Artec 3D

More information
about Artec Leo
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(kennisbank)

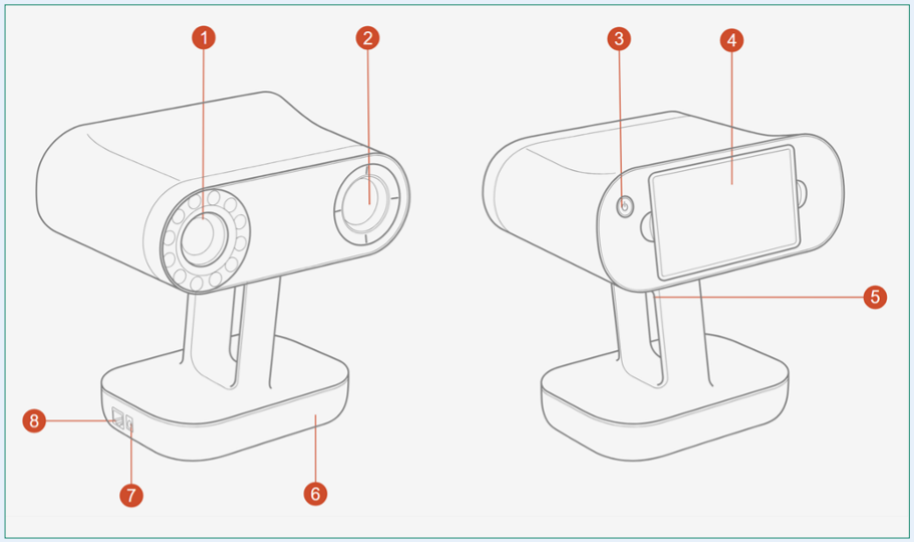
Artec LEO

Manual

English
Version 2025.05A

Inhoud

Overview: Structure, technology, specifications



About the Leo scanner

1. Camera with 12 LED's
2. Projector
3. Power button
4. Tiltable display
5. Handle with the start/stop button
6. Battery housing
7. Power connector
8. Ethernet-connector

Technology

Projector

Class 1 laser projector projects the pattern on the surface of the object.

Consequence

The pattern of Leo is invisible, and you can scan in the sunlight.

Cameras

Texture camera and 3D camera are grouped together on one sensor, geometrical and texture information is taken simultaneously.

Consequence

There are no problems with applying texture from Leo, e.g. from non-closed objects on the scan.

Leo specificaties

1. **Working distance**
   0,35 - 1,8 m closest range 244 x 142 mm, furthest range
   838 x 488 mm 3D-resolution up to 0,5 mm
2. **3D Accuracy**
   up to 0,1 mm
3. **Accuracy over distance**
   0,03% over 100 cm
4. **Texture resolution**
   2,3 mp
5. **Realtime Fusion rate**
   up to 22 fps (Frames per Second)
6. **3D-video-recording**
   up to 44 fps
7. **3D-reconstruction rate**
   for 3D-videostreaming up to 80 fps
8. **Data acquisition speed**
   up to 3 mln points/sec

Getting started: activate Leo

Registering the scanner with Artec

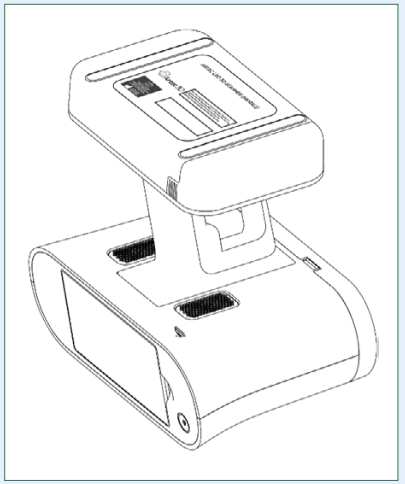
1. Turn on the scanner by pressing on the power button.
2. Read and accept the License Agreement.
3. Connect to the Internet (via Ethernet cord or Wi-Fi)
4. Enter your **my.artec3d.com** credentials, tap **Login**.

Note

The Leo scanner is now connected to one account: The User Account. Scans made by this Leo scanner can **only** be processed with Artec Studio that has the **same** login **or** you have to create a "Trusted Account" (See page 35)

Sticker with serial number

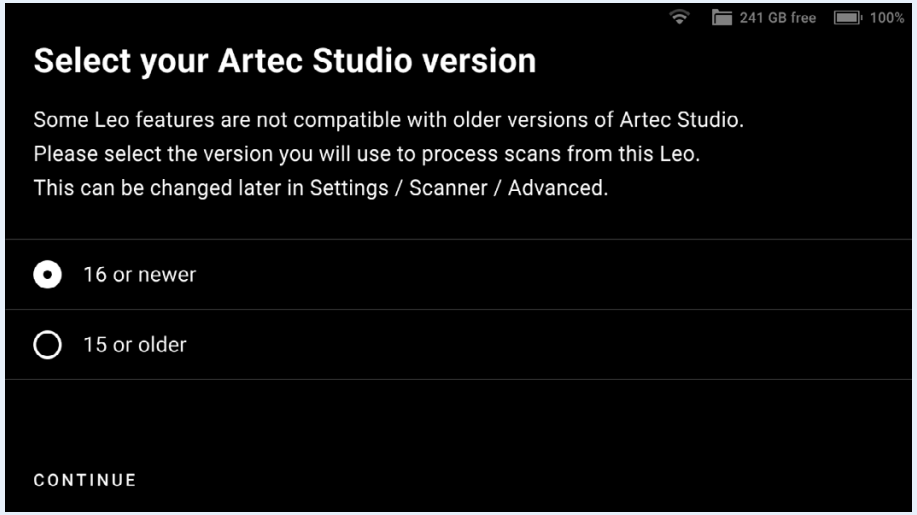
The envelope that comes with Leo scanner contains the serial number sticker.
Place it on the underside of your Leo battery housing.
Place the serial number sticker on the empty rectangle.



Select Artec Studio Version

Some new features of Leo may be incompatible with older versions of Artec Studio.

To prevent situations where Leo project is not supported by the currently installed version of Artec Studio, Leo will show the modal for selecting the Artec Studio version on the first launch. You can switch to a different version of Artec Studio later in the **Settings › Scanner › Advanced** under Artec Studio version section.

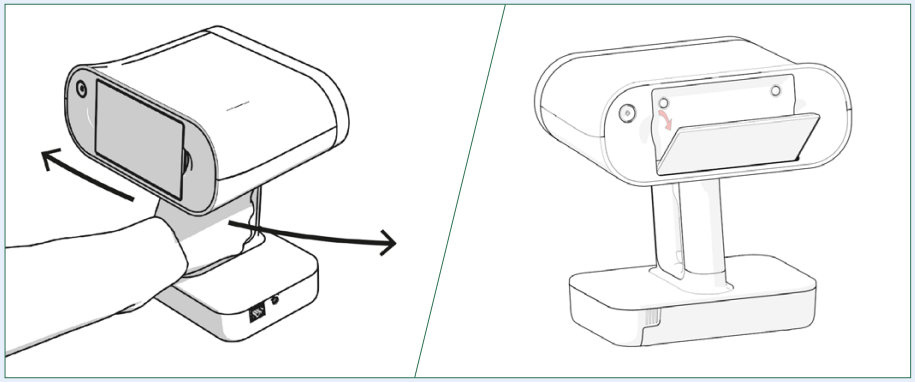


Scanning basics

Getting started: scanning

Preparation

Caution Always grip the scanner with its handle; use your other hand for extra support when necessary.



About Tiltable Display

When scanning particular objects or regions, you may need to tilt or rise your Leo scanner. In this case, the display content may disappear from your sight. What comes in handy is the ability to tilt the display to observe the scanning scene:

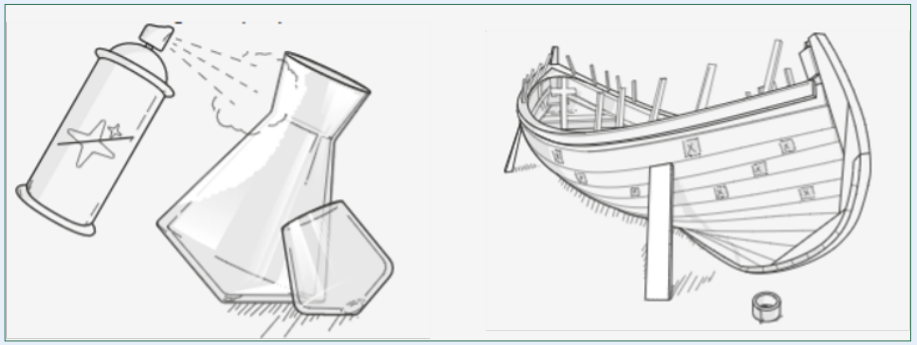
- Put your fingers into the finger recesses near the display.
- Drag both ends of the display to tilt it down.

Prepare Object and Surroundings

Before scanning, ensure that the objects meet the following requirements:

- They must be stationary.
- They should have geometry and/or texture features.
- They should have no black, transparent or reflective surfaces.
- They should be uniformly lit.
- There is enough space around the object for you to scan it.

If the object doesn't meet all the requirements, it can still be scanned. You may need to prepare its surface (see the next page).



Transparent, shiny, reflective

Dust with anti-glare spray

Thin, fine or repetitive features

Apply masking tape to the background and/or draw X's on it

Black glossy

Dust with anti-glare spray

Black matte

Increase Texture brightness

> **Note**
> In the HD mode, you can capture dark or shiny surfaces in high resolution, in their original shape and with no extra steps. See HD Mode for details.

About Targets

Typically, a target is a round sticker that has a black ring with a white circle in the center. The targets are placed on the object being scanned to ease identification of the various regions. Using the target-assisted scanning allows you to scan larger areas in one session, improve the accuracy of captured surfaces and boost productivity by reducing postprocessing time. You do not need to align the scanned surfaces after scanning, so you can immediately proceed to fusion (see Artec Studio Manual for details). The only downside of this method is the necessity of preparation.

To enable the target-assisted scanning with Leo, you need to perform the following steps:

1. Prepare a special target file in the OBC format that contain the coordinates of the targets. Such a file can be obtained, for example, by means of the **Scan Reference** kit (see Scanning with photogrammetry for details).
2. Upload the target file to Leo and make it a default one (see Enable Target-Assisted Scanning on page 26 for details).

After that, you can proceed to the Target-Assisted Scanning.

Object

- Examine features.
- Check the surface – is it hard to scan?
- Make sure that the object is immobile during scanning.

Scanning technique

- Keep the right distance and comfortable speed.
- Move your wrist and point the scanner at different angles.
- Always look at the screen.

Environment

Check the lighting

Lighting is important. We recommend ensuring there is sufficient lighting in the area where you are scanning, and the object is not overexposed.
For better texture tracking and good final texture we recommend scanning closer to the object.

- *Scanning in sunlight*
  With Leo we can scan in direct sunlight. It is important to hold the scanner closer to the object though, at the distance of 400-500 mm, for good reconstruction of the surface.

- *Scanning in the dark*
  For scanning in the dark tweak texture brightness slider for successful texture tracking.

Consider the distance

Leo's working distance falls between 350 mm and 1800 mm. Ensure there is enough area around the object you are going to scan to accommodate both you and the scanner.

- Objects for successful geometrical tracking at a large distance need to be bigger than at closer distance.

- Resolution decreases, while field of view grows when the scanner is moved further from the object. Since Leo's maximal distance is twice as big as Eva's, this effect becomes much more noticeable. This is why we don't recommend scanning at maximal distance when resolution is important.

- Leo can scan at a relative short minimal distance. So you need less area around the object and Leo scans more detail at short distance. Pay attention to this.

Attention
Artec Leo scanner is a Class 1 laser product. The security system stops the laser light if the distance between the device and the object becomes less than 5 centimeters.

Object: is the scan job easy or difficult??

View the object you want to scan: **Think before you start!**

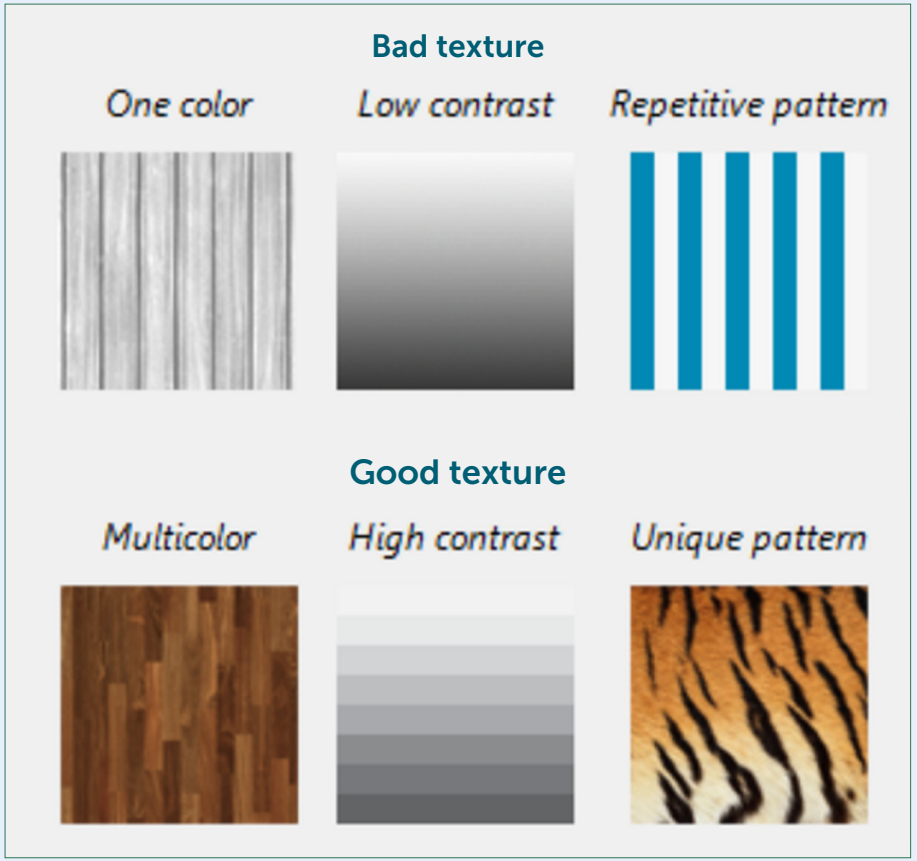
Texture

When it comes to texture, there are easy to scan objects and objects that are more difficult. This is made clear in the image on the next page.

Easy texture is therefore changing texture with a lot of contrast.

Regular patterns are also more difficult for the scanner. Take this into account and add extra texture to the object, for example. Think of tape, paper, etc.

Objects for successful geometrical tracking at a large distance need to be bigger than at closer distance.



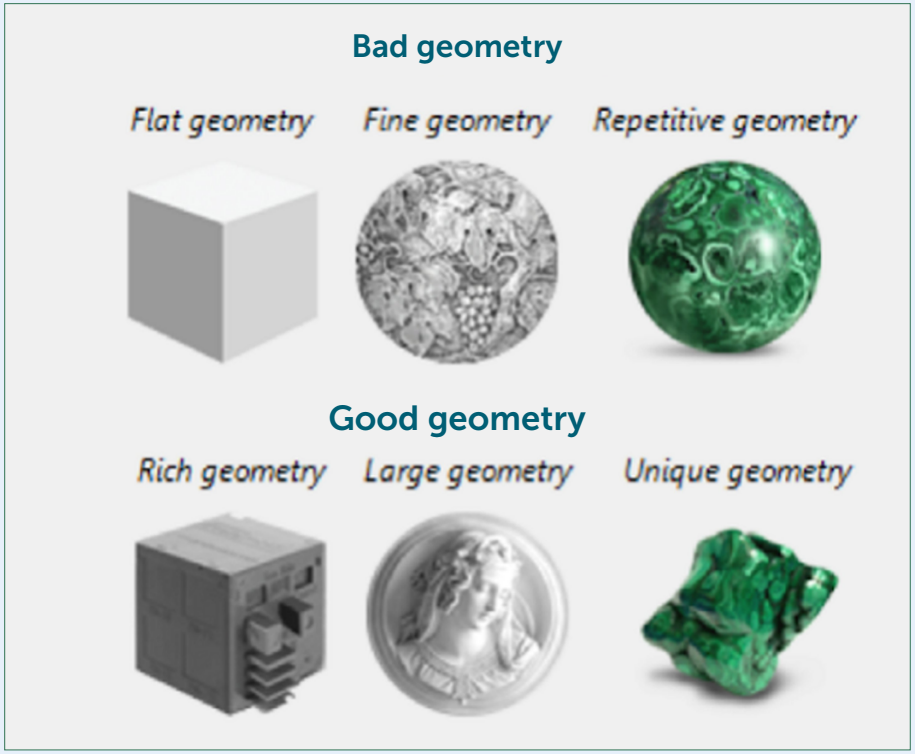
The Geometry or the shape of the object

What applies to the texture also applies to the shape: there are easy to scan shapes and more difficult to scan objects.

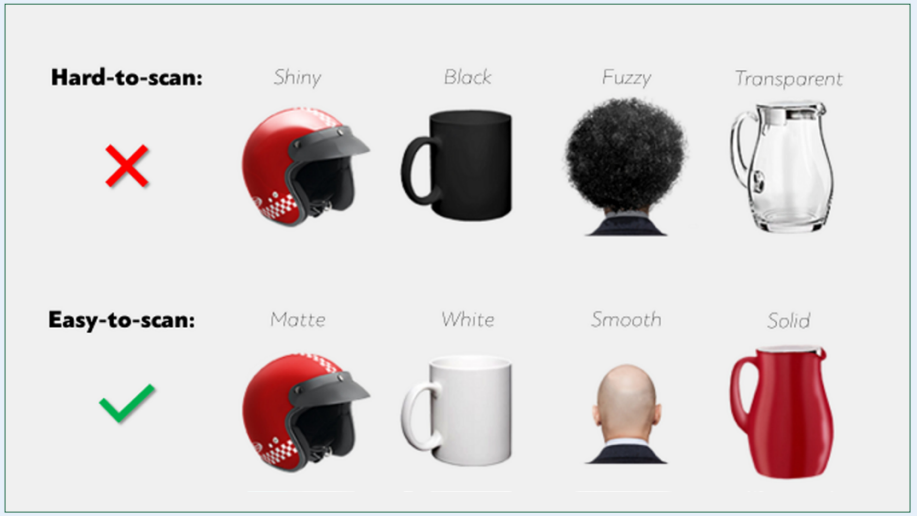
Rich in geometry is easy to scan. So in general we can say: the more irregular the geometry, the easier scanning.
The simplest forms, such as a sphere or a cylindrical form, are much more difficult.

To be able to scan this, we can either apply texture or put extra geometry in the immediate vicinity of the object to be scanned or on the object. The scan operator must be sometimes creative in this!

Very simple shapes are often faster to model in a CAD system, and you have to wonder if scanning is the best way to capture the shape.



A few more examples:



Note

Make sure that the object is immobile during scanning

Technique

- Keeping the right distance and comfortable speed is easier now but still is important. We will expand on these topics further on.
- Move your wrist and point the scanner at different angles is valid for all Artec handheld scanners.
- Always look at the screen – it has never been easier!

If the area you are going to scan requires you to scan upwards or downwards, consider tilting the display – or holding Leo upside down.

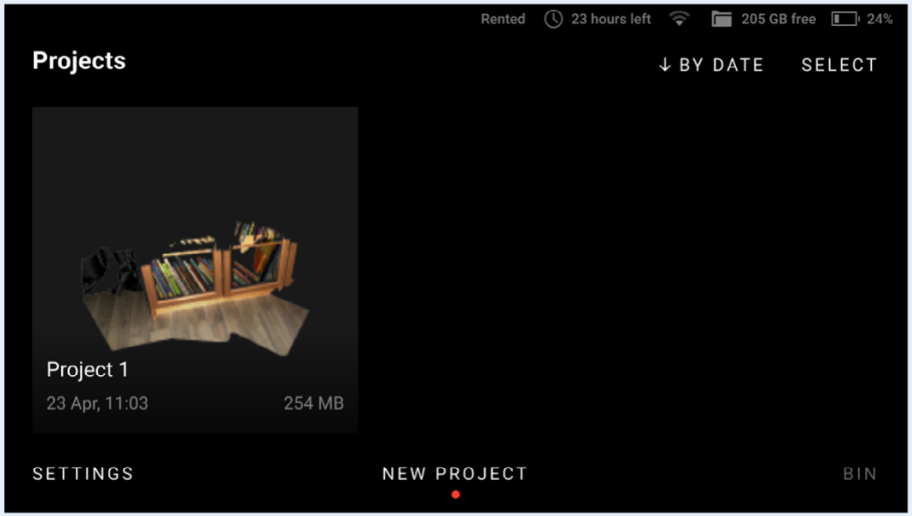
Please note that while it is possible to scan with Leo in any orientation, including upside down as shown in the picture, the maximum accuracy is achieved when the scanner is held upright.

