SHINING 3D

FREESCAN TRAK PROW

V2.2.1.0

User Manual

Table of Contents

Overview

Welcome

Symbol Conventions

Symbol	Description
	Note: This symbol is used to inform you of the additional information of the product.
	Caution: This symbol is used to inform you of incorrect operations that may damage the device or result in data loss. Any damages resulting from misuse are not covered by the warranty.
	Warning: This symbol is used to inform you of the potential risks that may result in serious personal injury and other safety incidents.

The Declaration of Intellectual Property and Disclaimer

Thank you for using the products of SHINING 3D TECH CO., LTD. (hereinafter referred to as the "SHINING 3D"). Before you use the products, please carefully read and understand this declaration. Once you use this product, it indicates that you fully accept this statement and promise to comply with the relevant regulations.

1. The contents of the Product Instruction and User Manual (hereinafter collectively referred to as the "Product Usage Documentation") are critical to your personal safety, legal rights, and liabilities. Before you use the products, please ensure that you have carefully read the Product Usage Documentation, and use the product correctly in accordance with the requirements of the Product Usage Documentation. We also recommend that the products be operated by trained professional technicians.

2. Please inspect and/or maintain the product before use. If the product is damaged, deformed or in any other abnormal condition, stop using it immediately and contact the after-sales service personnel for maintenance. SHINING 3D will not be responsible for any problems caused by your failure to inspect or maintain the product in a timely manner.

3. SHINING 3D does not guarantee the applicability of the outcomes of your use of the products, and you are responsible for verifying the quality and functionality of the outcomes. You should check and verify thoroughly that any outcomes meet your requirements before using them, for which you bear full responsibility. If any damage arising from using the outcomes of any products, you shall bear the corresponding risk, and SHINING 3D shall not bear any responsibility.

4. SHINING 3D owns complete intellectual property rights for the contents of the for which you bear full responsibility. Without the written consent of SHINING 3D, it is not allowed to copy, transmit, publish, adapt, compile or translate any contents of the Product Usage Documentation in any form for any purpose.

5. The Product Usage Documentation is a guidance for installing, operating, and maintaining the product instead of serving as the quality guaranty for the products. SHINING 3D makes all efforts to ensure the applicability of the Product Usage Documentation, but reserves the right of final interpretation. Images and diagrams in the product documentation are presented to provide convenience to user understanding. In the event that any images or diagrams are inconsistent with the physical products, the later shall prevail. In addition to the mandatory provisions of laws and regulations, the contents of the Product Usage Documentation are subject to changes without further notice.

6. SHINING 3D shall not be held responsible for any damages and/or losses caused by human factors, environmental factors, improper storage and use, or any other factors other than due to the quality of the product. SHINING 3D also shall not be held responsible for any indirect anticipated profit loss, loss of reputation and other indirect economic losses. Except as otherwise expressly provided by laws and regulations, the total liability assumed by SHINING 3D (regardless of cause) shall not exceed the purchase price of the products you paid to SHINING 3D.

7. Disputes arising from this Declaration and the Product Usage Documentation thereof shall be governed by the laws of the People's Republic of China, excluding its conflict of law rules. In the event that certain provisions are in conflict with the applicable law, these provisions will be reinterpreted in full accordance with the law, while other valid provisions will remain in force.

8. All disputes between you and SHINING 3D that arise from, shall first be resolved amicably through negotiation. If a dispute cannot be resolved through friendly negotiation, any party may submit the dispute to the Court of Xiaoshan District, Hangzhou City, Zhejiang Province, People's Republic of China for litigation and settlement.

9. In the event of any questions about the contents of this Declaration and application of Product Usage Documentation, please contact us by the contact information provided in the User Manual. Thank you for your cooperation and support! We hope that our products can bring you a great experience of using.

EMC

The devices are used in the factory for scanning components.

The Ethernet port is not supported to connect to the public network.

EU Statement

This device is restricted to indoor use when operating in the 5150-5250MHz frequency range.

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR
HR	IT	CY	LV	LT	LU	HU	MT	NL	AT
PL	PT	RO	SI	SK	FI	SE	UK(NI)	TR	NO
CH	IS	LI							

Frequency Range (RF)

Wi-Fi (5G):

Band 1: 5150-5250 MHz (TX/RX), 5.1 GHz Wi-Fi: < 23 dBm (.e.i.r.p)

Band 4: 5725-5850 MHz (TX/RX), 5.8 GHz Wi-Fi: < 14 dBm (.e.i.r.p)

2.4 GHz Wi-Fi: 2412-2472 MHz, 2.4 GHz Wi-Fi: < 20 dBm (.e.i.r.p)

2.4 GHz SRD: 2402-2480 MHz, 2.4 GHz SRD: < 10 dBm (.e.i.r.p)

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF Exposure Information

Scanner: The 3D scanner complies with FCC radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure compliance.

Tracker: The tracker complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20 cm during normal operation. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IC

This Class A digital apparatus complies with Canadian ICES-003. CAN ICES (A) / NMB (A)

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1) This device may not cause interference. (2) This device must accept any interference, including interference that may cause undesired operation of the device.

> **French Version**
>
> L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) L'appareil ne doit pas produire de brouillage; (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

> **French Version**
>
> Les dispositifs fonctionnant dans la bande de 5 150 à 5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

RF Exposure Information

Scanner: The 3D scanner complies with RSS-102 radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure compliance. The portable device is designed to meet the requirements for exposure to radio waves established by the CNR-102.

> **French Version**
>
> Le scanner 3D est conforme aux limites d'exposition aux rayonnements RSS-102 établies pour un environnement non contrôlé. L'utilisateur final doit suivre les instructions d'utilisation spécifiques pour satisfaire Conformité à l'exposition RF. L'appareil portatif est conçu pour répondre aux exigences relatives à l'exposition aux ondes radio établies par le CNR-102.

Tracker: The Tracker complies with RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

> 📋 **French Version**
>
> Le traqueur est conforme aux limites d'exposition au rayonnement RSS-102 établies pour un environnement non contrôlé.Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm Entre le radiateur et votre corps.

Getting Started

The following is an overview guide to the hardware and software of the device, making it easy for you to quickly locate the corresponding content.

About Hardware

Here you can learn about the hardware-related information of the device, including device introduction, device appearance and other content.

→ Introduction to the parts

→ How to connect the device?

→ Introduction to the device appearance and indicators

About Software

Here you can learn about software-related information of the device, including software installation, device activation, and other content.

→ How to install software?

→ How to activate the device?

→ How to upgrade the firmware / software?

→ How to run the software and do basic settings?

After successfully installing the software and activating the device, you can follow the steps below to operate the device.

1️⃣ Calibration	2️⃣ Project Group

Calibration is mainly used to re-adjust parameters of the device, which can ensure its accuracy and improve the scanning quality.

If you are using the device for the first time, please do calibration. After that, the software will automatically skip this step when you run it again.

→ Preparations before calibrating

→ How to calibrate the device?

Before scanning, you need to choose the storage path for the files and create a project group.

→ How to create / open a project group?

→ How to operate on a single project within the created / opened project group?

3 Set Scan Parameters

After creating a project group, you can set the scan parameters for the project group before scanning to get better scanning effect.

→ How to set scan parameters?

4 Scan

Scan the object and obtain the data.

→ Introduction to the scan interface

→ Preparation before scanning

→ Which scan modes can I choose for scanning?

5 Edit Scanned Data

You can edit the scanned data to reduce noise and obtain accurate data after pausing the scan or after the scan is completed.

→ Introduction to the edit toolbar

→ Introduction to shortcut key

→ Introduction to the right-click menu

→ Introduction to the cutting plane tool

6 Save and Export Data

You can save the scanned data for future import or export.

→ How to save data?

→ How to share data?

→ To which third-party software can I import the data?

7 Post-processing and Measurement

You can process or measure the scanned data.

→ What operations can I perform in post-processing?

→ How to use the FreeProbe?

→ How to create features in the measurement interface?

Hardware

Introduction

Based on the dynamic referencing technology, FreeScan Trak ProW is capable of capturing the spatial position of the scanner tip in real time to acquire an accurate and complete 3D data of large or medium-sized objects. In Trak Mode, there is no need to place markers, making the operation process simpler and less affected by the size of the scanned object and the scanning environment. The innovative scanning method offers a portable, efficient and reliable solution to scan large and complex objects. It is mainly applied in aerospace or manufacturing industries, and other scenarios unsuitable for markers attachment.

Appearance

This product consists of FreeScan TE25W (a laser 3D scanner), FreeTrak L (an optical tracker) and FreeProbe L[1].

FreeScan TE25W

The scanner is easy to use with high scanning efficiency.

Indicator Status

The indicator turns bluish after the device is powered on and goes out when the device is on standby.

During scanning, different light colors indicate different scanning distances.

- Blue: The device is too far from the scanned object.
- Light blue: The device is far from the scanned object.
- Green: The distance between the scanner and the scanned object is proper.
- Yellow: The device is close to the scanned object.
- Red: The device is too close to the scanned object.

Buttons

- Press and hold the up button: To turn on / off the **Local Enlarged View** function.
- Press and hold the down button: To turn on / off the **View Lock** function.
- Press and hold the left button: To switch the scan mode between **Scan Global Markers** / **Photogrammetry** and **Scan Mesh**.
- Press and hold the right button: To switch the scan object between normal and reflective.

FreeTrak L

With FreeTrak L, you can scan large and complex objects without markers, thereby saving much time and enhancing scanning efficiency greatly.

Indicator Status

- White: The device is power on.
- Blue: The device is unconnected to the software.
- Green: The device is connected to the network and the software.
- Red: The device is unconnected to the network.
- Orange: Tracking loss in **Photogrammetry**.
- Blue: The device is unconnected to the software.
- Green: The device is connected to the network and the software.

Button

- In **Photogrammetry**, pressing the button on the top of the tracker can cycle through **Preview** (optional), **Scanning**, and **Pause**.
- In **Photogrammetry**, pressing and holding the button on the top of the tracker allows for **Marker Optimization**.

Screen
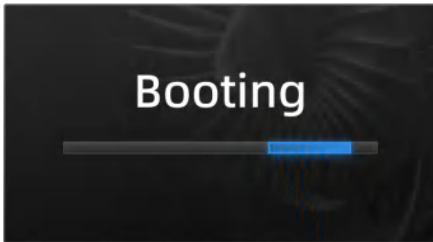
Booting
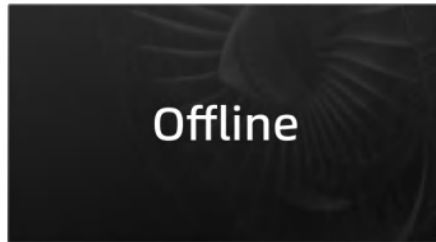
Disconnect from the software
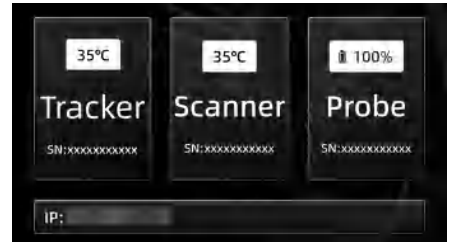
Connected to the software

> 📋 **Note**
>
> Once the device is heated, the screen will display the real-time temperature of the device.

Screen when scanning

Scanning

Pause

Tracking lost

The scanner is too close to the tracker
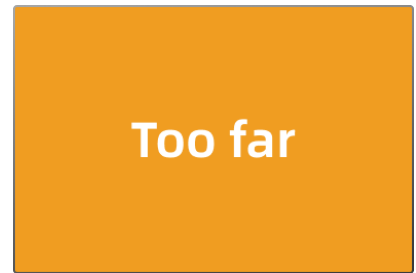
The scanner is too far away from the tracker
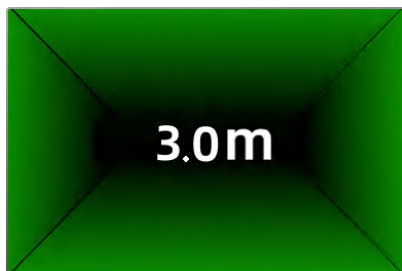
When the scanner is within the tracker's field of view, the surrounding areas on the screen will display as green.
The specific distance between the scanner and the tracker is shown in real-time on the screen in meters.
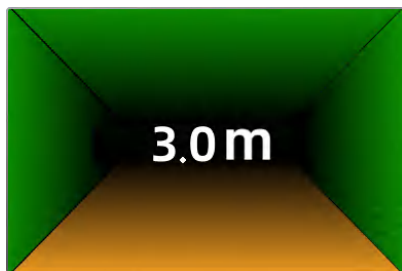
When the scanner is close to the edge of the tracker's field of view, the areas in that direction on the screen will display as yellow.

