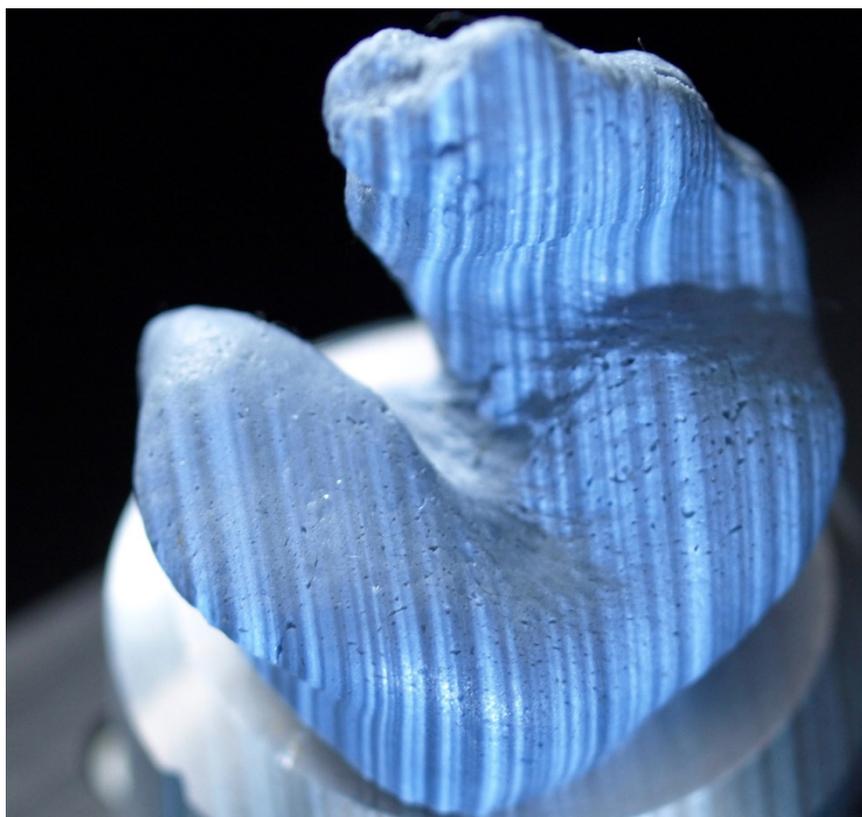




Operating Manual

Software version 3.6



Audiology Scanners

mono Scan ■ duo Scan ■ duo Scan Touch
free Stage ■ ds Production

Products from smart optics Sensortechnik GmbH



Legal notice

Support

For direct customers and resellers: support@smaroptics.de

For customers of resellers:.....(Your reseller)

Search for resellers:

Use the www.smaroptics.de contact form.

smart optics Help Center support.smaroptics.de

smart optics Audiology online shop

Delivery within the EU: smaroptics.shop/en/

Delivery outside the EU: onlineshop@smaroptics.de

Changes

smart optics reserves the right to make changes in the products and this documentation.

For current documents and software, visit the Download Center:

www.smaroptics.de/en/audiology/downloads/

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Alvium	
Vimba	
FlyCapture	Point Grey Research, Inc.
UpdaterGUI	
IPro	IPro GmbH, DE-71229 Leonberg
Noah	HIMSA II K/S, Copenhagen, (Denmark), Minneapolis (USA)
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PYLON	Basler AG, DE-22926 Ahrensburg
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1 About this manual

Please save this operating manual, pass it on with the product and replace it with a new version after performing an upgrade.

Symbols and highlighting of important information

▷ Action step

✓ Result



Cross reference to pages (with hyperlink). Back to the starting point: Use the page navigation of the PDF reader (“Previous View”, “Back”).

Hyperlink  (in this PDF file or external)



Paid addition or module



Variant, depending on the scanner



Mouse operation: the button to be pressed is highlighted



TIP

Helpful advice

Software controls

	Button
Name	Fields
“Name”	Icon
File New	Menu items
Name.txt	File and path names

Illustrations

The device and software images may differ from the customer’s systems. For example, the screenshots display no customer data.

Units of measurement and numbers

Units of measurement Units legally in force in Germany
 International System of Units (SI)

Numbers Decimal system with decimal places

Measurement	Unit	Abbreviation
Mass/weight	Kilogram	kg
	Gram	g
Length	Meter	m
	Centimeter	cm
	Millimeter	mm
	Micrometer	µm
Angle	Degree	°
Time	Hour	h
	Minute	m
	Second	s
Electrical power	Watt	W
Electrical voltage	Volt	V
	Alternating current	AC
Electrical frequency	Hertz	Hz
	Gigahertz	Ghz
Electrical current	Ampere	A
Protection class	International Protection	IP 1 st digit: solids protection, 2 nd digit: fluids protection
Temperature	Degree Celsius	°C
Memory (PC)	Random Access Memory	RAM
Data volume	Megabyte	MB
	Gigabyte	GB
CAD data format	Standard Triangulation Language	STL
	American Standard Code for Information Interchange	ASCII
	Mesh	MSH
	Point Cloud Measurement	PCM
	Polygon file format	PLY
Picture element	Pixel	px (monitor) dpi (print)
	Megapixel	MP

Warnings

Warnings provide information on:

- Possible personal injuries
- Possible damages to objects
- Risk avoidance

Warning levels

NOTICE



Material damages

CAUTION



Minor injuries

WARNING



Severe injuries

DANGER



Death or severe injuries

2 For your safety

2.1 Intended use

smart optics scanners are to be used exclusively for the purpose of their intended use, i.e.:

- The optical three-dimensional measurement of human ear impressions
- The digital production and archiving of earmolds.

2.1.1 Material properties

Scannable impression materials must be:

- Light-colored
- Solid
- Dimensionally stable
- Dry
- Opaque.

Reflective or dark surfaces must be matted with a 3D scan spray to become scannable.

2.2 Non-intended use

The following cannot be scanned:

- Transparent, non-dimensionally stable materials
- Objects other than ear impressions
- Living creatures.

smart optics shall not be liable for any damage caused by improper use.

2.3 General safety instructions

2.3.1 Qualification for use

In order to set up, configure and operate a smart optics scanner safely, you need specific knowledge to be acquired through:

- the Operating Manual
- Instruction or training.

Please comply with your local occupational safety and accident prevention regulations.

2.3.2 Constructive protective measures

smart optics scanners are developed and produced in accordance with the applicable safety standards.

Device protection:

- Protection against overvoltage.

Protection against injuries:

- Automatic power cut-off in the interior of the scanner when inactive or when the lid is opened (depending on the model),
- Stop of electrically driven parts.

2.4 Protection against injuries

Some risks of injury cannot be ruled out despite the protective measures. This is how you protect yourself and others:



WARNING

Risk of injury due to electric shock

Fire hazard due to short circuit

Defects in electrical devices/cables or contact with water can cause an electric shock, short circuit or fire.

- ▷ Make sure that all electrical devices/cables are intact and dry.
- ▷ Replace defective cables. Do not operate defective devices.
- ▷ Pull out the mains plug if a device/cable is:
 - Defective
 - Moist
 - Overheated
 - Not monitored (e.g., during the night).



WARNING

Health hazard due to magnetic fields

smart optics scanners and accessories include magnetic components. Magnetic fields can be health-damaging.

- ▷ Persons with implants, e.g., heart pacemakers, may only operate the scanner and its accessories with medical permission.



CAUTION

Health hazard due to structured light (concerns free Stage)

smart optics scanners work with structured light. Structured light can trigger epileptic seizures and migraine, among other conditions.

- ▷ People suffering from such conditions should cover the scanner with a light-tight foil or fabric when operating it.

CAUTION**Health hazard due to LED light with high blue content (concerns free Stage)**

smart optics scanners emit white light or blue light while measuring. Light with a high blue content can lead to retinal damage or other conditions in the long term.

- ▷ When operating the scanner, protect your eyes by:
 - Covering the scanner with a light-tight foil or fabric
 - Wearing glasses with a blue light filter.

CAUTION**Danger of crushing caused by mechanical parts or the lid (depending on the model)**

Your hands can get crushed by the mechanical parts or the lid of the scanner.

- ▷ Open the lid slowly and carefully up to the top, because otherwise it might fall down.
- ▷ Only put your hands inside the scanner when the axes have stopped.

CAUTION**Danger of injuries due to sharp needles**

The object holders (accessories) have sharp needles you can prick yourself with.

- ▷ Hold object holders and ear impressions only from the side.
- ▷ Do not press on the object holders from above.

CAUTION**Injury due to entanglement of clothing, jewelry or hair**

Loose objects can be drawn into the scanner.

- ▷ In case of entanglement, switch off the scanner immediately and pull out the mains plug. Remove any foreign objects from the scanner before continuing to work.
- ▷ Items such as the following should be avoided at the workstation:
 - Scarves & shawls
 - Neckties
 - Necklaces
 - Unbound long hair.

2.5 Protection against material damages

Some risks cannot be ruled out despite the protective measures. To avoid material damages to devices and data:

NOTICE**Damage to optical and electronic components due to touching, soiling, moisture, and cleaning agents**

The optical and electronic components of scanners are very sensitive.

- ▷ Protect the optical and electronic components by:
 - Not touching them
 - Not cleaning them
 - Keeping them clean and dry (close or cover the scanner)
 - Using the 3D scan spray only outside the scanner.
- ▷ Optical and electronic components should only be cleaned by your reseller or smart optics.

NOTICE**Data loss due to a too long USB cable**

The length of the USB cable affects the data transfer between the scanner and the PC.

- ▷ Only use a USB cable with a maximum length of 2 m.

NOTICE**Measuring errors due to vibrations**

Vibrations affect the measuring accuracy.

- ▷ Use a work table that:
 - Is stable or anchored
 - Can bear twice the weight of the load on it.

NOTICE**Measuring errors due to reflections on the measured object (concerns free Stage)**

Ambient light reflects on the measured object and influences the measuring accuracy.

- ▷ Choose a workstation that is not exposed to incident light or cover the scanner with a light-tight foil or fabric.

NOTICE**Measuring errors due to unsuitable climatic conditions**

Heat, cold and high humidity affect the ways materials expand and cause measuring errors. Overheating can permanently damage the scanner.

- ▷ Only operate smart optics scanners under the following conditions:
 - Temperatures between 15°C - 30°C
 - Low humidity
 - No direct sunlight.
- ▷ If necessary, use air conditioning and sunlight protection.

NOTICE**Material damages due to moisture**

smart optics are made of materials that are damaged by moisture.

- ▷ Dry moist components with a soft, lint-free microfiber cloth.

NOTICE



Data loss due to magnetic fields

smart optics scanners and accessories include magnetic components. These can impair the functioning or delete the data of other technical devices or data carriers, e.g., credit cards.

- ▷ Keep the distance between magnets and technical devices/data carriers.

2.6 Symbols on the device



Warning - Risk of cuts

Concerns: Object holders with sharp needles



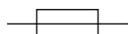
Do not touch

Concerns: Optical components



CE label

Documents the conformity of the scanner with EU directives at the time of issuance of the CE certificate.



Fuse

Documents a built-in overvoltage protection device.



USB

Documents a USB connection for camera and PC.



RGB TEXTURE SCAN

Identifies devices with RGB hardware components.

2.6.1 Warnings



Explanation of the warning symbols on the device

Achtung! Spitze Nadeln! Verletzungsgefahr!	DE	Kalibrierte Optik Nicht berühren!
Caution! Sharp needles! Danger of injury!	EN	Calibrated optics - Do not touch!
¡Atención! ¡Agujas finas! Riesgo de lesiones!	ES	Óptica calibrada - ¡No tocar!
Attention! Aiguilles pointues! Risque de blessure!	FR	Optique calibrée - Ne pas toucher!
Attenzione! Aghi appuntiti! Pericolo di lesioni!	IT	Optica calibrata - Non toccare!
Atenção! Aguilhas pontudas! Perigo de lesões!	PT	Ótica calibrada - Não toque!

3 About smart optics audiology scanners

smart optics audiology scanners are 3D desktop scanners for the purpose of digitizing ear impressions.

	mono Scan	duo Scan	duo Scan Touch	free Stage	ds Production
Features	Basic	Default	Default	Style	High-End
Scan quantity					
Slots for ear impressions	1	2	2	2	2
Housing shape	Flat, closed	Flat, closed	Flat, closed	High, open	Flat, closed
Touch operation	—	—	Touch screen	Touch sensor	—
Software	aural Scan	aural Scan	aural Scan	aural Scan	aural Scan
RGB hardware component ¹⁾	selectable	✓	✓	✓	✓
Data formats	STL, MSH, ASCII, PLY	STL, MSH, ASCII, PLY			
Interfaces	Noah System ²⁾ winIPRO ³⁾	Noah System ²⁾ winIPRO ³⁾			

- 1) Available since October 2022, not available for older scanners
- 2) Noah System: “Standard for integrated hearing care software” of HIMSA (Hearing Instrument Manufacturers’ Software Association):
www.himsa.com/products/all-about-noah-system-4/
- 3) winIPRO, auditory acoustics software of Haag-Streit:
www.haag-streit.com/ipro-gmbh/en/

3.1 Scope of delivery

Scanner		
Item number	Item name	Description
90401	free Stage	Open scan show
90026	duo Scan	Innovative production chain
90390	duo Scan Touch	<i>This model is no longer manufactured.</i>
90027	ds Production	For continuous operation and large quantities
90281	mono Scan	Scanner for single impressions
90527	mono Scan with RGB	mono Scan with RGB component

Transport box

- 1 scanner
- Object holders (needle adapters):
 - 1 silver (mono Scan)
 - 2 silver (duo Scan, duo Scan Touch, free Stage)
 - 2 blue) + 2 red (ds Production)
- 1 power cable (2.5 meters, AC 110/230 V)
- 1 USB cable (1.8 meters, type A/B)

Data carrier

- Software aural Scan
- Calibration data for the scanner
- Operating manual (PDF)
- Setup instructions for the Noah interface (PDF)

3.2 Optional accessories (chargeable)

Item number	Item name	Description
90066	Warranty extension	12-month extension, optional as of the 3 rd year after delivery
90195	Object holder (needle adapter) 1 piece blue (left)	Replacement/Accessory
90296	Object holder (needle adapter) 1 piece, silver	Replacement/Accessory
90303	Object holder (needle adapter) 1 piece red (right)	Replacement/Accessory
90347	Software upgrade	Upgrade for a single license
90410	3D calibration object	Required for 3D calibration
90524	Dust cover "free Stage"	Handmade, precise fit, branded, to cover when not in operation

Order replacements/accessories from:

Resellers (regional) or smart optics:

www.smartoptics.de/en/contact/ (worldwide)

www.smartoptics.shop (EU)

4 Device components

4.1 Front views

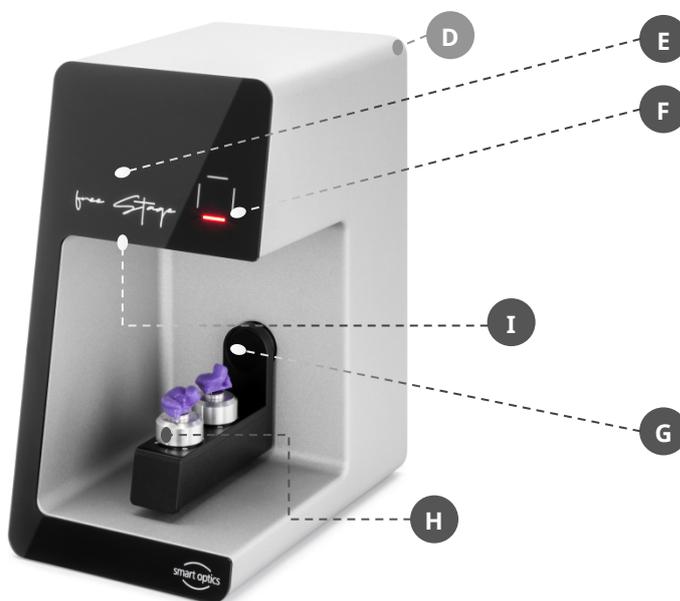


- Key**
A: Lid
B: Viewing window
C: Touch screen
D: Power switch
E: Status display





Key
 A: Lid
 D: Power switch



Key
 D: Power switch
 E: Front
 F: Touch sensor
 G: Swivel axis
 H: Rotary axis; base (displayed here with object holders)
 front: L
 back: R
 I: 3D sensor/Optical components (internal)

Indicator lights

	mono Scan	duo Scan	duo Scan Touch	ds Production	free Stage
		Scanner is off, no power	Scanner is off, no power	Scanner is off, no power	
		Ready for operation	Ready for operation	Ready for operation	
		Sleep mode			
		Scan finished			
		Scanning			

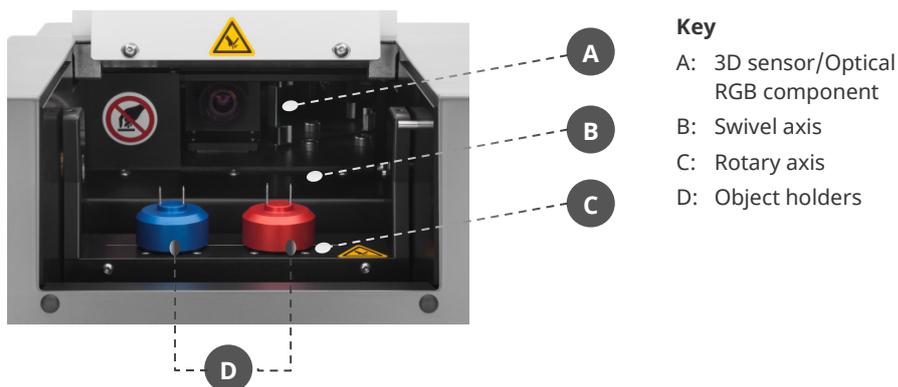
	mono Scan	duo Scan	duo Scan Touch	ds Production	free Stage
				Sleep modus	
				Ready for operation	
				Scanning	
					Scanning

4.2 Internal views

Closed scanners

Key

- A: 3D sensor/Optical RGB component
- B: Swivel axis
- C: Rotary axis
- D: Object holders
- E: Base L R



4.3 Accessory views

Intended use		Needles (top)		
Object holder*	Mounting of ear impressions	Neutral	Left	Right
3D calibration object*	Required for 3D calibration	Magnet (bottom)		
Power cable**	Scanner power supply			
USB cable**	USB connection Scanner - PC			

As accessory:
 * Available
 ** Not available

4.4 Rear view

Connections and type plate



Key

- A USB port
- B Type plate with technical data and serial number
- C Sensor number
- D Mains connection with fuse
- E Power switch (toggle switch) (mono Scan, free Stage)

5 Commissioning

5.1 Workstation requirements

▷ Choose the workstation according to these criteria:

	mono Scan	duo Scan/ duo Scan Touch	free Stage	ds Production
Stability	15 kg	16 kg	13 kg	20 kg
.Space (W x D x H mm)	300 × 367 × 217.5 *	300 × 350 × 210.0 *	186 × 292 × 348.0	300 × 350 × 232,5 *
Switch	Back	Front	Back	Front
Sockets	≥ 3	≥ 3	≥ 3	≥ 3
PC – scanner distance	≤ 1.5 m	≤ 1.5 m	≤ 1.5 m	≤ 1.5 m
Direct light	✓	✓	✗	✓
Shop, lab, workshop	✓	✓	✓	✓

* Open approx. 350 mm

The following should be avoided in work areas:

- Moistness
- Emissions (dust, vapors, oils, paints, etc.)

Multiple sockets and extension cords are allowed as long as the electrical cables are not overloaded.

Electric equipment must be used properly and checked regularly.

5.2 Set up the scanner

5.2.1 Check the delivery

▷ After receiving the delivery, please check if:

- The outer carton is damaged
- The delivery is complete
- There are damaged parts.



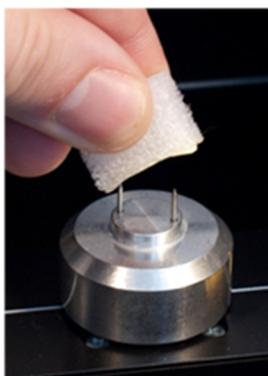
- ▷ Complain immediately:
 - To the carrier and seller in case of transport damage
 - To the seller (reseller/smart optics) in case of wrong/incomplete delivery.

5.2.2 Unpacking



- ▷ Grasp the scanner with both hands at the bottom from the sides.
Also for open scanners: Do not touch inside. Touching can damage the optical components.
- ▷ Pull the scanner upwards out of the carton.

- ▷ Set up the scanner at the workstation so that the power switch is easily accessible.
- ▷ Remove the accessories from the carton.



- ▷ Remove the transport protection (foil, foam insert, foam cube).
Grasp the object holders from the side: Risk of injury caused by sharp needles!



TIP

Keep the packaging and transport protection for later transports

5.3 Connect the scanner

Audiology scanners require connections for:

- Power supply
- Data transfer (USB)

5.3.1 Power connection



- ▷ Connect:
 - the **device plug** to the mains connection socket (at the back)
 - the E+F type **mains plug** to a socket (optionally with a socket adapter)



TIP

Voltage differences are automatically regulated by a built-in switched-mode power supply.

5.3.2 USB connection



- ▷ Connect:
 - The **type B plug** to the USB port of the scanner
 - The **type A plug** to a USB port at the back of the PC.
- ▷ Please note:
 - USB 3.0 sockets must be connected to **black** USB 3.0 ports.
 - USB 3.0 sockets must be connected to **blue** USB 3.0 ports.

Important for a failure-free and stable connection:

- Do not use a USB hub.
- Do not use an extension cord.
- Do not use a USB cable longer than 2 meters.



- ▷ Switch on the PC and the scanner (press the power switch, toggle switch in position I).
- ✓ The scanner is ready for operation.

6 Installation and upgrade

6.1 Installation

PC

The system requirements for aural Scan are:

	Minimum:
	Dual Core CPU, i3, 4 GB RAM, USB 2.0 Port, HDD with approx. 40 GB free disk space, graphics card with 1 GB RAM
PC system	Recommended
	Quad Core CPU, i5, 8 GB RAM, USB 3.0 Port, HDD with approx. 80 GB free disk space, graphics card with 2 GB RAM
Operating System	Windows 10 or Windows 11 (64 bit)
USB	2.0 or 3.0

PC hardware

smart optics recommends a Desktop PC (tower), not a mini-PC. It is possible to use a Notebook/Laptop, but only when connected to a network.

Installation methods



- Direct installation from the data carrier:
The calibration data for the scanner are loaded automatically.
- Installation from an external copy of the installation file (e.g., downloading it from the smart optics website):
Calibration data must be loaded separately.

Procedure

- ▷ Insert/place the aural Scan data carrier into a drive of the PC.
- ✓ Its content will be displayed. If not, open the drive in Windows Explorer.
- ▷ Copy the contents of the data carrier (optional).
- ▷ Double-click the file `auralScan.exe`.
- ▷ The setup starts with the selection of the language for installation (Suggested value: operating system language). You can select a different language for aural Scan later.
- ▷ Follow the setup instructions.
- ▷ Also install device software (camera drivers) on request.
- ✓ Destination folder (file path), start menu folder and desktop icon will be created.
- ▷ Complete the setup by restarting the PC.
- ✓ aural Scan is ready for operation (Start using the desktop icon or from the app menu).



TIP

Quick start: Pin the aural Scan icon to the taskbar (drag & drop).

Utilities

Several camera systems are foreseen in the audiology scanners. All camera drivers are installed along with aural Scan.

Installation paths:

C:\Program Files (x86)\Point Grey Research
 C:\Program Files (x86)\Allied Vision
 C:\Program Files (x86)\Basler



Do not change the camera drivers (except in case of connection problems).

Installation with Noah

To operate aural Scan with Noah (the software of the Hearing Instrument Manufacturers' Software Association (HIMSA)), you must accept the proposed target folder.

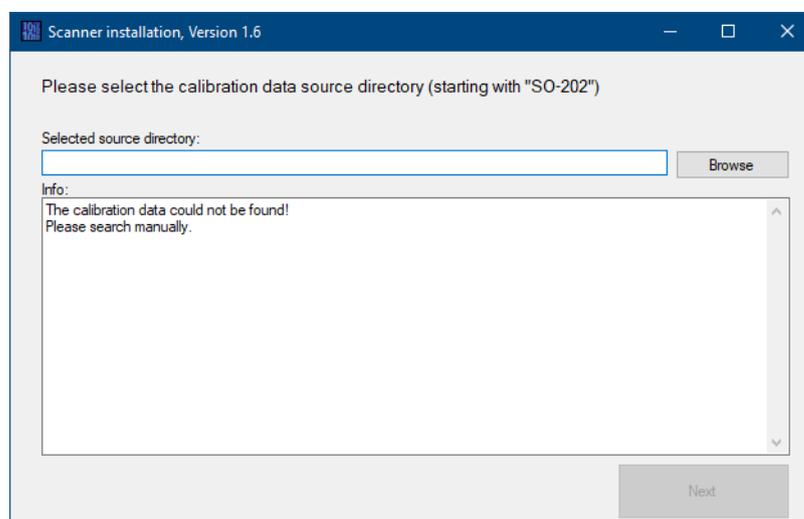
6.2 Load the calibration data

This step is not necessary if the initial installation is launched directly from the data carrier.

