SHINING 3D®

EinScan H
User Manual

V1.1.0

Safety instructions

Signal	Meaning
	Additional information for particular situation.
	Improper actions or conditions that may damage the product, and consequently void your warranty or service contract or lose the customer data or system data.
	The safety instructions that you must precisely follow to avoid injury. Failure to observe can cause damages to your product, or result in personal injuries.

About the document

This document is related to your safety, lawful rights and responsibilities. Read it carefully before installing and using the product.

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For more information, please visit our support website: support.einscan.com

Please read carefully before the first time of using EinScan H (hereinafter referred to as the "Scanner").

Appearance

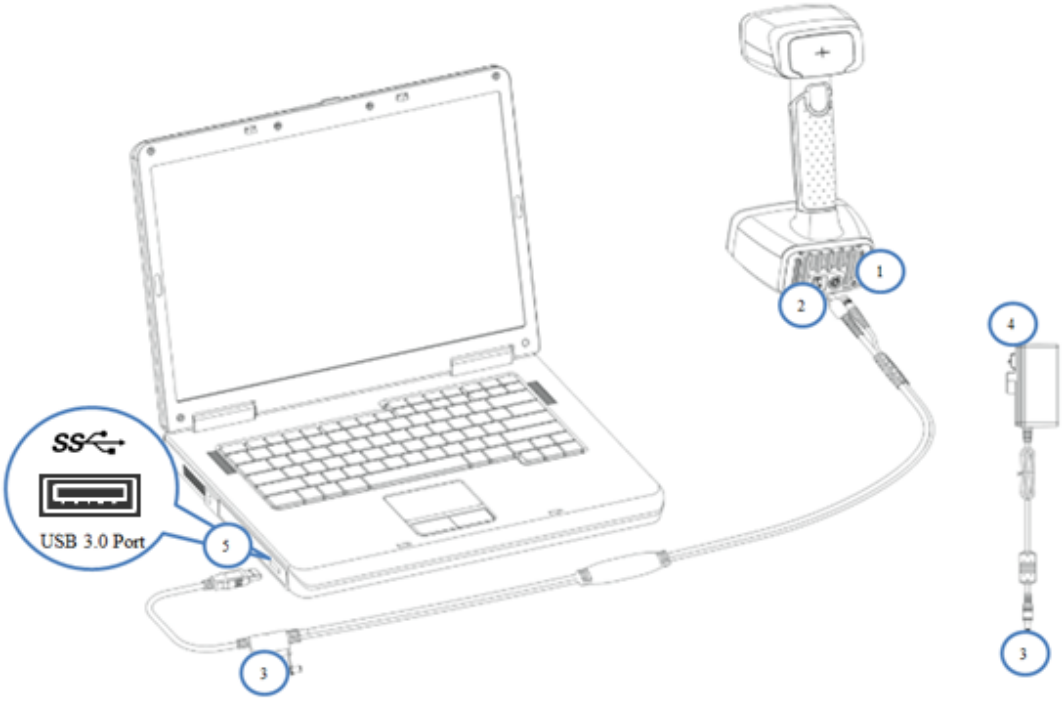
Scanner

Appearance	Description
1	Working distance indicator
2	Zoom in / Zoom out
3	Brighter / Darker
4	Preview / Scan / Pause
5	USB port
6	Power port

Component

1. Scanner
2. Calibration board
3. Power adapter
4. Markers
5. Connection cable (USB, DC IN)
6. USB drive

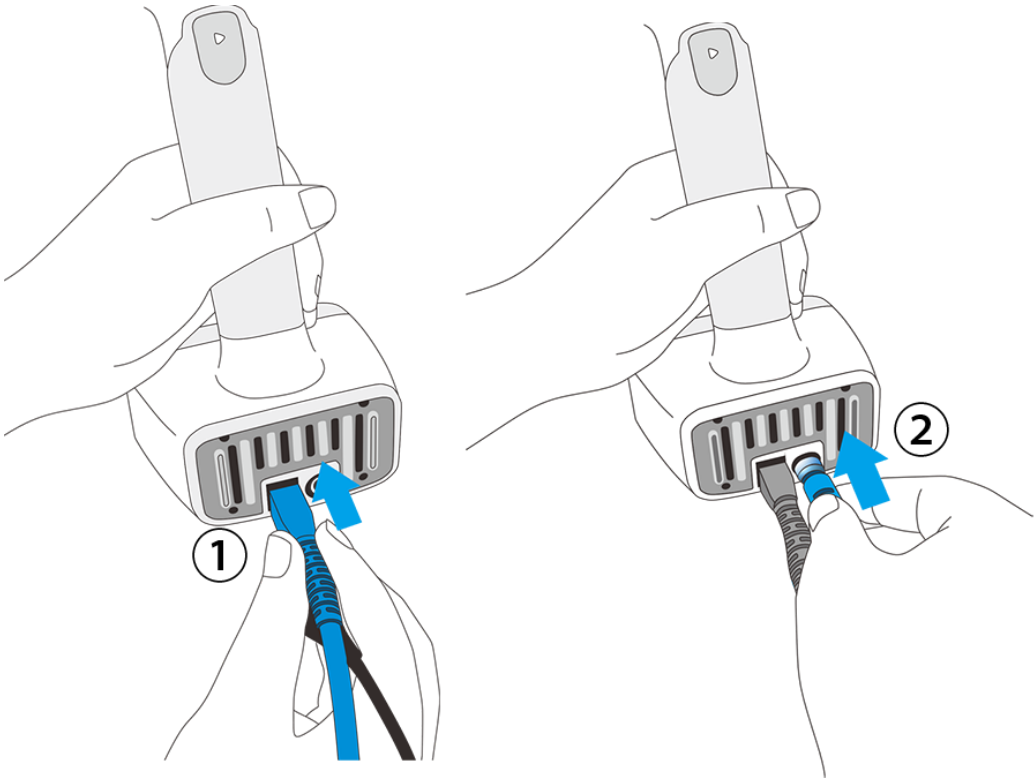
Connect the cable



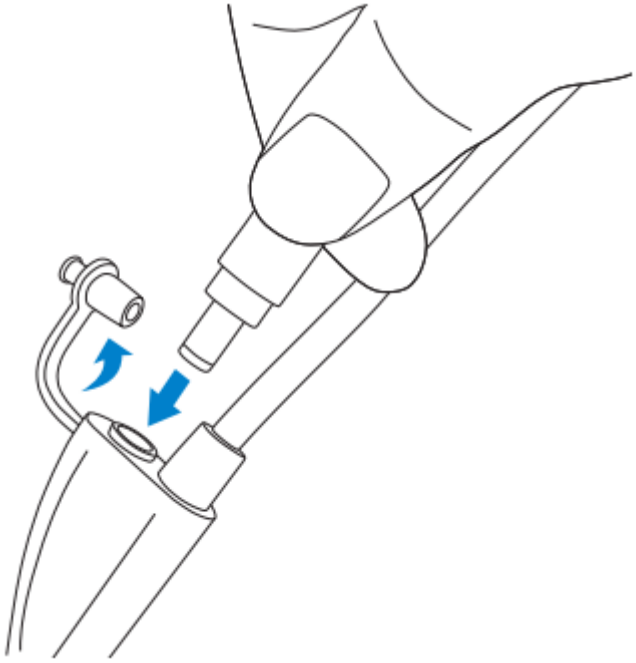
> **Warning**
>
> Make sure you are using the correct power adapter.

Steps

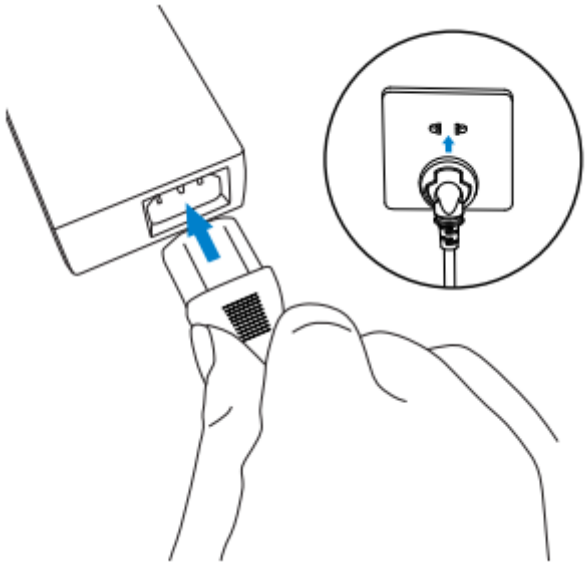
1. Plug *USB* and *DC IN* into the bottom of Scanner.



2. Plug the power cable into the connection cable.

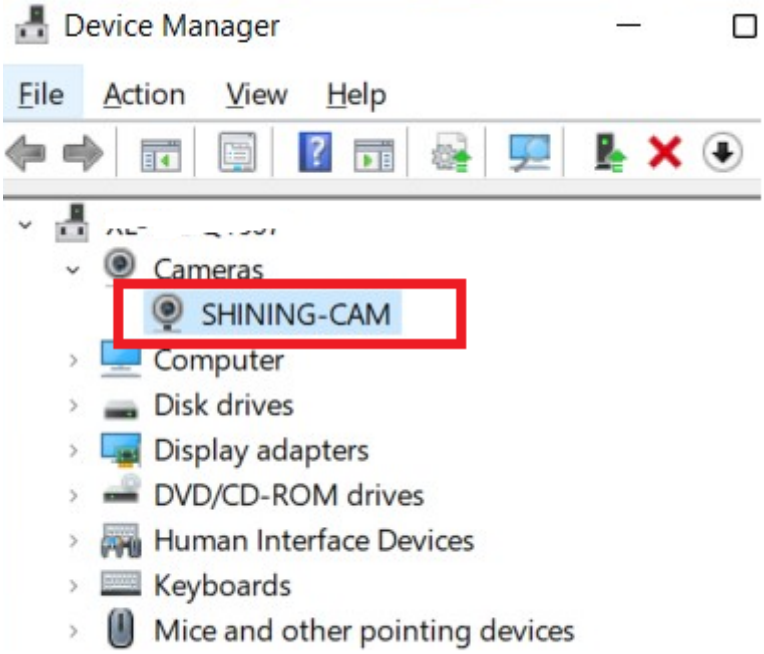


3. Power on and the LED indicator should show white.



4. Plug the other side of connection cable into the USB port of computer.

Now you can see our device in your Device Manager.



To use the scanner, you need to install the **EXScan** software first (hereinafter referred to as the "software").

Computer & Operating system requirement

Recommended computer:

Component	Model
CPU	Intel® Core™ i7-8700 or above
Graphics card	NVIDIA GTX 1080 or above
Graphics memory	4GB or above
RAM	32GB or above
USB	3.0 or above

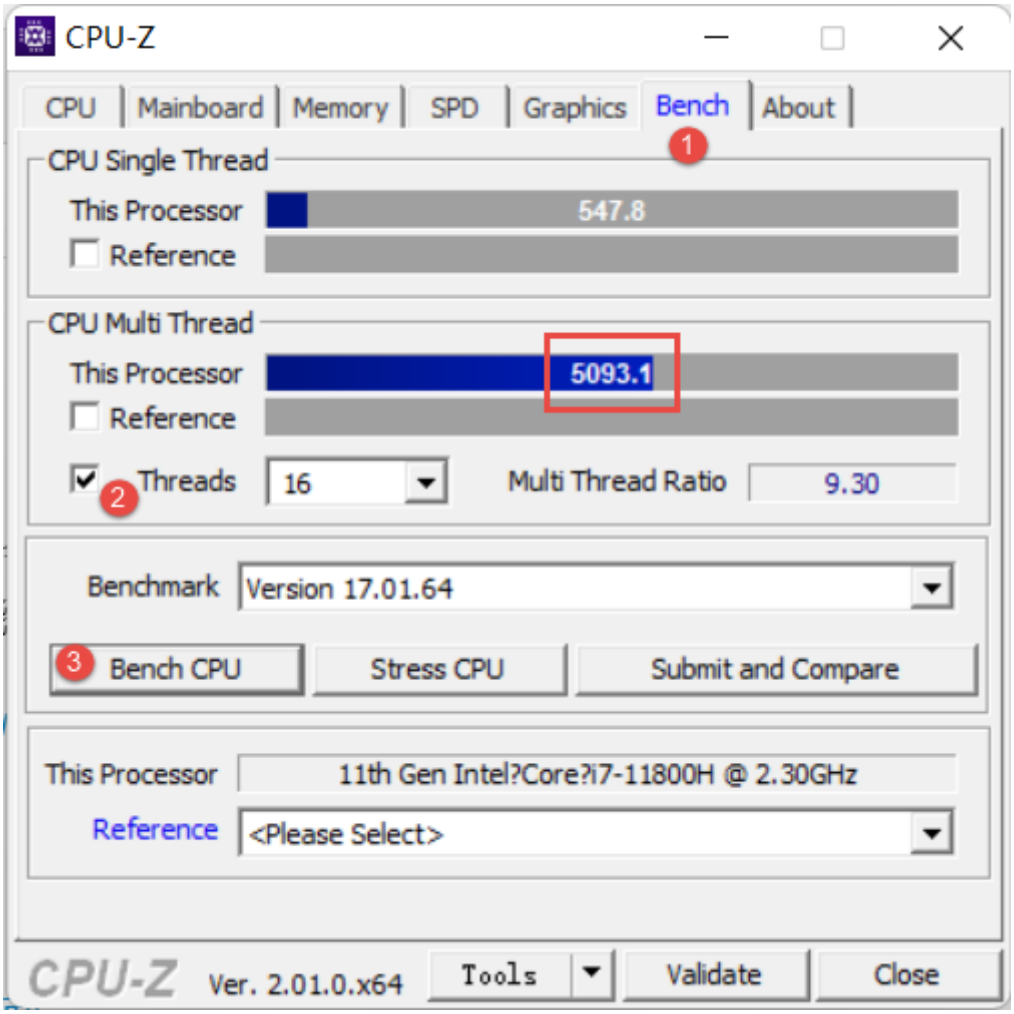
Recommended operating system: Windows 10, Windows 11 (both 64-bit only)

CPU

Improper computer configuration or hardware issues will cause CPU performance degradation and affect the user experience, it is recommended to use the CPU-Z tool to check CPU performance before starting scanning.