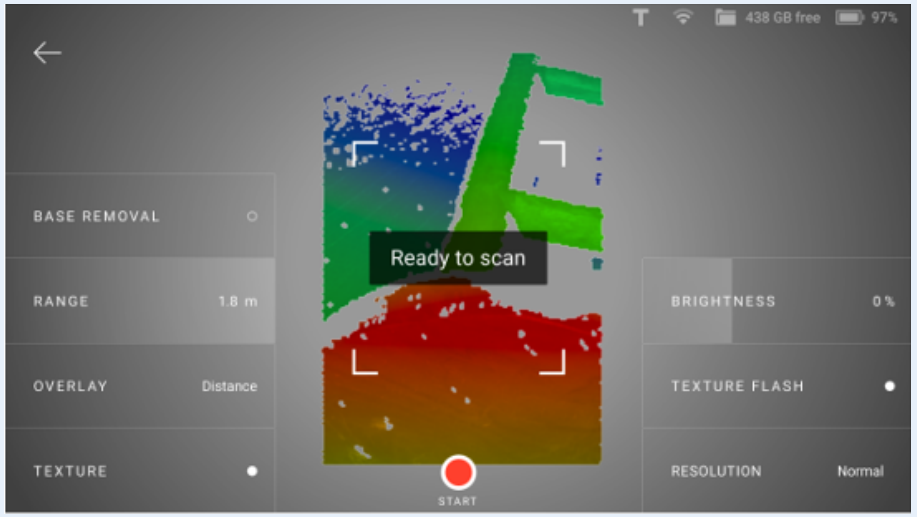
Start Scanning & Settings

Press **New project** in the screen or press the **trigger**.

1. Artec Leo will start preview, i.e. building surfaces without recording them.
2. Adjust either parameter as necessary.
3. Direct the scanner at the object.
4. Practice your movements and assess the quality of the surface being reconstructed on the screen.
5. Once you're ready, tap ● or press the **trigger**.
6. Scan the object from all possible sides.
7. Tap ⊙ or press the **trigger**.
8. Rotate or turn the object upside down to scan the missing regions (go to step 3).
9. Tap ← in the upper-left corner if you are done with the scan.

Once you have recorded a scan, it is added to the project (see Project Structure on page 29).



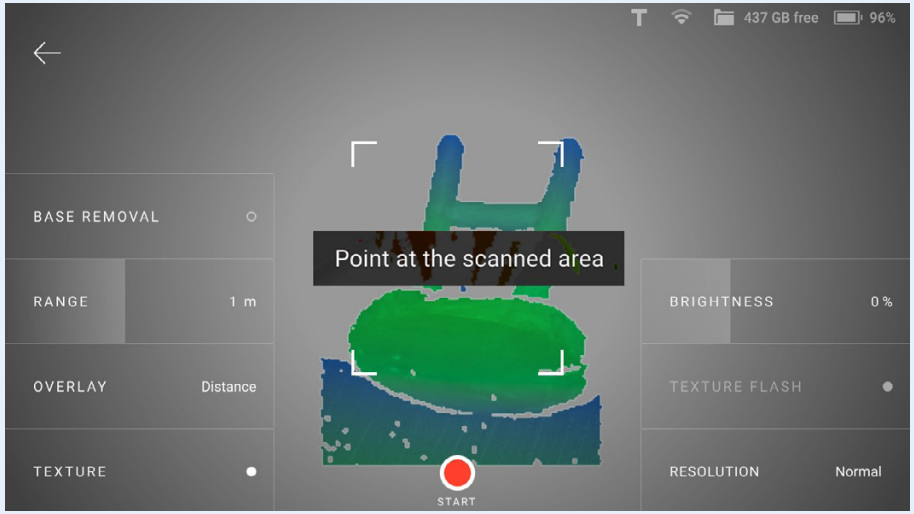


Losing and Resuming Tracking

As you move the scanner, it captures a series of frames. Leo uses features in overlapping areas of these frames to automatically align them. This process is called tracking. If Leo becomes unable to continue building an object surface, it enters the tracking lost mode. It may happen, if:

- You move the scanner very fast.
- Scanner's field of view contains insufficient surface area.

Leo in the lost tracking mode displays message: **Point at scanned area**.



Resume Scanning

To resume scanning:

1. Direct the scanner at a region you've already captured, maintaining the original scanner orientation toward this region.
2. If Leo recognizes the region, it will display the **Ready to scan** message and correctly orient the scene on the screen.
3. Press the **trigger** to continue recording. Leo will continue recording data in a new addition.

In this picture Leo has recognized the region and it ready to continue scanning

Pause and Resume Scan

While scanning, you may need to pause capturing for various reasons. Press the **trigger** to do this.

There are two ways to resume your scan:

- Addition
- New Scan in Project

Add a Scan

If you want to continue scanning the same scene, create a new addition to a scan. A successfully created addition will be aligned with the previously captured 3D data.

To continue scanning in the same scan, follow the procedure covered in **Resume Scanning**.

Alternatively, you can enable Leo to automatically continue scanning after tracking is lost and restored. To enable this:

1. Go to **Settings › Scanner › Scanning**
2. Turn on the **Continue scanning once tracking is restored** toggle.

This setting allows the scanner to automatically continue recording data, after you bring the scanner back to a recognizable region (i.e., after tracking is restored). You don't have to press the trigger for confirmation.

New Scan in Project

If you intend to add a new scan that relates to the project, but either of **the cases below** is applicable, consider adding a new scan:

- Scanning scene has changed.
- You flipped the object.

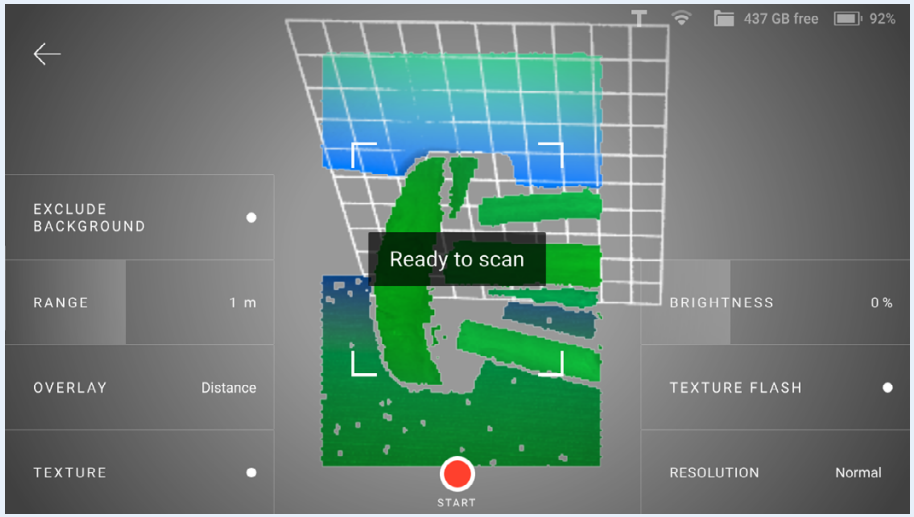
To add a new scan:

1. Open the required project.
2. Tap **Add scan.**
3. Point the scanner at the object and press the **trigger**. The result is a new scan and this one is NOT aligned with previous scans. These previous scans are also not on screen.

Scanning settings

You can set for scanning either of the following parameters.

- HD Mode - resolution
- Texture
- Texture Flash
- Base Removal
- Texture Brightness
- Scanning Range
- Quality Overlay
- Distance Overlay
- Targets

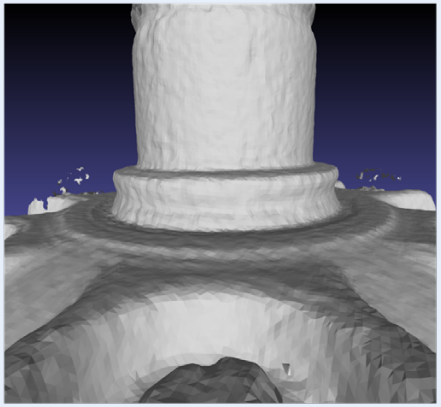


HD Mode & HD Reconstruction

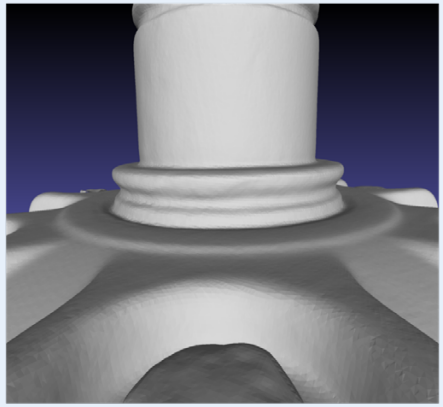
HD mode is an AI-powered scanning technology for ultra-sharp, clean, and detail-rich scans.

Key advantages of the HD mode:

- scanning with a high resolution of up to 0.2 mm.
- broad range of objects that can be scanned flawlessly and in high detail: from smaller, intricate parts like valve handles, to larger areas with fine details like car engines.
- little to no noise in raw data for cleaner post-processed data and saved time for your final 3D model.
- capability to capture dark or shiny surfaces in high resolution, in their original shape and with no extra steps.



Mesh Resolution: SD



Same scan in HD

When is HD better?

- High resolution needed.
- Object has a lot of noise.
- QA/Reverse engineering application.
- Object is difficult to scan and/or has thin parts.

When is SD better?

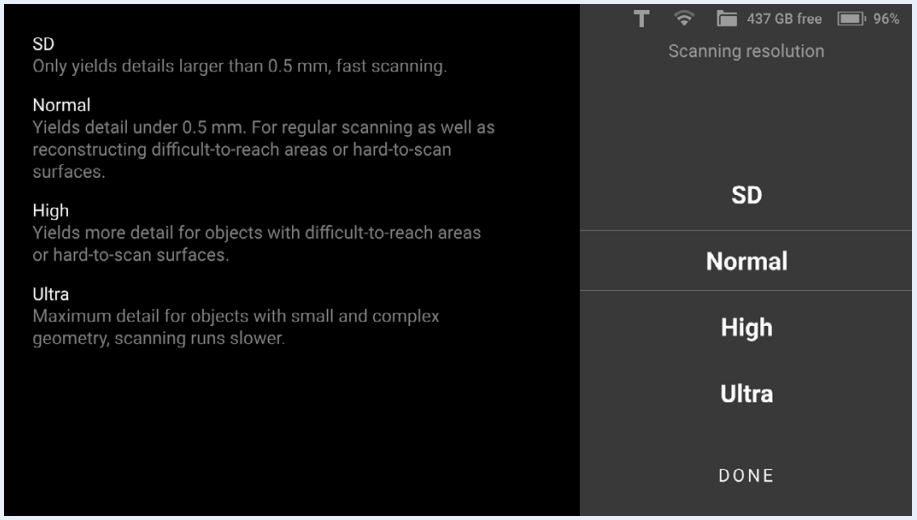
- Simple shapes are being scanned.
- The user doesn't have a powerful PC for processing.
- Limited time for scanning and processing.

The HD reconstruction in Artec Leo is **off** by default. When you start your project, you will see the **Resolution** button at the lower-right corner. Tap on **Resolution** before scanning and select an appropriate HD resolution to capture HD frames and enable HD reconstruction.

The HD resolution modes available are:

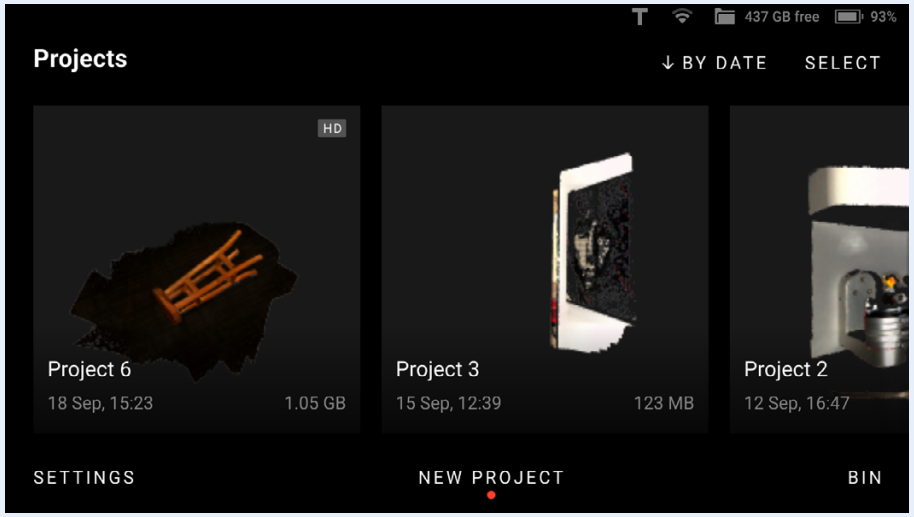
1. **SD** - no HD frames recorded
2. **Normal** - every 8th frame recorded, will be HD.
3. **High** - every 4th frame recorded, will be HD.
4. **Ultra** - every 2nd frame recorded, will be HD.

The higher the resolution, the larger the project will be and more time will be required for its reconstruction. The speed of scanning might also vary depending on the resolution.



Scanning resolution options

Then you perform the scanning as usual. Once you stop scanning and even exit the current project, HD reconstruction will continue to run in the background until you start another scan in a new project.



Project 6 with HD data

Note

It is advised not to rotate or change the position of the object during reconstruction. If you do so by mistake, the reconstruction will pause and resume again.

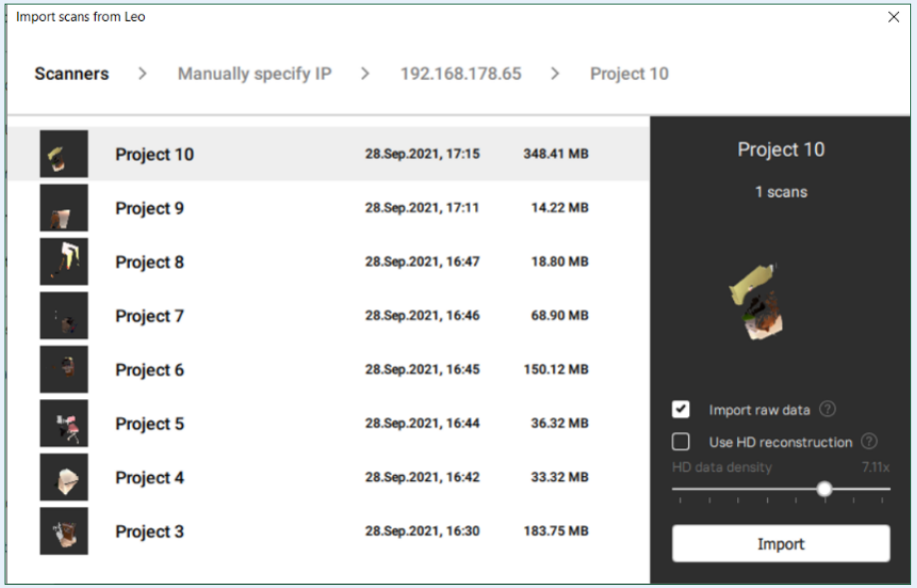
When you start your project, you will see the HD recording button at the lower-right conner. You need to tap it before scanning, to have HD frames in your project.

Note

During Export of the data, you must decide if you want to export the raw HD data or that it will be converted DURING export. We advise exporting the raw data and doing the conversion in Artec Studio. In this way you have faster access to the Leo again for scanning!

HD mode: import

- The user may choose to import scans in HD or SD, by selecting/deselecting the Use HD reconstruction checkbox in the “Import” window in Artec Studio.
- If the user wants to perform HD reconstruction at a later time, they can import raw data - the respective checkbox needs to be checked.



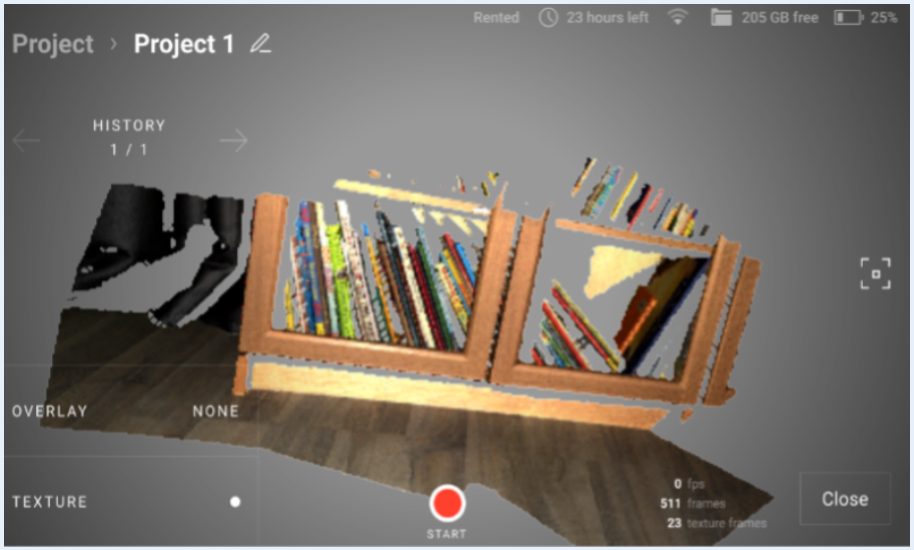
Texture

If you want to see texture while scanning:

1. Press the start/stop button to start Preview.
2. Ensure that Texture mode is activated.

> **Note**
>
> During scan, Leo displays texture blended with quality overlay. To observe pure texture, stop scanning.

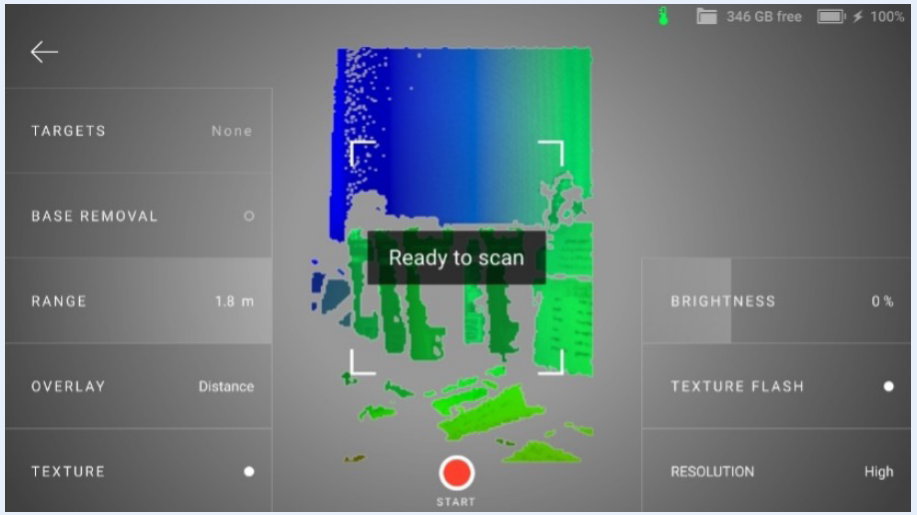
- In order to switch the texture visualization on/off, tap on the icon in the lower left corner of the screen.
- Can be changed during preview, scanning and data inspection.
- Recommended to be kept on when texture is important for tracking and further texturing of the model.



Texture Flash

To enable texture flash and get a bright, softly-lightened image:

1. Press the start/stop button to start Preview.
2. Ensure that **Texture flash** is on.



Turn it off if you cannot use it due to circumstances. Note that turning the flash off must be compensated for by sufficient ambient lighting or increasing the value of **Exposure**. Keep in mind that high exposure will result in slower performance.

When **Texture flash** option is turned on, the **Exposure** setting will not be displayed. Instead, you can adjust the **Brightness** of the output image.

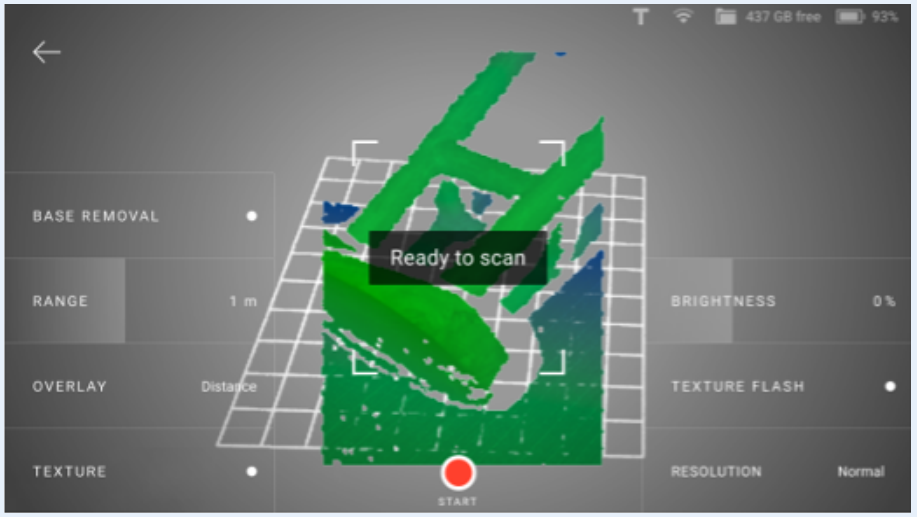
Base removal

Once imported in Artec Studio, scans from Leo can be cleared from base, i.e. flat surface that supports object being scanned. The following recommendations might help you decide whether you need this option.