- ▷ Start aural Scan (for the first time).
- ✓ aural Scan will indicate that a folder (Calibration directory) is missing in Program Files (x86):



- ▷ Follow the instructions.



- ✓ The specific calibration data for your scanner are stored on the aural Scan data carrier. Calibration data folder names begin with the character string \SO-202.
- ▷ To look for the folder, click on .



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The name of the calibration data folder must match the scanner's sensor number (→ See the back of the scanner: SO number).

- ▷ If the calibration data folder is named differently, please contact your seller (reseller or smart optics). Do not rename the SO folder.
- ✓ Once the calibration data have been loaded, you can start aural Scan.



The axes must necessarily be calibrated with the first start.

6.3 Upgrades

You can use any supplied version of aural Scan for the entire life span of the scanner.

New versions of aural Scan contain improvements and corrections. smart optics recommends using the latest version released for your scanner.

After the purchase of the scanner, the use of upgrades is:

- Free of charge for 12 months
- Chargeable from the 13th month.

The elapsed usage time is checked at startup, but not before the installation.

After being purchased, upgrades can be used for 12 months.

Current version: Download, release information, release notes

www.smartoptics.de/en/audiology/downloads/

To request of a 30-day trial version:

www.smartoptics.de/de/contact/

To purchase an upgrade extension or request a quote:

From smart optics:

smartoptics.shop/en/
onlineshop@smartoptics.de

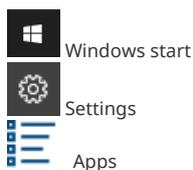
From a reseller:

www.smartoptics.de/en/contact/

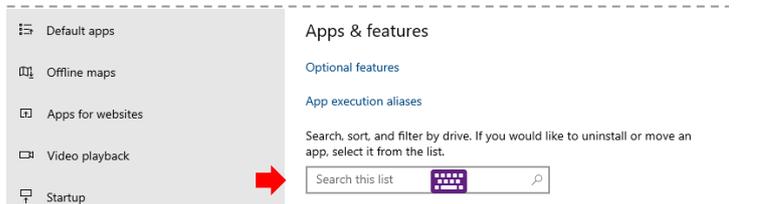
6.3.1 Uninstalling aural Scan

Uninstall

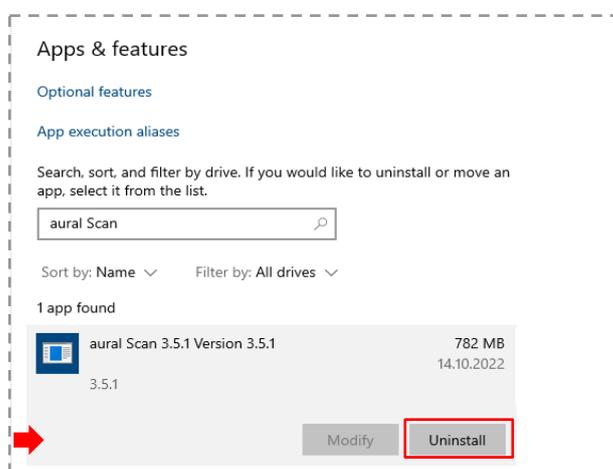
If you are no longer using aural Scan, you can remove the software from the PC. Scan projects, calibration data and a log file will be kept.



- ▷ In the start menu, open the Windows settings.
- ▷ Select **Apps**.
- ▷ Enter “aural Scan” into the search field and press ENTER.



- ✓ The aural Scan app will be found.
- ▷ Click on **Uninstall**, confirm and follow the instructions.



- ✓ Now you will be able to reinstall aural Scan.

Cleaning up an incomplete installation

This step allows you to completely remove aural Scan. This is not necessary for the installation of a normal upgrade.

- ▷ Delete the folders with software files, calibration data, personal settings, temporary files and camera drivers:
 - C:\Program Files (x86)\3D-Scanner\aural Scan
 - C:\Users\[User]\AppData\Roaming\3D-Scanner\aural Scan
 - C:\Program Files (x86)\Point Grey Research
 - C:\Program Files (x86)\Allied Vision

6.3.2 Installation of an upgrade

Backup (recommended)

- ▷ Before installing a new version, save the installation file of the old version, personal settings and the calibration data folder:
 - `auralScan.exe`
 - `C:\Users\[User]\AppData\Roaming\3D-Scanner\aural Scan\config\Settings.xml`
 - `C:\Program Files (x86)\3D-Scanner\aural Scan\data\SO-202...`
- ▷ Save all backup data on a different drive.
- ✓ The backup allows you to:
 - Restore the old version
 - Compare personal settings
 - Load the calibration data into the new version.

Procedure

- ▷ Save the `auralScan.exe` file on the PC on which aural Scan is installed.
- ▷ Quit aural Scan.
- ▷ Install aural Scan in the same way as the first installation. To overwrite the old version, select the same target folder (file path).



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The previous installation will be deleted without confirmation request (from the same or a different target folder).



32, 93

- At the first start you must:
- Enable the access to the software (after an upgrade extension)
 - Calibrate the axes.

Parallel installations

The parallel installation of several aural Scan versions is technically impossible, even in alternative target folders.

If an older smart optics scan software is available, e.g., `duo Scan.exe` or `ds Production.exe`, it is possible to install aural Scan in parallel.

However, smart optics recommends uninstalling older scan software.

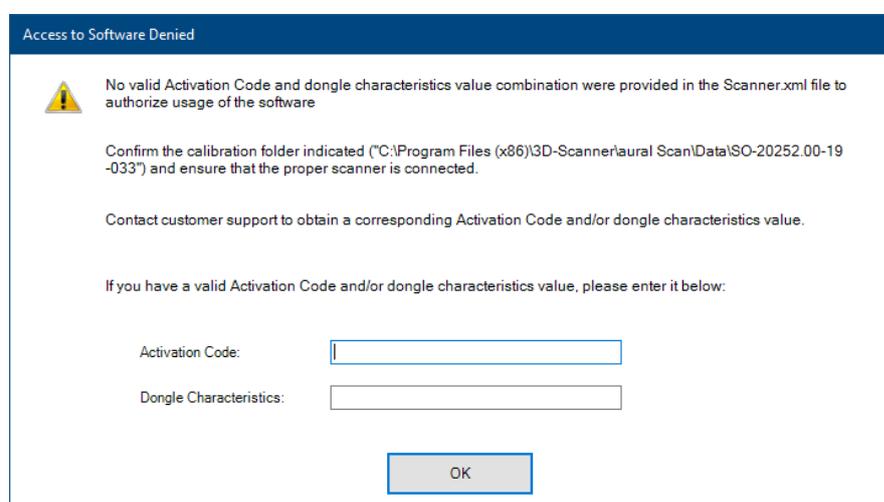
6.3.3 Activation of access to the software

If the scanner or the last upgrade extension was purchased more than 12 months ago, you will need to enable the access to aural Scan when starting the software.



The activation code must be purchased from your seller (reseller or smart optics). The activation code is generated when requested by smart optics and is usually sent on the next business day.

Message on startup:



The screenshot shows a dialog box titled "Access to Software Denied". It contains a warning icon and the following text: "No valid Activation Code and dongle characteristics value combination were provided in the Scanner.xml file to authorize usage of the software". Below this, it instructs the user to "Confirm the calibration folder indicated ('C:\Program Files (x86)\3D-Scanner\aural Scan\Data\SO-20252.00-19-033') and ensure that the proper scanner is connected." and to "Contact customer support to obtain a corresponding Activation Code and/or dongle characteristics value." It then asks the user to enter their Activation Code and Dongle Characteristics in two text input fields. An "OK" button is located at the bottom right of the dialog box.



TIP

Repeat the start of aural Scan to verify the message.

- ▷ Enter the activation code (a combination of letters, numbers and special characters). There is no need to renew the dongle characteristic.
- ✓ Upgrades can be used without a new activation code during the next 12 months.

7 Positioning of ear impressions

Ear impressions are attached to the object holders (careful with the sharp needles!) and magnetically fixed on the bases inside the scanner.

7.1 Removing and inserting object holders

You can remove the object holders from the scanner to:

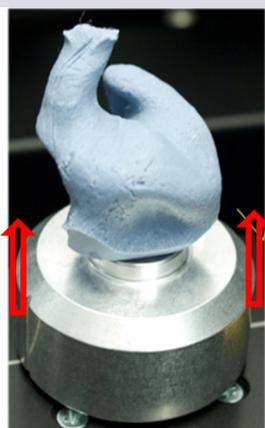


- Scan only one side
- Mount ear impressions (optional)
- Clean the object holders/interior of the scanner
- Matte ear impressions with 3D scan spray

Only use the 3D scan spray outside the scanner!

To protect against spray mist: Please close the lid or cover the scanner!

Removal



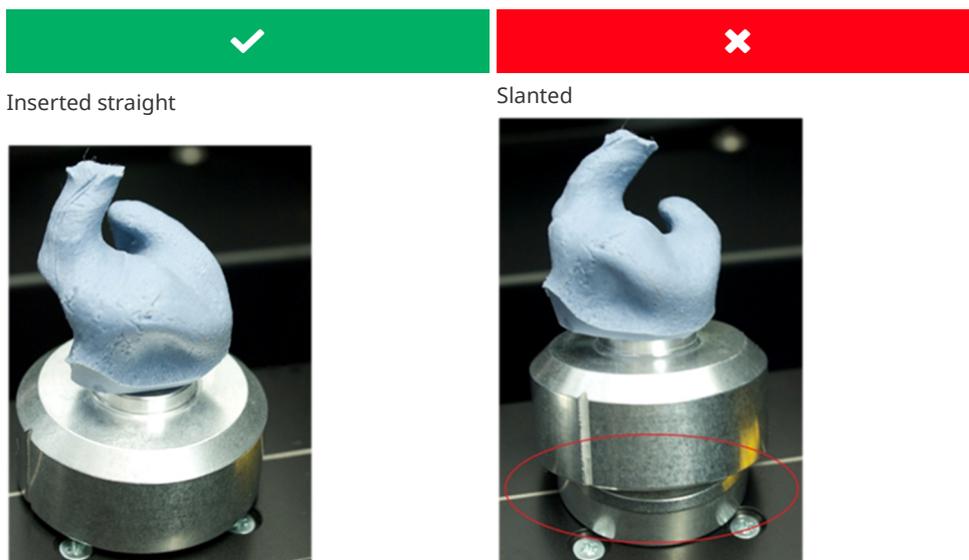
- ▷ Open the lid up to the stop.
- ▷ Hold the object holder from both sides.
- ▷ Pull the object holder upwards.
- ✓ The magnetic connection to the base is released.

Insertion



Aids for a correct alignment:

- The horizontal guiding line on which the bases are placed
- The side markings on the object holder
- ▷ Place the object holder straight on the base.
- ▷ Align the markings parallel to the guiding line.
- ✓ The magnetic base will keep the object holder in place.



Side determination

It is very important to always determine the left and the right side for the entire production process.



Perspective

Left and right ear – Patient view,
 Left and right base – Operator view.

Impressions must be scanned as follows:

- left ears on the left place,
- right ears on the right place.



ds Production has color-coded object holders and bases to help.

L = Left

R = Right



7.2 Mounting of ear impressions

- ▷ Prepare the ear impressions to be scanned:
 - Cleaning (of tamponade, cerumen, withdrawal string)
 - Drying
 - Smoothing (auricle, outside, the flat side to be mounted = bottom of the scan).



- ▷ Grasp the ear impression from the side.
- ▷ Mount the flat side:
 - Centered on both needles
 - Tightly on the object holder.



TIP

Check the setting **Object tone**.

3D scan spray

Ear impressions made from reflective or dark materials must be matted. Only use the 3D scan spray outside the scanner!

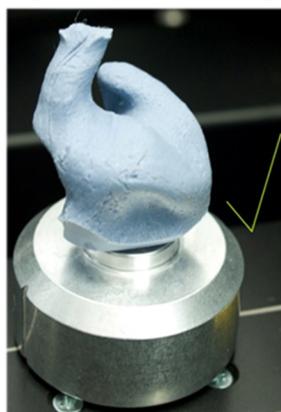
- ▷ Align the horizontal control line of the impression with the guiding line inside the scanner.
- ▷ Place the **left** and the **right** impressions inside the scanner.



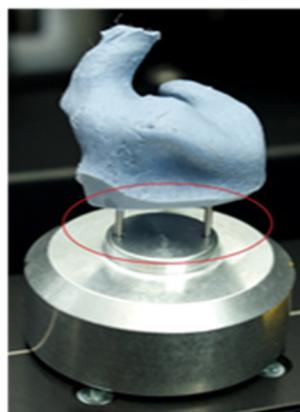
mono Scan has only one base: impressions must be scanned one after the other. Please note which side is being requested.

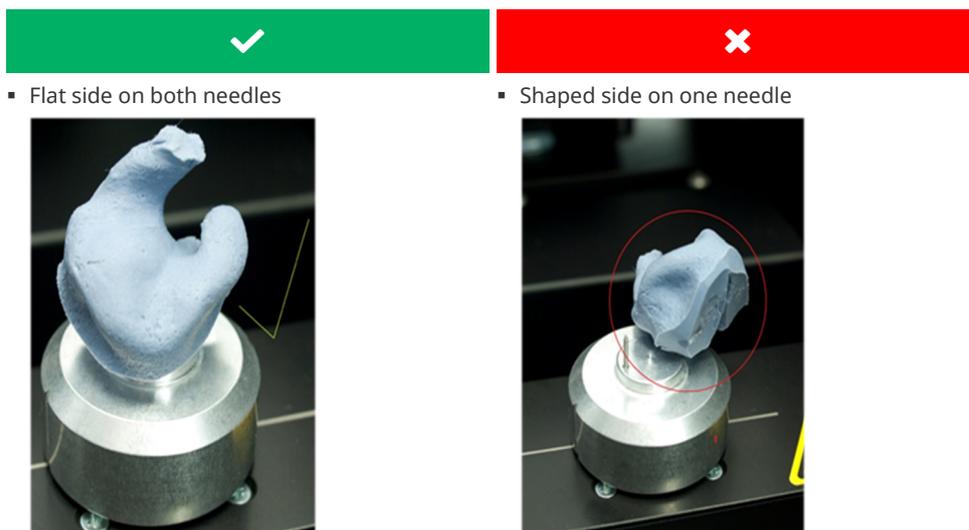


- Gapless fit
- Alignment parallel to the guiding line



- Gap between impression and object holder
- No alignment with the guiding line





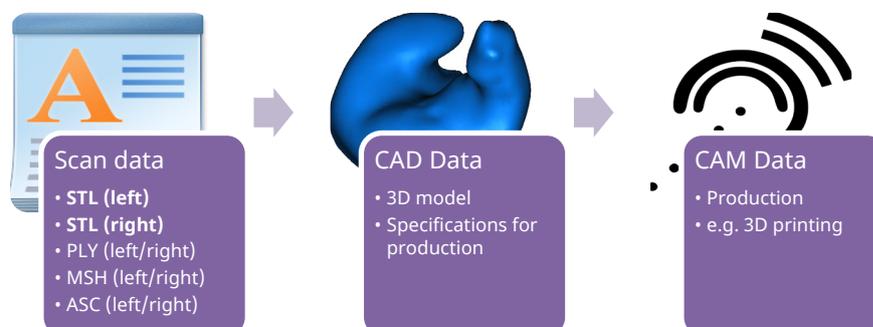
TIP

The axes can move when inserting and removing objects. The axes move back to the home position with the **Move to service position** function.

8 Introduction to scanning

8.1 Working with scan data

smart optics scanners create open data for common CAD/CAM systems (STL, PLY, MSH, ASC file formats). In digital production, the earmold is manufactured using the scan files.



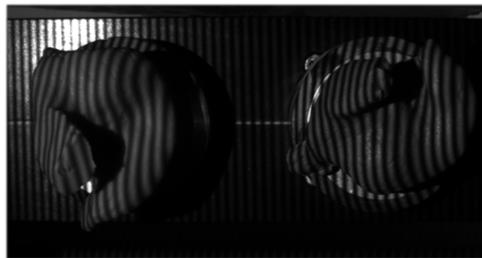
8.2 Operating principle of the scanner

The most important components of the scanner are the 3D sensor and the positioning mechanism.



- A** The positioning mechanism in the interior of the scanner consists of a swivel axis driven by an electric motor **(B)** and rotating bases **(C)**.
- B** Object holders are fixed magnetically onto the bases **(C)** and the objects to be scanned are mounted on the object holder.
- C**

The rotating bases **(C)** position the objects to be measured with regard to the 3D sensor **(A)** (above the swivel axis).

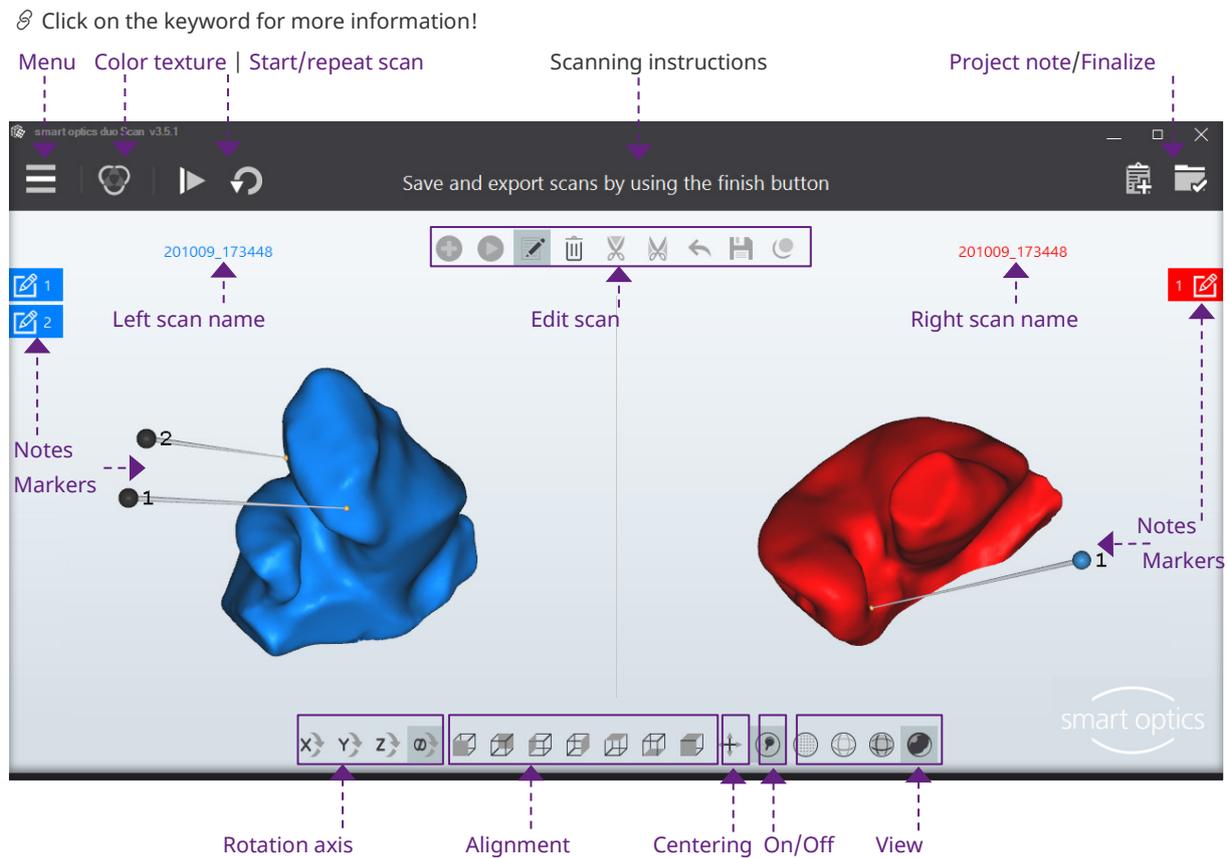


A striped pattern is projected onto the object to be scanned by the 3D sensor and recorded by the camera.

With the aid of several camera images taken from different perspectives, aural Scan calculates a 3-dimensional image of the object.

8.3 3D viewer workspace

The 3D viewer is aural Scan’s workspace. The left and right sides are worked on independently of each other and saved together as a scan project.



8.3.1 Icons in the 3D viewer



Rotation axis (X Y Z ∞)

Selection of the rotation axis; the default option is “All axes” (∞). When rotating with the mouse, the scan is rotated about the selected axis.



TIP

The Cartesian coordinate system applies in the 3D viewer (regardless of the **Orientation** setting).



Alignment (cube)

The filled side of the cube is the desired orientation (front, back, left, right, top, bottom). The default option is isometric orientation (front, top). Both scans are rotated to the selected side and zoomed to 100%.



Centering

Both scans are displayed centrally and zoomed to 100%.



On/Off (Show markers)

The markers (pins) are hidden and shown on both scans (e.g., to check the scan). The notes remain visible.



View (spheres)

Both scans are displayed as dots (corner points of the triangles), triangles (lines) or shaded areas (filled triangles). The Gouraud shading display looks three-dimensional and realistic.

Dots:	Triangles:	Flat shading:	Gouraud shading:
Display during scanning			Default after matching

8.3.2 Mouse in the 3D viewer

Default mouse button assignment

- | | | | |
|--|---------------------------|--|-------------------------|
| | Left: click, hold + move | | Rotate the scan |
| | Right: click, hold + move | | Move the scan |
| | Rotate the scan | | Zoom in/out of the scan |



See: Setting [Change mouse functions](#)

Rotate the scan

The pivot point is the center of the scan.



▷ Select a rotation axis. If **All axes** ∞ is selected, the axis of rotation follows the motion of the mouse, so that tilting movements are also possible.



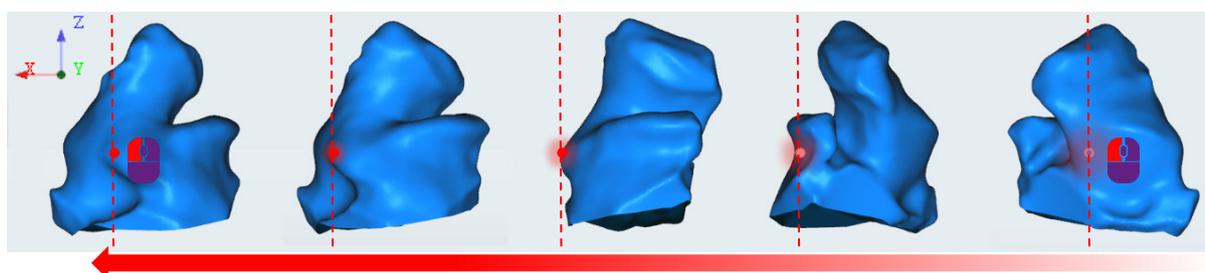
▷ To set the radius, click and hold:
 — Inside the scan = Small radius
 — Outside the scan = Large radius

▷ Move the mouse.



▷ Release the mouse button to stop the rotation.

Example: Left rotation around the Y-axis; start from the frontal view



Move the scan



▷ Click and hold the **right** mouse button (any point in the 3D viewer).
 ▷ Move the mouse.
 ▷ Release the mouse button to stop the motion.

The scan was moved too far and is no longer visible?

▷ Click on “Centering” or on a “Cube”.

Zoom in/out of the scan

You can zoom steplessly in and out up to a maximum or minimum size.

▷ Click on the scan.



— To enlarge: Turn the scroll wheel towards your hand.



— To reduce: Turn the scroll wheel away from your hand.

▷ Release the scroll wheel once the desired size is reached.