CPU-Z: https://www.cpuid.com/softwares/cpu-z.html

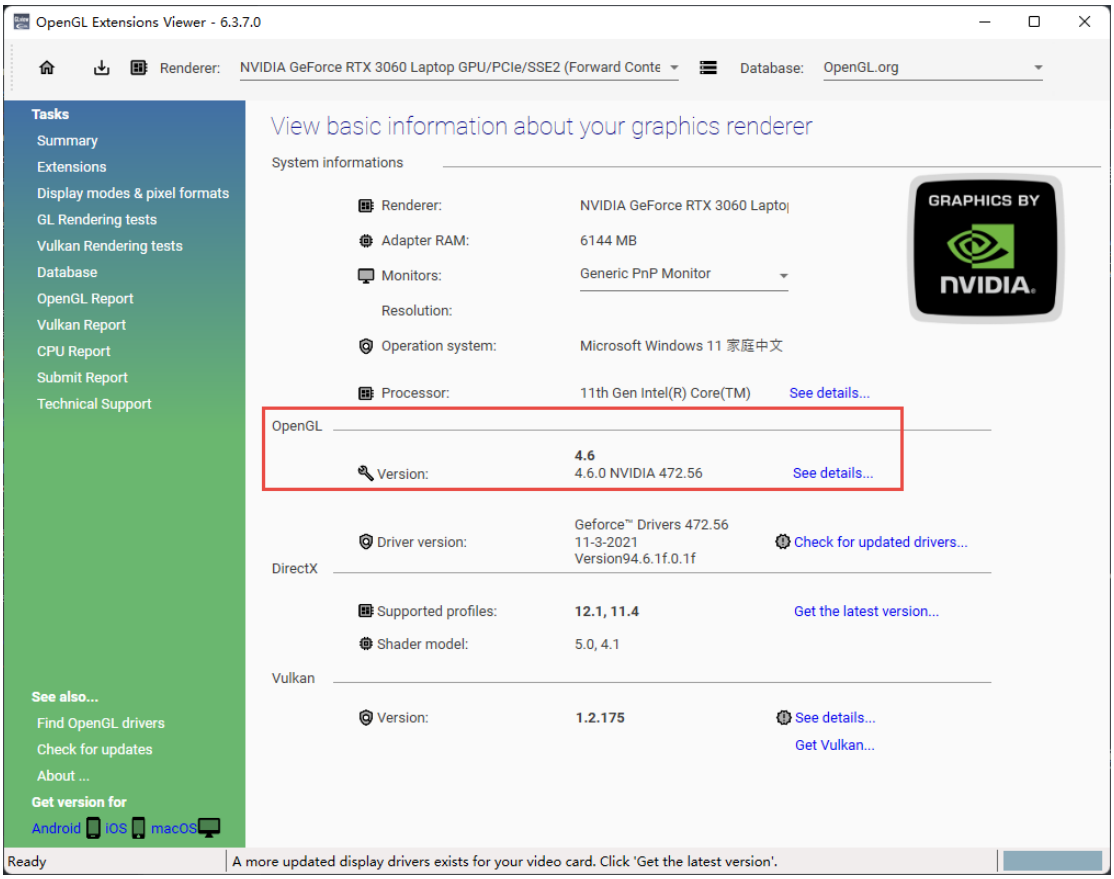
Install and launch CPU-Z, follow the steps in below figure to get a CPU multi thread performance score. A score of **4000** or more is required.



OpenGL

To use the scanner, you need a graphics card (integrated or discrete) which can support **OpenGL4.3** or above.

Use OpenGL Extensions Viewer to check the OpenGL version, if it's lower than 4.3, please update the graphics card driver and check again. If it's still lower than 4.3, it means that the graphic card CAN NOT support the scanner.



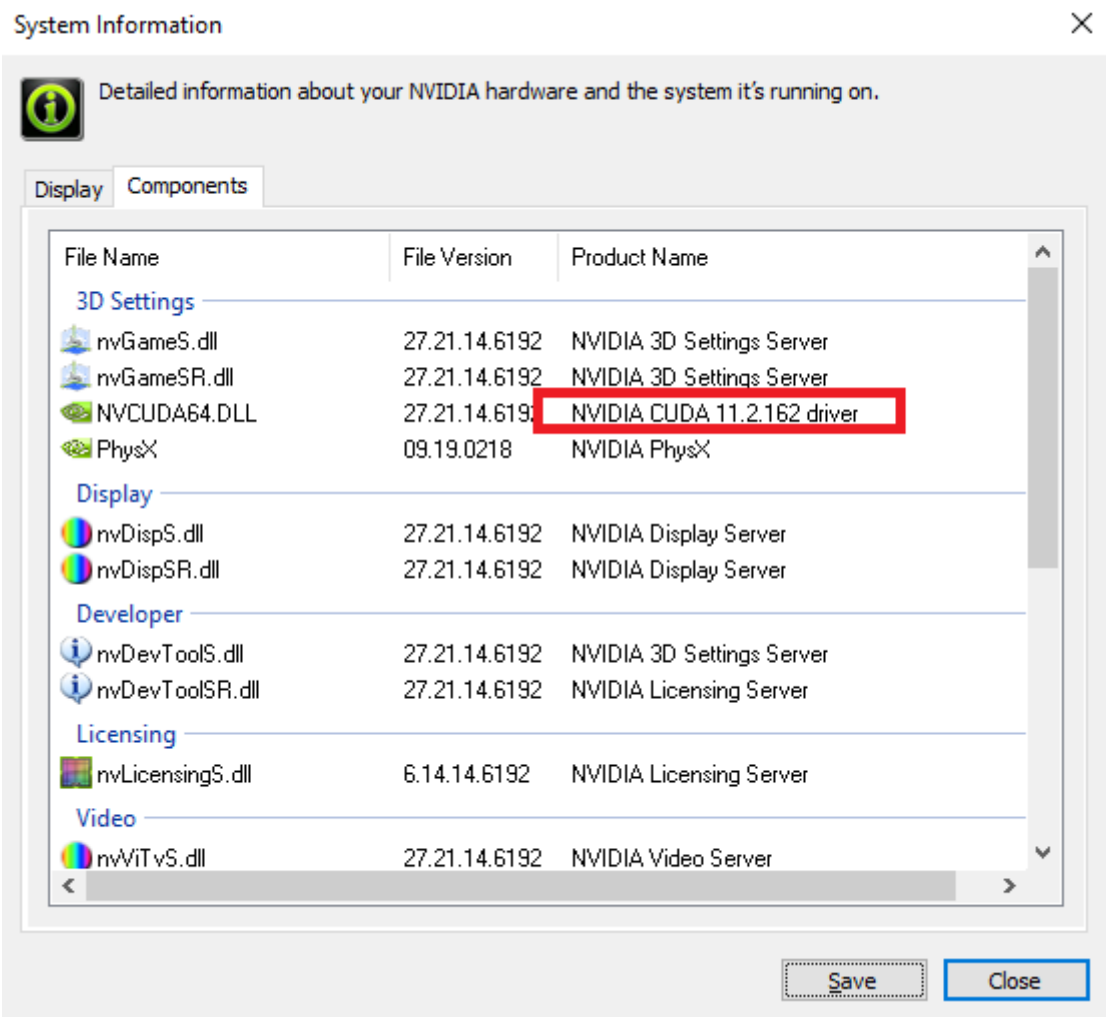
GPU

Highly recommend to use a NVIDIA[1] discrete graphics card for the scanner.

The NVIDIA discrete graphics card should support **CUDA10.2** or above.

Use **NVIDIA Control Panel** to get the CUDA version with follow steps.

- Launch **NVIDIA Control Panel**
- Go to **Help>>System information>>Components**.

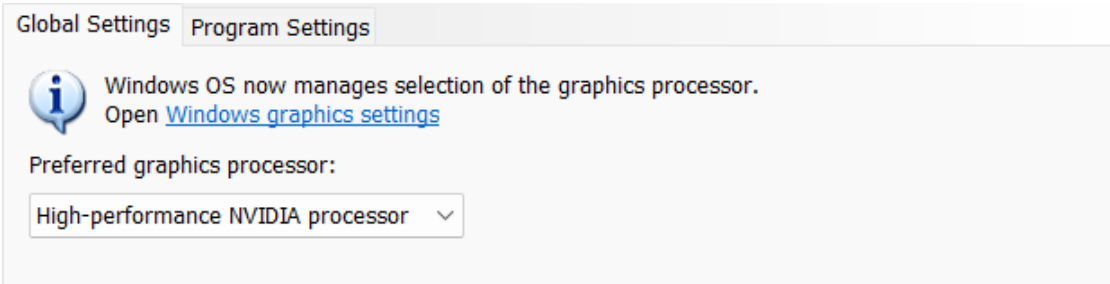


Use a discrete graphics card on desktop

- Connect your monitor to the port of discrete graphics card on the back of your computer, OS will use the discrete graphics card automatically.

Use a discrete graphics card on laptop

- Launch **NVIDIA Control Panel** on your laptop.
- In **3D Settings** --> **Manage 3D Settings** --> **Global Settings**, select **High-performance NVIDIA processor** and **Apply**.