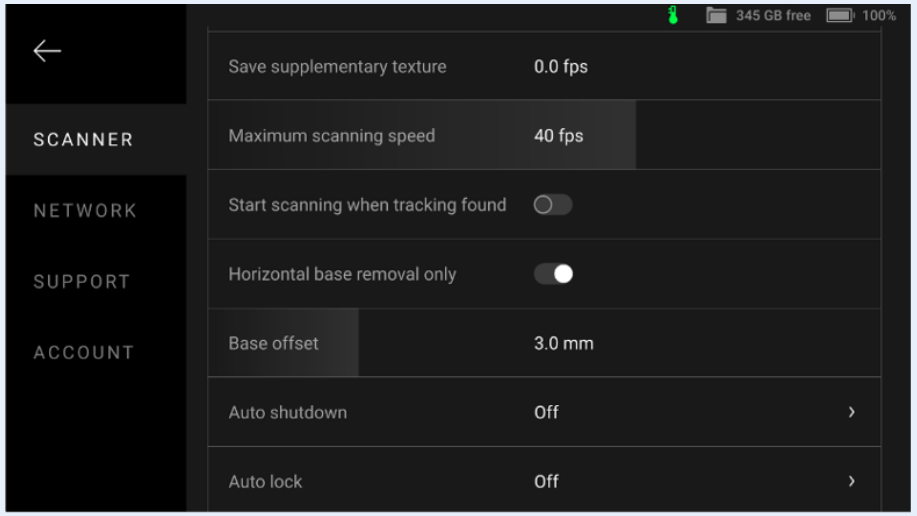
Objects to scan	Options
Distinct vertical object	Base removal in on
Entire scene, floor, table	Base removal in off
Object sticking out of a wall	Base removal in on and Horizontal base removal only off

To enable base removal:

1. Press the start/stop button to start Preview mode.
2. Ensure that Base removal is turned on.
3. Direct the scanner at the flat surface which you intend to leave out.
4. Press the start/stop button to start scanning.



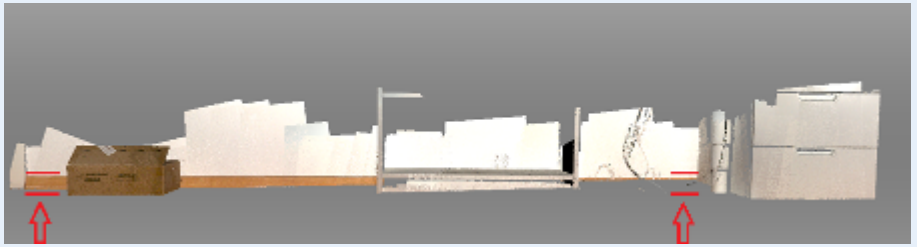
Detected Base



- The detected base is not shown but is recorded.
- The base is marked with the grid as it is in Artec Studio.
- Base removal position will be remembered between the scans when using auto-align.
- Setting in **Settings › Scanner › Advanced** allows to enable the base removal for horizontal surfaces only (see picture right).

If the Base Tracking Path is longer than 1000 mm, the Base Position will get noticeably higher due to tracking error accumulation and may damage the bottom of the object.

This can be compensated by flipping the object and scanning it from the other side. However, if the object is large and cannot be flipped, we recommend disabling Base Removal, or adjust the offset in **Settings › Scanner › Advanced › Base Removal Distance**.



The function **base removal** stays active during scanning. This means that when you make multiple scans, the base that was detected on the first scan, will also be removed on the second scan.

Exclude background

This feature enables you to remove any unwanted background in the entire 3D space surrounding the object during scanning. Naturally, the surroundings also include the base, and therefore this feature removes the base as well.

Note

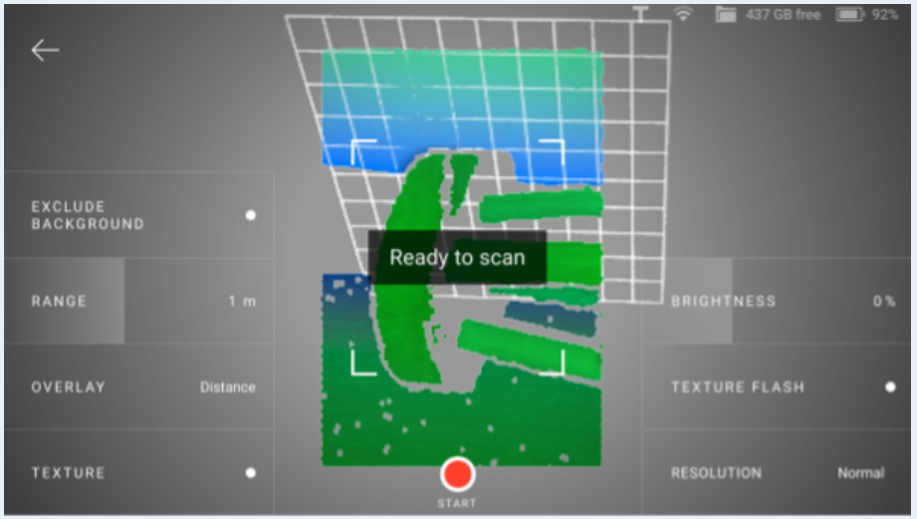
The **Base Removal** option disappears from Leo screen when this feature is enabled.

To exclude background in your scans:

1. Turn on the **Exclude background for new scans** in **Settings › Scanner › Scanning**.
2. Press start/stop button to start **Preview** mode.
3. Ensure that Exclude Background is turned on.
4. Direct the scanner at the object you intend to scan. The red areas on the window are excluded as unwanted background.
5. Press start/stop button to start scanning.

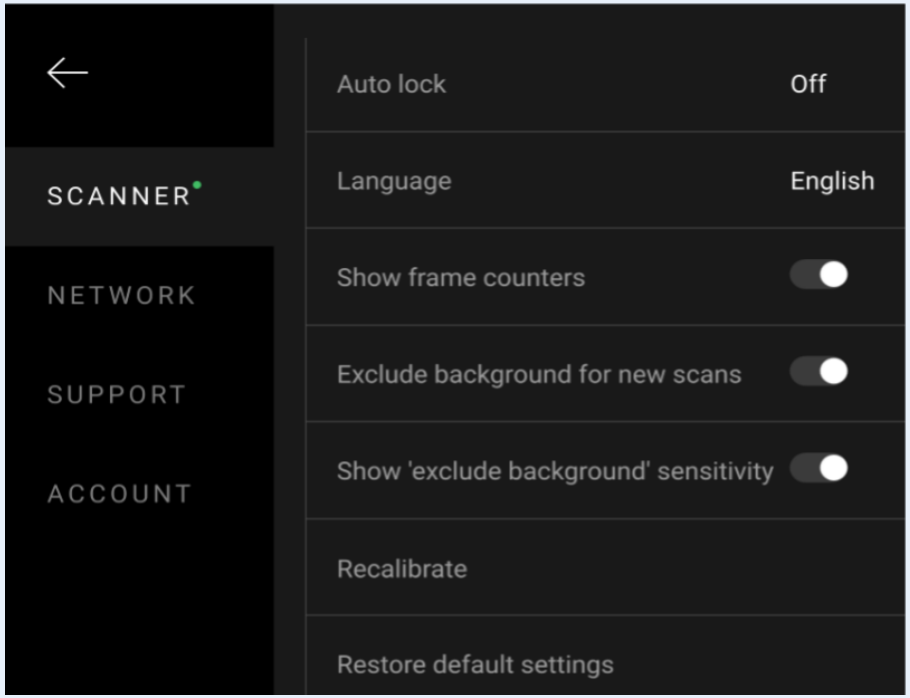
You can adjust the **Sensitivity** parameter depending on how much of the surrounding environment you want to leave out. The **Show exclude background sensitivity setting** displays the **Sensitivity** slider on your scan window in the Preview mode, which can be adjusted before scanning. However, if this option is disabled, you will be able to adjust the sensitivity after scanning is completed.

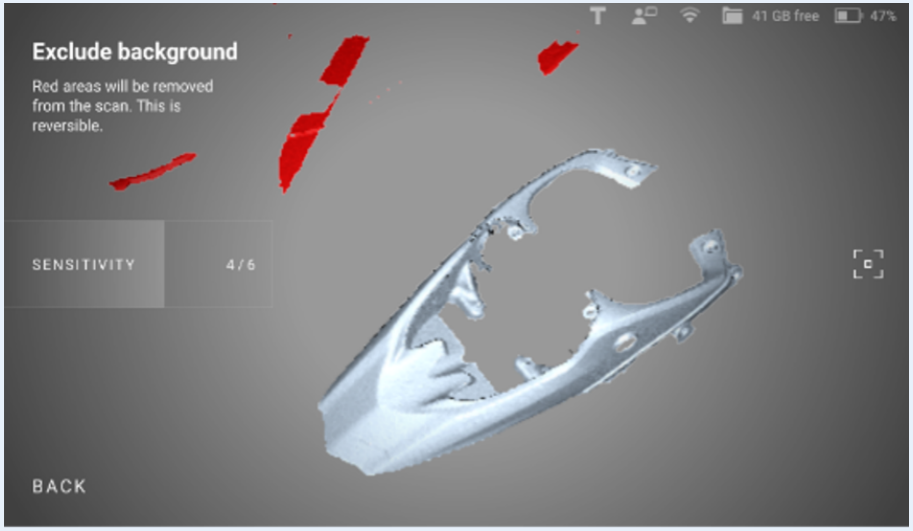
To adjust **sensitivity** after scanning, click on the Exclude Background button that appears after scanning is completed. Before you import project, ensure that the **Exclude background** for Leo scans checkbox is selected in Artec Studio settings.



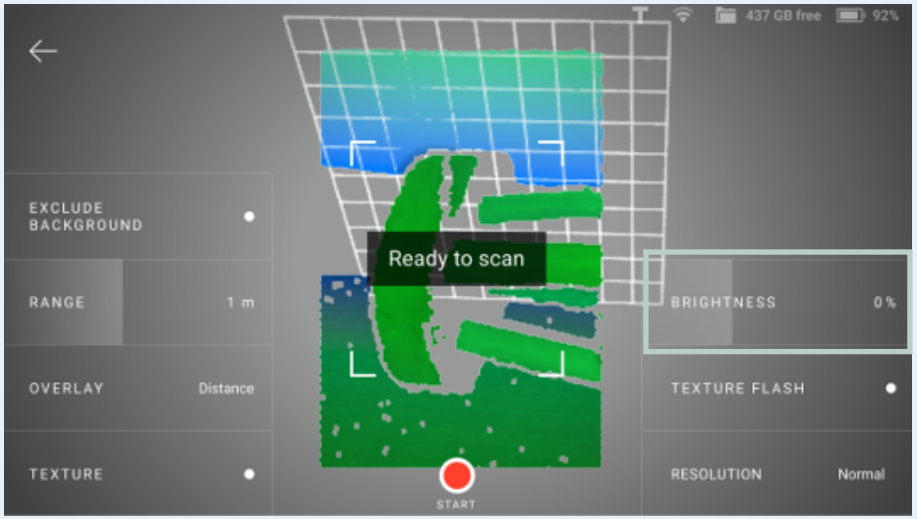
Option to exclude background

- Switch the option on in **Settings › Scanner › Scanning › Exclude background for new scans**.
- The sensitivity of the “Exclude Background” feature can be tweaked after you have stopped the scanning session. The areas selected for exclusion will be colored red and removed.
- The background exclusion is reversible.





Texture brightness



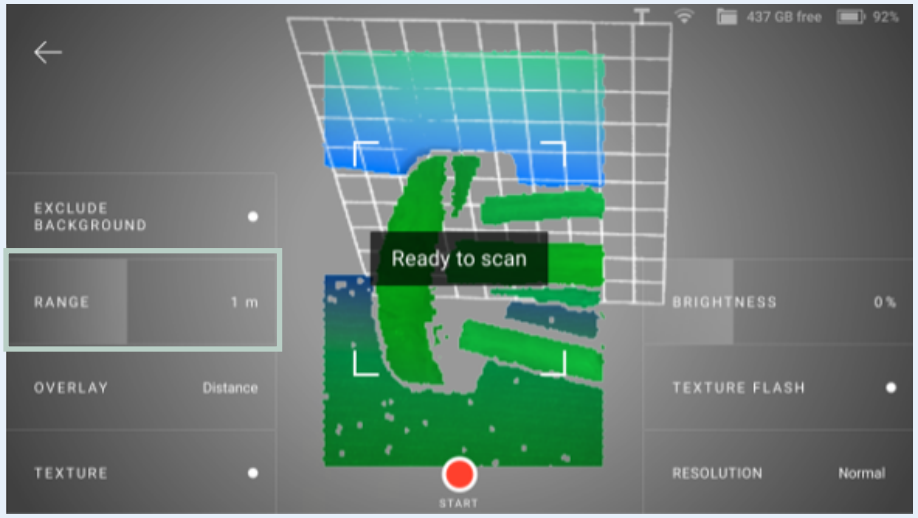
Texture brightness

1. Tap **New project** or **Add scan**. Leo starts **Preview**.
2. Direct the scanner at the surface with rich texture which you can use to assess texture quality.
3. Move the **Texture brightness** slider left and right to set an optimal value (as a percentage).

When is this useful:

- Increase for dim lighting or dark objects.
- Decrease for bright light or white object.
- Can affect tracking and every texture-using algorithm.

Scan Range

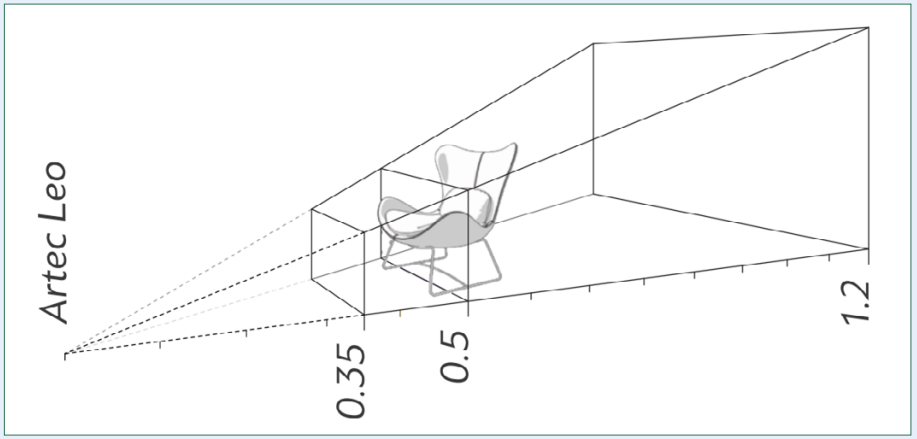


Leo's working range is from 0.35 mm to 1.2 meters.

Leo's default scanning range is from 0.35 to 1.2 meters. Optimal distance for most objects is about 0.5 meters (1.5 ft) which corresponds to the middle of this range.

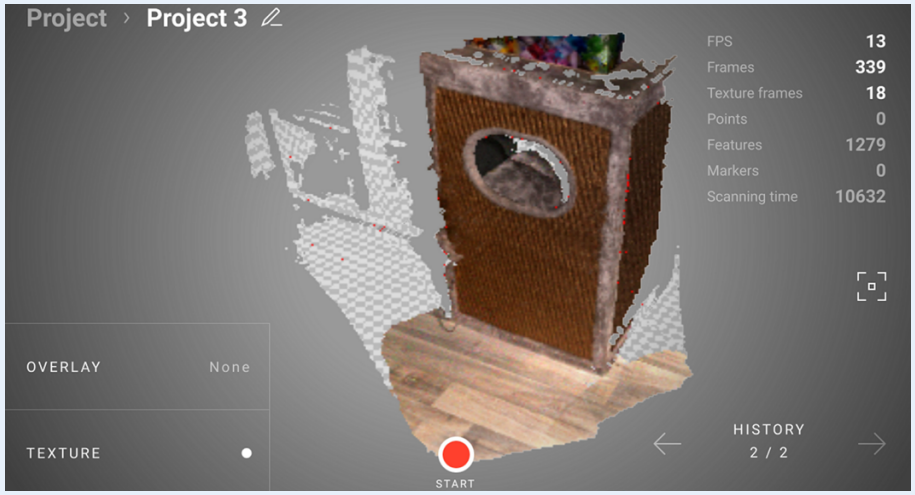
Surfaces recorded at the far distances might be of bad quality. You may want Leo to cull these distant surfaces, i.e. shrink its field of view by adjusting the position of the farthest plane:

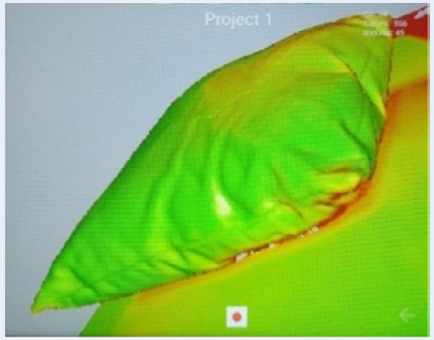
1. Press start/stop button to enter **Preview** mode.
2. Move the **Range** slider left and right to set an optimal value.



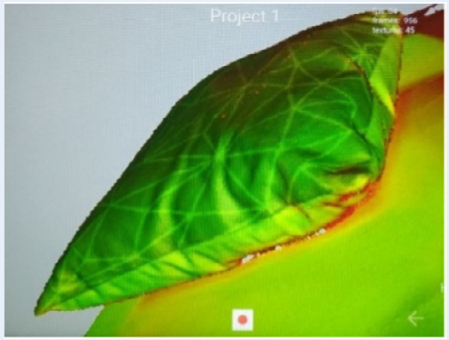
Texture and large distance

- Texture information captured at a distance larger than 1200 mm has lower resolution and is not taken into consideration for further processing.
- It is rendered with a checkered pattern to prompt the user to rescan those areas from a closer distance if color is important for the final model.





Quality overlay On
with Show texture Off



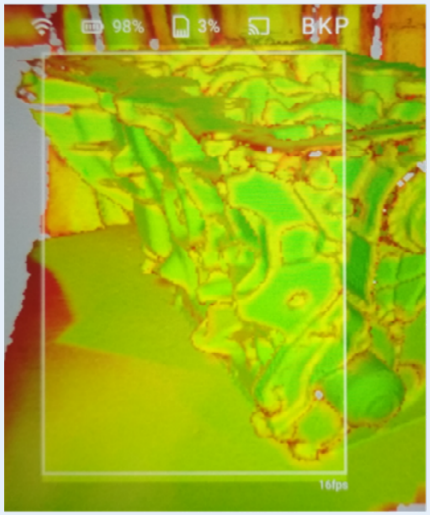
Quality overlay On
with Show texture On

Quality Overlay

Can be accessed during scanning and data inspection.

- **Red ›** Insufficient scanned area, distant object or fast movements.
- **Yellow ›** Satisfactory scanned area
- **Green ›** Well scanned are.

The surface quality mode is compatible with texture.



Quality Mode

Analyzes the scanning data during scanning and gives hints to the user which areas are reconstructed well, and which need additional attention.

This mode will show you if you are scanning too fast or holding the scanner too far. If you have many zones highlighted in red or yellow, hold the scanner longer at this spot, or move the scanner closer.

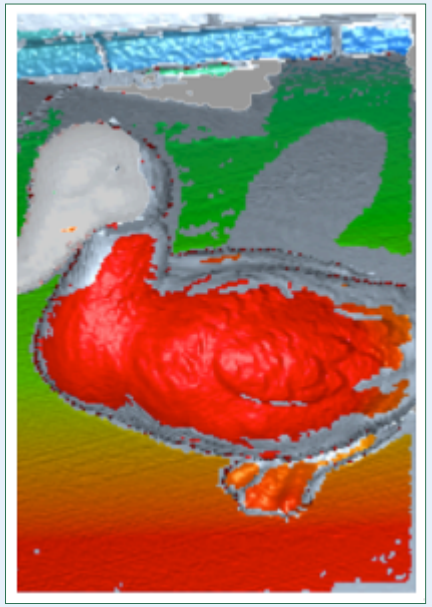
If you were scanning too fast (which is easy to do with Leo) slow down a little and hold the scanner at the same spot until the area turns green. General rule: if the area is not green, keep scanning it until it turns green.