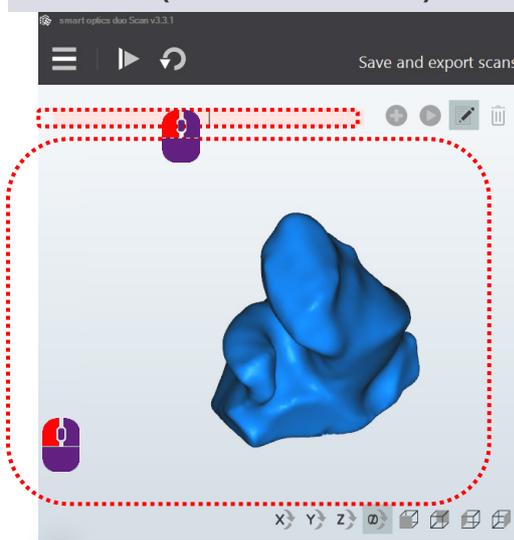
8.3.3 Keyboard in the 3D viewer

360° rotation, space bar



- ▷ Select the side to be rotated.
- ▷ Select the display to start, e.g., with the cube icons.
- ▷ Press the space bar.
- ✓ The scan will be rotated around its Z-axis allowing you to see all sides.

Select side (TAB or SHIFT + TAB)



Requirement:

The cursor is inside the 3D viewer.



- ▷ Press TAB or SHIFT + TAB.
- ✓ The cursor jumps to the other side.

9 Scanning the ear impression

Preparation



- ▷ Start by switching on the scanner.
- ▷ Start aural Scan.
- ▷ If necessary, change the **settings**, e.g., **file formats**, **object tone**.
- ▷ Decide whether you wish to scan with or without **color texture** (can be configured, **color texture scan**).
- ▷ Position one or two object holders with ear impressions (not empty object holders).



mono Scan will scan the left and right impressions one after the other (by default without color texture scan, available from mono Scan with RGB (Item 90527)).

9.1 Starting a scan project



- ▷ Start a new scan project using one of the following methods:



- Icon "Scan"
- RETURN or ENTER (in the empty 3D viewer)
- Scanning a barcode (except in mono Scan)



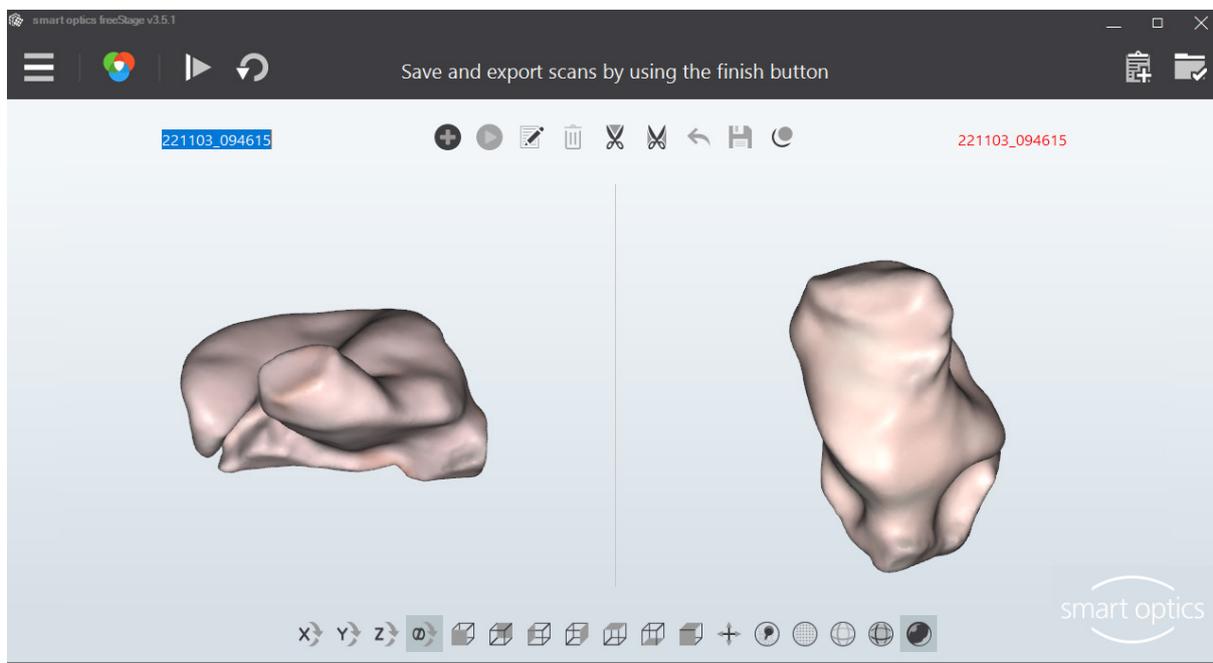
- duo Scan Touch: Touch screen



- free Stage: Touch sensor



- ✓ Result of the scan in the 3D viewer:
Left scan, right scan (standard colors, without color texture,)
Left scan name, right scan name, scan in the impression color (with color texture scan).



TIP
 The display depends on the settings for the [3D viewer](#), [Scanning](#) and [Matching](#).

9.2 Color texture scan

Color texture scans are used to add markings to the surface of an ear impression in a scan. The color of the ear impression is also scanned (by default instead of the [Scan color](#), blue – red).



With [Annotating and commenting](#), you can add notes, e.g., to identify errors in the impression or to give instructions to production.

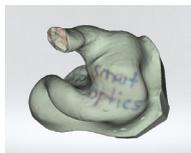


Availability

The color texture scan requires a scanner with an RGB hardware component, available for:

- free Stage, duo Scan, ds Production as of construction date October 2022,
- mono Scan RGB (Item 90527).





Annotating

- ▷ Draw the markings with a fine-tipped color pencil (good color contrast compared to the impression material, **not** black).
- ▷ You can use different colors to differentiate information types (e.g., cutting lines, material defects, other notes).

Settings

The following settings are required for color texture scans:



- Color texture must be activated (in the **3D viewer** or as a **setting by default**),
- PLY **file format** for color data,
- Deactivate **Thinning** for high-contrast, high-resolution markings.

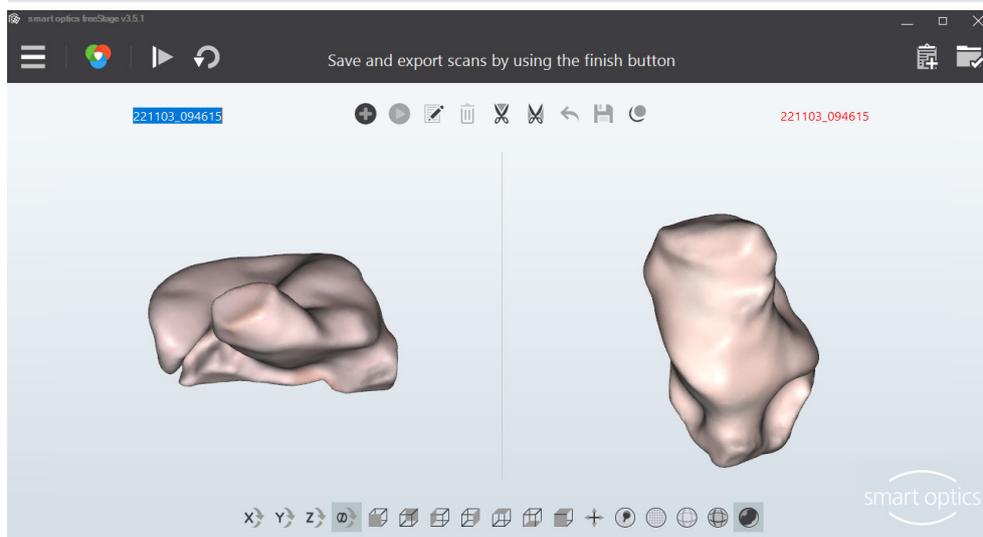
Checking the results

The scan shows:

- the impression color (approximately),
- the markings (in detail).

Color texture options

Icon	Meaning
	Scanning with color texture
	Scanning without color texture. Click here to activate.
	No color scan is possible. The file format PLY is deactivated.
—	If no icon is displayed, no device with RGB hardware component is connected.



9.3 Naming scans

aural Scan names scans automatically. To identify scans more easily, you can enter scan names manually, e.g., with patient names or case numbers.

9.3.1 Naming rules

Automatic naming	<p>Based on date and time (time stamp).</p> <p>Example</p> <pre>200612_094143 YY MM DD_HH MM SS Year Month Day_Hour Minute Second</pre>
File names	<p>Scan names are part of the file names.</p> <ul style="list-style-type: none"> ▪ Invalid character strings: AUX CON NUL PRN COM1 ... COM9 LPT1 - LPT9 ▪ Invalid special characters: < > : " / \ ? * ▪ Extensions: STL, PLY, MSH, ASC
Side identification	<p>Indicates the anatomical position.</p> <ul style="list-style-type: none"> — <code>_L</code> = Left sinister, <code>_R</code> = Right dexter, — completes the file names, — no display in the 3D viewer. <p>Example</p> <pre>Scan name: 200612_094143 File name: 200612_094143_L.STL</pre>
Left - Right	<p>Different scan names are possible.</p> <ul style="list-style-type: none"> — The same scan names can be forced (setting: Use the same scan name for the left and right ear cast). — Identical file names are distinguished by the identification of the side.
Length	<p>Is limited by Windows rules.</p> <ul style="list-style-type: none"> — The configuration for specific name lengths (from/to) is possible through Support (<code>Settings.xml</code>). — The display in the 3D viewer is single-line (fewer characters than allowed).

Saving location (Export)

- Default C:\Scans (Setting: **Project folder**)
- Project folder named with a time stamp, regardless of the scan name

9.3.2 Editing scan names

Scan names are displayed on both sides of the 3D viewer. Scan names:

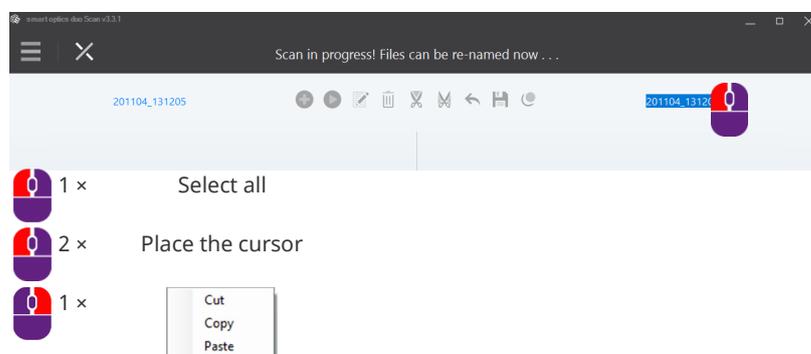
- Can be edited before, during and after scanning
- Can no longer be edited after work is finished.

Field representation

	Valid
	Invalid (empty, longer/shorter than allowed)

Editing with the mouse

- ▷ Click on the scan name you want to edit.



With the keyboard

- ▷ Press TAB or SHIFT + TAB to place the cursor on the side you wish to edit.



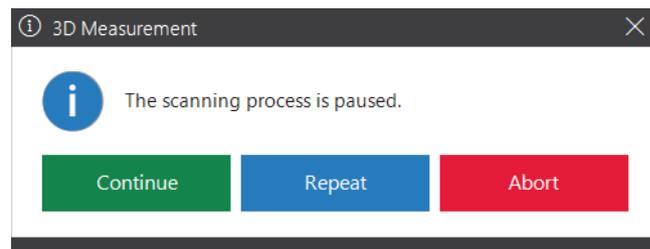
- ▷ Invalid special characters cannot be entered.
- ✓ When entering/finishing work it is checked whether:
 - at least one character has been entered
 - the permitted length (`Settings.xml`) has been complied with.

9.4 Cancelling a scan

You can cancel a scanning process without waiting for the result, e.g., if an ear impression is not correctly positioned.



- ▷ Click on “Cancel” or press ESC.
- ✓ aural Scan will ask you what to wish to do.



Continue: The measurements made are kept and completed.

Repeat: The measurements made are discarded and calculated again.

Abort: The scan project is discarded.

9.5 Repeat scan

You can repeat a scan to replace a bad scan result with a new scan (alternatively: [Correcting a scan](#)).



- ▷ Correct possible causes for the poor scan result:
 - Settings, e.g., the [Object tone](#)
 - [Positioning](#) of the ear impression.



- ▷ Click on the icon “Scan again”.
- ✓ The first scan result is discarded, and the object is scanned again. The scan name is kept.

9.6 Annotating and commenting

9.6.1 Annotate a scan

Individual areas in a scan can be annotated, e.g., to identify errors in the impression or to give instructions to production.

RECOMMENDATION



The best basis for annotations is **Color texture scans** with markings.



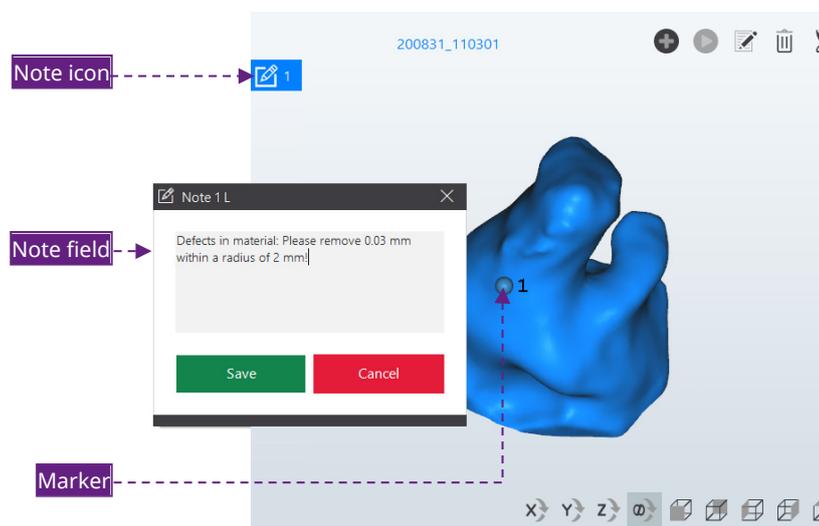
- ▷ Enable the Notes Tool (3D viewer, top).
- ▷ Rotate the scan so that the concerned area is visible.



- ▷ Aim precisely at the area and double-click to set a marker (pin).
- ✓ A numbered note symbol is set in the 3D viewer (**blue** for the left side, **red** for the right side, numbered from 1 to 6).



- ▷ Enter and save the note in the text field (150 characters max.).
- ✓ When work is finished, the text is printed in the **Order document** `order.pdf`. The target coordinates are documented in the project folder (XML file).



Moving a marker

Markers (pins) are movable so that they can be arranged in a clear way.



- ▷ Click and hold the marker with the left mouse button.
- ▷ Move the mouse to the desired target position.
- ✓ The target marker on the scan remains in its original position.



Hiding a marker

Markers (pins) can interfere with the display.



- ▷ To hide the markers (pins), click on “Show markers”.
- ▷ Click again to show the markers.

Reading and editing a note field

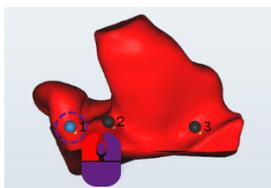


Bubble in the material. Please smooth it!

- ▷ With the left mouse button on the note icon:
 - Show, to read the tooltip
 - Click, to open and edit the note field.

Delete note

- ▷ Click with the left mouse button on the marker (pin) (it will turn blue).



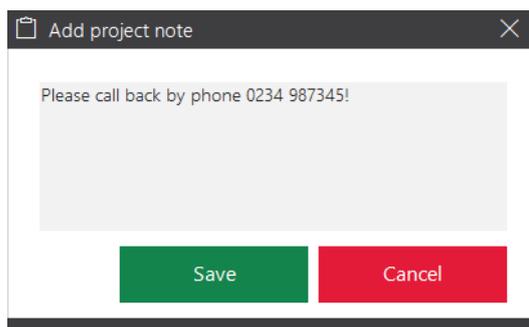
- ▷ Press DEL or click on the trash bin icon.
- ✓ Deleted notes cannot be recovered.

9.6.2 Commenting a scan project

You can enter general information about the scan project, e.g., to process the order.



- ▷ Click on “Add project note”.
- ▷ Enter and save the note in the text field (150 characters max.).



- ✓ You can delete the note from the text field until work has been finished.
- ✓ When work is finished, the text is printed in the [order document](#) `order.pdf`.

9.7 Correcting a scan

Holes (gaps) can appear in a scan, e.g., due to:

- Narrow places in the ear impression
- Light reflections on the surface.

To complete the scan data, these holes must be filled. This is important for the further processing in a CAD system and for the quality of the earmold.

Correction functions:



- [Rescanning](#)
- [Fill great holes](#)
- [Cutting](#)

9.7.1 Rescanning

The rescanning correction function specifically measures holes (gaps), e.g., in narrow places.



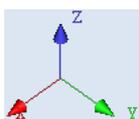
This function is not available for mono Scan.

- ▷ In the 3D viewer, click on:
 - The page to be rescanned
 - “Start rescanning”



You can switch sides with a double click.

- ✓ The following are displayed on the selected side:



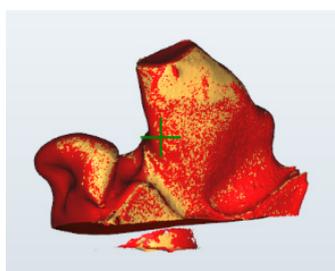
- The coordinates X, Y and Z (spatial orientation of the scan)
- A crosshair cursor.

The crosshair cursor marks the starting position of the additional measurement. It must be located on the scan, not beside it.



- ▷ Click on "Measurement".
- ✓ The area surrounding the crosshair cursor will be rescanned. The rescan area is displayed in the **rescan object color**:

- Scan
- Right object color
- Crosshair cursor
- +
- Rescan areas
- Rescan object color



Evaluating the result of the rescan

- ▷ Start as many rescans as are necessary to fill all holes.



TIP

Unnecessary areas are also scanned, e.g., the base. These are removed again during **matching** or by manual **cutting**.



- ▷ Check the result:
 - The last rescan is of bad quality. Click on "Undo" (last action).
 - The overall quality of the rescans is bad. Repeat the scan.
 - The overall quality of the rescans is good. Proceed with the matching of the scan project.

Positioning the crosshair icon.

- ▷ Position the crosshair icon on the scan by:

Rotating



Moving

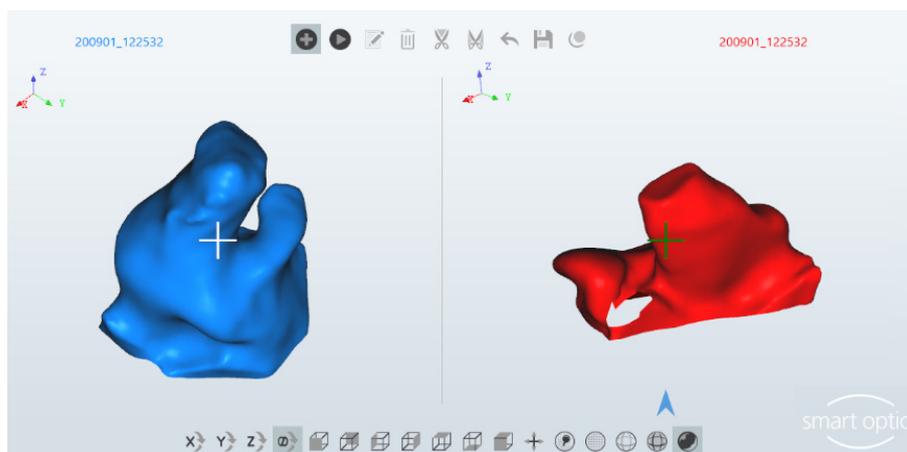


Zooming

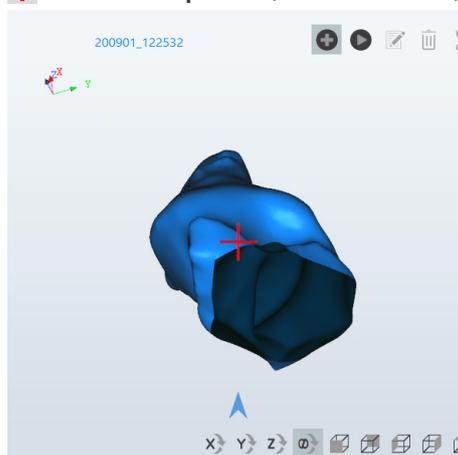


+ Side not selected

+ Side selected



+ Inadmissible position, not measurable, e.g., the underside



9.7.2 Matching

The matching function:

- Pieces together the measurements/images
- Is a requisite for finishing work
- Is executed by default immediately after scanning
- Must be carried out manually in order to end the rescanning process (the main scan and the rescan become a single scan).



- ▷ Click on “Matching”.
- ▷ You can cancel the matching process and continue rescanning.
- ✓ By default, scans are:
 - Thinned, smoothed and cut
 - Displayed isometrically in the object color
 - Rotated once by 360° (for visual inspection).

**TIP**

3D viewer- and matching options ([Colors](#), [Object rotation](#) and [Thinning](#), [Smoothing](#), [Cutting filter](#)) can be configured.

9.7.3

Fill holes

aural Scan can automatically fill holes (gaps) in scans without measuring. The function is fast and suitable for flat surfaces in the impression.

The rescan function is better suited for the construction of an earmold.



▷ Click on “Hole Filling”.

✓ Holes up to 10 mm² and larger flat surfaces such as the underside are closed.

▷ Click on “Hole Filling” until all holes are filled.

▷ Check the result:



— Bad quality:
Repeat the scan and fill holes with rescans.



— Good quality:
Finish the scan project.

9.7.4

Cutting

Data that is not needed for the construction of the earmold can be removed before work is finished, e.g.:

- Excessive length of the ear
- Auricle/Base
- Material residues (tamponade, cerumen, withdrawal string).

▷ Enable a data removal function:



— Outside of the selection



— Within the selection.

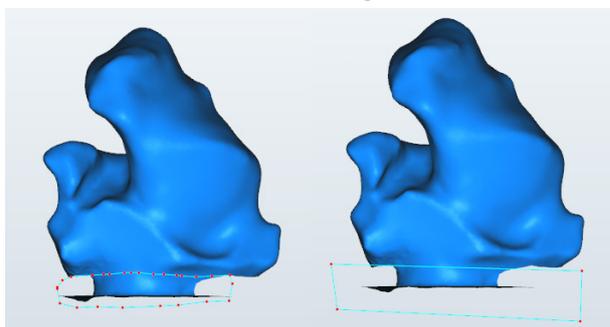


▷ Make the selection by clicking around the area with the left mouse button (many clicks = fine line, few clicks = rough line).

Example: Cutting the base

Fine

Rough



TIP

Zoom and rotate the view before making a selection.



The selection:

- Includes all levels, not just the surface
- Can be cancelled by pressing ESC.



▷ Complete the selection with the right mouse button.



▷ Check the result:

- The last cut is of bad quality.
Click on “Undo” (last action).
- All cuts are of bad quality.
Close the scan project without saving it, reload the scan files and repeat the cutting procedure.



▷ Click on “Save”.

✓ The cut scan data will be saved.

9.8 Scanning a barcode

USB barcode scanners read and decipher barcodes, e.g., of laboratory labels. In aural Scan, scan names can be created and new projects can be started using a barcode scanner.



This function is not available for mono Scan.

USB barcode scanners are not available from smart optics.

Preparation

aural Scan can be left open.

▷ Connect the USB barcode scanner to aural Scan’s PC following the manufacturer’s instructions.

- ✓ The USB barcode scanner is usually recognized and set up automatically by Windows.

Adjusting the settings for scan names

Recommendation:



- ▷ In the menu, select **Settings** and then the **General** tab.
- ▷ Enable the option **Use the same name for the left and right ear cast**.
- ✓ A single barcode assigns the name to the left and right side.

Starting a scan project with a barcode



- ▷ Start a new scan project.
- ✓ The cursor will flash in the left naming field.
- ▷ Scan the barcode.
- ✓ The scanning process will start.

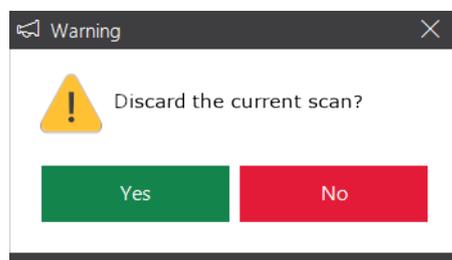
Use the same name for the left and right ear cast (recommended option):

- Enabled.
The scanned name will be displayed in both naming fields.
- Is not enabled.
The barcode names the left side and the name by default (time stamp) is applied to the right side.

- ▷ To replace the time stamp, mark it (e.g., with TAB) and scan a barcode.

Renaming scans

- ▷ Mark the scan name you wish to change.
- ▷ Scan the barcode.
- ✓ aural Scan will ask if you wish to discard the current scan.



- ▷ Click on **No**.
- ✓ The scan will be kept and the scan name changed.

9.9 Finishing and exporting work

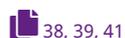
9.9.1 Checking the scan results



Recommendation:

Adjust the **Export**-settings to your workflow:

- **Export dialog**
- **Method**
- **FTP**
- **Export folder**



▷ Rotate the scans to check them:

- By 360° (space bar)
- Individually (mouse, icons).

