “export all data of this patient” at the top right corner of the patient management screen. This will bring up a dialogue box. Select where you would like to save the patient data, and click “Save”.

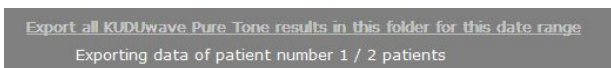
Note: This exported data can only be viewed if imported back into the KUDUwave software.

Exporting Multiple Patients' Data

From within a folder, you can export multiple pure tone test results for all patients within a specific date range. In the folder view click “Export”, select the date range and then click “Export all KUDUwave Pure Tone results in this folder”.



Select where you would like the file to be saved and click “Save” to finish. The software will inform you of the progress of the export.



Note: This exported data is saved in csv format and must be opened as a spreadsheet.

Importing Patient Data

To import patient data, select a folder from the Folder Management Pane and click “Import”. You have a choice to import a single patient or multiple from a spreadsheet. Select the option you would like, locate the file in the browser and click “Open”.

Patients + Add patient **Import** Export Move

Import a patient and clinical data from an KUDUwave software file that was exported on a patient

Import multiple patients listed in a spreadsheet using the following format

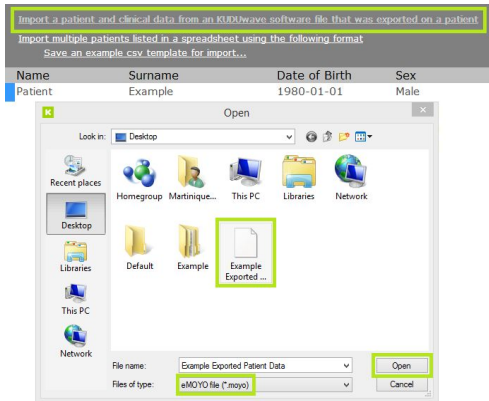
Save an example csv template for import...

Import a Single Patient from KUDUwave Software File

You can import a patient file which was exported from the KUDUwave software in a “.moyo” format.

Click on “Import a patient and clinical data from an KUDUwave software file that was exported on a patient”.

Find and select the “.moyo” file, then click “Open” to import it.



Import Multiple Patients from a Spreadsheet

You can import multiple patients into a folder from a spreadsheet that is saved in a “.csv” format.

Select the folder you wish to assign all your patients into. Click on “Import multiple patients listed in a spreadsheet using the following format”. Select the “.csv” file and click “OK”.

Note: This file upload cannot be undone! Make sure you have selected the correct folder!

Folders

- [-] Default
- [-] Example
 - Subfolder** (+) (-)

Patients + add patient import

Import a patient and clinical data from an KUDUwave software file that was exported on a patient

Import multiple patients listed in a spreadsheet using the following format

Save an example csv template for import...

Name	Surname	Date of Birth	Sex
Patient	Example	1980-01-01	Male
Test	NoSurname	1899-12-30	Unknown
Test	Test	1899-12-30	Unknown

Confirm

This action can not be undone. Make sure this is the correct folder where you are importing these patients.

Browse your PC folders, select the csv file and upload. An example file can be downloaded by clicking on “Save an example csv template for import...”. Your spreadsheet must include all headings in this order.

Searching and Finding Patients

Search

Recent patients Search

The search function can only be accessed from the Home screen. Search for patients using either: Name, Surname or Date of Birth. Begin typing in the search field and the software will automatically start bringing up possible matches.

Find

[+ Add patient](#) [Import](#) [Export](#) [Move](#) Find

The find function can only be accessed from within a folder. Search for patients using either: Name or Surname. Begin typing in the search field and the software will automatically start bringing up possible matches.

QR Codes

Your KUDUwave software has the ability to automatically generate a QR code for each patient that you create. This code will appear on all reports associated with this patient. To view the QR code assigned to them click on the box in the right hand corner of the patient profile, or view any record saved in their history.

Petra Haselmaier (34yr) export all data of this patient delete this patient

Patient details

Name: Surname:

ID no.: Passport no.:

Date of Birth*: Sex*:

Company*: Department*:

Job title*: Number:

History [+ Note / Test](#)

Date and time	Significance	Type	Signed

QR Code

0D723D34B4A34000B7F2C5ACFD095CC1

From this view you can print a page of these codes, copy the unique code associated to this QR code and assign a different QR code to your patient.

On the home screen you can scan this code on any of the printed reports and the software will take you directly to this patient's profile again.

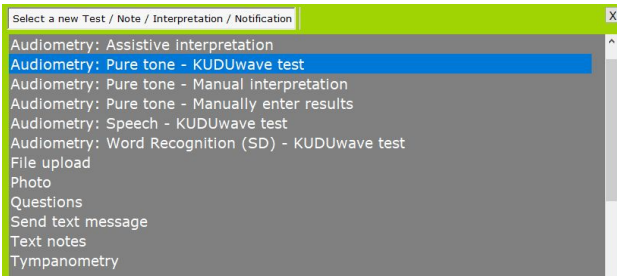
Click on to open the webcam view and hold the QR code in front of the camera lense of the computer. Once the code has been registered, click search and it will take you to the patient profile.

Working with Clinical Tests

Create a New Test

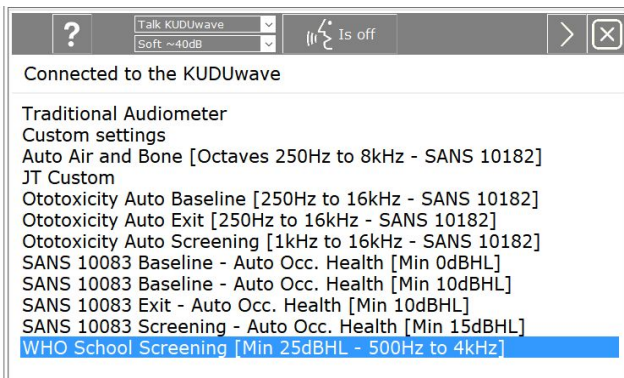
Ensure that your KUDUwave™ is plugged in before attempting to initiate a test.

To add a new test click on  to get access to the following options:



Choose the test you want to do:

Select “Audiometry: Pure tone - KUDUwave test”.



Select the type of protocol to perform from the list and then press “Next”.

This will start the “macro”, an automatic testing protocol with preloaded settings that meet the standards mentioned in the label.

Alternatively, select “Custom Settings” to create a macro with your own settings.

If at any stage during a test you would like to communicate with the patient, use the “Talk Kuduwave” button.



Click to turn on.
Click again to turn off.

Create a New Test Macro

Should you wish to customise your audiometry test, make sure the folder has default settings. You can check this by selecting the folder and noting the folder type in the top right hand corner. To change this refer to the Working with Folders section.

Select a patient in this default folder and click on

+ Note / Test

Select one of the test listed in the + Note/Test menu. You will now see this menu:

Traditional Audiometer
Custom settings
Auto Air and Bone [Octaves 250Hz to 8kHz - SANS 10182]
Ototoxicity Auto Baseline [250Hz to 16kHz - SANS 10182]
Ototoxicity Auto Exit [250Hz to 16kHz - SANS 10182]
Ototoxicity Auto Screening [1kHz to 16kHz - SANS 10182]
SANS 10083 Baseline - Auto Occ. Health [Min 0dBHL]
SANS 10083 Baseline - Auto Occ. Health [Min 10dBHL]
SANS 10083 Exit - Auto Occ. Health [Min 10dBHL]
SANS 10083 Screening - Auto Occ. Health [Min 15dBHL]
WHO School Screening [Min 25dBHL - 500Hz to 4kHz]

Each macro listed here is programmed to conduct testing protocols which adhere to the mentioned standard. Select the type of macro you wish to conduct.

Note: The macro you select **must** meet the standards which are required in your field. That is, Occupational Therapists must choose an already existing Occ. Health protocol, so that **all standards will be copied over** to the new macro which will be created.

Select "Add a new Test setup" at the bottom of the screen.

Add a new Test setup

Delete Test setup

Show settings when clicking the next button

New macro name

Macro name: My New Macro

OK Cancel

Enter the new name for this Macro. Select "OK"

Kuduwave

All the settings from here onwards will be saved as a Macro with the name "My New Macro"

OK

The Start Page will show you the automatic settings which have been copied from the previous Macro you selected.