The edges of non-watertight scans or the edges of the holes will always remain yellow or red.
This is not a sign of a problem; this is an indication that these areas may not have a perfect resolution (compared to the rest of the object). This is not specifically unique to Leo; it is true for every scanner. The quality indicator mode just makes you aware of it.

Distance Overlay

Distance overlay helps identify an optimal scanning distance. It colors surfaces using different colors depending on how close the scanner is to the object (see the table below).

Transparant	= Te veraf
Red	= 0.35 m
Orange	= 0.40 m
Green	= 0.45-0.85 m
Blue	= 1-1.2 m
Deep Blue	= Meer dan 1.2 m



Target-Assisted Scanning

To perform scanning with targets, a target file with information about the targets to use must first be uploaded into Leo and selected as the default one (see **Enable Target-Assisted Scanning for details**).

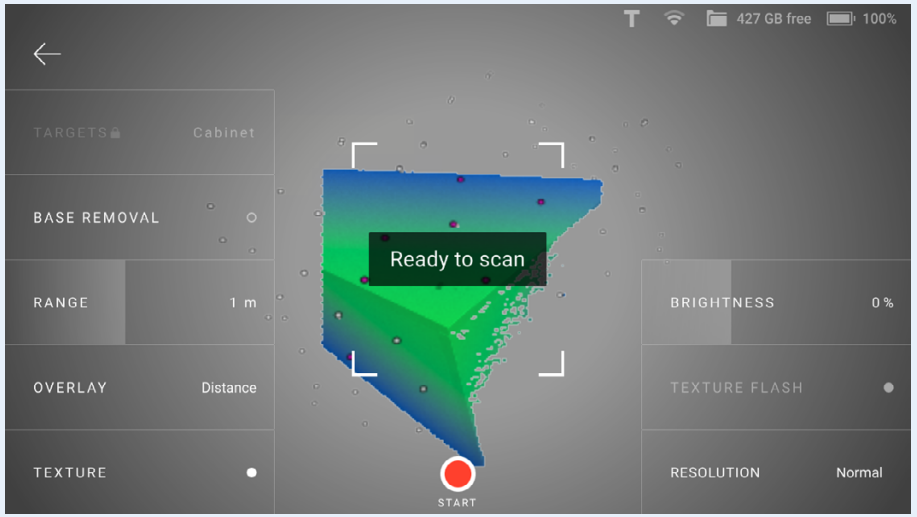
Then follow these steps:

Step 1.

Until Leo does not see the targets from the selected target file in its field of view, its screen will be like the one presented image below.

Target-assisted scanning mode is set but Leo does not see targets in its field of view.

Point the scanner at the object with the targets. When Leo recognizes the targets, you will see them on the preview screen.



Leo has recognized the targets and is ready to scan.

Step 2.

Before you start scanning, you can select another target file. To do this, tap Targets at the lower-right corner and then select the desired target file from the list. Select **None** to not use targets when scanning.

> **Note**
> Once the scanning has started, you will no longer be able to change the target file: the Targets button will be locked.

Step 3.

Tap **START** or press Trigger and start scanning. During the scanning process, the target marks should be visible on the screen, as they were on the preview screen (image left). If Leo does not see the targets in its field of view, then the tracking will be lost, the recording will be interrupted and the warning **Point at the scanned area** will be displayed.

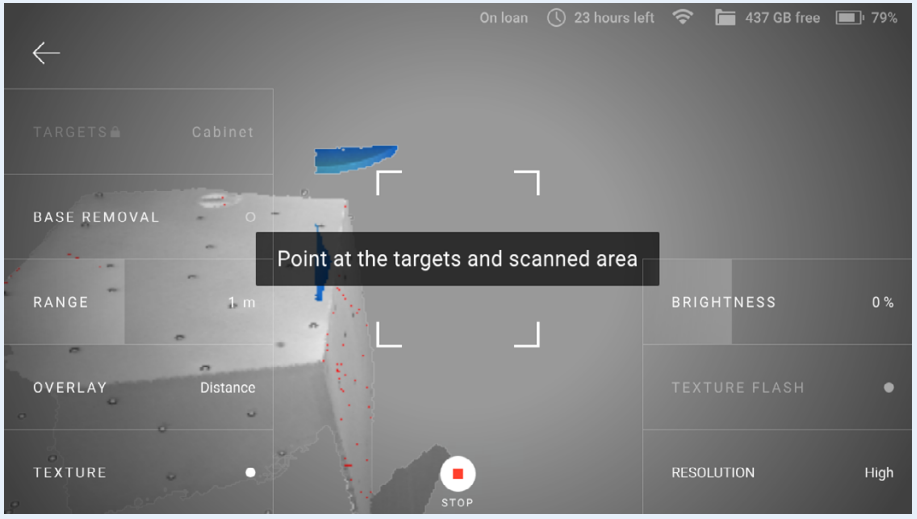


Figure 11 Leo has lost tracking when scanning with targets..

Step 4.

If the tracking is lost, you can do one of the following:

Point the scanner at the targets again. When Leo recognizes the targets, its screen will be like the one presented in the figure below and you can continue scanning.

Leo has recognized the targets and is ready to continue scanning.

Tap **start** or press **Trigger** to stop scanning.

Projects and Scans

Once Leo has booted up, the **Project** screen appears. Scanner allows you to view projects and scans on its display (**Open Project**), continue scanning to the existing scan and add new scans to the project.

By default, the most recent project is available on the left of the screen. To invert the order, tap the *Date* link in the top right corner.

Open Project

1. Access the **Projects** screen.
2. Scroll the list horizontally while consulting the preview images.
3. Then tap the required project. Leo will display the project structure where you can either add a new scan or continue recording to the existing one.

Project Structure

Any Leo project includes at least one scan. If the scan was paused or interrupted and then resumed, an addition appears in the **History** section of the Scanning screen. You can undo each addition sequentially by navigating the **History** backwards.

In this picture we see that Project 3 has three scans

- Scan 03 is one scan.
- Scan 02 (an “Add Scan”) has two additions, meaning the scan was interrupted and resumed twice.
- Scan 03 (an “Add Scan”) has three additions, meaning the scan was interrupted and resumed three times.

Adding scan data

There are two ways in which you can add scan data to existing projects:

- Continue the current scan (via auto-align).
- Make a new scan.

By default, auto-align is always enabled. Every pause and every stop will always be continued with auto-align. Auto-align is the same as in AS for Eva or Spider and follows the same rules.

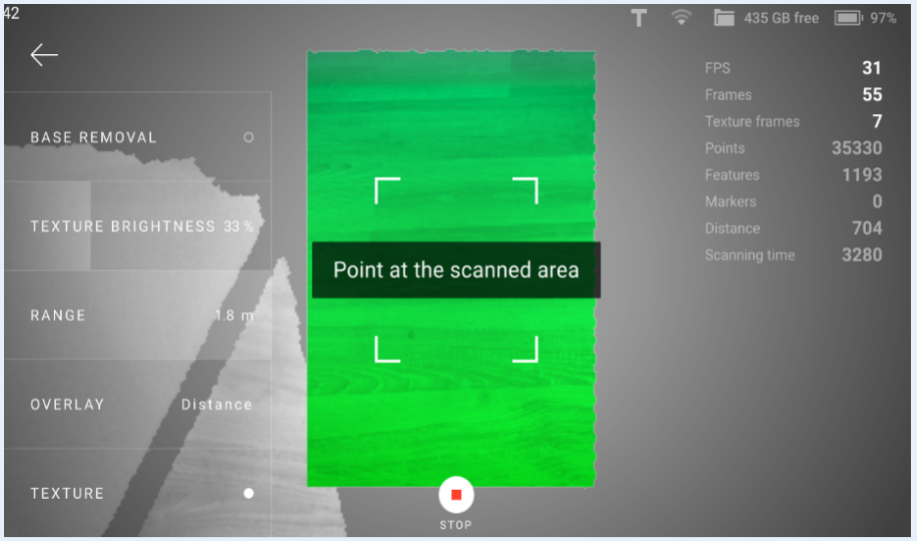
> **Note**
> The scan data captured before and after auto-align will merge into a single scan in Leo UI, but will appear as two separate (but aligned) scans when imported into Artec Studio.

Adding data to the same scan

- Access Projects, tap on the scan you want to continue, tap Scan.
- The screen reads: **Point at the scanned area**.
- Direct the Leo at the previously scanned area until **Ready to scan** appears on the screen. Then start scanning.

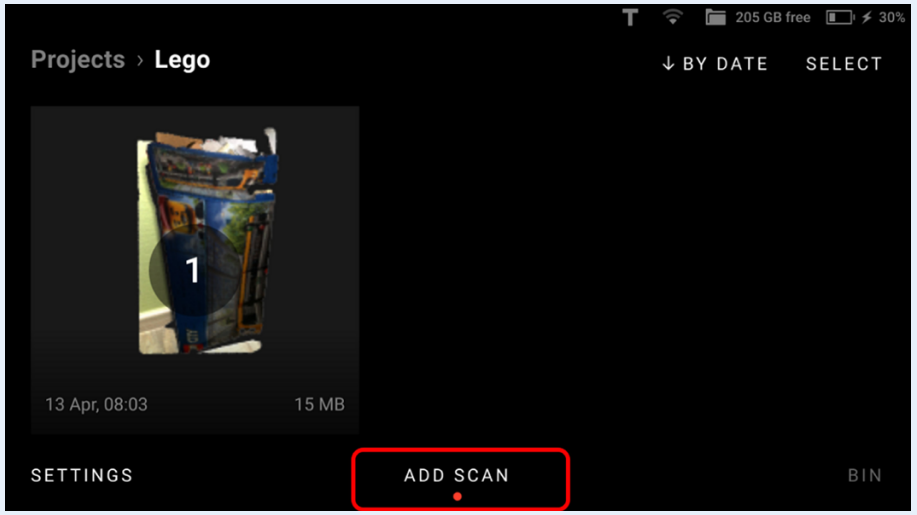
If the object was turned, it is still possible to add the data to the same scan.

Just direct the scanner at a region you've already captured, maintaining the original scanner orientation toward this region and wait for the message: **Ready to scan!**



Adding a new scan

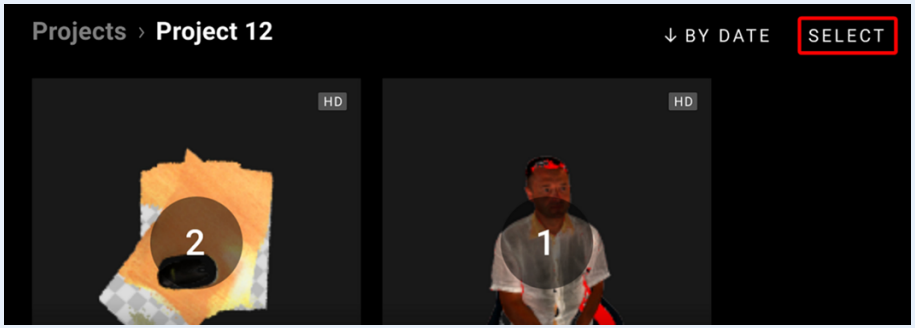
- If you have to scan a new, previously unscanned area, you need to create a new scan. To do so, tap on the project icon to open it, then click on the trigger button on the scanner or tap Add scan on the screen.
- Each time the Add scan function is used, a new scan group is formed automatically and will show so upon the project import to Artec Studio.

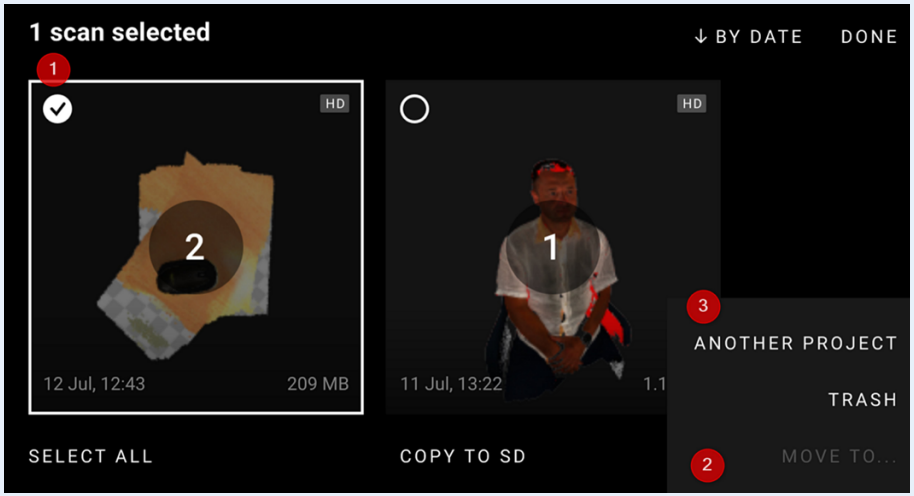


Moving a scan to another project

To move a scan to another project on the Leo scanner:

- access the Project from where the scan originates,
- press Select,
- choose the scan you need,
- press **Move to › Another Project** and select the destination project.

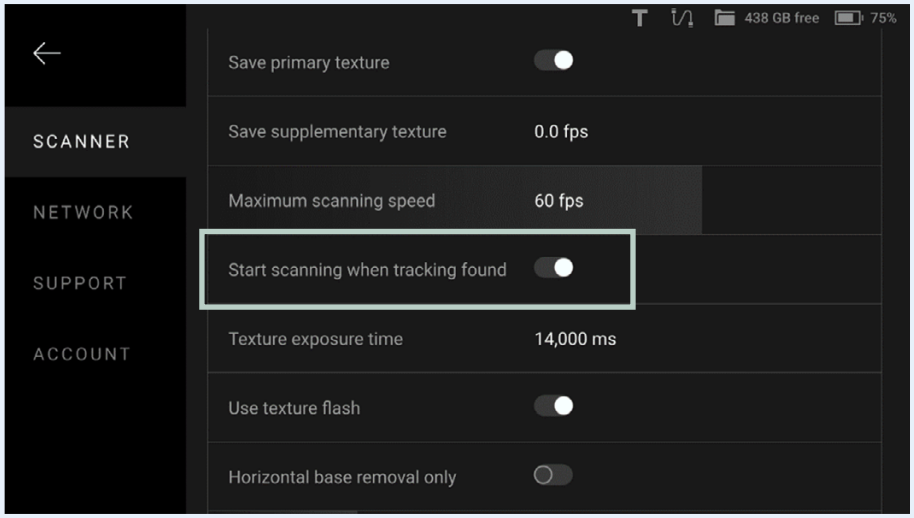




Start scanning when tracking found

As mentioned before, you must wait until the message “Ready to Scan” when the scanner has recognized the area with which he can continue to scan.

You must confirm this by activating the trigger in the handle of the Leo en scanning will start. **It is possible to skip this last step.**



Go to **Settings › Scanner › Scanning** and activate the function **Start scanning when tracking found**. Switch this option on to immediately go back to scanning again right after tracking is restored.

Encrypt Projects to Export

To ensure security of HD scan data, Leo enables you to encrypt your projects before exporting them to your local computer through the browser.

To do so, turn on the Encrypt projects feature in Settings. After selecting projects, when you tap Download, Leo converts those projects into a new “.leo” format before downloading them.

Note

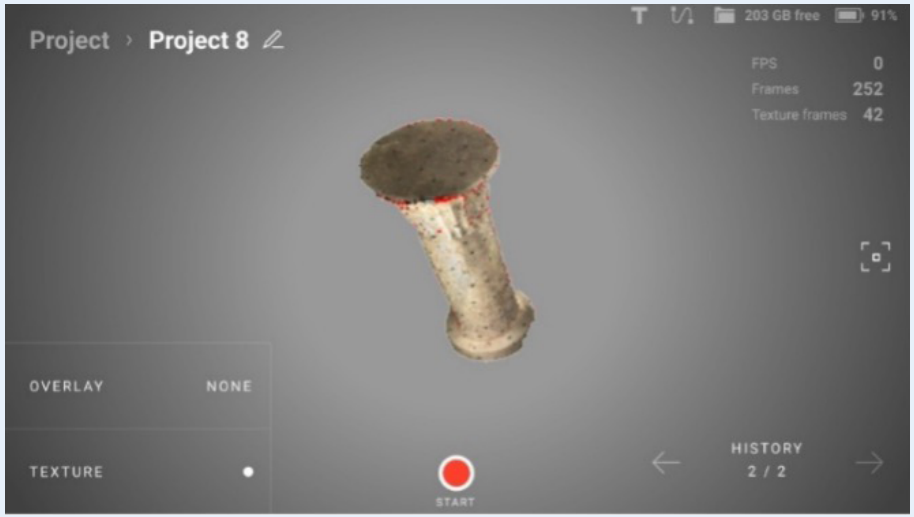
The encrypted projects in “.leo” format are only compatible with Artec Studio version 16 and above.

View 3D Data

Use the following gestures to navigate 3D content on Artec Leo.

Rotate › Move one finger across the screen around the scene.
Pan › Move two fingers across the screen.
Zoom › Use two fingers: spread them apart to zoom in and move them toward each other to zoom out.

To bring back and scale the possibly moved away 3D content, use the **Fit to view** button.

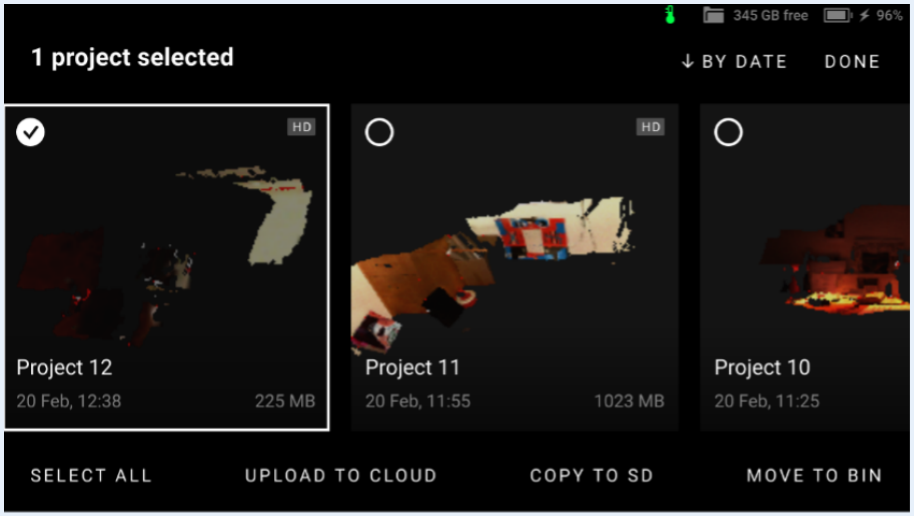


Upload Project to Artec Cloud

Using Artec Leo, you can now upload your projects directly to Artec Cloud without needing SD cards or cables. Artec Cloud is an easy-to-use collaborative platform that makes your 3D scan data available to you anytime and anywhere.

To upload one or several projects to Artec Cloud:

1. Access the Projects screen.
2. Tap the Select button.
3. Select the items that you want to upload.
4. Tap **Upload to Cloud**. Artec Leo will automatically upload the items to your Artec Cloud account.



Note

Please ensure that your Cloud account has enough storage space before uploading large projects. Also, make sure Leo is connected to the internet until the upload is completed.

Attention

The **Upload to Cloud** functionality is available to Artec Cloud users with a **Trial, Collaboration**, or Processing license only. Check the Artec 3D website for more information about Artec Cloud licenses or ask 4C.

Rename Project

To rename a project, open the project and open any scan inside the project. On the scanviewing window, simply tap on the Project name, or click on the Edit icon at the end of the name field and change the name.

Copy Project or Scan to microSD Card

Attention

To ensure that a trusted account user will be able to open a project from Leo, first renew the scanner configuration.

To copy one or several projects to SD card:

1. Insert a microSD card into Leo.
2. Access the **Projects** screen.
3. Tap the **Select** button.
4. Select the items that you want to copy.
5. Tap **Copy to SD**.

Remove Project or Scan

To delete one or several projects:

1. Access the **Projects** screen.
2. Tap the **Select** button.
3. Select the items that you want to remove.
4. Tap **Move to bin**. Artec Leo will move the items to the Bin.

Remove Scan

To delete scans from the project, open the Project and start at step 2.

Access Deleted Projects and Scans

To access the deleted scans and projects:

1. Open the **Projects** screen.
2. Tap the Bin button. Leo will open the Trash bin showing all deleted scans.

> **Note**
> Any deleted project will split into scans once it appears in the Trash bin.

Leo lists all the deleted scans by time created. Scans are named using the Project 2/1 pattern meaning that it is the Scan 1 from the Project 2.
To select scans in the **Trash bin**, tap them. To select all items at once, use the Select all button.

To restore scans

Tap **Restore**. The scans will then appear in their respective projects.

To delete scans

Tap **Delete**. The scans will be permanently deleted from Leo.