Wireless connection

After successfully connecting the device wirelessly, please check if the **Sync** is displayed as ✅.

- If the synchronization is normal, all functions of the software are available.
- If the synchronization is abnormal, functions in **Post-processing** and **Measurement** are available.

Probe

Failed to connect to the FreeProbe L	Connected to the FreeProbe L (Full charged)	Connected to the FreeProbe L (Low on battery)
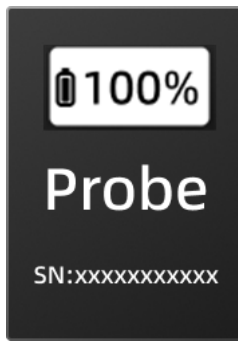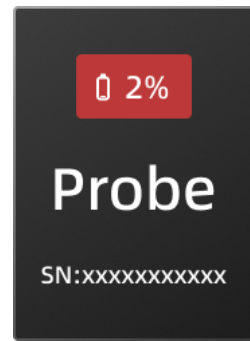
FreeProbe L

This instrument can obtain the 3D coordinate of points by touching the surface of an object to achieve different detection targets.

Indicator Status

- Cyan: The device is power on.

- Blue: The device has successfully connected to the computer hotspot.

- Green (steady): The device is successfully connected to third-party software or tools.

- Green (flashing): Each successful point marking will cause the green indicator light to flash once.

- Green (flashing continuously): Low battery alert.

- Red (steady): The device has disconnected from the third-party software or tool.

- Red (flashing): Each failed point marking will cause the red indicator light to flash once.

> 📋 **Note**
>
> When the indicator light is blue and the probe is not successfully connected to the software, you can long press the right rhombic button to switch the color of the indicator light to cyan.

Buttons

- Left rhombic button: Short press for power on; press and hold for 5 seconds for power off.

- In the state of steady green indicator light:
  ① The left and right rhombic buttons as well as the middle and down keys on the directional pad serve as the point marking keys.
  ② The left key is used to undo a single point that has been marked.
  ③ The right key is used to confirm fitting.

---

1. An optional device. ↩

Connection

Please connect all parts as the following steps.

Introduction to the Parts
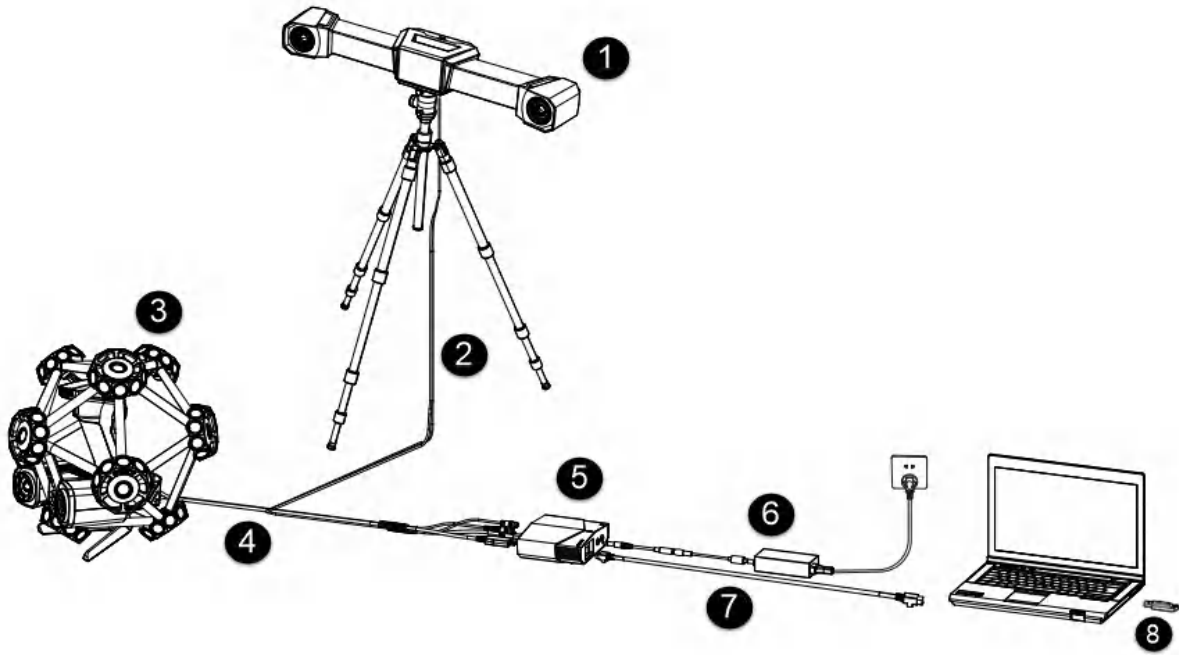
No.	Name	Description
1	Optical Tracker	An optical tracker, which can be installed on a tripod.
2	Tracker Cable	• One end for the tracker and the other end for the hub. • At the tracker end: One port for power supply, and the other port for data transmission.
3	Laser Scanner	Device for contactless detection of surfaces.
4	Scanner Cable	• One end for the scanner and the other end for the hub. • At the scanner end: One port for power supply, and the other port for data transmission.
5	Hub	To connect the tracker, the scanner and the computer.
6	Hub Power Cable	To connect the hub to the power supply.
7	Networking Cable	To connect the hub with the computer.
8	Dongle	To authorize the use of the software.

Introduction to the Hub

Front Ports
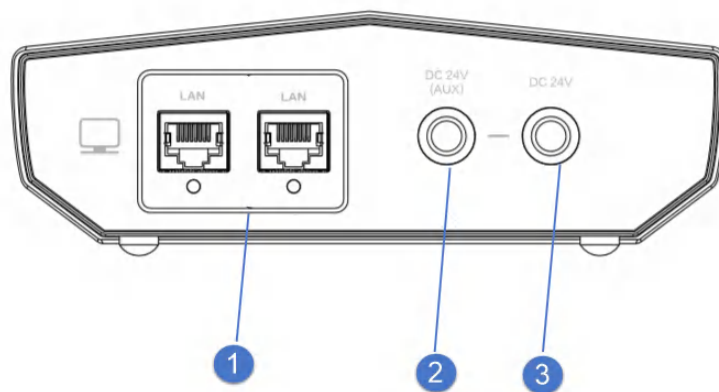
No.	Name	Description
1	Networking Port	To connect the tracker, the scanner and the computer to transmit data.
2	Auxillary Power Input	To connect the power adapter. It is only available when an extended tracker is used.
3	System Power Input	To connect the power adapter. It is a main power input of the system.

Back Ports
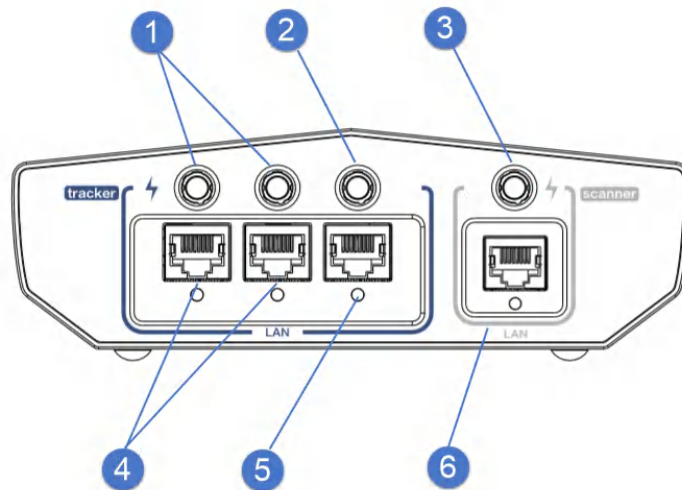
No.	Name	Description
1	Power Output	To power on the extended tracker.
2	Power Output	To power on the tracker.
3	Power Output	To power on the scanner.
4	Networking Port	To transmit data of the extended tracker .
5	Networking Port	To transmit data of the tracker.
6	Networking Port	To transmit data of the scanner.

Wired Connection

1. Install the tracker on the tripod and tighten the bolts.
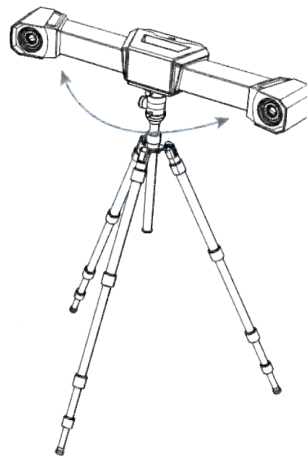
2. Insert the power plug and data cable plug into the bottom socket of the tracker.
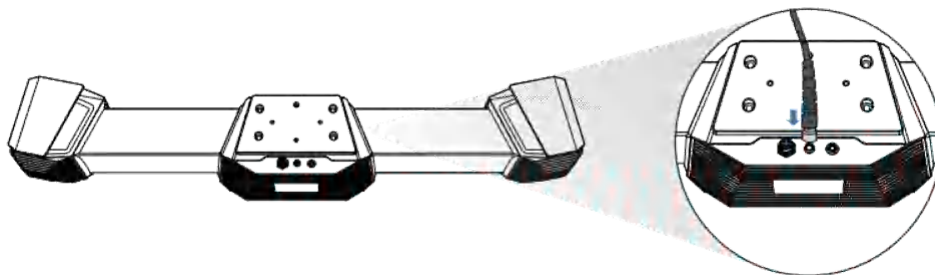
3. Insert the power plug and data cable plug into the bottom socket of the scanner.
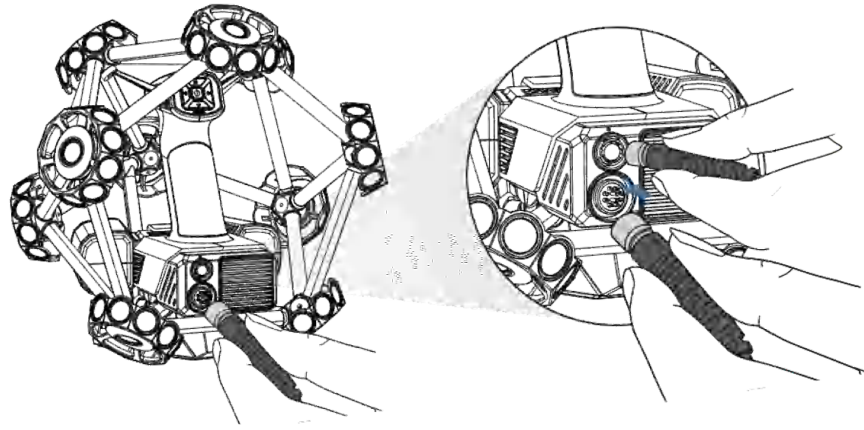
4. Insert the power plug and data cable plug of the tracker into the hub.

5. Insert the power plug and data cable plug of the scanner into the hub.

6. Connect one end of the networking cable to the hub and the other end to the computer's networking port.
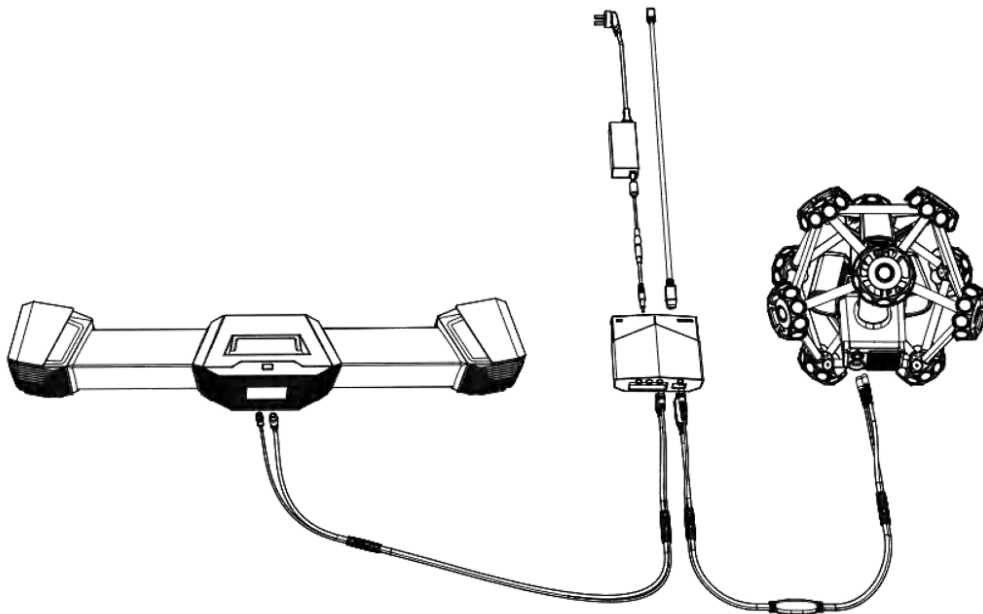
7. Power on the device.
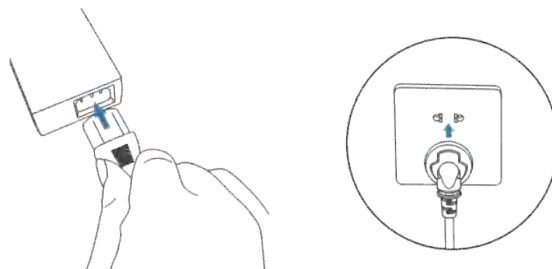
Wireless Connection

1. Connect your computer and router by a networking cable.

2. Power on the router, scanner, and tracker respectively.

3. After launching the software, check the device connection status.
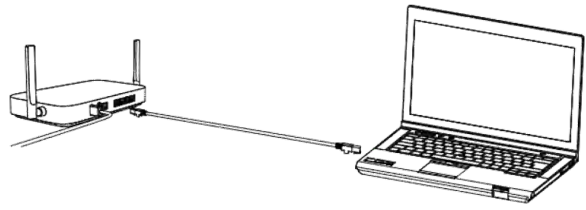
📋 **Note**

For more information on wireless connections and related illustrations, please refer to Device Pairing.