Get the installation package

Please visit the following website to get the installation package.
https://www.einscan.com/support/download/

Install the software

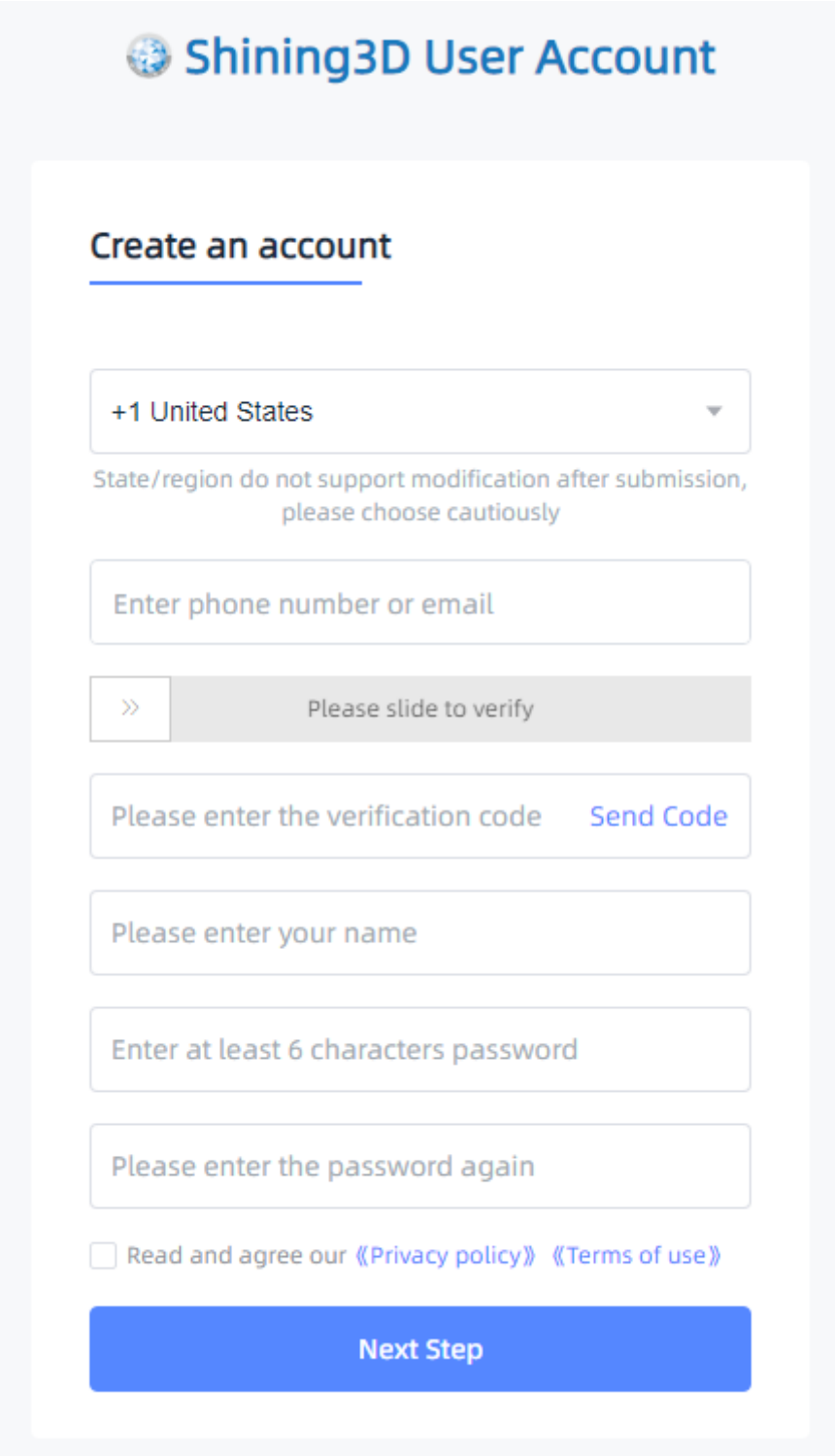
Please follow the installation wizard to install the software.

> **Note**
>
> Administrator rights are required for the installation of the software.

> **Note**
>
> You need a Shining 3D User Account before activating the device.

Register for Shining 3D User Account

For new user, you need to register a Shining 3D User Account first, click **Register** in the pop-up window when launching the software, or click **Sign Up** in our Shining 3D User Account website: https://passport.shining3d.com/

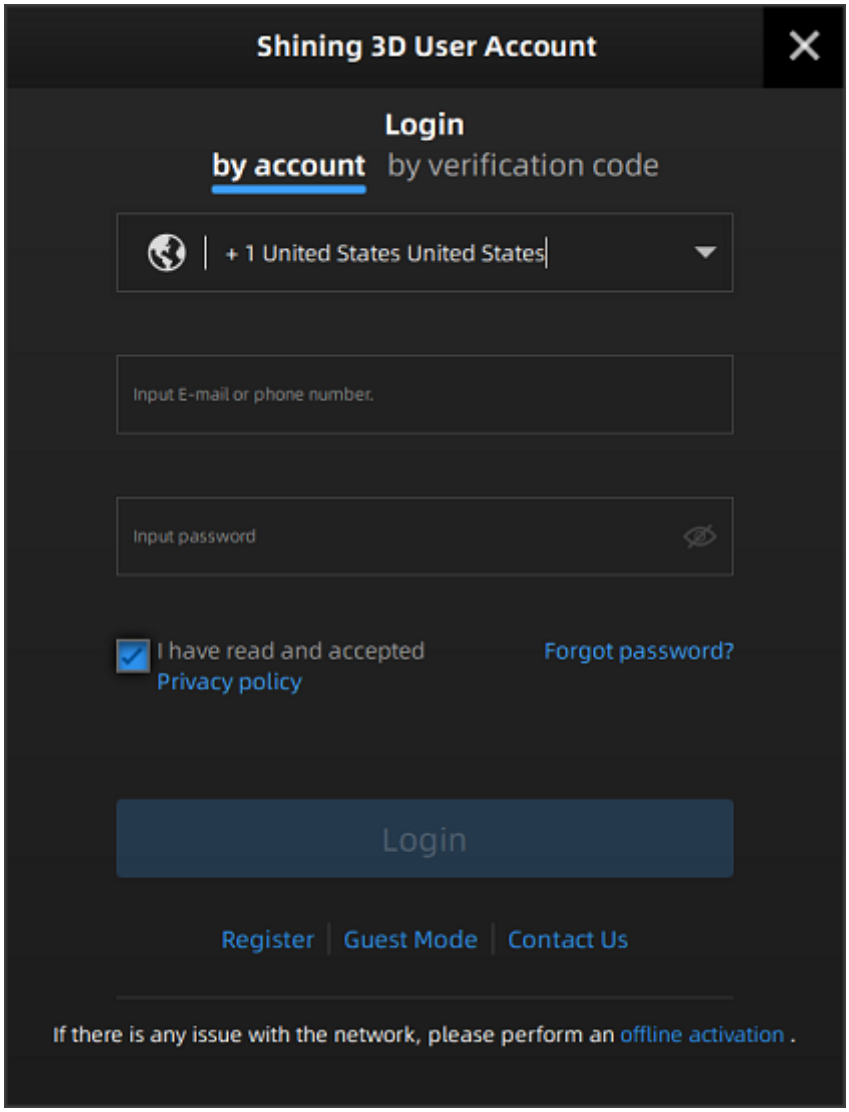


Note

- You need to enter valid email or phone number to get verify code for registration.
- Please enter correct user information for better service.
- Please read and then check **Privacy Policy** and **Terms of use**.

Log in Shining 3D User Account

Log in Shining 3D User Account from the pop-up window when launching the software.



Activate the device

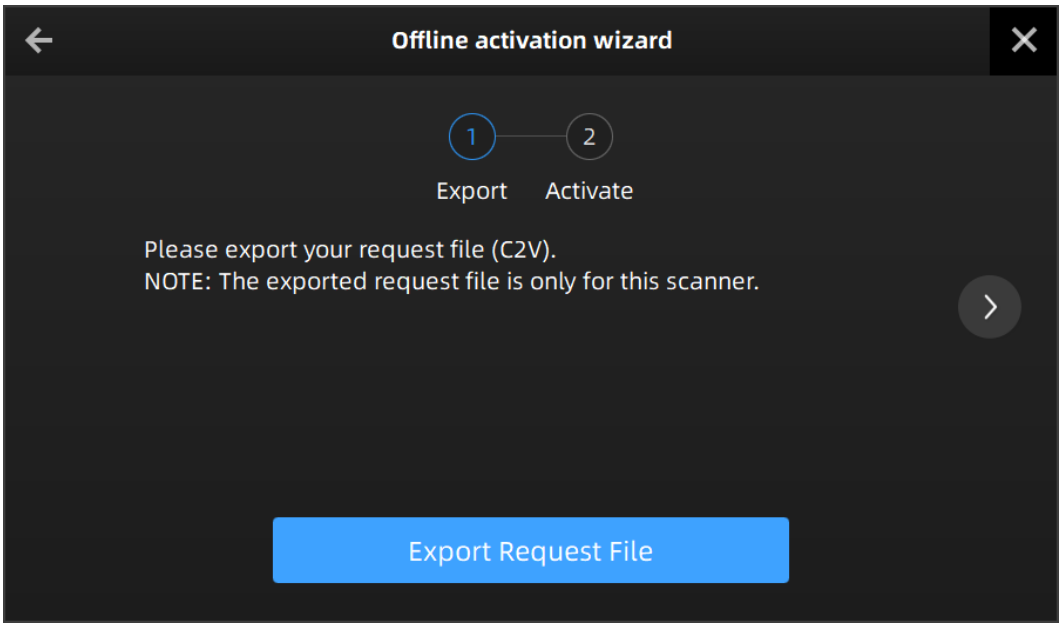
Online activation

If the computer is connected to the Internet, the activation will be processed automatically after you login Shining 3D User Account.

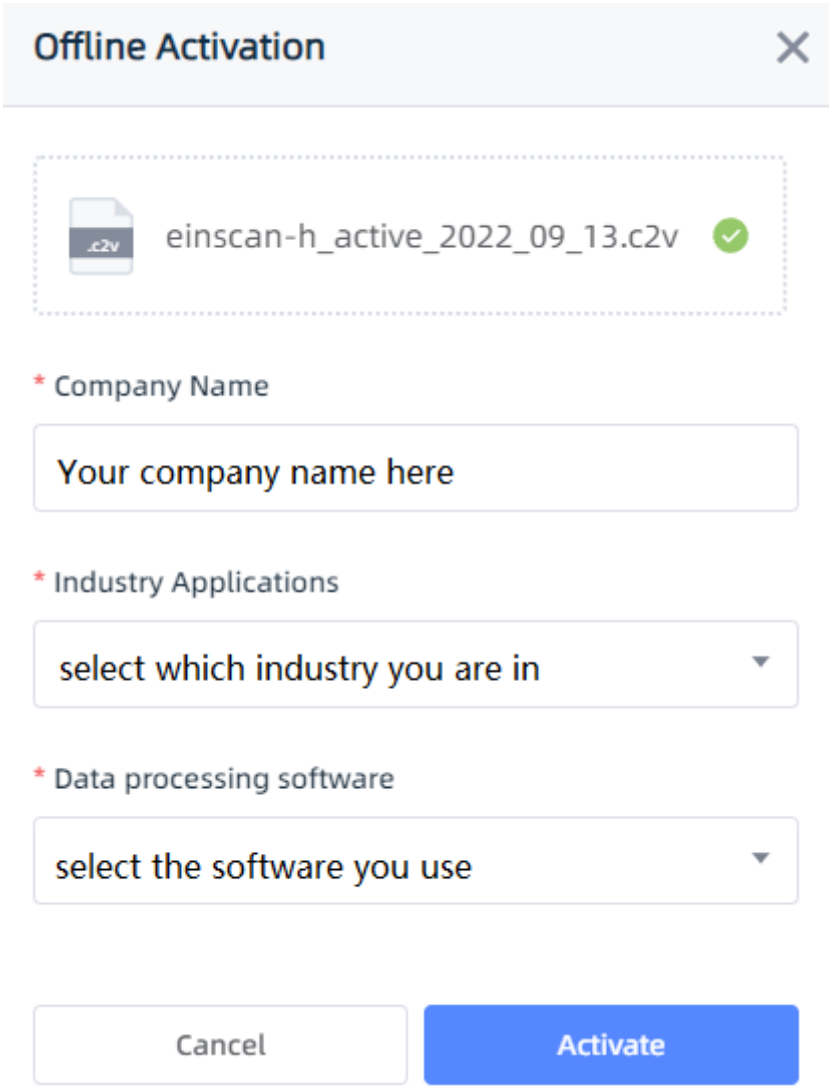
Offline activation

You need another computer which is connected to Internet to help you finish the offline activation.

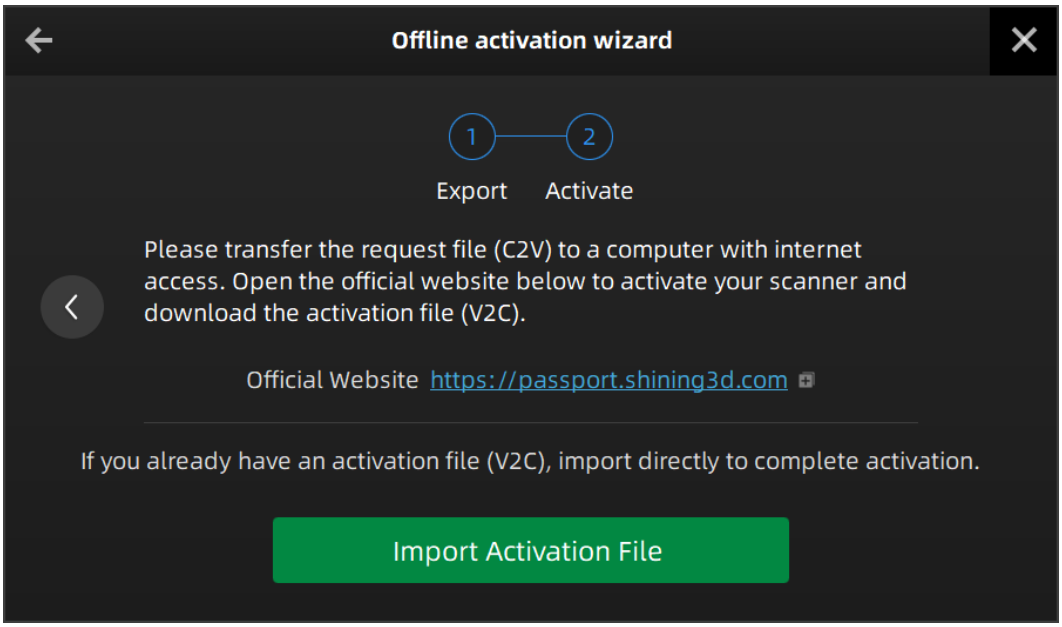
1. Connect scanner to the computer with no network, export C2V file.