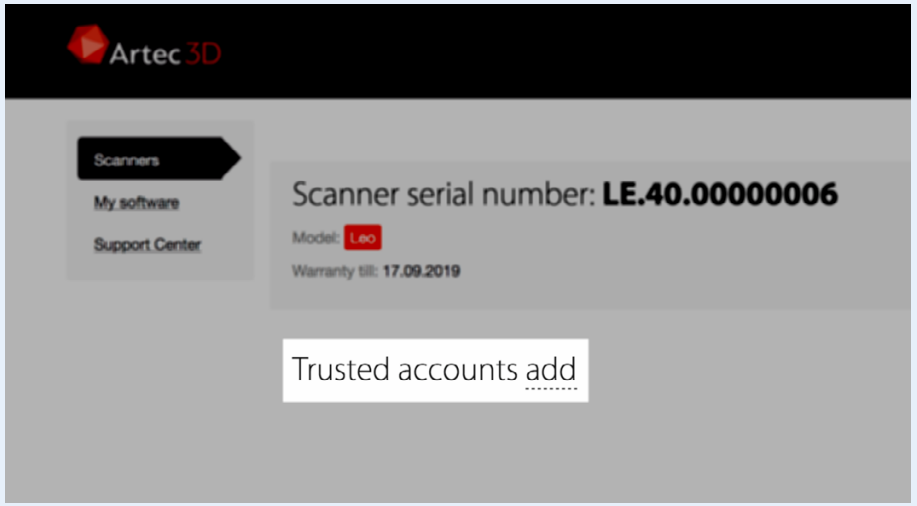
Trusted Accounts

Only specific users can open projects from Leo in Artec Studio:

- Scanner owner.
- Users from the **Trusted accounts** list.

To grant the specific user an access to your Leo projects, follow the steps:

1. Open **my.artec3d.com**.
2. Access the **Scanners** section.
3. Scroll to the **Trusted account** title.
4. Click the **add** link.
5. Enter the email address of this **my.artec3d.com** user account.
6. Access **Projects** on Leo.
7. Tap **Settings**.
8. Then select **Scanner › General › System**.
9. Tap Renew in the **Scanner configuration** field.



Attention

If you plan to share a project with someone from the Trusted accounts list by copying a project to a microSD card, **first ensure that you have renewed the scanner configuration**.

Open project in Artec Studio

Leo produces raw scans that you can process in Artec Studio. It is possible to import projects from Artec Leo either over a network (Direct Import From Artec Studio) or using a microSD card.

Attention

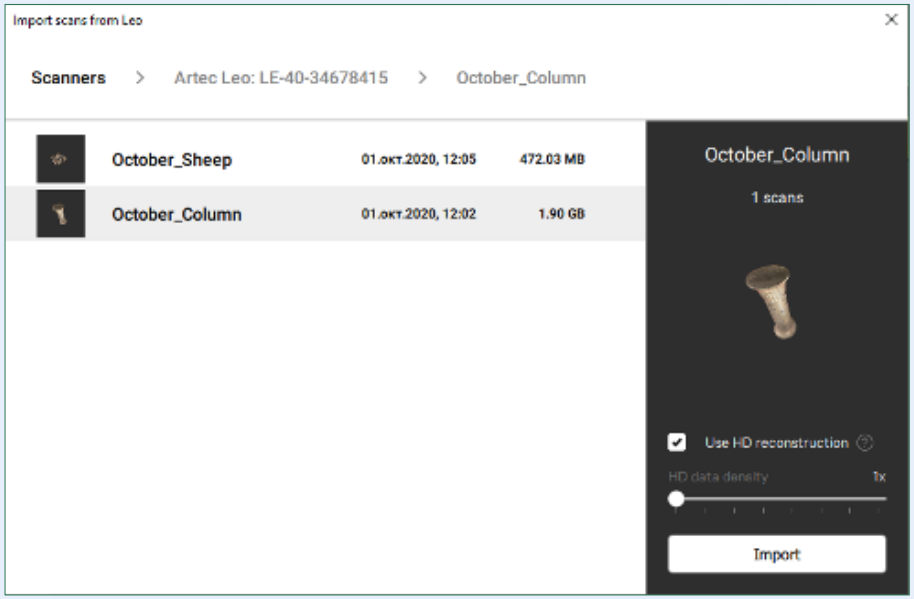
The account you use in Artec Installation Center must be either the same as on Leo scanner or one of the Trusted accounts list at **my.artec3d.com**.

If you scanned with the Remove base enabled, ensure that the Launch base removal for Leo scans checkbox is selected in Artec Studio settings.

Direct Import From Artec Studio

To successfully import a project from Leo:

1. Ensure that your computer and Leo are connected to the same network.
2. Ensure that Leo doesn't displays any 3D data.
   - If the device is scanning, cease the session.
   - If any project is open, close it.
3. Open Artec Studio.
4. Select **File › Import › Leo project (connect to scanner)**.
5. Choose the scanner from the list and click **Connect**.
6. Select the required project from the project list and click **Import**.



Once the application imports files, scans will appear in the Workspace panel. The imported project and scans will be automatically grouped — the group with the project name will be divided into subgroups of scans (see here about grouping in *Workspace* panel).

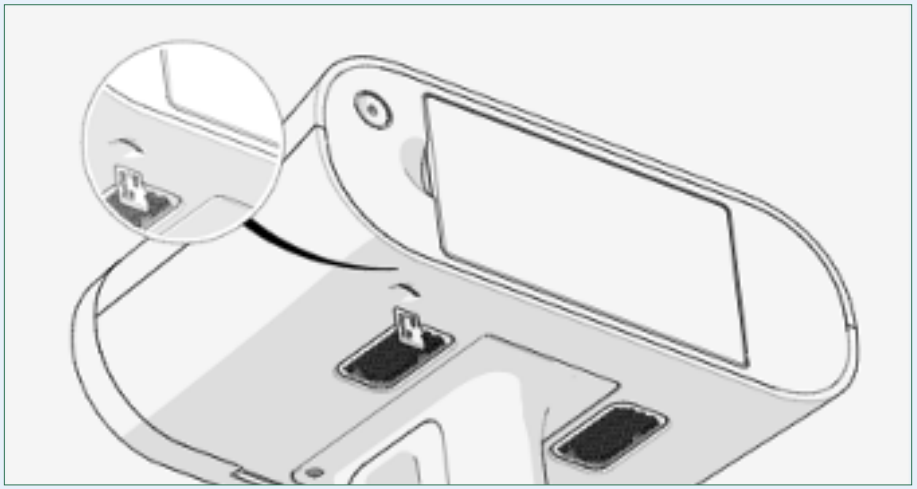
Use microSD card

In order to process 3D data from Artec Leo, first insert a microSD card into Leo. Then perform the following actions:

Attention

Strictly follow the instructions given in the MicroSD Memory Card section.

1. Copy data from device's internal storage to SD card.
2. Remove the microSD card from Leo.
3. Insert the card into a microSD reader connected to the computer with the installed Artec Studio.
4. Copy files to this computer.
5. Open Artec Studio.
6. Select **File › Import › Leo project**.
7. Navigate the folder tree to the required project.



Process Project in Artec Studio

Once you import the project, process it as Artec Studio Manual suggests.

Advanced scanning settings

Settings allows you to get information on various aspects of Leo operation and adjust it to suit your preferences. To access settings from the **Projects** screen, tap **Settings**.

This chapter covers the following scanner settings and some related topics:

Scanner
- General
- Scanning Settings
- Advanced Settings

Network
- Network Connections
- Cast Screen to Browser

Support

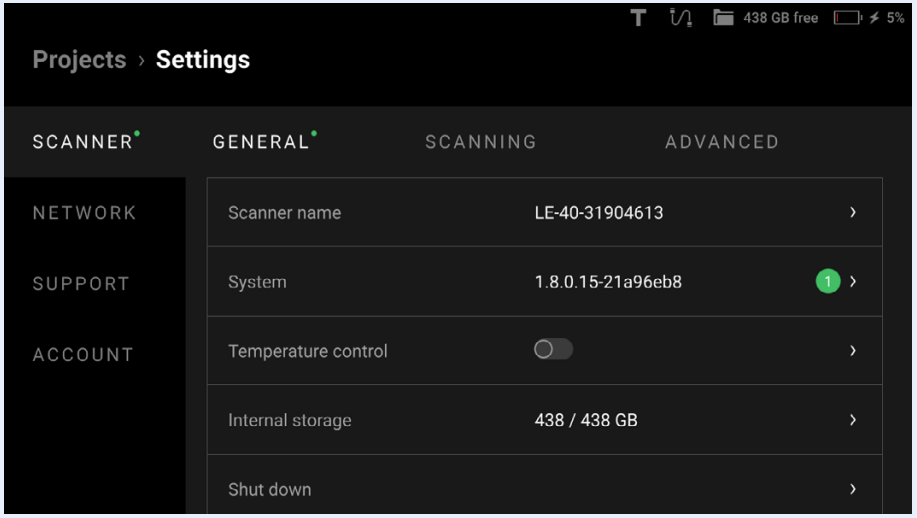
Account
- User

Turn Off

Scanner

General

The **General** tab (shown in the image) contains the following fields:



Parameter	Description
Scanner name	Also a network hostname. Tap the field to change it. Only use "normal characters"
System	Tap the field to see the versions of the scanner software and firmware and check for updates (details in the section below).
Temperature Control	Enable it for Leo to turn on the temperature indicator that indicates when Leo's temperature is optimal for best scan results (details in the **section below**).
Internal storage	Shows how much internal storage space is available (in GB) on Leo. To clear the storage, tap **Format**.
SD card	Shows how much storage space is available (in GB) on microSD card. To clear the card, tap **Format**.
Shutdown	Tap the **Shut down** button at the bottom right to safely turn off the scanner. **Note:** *y*ou can also press the **on/off** button until the Shutdown window pops up.

Temperature Control

The temperature of a measurement-device plays a significant role in its performance, and Leo is no different. Leo produces exceptionally precise results when it is within a specific temperature range. At a given point, to produce the best scans, enable the :Temperature Control feature in Settings. This will display a temperature indicator on Leo's screen. The temperature indicator shows you whether Leo is in its optimal temperature range, and displays the time left for it to reach that state. Even after Leo reboots, the timer won't reset. An initial warm-up time of 25 mins after turning on Leo, and an ambient temperature of 25°C is recommended.

Note that the initial warm-up time may vary according to the environmental temperature (say, in case of extremely cold environments). Once Leo reaches an optimal temperature, it's recommended to keep it ON, in order to prevent temperature drop. For example, when changing Leo's battery, it's better to keep it plugged in, to avoid losing heat.

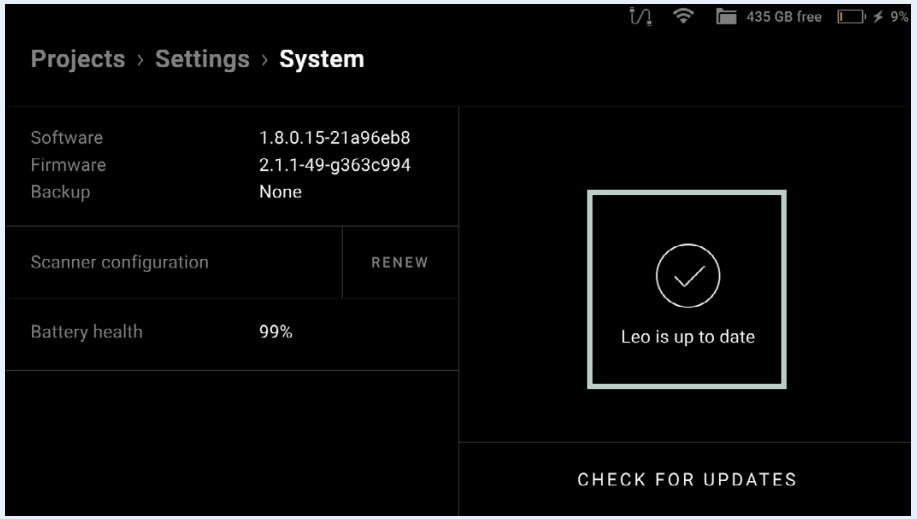
Attention

Leo's battery drains 3 times faster with this feature enabled. It is advisable to keep extra batteries in hand, when scanning large objects.

Update Leo Software

To ensure that your scanner is running the latest version of software, select **Scanner › General › System** and then tap the Check for updates button.

If Leo is connected to the Internet and there are no available updates (you have the latest software), you will be notified that **Leo is up to date** (see the image below).



If the update is available, then click the Update button and wait for the update to download.

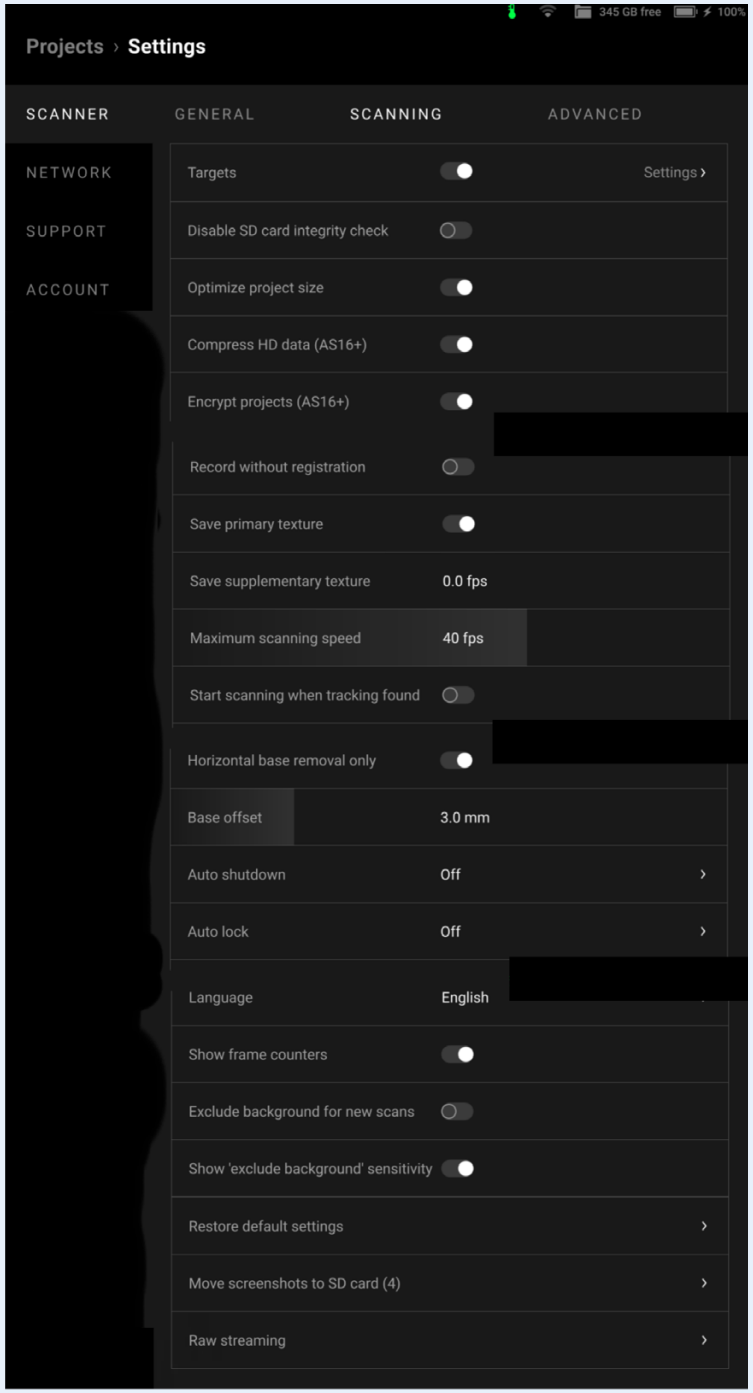
Why Renew Configuration?

To access projects from Leo, you don't necessarily need to use the same account both for the scanner and Artec Studio. A Leo owner may add any **my.artec3d.com** account as trusted from their profile at **my.artec3d.com**.

To download the latest scanner settings and license information, tap **Renew** in the **Scanner configuration** field.

Scanning Settings

The Scanning tab looks as shown in the image on the next page. The section allows you to make fine tuning of the parameters shown in the table below.



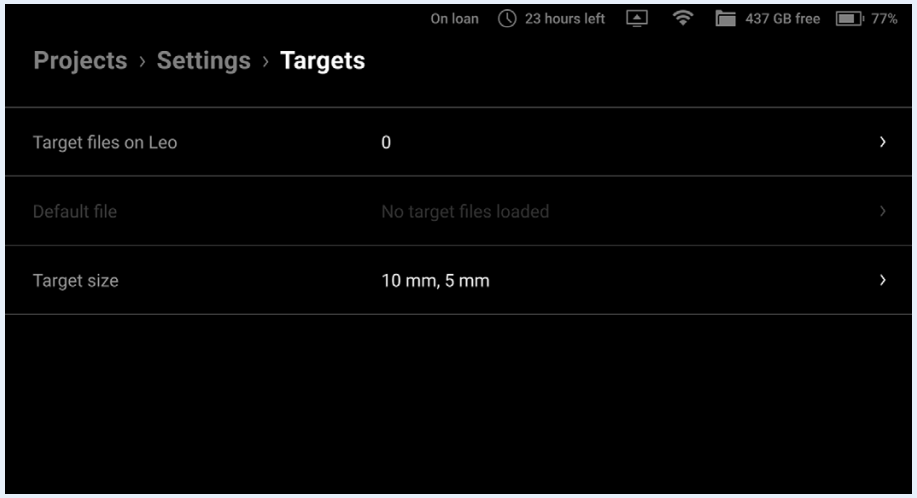
Parameter	Description
Targets	Turn it on to enable the target-assisted scanning with Leo. See Enable Target Assisted Scanning to find out how to configure this mode.
Disable SD card integrity Check	By default, the SD card is checked every time after insertion in Leo. We can disable this to save time.
Optimize project size	Reduce the project size by only storing sufficiently novel captured frames or at least 3 frames per second.
Compress HD data (AS16+)	Enable this setting to compress the size of your HD scan data. This can save storage space and speed up data transfers. Compressed HD data is only compatible with Artec Studio versions 16 and above.
Encrypt Projects (AS16+)	Turn it on for Leo to encrypt HD projects before exporting them to your local computer through the browser. The projects are exported in a new .leo format Encrypt Projects to Export.
Record without registration	Turn it on to increase scanning speed (fps) and avoid tracking loss by delaying registration (Leo will be capturing all frames).
Save primary texture	The setting determines whether to record texture for key frames. **Note**: *To entirely disable recording texture, turn off both Save primary texture and Save supplementary texture.*
Save supplementary texture	Instruct Leo to record additional texture frames. You can manually specify the texture-frame rate in frames per second (fps).

Parameter	Description
Maximum scanning speed	Select the scale value to change Leo scanning speed (in frames per second) if you find it not appropriate for your needs. For example, if you're just starting to use Leo, it's a good idea to choose a slower scanning speed, so that Leo will record fewer identical frames. You will avoid data redundancy and save your Leo's storage space.
Start scanning when tracking found	Turn it on to start scanning and recording data immediately once lost tracking is found (see Resume Scanning).
Horizontal base removal only	Turn it on to instruct the scanner to detect and mark for removal of only horizontal supporting surfaces in your scans (see Base Removal).
Base offset	By selecting the scale value (in millimeters), you can adjust the offset from the supporting surface to compensate for scanner error when determining this surface.
Auto shutdown	Use it to set the time of automatic shutdown when scanner is idle.
Auto lock	Turn it on to automatically lock the scanner when not in use, after a set amount of time. It also locks Leo's display on external devices or browsers. Leo can be unlocked by tapping on its display or with a PIN-Code.
Language	Choose the desired language for Leo's UI and change anytime.
Show frame counters	Turn it on to display the number of captured frames and textures as well as scanning speed (in frames per second) in the course of scanning.
Exclude background for new scans	Turn it on to instruct the scanner to detect and exclude the surroundings of the object in your scans.
Show 'exclude background' sensitivity	Use it to adjust the level of sensitivity for filtering out unnecessary data. Turn it on to display the sensitivity slider on the scan window before scanning. This setting is available only when the Exclude background for new scans is enabled.
Restore default settings	Turn it on to reset all changes in the settings.
Move Screenshots to SD card	When you make screenshots on the Leo by **simultaniously** pressing the trigger **and** the **on/off** button, a png file will be stored on the Leo. When you have done that, this additional line will appear in the settings. The **only** export option is now to insert an SD card and click on this line in settings.
Raw streaming	Select it to launch raw streaming without further data processing for use with SDK.