Software

Installation

Please install the software before using the scanner.

Steps

1. Insert the dongle.

2. Copy the installation file to the PC and double-click to run it.

3. Install the software by following the guidance.

Environmental Requirements

Recommendation	
Operating System	Windows 11 Professional 22H2 (64-bit)
Processor	13th Gen Intel® Core™ i7-13700H or above
Graphics Card	NVIDIA GeForce RTX 4060 Laptop GPU or above
VRAM	8 GB or above
RAM	64 GB or above, DDR5 dual-channel
Interface	USB 3.0

GPU

Please use a NVIDIA discrete graphics card for better scanning performance.

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**.
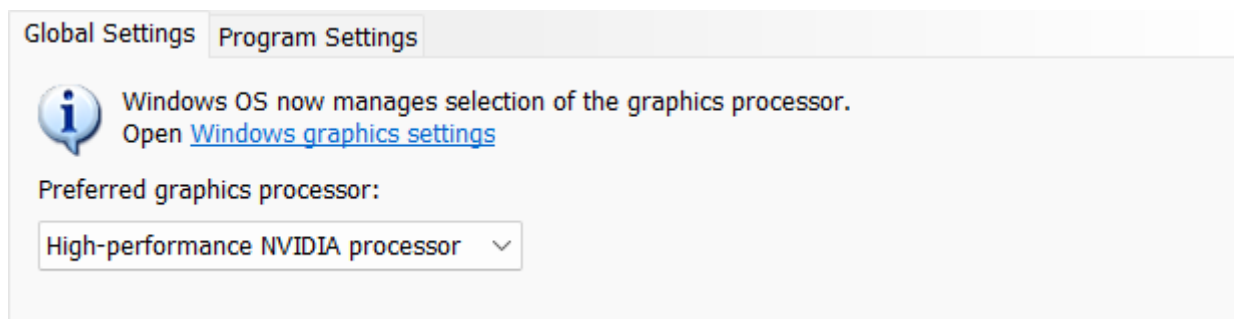
> ⚠ **Caution**
>
> - Administrator privileges are required for software installation.
>
> - The initial installation process may take some time, please be patient.
>
> - Do not install the software in **C:\Program Files** or **C:\Program Files (x86)** directories to prevent startup issues.
>
> - If driver abnormalities occurs, please open Device Manager, uninstall the current driver, and reinstall it. If reinstalling the driver does not resolve the issue, please contact technical support promptly.

Activation

If you are using the device for the first time, please start the software after installation and log in with your SHINING 3D user account to activate the device.
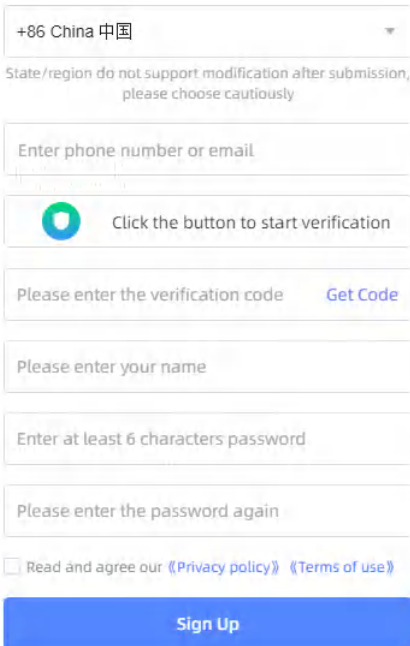
> 📋 **Note**
>
> - Please insert the dongle before running the software.
>
> - Please run the software after the device indicator light is on.

Register

For a new user, create an user account first.

- Sign up via the software
  Click **Register** and fill in the account information in the registration pop-up.

- Sign up via the website
  Click **Register a new account** in the website:
  passport.shining3d.com/login ⧉
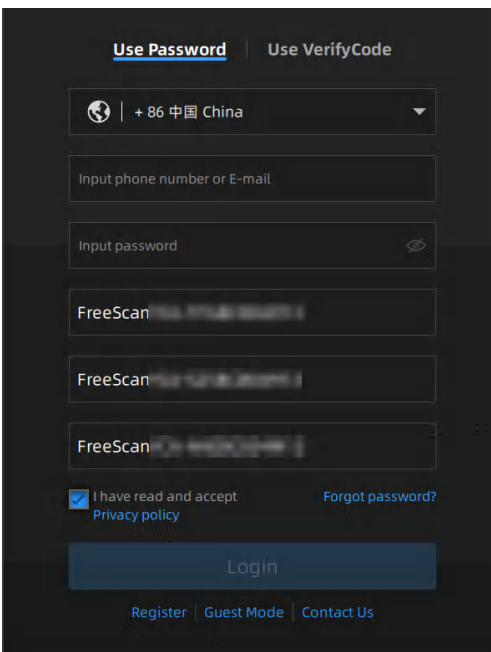
Log-in

Log in with your account or verification code.

Device Activation

Online Activation

The activation will be completed automatically after logging in successfully on the networked computer.

Offline Activation

If the PC cannot be networked, activate the scanner offline.

Steps

1. Connect scanner to the computer with no Internet, then export C2SN3D file.
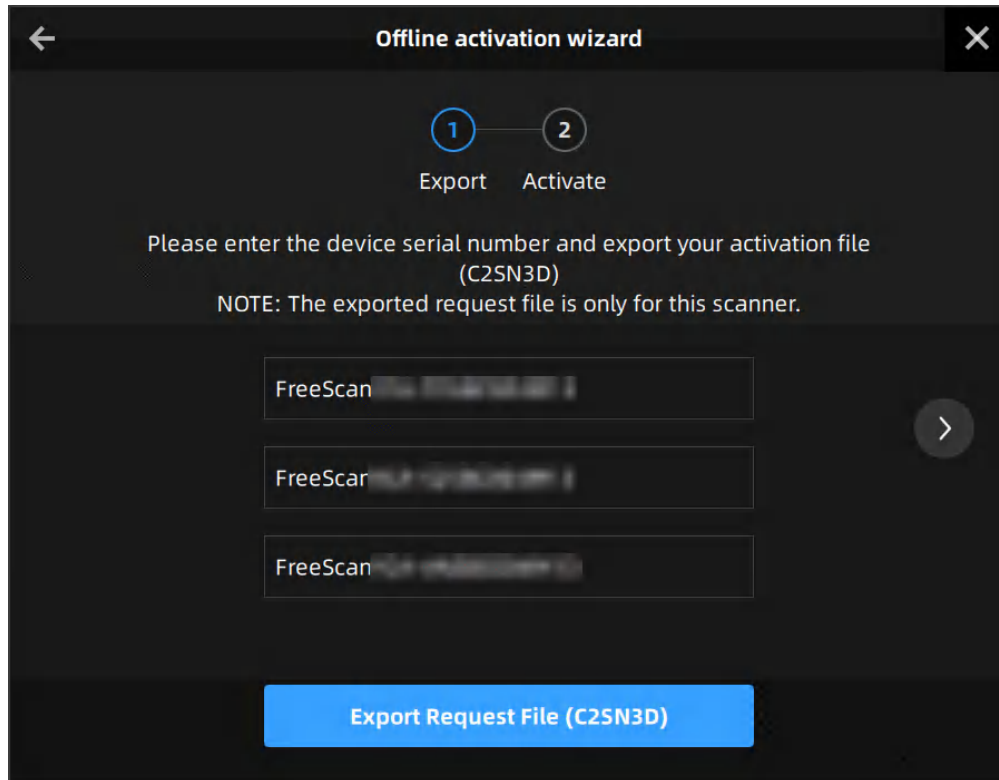
2. Log in to passport.shining3d.com on the computer with Internet connection, upload the C2SN3D file and fill in the relevant information on the Offline Activation page. Wait a moment to download the spawned SN3D2C file.
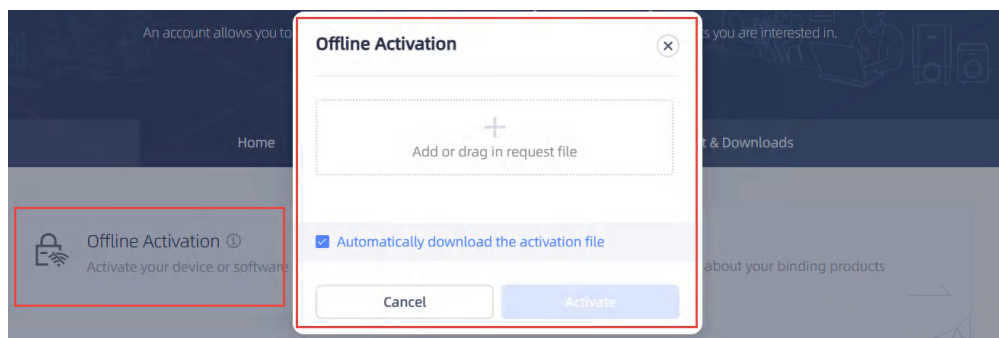
3. Copy the SN3D2C file to the computer without Internet connection, then import the file into the software for offline activation.
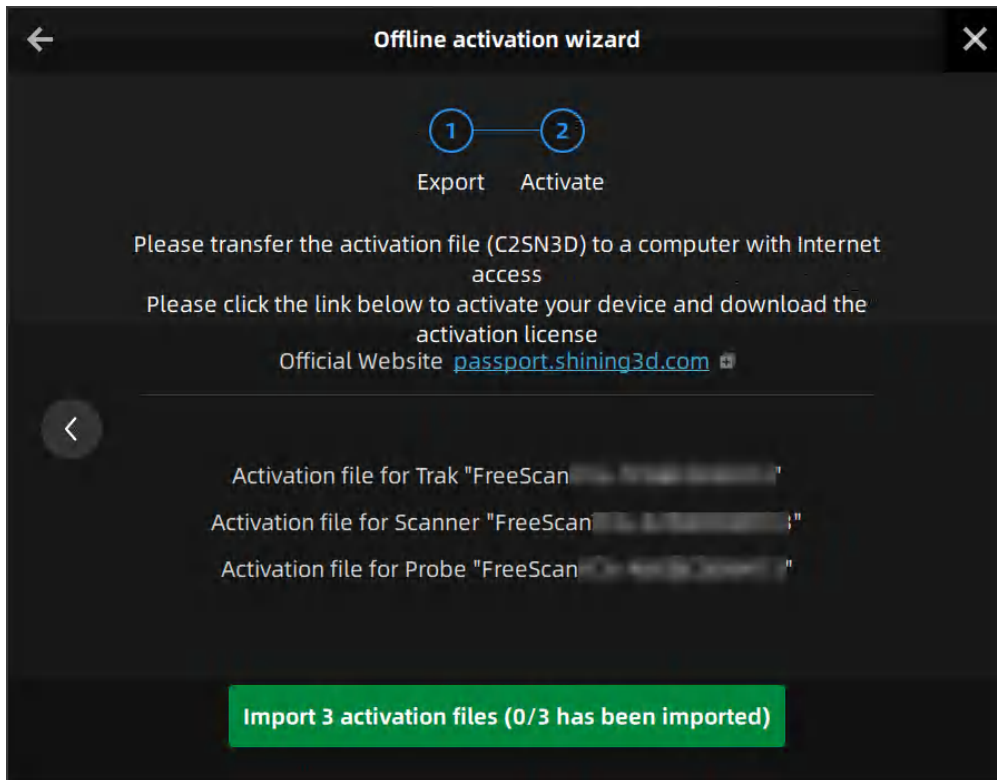
4. Start to use the device after the successful activation.