2. Copy the C2V file to the other computer connected to Internet.
3. On the computer with network, login https://passport.shining3d.com/, upload your C2V file in **offline activation** page and complete the information of activation, you can then download the V2C file.



4. Copy the V2C file to the computer with no network, import the file into the software.



> **Note**
>
> If you fail to activate the device in neither way, please contact your supplier or our support team.

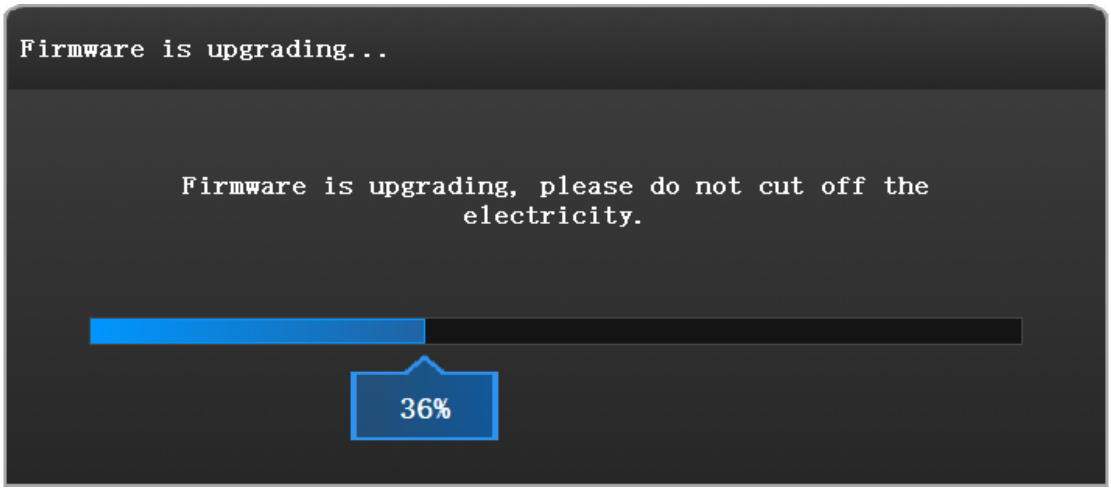
When new software is released, you will get prompted when launching the software. If the firmware in the software is newer than that in the scanner, you will get prompted too.

Firmware upgrade

The firmware is running on the scanner, it will be upgraded for better performance, stability or bug fixing.

> **Warning**
>
> Make sure that the device is powered on during the upgrade; avoid interruption of the upgrade due to power cuts.

When the scanner is connected, the software will automatically detect the firmware. If the firmware does not match, it will prompt you to upgrade the firmware. Click **Yes** to upgrade.

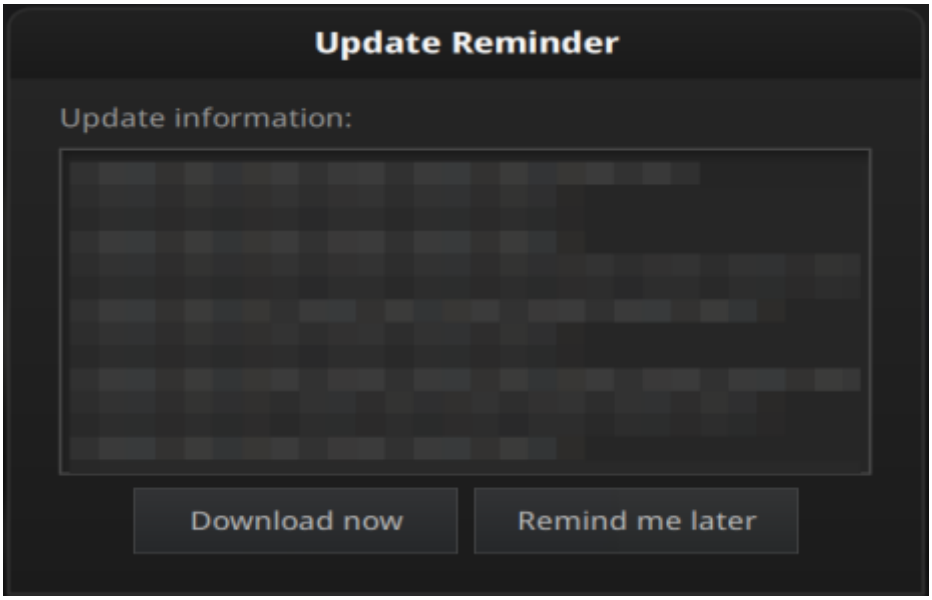


Software upgrade

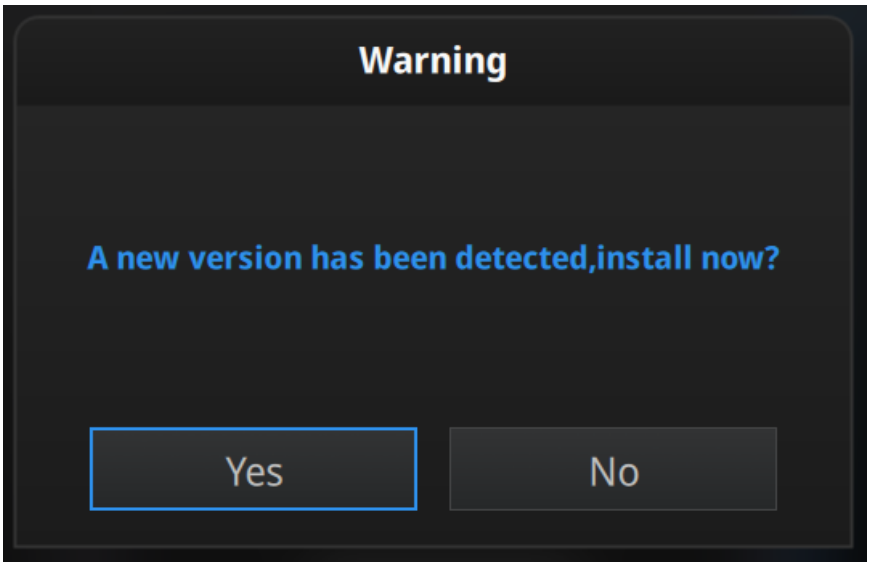
Software upgrade is to optimize software performance, add new functions or bug fixing.

> ⚠ **Warning**
>
> The software will be closed during upgrading, please save your projects properly before upgrading.

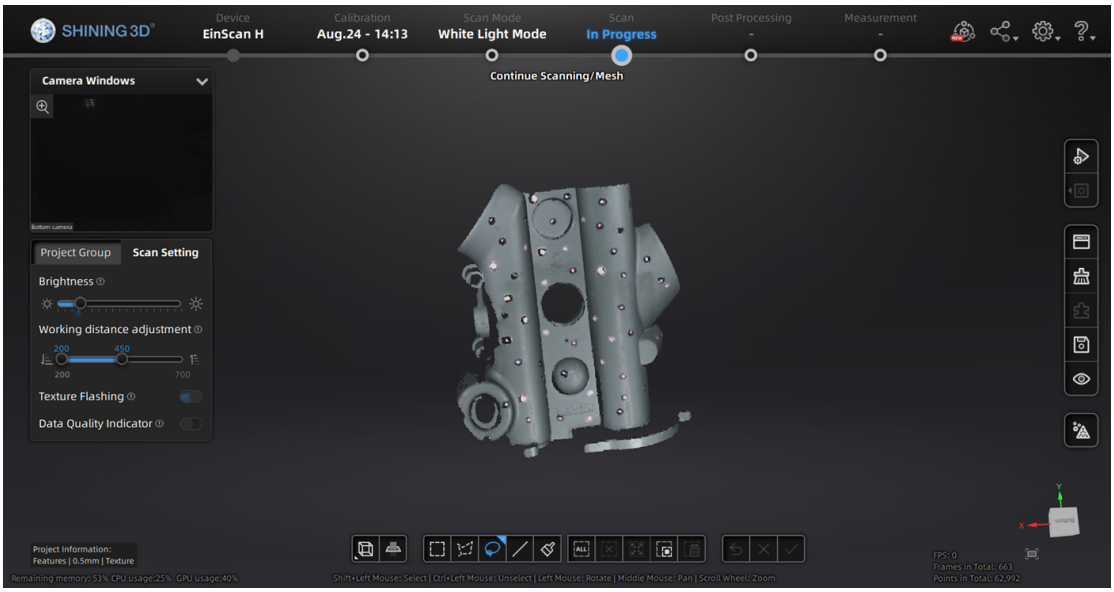
It is highly recommended to use the latest version of software. If not, a reminder will pop up immediately when you launch the software.



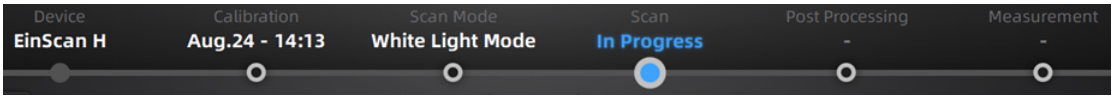
Click **Download Now** will download the new installation package in the background, you can continue using the software. Please do not close the software before the download has finished. Once it finished, the following prompt will show.



Click **Yes** to start the installation of the new version.

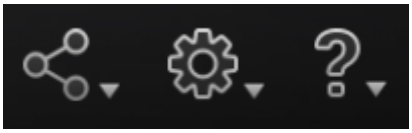


Navigation bar



Navigation	Description
Device	Displays the device status: online / offline
Calibration	Click to start calibration.
Scan Mode	Select different scan mode: white light mode / IR mode
Scan	Into scan process.
Post Processing	Into post processing after generating the point cloud, includes mesh and mesh editing.
Measurement	Use the software to measure your model.

Settings and feedback



Social

Function	Description
Official Website	Open the official website of Shining 3D to learn about the company's products and information.
Facebook	Enter Shining 3D's Facebook to view product introduction and other operations.
Support Platform	Enter Shining 3D's support platform to view product introduction and other operations.

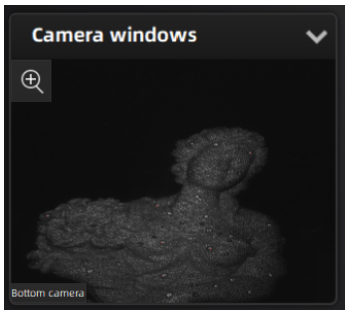
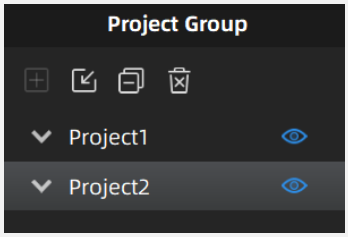
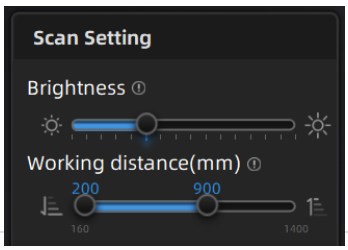
Settings

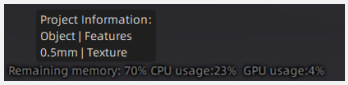
Function	Description
User Experience	To help us improve the quality and user experience of the device, we hope to be allowed to collect usage experience information. This information will not contain your personal information or scanned data and will not be accessible to any third party.
Factory Default	All settings can be restored to the initial settings, and the software will automatically restart.
Language	To select other language.
About	View related software release information, contact information, etc.

Help

Function	Description
Calibration guide	Checked by default, will display guide in calibration.
User Manual	Open a browser to show user manual.
Teamviewer	The quick access to remote assistance. Send the ID and password in the pop-up window to the technical supporters for remote assistance.

Other component

Component	Description
Camera Window 	This is the camera window in **scan** process. Show one by default, you can open other camera windows through Right-click menu.
Project Group 	Here you can manage your project group, for more detail please refer to Project and project group.
Scan Setting 	Here you can set the parameter when scanning, for more detail please refer to Scan Setting.