Start page

Simulate a sound booth (Monitor the ambient noise)

Maximum permissible ambient sound pressure levels for AC and Occluded BC to test accurately to 0 dBHL

- ANSI/ASA S3.1 for KUDUwave headset
 SANS-10182 screening for KUDUwave headset
 SANS-10182 diagnostic for KUDUwave headset
 BS 6655 / EN 26189 / ISO 6189 for KUDUwave headset
 OSHA for KUDUwave headset
 ACC Guidelines NZ Nov 2012 for KUDUwave headset

	125	250	500	1000	2000	4000	8000	Hz
	58	58	55	49	46	54	52	
	74	74	61	56	55	65	64	
	56	56	59	56	55	65	64	
dB SPL	69	68	57	52	49	58	58	
	83	78	67	58	52	67	67	

Simulate an audiometer (Maximum and minimum thresholds)

		125	250	500	750	1k	1.5k	2k	3k	4k	6k	8k	Minimum
<input type="radio"/> Type 1* Research Audiometer except for thresholds in maroon	Air**	-50	70	90	90	90	90	90	90	90	80	70	-10
	Bone***	-	25	45	45	55	60	60	60	60	-	-	-10
<input type="radio"/> Type 2* Clinical Audiometer	Air**	60	80	100	-	100	100	100	100	100	90	80	-10
<input checked="" type="radio"/> Type 3* Diagnostic Audiometer	Air**	-	70	90	-	90	-	90	90	90	80	70	-10
<input type="radio"/> Type 4* Screening Audiometer	Air**	-	70	60	-	60	-	60	60	60	60	-	0
<input type="radio"/> Type 4* Screening Audiometer that can test to 70dBHL including 8kHz	Air**	-	70	70	-	70	-	70	70	70	70	70	0

* IEC 60645-1 classification

** Maximum hearing levels for Air Conduction

*** Maximum hearing levels for Bone Conduction

Extended high frequencies

Extended High Frequencies are not enabled on this Audiometer. Please contact your supplier if you would like to upgrade to this functionality. (Extended High Frequencies go up to 16kHz)

Threshold seeking method

Manual

Automatic setup:

Shortened Ascending method (ISO 8253-1) v

Type of tone

Pure tone

Warble tone


Tone duration

500 v milli seconds (ms)

Tones are always presented at this fixed duration

Stenger offset: 10 v

Show Audiometer info

Click , to move on to the “Setup for automatic testing page”, it will give you access to specific features you can choose to be tested in this new macro.

Setup for automatic testing page

Frequencies to test (Hz):

Test these AC frequencies Left

<input type="checkbox"/> 125	<input checked="" type="checkbox"/> 2k	<input type="checkbox"/> 9k
<input type="checkbox"/> 250	<input checked="" type="checkbox"/> 3k	<input type="checkbox"/> 10k
<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 4k	<input type="checkbox"/> 11.2k
<input type="checkbox"/> 750	<input checked="" type="checkbox"/> 6k	<input type="checkbox"/> 12.5k
<input checked="" type="checkbox"/> 1k	<input checked="" type="checkbox"/> 8k	<input type="checkbox"/> 14k
<input type="checkbox"/> 1.5k	<input type="checkbox"/> 16k	

Test these AC frequencies Right

<input type="checkbox"/> 125	<input checked="" type="checkbox"/> 2k	<input type="checkbox"/> 9k
<input type="checkbox"/> 250	<input checked="" type="checkbox"/> 3k	<input type="checkbox"/> 10k
<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 4k	<input type="checkbox"/> 11.2k
<input type="checkbox"/> 750	<input checked="" type="checkbox"/> 6k	<input type="checkbox"/> 12.5k
<input checked="" type="checkbox"/> 1k	<input checked="" type="checkbox"/> 8k	<input type="checkbox"/> 14k
<input type="checkbox"/> 1.5k	<input type="checkbox"/> 16k	

At the end of AC, redo the first frequency that was tested again

Then redo all AC frequencies up to 8kHz with thresholds worse than dB HL

Then also test the following AC frequencies if any one AC threshold is worse than dB HL

125 250 500 750 1k 1.5k 2k 3k 4k 6k 8k

Then redo all AC frequencies with thresholds worse than dB HL where noise levels were too loud

Then redo all AC frequencies with thresholds worse than dB HL and where Orange and Green overlapped more than dB

Then add these BC frequencies for each AC frequency thresholds that is greater or equal to dB HL

250 500 750 1k 1.5k 2k 3k 4k *Automatic masking*

Then also test the following BC frequencies if any one AC threshold is worse than dB HL

250 500 750 1k 1.5k 2k 3k 4k *Automatic masking*

Always test these BC frequencies Left *Automatic masking*

<input type="checkbox"/> 250	<input type="checkbox"/> 1.5k
<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 2k
<input type="checkbox"/> 750	<input checked="" type="checkbox"/> 3k
<input checked="" type="checkbox"/> 1k	<input checked="" type="checkbox"/> 4k

Always test these BC frequencies Right *Automatic masking*

<input type="checkbox"/> 250	<input type="checkbox"/> 1.5k
<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 2k
<input type="checkbox"/> 750	<input checked="" type="checkbox"/> 3k
<input checked="" type="checkbox"/> 1k	<input checked="" type="checkbox"/> 4k

Then redo all BC frequencies up to 4kHz with thresholds worse than dB HL

Then redo all BC frequencies with thresholds worse than dB HL where noise levels were too loud

Prompt to apply the bone conductor when bone conduction testing starts (Also play a tone)

Block tones from being presented if the noise levels are too loud for seconds

Default test order:

Minimum testable threshold for each frequency

Hz	125	250	500	750	1000	1500	2000	3000	4000	6000	8000
Air conduction	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Bone conduction	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Hz 9000 10000 11200 12500 14000 16000

Air conduction	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
----------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------	--------------------------------

Maximum testable threshold

Use the maximum thresholds that this audiometer can test to

Use this maximum level dB HL

Next frequency start threshold level

dB HL

Delay before randomization delay ms


Randomization delay before next tone

Enable randomised delay

Between & ms

You can select frequencies for each ear, for Air Conduction (AC) and Bone Conduction (BC) testing.

You can also alter the randomized delay between tones.

Click  , to move on to the "Conditioning page".

Conditioning

Conditioning page

Auto conditioning

1000 Hz

Left

Right

Present tone Mask

Present tone Mask

Left loudness setting

Right loudness setting

40 dBHL (Soft)

60 dBHL (Normal)

80 dBHL (Loud)

100 dBHL (Very loud)

110 dBHL (Extremely loud)

40 dBHL (Soft)

60 dBHL (Normal)

80 dBHL (Loud)

100 dBHL (Very loud)

110 dBHL (Extremely loud)

Automatic Wait Time (milliseconds)

2500

Increase wait time

Decrease wait time

Side to start

Left

Right

This is the conditioning page. It allows you to play a sound to the patient and see how long they take to respond. This tests their response time and conditions them to the test environment.

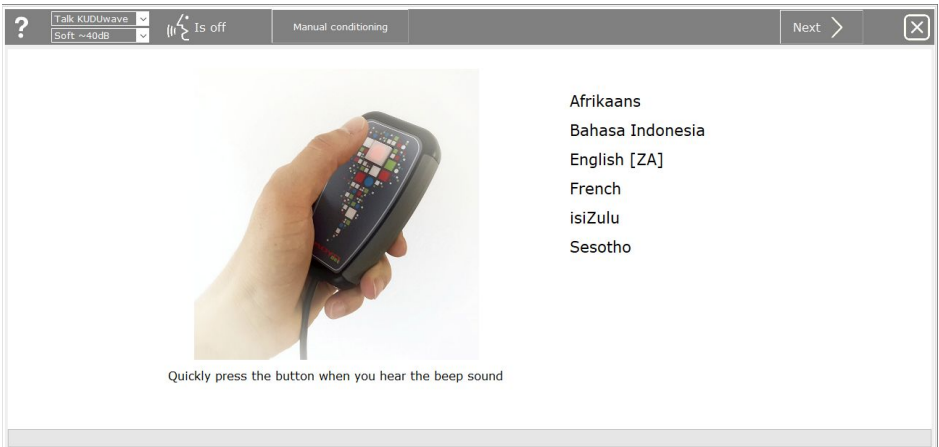
Tones will be presented to them and they must press the response button to indicate they have heard the tone. If the patient does not respond in time, a pop up message will say: "Button not pressed in time". Explain the testing process again, e.g. "When you hear the sound, quickly press the response button and release."

If the patient was too slow in pressing the button, a pop up message will say: "Pressed bit too slow for automatic wait time". The wait time is how long it takes for patients to press the button. This is automatically set to 2,5 seconds (2500ms). You can extend or shorten this time by clicking on: "Increase wait time" or "Decrease wait time".

There are two options for patient conditioning: Manual and Automatic.

Auto conditioning


To switch between the two modes click:



This is the Automatic Conditioning page. Here you can select the preferred language of the patient. The conditioning process will now be explained to them in that language.


In Manual mode, begin conditioning at 40 dBHL and increase the intensity until the patient responds. This gives you an indication of where to begin testing.

Condition the patient for masking by selecting "Mask". This will play white noise to the ear selected on the conditioning page and present the toneto the opposite ear.

Once both ears have been conditioned, you will know the patient understands how the test is conducted. Select "Next". 