The scan result is good if the ear impressions:

- Are fully scanned (without any holes)
- Do not contain any unnecessary components (excess lengths, base, material residues).

Bad scan results can be caused by:



- Wrong **view** in the 3D viewer (e. g. dots)
- Flaws in the impression
- Wrong settings (**3D viewer**, **Scanning**, **Matching**).



▷ If you have changed any of the settings, repeat the scan. If not, annotate the scan.

9.9.2 Finish and export



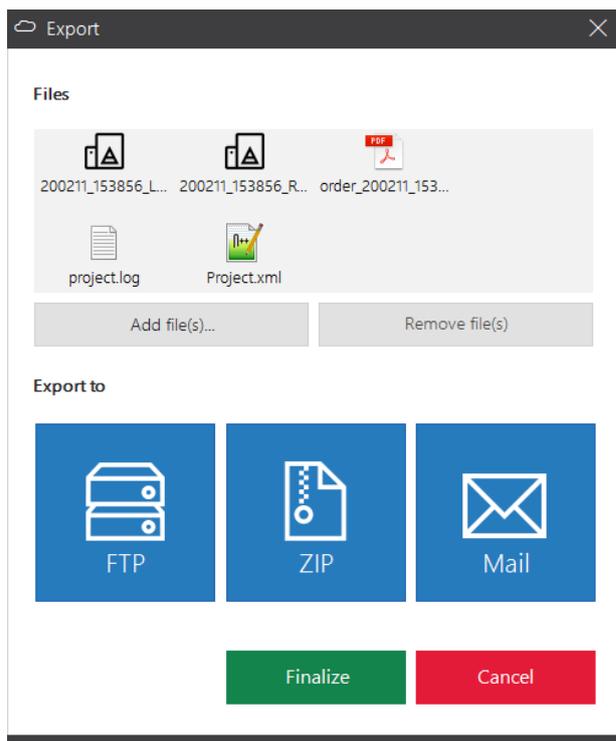
▷ Click on "Finish work".

✓ The scan project will be:

- exported according to the settings
- saved in the **project folder** (by default C:\Scans)
- saved in the **export folder** without subfolders (can be configured).

9.9.3 Finishing and exporting with confirmation (Default)

Files can be added or removed when finishing work with confirmation. You can choose an export method or finish the scan project without exporting it.



Files

- Files to export.
- aural Scan suggests the project files (by default scan files in the STL data format, `order.pdf`, `project.log`).

Add file(s)

- File selection for export.

Remove file(s)

- No effect on the files contained in the **project folder**.

Examples

Adding patient photos.
 Removing the log file if it is not important for the addressee.

Export to

- Execution of the export method for the scan project:
 FTP upload, Saving of a ZIP file, Sending of an email.
- Added/removed files are taken into account.

- Finalize**
 - Saves the project files in the **project folder** (Settings: **File formats**, **PDF file**, **Log file**).
 - Saves the scan data in an **export folder** (can be configured).
- Cancel**
 - The scan project/scan files are not saved in the **project folder/export folder**.
 - An export cannot be undone.

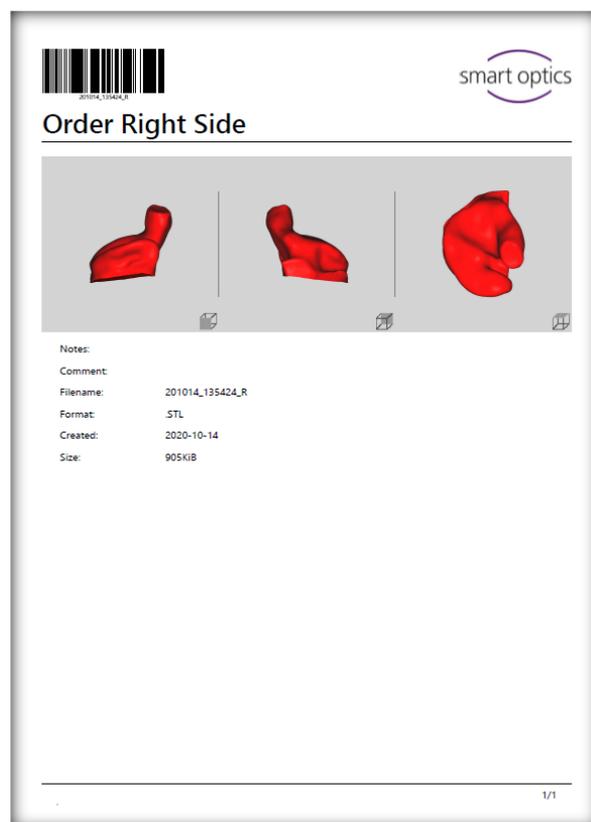
9.9.4 Documents (order.pdf, project.log)

Order document “order.pdf”

Setting:
PDF file
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aural Scan generates by default the order document “order.pdf” for a scan.

- Barcode**
Coded order data to be captured by a barcode scanner
- Company logo**
Configurable
- Title “Order Left Side/Right Side”**
Fixed text
- Front, back, top screenshots**
Fixed perspectives, with markers
- Notes**
Text from an annotation with a number assigned in the image
- Comment**
Text from the project note
- Filename**
Name of the scan file without extension
- Format**
Format of the scan file:
STL, PLY, MSH, ASC
- Created**
Date created
in the format YYYY-MM-DD
- Size**
Size of the scan file in kilobytes



The order document can have the design of your company logo and your company address. The company address is printed in the footer.



Setting:
Write log file
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Project log “project.log”

aural Scan generates by default the order project log “project.log” for a project. Certain settings and general conditions are logged (useful for analyzing scan results).

The scanner’s sensor number

Time stamp: Creation time + Name

Name left/right: Side identification

Settings:

- Use the same name for the left and the right ear cast
- Always add side description to scan names
- Apply patient name (Noah)
- Enable standby mode(Noah)

Strategy

- Default

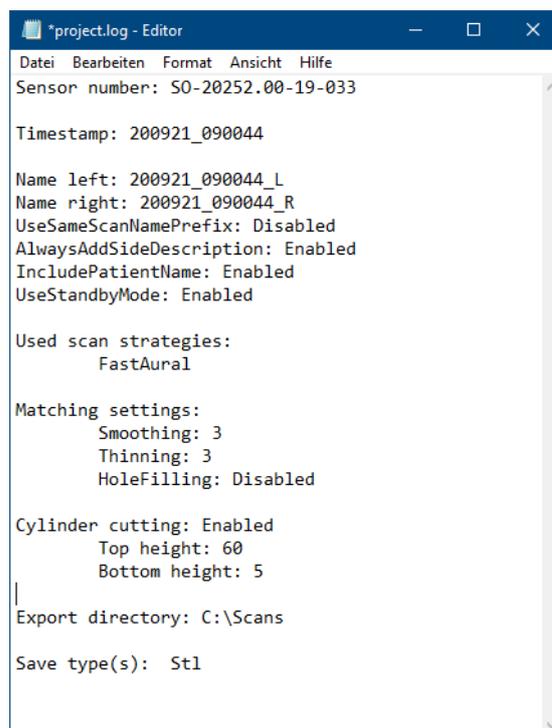
“Matching” settings:

- Smoothing
- Thinning
- Fill big holes

“Cutting filter” settings:

- Enabled
- Height of the top cutting filter | Height of the bottom cutting filter

- Project folder
- File formats



9.9.5 FTP export method

The FTP method is used to transfer data to external parties (service providers/labs). Project/export files are uploaded to one or more FTP servers as a zip file.

Requirement

- FTP server connection information and login information (➔ Recipient)

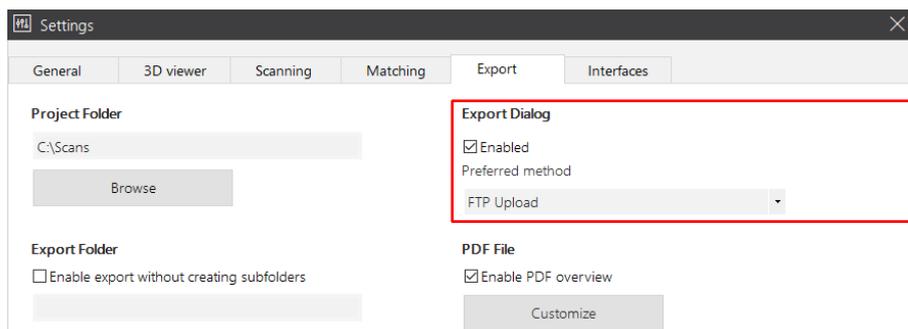
Starting the FTP export

- Button in the **Export** dialog (default)



- Direct start (without file selection) by setting the **FTP-Upload** method:

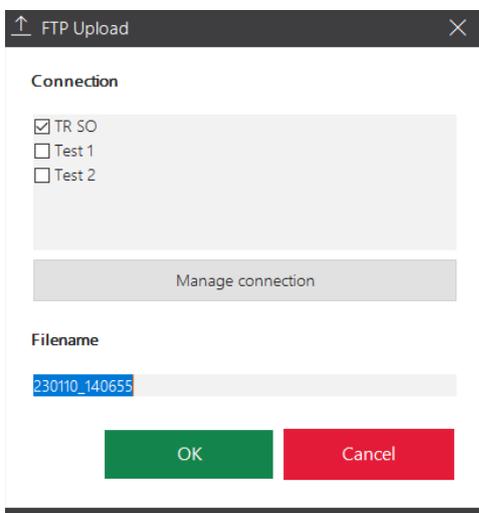
Settings
Export dialog
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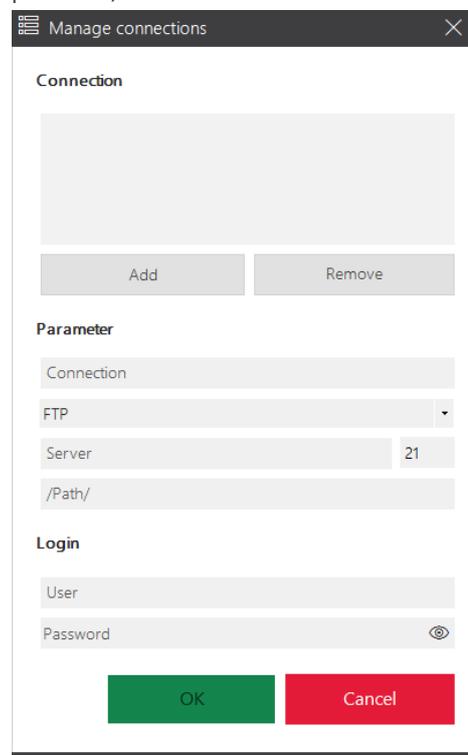
Uploading files to a FTP server

At the end of work, aural Scan will ask you to select or enter an FTP connection (if one has not been saved yet).

Selection of an FTP connection:



Entering of a new FTP connection (password-protected):



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- ▷ Check one or more connections to upload the export files to the FTP server. The selection will be saved.
- ▷ The project name will be displayed under **file name**. You can overwrite the file name for an FTP upload.

- ▷ With **Manage connection** in the upload dialog, you can view and edit the information about the saved FTPs and enter new FTP connections (password-protected dialog, by default: smartoptics).

9.9.6 ZIP export method

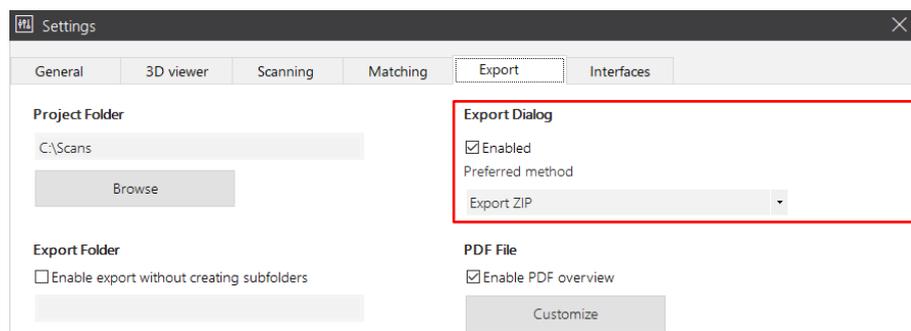
The ZIP method is used to save the project/export files as a zip archive.

Starting the ZIP export

- Button in the **Export** dialog (default)



- Direct start (without file selection) by configuring the **Export ZIP** method:



Exporting files as a ZIP archive

When work is finished, aural Scan asks you to select a folder to save the ZIP archive.

The suggested saving location depends on how the export method is started:

Start from	Folder
Export dialog	C:\Scans (Project folder)
Finish work (directly)	C:\Scans\YYMMDD_hhmmss (project folder)

9.9.7 Email export method

The email method is used to send the project/export files as a zip archive via email.

Requirement

Standard Windows emailing software:

- Microsoft Outlook
- Mozilla Thunderbird

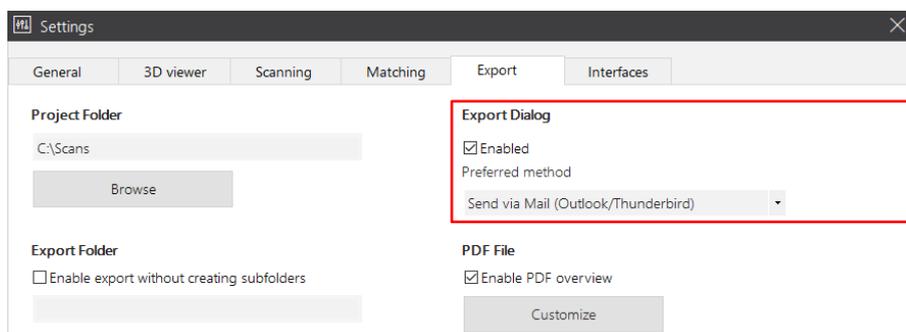
Starting the sending of an email

- Button in the **Export** dialog (default)



- Direct start (without file selection), by setting the **Send via Mail (Outlook/Thunderbird)** method.

Settings
Export dialog
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Sending files via email

When work is finished, aural Scan initiates a new email with attachment (ZIP archive). You can only continue working in aural Scan when the email has been sent or saved.

The suggested saving location depends on how the export method is started:

Start from	Folder
Export dialog	C:\Scans (Project folder)
Finish work (directly)	C:\Scans\YYMMDD_hhmmss (Individual projects)

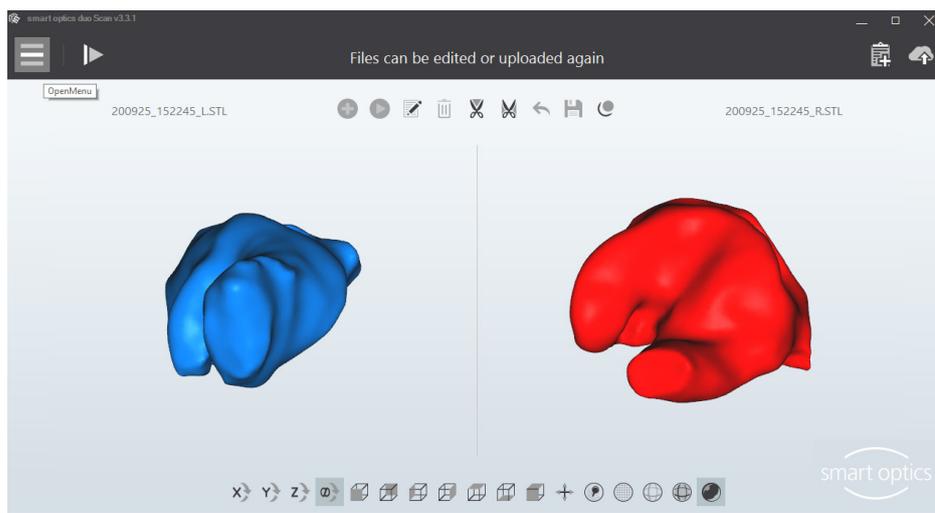
9.9.8 Editing and exporting

You can edit finished scan projects at a later time and export them again.

Example: Uploading data to an FTP server at a later time



- ▷ Open the scan file for the left and/or right side.



38, 49, 53, 53

▷ Edit the scan. The following functions are available:

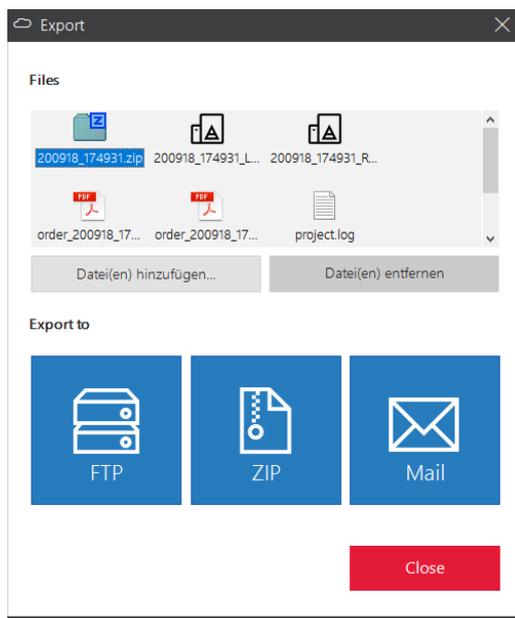
- Rotate, zoom, display
- Annotating and commenting
- Fill great holes
- Cutting

The following are not available:

- Renaming/naming with a barcode
- Repeating the scan
- Rescanning



- ▷ Export the scan project.
- ▷ You can add or remove files for the export process, e.g., an old zip file.
- ▷ Choose an export method: FTP, ZIP or email.





- ▷ Finish editing by:
 - Placing aural Scan in the standby mode (you have to confirm the message “Discard the current scan?”)
 - Quitting aural Scan.

10 aural Scan with Noah

www.himsa.com

aural Scan can be integrated into Noah (Manufacturer: Hearing Instrument Manufacturers’ Software Association (HIMSA)). Scanning processes start directly from the Noah patient browser. Scan results will be assigned to a patient in Noah and available with other actions.

10.1 Noah interface setup

The following work steps are necessary at the workstation. Further setup steps may be necessary in the Noah administration.



TIP

Setup instructions for the administration are on the data carrier or can be requested from smart optics: support@smarptics.de.



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- ▷ Install the current Noah version as described in the [Noah Knowledge Base](#). Please note requirements such as the installation type.
- ▷ Install aural Scan in the standard installation folder:
C:\Program Files (x86)\3D-Scanner
- ▷ Start Noah first, then aural Scan.



TIP

If necessary, Noah must be configured further now.



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- ▷ Edit the following settings in aural Scan:
 - **Project folder**
By default C:\Scans
Network path of the Noah server, local sharing with access to Noah (according to your Noah configuration)



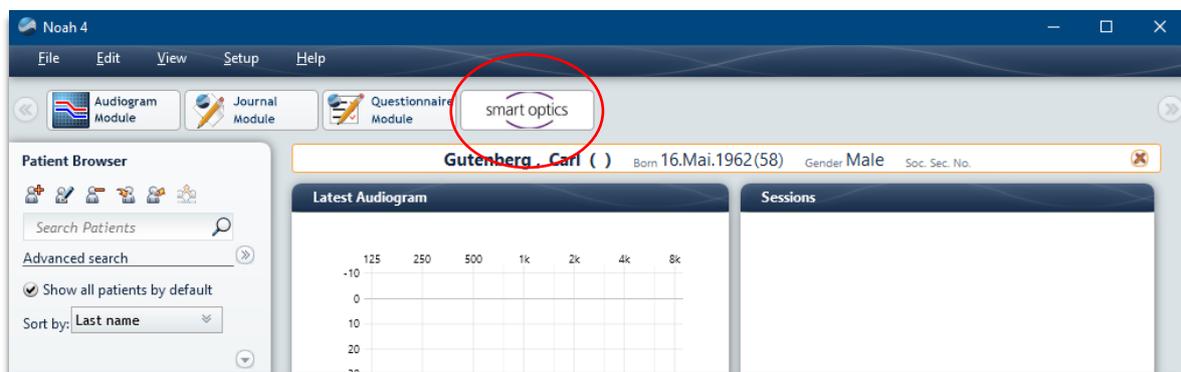
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- Interfaces: **Include Patient Name** (optional),
- Interfaces: **Use standby mode** (mandatory).

- ▷ Close aural Scan and Noah.
- ✓ Noah will have recognized aural Scan automatically.
- ▷ Restart Noah and select the Noah server.
- ✓ Noah has a new start button for aural Scan.

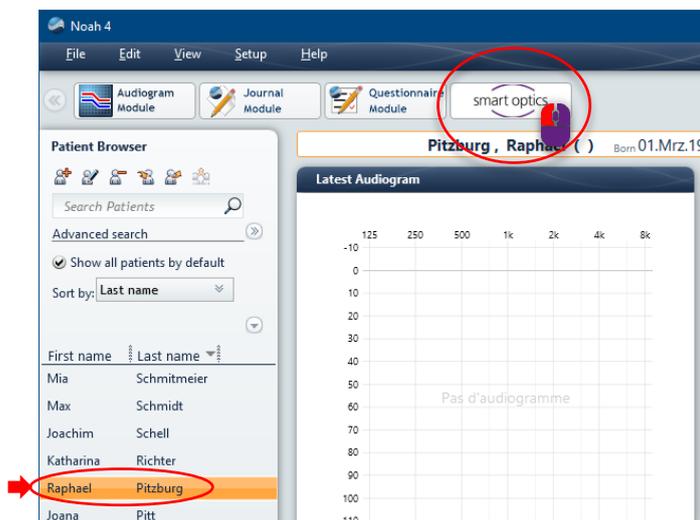
Recommendation:

- ▷ In Noah, select **View | Mixed view** to see the patient browser and the sessions (linked files) at the same time.



10.2 Scanning with Noah

- ▷ Switch on the scanner.
- ▷ Choose a name (Noah patient browser, left).
- ▷ Start aural Scan with the smart optics button.



- ✓ aural Scan will start and opens a scan project for the patient.

Possible tasks:

- Starting
- Renaming/Naming with a barcode
- Rotate, Zoom, Display
- Annotating and Commenting
- Repeating
- Rescanning/Hole Filling
- Cutting

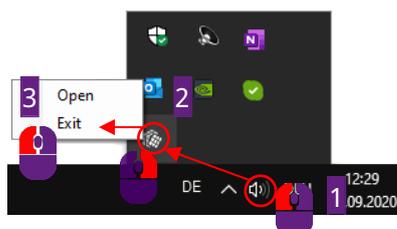


- ▷ Finish work, optionally with an export (FTP, ZIP, email).
- ✓ aural Scan goes into the standby mode by default.
If it doesn't, select **To the standby mode** in the menu.
- ✓ aural Scan saves:
 - Scan projects in the file path: C:\Scans\Noah
 - a subfolder per patient (numbered).
- ✓ Noah saves:
 - A patient folder (for all scans concerning a patient)
 - Links to the scan files (under **Sessions**).
- ▷ Start the next scan project from Noah.

Starting and finishing

When scanning with Noah, the order of the steps is important:

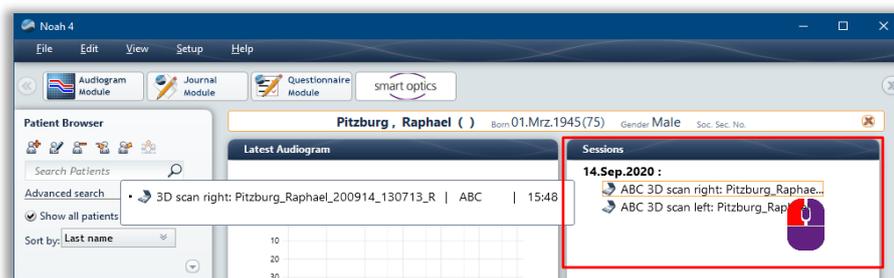
- ▷ Start the scan projects from Noah.
- ▷ Place aural Scan in the standby mode when finishing work.
- ▷ Quit Noah.
- ▷ Quit aural Scan in the standby mode:



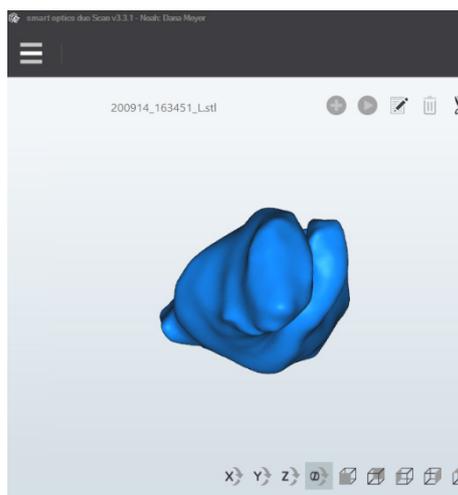
10.3 Viewing, editing and exporting scans from Noah

From Noah (with and without a scanner), you can:

- View and edit scans individually
- Re-export the scan project.
- ▷ In Noah's patient browser (on the left), click on a patient.
- ✓ The links to the scan files are displayed under **Sessions**, sorted by creation date.
- ▷ Click on **scan right** or **scan left**.