Project Information 	In this area, you can check the project information and computer information.
Working distance indicator 	Indicate working distance between the scanner and the object. Green: proper Red: too close Blue: too far
Edit	Please refer to Data edit.
Sidebar	Please refer to Scan function.

Quick guide

1. Select scan mode.
2. Create a project group, setup project settings.
3. Set scan parameters while preview .
4. Scan and generate point cloud.
5. Mesh.
6. Save the scan data.

Calibration

With **calibration**, the scanner parameters are recalculated, which not only ensures the accuracy of the scanner, but also improve the quality of scanning.

Note

Calibration is required under the following conditions:

- When the scanner is used for the first time.
- The scanner was severely shaken or shocked, such as shocked during transportation.
- Severe accuracy reduction, such as frequent errors in alignment or unrecognized markers.
- Incomplete data is acquired during the scanning or serious deterioration of the quality of scanned data.
- When the scanner is NOT calibrated more than 14 days, the software will prompt you to do calibration.

Warning

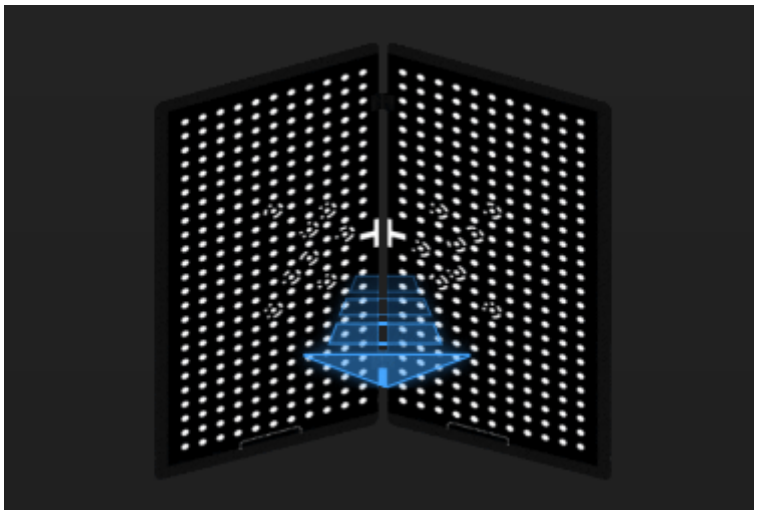
- The calibration board is matched to the device. Doing the calibration with an incorrect calibration board will fail to generate good scan data or optimum accuracy.
- Always make sure that both sides of the calibration board are clean and free of scratches.
- Do not place heavy objects or sundries on the calibration board.
- Keep the calibration board away from corrosives, metals and sharp objects to avoid corrosion or damage.
- It is not recommended to wipe the calibration board. When cleaning the board becomes very necessary, gently wipe it with a piece of a clean damp cloth. Do not use a cloth with chemicals or alcohols to wipe the calibration board.
- After using the calibration board, put it safely in a box or flannel bag.

Standard calibration

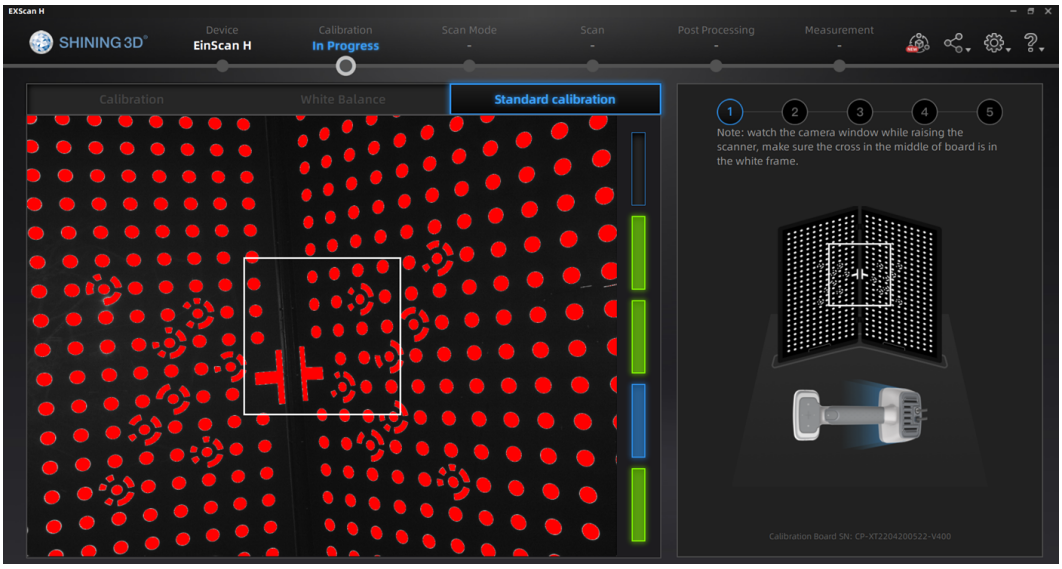
For the first time use, you will be guided to **Standard calibration** when you click **Calibration** button.

Follow the steps of the calibration wizard in the software. You need to calibrate the scanner from 5 different directions.

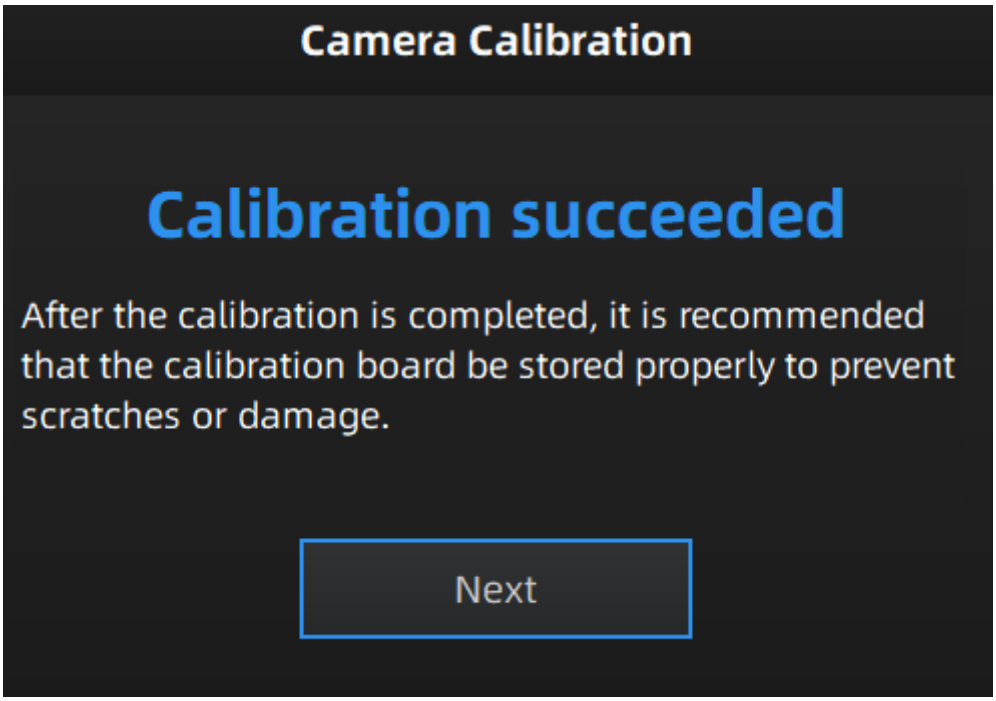
1. Follow the instruction in the picture to place the calibration board onto the holder, with its front site (black with markers) towards the scanner.



2. Press the scan button on the scanner to start calibration.
3. Move the device slowly and adjust the distance between the scanner and the calibration board according to the height indicating box.



4. Keep moving until all height boxes turn green.
5. Place the scanner in the next position and repeat step 2 ~ 4.
6. Finish calibration and check the calibration result.



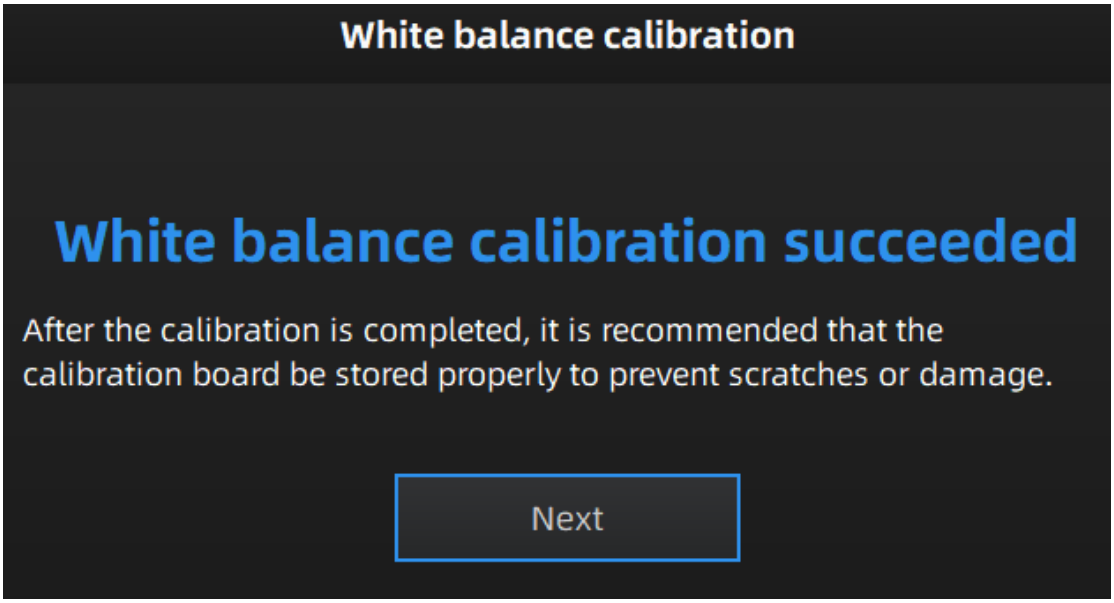
Note

- If the calibration fails, please try it again from step1.
- If you cannot get the pass result anyway, please contact your supplier or our support team.

White balance

1. Place the calibration board on a horizontal flat surface with its back site (white) lying towards up.
2. Hold the scanner face to the center of board in upright position.
3. Press the scan button on the scanner to start calibration.
4. Keep moving the scanner up and down slowly until the scanner takes a photo automatically, which indicates that the distance is optimal.

After finishing the white balance calibration, click Next on the following pop-up for entering the scan mode.



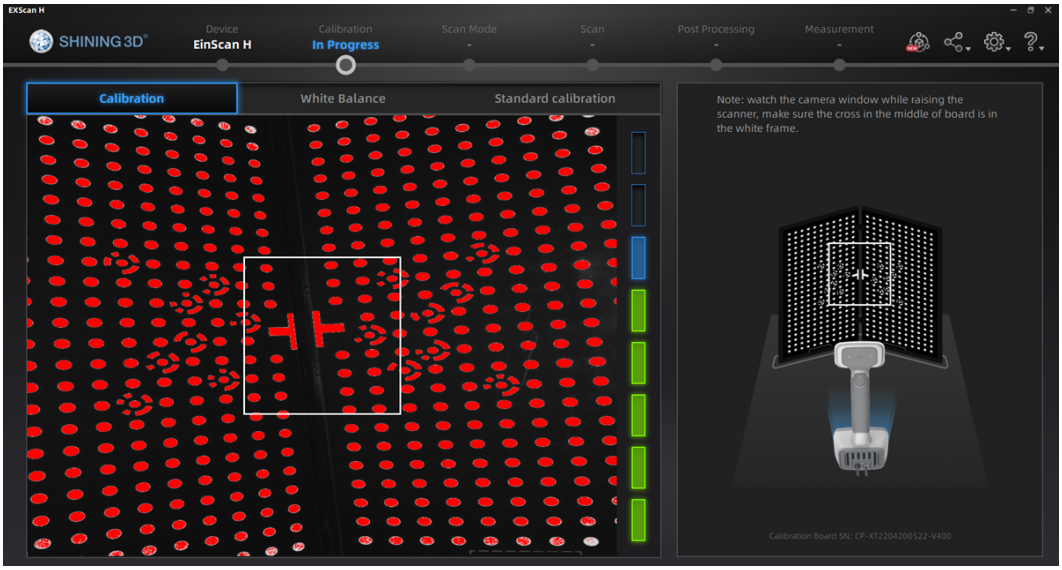
Note

- Do not do white balance or scan under strong light, it may cause color deviation.
- If white balance fails, please try it again.
- If you cannot get the pass result anyway, please contact your supplier or our support team.