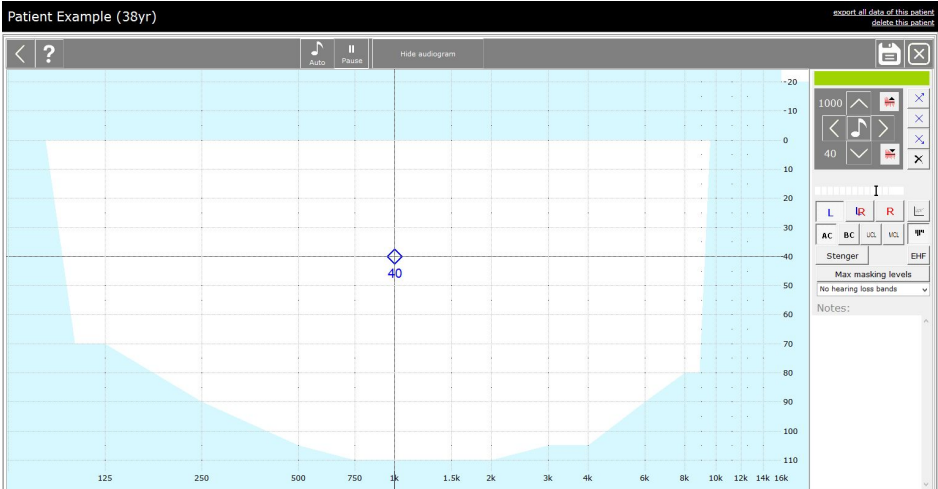
Conducting a Clinical Test

Automatic Test

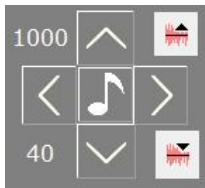
The automated test will start running immediately after conditioning is completed. Wait for the test to complete and select "Save". 


Manual Test


After conditioning the patient, click . Now manual testing can be performed.






Use the keypad to move the cursor across the plane.



To present a tone at the set frequency (1000) and intensity (40), click .

To increase intensity (to make it louder) click ,

to decrease intensity (to make it softer) click .

To increase frequency click , to decrease frequency click .









The blue screen is for the left ear test and the red screen for the right ear. Use these buttons to switch between left and right or to show both.




After a tone is presented, this bar will become coloured as you wait for the patient to respond. It will be green and show a thumbs up if the patient responds in time.

If the patient was too slow it will turn orange and show a thumbs down. If the patient presses the response button without a tone being presented, a grey spot will mark the screen.



Use these keys to move the masking level.
 The blue crosses/red circles on the side bar are to mark the minimum plateau threshold  , threshold frequency   and the points the patient did not respond  .

Use  to delete.



To switch between air conduction and bone conduction testing, use these buttons.

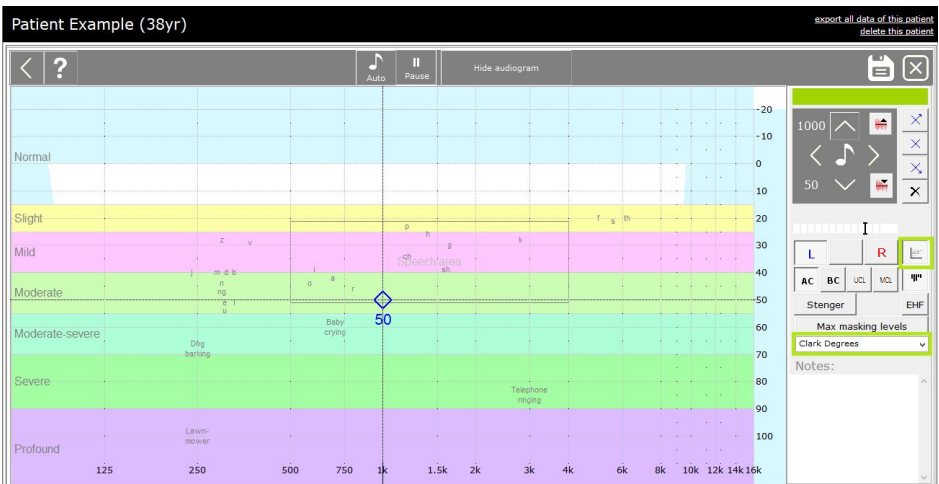
The KUDUwave will automatically mask the ears when performing bone conduction tests.




When counselling a patient or person interested in the testing results, use this button to view the speech area of the patient. On the screen it will show the various consonants and vowels available to the patient and also shows the intensity of sounds i.e. a baby crying or a dog barking.

Another feature you can use is applying hearing loss bands to the screen. To view the hearing loss bands, click on **No hearing loss bands** and select one of the options in the menu.

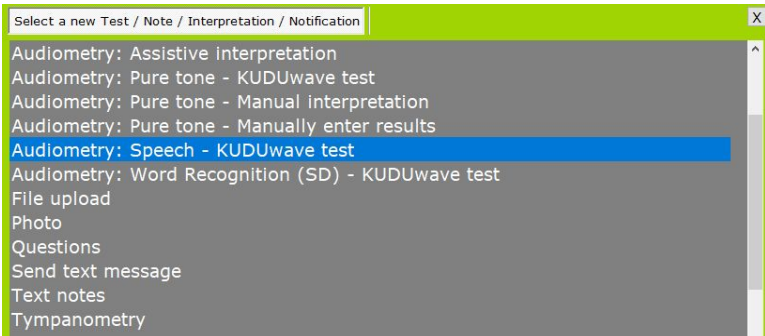
This is what the screen will look like if you selected Clark Degrees.



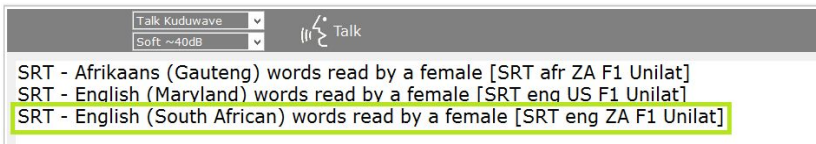
The  will bring up the Help page and it will show you shortcut keys to perform tests quicker.

Speech Reception Threshold (SRT) Testing

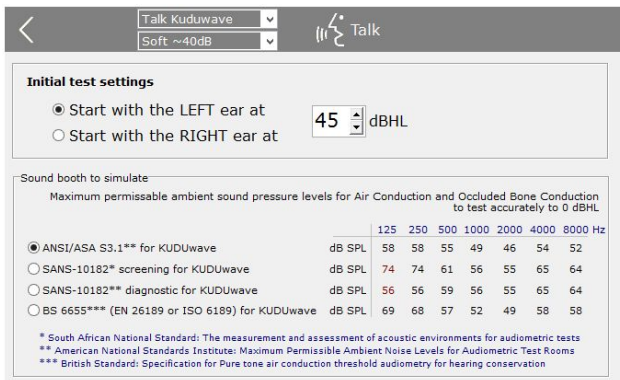
To conduct a SRT test, select the “Speech - KUDUwave test” option from the New Test Menu.



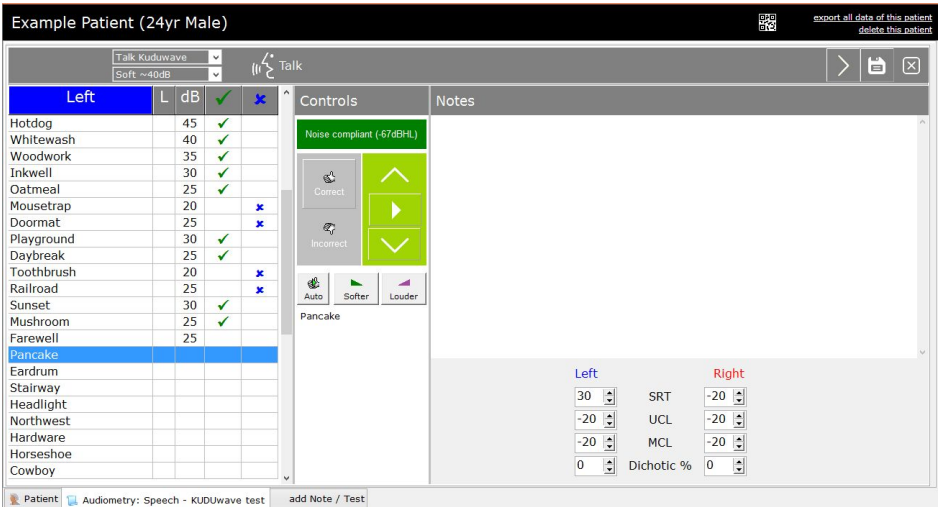
Then select the list of words read in the specified language you wish to use.



Select which ear you want to begin testing at the specified intensity level.



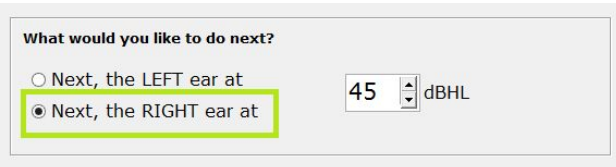
The SRT page will open and automatically read the words to the patient once you select the play button on the control panel.



Click the “Correct” button with the thumbs up if the patient recites the word correctly. In automatic mode, the next word will be read to the patient at 5 dBs softer. Use the “Incorrect” button with the thumbs down if the patient did not recite the word correctly or did not hear the word. If incorrect, the next word will be read at 5 dBs louder.