- ✓ aural Scan loads the scan into the 3D viewer.



Editing and exporting scans

The following functions are available:



- Rotate, Zoom, Display
- Commenting a scan project
- Fill great holes
- Cutting
- Editing 3D viewer settings

The following are not available:

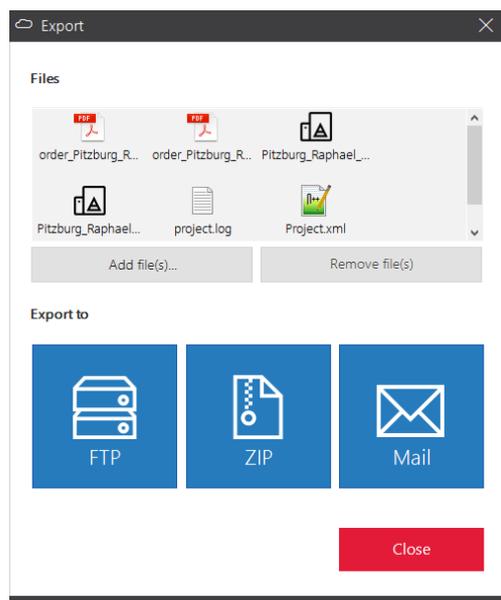
- Renaming/Naming with a barcode
- Annotating a scan
- Repeating a scan
- Rescanning



- ▷ Re-export the scan project if you have commented, filled holes or cut the scan.



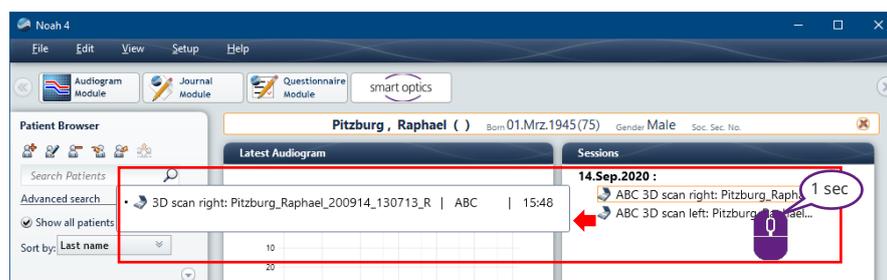
- ✓ The export dialog is displayed (regardless of the export settings).
- ▷ You can add/remove files to export. Then choose your export method.



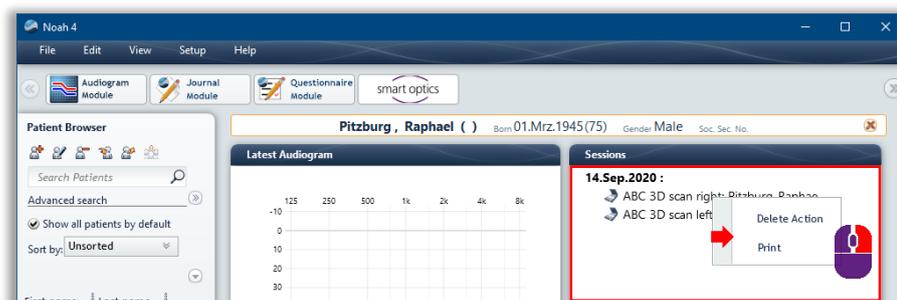
- ▷ Close the scan by:
 - Placing aural Scan in the standby mode (you have to confirm the message “Discard the current scan?”)
 - Quitting aural Scan.
- ✓ The project files will be saved.

Noah actions

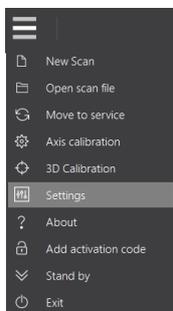
- Tooltip: Information on the scan, the Noah server and saving time



- Context menu:
 - Delete Action** deletes the link to the scan file (not the file itself).
 - Print** opens the order document “order.pdf”.



11 Software settings



aural Scan usually achieves good results with the standard settings. However, you can change these settings during operation, should it be necessary.

▷ Check and change the settings after installation:

- File formats
- Language
- Object tone
- Project folder
- Interfaces (for Noah)

▷ In the menu, select **Settings** and then the desired tab.

✓ Changes apply immediately.

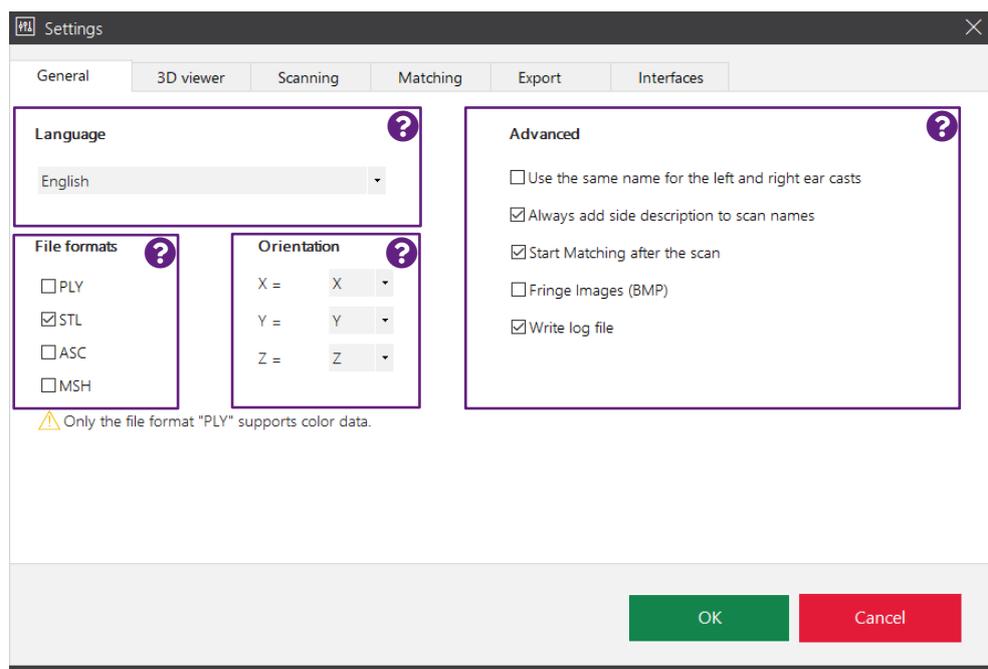


TIP

Different usage profiles –different settings:
Save your custom settings file and replace it if necessary.

11.1 General settings

Click on for information



11.1.1 Language

The controls within the software can be displayed in different languages. The following are available: German, English, Spanish, French, Italian, Portuguese, Romanian, Turkish, Russian, Chinese (simplified and traditional).

Default value: English (independently from the setup language)

11.1.2 File formats

PLY STL MSH ASCII

Determines in which file formats the scans are saved.

- ▷ Select at least one file format. If no format is specified, no files will be saved.

 **Only the file format “PLY” supports color data.**



- ▷ **PLY** must be activated manually before you can make [Color texture scans](#). This is the only format that allows saving color data.

Default value: STL

11.1.3 Positioning

X Y Z

aural Scan saves the data in the Cartesian coordinate system XYZ, with the following values per axis: x; y; z; -x; -y; -z.

- ▷ Please change the assignment of the axes so that the scan data do not have to be realigned to be processed in a CAD system.
- ▷ Enter the coordinates of the CAD system.
aural Scan does not check the values.

Default value: x = x; y = y z = z (Cartesian)

11.1.4 Advanced

Use the same name for the left and right ear cast

Determines whether only a single scan name can be entered for the left and right side (like the automatically assigned time stamp). If the scan names are the same, the side identification must necessarily be appended (the setting [Always add side description to scan names](#) cannot be disabled).

**Recommendation:**

- ▷ Enable this option when naming with barcodes.

Default value: disabled

Scan prefixes can be different for the left and right side.

Always add side description to scan names

Side identification: anatomical location identification:

L left, sinister

R right, dexter

Determines how file names are formed. Makes the file names unique (mandatory if the scan names are the same) and the assignment to a side distinctly recognizable. No display in the 3D viewer.

Sample: Scanname_L.STL

Default value: enabled; file names are formed with L and R

Start matching immediately after the scan

After scanning, all images are merged into a data record, filtered, thinned and smoothed (i.e., “matched”).

Representation: Gouraud shading(unmatched: dots)

- ▷ If disabled, you will have to do the matching manually.

Default value: Enabled; scans are matched immediately

Fringe images (BMP)

aural Scan creates recordings of the fringe areas with the structured light pattern as an aid for [Support](#) (to find the cause of measurement errors).

When quitting aural Scan, the setting is disabled automatically.

- ▷ Enable the setting if measurement errors have occurred and scan immediately.

Default value: Disabled; aural Scan does not create BMPs

File path: C:\Users\[User]\AppData\Roaming\3D-Scanner\aural Scan\temp

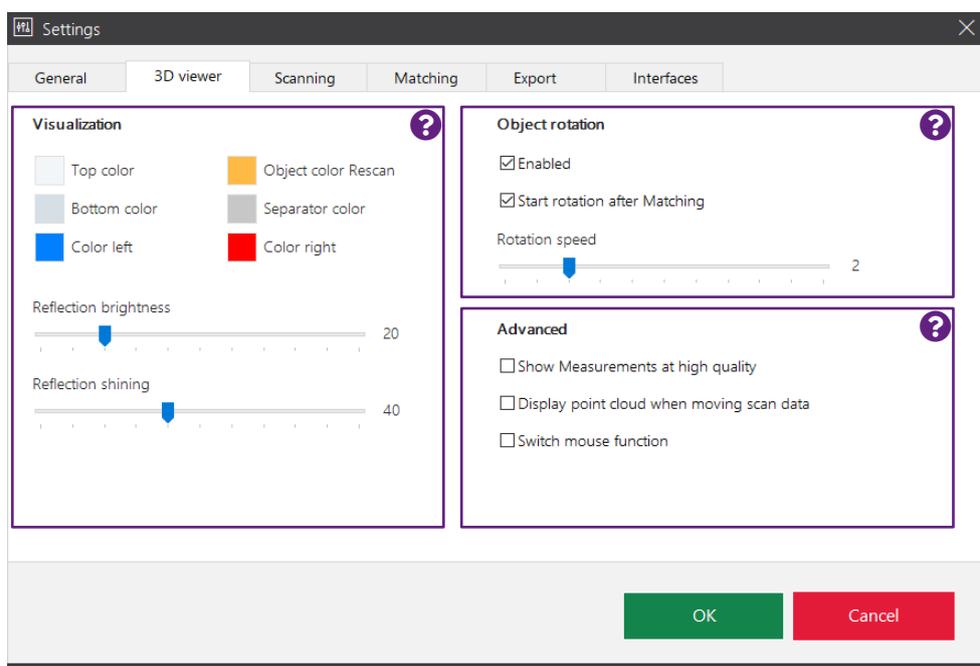
Write log file

Determines whether a `project.log` text file is created for scan projects (information for project analysis). It can be exported when work is finished.

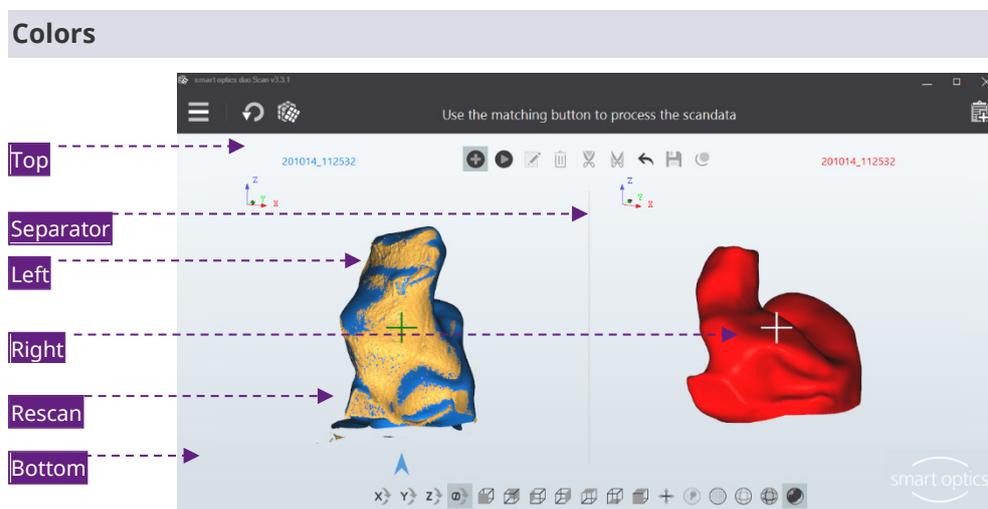
Default value: enabled
 File path: C:\Scans\[project]

11.2 3D viewer settings

Click on for information



11.2.1 View





Scans, rescanned areas and the background are differentiated by colors. These colors belong to the 3D viewer, not to the scan (this is different for a [Color texture scan](#)).

To change a color

- ▷ Click on the color box.
- ▷ Select a color from Windows' basic colors or define one with Define Colors (RGB values/hue + saturation + brightness).
- ✓ A gradient is created from the background colors (top, bottom).
- ✓ Scan and rescan colors depend on reflection brightness and reflectance. The view also influences the color gradient (e.g., Gouraud shading).



Default values (RGB)

	R	G	B
Background top	242	246	249
Background bottom	214	223	230
Scan left (sinister)	0	128	255
Scan right (dexter)	255	0	0
Rescan areas	255	186	69
Separator	199	199	199

Reflection brightness

Determines the brightness of the light reflection on the scans in the 3D viewer.



Scale 0 – 100
Steps of 1
Steps of 10

Default value: 20

Reflectance

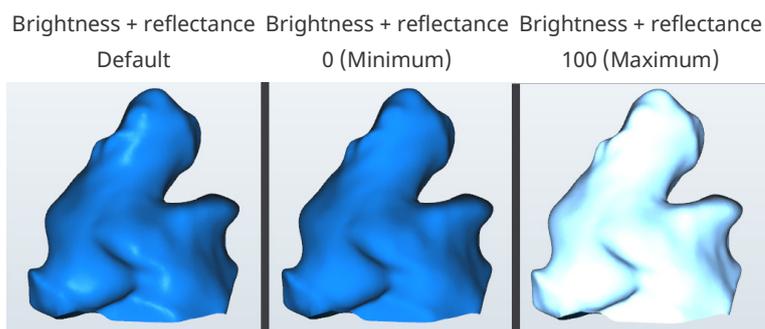
Determines the intensity of the light reflection on the scan in the 3D viewer.



Scale 0 – 100
Steps of 1
Steps of 10

Default value: 40

Effect of the reflection in the 3D viewer (brightness + reflectance); it has no influence on the 3D measurement.



11.2.2 Object rotation

The object rotation is a 360° rotation in the 3D viewer around the Z axis of the scan. In the view by default, all sides are visible except the underside. The object rotation is used to check the results.

Enabled



Determines whether the object rotation is allowed.
Manual rotation using the space bar.

Default value: enabled

Start rotation immediately after matching

Determines whether both scans are automatically rotated after matching. Rotation after matching is only possible if the **Enabled** setting has been checked.

Default value: enabled

Rotation speed

Determines the speed of the object rotation. Applies to both manual and automatic rotation.



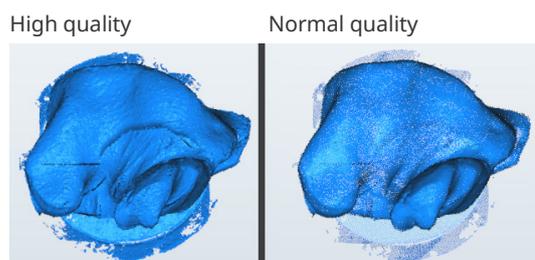
Scale 0 – 10; 0 = Off
Steps of 1

Default value: 2 (slow)

11.2.3 Advanced

Show high-quality measurements

Determines the quality of the display in the 3D viewer during scanning. Requires a better graphics card performance and slows down the scanning process. It has no influence on the 3D measurement itself.



Default value: disabled

Display point cloud when moving scan data

Determines whether moved scans are visualized in the 3D viewer as a pixel cloud. Accelerates the visualization.

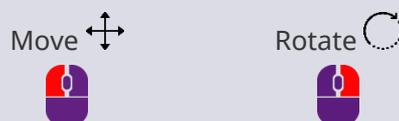
Default value: disabled

Change mouse functions

Changes the assignment of the right and left mouse button for moving scans:

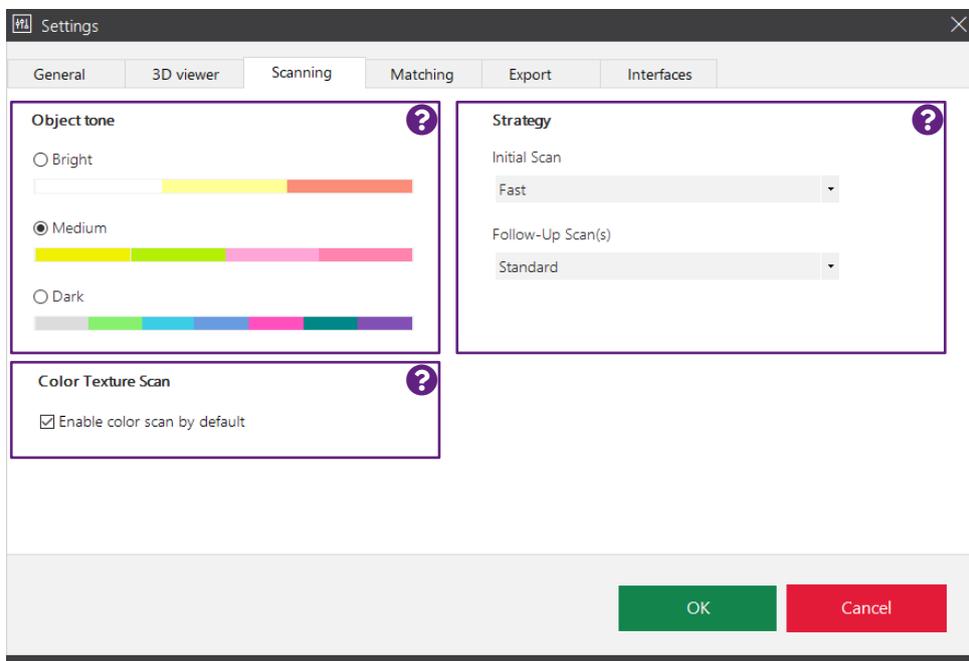


Default value:



11.3 Scanning settings

Click on for information



11.3.1 Object tone

Categorization of the impression material to be scanned as light, medium or dark according to the color scale.

- ▷ Select the setting that is most similar to the impression material to be scanned. Change the setting if the color of the impression material changes.
- ✓ The light intensity of the sensor will be adjusted accordingly.
- ▷ Shiny materials must be additionally matted with 3D scan spray.

Default value: Medium

11.3.2 Color texture scan



Setting for scanners with a RGB hardware component; otherwise not available (older series, mono Scan standard item 90281).



Determines whether the option “Color texture” is activated by default. If color texture is not the default setting, it can be activated before starting the scan.



For color texture scans, it is also necessary to activate the PLY file format. Otherwise, the standard setting has no effect.

Default value: disabled

11.3.3 Strategy

Determines the type of measurement and the number of images. The setting is logged (`project.log`).

aural Scan has the following modes:

Mode	Scanning Time	Number of Images
Ultra-fast	52%	+
Fast	71%	++
Default	100%	+++
Advanced	132%	++++



- ▷ If necessary, change the scanning strategy to regulate the measurement accuracy.

The standard values are selected to allow audiology scanners to achieve measurement accuracy pursuant to ISO 12836. If you have any questions about quality management, please contact your [Support](#).

Default

Refers to the first scan.

Default value: Fast

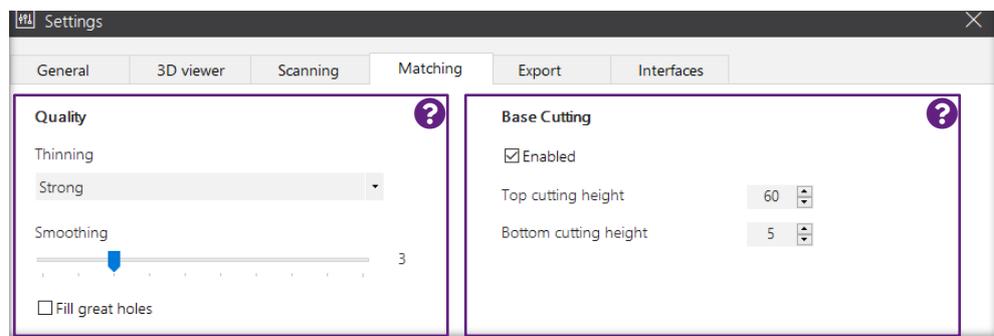
Advanced

Refers to a repeat scan.

Default value: Default

11.4 Matching settings

Click on for information



11.4.1 Quality

Thinning

Determines the accuracy, i.e., the distance between the pixels that are linked to form a data set. The maximum accuracy is limited by the maximum resolution of the sensor. The size of the data increases with a greater accuracy. The setting is logged (`project.log`).

Value range (steps):

Thinning	Accuracy	Data Size
Auto	Automatic Adjustment	△ Accuracy
Off	■■■■■	■■■■■
Low	■■■■	■■■■
Medium	■■■	■■■
Strong	■■	■■

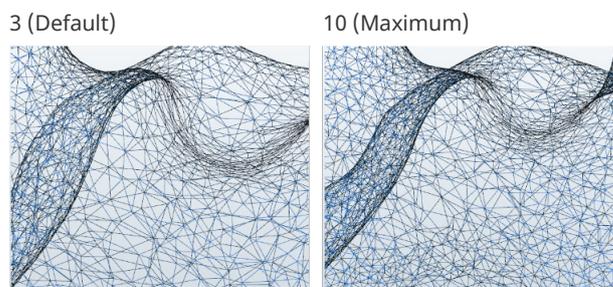


▷ Previous to **color texture scans**, you must select **Off**, so that the markings can be scanned in high contrast and high resolution.

Default value: Strong

Smoothing

Determines the digital smoothing of the 3D data meshes. Bubbles, edges and other defects on the surface of the impression are adjusted. The physical product needs less polishing later on. The setting is logged (`project.log`).



Scale 0 - 10
Steps of 1

Default value: 3 (low)

Fill great holes

Determines whether data that is missing on flat surfaces is automatically filled during matching. This is an alternative function to rescanning, but less accurate. The setting is logged (`project.log`).

Default value: disabled

11.4.2 Cutting filter

Cutting filters are used to:

- Cut the top and bottom area of the scan in the data set
- Make manual cutting unnecessary.

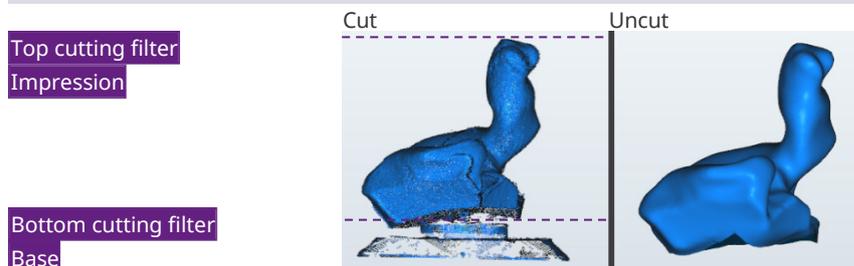
The settings must match the size of the ear impressions.

Enabled

Determines whether the cutting filters are applied.

Default value: enabled

Top cutting height | Bottom cutting height



The cutting filters are only applied if the **Enabled** setting has been checked.

- ▷ Change the values if matched scans:
 - Include unnecessary areas, e.g., the base
 - Are cut excessively, e.g., in the auditory canal area.