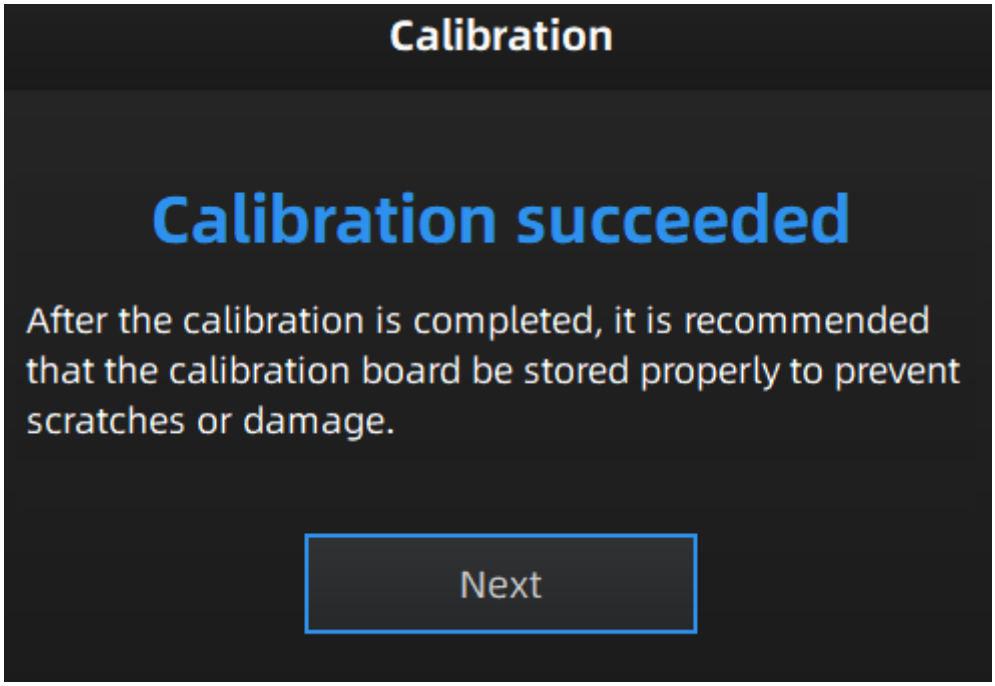
Quick calibration

Quick calibration can be used for re-calibration when accuracy reduction or misalignment during scanning. Only one position should be done during quick calibration.

1. Place the calibration board onto the holder, with its front site (black with markers) towards the scanner.
2. Place the scanner as shown in the software, then press the scan button on the scanner to start calibration.
3. Move the device slowly and adjust the distance between the scanner and the calibration board according to the height indicating box.



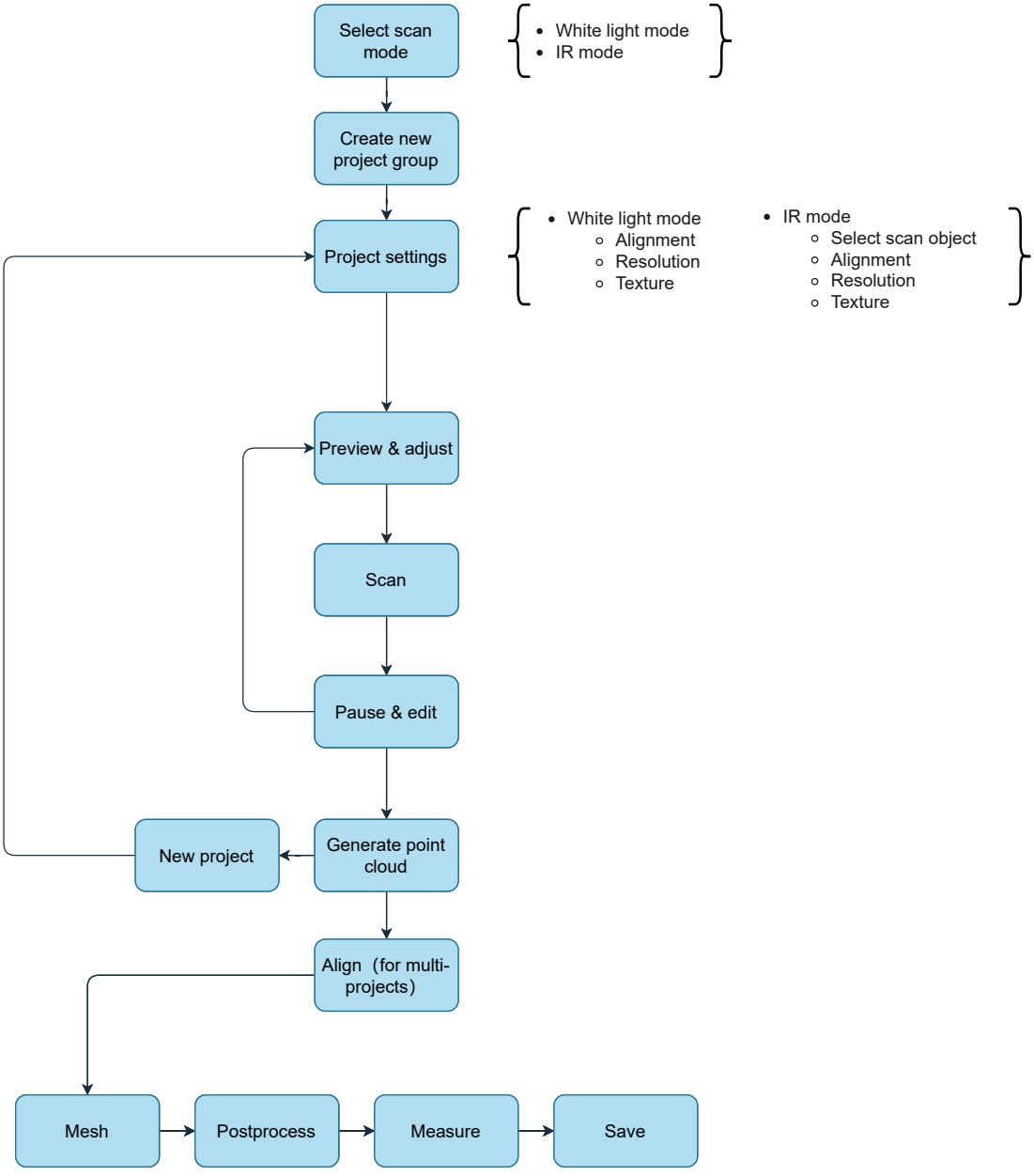
4. Keep moving until all the eight boxes turn green.
5. Finish calibration and check the calibration result.



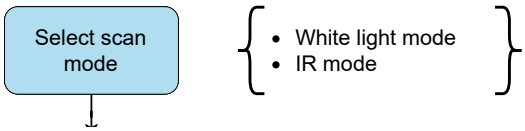
Below is the workflow of the scanner. There are two different workflows: Basic workflow, Global marker workflow.

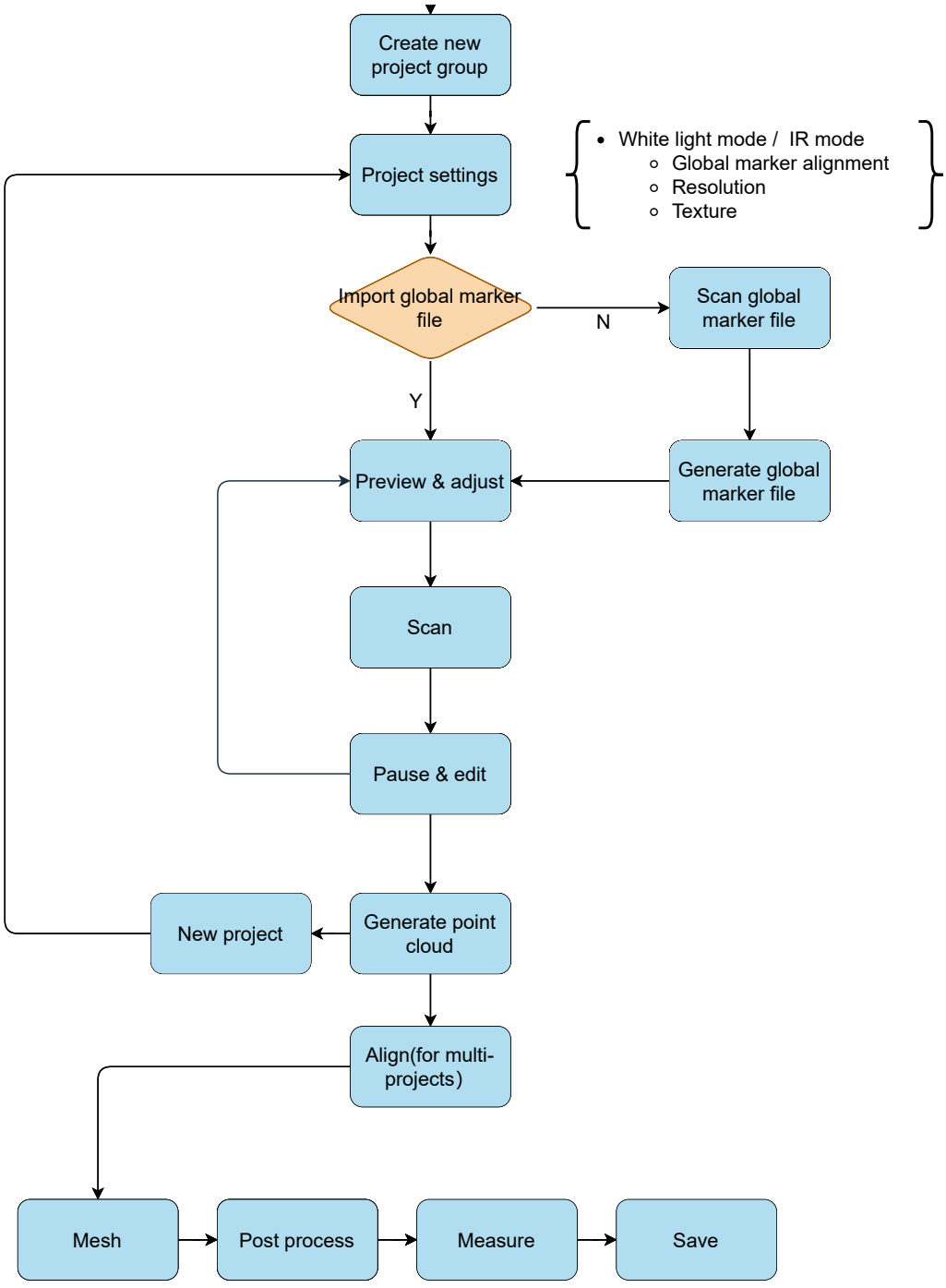
The basic workflow can fulfill most of your needs, if you want higher accuracy, you can use global marker workflow.

Basic Workflow



Global Marker Workflow





Preparation

Object has good geometry or texture features will get scanned easily and fast with good quality. If not, you need to do some preparation before scanning.

Note

Not recommend to scan following objects:

- Moving or vibrating objects, which cause the shape of object changed during scanning process.
- Soft material object.
- Lattice structures with many small deep holes.

Preparation for portrait scan

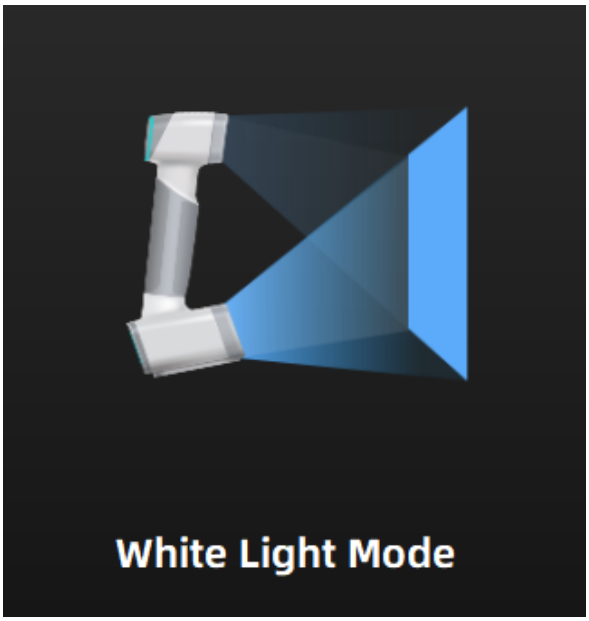
Hair

Bad sample	Good sample

Preparation for different object

Object	Preparation	Notes while scanning
Transparent, shiny, reflective surface objects	Use washable or vanishing scanning spray	Scan as normal
Objects with less features or repetitive features	- Place markers on the object. - Mark/draw on the surface to add features	- Select hybrid alignment. - Select texture alignment
Thin wall objects	Place markers on and around the objects	Choose global marker alignment

There are two scan modes: **White light mode** and **IR mode**.