Use the up and down keys to navigate through the word list. The “Play” button will read the word to the patient and the loudness of the word can be changed by clicking the “Softer” or “Louder” buttons.

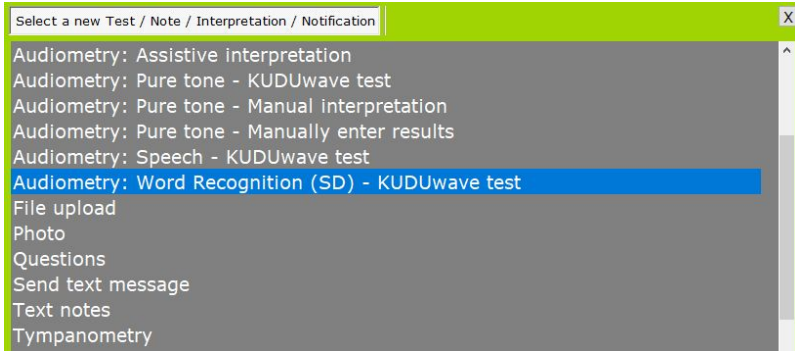
Click the “Next” button to continue once testing of the left ear is complete. Select the Right ear option and specify the Intensity level testing should begin at.



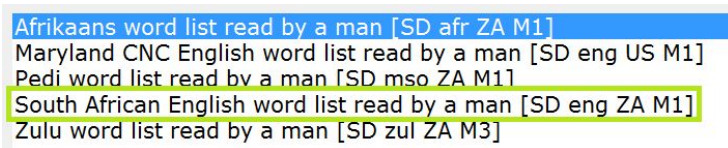
The same procedure must be done for the Right ear. Once complete click “Save”.

Speech Discrimination (SD) Testing

To conduct a SD test, select the “Speech Discrimination - KUDUwave test” option from the New Test Menu.



Select the preferred word list you wish to use.



Select which ear and intensity to begin testing with and click the next arrow.

Start threshold:

Present the first word list in the LEFT ear at dBHL
 Present the first word list in the RIGHT ear at

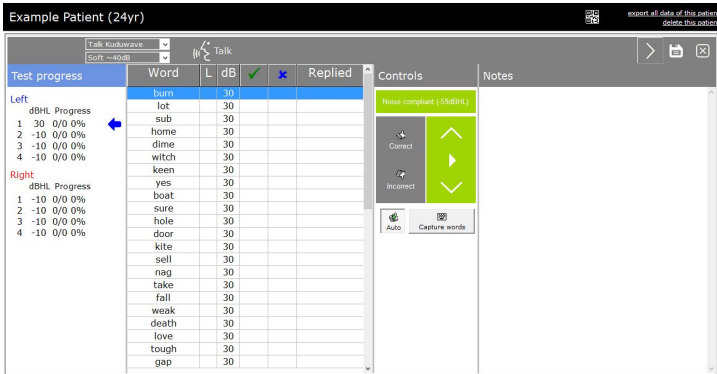
Sound booth to simulate

Maximum permissible ambient sound pressure levels for Air Conduction and Occluded Bone Conduction to test accurately to 0 dBHL

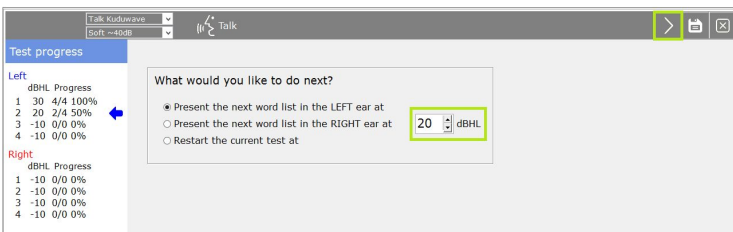
		125	250	500	1000	2000	4000	8000 Hz
<input checked="" type="radio"/> ANSI/ASA S3.1** for Kuduwave headset	dB SPL	58	58	55	49	46	54	52
<input type="radio"/> SANS-10182* screening for Kuduwave headset	dB SPL	74	74	61	56	55	65	64
<input type="radio"/> SANS-10182** diagnostic for Kuduwave headset	dB SPL	56	56	59	56	55	65	64
<input type="radio"/> BS 6655*** (EN 26189 or ISO 6189) for Kuduwave	dB SPL	69	68	57	52	49	58	58

* South African National Standard: The measurement and assessment of acoustic environments for audiometric tests
 ** American National Standards Institute: Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms
 *** British Standard: Specification for Pure tone air conduction threshold audiometry for hearing conservation

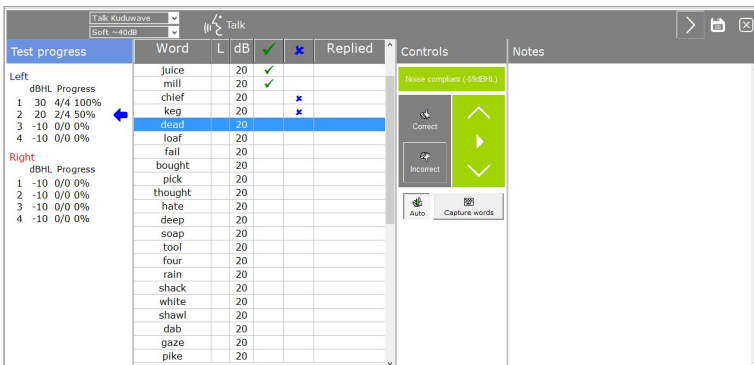
The SD testing page will open and each word will be presented at the selected dB level.



Mark each word correct or incorrect with the thumbs up and down buttons. To change the dB level for the following words click on the next arrow.



Change the dB level and click the "Next" arrow again. Continue testing at the new dB level.



Click the "Next" arrow again and select the right ear to continue testing the right ear. Click "Save" at the end of the test.

Viewing Notes and Tests

Selecting a record in the history panel will open the file in the Test Data Pane (5).

Now you can view , print  or save a pdf  to download.

Patient Example (38yr) export all data of this patient
delete this patient

Patient details 21E77C706CFS498A2DF357B355682C0

Name: Surname:
 ID no.: Passport no.:
 Date of Birth: Sex:
 Company: Department/Ward:
 Job title: Number: Employee no / File no / Scholar no:
 Job title / Bed / OPD room / Class:

History + Note / Test

Date and time	Significance	Type
2018-03-02 09:25	None	Audiometry: Pure tone - KUDUwave test
2018-03-02 09:25	None	Audiometry: Pure tone - Manual interpretation
2018-03-02 09:25	None	Audiometry: Automatic interpretation - Interpret
2018-03-02 09:25	None	Audiometry: Pure tone - KUDUwave test
2018-03-01 17:11	None	Audiometry: Automatic interpretation - Interpret
2018-03-01 17:02	None	Text notes - Text Note 2
2018-03-01 17:02	None	Text notes - Text Note 1

Audiometry: Pure tone - KUDUwave test None
Change significance

Notes made while doing test:

Test Significances

You can change the Significance of a test or note by clicking on the highlighter, or right clicking on the test in the History Pane, and selecting the appropriate label from the drop down menu.

By selecting To Interpret, you can use the Assistive Interpretation feature found in the New Test menu.



- None
- Worst
- Best
- Last significant
- General Baseline (Old)
- General Baseline
- General Baseline (Deleted)
- Comparison
- Screening
- Diagnostic
- Exit
- Deleted
- Baseline test
- PLH Baseline
- Milestone Baseline
- PLH/Milestone Baseline
- Entry
- Follow up
- Periodic
- Ototoxicity Baseline
- Ototoxicity Monitoring
- Ototoxicity Exit
- PLH Screening
- STS Screening
- PLH/STS Screening
- To interpret
- PLH Entry
- STS Entry
- PLH/STS Entry
- PLH Exit
- STS Exit
- PLH/STS Exit

Digital Signatures

To sign off a test record or report click on the pen icon. The patient must sign in the block with the red cross and the clinician / tester in the other block.



Sign this test result

This is my test result

Patient Name_Surname

This is the hearing test of Patient Name_Surname (118yr)

Leave Blank
This can always be edited

Assistive Interpretation

To use the assistive interpretation feature, change the significance of the saved test to: “To interpret” or mark it as a Baseline test for PLH, Milestone or Ototoxicity.

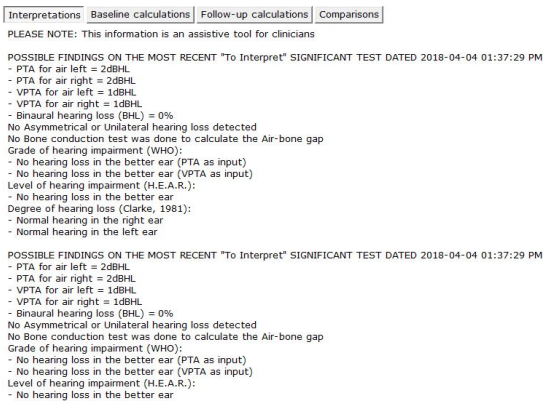
Click on **+ Note / Test**, and select the option from the menu for Assistive Interpretation.