Enable Target-Assisted Scanning

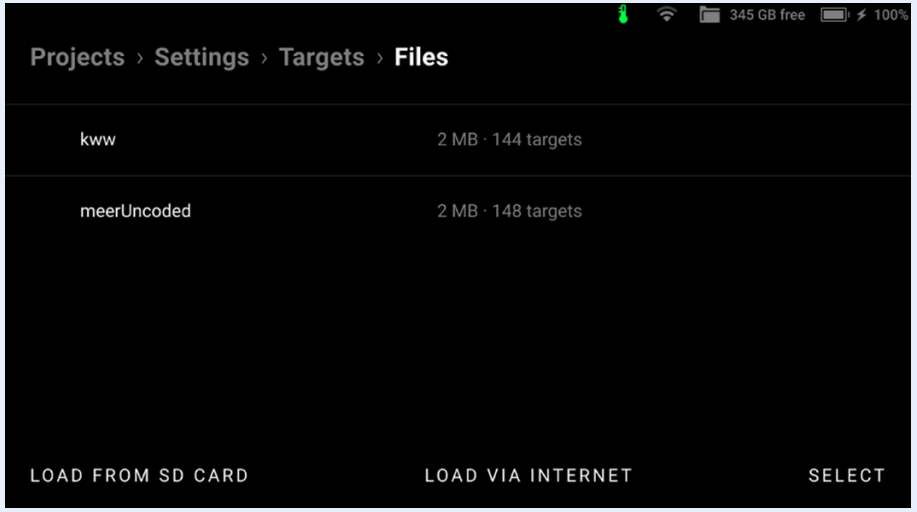
To enable the target-assisted scanning, follow these steps:

1. Select **Settings › Scanner › Scanning**.
2. In the **Targets** line, tap **Settings**.
3. On the next screen, specify the inner and outer diameters of the targets and then tap **Target files on Leo**.



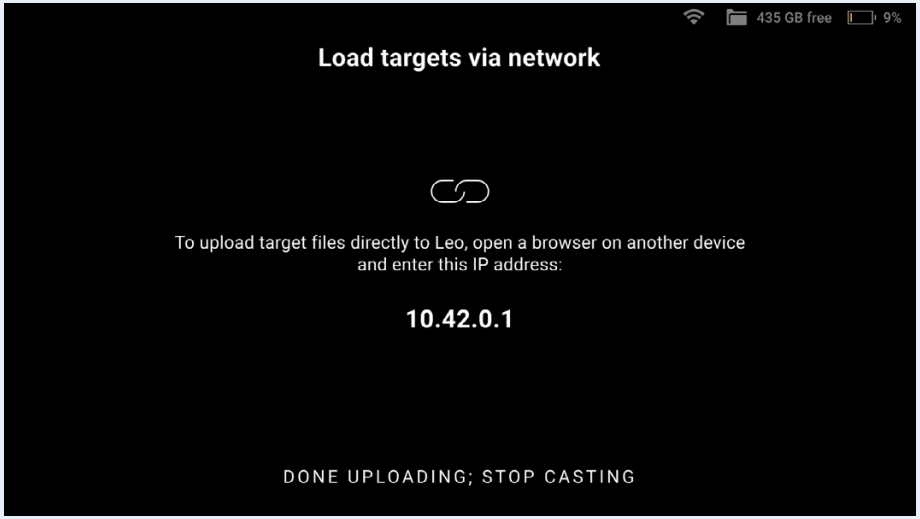
You will see a screen with one option for uploading a target file: **Load targets from SD card**.

But if we go to Target files on Leo, we also get the option to **Load via internet**.

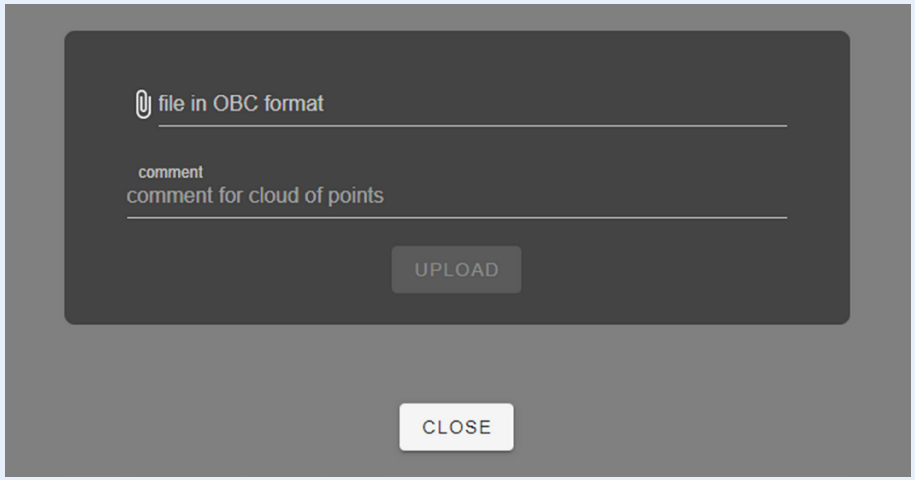


Select one of the uploading options:
If you select the **Load via Internet** option, the following screen appears.

a. Open a browser on the computer where the desired target file (or files) is stored and enter the IP address shown on Leo's screen into the address bar. Leo's response will appear in the browser.

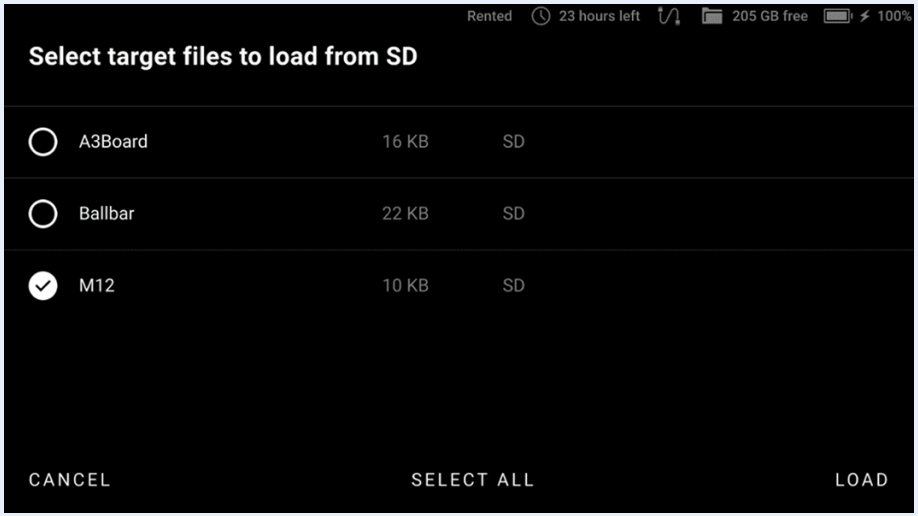


b. In the line with the paperclip icon, specify the path to the target file in the OBC format along with its name. In the comment field, you can provide a short custom name that will be used for the uploaded target file on all Leo's screens.



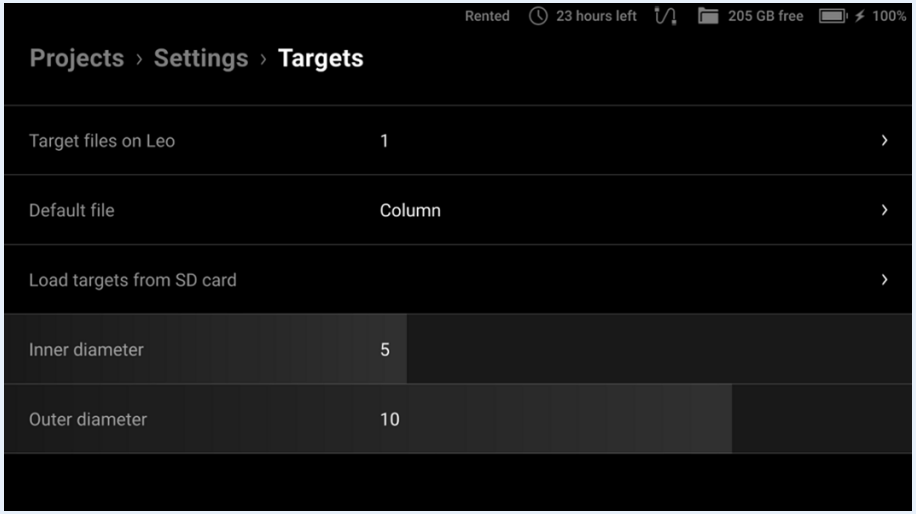
c. Tap **Upload** and wait until the processing is finished.

If you select the **Load from SD card** option, the following screen appears.



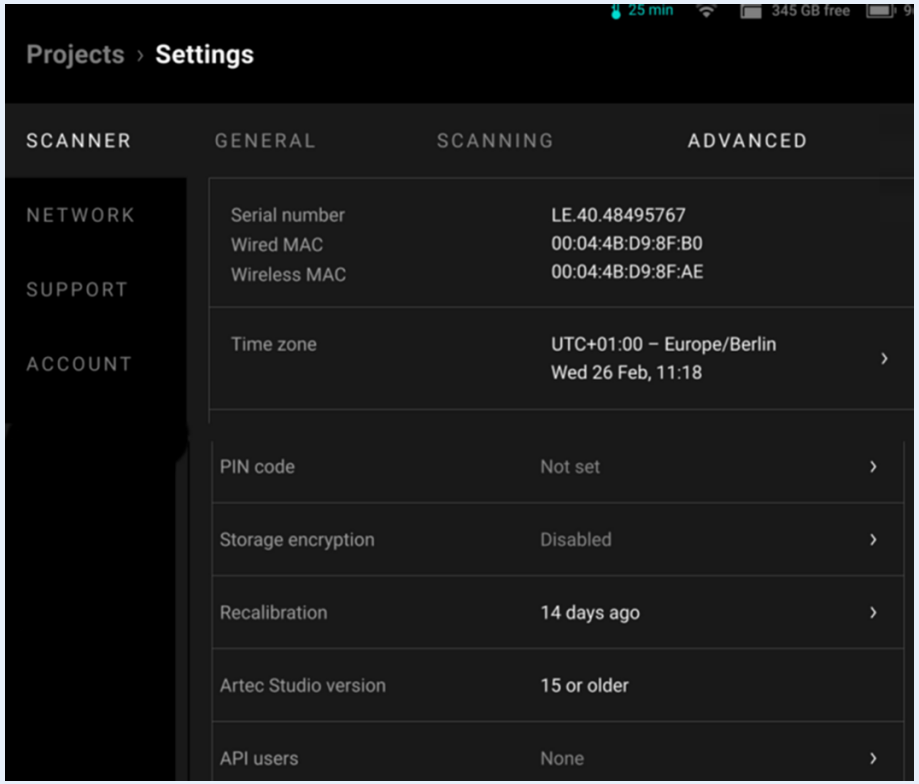
Select the required target file (files), tap Load and wait until the processing is finished.

Once the uploading is complete, choose the default target file for the next scanning session and tap Select. The resulting screen will look like in figure below.



Advanced Settings

The **Advanced** tab shows miscellaneous parameters.



Parameter	Description
Serial number	Shows the serial number of the scanner.
Wired MAC	Displays the MAC address of the Ethernet adapter.
Wireless MAC	Shows the MAC address of the Wi-Fi adapter.
Time zone	Displays the current date and time and allows you to select the required time zone.
PIN code	You can set a PIN code here for your Leo
Storage encryption	Shows the status of storage encryption (see **Storage Encryption**).
Recalibration	If you have a calibration board, you can calibrate your Leo here
Artec Studio Version	**16 or newer** is one option. The other is **15 or older**.
API users	Using API, developers can connect their applications to this Leo

Note

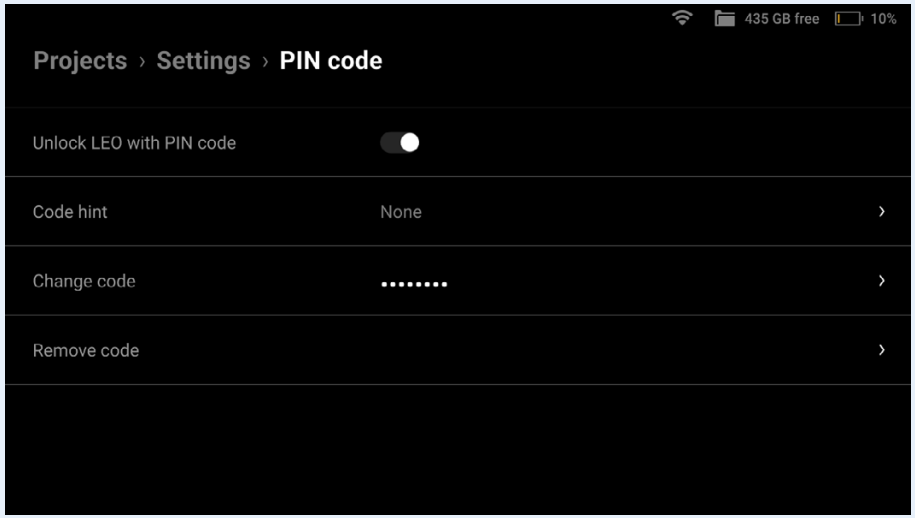
You cannot set the time manually because it is synchronized with a time server.

PIN Code

You can enhance the security of your device and data by setting a 4-digit unlock PIN Code. Every time Leo screen gets locked, you need to enter this PIN Code to unlock it.

To enable unlock with a PIN Code, follow these steps:

1. Select **Settings › Scanner › Advanced › PIN Code**.
2. Turn on the **Unlock Leo with PIN Code** toggle.
3. On the next screen, set up your 4-digit numerical PIN Code and confirm.



Unlock with PIN Code

- If you need help to remember your PIN Code, you can also set up a :**Code hint**.
- To change your current PIN Code, tap on **Change code**, enter a new PIN Code and confirm it.
- To remove your current PIN Code, tap on **Remove code** and confirm it.

Attention

If you enter the wrong PIN Code three times in a row, our system will automatically invalidate your PIN Code. You will then have to reset your PIN Code using your MyArtec credentials. See **Reset PIN Code** about recovering your PIN Code.

Storage Encryption

Storage encryption is a way to restrict access to Leo's storage by using a password. Once the storage is encrypted, no one will be able to use the Leo scanner without knowing the password.

Attention

If the password for Leo's storage is lost or forgotten, it cannot be restored. In this case, to reset your password or disable the storage encryption, you will need to format the storage and erase all your data.

You can change the password for Leo's storage at any time without affecting your data. However, this would require entering the current password (see Changing encryption password on page 49).

Note

By default, the storage encryption is disabled.

The status of storage encryption can be one of the following:

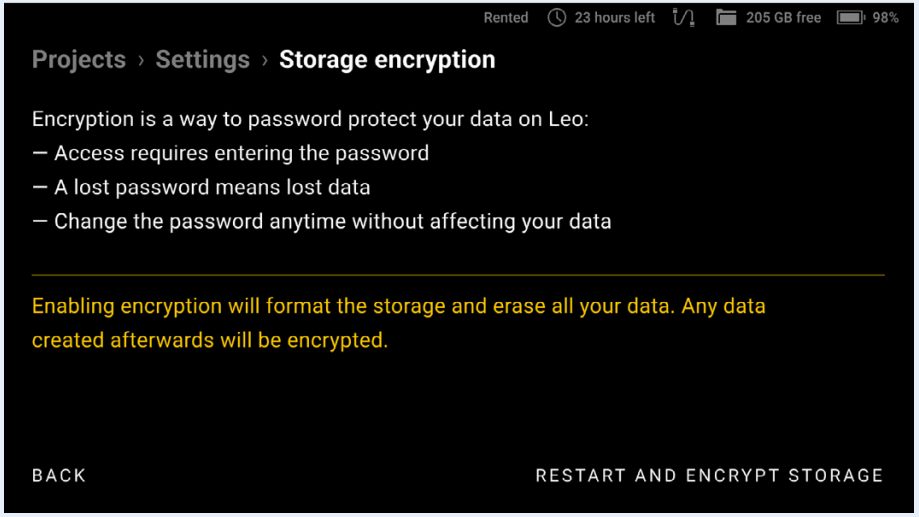
Encryption status	Description
Disabled	The storage encryption is disabled.
Enabled	The storage encryption is enabled, the device is password protected.

Attention

Both enabling and disabling the storage encryption require formatting Leo's storage, which means the loss of all stored data.

To **enable storage encryption**, follow these steps:

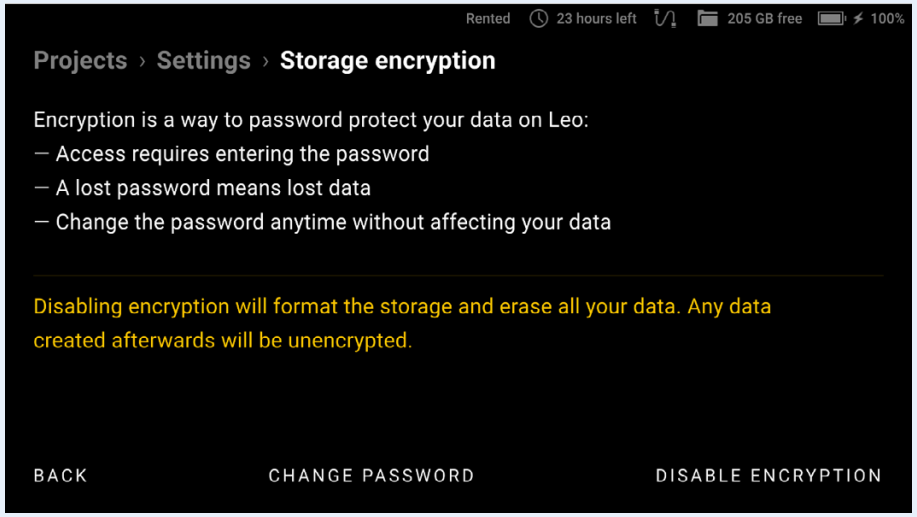
1. Select **Settings › Scanner › Advanced › Storage Encryption**.
2. Tap **Restart and encrypt** storage in the lower-right corner.
3. Create and enter a password for accessing the storage and then confirm it on the next screen.
4. On the screen that appears, enter "**Erase all**" to confirm **the erasure of all stored data** and then tap **Start encryption**.



After this, the process of **storage encrypting** will start. During encrypting the progress bar will be displayed as well as the estimate of the remaining time.

To disable the storage encryption, follow these steps:

1. Select **Settings › Scanner › Advanced › Storage Encryption**.
2. Tap **Disable Encryption** in the lower-right corner.



After this, the process of disabling the storage encryption will start.

To change the password for the Storage Encryption, follow these steps:

1. Select **Settings › Scanner › Advanced › Storage Encryption**.
2. Tap **Change Password** at the bottom of the screen.
3. Enter the current encryption password.
4. On the next screens, enter a new encryption password and then confirm it.

The storage encryption password will be changed without affecting your stored data.

Attention

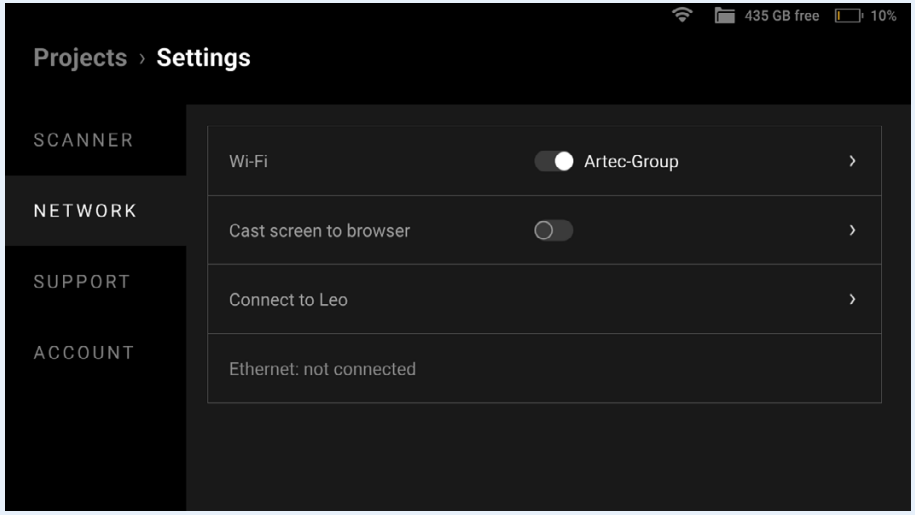
This password will be required every time you turn on your Leo, so be sure to remember or write it down.

A lost Password means lost data!

Network

To transfer project files, Leo must be connected to the local network. For initial activation and regular updates, an Internet connection is required.

You can use both wired (Ethernet) and wireless (Wi-Fi) connections to set up Leo's communication with other devices. Leo can connect to an existing network or create one itself.



Network Connections

To connect to an existing wired network, you need to:

- Connect the scanner via an Ethernet cable to a network device that provides the network operation (e.g. a switch).
- Check that the scanner has obtained an IP address via DHCP.

Note

DHCP is a protocol that provides automatic central management for the distribution of IP addresses within a network. A DHCP server must be configured to automatically assign an IP address to a device in a network. For more information about DHCP server operation, contact your network administrator.