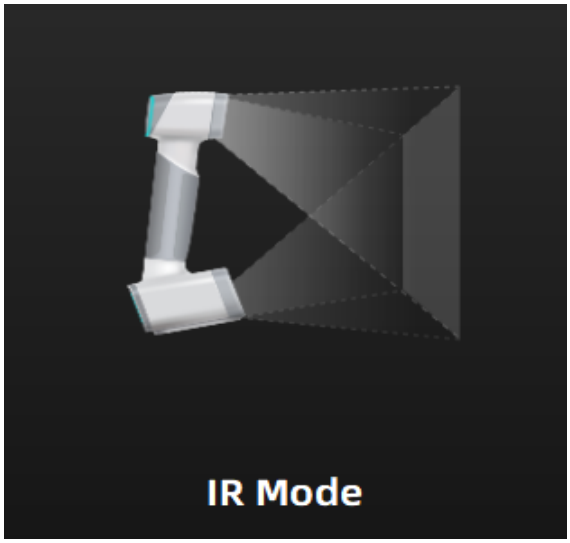


White light mode

Use white light source for scanning, with higher scan data quality and accuracy, suitable for scanning non-reflective, non-black material objects.

IR mode

Use the infrared light for scanning,
the data quality and scan accuracy are l
ower than the white light mode,
it is often used to scan people,
objects which are slightly reflective.



Project and project group

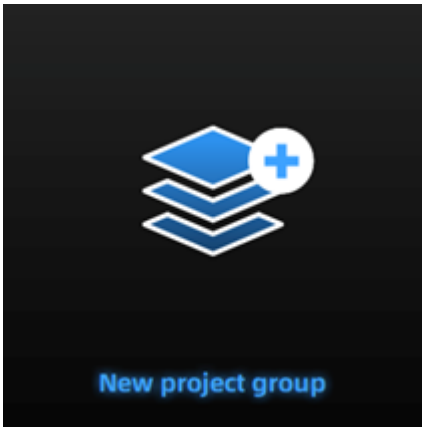
Project group

To start scanning, you need to create/ open a **project group**. Project group is the standard file structure of the software, it contains one project or more. Each project contains the scan data of its own.

Scenario	Project group	Instruction
One object in the scene, one align mode for the object	One project in the group	Only need one project to finish the scan
Multiple objects in the scene, all can align with the same mode	One project in the group	only need one project to finish the scan
Multiple objects in the scene, need different align mode	One project for each object	The objects might be different in material or need different align mode
A big object in the scene	One project for one part of the object	Scan different part and align together
One object in the scene but needs different align mode in different part	One project for each part of the object	Scan different part and align with different mode

Create project group

Two ways to create a project group:



1. Before scanning, select **scan mode**, then click **new project group** in prompt.
2. In **scan** window, click **project group** in side bar, then click **new project group** in prompt.

In the prompt window, name the project group and **new** to the path you choose, all the scan data will be saved to the folder with the name you just set.

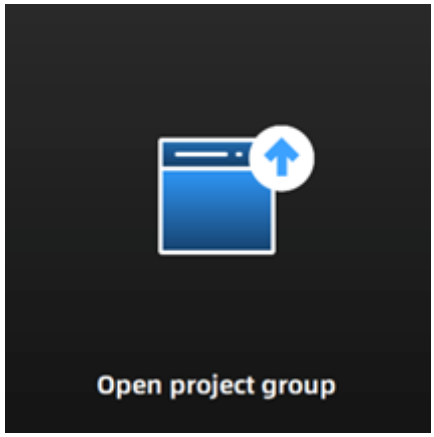
Open project group

> **Note**
>
> Current project group will be saved automatically.

Two ways to open a project group:

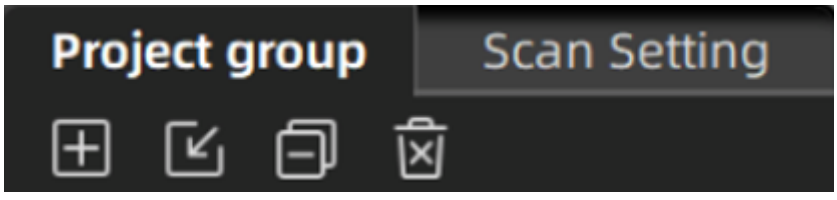
1. Before scanning, select **scan mode**, then click **open project group** in prompt.
2. In **scan** window, click **project group** in side bar, then click **open project group** in prompt.

In the prompt window, select the project group file and then **open**.



Project

Consider each **project** as a part of the **project group**. All operations of project can be done by the following buttons.



icon	function	instruction	note & warning
	Create new project	Two ways to create a project: 1. A project will be created automatically when you create a project group. 2. In scan window, click  to create a new project.	Only can create project when scanner connected.
	Open project	Two ways to open project: 1. When opening a project group, all project(s) of this group will be loaded to the software. 2. Click to open the project of one project group.	Cannot open project with different resolution or texture setting.
	Remove project	Click  to remove selected project from the project tree.	The data will not be deleted, you can open the project when needed.
	Delete project	Click  to delete the project from the project tree, and delete all the data of this project.	This operation will delete the scan data from the computer permanently.

White light mode

Alignment

Alignment	Instruction
Feature	uses object geometric features for auto aligning during scanning. Rich features on the object are required for this mode.
Texture	uses objects surface texture to align the scans.
Global Markers	uses global markers file to help align the scans. You may add an existed global markers file or scan one.
Hybrid	uses features, markers to align the scans. Use the function to avoid alignment error in some target parts. By this alignment, we do not need to place the markers all over the part, but only on the region where has less geometry.

Resolution

Resolution	Instruction
0.25mm ~ 3mm	0.5mm by default

Texture

Texture	Icon	Instruction
Texture scan on		Will capture texture data.
Texture scan off		Will not capture texture data.

Note

Texture switch cannot be changed once the project group been created.

IR mode

The scanner support two scan targets: **Portrait scan**, **Object scan**.

You need to choose scan target when you create the project. With different scan target, the settings below will be different.

Note

- You can select **Medium object** or **Large object** under object scan.
  - Medium object: size between 100mm X 100mm X 100mm and 300mm X 300mm X 300mm.
  - Large object: size larger than 300mm X 300mm X 300mm.

Alignment

Scan Mode	Alignment	Instruction
Portrait Scan	- Features - Texture - Hybrid	**Hybrid** alignment here means feature alignment plus texture alignment.
Object Scan	- Features - Texture - Hybrid - Global Markers	- When select **Global Markers** alignment, if global marker file not import, you need to scan global marker file first. - **Hybrid** alignment here means feature alignment plus marker alignment.

> **Note**
>
> **FEATURE ALIGNMENT** uses object geometric features for auto aligning during scanning. Rich features on the object are required for this mode.
>
> **TEXTURE ALIGNMENT** uses objects surface texture to align the scans. Texture Scan is required to select if you want to use texture align.
>
> **GLOBAL MARKERS ALIGNMENT** uses global markers file to help align the scans. You may add a existed global markers file or scan one.
>
> **HYBRID ALIGNMENT** uses two different alignments to align the scans. Use the function to avoid alignment error in some target parts. By this alignment, we do not need to place the markers all over the part, but only on the region where has less geometry.

Resolution

Scan Mode	Resolution	Instruction
Portrait Scan	0.25mm~3.0mm	1.0mm by default
Object Scan	0.25mm~3.0mm 0.25mm~0.5mm(Medium object)	0.5mm by default 0.3mm by default(Medium object)

> **Note**
>
> - With smaller setting value, you will get more detail, but will lead to larger file size and longer processing time.
> - Resolution cannot be changed once the project group been created.

Texture

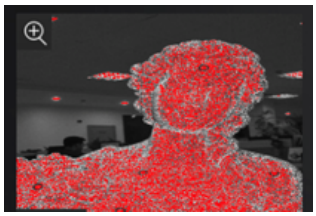
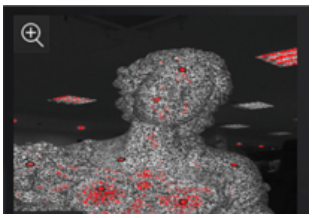
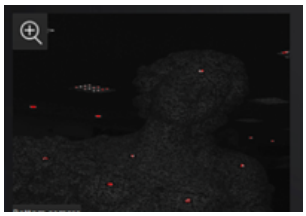
Texture	Icon	Instruction
Texture on		will capture texture data
Texture off		will not capture texture data

> **Note**
>
> Texture switch cannot be changed once the project group been created.

Following parameters can be set when scanning.

Brightness

Adjust the brightness for different material / color of the object to get better scan data.

Too high	Proper	Too low
		

Working distance

Use short working distance to get more detail, but need more time to scan the whole object.

Use long working distance to get large FOV, scan time will be shorter, but will lose some detail of the data.

Scan Mode	Minimum distance	Maximum distance	Working distance range
White light mode	200mm	700mm	>=200mm
Portrait scan in IR mode	200mm	1500mm	>=200mm
Object scan in IR mode	200mm	700mm 450mm(Medium Object)	>=200mm >=40mm(Medium Object)

Other function

Function	Value	Instruction
Data Quality Indicator	ON/OFF	To indicate the data quality of your scan, help you to get better scan data. - Only available before generating point cloud.
Texture LED Light	ON/OFF	Please turn on the LED light when there is not enough light for better texture scanning (This function is enabled by default). - Only available when **texture on** - Cannot change during scanning
Hair Mode	ON/OFF	Easier to scan hair, but also increase data noise. - Only available in **Portrait Scan**. - Cannot change during scanning.

Preview / Scan / Pause

You can always switch in these 3 status with the trigger on the scanner, or click the button in the software. The basic switch order is: **Preview** -- **Scan** -- **Pause**

Function	Icon	Instruction
Preview		In this mode, only show data for preview, but not record the data, you can modify the scan parameters according to the preview.
Scan		Start scanning, data is recorded. During scanning, make sure to keep the scanner perpendicular to the surface, keep a proper distance from the object, and adjust the brightness depending on the ambient light or texture of the object.
Pause		Pause scanning, you can edit the scan data or change the view angle if you want.

Preview

Generate point cloud

When you finish the scan, you can **Generate Point Cloud**[1] or **Optimize and Generate Point Cloud**[2]. You may want to edit the data later.

> **Note**
>
> The time it takes to generate point cloud depends on the data size of your project and the hardware configuration of your PC.

We provide functions to edit the scan data when you pause scanning or after you generate point cloud.

Icon	Function	Instruction
	Multi View	There are 6 different view angles for you to choose.
	Create Cutting Plane	Create a plane to do quick cut, check below for detail.
	Rectangular	Click and hold LMB to **drag** to select / deselect an area of the data.
	Polygon	Click LMB one-by-one to select / deselect an area of the data.
	Lasso	Click and hold LMB to **drag** to select / deselect an area of the data.
	Straight Line	**Drag** to create a line to select / deselect an area of the data.
	Brush	Use brush to select / deselect an area of the data.
	Select All	Select all of the data.
	Unselect	Cancel all the selections.
	Connected Domain	Click the button after select data, all connected region to the selected data will be picked.
	Revert	Revert the selection.

	Delete	Click the button or “DELETE” on the keyboard to delete selected data.
	Undo	Click the button to undo the most recently operations.
	Cancel	Undo all edit, and exit edit mode.
	Apply	Click the button or space bar to apply the edit, and exit edit mode.

Note

- press **Shift** + LMB to select the area.
- press **Ctrl** + LMB to deselect the area.

Cutting plane

Cutting plane is very useful when a base needs to be removed during scanning.

After setting cutting plane, there will be no more data scanned below the cutting plane.

Create cutting plane

Three methods to create cutting plane:

Method	Instruction
Fitting Point Cloud	Press Shift + LMB to select data, then click the button “Generate plane”. The cutting plane will be created by point cloud fitting. The direction of the plane will be calculated by the software according to the direction of point cloud.
Creating Straight Line	Press Shift + LMB to draw a line, and generate the cutting plane according to the line.
By Markers	Press Shift + LMB to select markers. 3 markers or more are required to generate the cutting plane.

Set cutting plane

Method	Instruction
Rotation axis	Cutting plane can be rotated around the axis by dragging the small ball.
Move cutting plane	Move the cutting plane by operating the active bar, editing the text box or dragging the arrow.
Delete	Click this option, data in the reverse direction will be shown in red. Apply this, and the red data will be deleted.
Reverse	Reverse the normal direction of the cutting plane.
Delete plane	Delete the created cutting plane.