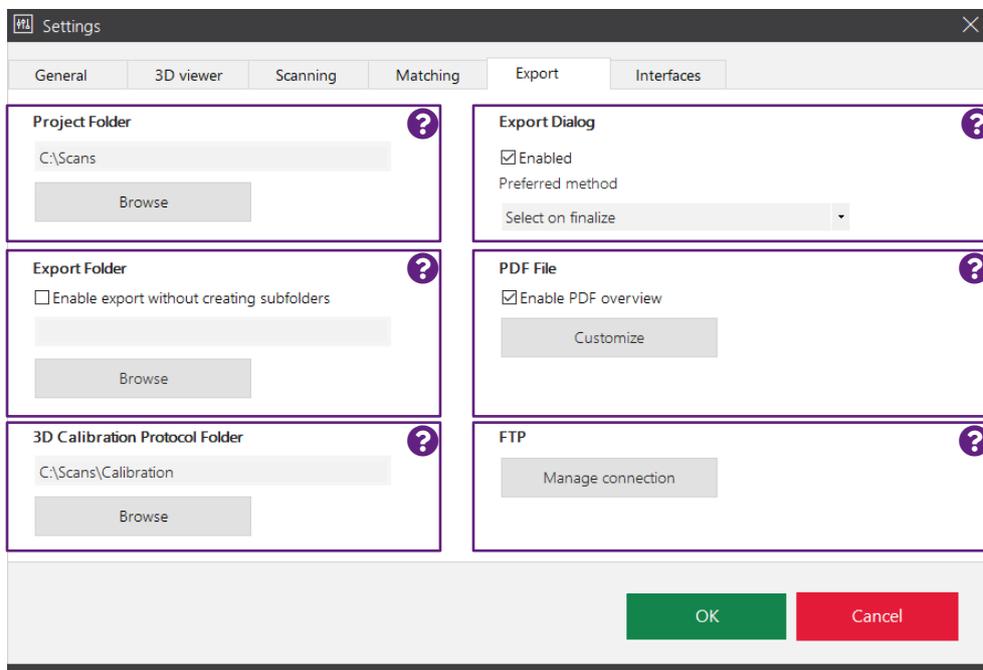
Value range: 0 -100 mm

The settings must be plausible. For example, this is not the case in 0 + 0 or 100 + 100 (scans are not matched automatically). The setting is logged (project.log).

Default value: Top = 60 mm; bottom = 5 mm

11.5 Export settings

Click on for information



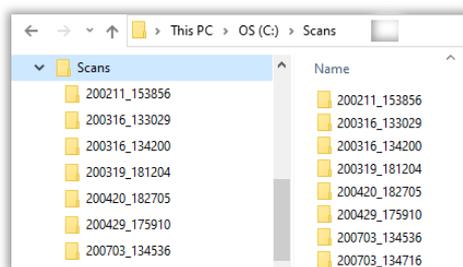
11.5.1 Project folder

Folder in which aural Scan saves the scan projects (mandatory, cannot be deleted). Paths that have become invalid are displayed in red.

- ▷ Enter the path or select it from the folder structure with **Browse** (local folder, network path or network drive). A desired folder is created.
- ✓ aural Scan will save new projects in the new path. The old folder remains in place.

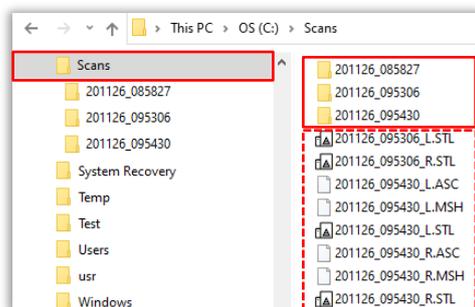
Recommendation:

The folder structure in the project folder is not practical for production processes:





- ▷ Use the export setting **Export folder**. The path can be a different one or the same for both settings.



- Project folder `C:\Scans`, created by means of the **Project folder**
- Scan files in `C:\Scans` (all data formats), created by means of the **Export folder**

aural Scan with Noah

Hearing Instrument Manufacturers' Software Association – HIMSA

Details: Setup instructions for the Noah interface

- ▷ Set the project folder according to the specifications of the Noah system (`C:\Scans`, network path or network drive: `\\PC_1\Scans`), to allow Noah clients to have access to the scan results.
- ✓ The subfolder `... \Noah\` and consecutively numbered project folders will be created automatically. When calling up aural Scan from Noah, the project folder of the current Noah patient will be displayed (cannot be changed).
- ▷ If you are not sure, request help from your system administration or **Support**.

Default value: `C:\Scans`

11.5.2 Export folder



Determines whether the scan files are saved in a folder without a folder structure other than the **Project folder**, e.g., on a server. This is used for sharing and backing up production scan files.

The project folder and the files `project.log` and `order.pdf` are only saved in the project folder.

- ▷ Enter a path or search for it in the folder structure.
- ✓ If the folder entered does not exist, it will be created during the next export.
- ▷ Enable the check box to use the export folder. If it is not activated, no data will be saved in the export folder.

Default value: disabled

11.5.3 3D calibration logs folder



Folder in which aural Scan saves the **3D calibration** (logs are optional). Paths that have become invalid are displayed in red.

- ▷ Enter the path or select it from the folder structure with **Browse** (local folder, network path or network drive). A desired folder is created. aural Scan saves new logs as a PDF file on the new path. The old folder remains in place.

Default value: C:\Scans\Calibration

11.5.4 Export dialog

Enabled

Determines whether an export dialog is displayed when work has been finished (for details see **Method**). When it is disabled, projects are only saved in the **project folder**.

Default value: enabled

Method

Determines which export dialog is displayed when work is finished: ZIP export, email export, FTP upload or an export dialog. An export dialog is only displayed if the **Enabled** setting has not been checked (it is disabled).

At least one connection must be entered for FTP upload.

Files can be removed/added in the export dialog.

Default value: **Select on finalize**

11.5.5 PDF file

Enable PDF overview

Determines whether a PDF document (`order.pdf`) is created for each impression for order communication purposes.

- ▷ To enter your address and contact details, click on **Customize**.

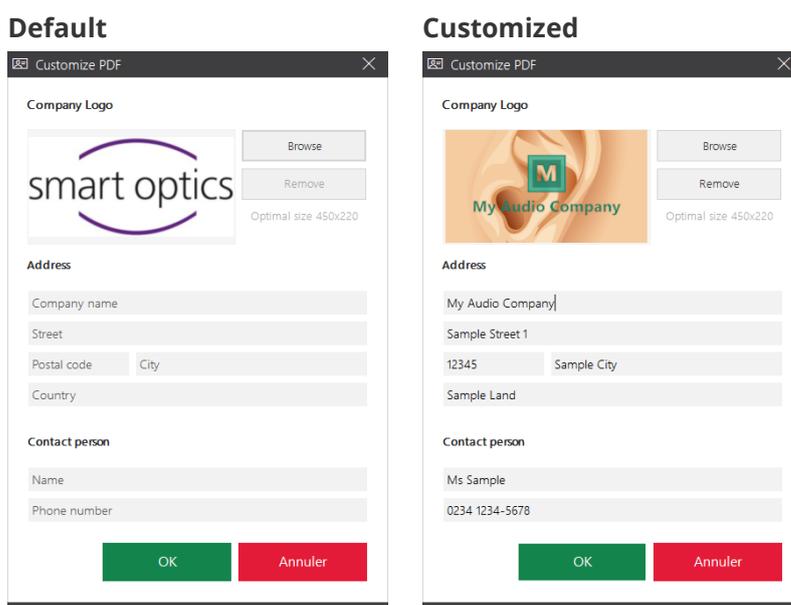
Default value: enabled

Customize

Company logo, address and contact details can be printed in the PDF document.

- ▷ Enter the relevant information into the corresponding fields.
- ▷ Load your company logo into the template in the form of an image file.
File formats: BMP, JPG, JPEG, GIF, PNG, image size: 450 × 220 px.
- ▷ Reset PDF document to default: Field entries and logo are removed.

Dialog



PDF (Impression)



Default value: —

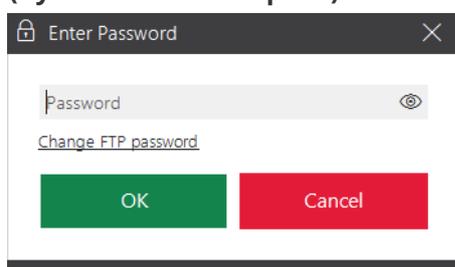
11.5.6

FTP

FTP connections are required for the FTP upload export method. Upon finishing work, the export files are loaded onto the selected FTP server. The recipient must provide the connection information to the FTP server and the corresponding login information.

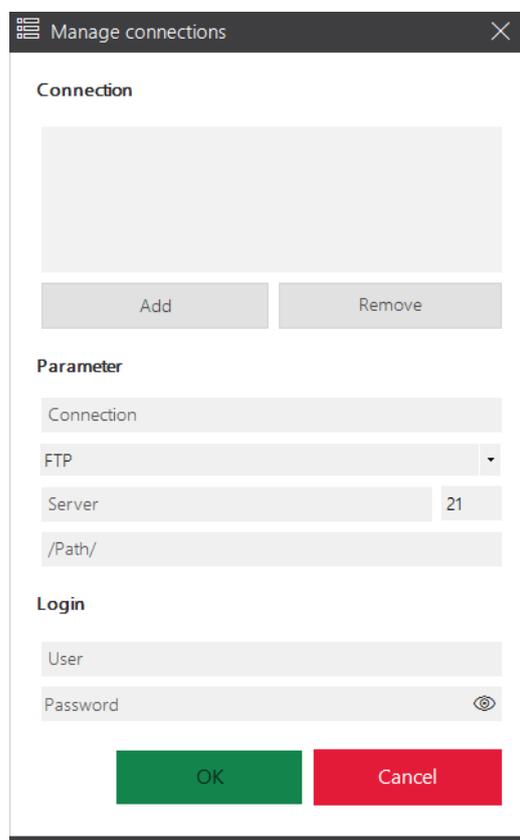
FTP connections can be edited both in the settings and upon finishing work.

The FTP connection management dialog is password protected (by default: smartoptics).



Managing connections

- ▷ The link **Change FTP Password** allows you to replace the default password (smartoptics) with a new password.
- ▷ Log in with the current password.



- ▷ To add an FTP connection:

Enter the information under **Parameter** and **Login**.

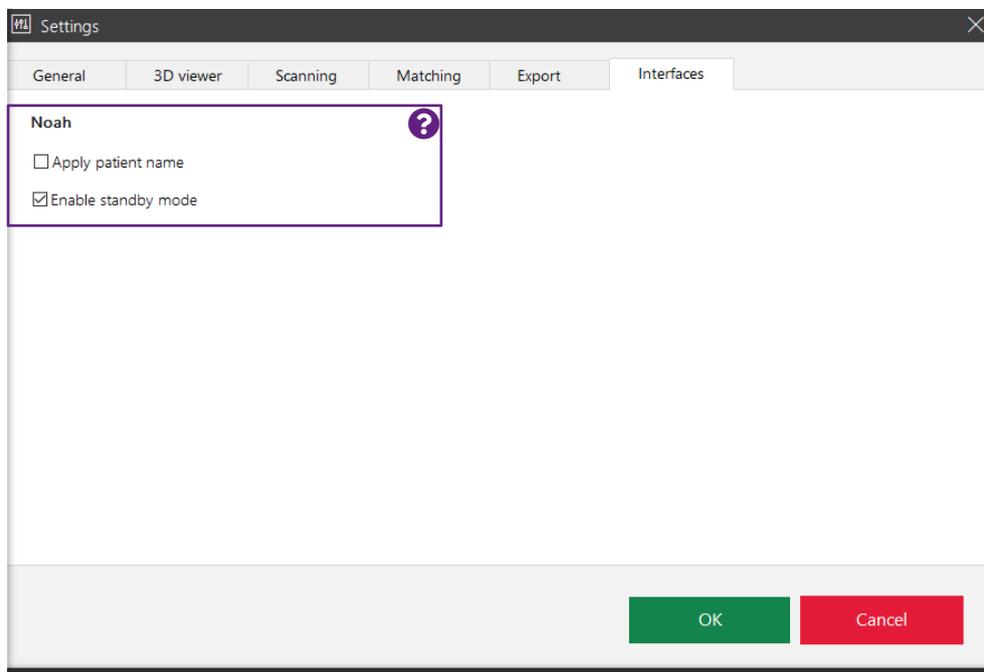
Connection	<ul style="list-style-type: none"> ▪ Name of the FTP connection ▪ For identification purposes ▪ Freely selectable ▪ Cannot be changed
FTP	<ul style="list-style-type: none"> ▪ Protocol for data transmission ▪ FTP or FTPS (encryption with security function) ▪ Can be changed
Server	<ul style="list-style-type: none"> ▪ URL of the FTP-server, e.g., <code>uploads.labor.de</code> ▪ Can be changed
/Path/	<ul style="list-style-type: none"> ▪ Shared path on the server where the export files are saved ▪ A slash must be placed before and after folder names ▪ Can be changed
User	<ul style="list-style-type: none"> ▪ Name for logging into the FTP server ▪ Can be changed
Password	<ul style="list-style-type: none"> ▪ Password of the FTP user ▪ Can be changed

- ▷ Click on Add to check the new connection and save it in the connection list.
- ✓ A valid connection will be saved. Connections with an invalid URL or incorrect login information will not be saved.
- ▷ Remove FTP connections if:
 - You no longer use them (to prevent incorrect uploads)
 - the operator has changed the connection information (to prevent project cancellation)

Default value: —
 Password for the dialog: smartoptics

11.6 Interfaces

Click on  for information



11.6.1 Noah

These settings only concern the operation of aural Scan with Noah (software of the Hearing Instrument Manufacturers' Software Association (HIMSA)).

Apply patient name

Determines whether the patient names in Noah are included in the scan names. The default name (time stamp) is appended. The patient name represents an advantage, but it is not a condition for assignment to a person.

Default value: disabled

Enable standby mode

Determines whether aural Scan automatically switches to the standby mode after work is finished. If aural Scan remains open, you will need to activate the standby mode manually to allow a new scan to be started from Noah.

Default value: enabled

12 Module activation

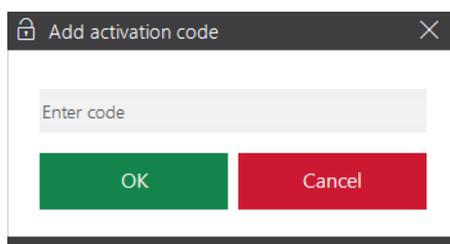
To unlock additional software functions, the following steps must be carried out once after the purchase of the corresponding module.

Starting with aural Scan 3.3, there is no module sold requiring activation.

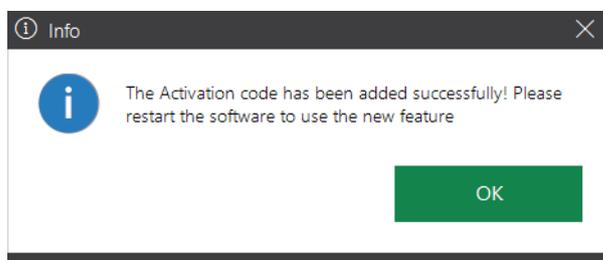
Up to version 3.2, the FTP upload module was optional, had to be purchased separately and activated.



- ▷ Select **Add activation code** in the menu.
- ▷ Enter your activation code.



- ▷ You must restart aural Scan to use the module.



13 Icons, menu items and shortcuts

13.1 Icons

Icon		Meaning
	43	Color texture scan is activated
	43	Color texture scan can be activated
	43	Color texture scan is not possible (no PLY)
	42	Start scanning
	47	Repeat scan
	56	Finish work
	49	Add a project note
	62	Upload (export project files)
	47	Cancel scan
	52	Cancel matching
	52	Match a rescan
	90	Open menu
	50	Enable the rescan mode
	50	Start the rescan
	48	Annotate a scan
	49	Open note field
	49	Delete note
	53	Cut inside a selection
	53	Cut outside a selection
	54	Undo the last step

Icon		Meaning
	54	Save the cut
	53	Fill holes
	38	Set the X axis as the rotation axis
	38	Set the Y axis as the rotation axis
	38	Set the Z axis as the rotation axis
	38	Set all axes as the rotation axis
	39	View the front
	39	View the back
	39	View the left side
	39	View the right side
	39	View the top
	39	View the underside
	39	Isometric view
	39	Centre scans, reset the zoom
	39	Show/hide markers (pins)
	39	3D view dots (corners of triangles)
	39	3D view triangles (grid)
	39	3D view triangles flat shaded
	39	3D view Gouraud shading

13.2 Menu



aural Scan functions. The menu can be opened if no scan is running and no dialog/message is open.



New scan

- An active scan is discarded (after confirmation).
- A new scan can be started.



Move to service position

- Moves the axes to the service position (starting position).
- This is necessary if the axes are moved when removing or inserting the object.



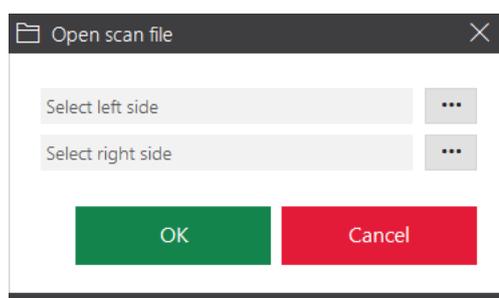
Axis calibration

- Starts the calibration the axes.
- Automatic monthly reminder.



Open scan file

- Opens the dialog for selecting the left and right scan file from the current **project folder**.



- All data formats with the exception of SSC files can be opened (it is not allowed by the ASCII data structure).
- By opening a file, an active, incomplete scan will be discarded (after confirmation).



3D calibration

- Starts the 3D calibration of the scanner.
- 3D calibration object must be purchased.



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Settings

Opens the aural Scan settings.



Info

- Information on the version, including licensing information on program libraries.



88

Add activation code

- Opens the dialog to enter an activation code to enable the activation of a chargeable module.



To the standby mode

- Switches aural Scan to the standby mode.
- The current scan project is discarded (after confirmation).
- aural Scan minimizes into the “Hidden symbols” group of the task bar.
- The power supply within the scanner is switched off.
- You can return to the operating mode by double-clicking the aural Scan desktop icon or the icon in the **Hidden icons**.



- The standby mode is activated by default if you use aural Scan with Noah (the Hearing Instrument Manufacturers’ Software Association (HIMSA)’s system).



Exit

- Exits aural Scan.
- The current scan project is discarded (after confirmation).

13.3 Shortcuts

aural Scan supports Windows shortcuts, e.g., for selecting, copying and cutting field contents (CTRL + A, CTRL + C, CTRL + X, CTRL + V). The same shortcut can have different effects depending on the context or cursor position.

Shortcut		Context	Meaning
	47	Scan	Cancel the ongoing scanning process
	45	Scan name	Jump from the left to the right scan name and vice versa (the focus must be in the 3D viewer)
	—	3D viewer	Jump from the left to the right scan (the focus must be in the 3D viewer)
	—	Dialogues and messages, e.g., settings	Select the next user control, e.g., input field, checkbox, button
	42	Scan	Start scanning
	—	Dialogues and messages, e.g., settings	Trigger the function of a selected button
	41	3D viewer	Rotate the scan by 360°
	70	Dialogues and messages, e.g., settings	Turn a checkbox on or off
	70	Dialogues and messages, e.g., settings	Open the context menu of a selected input field
	70	Dialogues and messages, e.g., settings	Open the context menu of a selected input field
	—	Software	Close the software (cancel the scan at the same time if a scan is still open)
	70	Dialogues and messages, e.g., settings	Select option, select entry in a list
	70	Dialogues and messages, e.g., settings	Select option, select entry in a list
	70	Dialogues and messages, e.g., settings	Select option, select entry in a list

14 Device care

The following device care tasks are necessary for the scanner to function properly:

- [Axis calibration](#)
- [3D calibration](#) (optional)
- [Cleaning the scanner](#)



TIP

smart optics scanners do not require maintenance.

14.1 Axis calibration

The calibration of the axes of the scanner ensures the correct alignment of the axes and thus accurate measurement results.

Schedule

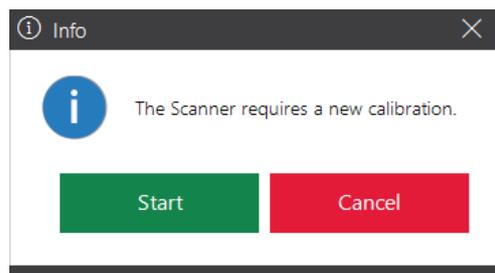
smart optics recommends performing an axis calibration after:

- the first installation of aural Scan
- an aural Scan upgrade
- Transporting the scanner to a different place
- Four weeks since the last calibration (with automatic reminder)
- Daily if there are fluctuations in temperature and/or humidity.

Procedure



- ▷ Restart aural Scan or finish the current scan.
- ▷ Select **Axis calibration** in the menu.
- ▷ You can optionally start from the info message (displayed after 30 days):



- ✓ aural Scan requests you to place ear impressions inside the scanner.



- ▷ Only use well-crafted, average-sized impressions.
- ✓ After the message **Axis calibration successful**, you can start scanning.

14.2 3D calibration

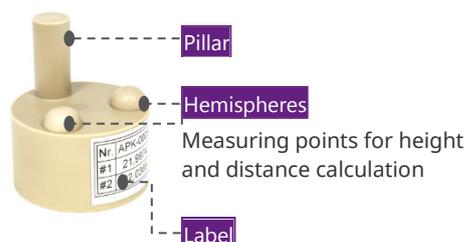


Your scanner works with sufficient accuracy when you use the axis calibration. However, if there are high demands on the measurement accuracy of the scanner in production or quality control, a 3D calibration is also useful.



Required accessories: 3D calibration object.
It is:

- Manufactured industrially
- Individually certified by smart optics
- Optionally available from your reseller or smart optics.



Label sample:

No.	APK-0005
#1	21.9974
#2	22.0368

Storage

Please store the 3D calibration object:

- In its original packaging
- Between 10°C and 35°C.

Properties

The 3D calibration object must not show:

- Damages in its surface
- Scratches
- Discolorations.

3D calibration process

aural Scan compares the current measured values with the documented values of the 3D calibration object and calculates correction values to achieve precise measurement results.

If the 3D calibration is completed with a validation (optional), the correction values are used for a new measurement. The following are recorded in the log:

- The measured values
- The scanner’s sensor number
- The creation time.

The log file serves as proof of the accuracy of this individual scanner.

14.2.1 Performing the 3D calibration

Schedule

Calibration must be performed:

- No later than 12 months after initial delivery of the scanner
- In a 12-month cycle
- More often at your own discretion.

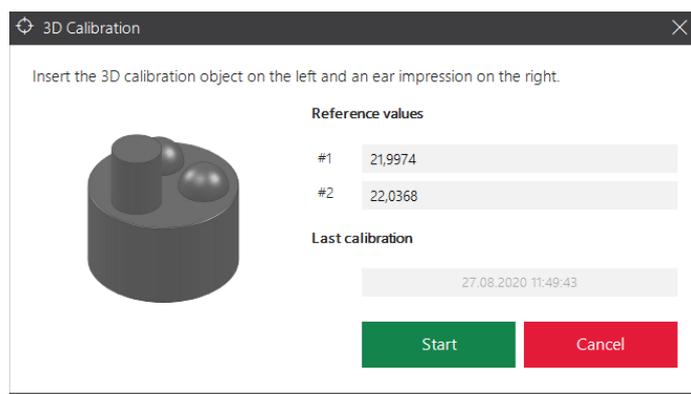
Criteria to perform a 3D calibration at your own discretion can be based on:

- Installation/upgrade of aural Scan
- Transporting the scanner to a different place
- Increased production volume
- High or fluctuating temperature
- High or fluctuating humidity
- QM specifications.

Procedure



- ▷ Select **3D calibration** in the menu.
- ✓ During the first 3D calibration, the fields **Reference values #1** and **#2** display the approximate value 22; subsequently, the last input values.



Label sample:

No.	APK-0005
#1	21.9974
#2	22.0368

- ▷ Enter the values indicated in the label into fields **#1** and **#2**:
 - In full, with all digits
 - With the separator , (comma).

If you do not enter the reference values on the label correctly, the 3D calibration becomes unusable and the scanner’s measurements will be inaccurate.



- ▷ aural Scan requires the following positioning:

3D calibration object
(without object holder)



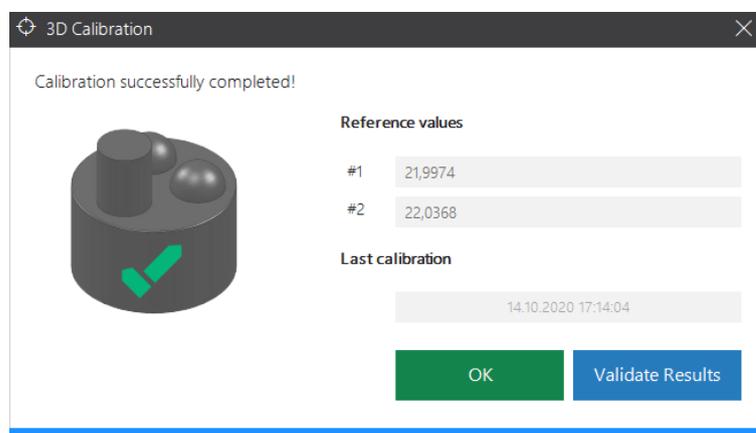
Ear impression



For mono Scan, the 3D calibration object and the ear impression are requested one after the other.