To connect to an existing wireless network, you need to:

- Turn on Wi-Fi to enable wireless connection.
- Select the required Wi-Fi network from those found by your scanner.
- Enter the password (key) for this network and tap Connect.

After successfully connecting to the network, the connection icon will appear in the status bar.

To set up your own wired network with Leo, you need to:

- Connect the scanner via an Ethernet cable to a computer with Artec Studio software.
- Select **Settings › Network › Connect to Leo**.
- Turn on the Wired (DHCP server) toggle for the computer to automatically obtain an IP address from Leo via DHCP.
- Configure the computer to automatically obtain an IP address via DHCP in the network adapter properties.

After these steps, you can interact with the scanner using Artec Studio software.

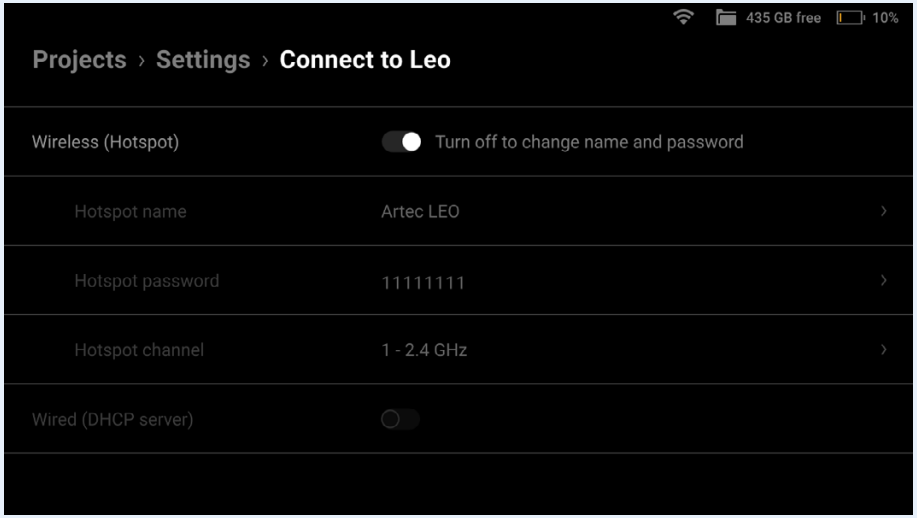
Attention

Be careful when using Leo as a DHCP server. If you connect to a network in this mode with another DHCP server, it may result in an unwanted network configuration.

To set up your own wireless network with Leo, you need to:

- Select **Settings › Network › Connect to Leo**.
- Specify **Hotspot name** and **Hotspot password** for your future connection.
- Turn on the Wireless (Hotspot) toggle.
- Connect your computer with Artec Studio software via Wi-Fi to the newly created hotspot.

After these steps, the computer and scanner will be on the same network and ready to communicate.



Note

Connecting to existing networks (both wired and wireless) will allow you to access the Internet (if configured) to update the software, communicate with my.artec3d.com and download projects. Networks created by Leo (as a DHCP server or hotspot) allow only file transfer.

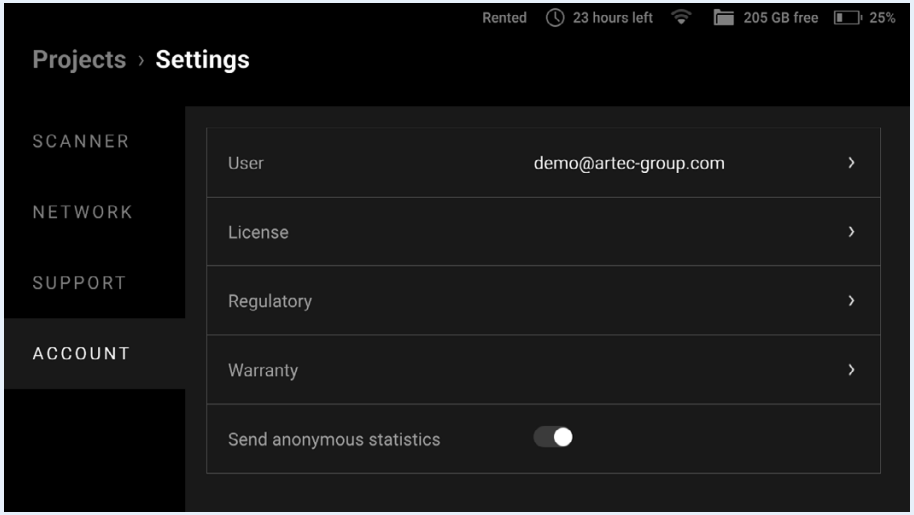
Cast Screen to Browser

The **Networks** section also contains screen casting controls. They have already been described in this document earlier.

Support

This section allows you to generate and send reports to support.

Settings / Account



The *Account* tab contains the following parameters:

Parameter	Description
User	Select to view and edit user information.
License	Select the section to see the license agreement for the Artec Leo embedded software.
Regulatory	Select the section to see the regulatory compliance statements.
Warranty	Select the section to see the information about the legal warranty and liability of the parties.
Send anonymous statistics	Turn on the toggle to allow Leo to send anonymous statistics to Artec 3D to improve the quality of the product.

Settings / Account / User

The *User* tab lists the following fields:

Parameter	Description
MyArtec account	Determine the **my.artec3d.com** account that you are using for your Leo scanner.
Name	Name for a person who uses Leo.
Contact email	Select to specify an email different from that used in **my.artec3d.com** account. The support team will use it as a reply-to address for the support reports sent by Leo.
Log out and remove projects	Use it to log out from this account and log in with another one. **Note** that you first need to back up your projects, since logging out will delete all data on the SSD.
Refresh authorization	If you change your My Artec password, Leo will require the new password to continue syncing with My Artec servers. Clicking the **Refresh Authorization** button prompts you to enter the updated password for the currently logged-in account. This feature prevents loss of access to projects in case the password is changed on My Artec.

Turn Off

Note

A single press of the power button on the scanner housing works as a Back button, i.e. it returns a user to the previous screen or state.

To turn off Leo scanner, follow the steps:

- Press the power button as many times as needed for the Project screen to appear. Then press the power button once again.
- Select **Settings › Scanner › General › Shut down**.
- Tap **Shut down** that appeared on the screen.

Attention

A long press of the power button starts a hard reset. Use a hard reset sparingly, only if it is absolutely necessary, since it may lead to incorrect termination of the system processes.

External Display

Artec Leo allows you to cast its screen to a browser. It means that you can have an additional display to observe a 3D scene. Another device needs to be connected to the same network as Leo scanner.

Note

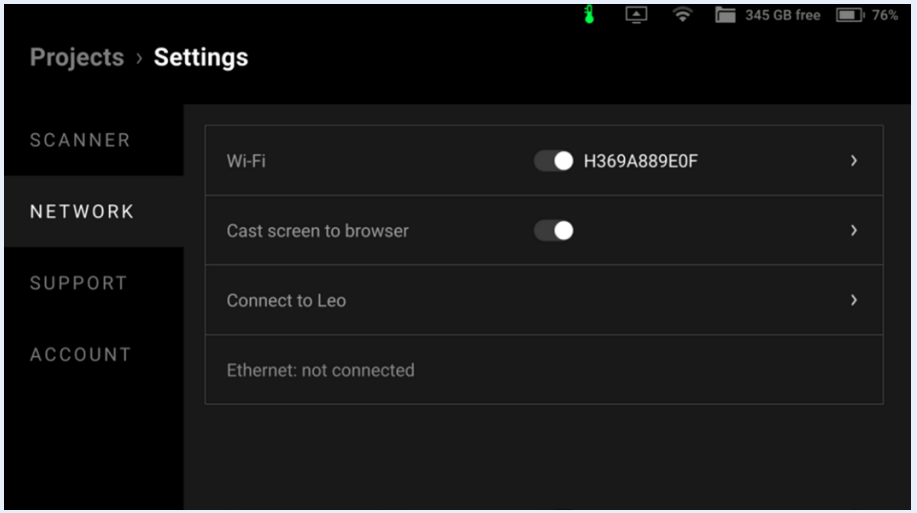
Only screens with 3D content can be casted. To enable casting, you need to start scanning or open a project.

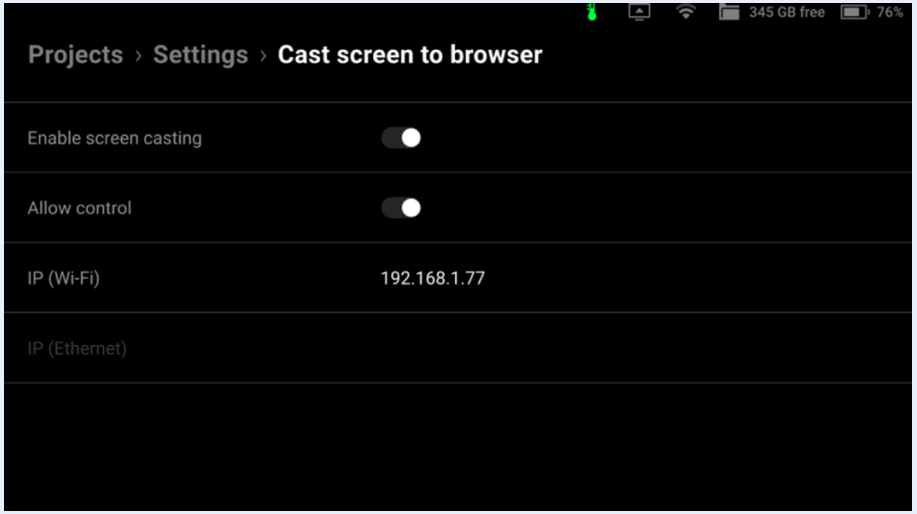
To cast your Leo screen, follow the steps:

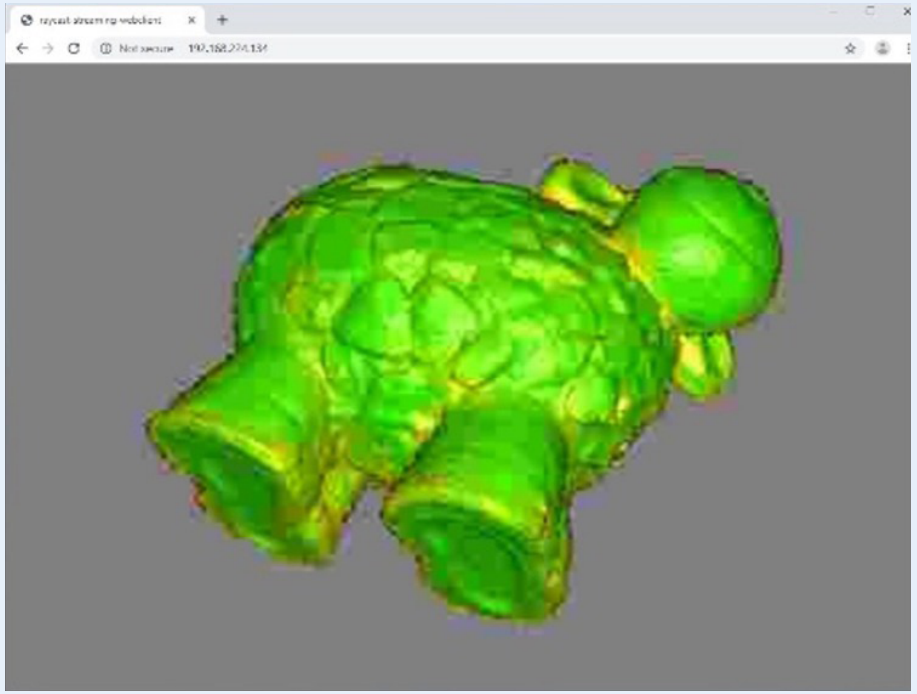
1. Go to **Settings › Network**.
2. Turn on the **Cast screen to browser** toggle.
3. On the next screen (>) you will see the scanner's IP address.
4. **Enable Screen casting "on"**
5. Open a web browser on another device.
6. Type in Leo's IP address and confirm your entry.
7. On Leo, start scanning or open a project.

Allow Control

If you turn on Allow control, the browser window will also display the buttons to control the scan process: **Start**, **Stop** and **Close**.







Browser window set to cast Leo screen.

Battery

Charge Battery

To charge your Leo battery, plug the power adapter into your scanner. You can also take out the battery from the scanner and charge it using the special charger.

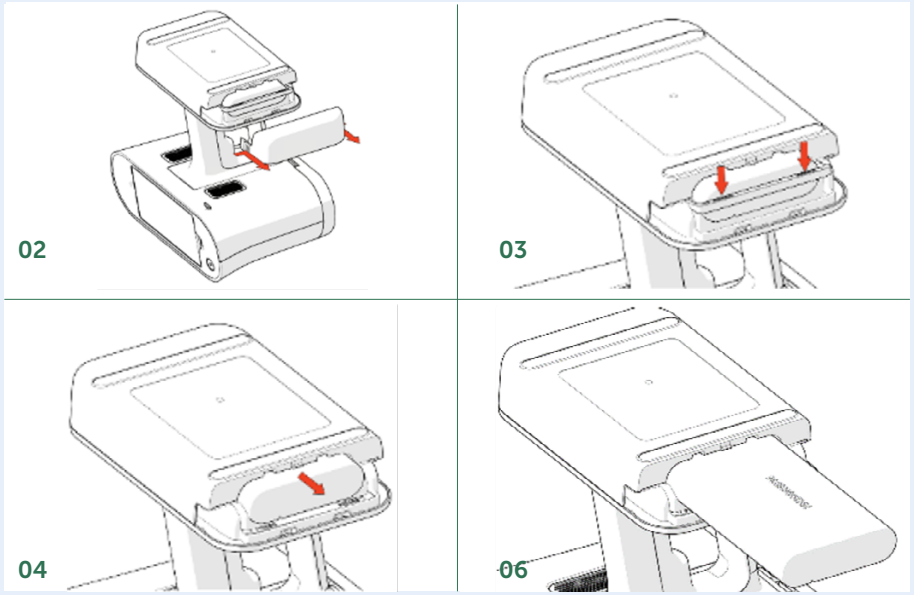
Replace Battery

Caution

Shut down your Leo before replacing its battery.

To remove the battery from Leo, follow the steps:

1. Turn Leo upside down.
2. Open the battery compartment by pressing both latches of the lid.
3. Push the bracket in the direction of the depicted arrow.
4. While still holding the bracket in the lowest position, pull the battery towards you.
5. Again push the bracket down.
6. While still holding the bracket in the lowest position, insert a newly charged battery into the compartment.
7. Close the battery lid.



Taking Care of your Spare Battery!

The lifespan of any lithium-ion-based batteries is mainly impacted by age (charge-discharge cycles), but correct storage conditions are also crucial to avoid premature degradation.

The batteries should never be stored in a discharged state.

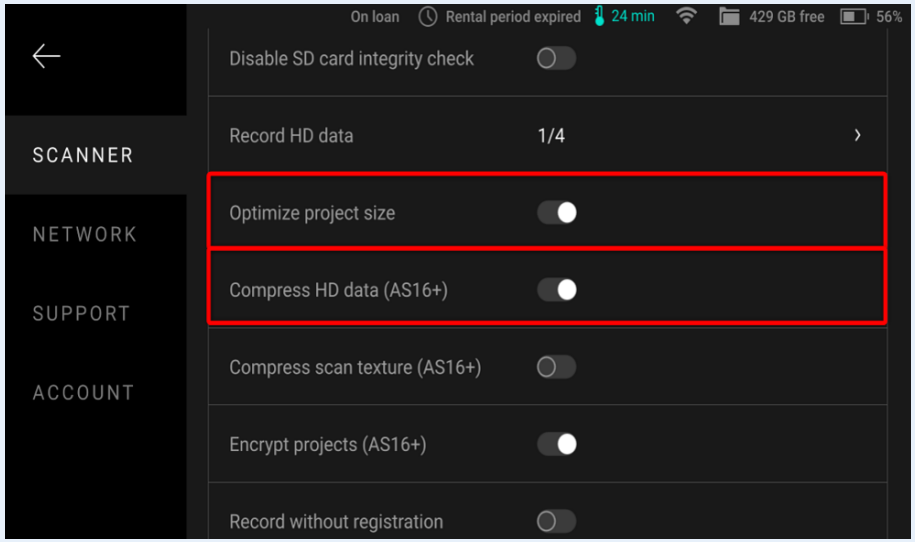
Doing so may lead to capacity degradation and even total failure. Ideally, all Artec batteries should be stored in a charged or at least semi-charged state (>60% charge), and recharged every few months even if not in use.

Please note that due to airline shipping regulations, all new batteries shipped via air are required to be charged to no more than ~30%. **Make sure to charge your batteries upon receiving them, and don't forget to keep them charged during any prolonged storage period**.

Advanced scanning tips

Scan Size

- To have better control over the number of frames per scan, enable the “Show frame counters” in **Settings › Scanner › Scanning** to display the number of frames you capture in the screen.
- Use Optimize project size to decrease the amount of repetitive data.
- The Compress HD data also helps reduce the project size. If the HD frames frequency (Record HD data) was set as 1/1, the project size will be compressed up to 17%, if 1/8 - approximately 4%.



The total size of scans in a project is considered a matter of preference; however, the size of an individual scan can affect the registration quality and processing time.

What does the scan size affect?

Affect 1.

How likely it will be for the scan to have registration problems

Bigger scans are less rigid, so especially when scanning large objects, a bigger error will be accumulated during one scan - more significant than if an object was scanned with the same number of frames, but in more scans. This increases the possibility of bigger scans having registration problems, at least with default settings of Global registration.

Affect 2.

How easy it will be to find and fix the problems

When you have several scans, a potential mistake is likely to be contained within only one of them and will be easier to work with. It will be faster to find the problematic frames and faster to experiment with Global Registration settings.

Affect 3.

How likely the scans are to have excessive frames

In theory, whatever you can scan in 5000 frames in one scan, you can scan in 5 scans, 1000 frames each. In real life, the longer you scan, the more trajectory mistakes you make - you may sometimes forget that you've scanned a certain area and scan it again, you may linger, trying to think of further path while recording unnecessary extra frames. Excessive frames just take up space and time at best and may even be bad for fine geometry at worst.

Affect 4.

How likely it is to damage fine geometry

Each excessive frame past a certain limit brings extra noise on most objects. When scanning fine geometry, the 3D noise smoothes it out: our fusion algorithms can filter noise, but if there are a lot of frames of the same area, each with its little bit of noise, the noise points may become dense enough for fusion to stop considering it a noise and actually fuse them into a surface.

Also, when the object has small crevices or holes (especially those that can be scanned from both sides), accumulated noise can make fusion fill the hole, instead of constructing it correctly.

These rules are applicable for every handheld scanner, but especially for Leo. Due to a higher recording speed (FPS) and due to the Quality mode, which inclines users to scan slower, more frames are inevitably collected.

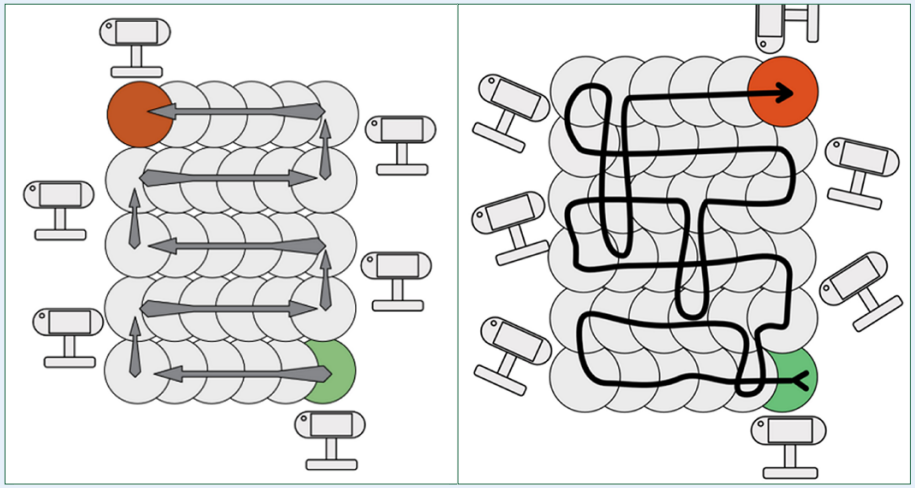
While searching for erroneous frames (in one or multiple scans) is mostly a convenience matter, the more critical issues are: potential registration problems, longer processing times, and the smoothing of fine geometry. These issues dictate that the recommended scan size should be limited.

With Leo in general, we do not recommend capturing more than 3000 frames per scan (in SD-quality).

To have better control over the number of frames per scan, enable the "Show frames counter during scanning" in **Settings › Scanner › Advanced** to display the number of frames you capture in the screen.

Trajectory

When scanning a large object, point the scanner at an already scanned area every 5-10 seconds – this will greatly improve the **Global Registration** quality.