Select the type of interpretation wanted:



Interpret the latest pure tone test marked as To interpret
Ototoxicity interpretation
PLH interpretation for South Africa
Milestone baseline (Audiometric Zero) / STS interpretation
HSE for Europe

The interpretations can now be viewed and saved from this window.



Interpretations | Baseline calculations | Follow-up calculations | Comparisons

PLEASE NOTE: This information is an assistive tool for clinicians

POSSIBLE FINDINGS ON THE MOST RECENT "To Interpret" SIGNIFICANT TEST DATED 2018-04-04 01:37:29 PM

- PTA for air left = 2dBHL
- PTA for air right = 2dBHL
- VPTA for air left = 1dBHL
- VPTA for air right = 1dBHL
- Binaural hearing loss (BHL) = 0%

No Asymmetrical or Unilateral hearing loss detected
No Bone conduction test was done to calculate the Air-bone gap
Grade of hearing impairment (WHO):

- No hearing loss in the better ear (PTA as input)
- No hearing loss in the better ear (VPTA as input)

Level of hearing impairment (H.E.A.R.):

- No hearing loss in the better ear

Degree of hearing loss (Clarke, 1981):

- Normal hearing in the right ear
- Normal hearing in the left ear

POSSIBLE FINDINGS ON THE MOST RECENT "To Interpret" SIGNIFICANT TEST DATED 2018-04-04 01:37:29 PM

- PTA for air left = 2dBHL
- PTA for air right = 2dBHL
- VPTA for air left = 1dBHL
- VPTA for air right = 1dBHL
- Binaural hearing loss (BHL) = 0%

No Asymmetrical or Unilateral hearing loss detected
No Bone conduction test was done to calculate the Air-bone gap
Grade of hearing impairment (WHO):

- No hearing loss in the better ear (PTA as input)
- No hearing loss in the better ear (VPTA as input)

Level of hearing impairment (H.E.A.R.):

- No hearing loss in the better ear

Ototoxicity Monitoring with Assistive Interpretation

For ototoxicity monitoring, select the first baseline test as "Ototoxicity Baseline" and the following test as "Ototoxicity Monitoring".

Click on  and select the option for assistive interpretation.

Select "Ototoxicity interpretation".

You can now view the interpretation notes and calculations for both the Baseline test, the Follow up test and comparisons of the two.

Interpretations	Baseline calculations	Follow-up calculations	Comparisons									
Baseline 04-04-2018	Difference Left and Right Air	125	250	500	750	1k	1.5k	2k	3k	4k	6k	8k
	Difference Left and Right Bone	0		0	0	0		0	0	0		0
	Difference Air and Bone Left											
	Difference Air and Bone Right											

Interpretations	Baseline calculations	Follow-up calculations	Comparisons									
Follow-up 04-04-2018	Difference Left and Right Air	125	250	500	750	1k	1.5k	2k	3k	4k	6k	8k
	Difference Left and Right Bone	0	0	0	0	0		0	20	20	25	30
	Difference Air and Bone Left											
	Difference Air and Bone Right											

Interpretations	Baseline calculations	Follow-up calculations	Comparisons																					
Air	Left	Baseline	125	250	500	750	1k	1.5k	2k	3k	4k	6k	8k	9k	10k	11.2k	12.5k	14k	16k	MHL	PTA	VPTA		
		Follow-up	0	0	0	5	0	0	0	0	0	5									0	2	1	
		Difference	20	20	20	20	20	40	40	40	45	50									0	20	25	
	Right	Baseline	0	0	0	0	5	0	0	0	5										0	2	1	
		Follow-up	20	20	20	20	20	20	20	20	20	20									0	20	20	
		Difference	20	20	20	20	15	20	20	20	15										0	18	19	
	Binaural		PLH-ZA	BHL																				
		Baseline	1,1	0																				
		Follow-up	4,3	0																				
	Bone	Left	Baseline	250	500	750	1k	1.5k	2k	3k	4k													
Follow-up																								
Right		Baseline																						
		Follow-up																						

Settings



From the home, folders or patient screens you can access the settings menu by clicking the settings icon.

Checked! You do have the latest software version

[Upload a letterhead](#)

[Design a letterhead](#)



Database

[Backup...](#) (Please do regular backups. Store the backup on an external drive like a memory stick)

[Import a backup and merge it with this database...](#)

Cloud dashboard service (You need to connect to the Internet every so often to sync)

[Install Python](#)
[Install AWS](#)

[Change database](#) (You need administrative rights to perform this action)

[Move all patients in the root folder to a separate folder](#)

[Import eMoyo 4.0 data](#) (Any version before eMoyo 4.0 will automatically be imported)

[Open SYNTHING synchronisation administration panel.](#) (We recommend you contact support [Install Synthing](#))

Default smart folder

When creating a new folder it must always be the the following default smart folder:

Default folder type

QR codes

[Print QR cards](#)

Quantity

Do not automatically start QR code scanning when opening the home page

Password protect "Settings"

Password:

[Create password now](#)

[Remove password](#)

Backup

This function allows you to copy all patient data into one file, which will be saved to a chosen drive. Click on "[Backup...](#)", select the destination to send the backup data to and click "Save".

Import and Merge Data from a Backup

To import a previously backed up version of all patient data, select “[Import a backup and merge it with this database...](#)”.

Note: A warning will pop up. Older versions of software may not support patient data which was backed up from a newer software version. Always run the latest version of software available.



Click “OK”, and browse to the location of the backup file that you would like to import. Select the file and click “Open”. The data will be merged with the current database and be available on the home screen.

Import eMoyo 4.0 Data

If you had eMoyo 4.0 you will need to import patient data into KUDUwave 5. By clicking “[Import eMoyo 4.0 data](#)”, a new interface will open. Click “Start Migration”. Once completed close this window and KUDUwave 5. Reopen the software and all patient data should be available. Contact support if data is found missing.

Upload a Letterhead

To include your personalised logo to patient reports, first create a 700x110 pixel image (click “[Design a letterhead](#)” to open Paint with a window automatically sized to these specifications) and save the image as a .bmp file. Click “[Upload a letterhead](#)”, “OK”, find your bmp file and “Save”.

Set a default Smart Folder

All new folders created will have the settings associated to the smart folder type selected from the drop down menu.

Manage QR codes

Print multiple QR codes to later associate to patients, and set the webcam to automatically open with the software.

Automatically start the camera for QR code scanning on the home page

Password Security

Add a password to the settings page to restrict access here.

X-check (Cross Check)

The X-check verifies the calibration of the KUDUwave.

Note: This does not replace the need for calibrations as per local standards.



To cross check your KUDUwave click the **X-check** button in the system menu on the left hand side. If your KUDUwave is equipped with X-check the following start page will appear:

X X-check Wizard (Version 1.2.0.0)



Hi, Are you ready to start your daily cross check?

1. Remove eartips from both sound tubes
2. Plug the left sound tube into the left X-check port
3. Plug the right sound tube into the right X-check port

Note: X-check is a verification tool and does not replace the need for calibrations as per your local standards

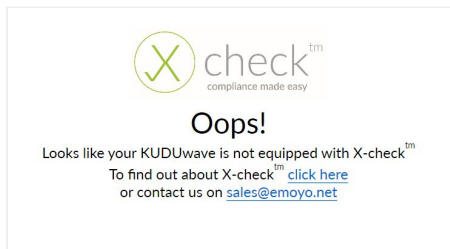


When you are ready click start

Start

Follow the instructions and then click the Start button to run the X-check.

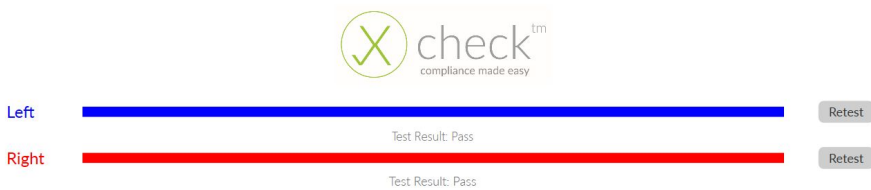
Note: that the X-check can only run if your KUDUwave is equipped with the cross check hardware. If this is not the case you will see the following screen:



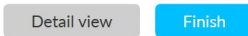
After clicking the “Start” button the X-check will run automatically and the following test page will be shown:



The X-check should take about 23 seconds to complete if the tests pass. A message will then be shown to tell you if your device calibration verification has passed:



Congratulations, X-check has verified your calibration



Clicking the “Finish” button will exit the X-check application. Clicking the “Detail view” button will show the following Detail page:

Result	Amplitude Error [dB]	Test Frequency [Hz]	Amplitude Error [dB]	Result
Pass	0.19	125	0.16	Pass
Pass	0.38	250	0.46	Pass
Pass	-0.39	500	0.40	Pass
Pass	0.58	750	0.32	Pass
Pass	0.52	1000	-0.05	Pass
Pass	-0.06	1500	-0.31	Pass
Pass	0.58	2000	0.49	Pass
Pass	-0.04	3000	-0.24	Pass
Pass	0.25	4000	0.54	Pass
Pass	0.30	6000	0.23	Pass
Pass	-0.39	8000	-0.20	Pass
Pass	0.35	9000	0.13	Pass
Pass	-0.02	10000	0.44	Pass
Pass	-0.70	11200	-0.82	Pass
Pass	-0.10	12500	-0.45	Pass
Pass	-0.21	14000	0.12	Pass
Pass	0.14	16000	-0.58	Pass

This Detail page shows the test frequencies as well as the Amplitude Error.