This is the right way to rotate the 3D calibration object:

- The pillar faces the operator.
- The label faces away from the operator.
- ▷ Click on **Start calibration**.
- ✓ The 3D calibration includes:
 - Sensor calibration
 - Axis calibration
 - Mesh calibration.
- ✓ After these steps, aural Scan requires making a decision between simply completing the procedure or checking the results.



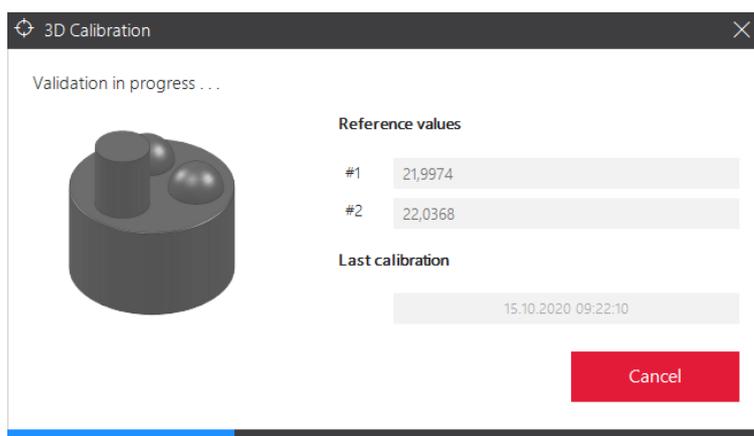
Simple completion

- ▷ Click on **OK**.

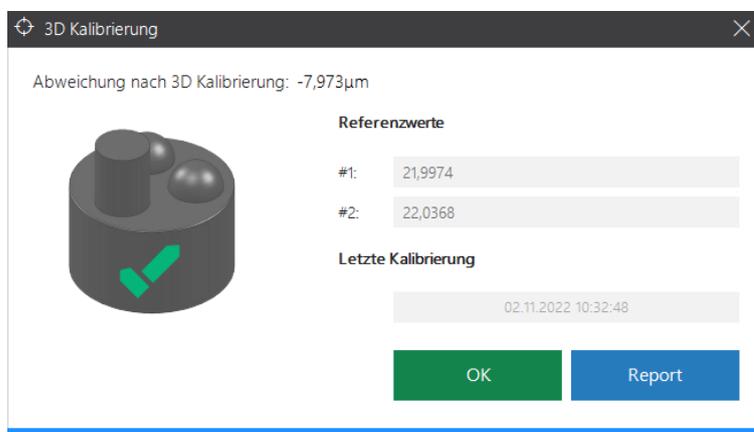
- ✓ The 3D calibration will be completed without testing and without a log.
- ✓ aural Scan will observe the determined correction values for subsequent measurements.

Completion with validation

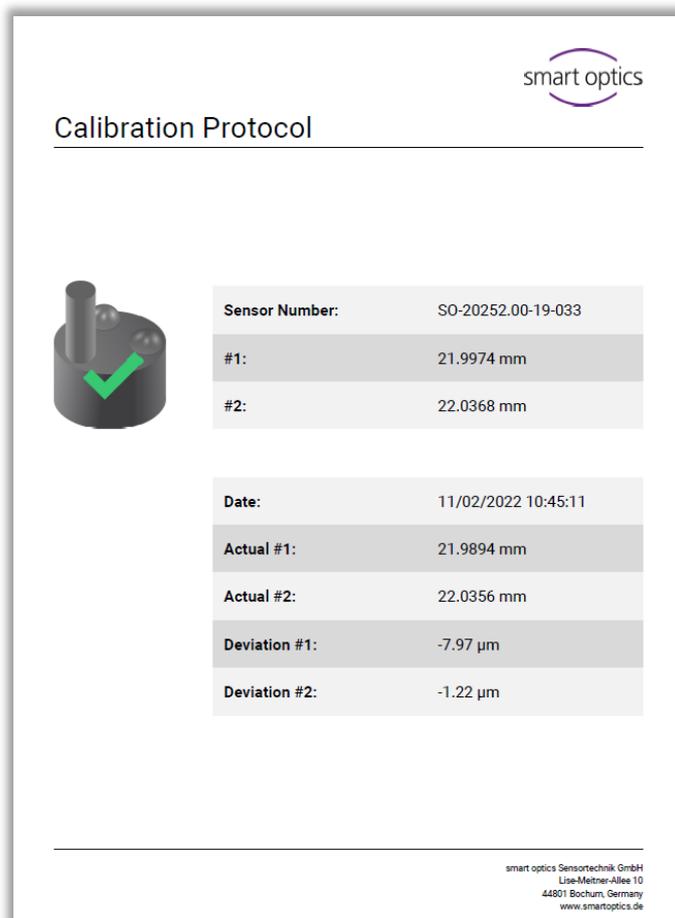
- ▷ Click on **Validate Results**.
- ✓ A test measurement will be carried out.



- ✓ The deviation determined after the 3D calibration will be displayed.



- ✓ The log is saved as a PDF file:
 - C:\Scans\Calibration (The folder can be configured under **3D calibration logs folder**)
 - Naming pursuant to the creation time:
CalibrationProtocol-[YYYY]-[MM]-[DD]-[hh]-[mm]-[ss].pdf
- ▷ To open the log in your default PDF software, click on **Report**.



- ▷ Please contact your **Support** in case of deviation values of $\pm 9 \mu\text{m}$ or red deviation values (**Deviation**).

Scanners work according to specifications if after a 3D calibration, the deviation values are less than $\pm 9 \mu\text{m}$.

14.3 Cleaning the scanner

The scanner must be cleaned regularly during operation.

The optical and electronic components inside the scanner are sensitive to touch.

If these need to be cleaned, please contact your **Support.**

Please avoid the following inside the scanner:

- Dirt and dust
- 3D scan spray
- Moistness
- Cleaning agents.

Before cleaning

- ▷ Switch off the scanner.
- ▷ Remove the cables.
- ▷ Removing the object holders.

Materials



The following are suitable:

- Microfiber cloths for high-gloss surfaces (soft, smooth, lint-free, antistatic)
- Glass cleaner to moisten the microfiber cloth
- Vacuum cleaner for coarse dirt (crevice nozzle, lowest level).



The following are unsuitable:

- Dry, rough cloths
- Abrasives
- Polishing pastes.

Cleaning

- ▷ Vacuum coarse dirt from the bottom of the scanner.
- ▷ Clean the surfaces with a damp microfiber cloth.
- ▷ Clean the touchscreen and touch sensor (if present) without applying pressure.

15 Troubleshooting

15.1 What to do in case of problems

Troubleshooting offers solutions for known problems:

- [Startup problems](#)
- [Connection problems](#)
- [Calibration problems](#)
- [Failed axis calibration](#)
- [Failed 3D calibration](#)
- [Failed FTP upload](#)
- [Other problems](#)



Error messages indicate possible sources of error and give advice on solutions.

Additional help

Is your problem not mentioned in this Operating Manual or cannot be solved?
Then you can:

- Contact your [Support](#)
- Visit the support page: support.smartoptics.de
The help articles are under **Cross Product** or  **Audiology**. You can also [submit a request](#).

Requirements for error-free work

 26, 28, 93, 114

- Windows updates are installed (→ Windows settings).
As of aural Scan 3.4, you can use Windows 11.
- Your first version of aural Scan or an upgrade are installed.
- The calibration data for the connected scanner are loaded.
- The device care tasks are carried out regularly.

Malfunction

- ▷ Do not operate the scanner in case of:
 - Visible damage to the hardware (scanner, accessories)
 - Loud or immobile axes
 - Measurement errors despite regular [device care](#) and correct scanning procedures.
- ▷ A technical examination is necessary in these cases. Hardware damages need to be fixed. Please contact your [Support](#).

15.1.1 Check the PC

- ▷ Update the following PC components:
 - Important Windows updates
 - BIOS
 - Hardware drivers
 - Virus and threat protection.
- ▷ Mark aural Scan as trusted in your antivirus software.
- ▷ In case of a computer failure, replace the defective hardware component or the PC.

15.2 aural Scan does not start

A message is displayed when aural Scan starts.

- ▷ Follow the instructions, e.g.:
 - Reload the [calibration data](#).
 - Obtain a new [activation code](#) to use aural Scan (chargeable).

Nothing happens when starting aural Scan

Possible causes:

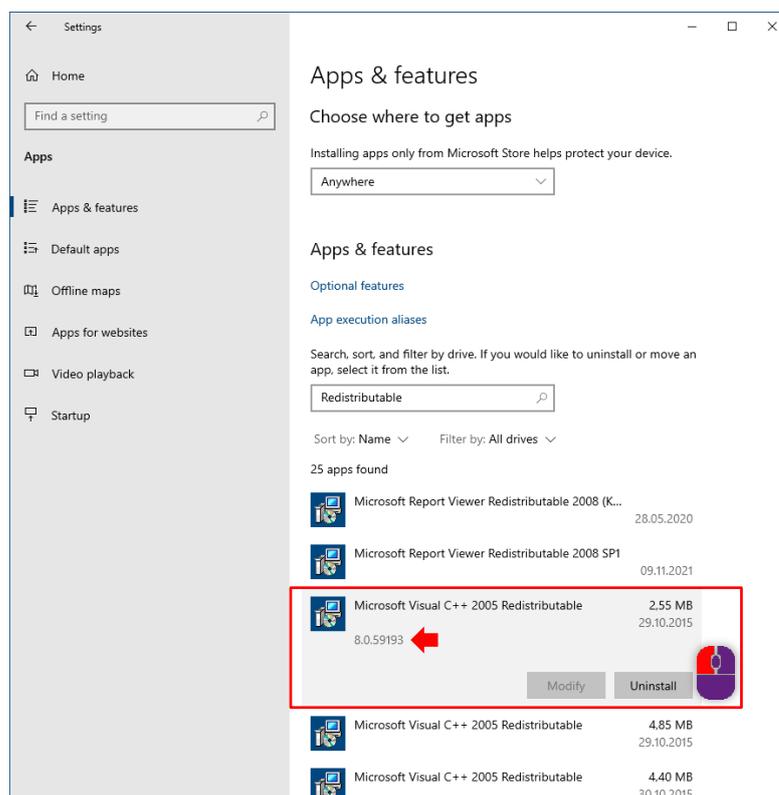
- Missing or defective installation files
 - Missing Microsoft Visual C++ redistributables.
- ▷ [Uninstall](#) and [install](#) aural Scan again.

Despite reinstallation nothing happens at startup.

As a Visual C++ program, aural Scan requires runtime libraries from Microsoft ("Redistributables").

Check whether all the redistributables required by aural Scan are installed:

- ▷ Open Windows settings, **Apps | Apps and Features**.
- ▷ Search the app list for the keyword "Redistributable".



Older and newer versions can be installed in parallel. aural Scan requires the following versions:

Package/folder	Version for aural Scan
2005	v8.0.61000
2008	v9.0.30729
2012	v11.0.61030
2013	v12.0.30501
2015-2022	v14.32.31326

- ▷ Is a version missing? Open aural Scan's target folder:
C:\Program Files (x86)\3D-Scanner\aural Scan
- ▷ Open the folder ...\Prerequisites\Redistributables and the corresponding subfolder. Execute the setup by double-clicking.



TIP

If a previous version is required for aural Scan, all later versions must be uninstalled first. This may cause that other software installed on your PC does not work any longer. If Setup requires uninstalling installed versions, please contact your [Support](#).

15.3 Connection problems (USB, camera)

The following are signs of connection problems:

- Displaced single images
(the scan looks like a flower in the 3D viewer),
- The scanning process is interrupted.

The following are signs for incorrect power settings:

- Slow data transfer
- Unstable scanner performance
- Slow response in standby mode.

15.3.1 Check the USB connection

- ▷ Check the (USB and camera connections):



- Use a different USB slot.
- Disconnect unnecessary USB devices from the PC.



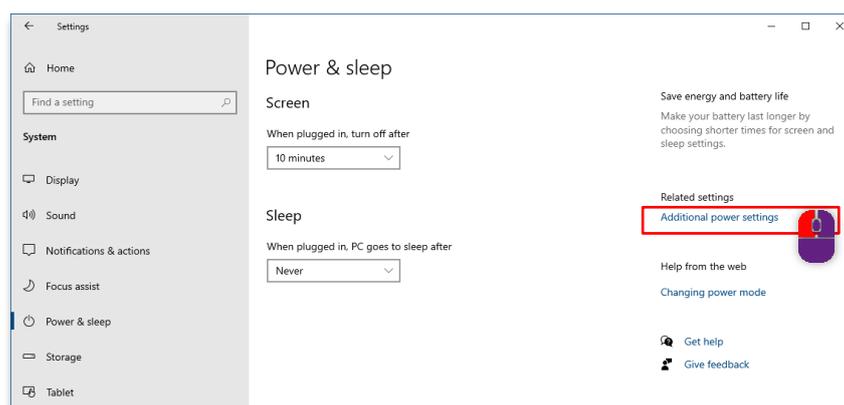
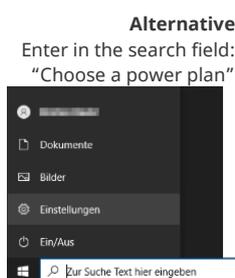
- Connect the scanner's USB port directly to a USB slot on the back of the PC.

The following are common failure sources:

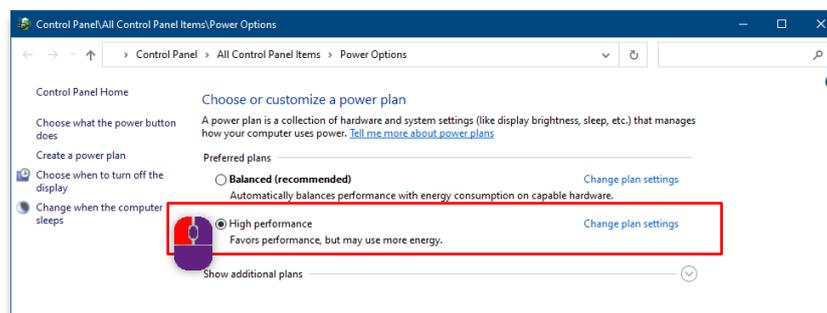
- too long USB cable (> 2 meters)
 - USB extension cable
 - USB hubs.
- ▷ Only use USB cables of a maximum length of 1.8 to 2 meters.
 - ▷ Remove a USB hub.

15.3.2 Enable maximum power (Windows)

- ▷ Open Windows **Power options** via:
 - Settings | Power & Sleep
 - Additional Power Settings.



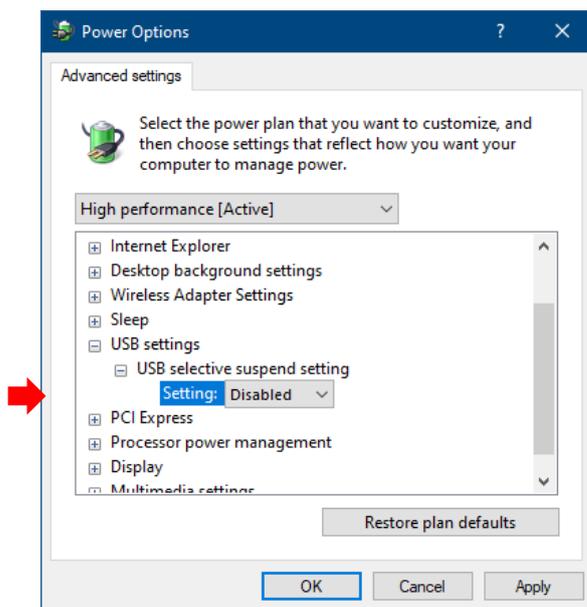
- ▷ Enable **High performance**.



USB settings

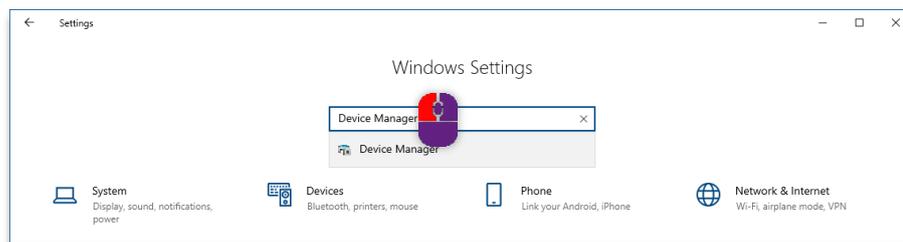
There is a setting in the power plan for a stable USB camera connection.

- ▷ In the power plan, open:
 - Change plan settings (at the side of the **High performance** option)
 - Change advanced settings | Group **USB settings**.
- ▷ Disable USB selective suspend setting.

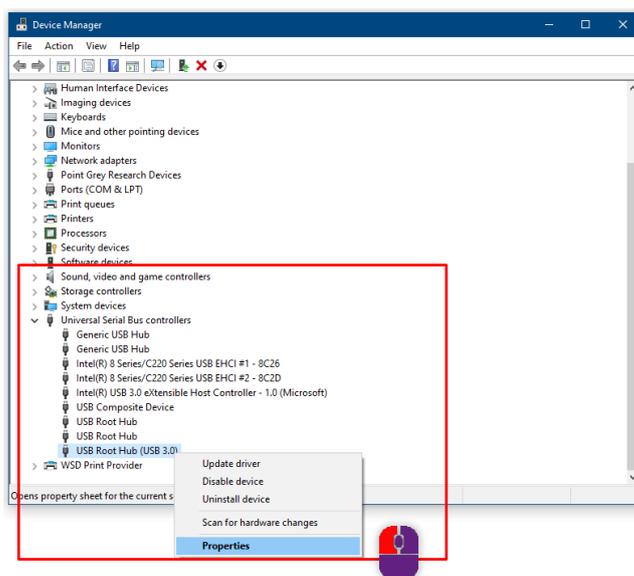


15.3.3 Disable energy saving option for USB root hub (Windows)

▷ Open the Device Manager in the Windows Settings.



▷ Select **USB Controller | USB Root Hub**, and **Properties** in the context menu.



- ▷ Under **Power Management** disable **Allow the computer to turn off this device to save power.**



15.3.4 Check the camera's connection

- Q A sign of a missing/defective camera driver is a startup message such as:
Could not connect to the camera.
No connection to the camera. Defective camera driver.

Camera systems

The cameras of the audiology scanners can be of different types. The installation of aural Scan includes the drivers for all types.

Manufacturer	Camera type	Driver	Version
Point Grey Research (currently Teledyne FLIR)	Fly Capture	FlyCap2 Viewer	2.13.31
Basler	Pylon	Windows Windows driver package Pylon 5 (plnu3v) Pylon USB	07/19/2019 11.3.0
Allied Vision Technologies	Alvium	Vimba Vimba USB Transport Layer	5.1.0 1.4.0

To connect the camera, follow the possible solutions, one by one.

Restart the scanner

- ▷ Switch off the scanner.
- ▷ Disconnect the USB cable from the scanner.
- ▷ Disconnect the scanner from the power for at least 10 seconds.
- ▷ Reconnect the power.
- ▷ Reconnect the USB cable.
- ▷ Switch on the scanner again.
- ▷ Start aural Scan.

If the system restart doesn't work, reinstall aural Scan.

Reinstall aural Scan



- ▷ Use the setup:
 - Of the data carrier (version included in the scope of delivery or

- download it from the smart optics website:

www.smartoptics.de/en/audiology/downloads/

Upgrades are chargeable after 12 months of use.

Their use is only possible with an activation code.



- ▷ Install the upgrade (back up the settings and the calibration data first).
- ✓ All camera drivers are installed with aural Scan.

If reinstalling aural Scan doesn't work, install the camera drivers manually.

Install the camera drivers manually

The drivers' installation files are stored in the aural can destination folder:

C:\Program Files(x86)\3D-Scanner\aural Scan\Prerequisites\Camera

- ▷ Install them in any order you wish
(run the EXE files as administrator):
 - FlyCap2Viewer_2.13.3.111_x86.msi
 - Vimba_v5.1_Windows.exe (5.1.0.31755)
 - pylon_USB_Camera_Driver_v7.2.0.25592.msi
- ▷ Follow the setup instructions. The drivers can be:
 - Repaired or modified
 - Uninstalled and reinstalled.

If the driver installation does not work, contact your Support. You will receive new driver files and instructions for the settings.

15.4 Calibration problems



Holes and overlaps in scans are signs of calibration problems.

Delete and reload the calibration data

The calibration data must be up-to-date and match the scanner's sensor number (SO-number).

A paid upgrade is not compatible with the calibration data of the initial installation.

Enter into the Explorer: %appdata%

- ▷ Open the path
C:\Users\[User]\AppData\Roaming\3D-Scanner\aural Scan
- ▷ Delete the folder \Service.

Enter into the Explorer: %programfiles%

- ▷ Open the path
C:\Program Files (x86)\3D-Scanner\aural Scan\data
- ▷ Delete the calibration folder ... \SO-202... .

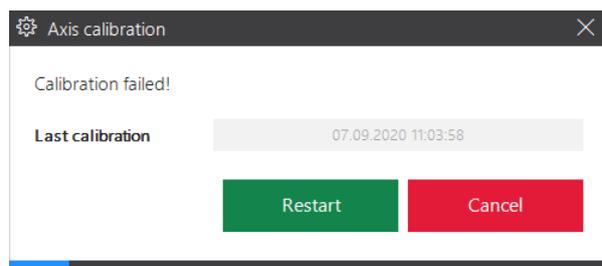


- ▷ Reload the calibration data via the installation tool.



Now you must proceed with the **axis calibration**, optionally also with the **3D calibration**.

15.5 Failed axis calibration



Correct scan results are not possible after a failed axis calibration.



- ▷ Check the following possible causes:
 - Quality and fit of the ear impressions

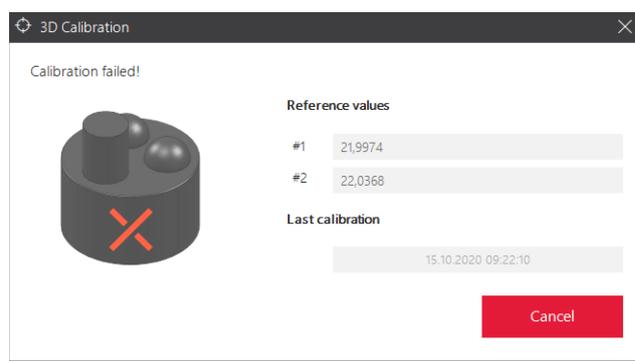


- Loaded calibration data:
Scanner's sensor number (back) = Name of the calibration data folder
C:\Program Files (x86)\3D-Scanner\aural Scan\data\SO-202...



- ▷ Restart the scanner and aural Scan.
- ▷ Repeat the axis calibration.

15.6 Failed 3D calibration



The measuring accuracy of the scanner will not be corrected if the 3D calibration fails. Scanning is still possible however, but without correction values.

After cancelling a scan, the axes remain in the last position.



- ▷ Move the axes back to the home position with **Move to service position**.



- ▷ Check the following possible cancellation causes:
 - Is the 3D calibration object positioned on the left?
 - Is the ear impression positioned on the right?
 - Are the ear impression and the 3D calibration object intact?
If not, a spare part is required.
 - Were the reference values entered correctly?
- ▷ Restart aural Scan and the scanner.
- ▷ Repeat the 3D calibration.

TIP

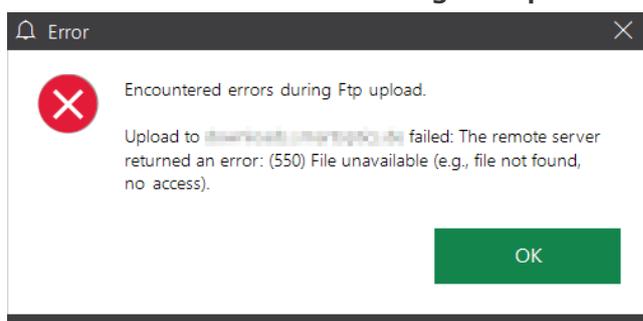
aural Scan cancels the 3D calibration if the entered reference values are invalid. The 3D calibration cannot check the correctness of the reference values.