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

Running

If you are using the device for the first time, after logging in and launching the software, it will automatically go to the calibration interface. You need to complete the calibration before using the device properly. Once the calibration is done, the next time you enter the software, it will skip this step and go to the scan mode interface. You can choose the appropriate mode for scanning based on your actual application scenario.

> 📋 **Note**
>
> - If the software takes a long time to start after running, you can open **Windows Security Center** > **App and Browser Control** after closing the software, disable **SmartScreen for apps and files**, and then restart the software.
> - Please make sure to reserve at least 15 GB of storage space on the system drive and the software installation drive before running the software.

Interface
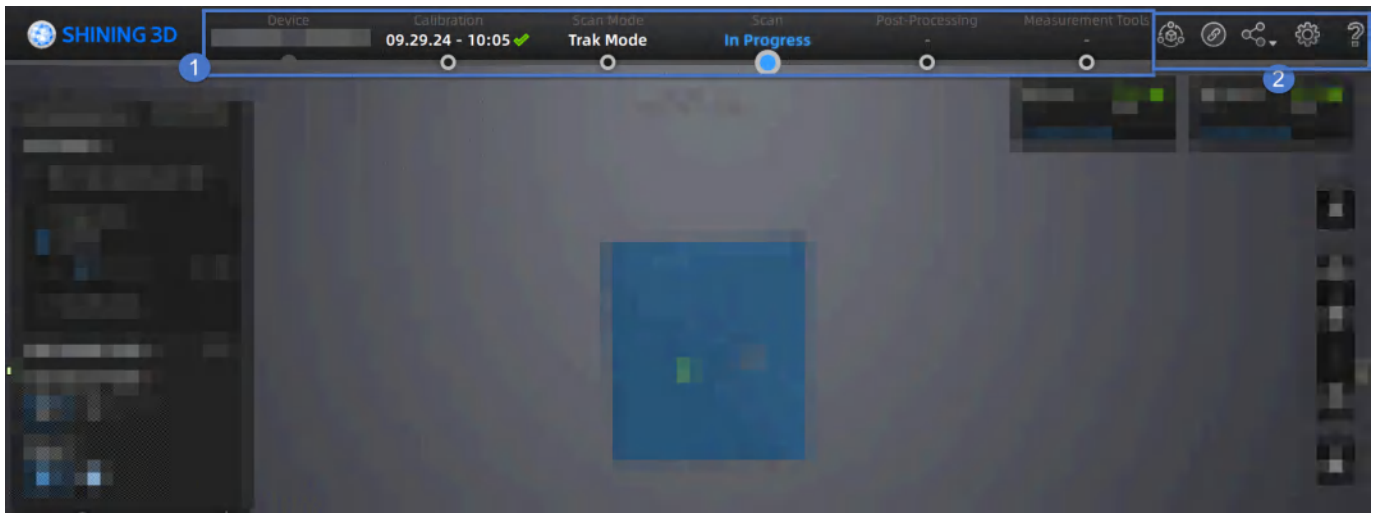
① Navigation Bar

Button	Description
Device	To display the device status: Online / Offline. Device online: To show the device name. Device offline: Click to reconnect the device.
Calibration	Click on the corresponding position in the navigation bar to start calibration.
Scan Mode	Click on the corresponding position in the navigation bar to switch to the scan mode interface. There are different modes you can select.
Scan	Click on the corresponding position in the navigation bar to start scanning.
Post Processing	Click or after scanning, it will go into the post-process interface where you can do mesh and mesh editing. You can also click on the corresponding position in the navigation bar to switch to the post-process interface.
Measurement	Click on the corresponding position in the navigation bar to switch to the measure interface where you can measure your model.

② Settings and Feedback

Reverse Engineering Service: If you encounter any problems, please send us the project files and specific information so that we can assist you with your projects.

Pairing Guide: You can refer to the wired/wireless pairing guide in the pop-up to complete the pairing process; if there are issues with pairing, please contact technical support promptly. For specific pairing operations, please refer to Device Pairing.

Option	Description
Official Website	Open our official website to learn about the company's products and information.
Facebook	Check the Facebook account and get latest information.

General Settings

- Language: To set the language of the software.

- Preview: To preview the scanning effect before scanning when enabled.

- Scan Global Markers: You can select **Video-Stream Scan** or **Single-Shot Scan** before using Trak Mode. For specific scanning operations, please refer to Scan Global Markers and Photogrammetry.

- Shape Detection Optimization: To improve the accuracy of sphere diameter at the cost of some details of the scanned data.

- Scanner Tone: To turn on / off the scanner's beep.

- Detecting Scanner Frame: After enabling it, the tracker will automatically filter out the scanner's markers that are recognized within the field of view.

- Probe Setting: Select or switch to a third-party software for using the probe[1].

- Factory Default: Click **Recover** to restore the software to its factory settings.

Laser Mode

- Scanning Distance Indication Method: There are two methods to indicate the scanning distance.
  During scanning, you can adjust the scanning distance according to the color indication.
  Blue: The scanning distance is too far.
  Green: The scanning distance is proper.
  Red: The scanning distance is too close.
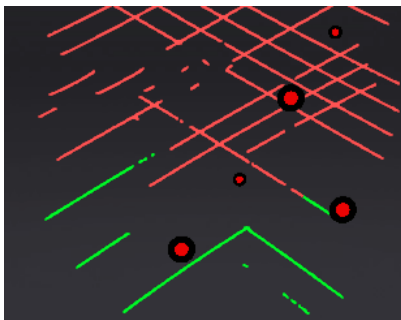
Laser Line Indicator
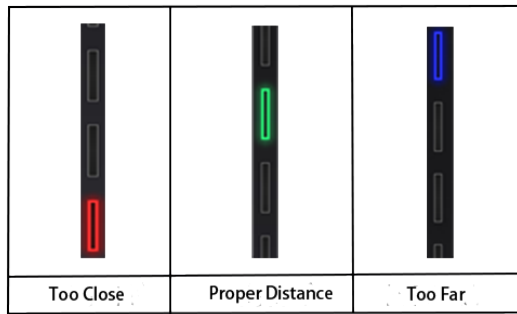
Scanning Distance Indicator

- The Laser Line Closes Intelligently: Not to project laser lines when not enough markers are recognized.

⊞ 3rd-Party

Check the third-party software to be called up and select the calling path. Only the checked third-party software will be displayed in the third-party software list of the Photogrammetry, Post-Processing and Measurement interfaces.

- About: To view related scanner information, software version, etc.

- System Diagnose: To check if the computer meets the operating conditions. If all items show ✓, it indicates that the configuration meets the operation requirements. If not, please resolve the problem according to the prompts in the interface. Click **Refresh** to diagnose the system again.

- Support: You can open the user manual, get remote assistance and check contact information of technical support here.

---

1. The probe is an optional accessory and needs to be purchased separately. ↵

Upgrade

When a new version of the software is released or a higher firmware version is available, you will be prompted when launching the software.

> ⚠ **Caution**
>
> If you need to perform the firmware / software upgrade, please ensure that all your devices are online simultaneously.

Firmware Upgrade

Update the **firmware** for better performance, stability or bug fixing. Click **Upgrade** to start the firmware upgrade.
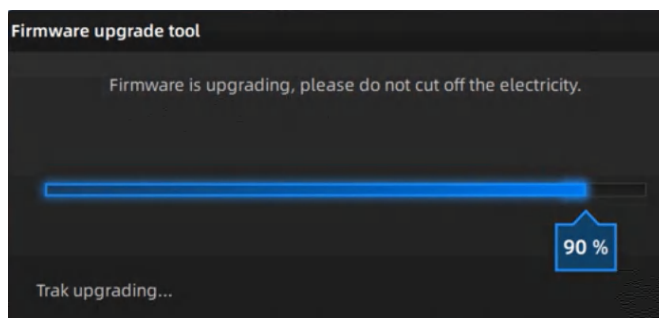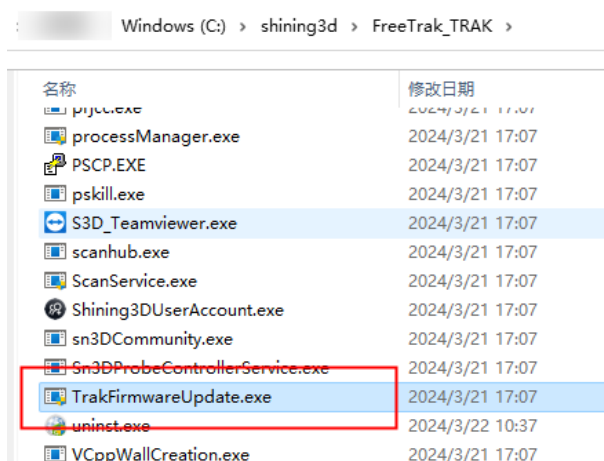
When you need to upgrade the firmware of the freeprobe, please first confirm that the probe is connected to the computer hotspot, and then start **TrakFirmwareUpdate.exe** in the software root directory.

> ⚠ **Caution**
>
> - If the upgrade fails, please power off the device and reconnect it to try it again.
> - Make sure that the device is powered on during the upgrade; avoid interruption of the upgrade due to power cuts.
> - Do not use mismatched firmware, because this may affect the scanning effect. If in doubt, please contact your supplier or technical support.

Software Upgrade

Update the software for better performance, new functions or bug fixing.
We recommend that you use the latest version of the software. As soon as an updated version is available, you will be notified when you start the software.
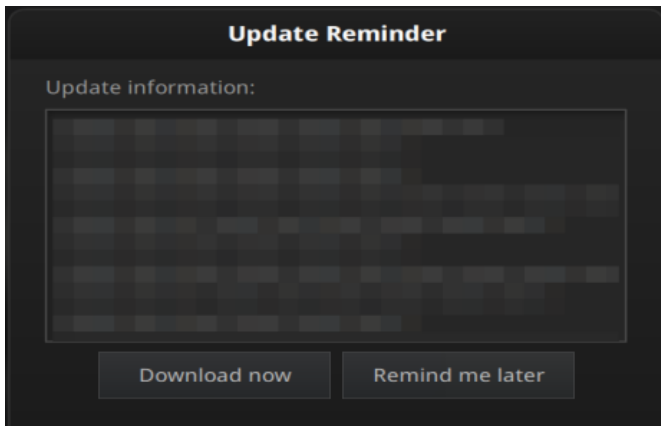
Click **Download Now** will download the installation package in the background. Do not close the software during the download process. Once the download is complete, you can decide whether you want to install the new version directly.

> ⚠️ **Caution**
>
> - The software will be closed during upgrading.
> - Please save your projects properly before upgrading.

Device Pairing

This software supports wireless scanning with wireless connected devices. If the wireless connection fails, you can choose the wired pairing. Once the pairing is successful, you can use wireless scanning.

Wireless Connection

Please launch the software to establish a wireless connection. Once the wireless connection is successful, you can use the device for wireless scanning.

Steps

1. After completing the device connection, launch the software, and the device will automatically establish a wireless connection.

2. If the automatic wireless connection fails, you can click on the top right corner > **Connection Guide**, then click **Connect** in the pop-up window to connect the device.