The **Amplitude Error** is the discrepancy or difference between the calibrated level of the KUDUwaves air conduction output and the actual air conduction output, which has just been measured by the X-check. Ideally all of these values should be zero.

[Print Report](#)

If you would like a PDF report, scroll down and click the [Print Report](#) button. This will generate and open a PDF, like the one shown here. The PDF report is automatically saved in the eMoyoDotNet/Pdf folder on your computer.

KUDUwave Cross Check Report



Test Details:

Cross Check Test Date:
KUDUwave Calibration Date:
KUDUwave Serial Number:

Left	Amplitude Error [dB]	Test Frequency [Hz]	Amplitude Error [dB]	Right
Pass	0.18	125	0.18	Pass
Pass	0.08	250	0.48	Pass
Pass	-0.24	500	0.40	Pass
Pass	0.18	750	0.22	Pass
Pass	-0.02	1000	-0.05	Pass
Pass	-0.04	1500	-0.91	Pass
Pass	0.08	2000	0.49	Pass
Pass	+0.04	3000	+0.14	Pass
Pass	0.22	4000	0.24	Pass
Pass	0.50	6000	0.28	Pass
Pass	-0.89	8000	-0.20	Pass
Pass	0.82	9000	0.19	Pass
Pass	-0.01	10000	0.44	Pass
Pass	-0.70	11000	-0.82	Pass
Pass	-0.18	12800	-0.48	Pass
Pass	-0.11	14000	0.11	Pass
Pass	0.44	16000	-0.20	Pass

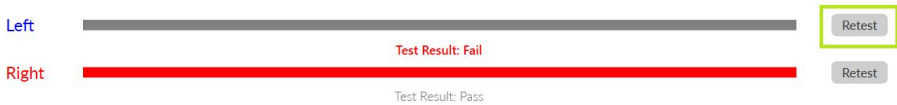
X-check: Abnormal Test

If the test fails, a message will list common reasons which cause X-check to fail alternatively to your KUDUwave being out of calibration.

At least one test has failed. Please go through the checklist and click 'Retest':

1. Ensure that the sound tubes are plugged in tightly and deep enough
2. Ensure that the brass couplers are clean and you can see through them
3. Ensure that the sound tubes dont have damage nor are there any holes
4. Ensure that the KUDUwave is not moved or bumped while running the cross check

As an example, bumping or moving the KUDUwave while the X-check is running will prevent it from accurately measuring the air conduction output and cause the test to fail. Follow the instructions and click the “Retest” button for the failed side.



You can also click the “Detail view” button to go to the Detail page and get more information about why the test failed. Failed frequencies are shown in red along with a reason of why the test failed.

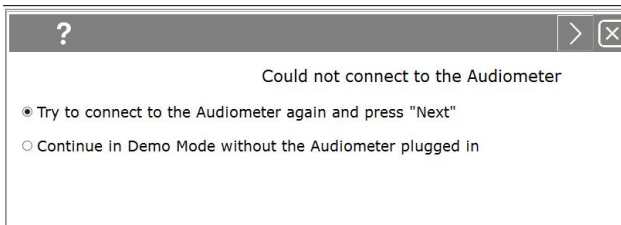
Result	Amplitude Error [dB]	Test Frequency [Hz]
Pass	0,63	125
Pass	0,82	250
Pass	0,05	500
Pass	0,94	750
Pass	0,93	1000
Pass	0,32	1500
Pass	0,94	2000
Pass	0,25	3000
Pass	0,50	4000
Pass	0,34	6000
Fail (Amplitude Deviation Too High +Frequency Deviation Too High +SNR Too Low+Recording Not Stable)	10,79	8000

If the test still fails after you have followed the instructions then your KUDUwave could be out of calibration. Contact eMoyo to book a calibration.

Troubleshooting


Computer is not able to connect to the KUDUwave

If the computer is not able to connect to the KUDUwave, the following message will pop up.



This means that the KUDUwave audiometer was not plugged in correctly.

Please follow these steps to correct the problem:

1. Cancel the current test by selecting  in the top right corner.
2. Unplug the KUDUwave from your computer, wait a few seconds, and plug it back in ensuring that both the KUDUwave and response button are firmly plugged in.
3. Restart the test.

The KUDUwave is incorrectly your current default audio record device

If a pop up error message says “AudioTympCtrl. The KUDUwave is incorrectly your current default audio record device. We will now try fix the problem”, click “OK” and the software will correct your PC settings.

Remote Assistance

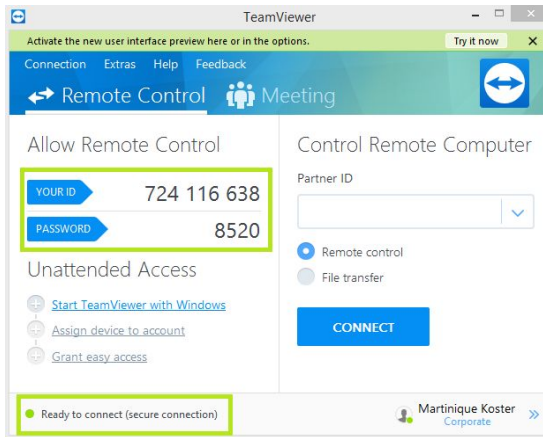
We offer to help you remotely by taking control of your laptop with the TeamViewer plugin.

To download the TeamViewer remote assistance plugin, please visit:

<https://www.teamviewer.com/en/download/windows/>

For live remote assistance, make sure you have:

1. Downloaded and installed **TeamViewer** on your PC
2. A **active internet** connection.
3. Your **TeamViewer ID** and **Password** handy.



Get in contact with our Support Team at: support@emoyo.net

Cleaning and Maintenance

General Care

The KUDUwave is a highly sensitive, state of the art device that must be treated with care. It must be cleaned and disinfected regularly and care should be taken not to damage any of the sensitive microphones or speakers when cleaning or handling the device.

Cleaning Procedure

The KUDUwave must be thoroughly cleaned and disinfected after each and every use (i.e. before each new patient is tested) with a cleaning and disinfection wipes complying with EN1276 that are intended for use on plastic items.

When Cleaning the KUDUwave:

1. Disconnect all USB cables and use an antibacterial wipe to clean the KUDUwave headset, ear cups, sound tubes, response button and the bone vibrator (if it was used).
2. It is important to ensure that during cleaning no liquid enters any holes in the ear cups.
3. Used foam eartips must be disposed of after each test as medical waste.
4. When cleaning the device, avoid bending or twisting any of the cables or sound tubes.
5. If any permanent sharp bends, cracks or holes in the sound tubes are visible, replace them with spares provided. Calibration can be verified using the standard daily biological calibration check routine.
6. Check that the sound tube or brass ear-tip coupler has not become blocked or obstructed over time.

Warning: Never use acetone based cleaning products when cleaning the KUDUwave.

Note: Ear wax and debris can collect in the ear probe. Make sure that there is no debris on the ear probe or inside the disposable ear tip before placing an ear tip. Once debris or any foreign material has lodged into the little holes of the ear probe, it may be possible to remove the debris from the holes. If debris enters the holes, then the debris must be removed, cleaned and disinfected and the calibration should be verified using the standard biological calibration verification routines.

Warning: Make sure that there is no debris on the ear probe or inside the disposable ear tip before placing an ear tip onto the ear probe.

Note: The recommended daily biological calibration routine is as follows: Put the KUDUwave on your head and do an automatic KUDUwave tone threshold test of all the octave frequencies. Save the test results. Remove the KUDUwave, turn it around so that the left side is on the right ear and the right side is on the left ear and redo the automatic KUDUwave tone threshold test. Compare the left and right thresholds of the two tests with each other. None of the thresholds of the compared sides may differ with more than 10 dB.

Note: Disposable ear tips of different sizes act as barrier between the ear probe and the patient. Never reuse disposable ear tips because old ear wax and cleaning solutions can damage the ear probe permanently. Cleaning solutions also damages the foam of the eartips and can lead to incorrect readings. It is an irresponsible risk to clean eartips for re-use, as cleaning solution or wax can end up inside the ear probe and give incorrect results.