Insufficient overlapping of frames

Recommended overlap

General Tips

Tip 1.

Leo scans in Real Time Fusion, therefore, avoid scanning in loops as they will not be closed.

Tip 2.

Do not hold the scanner closer than 100 mm to the object – the scanner will switch off the laser and you will lose tracking. If some obstruction in front of the scanner triggers the protection system, the scanning object remains in the field of view; tracking will be instantly regained as soon as the obstruction disappears. The scan data captured before the tracking loss will be saved.

Tip 3.

Do not hold the scanner by any part other than its handle. Do not hold it by the battery compartment or the upper section. Doing so will likely damage the scanner.

Tip 4.

Trajectory in case of **Glare Reduction**: When you want to use Glare reduction in the calculation of the texture, the area with glare has to be scanned from angles where the scanner leaves no glare, therefore scan each area from multiple angles to be safe.

Tip 5.

In this case you also need to take a picture every third frame. See also **Advanced Settings/Texture save mode**.

Processing tips

See for Postprocessing your Leo-data the document
Tips en Tricks - Postprocessing in ARTEC Studio 19

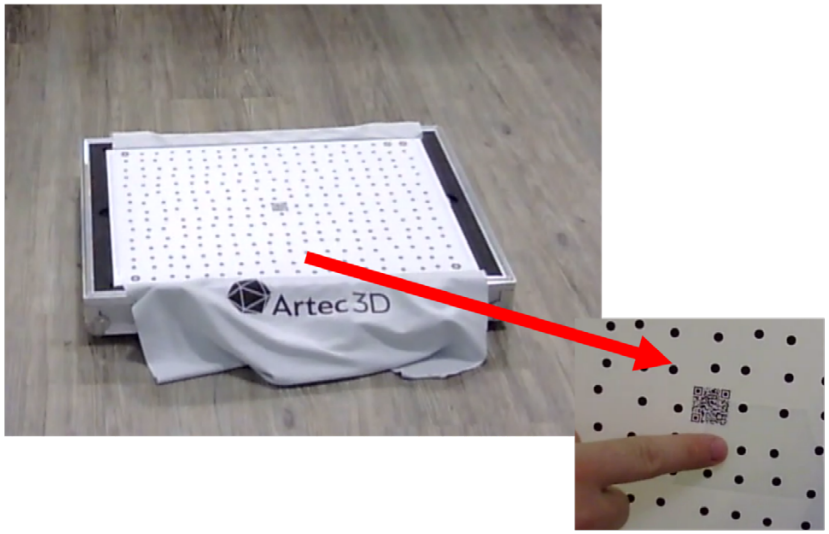
Calibration

Calibration is the process of checking and adjusting a scanner's measurements by comparing them with the standard (etalon) values.

All Artec Leo scanners are delivered pre-calibrated and issued with a calibration certificate (2022 onwards). However, in some cases, owing to careless handling or transportation (jolts, accidental drops or some other reason), Leo may fail to produce the best results. To resolve these issues, you can recalibrate your Leo. You need for this the Calibration Kit.

Access **Scanning › Advanced › Recalibration** on your Leo, and in a few seconds, you'll see an instruction for further steps.

To perform recalibration, you will need a calibration board with the QR code in the center.



Attention
It is advised to handle the Calibration board with utmost care. Perform calibration while keeping the board inside its casing always.

Preparation

Turn on Leo, and **if calibrating for the first tim**e, make sure it is connected to Wifi.

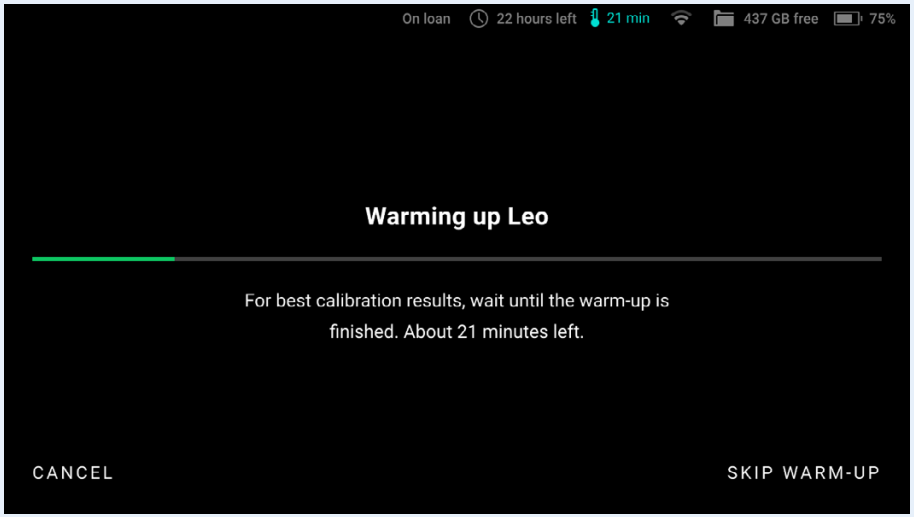
Note

Subsequent recalibrations can be performed even without internet, as Leo caches the board file.

1. Go to **Settings › Scanner › Advanced** and select the **Recalibration** option. The following screen displays the recommended environmental conditions for recalibration.
2. Make sure the ambient temperature is around 20-23 degrees Celsius, and there is no direct sunlight in the room. Click on **Start**.
3. Scan the QR-code on the **Calibration board** and wait.
4. The next screen is the warm-up screen that indicates the time required to warm Leo up to its optimal temperature range (~30 minutes). Keep Leo ON and wait while Leo warms up.

Note

To obtain precise results, it is essential to warm up Leo to its optimal working temperature before recalibration. DO NOT skip this step.

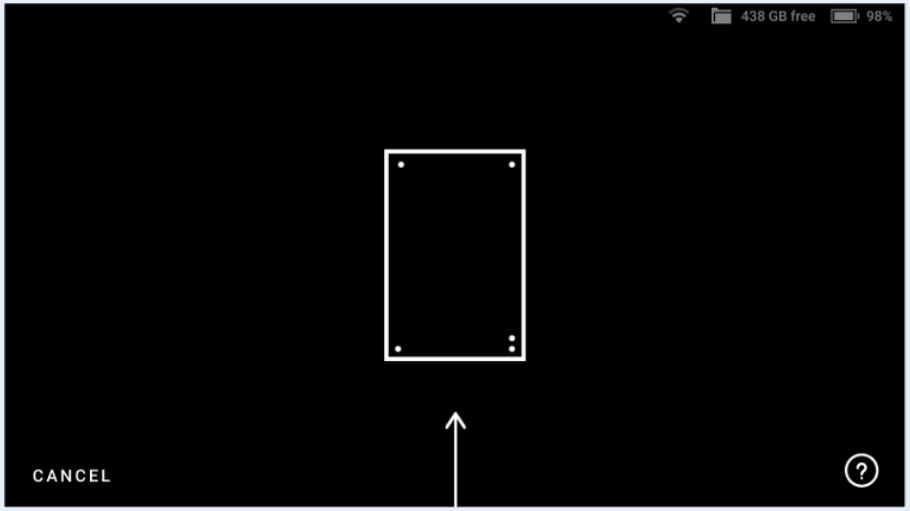


Leo warms up to its optimal working temperature.

Calibration

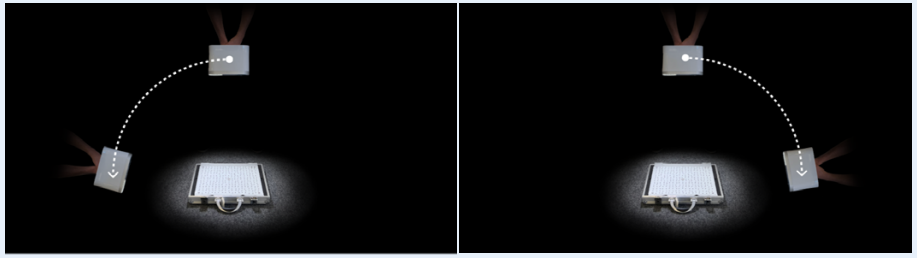
1. After Leo warms up to its optimal temperature, the scanning screen opens up.
2. If there is no **Calibration board** in the field of view, Leo displays the screen as shown here.

In this case, simply point Leo to the **Calibration board** to open the scanning screen.



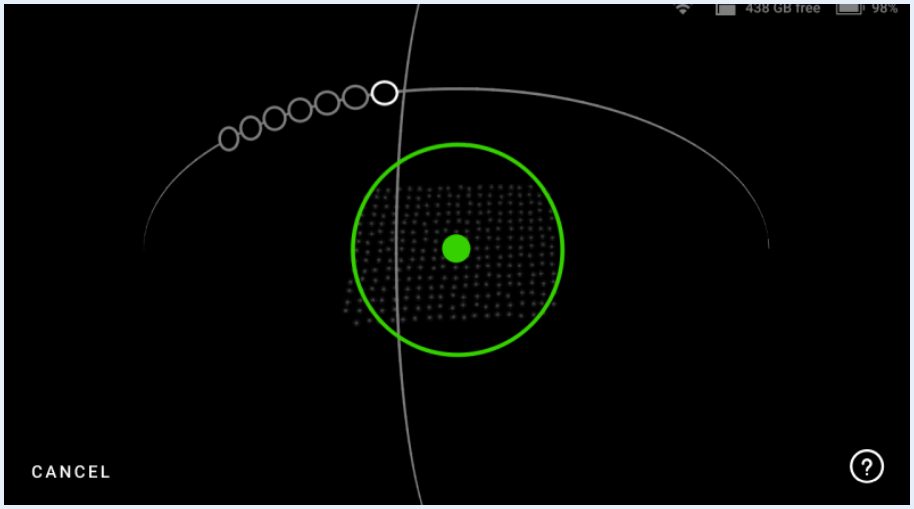
Leo's screen when there is no Calibration board in its field of view.

3. Hold Leo within the distance range of **66 - 106 cm** from the calibration board, throughout the scanning procedure.
4. Point Leo to the **Calibration board** and start scanning. There are multiple trajectories you should cover with your scanner, to perform recalibration.



Trajectories of scanning for recalibration.

5. The green dot in represents the center of the **Calibration board**, and the green circle represents the **Calibration board**, i.e. your field of view.
6. The arcs represent the respective trajectories you will have to follow during scanning.
7. To capture data, first align the green dot with the intersection of the arcs.

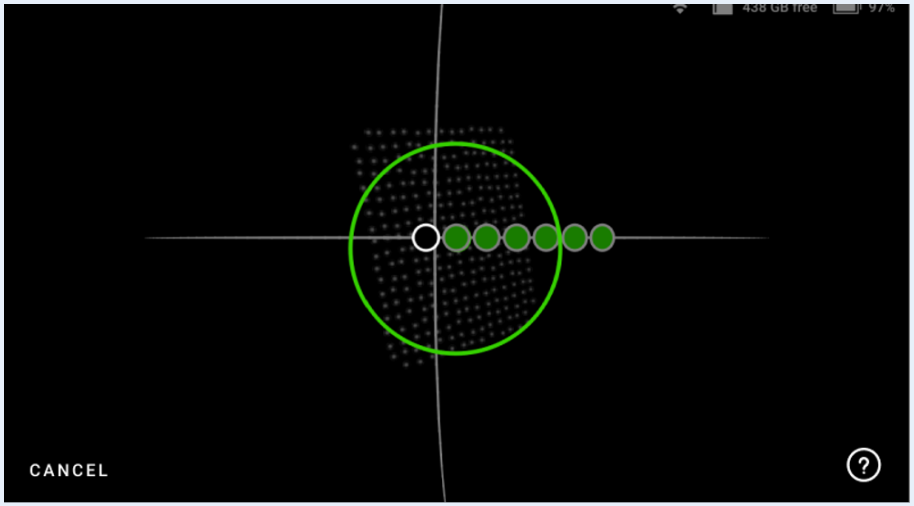


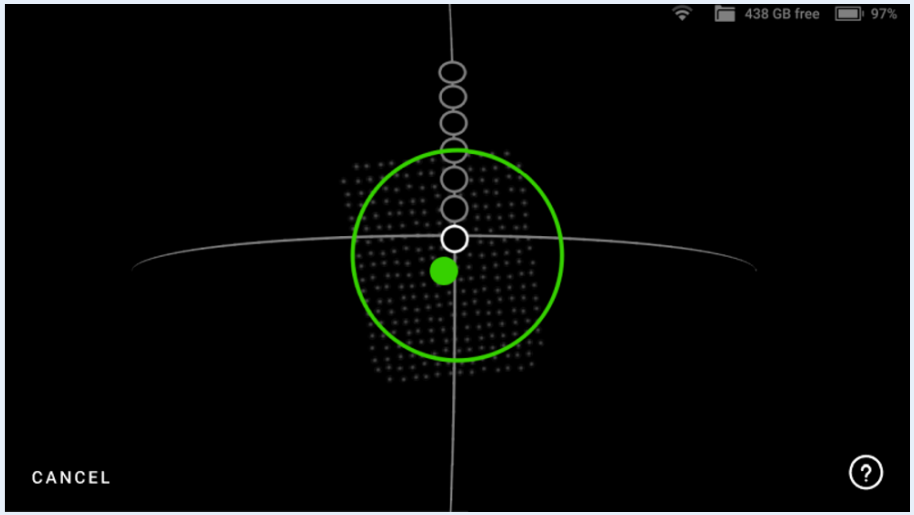
The Green dot represents the center of the Calibration board.

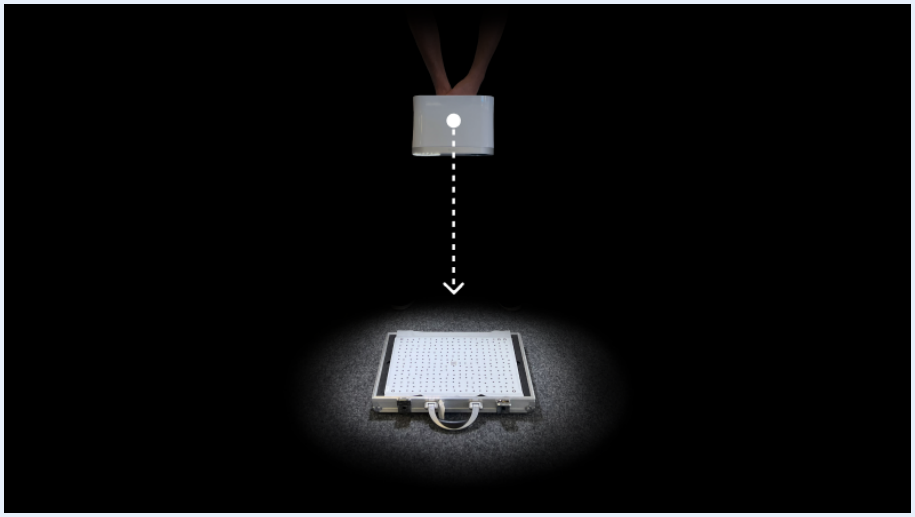
Attention

Make sure the green dot stays inside the green circle (field of view) during scanning. A red dot indicates that the scanner is out of the field of view.

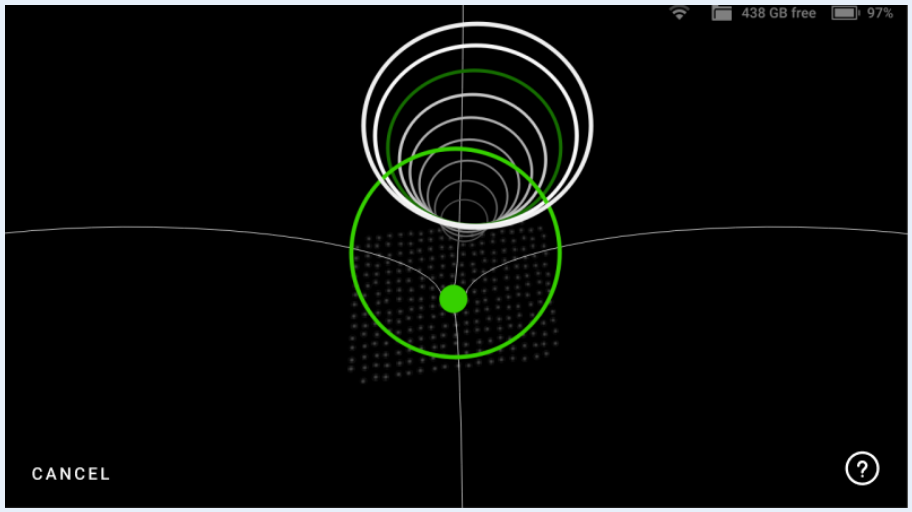
8. Now slowly move the green dot to the first circle on the arc, and glide Leo following the trajectory, from one circle to another such that the green dot overlaps each circle.
9. As you move along the arc trajectory, the circles will turn green, indicating that the data has been captured. Scan until all the circles turn green.
10. Similarly, scan the board following all the subsequently displayed arc trajectories on Leo.
11. Lastly, you need to hold Leo over the Calibration board, and move it perpendicularly forward and backward, along the z-axis.
12. Scan in this manner, until all the white circles turn green.
13. Always maintain the recommended distance between the 'calibration board' and scanner. If the scanner is too far from the board, Leo will display an error on the scanning screen.



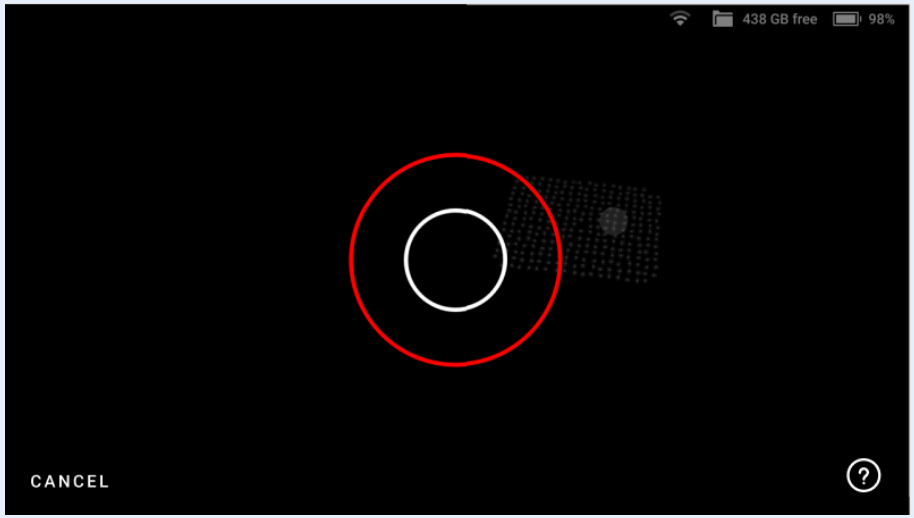




Forward and backward scanning of the board.



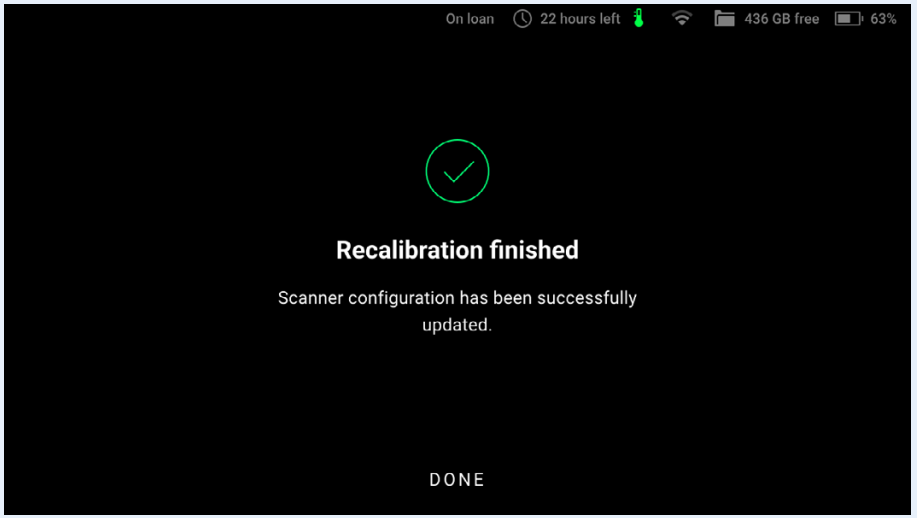
Move the scanner along the trajectory until all circles are green..



Red circle indicates a distance error.

The End Result

1. After capturing data from all three positions, Leo will proceed to finish the calibration process.
2. Leo will display the recalibration result. Click on **Done**, and you have successfully recalibrated your Leo.
3. If for some reason, the recalibration was unsuccessful, repeat the process from the beginning or ask **4C for support!**



Leo screen displays the calibration result.

Have fun scanning with ARTEC LEO

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For more information, FAQ, updates, documents and videos about Artec Leo **go to 4cccc.nl/kennisbank/artec-leo**

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