3. Once the connection is successful, you can start the wireless scanning. If the battery level is low (below 25%), please connect the scanner to a power source as soon as possible.
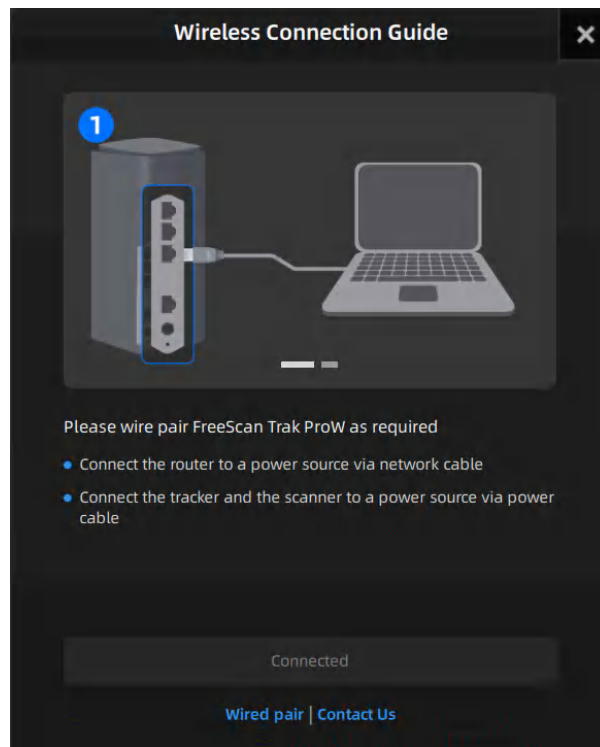
> **Note**
>
> If the wireless connection fails multiple times, you can connect the device to the computer using cables for wired scanning. Alternatively, follow the instructions to do the wired pairing. After the successful pairing, you can use the device for wireless scanning.

Wired Pairing

> ⚠ **Caution**
>
> If you encounter the following situations, please connect the device to the computer using cables, and complete the **wired pairing**:
>
> 1. Multiple failed attempts at wireless connection.
>
> 2. Changed to a new router.
>
> 3. Altered the router's name or password.
>
> Only after the successful pairing can you use wireless scanning.

Steps

1. Go to the router settings page, set the router to Wi-Fi 6 mode, and disable 2.4G.

2. Launch the software and click in the top right corner of the software.
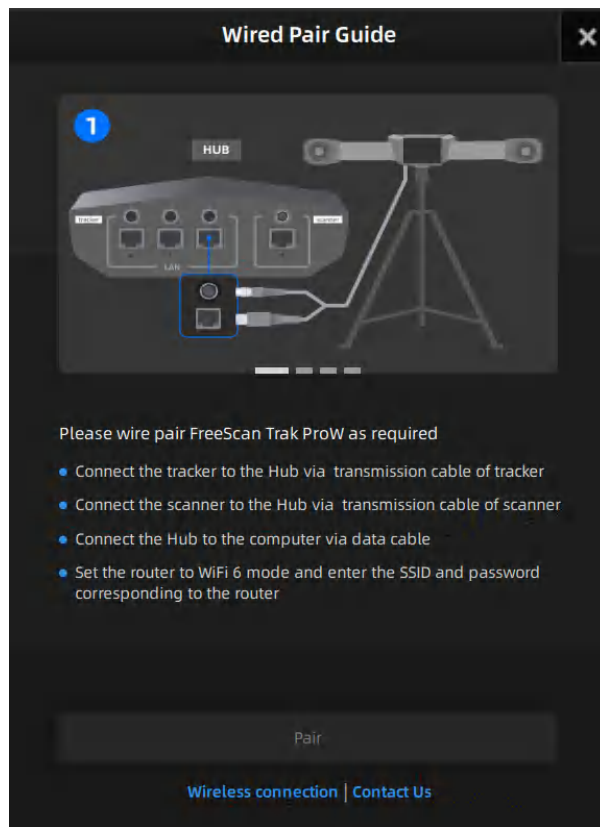
3. Click **Connection Guide** in the pop-up window and switch to the wired pairing.

4. Click **Pair**, input the corresponding SSID and password of the router in the pop-up window, and click **Confirm**.

5. After successful connection, you can click to view the connected device.

📋 **Note**

If the wired pairing ended in failure for several times, please contact technical support promptly.

Calibration

Preparation

You can re-adjust parameters of the device through calibration, which not only ensures the accuracy of the device, but also the scanning quality.

> **📋 Note**
>
> **Calibration** is required under the following conditions:
>
> - The scanner was severely shaken or vibrated during transportation.
> - The scanner is used for the first time or it is not in use for a long period of time (1-2 weeks).
> - The accuracy drops during scanning, such as frequent alignment failures or the inability to recognize markers.
> - Incomplete data is acquired or the quality of scanned data drops during scanning.

> **⚠️ Caution**
>
> - Do not wipe the calibration board with chemical liquids.
> - Do not put heavy objects or sundries on the calibration board.
> - After using the calibration board, put it in the flannel bag.
> - The calibration board can only be used for the calibration of the device.
> - Keep the calibration board away from corrosives, metals and sharp objects to avoid corrosion or damage.
> - Make sure that the markers on the calibration board aren't damaged or stained, and that the front side of the calibration board is clean and free of scratches.
> - Make sure both the scanner and tracker are online before or during calibration.
> - After powering on the device, please warm it up to a proper and stable temperature (about 35℃) before the calibration to ensure accuracy and precision.

Calibration

Please follow the guidance to start the calibration.

> **📋 Note**
>
> To enlarge the calibration interface, press `F11` for the full-screen display. While in full-screen mode, press `F11` or `⊘ Esc` to exit the full-screen display.

Trak Calibration
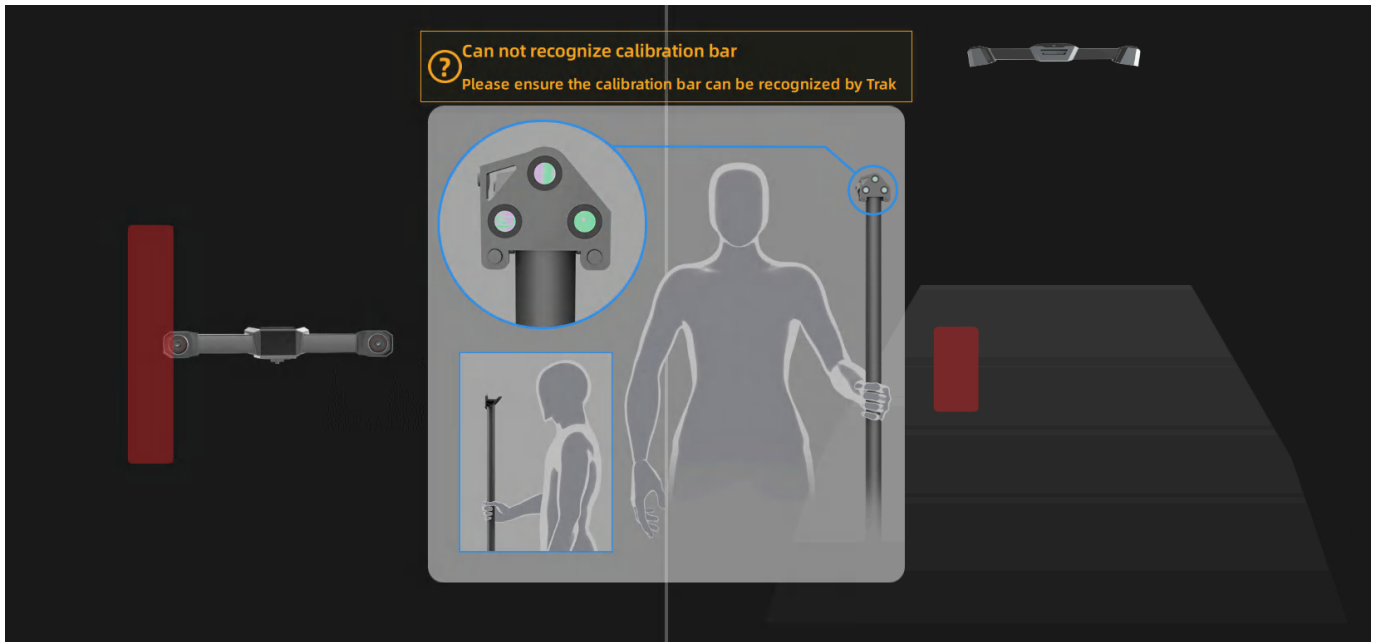
1. Stand in the visual field of the tracker with a calibration bar.

2. Move the bar to a correct position and the calibration will start.

3. Change its direction.

> **📋 Note**
>
> - Do not cover or damage the markers on the calibration bar.
> - If the tracker fails to identify the calibration bar, please follow the guidance and adjust the direction of the bar to make sure it is at a right position in the front view and the top view.

System Calibration

1. Place the system calibrator in the visual field of the tracker, and move it to a right position in the front view and the top view.

2. Click **Next** to do system calibration.

3. Align the three-dimensional graphics and coordinates of the device with the diagrams on the interface one by one, and complete the calibration of all positions.
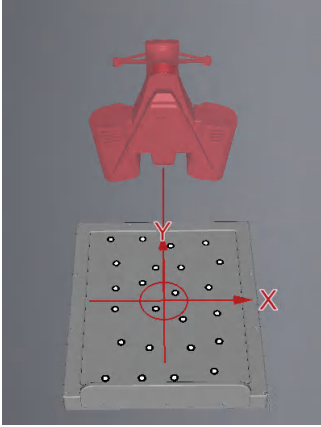
The orientation guide diagram for the current calibration position.
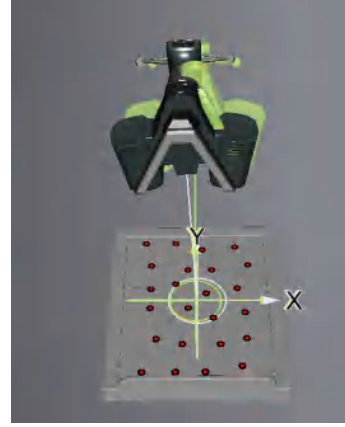
Adjust the position of the device to align the 3D graphics with the orientation guide diagram.

Probe Calibration

1. Please enter the diameter and the length of the probe.

- Ruby Diameter: Please enter a value between 0.3 (inclusive) and 10 (inclusive), with a maximum of one decimal place (unit: mm).
- Tip Type: Only the vertical probe is supported.
- Tip Length: Please enter a value between 1 (inclusive) and 200 (inclusive), with a maximum of two decimal places (unit: mm).

2. Move the calibrator of FreeProbe into the position according to the guidance.
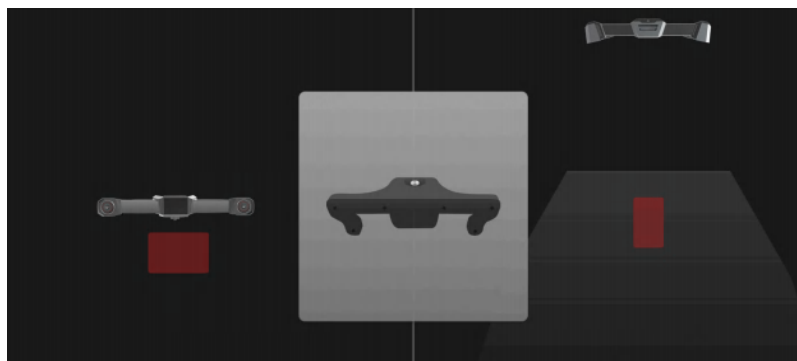
3. Place the tip of the probe at the specified position according to the interface diagram, and adjust the position of the probe to align with the red indicator diagram multiple times until the entire probe calibration is completed.
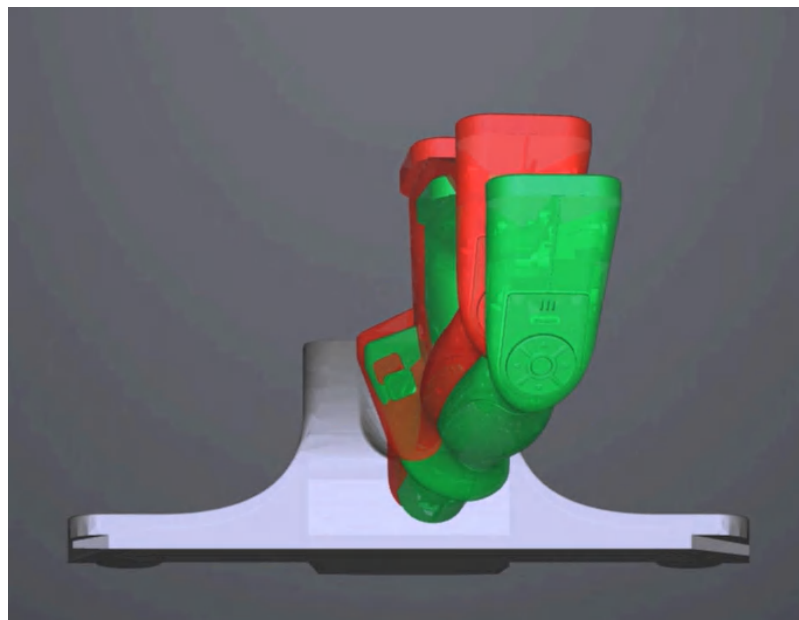
The navigation bar on the top of the interface will display ✔ when the calibration is successful. If no calibration is performed for more than 7 days, ⚠ will appear and prompt you to calibrate the device again to ensure scanning accuracy.