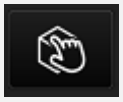
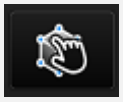
Before or after scanning, you can access the other scan functions through the sidebar function buttons.

Icon	Function	Instruction
	Project Group	Create / open a project group. About project group, please refer to Project Group.
	Clean Data	Clean the current point cloud data to redo scan.
	Align	Align the data as you need, please refer to Align.
	Save Data	Save scan data.
	Show Texture	To show / hide texture on screen.
	Mesh	Will move to next step "Post Processing" to mesh.

Align point cloud

This is how you align multiple projects in one project group.

Click  on the right side of the interface to enter the project alignment interface.

Align Mode	Instruction	Note
	Choose **Feature Alignment** and click **Apply**, alignment will be performed automatically.	Regular shaped objects (circular objects and square objects included) or small sized objects are not suitable for this mode.
	Manually choose at least 3 common points in the fixed window and floated window. Click Apply to align.	- The chosen points should NOT in a line. - Manual alignment is a supplement to feature alignment, which can solve the problem of feature alignment failures such as some areas with few common areas or extremely similar areas. The data is aligned by the best fit of all points of the data in the floated viewport and the fixed viewport.
	If the currently selected project is a marker project, the marker alignment can be performed. The software will automatically align according to the mark points.	The two projects have no less than 3 common markers each other.
	Select two project files and manually select multiple (≥3) markers for alignment.	- The selection of markers should be as separate and random as possible. - The selected markers will be cleared after aligning.

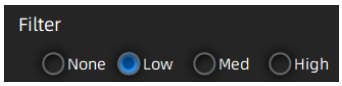
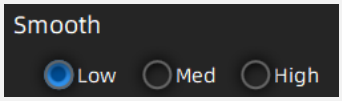
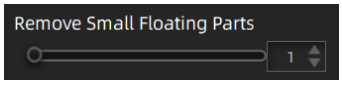
> **Note**
>
> You should **generate point cloud** before doing **align**.

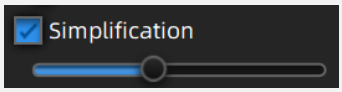
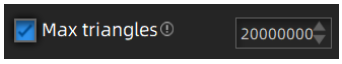
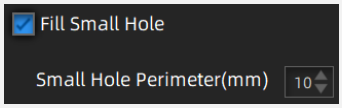
Meshing is to convert the point cloud into a triangular mesh surface. The data after mesh can be directly used for rendering, measurement or printing.

Mesh type

Icon	Function	Instruction
	Unwatertight	Unclosed model stays the way it is scanned. Processing time is quicker than Watertight.
	Half watertight	Some of the holes will be filled automatically. Holes with a diameter less than or equal to the resolution*5 will be filled.
	Watertight	All holes will be filled automatically. The data can directly be 3D printed. Only watertight mesh can set model quality.

Mesh optimization

Optimization	Instruction	Note
Filter	Optimize the data and improve the clarity of the data. The higher the level, the less the small details . 	- None: No optimization - Low: Optimizes data slightly and preserves data characteristics - Med: Reduce the noise on the surface of the scan data - High: Reduce the noise on the surface of the scan data and sharpen it powerfully.
Smooth	Smooth the possible noise on the surface of the scan data. 	
Remove small floating parts	Remove small floating parts on the model. 	
Simplification	Select to reduce the polygon	- Resolution <= 0.5mm, simplification

	numbers, file size and detail of data while meshing. 	will be selected by default. - Resolution > 0.5mm, simplification will be deselected by default.
Max triangles	Set max plate number to get mesh model's triangle plate number is within configured plate number. 	
Fill small hole	Auto fill the small hole when mesh. 	Default value 10mm, for objects with holes (smaller than 10 mm), please set the function parameter value to a smaller one.
Remove spike	Remove spike-like data on the image edge. 	
Marker hole fill	Fill in the surface of the object that is not scanned to the pasting marker.	

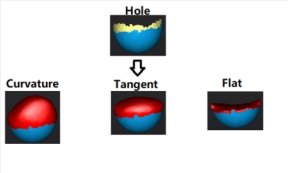
Click **Apply** to confirm the settings and start meshing, you can click  to restore or click **Confirm** to confirm the mesh result.

Mesh editing

Left panel

Click **+** to open each function.

Function	Instruction	Note
Texture	**Brightness** and **Contrast** can be adjusted.	**Confirm** to apply, **Cancel** to restore

Simplification	After simplification, the polygon numbers, file size and detail of data will be reduced universally.	High level may cause detail loss. Set the ratio from 1 to 100, the default is 0.
Mesh Optimization	Mesh optimization can optimize the quality of the data by adding more triangles to curvature regions.	
Smooth	Smooth the possible noise on the surface of the scan data.	It might remove some small details or smooth some sharp edges at the same time. Set the ratio from 1 to 100, the default is 0.
Remove small floating parts	Remove small floating parts in the scan data.	From 0 to 100% where 100% is the size of the largest mesh island. Smaller islands will be removed. 0 means no operation, 100 is the maximum. The maximum value is the square of the diagonal length of the floating part/10, MAX=(L/10)².
Auto Hole Filling	Auto fill every hole with a smaller perimeter than the number input. 	Choose Curvature, Tangent or Flat before filling hole. - **FLAT**: calculates the solution for the hole filling considering the point position on the boundary. - **TANGENT**: calculates the solution considering the point position and the normal of the last row of triangles forming the boundary. - **CURVATURE**: calculates the solution considering the point position and the normal of the 2 last rows of triangles forming the boundary.
Manual Hole Filling	The hole edges are displayed green and get red after picking. The number of the holes and the number of holes filled will be displayed on the interface.	Choose Curvature, Tangent or Flat before picking a hole.

Flip Normal	To redefine the front direction of the scanned data in reversal design.	Texture mapping will be unavailable after flip Normal
Cutting Plane Tool	Define a plane by drawing a straight line. Delete the selection and close the mesh at the intersection. Use the cutting plane to align the mesh to the CSYS.	
Mirror	Mirror the mesh through a plane defined by a straight line.	After mirroring, texture remapping cannot be performed.

Bottom panel

Icon	Function	Instruction
	Select Visible	To select data on the front view only.
	Select through	To select data all through.

Note

The other editing functions are the same as point cloud editing

Right panel

Icon	Function	Instruction
	Open file	Open a file (STL, OBJ, PLY) for post processing.
	Save Data	Save scan data.
	Sketchfab Upload	Use your Sketchfab account to share the model.
	Third-party software	Save the data and open with third-party software.
	Texture remapping	After the post-processing, hole filling on texture scanned data will affect the texture render. By doing the texture remapping, the texture information will be reapplied on the mesh.
	Show Texture	To show / hide texture on screen.

You can measure on the model you just scanned, or you can open a model file to do the measurement, the software supports .stl, .obj, .ply files.

Create features

To use **3-2-1 System Movement**, you need to create features first. There are three kinds of features you can create: point, line and plane.

Point

Creation Method	Requirement	Description
Selected Points	-	Click on the data to select a point. Click create to create a point.
Line-Plane Interface	Line and Plane should be created in advanced	Click on the created line, or select it on the drop-down. Click on the created plane, or select it on the drop-down. The point generated is the intersection between the non-parallel line and plane.

Line

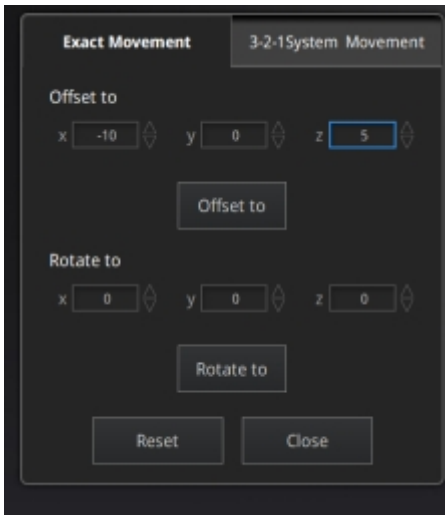
Creation Method	Requirement	Description
Point-Point	-	- Pick 2 points. - Click on the data to select a point or click on a feature point previously created. - In the Choice list select one of the points to redo it. - The line generated is define as point from to point to point.
Plane-Plane Intersection	2 planes should be created in advanced	Click on the plane previously created, or select it on the drop-down, repeat for the second plane. The created line is the intersection between the 2 non-parallel planes.

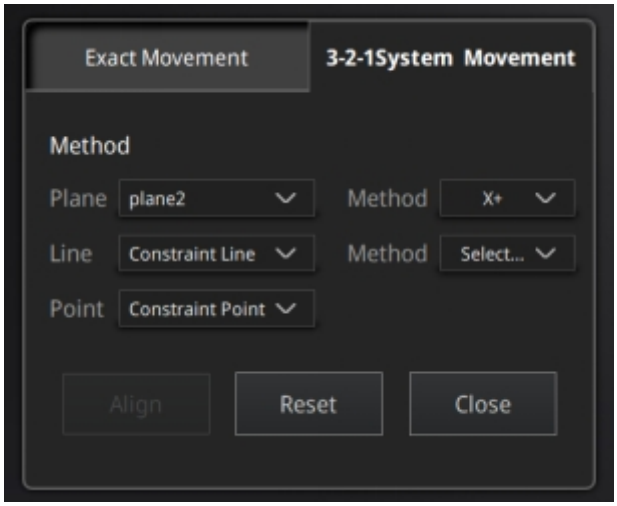
Plane

Creation Method	Requirement	Description
3 Points Fit	-	The plane is generated by 3 points not co-linear. Click on the data to select one point or click on a previous created feature point. In the Choice list select one of the points to re-select it.
Point-Line Fit	Line should be created in advanced	The plane generated includes the point and the line (The line should be created in advanced). Click on the line previously created or select it from the drop-down. Click on the data to select a point or click on a feature point previously created. In the Choice list select one of the elements to re-select it.
Best Fit	-	Press Shift+ LMB to select an area, press Ctrl+ LMB to deselect. The plane generated is the position with the smallest deviation from the selected area.

Movement

Use this mode to modify the alignment of the data to the global coordinate. This action is useful for post processing or reverse engineering.
The transformations do not affect the shape and size.





Movement method	Description	Steps
Exact Movement	- **Offset**: adjust the object data center coordinates in X, Y, Z axis. - **Rotation**: adjust the rotation angle in X, Y, and Z axis.	1. Enter the setting value then click **Offset** or **Rotate**. 2. Repeat step 1 until it meets your needs. 3. Click **Close** to save the results and exit. 4. Click **Reset** to cancel all movement.
3-2-1 System Movement	3-2-1 system movement aligns model by selecting the point, line and plane. Before movement, create feature points, lines and planes. The feature lines created are not perpendicular to the plane. The coordinate system on the interface represents the global coordinate system. Red=X+, Green=Y+, Blue=Z+.	1. Make a one-to-one correspondence between the created feature points, lines and planes with the origin and axis of the coordinate system to be aligned. That is, the normal of the selected plane corresponds to the coordinate axis; the selected feature point corresponds to the origin. - Select a feature plane in the plane drop-down menu, and select an axis in the corresponding constraint drop-down menu of the plane. The arrow on the plane corner indicates the positive direction of the plane, and the selected axis direction will be consistent with the plane direction. - Select a feature line in the drop-down menu of the line, and select an axis in the drop-down menu of the line. The arrow of the line indicates the positive direction of the line, and the direction of the selected axis will be consistent with the direction of the projection of the line on the selected plane. -Click the drop-down menu to select a point, the position of this point is the origin of the coordinates (0, 0, 0).

Measure

Three kinds of measurements can be done in the software: **Distance**, **Surface area** and **Volume**.

Measurement	Description	Steps
Distance	Calculates the distance between two points on the surface of the model.	Click on the surface of the model to pick two points, the calculation will be done automatically. **Total** is the 3D distance, **X**, **Y** and **Z** are the projection of the segment to the respective planes.
Surface area	Calculate the surface area value.	- Press **Shift + LMB** to select an area, press **Ctrl + LMB** to unselect. - **Ctrl + A** to select all. - Click **Calculate** to display the Area value of the selected data in mm^2.
Volume	Calculate the volume contains in a watertight mesh.	It returns the volume in mm^3 and the coordinates of the bounding box. - Only available for watertight mesh.

1. To generate point cloud directly without any optimization, will be fast and less memory been used; Only available in **Object Scan**. ↵↵
2. Optimize then generate point cloud, suggest choosing this option when you have higher accuracy requirement or when there is layering problem caused by accumulated aligning errors during scanning. ↵