Warning: Never reuse disposable eartips. Eartips are cheap and any perceived cost saving will not outweigh the risks to the device and more importantly, the patient.

Calibration

In order for the KUDUwave to operate correctly it is vital that it is calibrated correctly. eMoyo has the equipment and necessary expertise to calibrate your KUDUwave. Please contact eMoyo to schedule your next calibration.

Daily Calibration Verification

It is advisable to perform a biological test at the start of each day that the KUDUwave will be used.

Annual Calibration

Annual calibration is required. eMoyo will calibrate and return your KUDUwave to you in accordance with your maintenance contract.

Note: The KUDUwave software has been designed to automatically warn you when the minimum calibration is due. Your device will be assessed annually to determine its serviceability before it is calibrated. The KUDUwave users can expect a minimum service life of 5 years.

Ad Hoc Calibrations

Some states or countries require audiometers to be calibrated more than once a year, especially when audiometers are used for mobile testing. Please make sure of what the legislative requirements are for your state or country. If you are ever in doubt whether the KUDUwave is in calibration it is recommended to verify the calibration biologically. If you are still in doubt it is essential to do an electro-acoustic calibration check.

Calibrations by Other Organisations

Due to the digital, robust and integrated design of the KUDUwave, chances of it going out of calibration are very slim. If another organisation wants to calibrate a KUDUwave, they may perform a typical calibration process to verify that the thresholds and frequencies of the unit are correct. After completing the calibration routine the calibration organisation will not need to adjust any thresholds

or frequencies. A calibration certificate must be issued to show that the KUDUwave is within calibration limits. In the unlikely event where the calibration shows limits outside acceptable limits, please contact eMoyo immediately.

Storage and Shipping

Warning: When shipping the KUDUwave please use the robust shock absorbing carry case to reduce the risk of damage to the device during transit.

Remember to seal the shipping container securely and to mark the container FRAGILE. Always store the KUDUwave out of direct sunlight in a clean and dry environment within the temperature and humidity limits detailed in the Technical Specifications.

Expected Service Life

The KUDUwave has an expected service life of at least five years of continuous use. Regular maintenance and general care will prolong the service life considerably. The KUDUwave can be used any number of times without restriction as long as it is both calibrated, and cleaned in accordance with the instructions in this User Manual.

Disposal and Recycling

It is advisable that the unit is returned to eMoyo for disposal and recycling. Please call +27 87 231 0132, or email support@emoyo.net, for instructions. Alternatively contact your international distributor or EU representative for disposal and recycling instructions.

Traveling with Your KUDUwave™

When traveling or shipping the KUDUwave it is important to use its original case. This casing is specifically designed for traveling and to absorb shock.

Please make sure to perform the following tasks:

- Always unplug all USB cables before placing the KUDUwave into the case.
- Also make sure the bone vibrator is attached to the headband to ensure it does not move while being shipped.
- Keep a foam eartip on each sound tube tip to prevent dirt from entering the sound tubes.
- Make sure no cables or sound tubes are caught up between the lid and the case before closing it.
- Always perform a biological test after traveling with your KUDUwave.

Upgrades, Maintenance and Support

Upgrades and New Features

eMoyo provides software and hardware upgrades for existing products. Please contact eMoyo at info@emoyo.net for the latest information on upgrades and new features. You can also visit our website at www.kuduwave.com.

Frequently Asked Questions (FAQs)

Please refer to websites for more information.

Support Service

At eMoyo we are confident that we can deliver a unique support service specifically designed for clients in remote areas. Contact us directly on our website by going to www.kuduwave.com and going to our support page for useful information. Or you can fill us in on your KUDUwave related problems by leaving a message on our contact us page.

Loan Devices

In the unlikely event that one of our devices has a problem, we will express courier a loan device to you at your cost (if available).

Online Virtual Support and Training

You can obtain online training using video conferencing software on your laptop.

To receive online virtual support, you will need to be located in an area with a good broadband internet connection.

Service, Support and Maintenance Contract

The latest service, support and maintenance contract can be obtained from your local sales representative.

Troubleshooting

If you experience problems, kindly send an email with as much information as possible (including the specific error message(s) and under which circumstances they occurred) to support@emoyo.net or contact your local sales representative. Additional support information can also be accessed at www.kuduwave.com.

Troubleshooting Checklist

Problem	Possible Solution
KUDUwave 5 software does not recognise that the KUDUwave is connected.	Check that the USB cables have been firmly connected from both ear cups to the USB ports on the personal computer. The left and right LED's will indicate if power is being received from the USB port.
	Try the second set of two new USB cables in case the original pair have become damaged.
	Ensure the Patient Response Handset has been connected to a USB port.
	Restart the computer and try to launch the software again.
Responses from the Patient Response button are not being recorded by the KUDUwave 5 software.	Ensure the Patient Response Handset has been firmly connected to the left ear cup.
	If another Patient Response Handset is available try it instead to ascertain if the response button is broken.
	Ensure that the patient environment is not too noisy so non-compliant results are not being recorded.
	Confirm that the operator can hear sounds being presented using the same headset.
The patient cannot hear sounds being presented even at high intensities.	Inspect the ear probes and eartips for debris that may be blocking the sounds.
I have run out of ear foam eartips.	Contact your sales representative to obtain new eartips. Do not continue using the existing ones or attempt to clean and reuse them.
The KUDUwave 5 software keeps telling me I have X days until the device needs calibration.	Ensure that you send your KUDUwave to eMoyo to be calibrated whenever prompted. Contact your local sales representative for more details.

In Need of Assistance?

Please contact your local IT consultant if you need assistance with confirming your personal computer's specifications, or need an upgrade to meet the minimum requirements.

Technical Specifications

Standards

The KUDUwave has been independently examined, tested and certified by a registered Notified Body in order to ensure Safety and Design Standards detailed in the General and Audiometry Specifications.

Audiometry Standards	Pure tone: BS EN 60645-1 (Type 3) Speech: BS EN 60645-2 (Type B)
Other Standards	BS EN 60601-1, BS EN 60601-1-2, BS EN 60601-1-6, BS EN ISO 13485, BS EN ISO 14971, BS EN 62304, BS EN ISO 14155, BS EN ISO 15223-1, EN 1041
Medical CE mark	European Council Directive 93/42/EEC
Medical device class	Ila
Calibration	Laboratory calibrated in accordance with: BS EN 60645-1, EN 60645-2, SANS 10154-1 and SANS 10154-2

Instrument Specifications

Dimensions	210 x 260 x 110 mm
Shipping dimensions	410 x 320 x 190 mm
Net weight	250 g
Shipping weight	1627 g

Power supply	2x standard laptop USB ports (5 V, 500 mA max per port) Unplug laptop from mains while testing	
Data transfer	Twisted KUDUwave™ dual USB cable 2x standard 3 meter A Male to Mini B Male USB cables	
Environmental conditions Indoor use only	Operational temperature	15 - 35 °C
	Operational humidity (non-condensing)	30 - 90 %
	Operational ambient pressure	98 - 104 kPa
	Shipping and storage temperature	10 - 40 °C

	Shipping and storage humidity (non-condensing)	30 - 75 %
	Shipping and storage ambient pressure	70 - 106 kPa
Warm-up time	10 - 20 sec	
Patient response system	Handheld tactile push button (USB)	
Sound tube	Medical grade PVC 80 shore, Clear with white x-ray line, L 180 mm, ID 1.7 mm, OD 2.9 mm	

Audiometry Specifications

Pure tone testing, speech testing, general, air conduction frequency specification, bone vibrator frequency specification and narrow band frequency specification.

Pure Tone Testing Specifications

Air conduction transducer	KUDUwave™ 5000 built-in insert earphone
Bone vibrator transducer	Radio Ear B71, B71W or B81
Bone vibrator placement	Forehead
Air conduction frequency range	125 Hz - 8 kHz standard 8 kHz - 16 kHz extended
Bone vibrator frequency range	250 Hz - 4 kHz
Frequency accuracy	< 0.05 %
Air conduction total harmonic distortion	< 3 %
Bone vibrator total harmonic distortion	< 6 %
Bone vibrator headband static force	5.4 N ±0.5 N
Air conduction calibration coupler	IEC 60318-4 (IEC 711) Ear Simulator RETSPL as per ISO 389-2, ISO 389-4*
Bone vibrator calibration coupler	IEC 60318-1 Ear Simulator with IEC 60318-6 Artificial Mastoid RETSPL as per ISO 389-3
Tone presentation	Pure tone or warble tone
Warble tone waveform	Sinusoidal
Warble tone repetition rate	4 - 20 Hz

	Default = 5 Hz
Warble tone frequency deviation	5 - 25 % Default = 10 %
Masking	Narrow band noise automatically centered at the test frequency

**The default extended high frequency (9 kHz - 16 kHz) reference equivalent threshold sound pressure levels (RETSPL) are different to those of ISO 389-5 for insert earphones.*