Scan Mode

Trak Mode

This mode requires both the tracker and scanner to be online. Once selected, you can quickly obtain scanning data without placing markers on the object in **Scan Mesh**. It is suitable for medium to large-scale 3D scanning of static / dynamic scenes in manufacturing industries such as aerospace, automotive, rail transportation, energy, etc.

Trak Mode
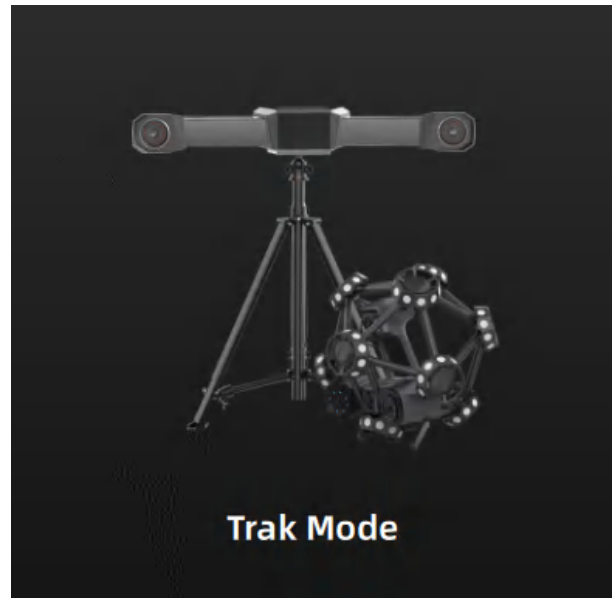
Laser Mode

Laser Mode

This mode requires both the tracker and scanner to be online. Once selected, markers need to be placed on the object in **Scan Mesh** before scanning.

Probe Mode

When you need to perform measurements on your scanned model by the probe, you can choose this mode. For specific connection methods and operating instructions, please refer to FreeProbe Operation.
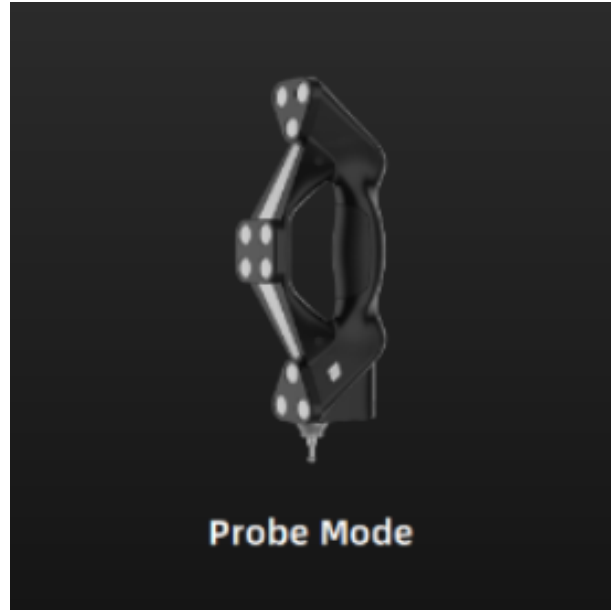
Scan

Project Settings

After successful calibration, please create a new project group or import a project group before scanning.
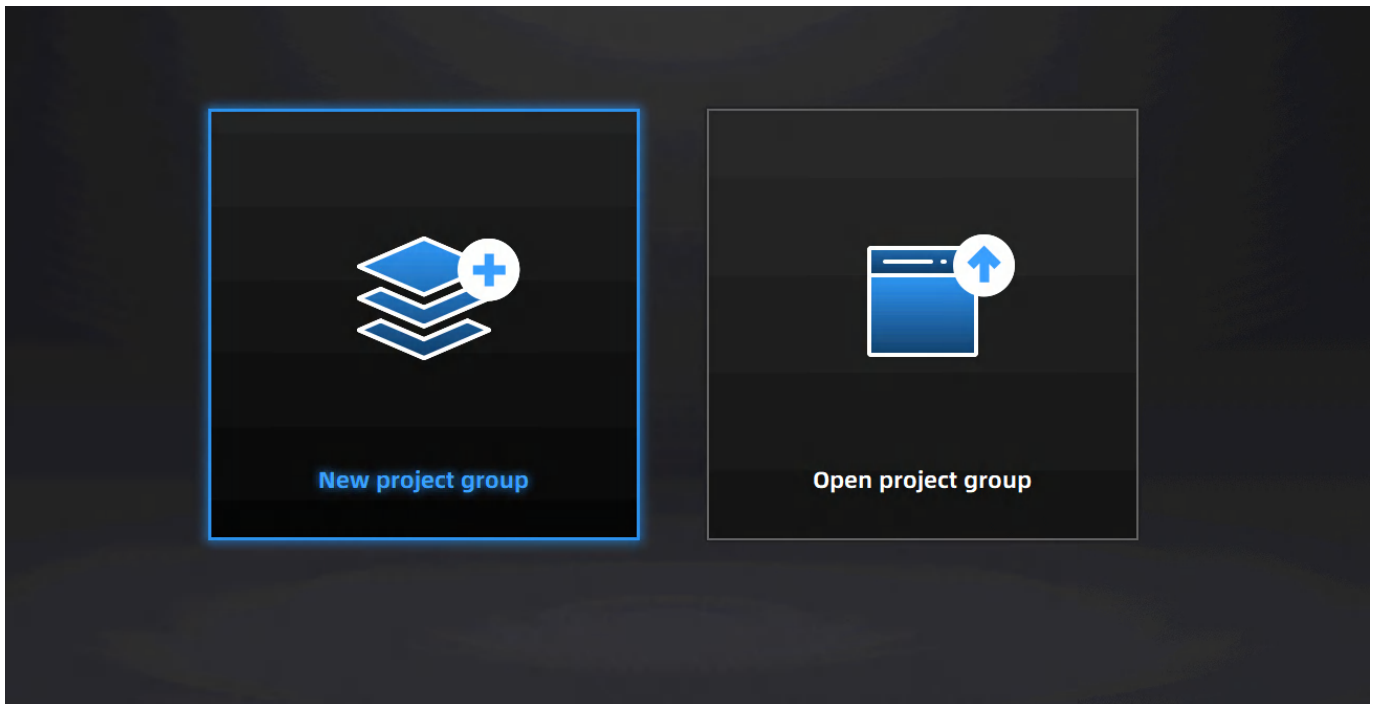
Create a Project Group

To create a project group, please refer to two ways as follows:

- After selecting the scan mode, the project group interface will automatically appear. At this point, select **New project group**. In the file dialog that appears, enter the name and path for the project group, then click **New**. All data related to this project group will be saved to the specified path.

- In the scan interface, click ▭ in the right sidebar. In the pop-up window, click **New project group** and then follow the same steps as described above.

Open a Project Group

To open a project group, please refer to two ways as follows:

- After selecting the scan mode, the project group interface will automatically appear. At this point, select **Open project group**. In the file dialog that appears, choose the specified project group or search for it, then click **Open**.

- In the scan interface, click ▭ in the right sidebar. In the pop-up window, click **Open project group**. The following steps are the same as mentioned above.

📋 **Note**

- The current project group (if there is) will be saved automatically when you choose to open anther project group.

- If you need to perform additional scans on imported project, please use the same device that scanned the data of the imported project.

Project Management

In the scan interface, click **Project Group** at the top left to open the menu where you can create, import, remove and/or delete a project within a project group.
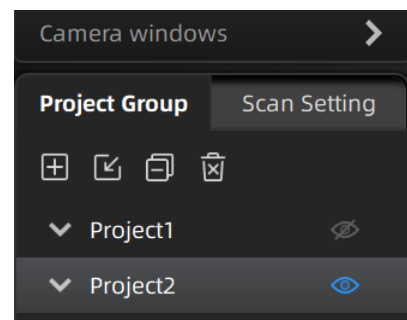
Icon	Function	Description
	Create a new porject	Click to create a new project.
	Open a project	Click to import a project. You can right-click one in the list to rename it.
	Remove a project	Click to remove the project from the list, which still exists in the folder and you can add it in the list by opening it.
	Delete a project	Click to delete the project, which can not be recovered.
	Visible / Invisible	Click to show / hide the data or markers.

Preparation

> ⚠️ **Caution**
>
> - Ensure the lens is free of scratches or damages.
> - Ensure the device is connected and powered on.
> - Ensure a secure joint of the scanner with the tripod and make them stable.
> - Do not touch the lens with your fingers lest fingerprints be left to affect data acquisition.

> 📋 **Note**
>
> When scanning mesh in **Trak Mode:**
>
> - No need to place markers on the objects.
> - Make sure the object to be scanned is in the visual field of the tracker.
> - Do not cover, touch or damage the balls on the scanner when it is working.
> - Do not move the object and the tracker during scanning.

> **📋 Note**
>
> When scanning markers in **Trak Mode** or **Laser Mode:**
>
> - Need to place markers on the objects.
>
> - Place the markers evenly and randomly.
>
> - Do not use damaged or incomplete markers.
>
> - Do not use greasy, dusty, or dirty markers.
>
> - Do not attach the markers to a surface with high curvature.
>
> - If the device fails to capture markers, it will not emit laser lines.
>
> - Four markers are required for the alignment of common areas.
>
> - Ensure that the device's camera can scan at least 3 markers within the normal scanning range.
>
> - Place markers with a diameter of less than 6 mm to edges and/or small areas of the model.
>
> - Ensure that the distance between markers is about 50 cm when scanning markers in **Trak Mode** and the distance between markers is about 2-10 cm when scanning in **Laser Mode**.
>
>
>
> Markers are attached correctly ✅   Artificial grouping of markers ❌   Attach markers only in one line ❌
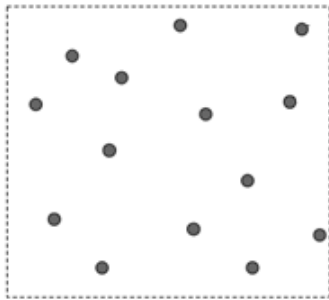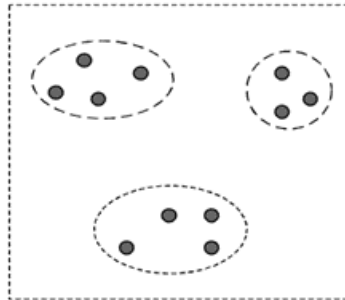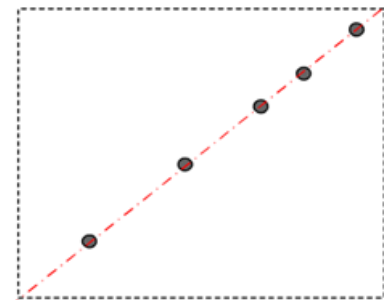
Interface

Function Preview
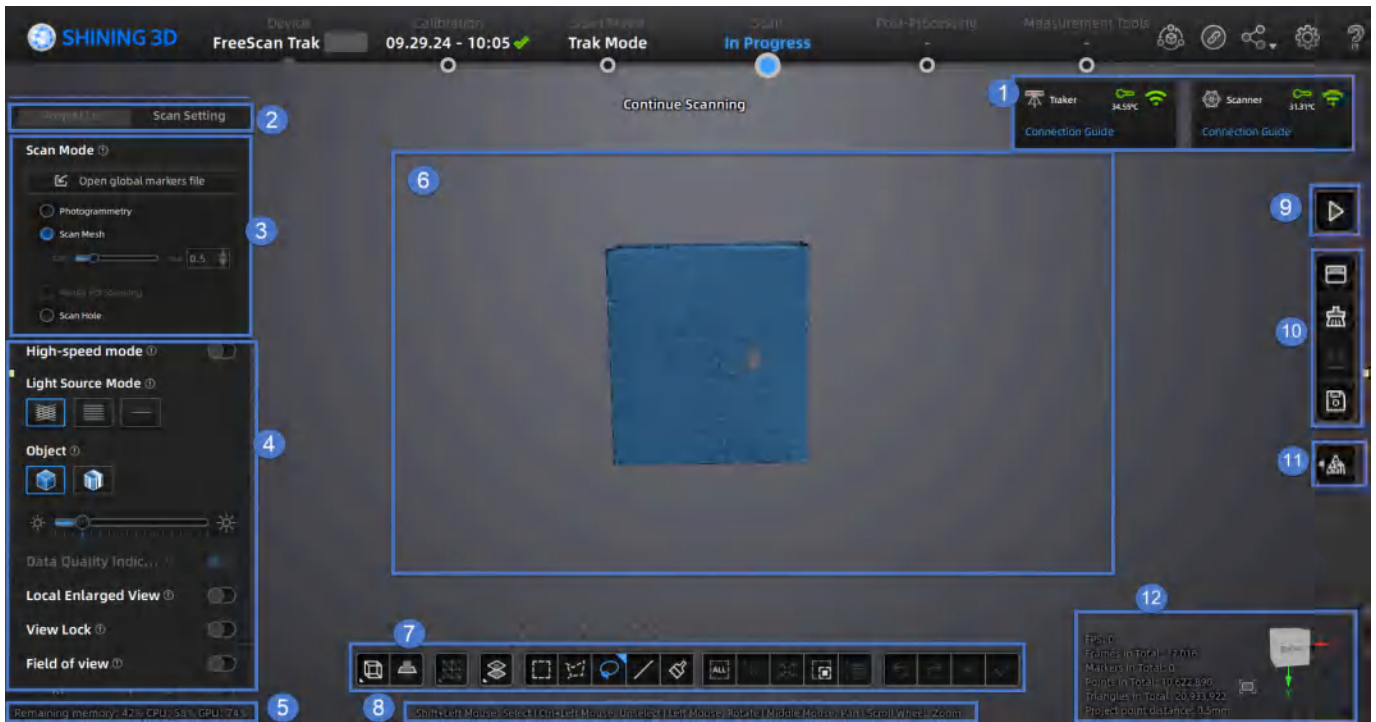
① Connection Information

When the device is connected successfully, click to view the relevant information about the device connection.