15.7 Failed FTP Upload

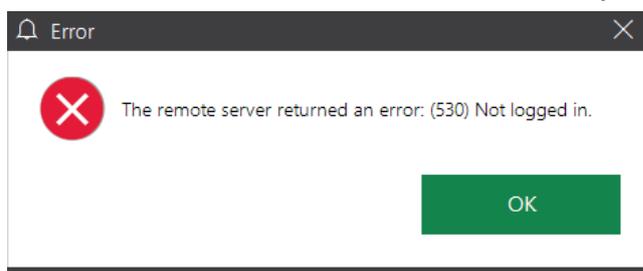
Upload errors are caused by:

- Typing errors when entering data
 - Internet disruptions
 - Changes to the FTP server (e.g., path name, password).
- ▷ Ask the recipient for the current connection and login information.

Error: Encountered errors during FTP upload



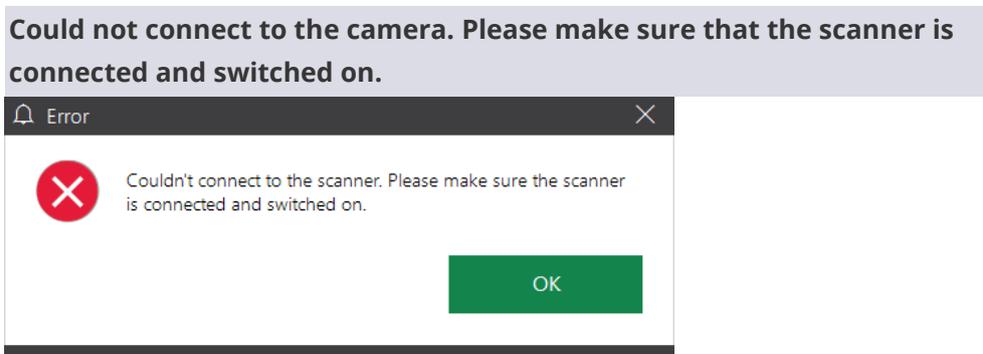
Error: The remote server returned an error. (530) Not logged in.





- ▷ Restart aural Scan, open the scan files or scan again.
- ▷ Click on "Upload", then on **FTP**.
- ▷ Edit the saved FTP connection (server, login).
- ▷ Confirm the "Replace existing connection?" warning.
- ✓ aural Scan tests the connection. After a successful test, you can carry out the upload.

15.8 Error messages



Possible sources of error

- Scanner
- Camera

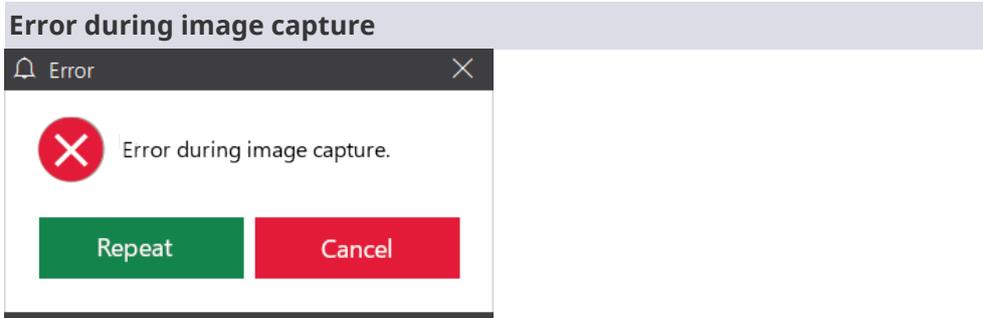
Possible solution



- ▷ Restart the scanner.



- ▷ Solve connection problems.
- ▷ If the problem persists, please contact your [Support](#) to request a technical examination.



Possible sources of error

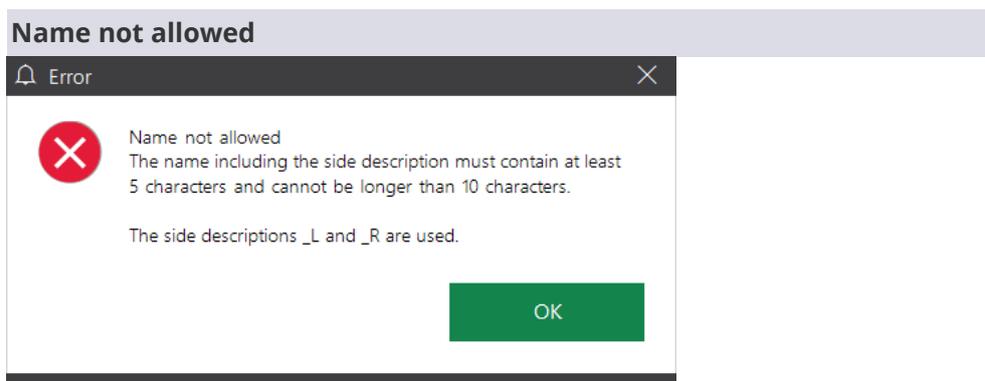
- Camera
- Position of the axes
- Prolonged inactivity

- Communication or connection problems

Possible solution



- ▷ **Cancel**, then **move to service position** and restart the scan.
- ▷ Exit aural Scan, switch off the scanner.
- ▷ Disconnect other USB devices, remove any USB hubs, replace USB cables that are too long (max. 2 meters).
- ▷ Restart the scanner and aural Scan and then restart the scan.



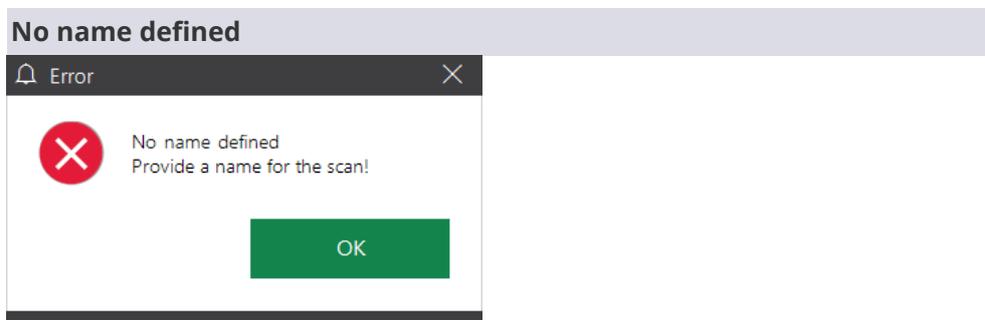
Possible sources of error

- Selected scan name

Possible solution

aural Scan is configured for a minimum and maximum length of the scan names (Settings.xml).

- ▷ The scan must be named according to the message.
- ▷ To change the configuration, please contact your **Support**.



Possible sources of error

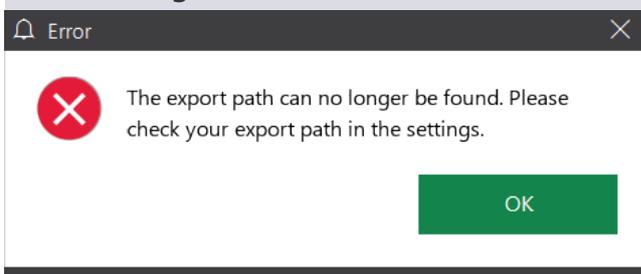
- The scan name is missing

Possible solution



- ▷ The scan must be **named**.

The export path can no longer be found. Please check your export path in the settings.



Possible sources of error

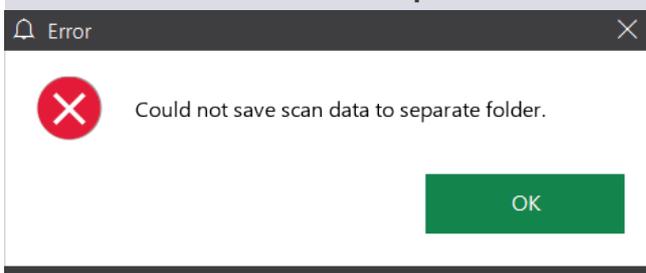
- Windows user write permissions for the folder
- Change or deletion of the folder

Possible solution



- ▷ Change the [Project folder](#) setting.
- ▷ Restore the path on the PC/server.
- ▷ Grant the Windows user write access to the folder.

Could not save scan data to separate folder



Possible sources of error

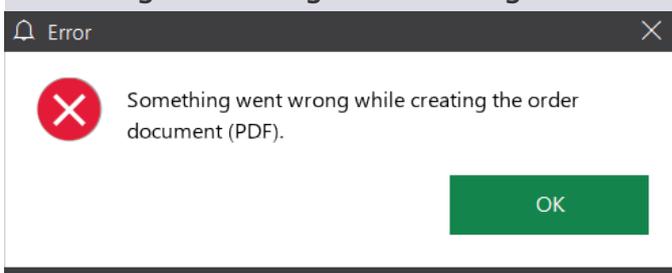
- Export folder setting for scan data

Possible solution



- ▷ Indicate an [export folder](#)
- ▷ Create the path accordingly in Windows.
- ▷ Grant write access to the Windows user.

Something went wrong while creating the order document (PDF)





Possible sources of error

- PDF file settings (`order.pdf`)
- File format settings

Possible solution

- ▷ Edit the [PDF file](#) settings.
- ▷ Enable at least one [file format](#).
- ▷ Repeat [finishing work](#).

15.9 Other problems



The scanning accuracy is not documented

- ▷ Perform the [3D calibration](#) (with 3D calibration object).



The scan results are of bad quality or are becoming worse.

- ▷ Perform the [Axis calibration/3D calibration](#) (with 3D calibration object).
- ▷ Establish the [Object tone](#).
- ▷ Use the 3D scan spray for dark/glossy impressions.



Displaced images in scans (“Flower”)

Scans are composed of several images which must be perfectly juxtaposed. If the images are displaced:



- ▷ [Check the USB connection](#).
- ▷ [Enable maximum power \(Windows\)](#).
- ▷ [Disable the energy saving option for USB root hub \(Windows\)](#).



Scans are cut off

- ▷ Settings: Reduce the values of the [cutting filters](#).



Scans must always be cut (base)

- ▷ Settings: Increase the values of the [cutting filters](#).

A scan shows an empty object holder

- ▷ To scan only one side, remove the empty object holder.
- ▷ Discard the scan and [start a new scan](#).
- ▷ To scan both sides, place the ear impression on the empty object holder.



A scan has disappeared from the 3D viewer.

▷ The scan was moved out of the visible area with the mouse: Retrieve it with the [cube icon](#) or [center](#) it.



▷ Use aural Scan in the full screen mode.



No files are saved in the project folder

▷ Settings: Enable the [file format](#).

15.10 File paths



TIP

To open protected Windows folder:

Enter the path name into the Explorer using the placeholder %.

%appdata%

%programfiles%

Data paths by default as of aural Scan 3.0

Target folder	C:\Program Files (x86)\3D-Scanner\aural Scan
Session logs	—
3D calibration logs	C:\Scans\Calibration
Project folder (standalone)	C:\Scans
Project folder (with Noah)	C:\Scans\Noah
Project log	C:\Scans\[Project*]\project.log
Camera driver	C:\Program Files (x86)\3D-Scanner\aural Scan\Prerequisites\Camera
Calibration Data	C:\Program Files (x86)\3D-Scanner\aural Scan\data\[SO-202..*]
FTP connection information	C:\Users\[User*]\AppData\Roaming\3D-Scanner\aural Scan\config\FTPConnections.xml*
Forms for support requests	C:\Program Files (x86)\3D-Scanner\aural Scan\Support
Settings	C:\Program Files (x86)\3D-Scanner\aural Scan\data\Settings.xml
▪ Default	C:\Users\[User*]\AppData\Roaming\3D-
▪ Custom	Scanner\aural Scan\config\Settings.xml**
Order document "order.pdf"	C:\Scans\[Scanname*]\order_[Scan*]_[Seite*].pdf

* Placeholder

** Path to XML files: XML files are important for software functionality. Do not manually change file names or the contents of XML files.

16 Faults and repairs

In the following situations, please contact your [Support](#):



- Persistent malfunction despite device care and troubleshooting
- Repair or custom help required

Damages to the device due to improper repairs

Repairs may only be carried out by your reseller or smart optics. Improper repairs can permanently damage the scanner.

smart optics assumes no liability for consequential damages caused by improper repairs and the warranty will be void.

Voluntary warranty benefits

smart optics' manufacturer's warranty applies to device damages, but not to consequential damages such as financial losses due to business interruptions.



Spare parts

These can be purchased as [optional accessories](#).

16.1 Serial numbers

When contacting your [Support](#), please have the serial number and sensor number of your scanner at hand.

Back of the scanner

Serial number	Sensor number
<p>Type plate</p> <p>The type plate contains the following information: smart optics Serialno: SO-20061.04-15-015 Voltage: 100-240 VAC 50/60Hz Rating: 30 W CE mark Manufactured in Germany Manufacturing Date: 12/2015 smart optics Sensortechnik GmbH Lise-Meitner-Allee 10 D-44801Bochum WEEE:DE47893210 http://www.smartoptics.de Barcode: 2 006104 150823 =2X T1,6A L250V</p>	<p>Label</p> <p>The label contains the following information: Serialno. 3D Sensor SO-20246.02-15-123</p>

17 Disposal

You can prevent negative consequences for people and avoid harming the environment by the proper disposal of the device.

Legal basis

National guidelines for the disposal of packaging and electronic waste.

17.1 Disposal of the packaging

You can return the packaging to your dealer for disposal (according to local packaging regulations).

Recommendation

Keep and reuse the packaging for transport.

17.2 Disposal of the device



Symbol for devices that are subject to the European WEEE Directive (Waste Electrical and Electronic Equipment, 2002/96/EC)

WEEE registration number of smart optics:
DE47893210

Send your smart optics scanners for disposal to:

- smart optics (Manufacturer)
- Your reseller (if you are a resident of the area of application of the EU directive).

Disposal is not permitted:

- With household waste
- With public waste disposal companies.

18 Technical specifications

	mono Scan	duo Scan	duo Scan Touch	ds Production	free Stage
First production (year)	2016	2011	2018	2012	2019
Most recent hardware or speed update	2022 (RGB optional)	2022 (RGB)	—	2022 (RGB)	2022 (RGB)
Dimensions (closed)	300×367×145 (W × L × H mm)	300×350×140 (W × L × H mm)	300×350×140 (W × L × H mm)	300×350×155 (W × L × H mm)	186×292×348 (W × L × H mm)
Weight	7.5 kg	8 kg	8 kg	10 kg	6.5 kg
Housing	Acrylic glass, purple-white	PUR (polyurethane) integral rigid foam, matte silver	PUR (polyurethane) integral rigid foam, black	Steel sheet DC01 (1.0330), anthracite-light grey	PUR (polyurethane) integral rigid foam, matte silver Front acrylic glass, glossy black
Display with touch panel	✗	✗	2,83" TFT	✗	✗
Capacitive touch sensor	✗	✗	✗	✗	✓
On/Off switch	Toggle switch, rear	Pressure switch, green LED, front	Pressure switch, green LED, front	Pressure switch, green LED, front	Flip switch, rear
LED status display	✗	✓	✓	✗	✓
Lid	✓	✓	✓	✓	✗
Supply voltage	100-240 V AC 50/60 Hz				
Fuse	2 × T 1,6 A L 250 V				
Power consumption	max. 30 W				
Connections	1 × USB, 1 × power				
Operating temperature	15°C - 30°C				
Storage temperature	-5°C - 50°C				
Camera resolution	1.3 MP				
Measuring Accuracy pursuant to ISO 12836	< 9 µm after 3D calibration				
Impressions simultaneously	1	2	2	2	2
Scan speed (without matching) as of construction date October 2022	15 seconds	18 seconds	17 seconds	16 seconds	16 seconds
Output data format	STL, PLY, ASCII and MSH				
PC system	Minimum: Dual Core CPU, i3, 4 GB RAM, USB 2.0 Port, HDD with approx. 40 GB free disk space, graphics card with 1 GB RAM Recommended Quad Core CPU, i5, 8 GB RAM, USB 3.0 Port, HDD with approx. 80 GB free disk space, graphics card with 2 GB RAM				
Operating System	Windows 10 or Windows 11 (64 bit)				
USB	2.0 or 3.0				
Barcode interface	✗	✓	✓	✓	✓
Noah System Interface*	✓				
Compatible with winIPRO®	✓				

* smart optics is a registered member company of HIMSA: www.himsa.com

19 Declaration of CE conformity

mono Scan



smart optics Sensortechnik GmbH
Lise-Meitner-Allee 10
44801 Bochum, Germany

Declaration of CE- Conformity

According to EU-regulation 2006/42/EG Appendix II A

We declare that the device identified below complies with the requirements of the EU guideline which regard to safety and physical health requirements both in concept and construction put in circulation.

This declaration becomes invalid in case of an unauthorized change of the device.

Device description:	Optical 3D scanner
Device type:	mono Scan
EU guidelines applicable:	machine guideline (2006/42/EG) low voltage guideline (2014/35/EU) EMC guideline (2014/30/EG)

Harmonized standards applied:

DIN EN ISO 12100:2010 Safety of machinery
 DIN EN 61326-1:2013
 DIN EN 61010-1:2010

The CE label was used first for this product in 2015.

Document prepared by: Jörg Friemel



Bochum, 01.10.2020

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 Fon: +49 234 29 82 8-0 Fax: -20

duo Scan



smart optics Sensortechnik GmbH
Lise-Meitner-Allee 10
44801 Bochum, Germany

Declaration of CE- Conformity

According to EU-regulation 2006/42/EG Appendix II A

We declare that the device identified below complies with the requirements of the EU guideline which regard to safety and physical health requirements both in concept and construction put in circulation.

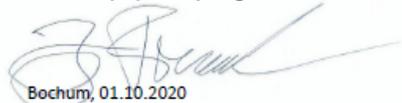
This declaration becomes invalid in case of an unauthorized change of the device.

Device description:	Optical 3D scanner
Device type:	duo Scan
EU guidelines applicable:	machine guideline (2006/42/EG) low voltage guideline (2014/35/EU) EMC guideline (2014/30/EG)

Harmonized standards applied:
DIN EN ISO 12100:2010 Safety of machinery
DIN EN 61326-1:2013
DIN EN 61010-1:2010

The CE label was used first for this product in 2014.

Document prepared by: Jörg Friemel



Bochum, 01.10.2020

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duo Scan Touch



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Declaration of CE- Conformity

According to EU-regulation 2006/42/EG Appendix II A

We declare that the device identified below complies with the requirements of the EU guideline which regard to safety and physical health requirements both in concept and construction put in circulation.

This declaration becomes invalid in case of an unauthorized change of the device.

Device description:	Optical 3D scanner
Device type:	duo Scan Touch
EU guidelines applicable:	machine guideline (2006/42/EG) low voltage guideline (2014/35/EU) EMC guideline (2014/30/EG)

Harmonized standards applied:

- DIN EN ISO 12100:2010 Safety of machinery
- DIN EN 61326-1:2013
- DIN EN 61010-1:2010

The CE label was used first for this product in 2018.

Document prepared by: Jörg Friemel



Bochum, 30.04.2018

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free Stage



smart optics Sensortechnik GmbH
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44801 Bochum, Germany

Declaration of CE- Conformity

According to EU-regulation 2006/42/EG Appendix II A

We declare that the device identified below complies with the requirements of the EU guideline which regard to safety and physical health requirements both in concept and construction.

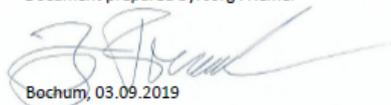
This declaration becomes invalid in case of an unauthorized modification of the device.

Device description:	Optical 3D scanner
Device:	freeStage
EU guidelines applicable:	Low voltage guideline (2014/35/EU) EMC guideline (2014/30/EG)

Harmonized standards applied:
DIN EN 61010-1:2010
DIN EN 61326-1:2013

The CE declaration was issued first time for this product in 2019.

Document prepared by: Jörg Friemel



Bochum, 03.09.2019

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ds Production



smart optics Sensortechnik GmbH
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44801 Bochum, Germany

Declaration of CE- Conformity

According to EU-regulation 2006/42/EG Appendix II A

We declare that the device identified below complies with the requirements of the EU guideline which regard to safety and physical health requirements both in concept and construction put in circulation.

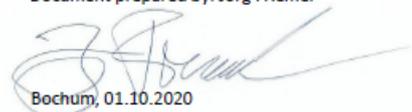
This declaration becomes invalid in case of an unauthorized change of the device.

Device description:	Optical 3D scanner
Device type:	ds Production
EU guidelines applicable:	machine guideline (2006/42/EG) low voltage guideline (2014/35/EU) EMC guideline (2014/30/EG)

Harmonized standards applied:
DIN EN ISO 12100:2010 Safety of machinery
DIN EN 61326-1:2013
DIN EN 61010-1:2010

The CE label was used first for this product in 2014.

Document prepared by: Jörg Friemel



Bochum, 01.10.2020

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20 Quick guide



Workstation: Table load-bearing capacity (kg) – scanner’s space requirements (W×L×H mm, open)

mono Scan	duo Scan	duo Scan Touch	ds Production	free Stage
15 kg	16 kg	16 kg	20 kg	13 kg
300 × 367 × 350 *	300 × 350 × 350 *	300 × 350 × 350 *	300 × 350 × 350 *	186 × 292 × 348

*Height with open lid



PC & operating System:

- Windows 10/Windows 11 (64 bit)
- Quadcore CPU, i5
- 8 GB RAM
- USB 2.0/3.0 Port
- Approx. 80 GB free hard drive space
- ≥ 1 GB RAM graphics card



Unpacking and Connecting

- ▷ Remove the scanner and the accessories from the packaging.
- ▷ Remove the transport protection (pay attention to the needles).

RECOMMENDATION

Keep the packaging.



- ▷ Connect the power cable.
- ▷ Connect the USB cable:
Type B plug (square) to the scanner,
Type A plug (flat) to the PC.
- ▷ Switch on the scanner (LED switch on the front or toggle switch on the rear).
- ✓ The scanner is ready for operation.

Installation of aural Scan



- ▷ Execute `auralScan.exe`.
- ▷ Follow the setup instructions.
- ▷ Start the software.
- ▷ Load the calibration data (folder `SO-202...`).
- ▷ Calibrate the axes.
- ✓ aural Scan is ready for operation.

Scan



- ▷ First switch on the scanner, then start aural Scan.
- ▷ Marking production or error issues on impressions.
- ▷ Mount and insert the impressions:

Left ear – left position

right ear – right position



- ▷ If necessary, activate color texture scans (Requirement: PLY format)
- ▷ Scanning:

Start with:

The method is supported by:



mono Scan, duo Scan, duo Scan Touch, ds Production, free Stage



mono Scan, duo Scan, duo Scan Touch, ds Production, free Stage



duo Scan, duo Scan Touch, ds Production, free Stage



duo Scan Touch



free Stage

- ▷ The scan is generated and rotates once.
- ▷ Everything OK? Finish work.
- ▷ Select the export method:



- ▷ **Finalize** and export the project.
- ✓ The scan files are saved (folder C:\Scans).

Check the settings



Answer the following decisive questions:

- Yes** Everything is ok, no changes needed.
- No** Change the setting! ⓘ Click on the keyword for more information!

General
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Should aural Scan:

- Display texts in the current language ?
- Create a log file for the scan project?
- Limit scan names to a specific length?
Please contact your Support!

Should aural Scan:

- Save the scan files in the PLY (for color data) or STL data format ?
- Position scan files in the XYZ coordinate system?
- Name the right and left impression differently?
- Necessarily name scan files with the side identification L and R?
- Automatically match the scan files?

3D viewer
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Should aural Scan in the 3D viewer:

- Display the following colors?

Background top
Background bottom
Left scan (sinister)
Right scan (dexter)
Rescan area
Separator

- Brighten up scans and display them with light reflexes?
- Rotate scans at the end of the process once around themselves and ...?
- ... rotate slowly?
- Display scans in normal quality?
- Display scans in normal quality while moving them?
- Rotate scans with the left mouse button and move them with the right one?

Scanning
77

When scanning, should aural Scan:

- Expect these impression colors ?



- Use the fast scan strategy?

Matching
 78

When matching, should aural Scan:

- Perform the **thinning** of the 3D data (reduce them to what is essential)?
 - Perform the **smoothing** of the 3D data (compensate material faults)?
 - Leave **holes** (areas without data) in scans?
 - Automatically cut** bases and the auditory canal?
-

Export
 81

Upon finishing work, should aural Scan:

- Save scan projects in the **project folder** C:\Scans?
 - Backup **scan files** (the folder can be selected)?
 - Export** selected projects (FTP, ZIP, email)?
 - Create an **order document** order.pdf?
 - Suggest an **FTP connection**?
-

Interfaces
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Should aural Scan connected to Noah:

- Name scans by default (without **patient names**)?
- Switch to the **standby mode** after finishing work?



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