Speech Testing Specifications

Transducer	KUDUwave 5000 built-in insert earphone
Masking	Speech weighted random noise Spectrum constant from 125 Hz to 1000 Hz, then -12 dB/oct from 1 kHz to 6 kHz ± 5 dB
Calibration	All pre-recorded words in word lists calibrated against 1 kHz calibration signal

Additional Audiometry Specifications

Talk forward	40 - 100 dBHL adjustable
Modes of operation	Manual Automatic shortened ascending (Hughson and Westlake method - ISO 8253-1) Automatic standard ascending Shortened and standard bracketing Fixed frequency Békésy sweep (optional) Pure tone Stenger (optional)
Air conduction system sound attenuation characteristics using Ambi-dome™ technology Combined ear-cup and ear-insert attenuation	31.0 dB at 125 Hz 37.7 dB at 250 Hz 43.8 dB at 500 Hz 40.8 dB at 1000 Hz 38.1 dB at 2000 Hz 52.3 dB at 4000 Hz 45.8 dB at 8000 Hz
Operational background sound pressure levels to test down to 0dBHL	< 70 dB SPL at 125 Hz < 69 dB SPL at 250 Hz < 58 dB SPL at 500 Hz < 53 dB SPL at 1000 Hz < 50 dB SPL at 2000 Hz < 59 dB SPL at 4000 Hz < 59 dB SPL at 8000 Hz

Air Conduction Frequency Specifications

Freq (Hz)	RETSPLs (dB)	Max Output (dBHL)
125	28.0	70
250	17.5	90
500	9.5	105
750	6.0	110
1000	5.5	110
1500	9.5	110
2000	11.5	110
3000	13.0	105
4000	15.0	100
6000	16.0	85
8000	15.5	85
9000	13.5	85
10000	12.5	80
11200	21.5	75
12500	25.5	75
14000	32.5	60
16000	41	50

Bone Conduction Frequency Specifications

Freq (Hz)	RETFLs (dB)	Maximum Mastoid Hearing Levels (dBHL)	Maximum Forehead Hearing Levels (dBHL)	Maximum Mastoid Hearing Levels (Occluded ear) (dBHL)
250	67.0	35	35	45
500	58.0	60	50	60
750	48.5	65	55	60
1000	42.5	70	60	65
1500	36.5	80	70	70
2000	31.0	80	70	70
3000	30.0	80	65	70
4000	35.5	65	60	60

Occluded ear (bilateral ear tips in situ)

Narrowband Masking Specifications

Freq (Hz)	Max Output (dBHL)	Lower Cut-Off Frequency (Hz)	Upper Cut-Off Frequency (Hz)
125	80	110	145
250	90	215	290
500	105	435	575
750	110	650	890
1000	110	865	1150
1500	110	1295	1770
2000	110	1730	2310
3000	105	2600	3560
4000	100	3475	4700
6000	90	5100	7120
8000	85	6770	9380

Replacement Item Specification

Item	Specification	Comment/Warning
Eartip	Foam, manufactured to eMoyo specification	Do not replace with any other than eMoyo supplied items.
Ear Cup Cushions	Acoustic Foam, manufactured to eMoyo specification	Do not replace with any other than eMoyo supplied items.
Detachable Sound Tubes	Medical grade PVC	Do not replace with any other than eMoyo supplied items.

Electromagnetic Compatibility (EMC)

Medical electrical equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this section. Portable and mobile radio frequency (RF) communications equipment can affect medical electrical equipment. Following the guidelines in this section will help prevent this.

Warning: The KUDUwave has been tested to the BS EN 60601-1- 2:2007 for both immunity (susceptibility to interference from external sources) and emissions (interference generated by the KUDUwave). In order to ensure correct operation the following precautions must be adhered to:

The use of accessories and cables other than those specified or sold by eMoyo may result in increased emission or decreased immunity of the KUDUwave. The list of cables and accessories below must be adhered to in order to ensure compliance.

The KUDUwave should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary then the KUDUwave™ should be observed to verify normal operation in the configuration in which it will be used.

List of cables and accessories that affect compliance

- USB Cable, Type A to mini-B, maximum length 3.0 metres.

Guidance and Manufacturer's Declaration - Electromagnetic Emissions

The KUDUwave™ is intended for use in the electromagnetic environment specified below. The customer or operator of the KUDUwave™ must ensure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The KUDUwave™ uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The KUDUwave™ is suitable for use in all establishments other than domestic and those directly connected to the public low- voltage power supply network that supplies buildings used for domestic purposes
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations / flicker emissions IEC 61000-3-3	Not applicable	

Guidance and Manufacturer's Declaration - Electromagnetic Immunity

The KUDUwave is intended for use in the electromagnetic environment specified below. The customer or operator of the KUDUwave™ must ensure that it is used in such an environment.


Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	Power supply lines: not applicable, see note 2 ±1 kV for input/output lines	See note 2
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	Not applicable, see note 2	See note 2
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % UT (>95 % dip in UT) for 0.5 cycle 40 % UT (60 % dip in UT) for 5 cycles 70 % UT (30 % dip in UT) for 25 cycles <5 % UT (>95 % dip in UT) for 5 sec	Not applicable, see note 2	See note 2
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE 1 - UT is the a.c. mains voltage prior to application of the test level.

NOTE 2 - Power supply line electrical fast transient is not applicable because the KUDUwave is powered from the USB port of a laptop running on its battery.

Guidance and Manufacturer's Declaration - Electromagnetic Immunity

The KUDUwave™ is intended for use in the electromagnetic environment specified below. The customer or operator of the KUDUwave™ must ensure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	<p>Portable and mobile RF communications equipment should be no closer to any part of the KUDUwave™, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance:</p> $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P} \text{ 80 MHz to 800 MHz}$ $d = 23\sqrt{P} \text{ 800 MHz to 2.5 MHz}$ <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey a, should be less than the compliance level in each frequency range b. Interference may occur in the vicinity of equipment marked with the following symbol:</p> <div style="text-align: center;">  </div>
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	

NOTE 1 - At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 - These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

- a. Field strengths from fixed transmitters, such as base stations for radio (cellular/ cordless) telephones and land mobile radios, amateur radio, AM and FM broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the KUDUwave™ is used exceeds the applicable RF compliance level above, the KUDUwave™ should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the KUDUwave™.
- b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distance between portable and mobile RF communications equipment and the KUDUwave

The KUDUwave is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the operator of the KUDUwave can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the KUDUwave as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 - At 80 MHz and 800 MHz, the separation distance for the higher frequency applies.

NOTE 2 - These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

End User License Agreement (EULA)

The eMoyoDotNet (Pty) Ltd. End-User License Agreement (EULA) is a legal agreement between you, either an individual or a single entity and eMoyo, for the KUDUwave device and software. Software includes the personal computer software and the KUDUwave device firmware.

Software may be installed and used by any number of people (either an individual or a single entity). The software may be installed on any number of computers. The software can be operated over a network by any number of people from any number of computers. When it is plugged in, the KUDUwave will check that the Personal Computer Software is suitable to control it. Additional software functionality purchased will be associated with a single device and such software will only work for devices that have the license to use the new software.

The hardware may be used by any number of people (either an individual or a single entity). The hardware may be used on any number of Personal Computers and can be operated over a network by any number of people.

eMoyo took all reasonable care to ensure a safe and compliant device, but there is always the slightest possibility for error. eMoyo and its employees and consultants do not take responsibility for any complications that may be the result of errors in the device or software.

Specifications are subject to change without notice due to the continued development and enhancement of the KUDUwave.

eMoyo reserves all rights not expressly granted.

Warranty and Disclaimer

Limited Warranty

eMoyoDotNet (Pty) Ltd. t/a eMoyo warrants that the KUDUwave, if properly used and installed as per eMoyo's instructions, will be free from defects in material and workmanship. The KUDUwave will conform to eMoyo's high quality specifications for the period of three years, as stipulated on the Terms and Conditions found on the invoice.

This warranty

- begins on the date of purchase, (for your convenience, please keep the dated tax invoice as evidence of this date)
- is extended through distributors,
- covers defect(s)
- and does not cover tamper, drop, misuse or modifications.

If the KUDUwave, which is the subject of this Limited Warranty, fails during the warranty period for reasons covered by this Limited Warranty, eMoyo will retain the option to repair or replace the KUDUwave. All shipping costs required to repair or replace the device remain the responsibility of the purchaser.

Disclaimer

The Purchaser shall have no claim against eMoyo whatsoever, notwithstanding the termination or lapse of any contract. eMoyo will not be held responsible for loss or damage of any nature whatsoever, whether direct or indirect, consequential or otherwise, sustained as a result of any goods or equipment supplied or any advice given or any installation effected or any maintenance undertaken by eMoyo being in any way defective or absent or not conforming to the description thereof as a result of any other cause whatsoever.

Under no circumstances will eMoyo be liable for damage arising from misuse or abuse of the goods. The Customer does hereby indemnify and hold eMoyo harmless against any claim by any third person arising directly or indirectly out of any defect(s) in the goods or equipment supplied and or advice given to the Customer.

KUDUwave™

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