② Project Group and Scan Setting

To manage your project group and set scanning parameters.

③ Scan Mode

You can choose **Trak Mode** or **Laser Mode** for scanning based on the application scenario.

To switch among Scan Mesh, Partial HD Scanning,Scan Global Markers / Photogrammetry and Scan Hole.

> 📋 **Note**
>
> Photogrammetry is only supported when selecting **Trak Mode** (real-time scanning).

④ Parameter Settings

See more details in Parameter Settings.

⑤ Remaining Memory, CPU Usage and GPU Usage

- Remaining Memory: To display the percentage of remaining memory.

- CPU Usage: To display the CPU Usage of the computer in real time. You may need to close other unrelated software if it is too high.

- GPU Usage: To display the GPU Usage of the computer in real time.

⑥ Preview / Scanning Window

To preview the model and check the scanned model.

⑦ Data Editing

To edit data after scanning. See more details in Data Editing.

⑧ Keyboard Shortcuts

To change the perspectives and move the model by the composition of keys.

⑨ Buttons

Click ![icon] to preview the scanning; click ![icon] to start scanning; click ![icon] to pause scanning.

⑩ Function

To import the project file and to align, delete and save the model data.

⑪ Mesh

See more details in Mesh Processing.

⑫ Others

Display FPS, frame amount, point amount of the project and other information.

Function	Description
![icon] Fit View	Click ![icon] to center the model and adjust the view size to fit the screen automatically.
![icon] View controller	- When adjusting the model, a coordinate system reference is provided. - You can quickly adjust the model view by clicking on different faces of the view controller.

Settings

You can adjust scan settings during pre-scanning or scanning, including the mode, light source, object, brightness and so on, to achieve an ideal result.
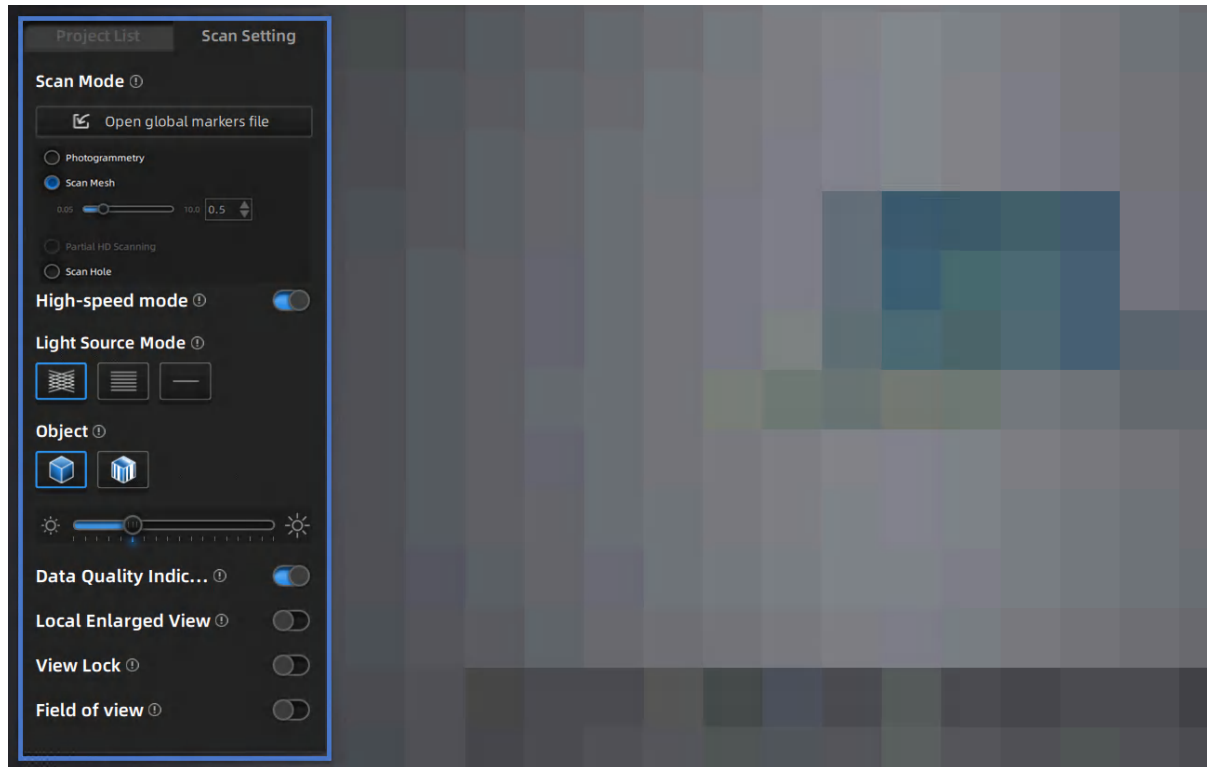
Scan Mode

You can select Scan Mesh, Partial HD Scanning, Scan Markers / Photogrammetry or Scan Hole to scan.

> 📋 **Note**
>
> When the scanner is in **Scan Mesh** and there is only one project within the project group, you can adjust the point distance in real time.

High-Speed Mode

You can improve the scanning speed when it is enabled.

Light Source Mode

FreeScan TE25W	Description
50 Lines	This mode can be used to scan a large object.
7 Lines	This mode can be used to scan fine details.
1 Line	This mode can be used to scan deep holes and pocket area.

Object

Select the mode according to the material of the object you are ready to scan.

Brightness

Adjust the brightness by dragging the slider until the scanned data or markers are clear and fully visible. Please make sure that the brightness is not set too high, as this may cause a lot of noise in the scanned data.

Data Quality Indicator

The quality of the scanned data is shown by a color indicator. Blue stands for a high quality of the scanned object, while yellow stands for an insufficient quality of the scan. Insufficiently scanned areas require further scanning, as they may disappear or be calculated inadequately.

> 📋 **Note**
>
> This function is not available for scanning in scan markers mode.

Local Enlarged View

When the function is enabled, the scanning interface only displays the local perspective of the scanned object, which can be used for supplementary scanning of small holes.
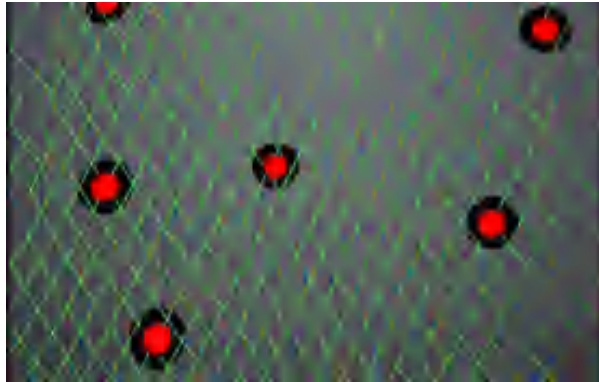
View Lock

When the function is enabled, the view will be locked during scanning and not follow the scanning path, which can be used for scanning the data of the locked view.
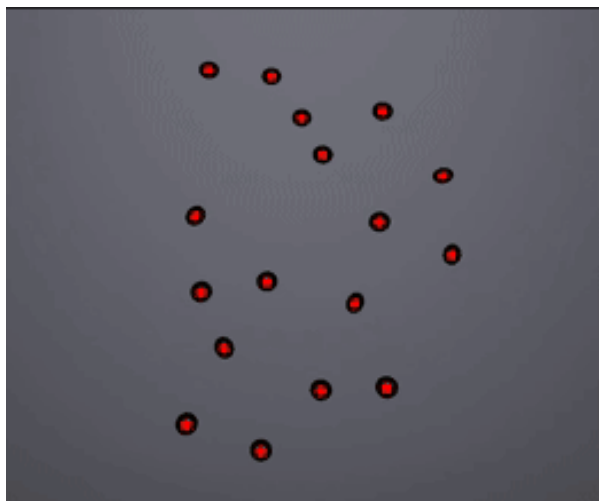
Field of View

When the scanner is outside the view field of the tracker, the scanner may not be able to scan data or the quality of the scanned data may be poor. In such a situation, you can enable this function. Once enabled, the view field of the tracker will be visualized in the 3D scene, allowing you to see the relative positions of the tracker, scanner, and the object being scanned.

During scanning, you can use this function to adjust the position of the tracker to ensure that the object being scanned and the scanner are within the view field of the tracker.

> 📋 **Note**
>
> This function can be enabled in **Trak Mode**.

Intelligent Resolution

After enabling **Intelligent Resolution**, the software automatically adjusts the mesh resolution based on the curvature of the scanned object. Multiple scans are required during the scanning process to achieve high-quality data and make the features of the scanned object more clear. After selecting **High Intelligent Resolution** / **Standard Intelligent Resolution** and generating mesh, click **Apply** in the **Mesh Processing** interface to view the intelligent resolution effect: areas with high curvature will have higher data density.

📋 **Note**

- Enabling **High Intelligent Resolution** requires a point distance in the project greater than 0.4 mm.
- Enabling **Standard Intelligent Resolution** requires a point distance in the project greater than 0.2 mm.
- Intelligent resolution is only available for **Scan Mesh** in the **Trak Mode** and the **Laser Mode**.
- Intelligent resolution only applies to individual project files. Different project files within a project group can have different intelligent resolutions.

Scan Mode

Scan

Laser scan can quickly and accurately acquire 3D data of the scanned object. Featured in contact-free measurement, high sampling rate of data, active emission of scanning light source, low requirements for use, and strong environmental adaptability, laser scan can be used in complex environments, and acquire complete 3D data of large and complex objects into the computer, thereby reconstructing the corresponding 3D model as well as various geometric data concerning the points, lines, surfaces, and solids.

Scan Mode

Mode	Description
Scan Mesh	Directly scan to generate mesh. This mode is suitable for most scanning scenarios. 📋 **Note**: When the global markers are not fully scanned, you can click **Add new global markers** to scan new global markers in **Scan Mesh**.
Partial HD Scanning	You can both save scanning time and get an ideal scanned data in this way. This mode is suitable for: • There are missing data in a specific area after scanning an object in **Scan Mesh**. • There are missing data in a specific area of the imported project, requiring you to delete the data in that area and rescan it.
Photogrammetry	This mode is only supported in **Trak Mode**. This mode is suitable for: • Scan large objects • Scan the model from different angles • Scan in an unstable external environment 📋 **Note** • The scanner does not project laser lines during the scanning process. • You can import the global markers file and scan for adding new global markers. • After completing the scan, you can save the data or switch to **Scan Mesh** to continue scanning. • You can place a calibration bar in the scanning scene to ensure accuracy.
Scan Markers	This mode is only supported in **Laser Mode**. 📋 **Note** • By scanning the surface of an object with markers, you can quickly obtain the global markers data. • The scanner does not project laser lines during the scanning process. • You can import the global markers file and scan for adding new global markers. • After completing the scan, you can save the data or switch to **Scan Mesh** to continue scanning.
Scan Hole	This mode is only supported in **Trak Mode**. This mode is suitable for scanning circles, grooves and rectangles of sheet metal stamping parts for further measurement. 📋 **Note** The scanner does not project laser lines during scanning.

> **📋 Note**
>
> Click ⬀ **Open global markers file** to import the global markers file.

Scan Operation

Press the scan button on the scanner or click the icons in the interface to switch among **Preview**, **Scan**, and **Pause**.

Function	Icon	Description
Preview	▷	To preview the scanned data and adjust scan parameters for a better scanning effect. The scanned data won't be saved. You can open the setting interface by clicking ⚙ in the upper right corner to enable or disable **Preview**. When disabled, this button will not appear on the scanning interface.
Scan	▷	To start scanning. You can adjust the brightness of the scanner according to the brightness and color of the object during scanning. The scanned data will be saved. ⚠**Caution** • Please ensure that the device is facing the surface of the object being scanned during the scanning process. • Maintain an appropriate working distance as prompted by the software during the scanning process. • Adjust the scanning brightness based on the surface brightness and color of the object during the scanning process.
Pause	⏸	To pause scanning. And you can edit the scanned data.

Scan Mesh

The software automatically generates mesh from the scan.

> **⚠ Caution**
>
> • No need to place markers on the objects in **Trak Mode**.
> • The data will be deleted if you switch to **Scan Markers** or import a file of global markers.

Steps

1. After completing the pre-scanning, click or press the scan button on the scanner to scan.

2. Click or press the scan button to pause scanning; click again or press the scan button again to resume scanning.

3. Click to save the data.

Add New Global Markers

When the markers are not fully scanned in **Scan Global Markers**, you can choose **Add New Global Markers** to scan new global markers.

> ⚠ **Caution**
>
> - Preview scanning is not available when scanning new global markers.
>
> - **Add New Global Markers** is only available during mesh scanning in **Trak Mode** (real-time scanning) and **Laser Mode**.
>
> - **Add New Global Markers** is only available when there is global markers data for the current project within the scanning process.

Steps

1. Click **Add new global markers** to scan new global markers.

2. Click or press the scan button to pause scanning; click again or press the scan button again to resume scanning.

3. After scanning, click to optimize global markers.

> 📋 **Note**
>
> After completing the scan for adding new global markers, you can either click on the right side or press the scan button on the scanner to scan mesh.

Partial HD Scanning

Steps

1. Switch to **Partial HD Scanning** after acquiring the data in **Scan Mesh**.

2. Review the scanned data to identify areas that need to be re-scanned.

3. Select the areas to delete and re-scan here.

① Select , or in the editing bar.

② Press and hold `⇧ Shift` + `Left Button` and then move the cursor to select an area on the scanned object. The selected area will be displayed in red.

4. Set the point distance.

① Drag the slider or adjust the point distance by the up and down arrows `0.4 ▲▼`.

② Click **Confirm** and a second window will pop up for confirmation.

5. Click **Confirm** and the selected data will be deleted.

6. (Optional) Click or press the scan button on the scanner to preview the model and adjust scan parameters for a better scanning effect.

7. Click or press the scan button on the scanner to start scanning.

8. After scanning, click to save the data.

Scan Markers

Scan Markers refers to the collection of the markers. By detecting such markers, the relative positions of the markers to the scanner are efficiently determined.

Trak Mode

1. Select **Trak Mode (Single-Shot Scan)** > **Scan Markers**.

2. (Optional) Click on the right sidebar or press the scan button on the scanner to preview scanning.

3. Click on the right sidebar or press the scan button on the scanner to start scanning.

4. Change the scanning perspective (move the tracker or the object being scanned) and click ▷ to scan other markers. The software will automatically align the new markers with the former ones.

5. Click ⊞ on the right sidebar to optimize the markers.

6. Click 💾 to save data, or choose Scan Mesh to continue.

> 📋 **Note**
>
> After scanning and optimization, you can click 🔴 in the right-side function bar to import the data into Polyworks for measurement.

Laser Mode

1. Select **Laser Mode** > **Scan Markers**.

2. (Optional) Click ▷ on the right sidebar or press the scan button on the scanner to preview scanning.

3. Click ▷ on the right sidebar or press the scan button on the scanner to start scanning.

4. After scanning, click ▮▮▮ to stop.

5. Click ⊞ on the right sidebar to optimize the markers.

6. Click 💾 to save data, or choose Scan Mesh to continue.

> 📋 **Note**
>
> In **Laser Mode**, after scanning the global markers, you may notice additional colors outside the global markers.
>
> - If there is an orange circle outside the markers, it indicates that the quality of the scanned markers is low.
>
> - If there are no additional colors outside the markers, it indicates that the quality of the scanned markers is normal.
>
> - Markers with an orange circle may disappear or be displayed abnormally after data processing.
>
> - Once the markers are optimized, the color indication will disappear.
>
> - There is no color outside the newly added global markers in **Scan Mesh**.
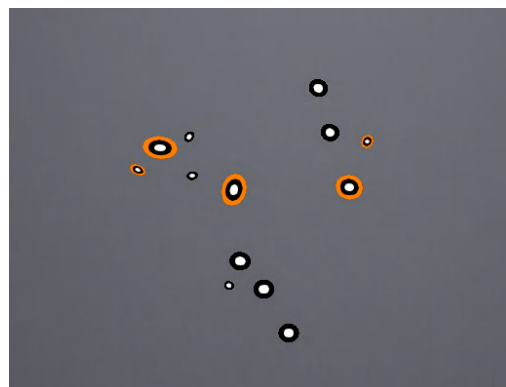
Photogrammetry

In the **Trak Mode** (real-time scanning), after scanning the global markers, you may notice additional colors outside the global markers.

- If there is an orange circle outside the markers, it indicates that the quality of the scanned markers is low.

- If there is no additional color outside the markers, it indicates that the quality of the scanned markers is normal.

- Markers with an orange circle may disappear or be displayed abnormally after data processing.

- Once the markers are optimized, the color indication will disappear.

- There is no color outside the newly added global markers in **Scan Mesh**.
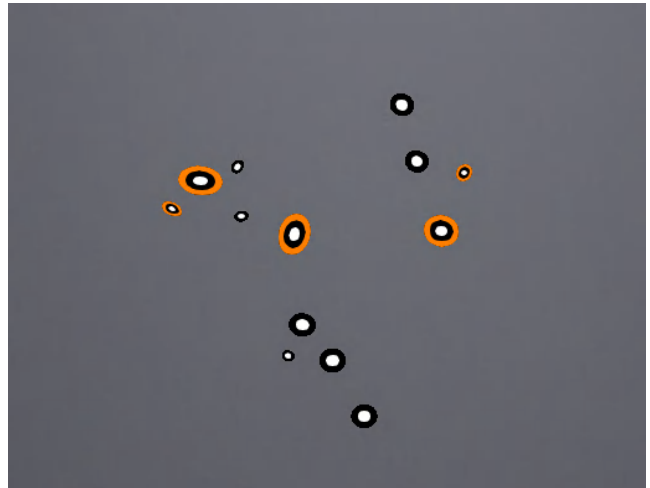
Steps

⚠ **Caution**

The global markers of imported files and the newly added global markers in **Scan Mesh** cannot be optimized in **Photogrammetry**.

1. Place the calibration bar near the object to be scanned.

   📋 **Note**

   Do not place the scanner within the tracker's field of view to avoid affecting the scanning accuracy. You can also turn on **Detecting Scanner Frame** in ⚙ Settings, and the tracker will automatically filter out the scanner's markers that are recognized within its field of view.

2. Select **Trak Mode** > **Photogrammetry**.

3. (Optional) Click on the right of the panel or press the scan button on the scanner to preview scanning. You can check the scanning performance and adjust parameters.

4. Click on the right and the tracker starts to scan the markers. At this time, the left side of the interface will display the number of markers that can be aligned and the total number of recognized markers.

> **Note**
>
> If the calibration bar is placed, only scan the markers on one side of the bar.

5. Change the scanning perspective (move the tracker or the scanned object) and click to start scanning other markers. The software will automatically align the new markers with the former ones.

6. Click to stop.

7. Click to optimize the markers.

> **Note**
>
> After optimization, recognized markers on one side of the bar will disappear.

8. After optimization, click to save data, or choose **Scan Mesh** to continue.

> **Note**
>
> - After scanning, you can remove the calibration bar and then switch to **Scan Mesh** to continue.
>
> - After scanning and optimization, you can click in the right-side function bar to import the data into Polyworks for measurement.

Scan Hole

This mode is suitable for scanning circles, grooves and rectangles of sheet metal stamping parts. After scanning, you can save models with these features and import them into the third-party software for further measurement.

> **Note**
>
> This mode is only supported in Trak Mode.

Steps

1. After completing Scan Mesh, switch the scan mode to **Scan Hole**.

2. Hold the scanner within the field of view of the tracker and press the device's scan button or click to start scanning the corresponding holes; at this time, the recognized features will automatically appear on the scanned data in the 3D scene, and the corresponding features will also appear in the project list on the left side of the interface.

> 📋 **Note**
>
> If the scanned features are yellow, it means that the quality of the scanned data is not ideal. Please continue scanning until the features turns green.
>
>
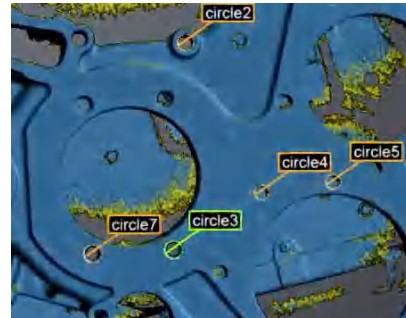
3. Press the pause button on the scanner or click to pause the scan.

4. Check the scanned features in the 3D scene.

5. (Optional) Delete the extra features in the project list.

6. Click Save Your Scan in the function bar on the right. You can then import this type of project file into the third-party software for measurement. If you want to save a separate feature file, select the corresponding feature in the project list, right-click, and select **Save** to save a single feature file.
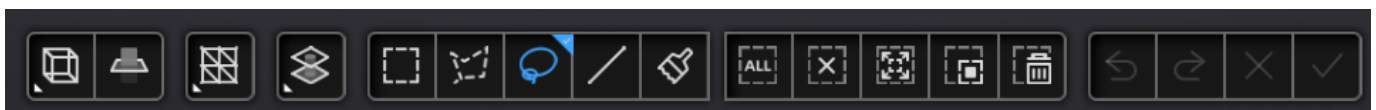
> 📋 **Note**
>
> It is supported to save **feature files** in .stp, .csv, .txt, .igs, and .asc formats.

Data Editing

A variety of tools are provided to process the 3D data. Users can use these tools to reduce image noises and obtain accurate 3D data.

Bottom Panel

After pausing or completing the scanning, you can use the following tools to edit the data.

Icon	Function	Description
	Multi view	To view the scanned data from 6 different angles.
	Cutting plane	To create a plane to do quick cutting. See more details in Cutting Plane.

Icon	Function	Description
	Data editing	To edit the selected data. Click it again and you can switch the mode.
	Edit markers	To edit the markers. Click it again and you can switch the mode.

Icon	Function	Description
	Select visible	To select the outer data.
	Select through	To select the inner and outer data.

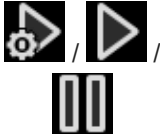| Icon	Function	Description
	Rectangular	To select a rectangular area by holding down `⇧ Shift` + `Left Button`, which will then turn red.
	Polygon	To select a polygonal area by holding down `⇧ Shift` + `Left Button`, which will then turn red.
	Lasso	To select an area at will by holding down `⇧ Shift` + `Left Button`, which will then turn red.
	Line	Hold down `⇧ Shift` + `Left Button` and move the cursor to draw a straight line to select the area.
	Paint brush	To brush an area with red solid circle, which will then turn red. Press `⇧ Shift` / `^ Ctrl` and roll the wheel to zoom in / out the circle.
	Select all	To select all data.
	Unselect	To cancel all selection.
	Connected domain	To select the area connected to the chosen part.
	Invert	To revert the selection.
	Delete Selected Data	Click it or press `Delete` to delete the selected data.
	Undo	To undo the last deletion.
	Redo	To redo the last operation.
	Cancel edit	To cancel all edits and quit the editing mode.
	Apply edit	To apply all edits and quit the editing mode.
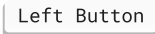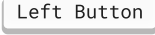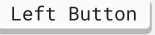
> ⚠ **Caution**
>
> Once the edit are applied, the data can not be recovered only if you re-load the file.

Right Panel

Icon	Function	Description
⚙▷ / ▷ / ▮▮	Preview / Scan / Pause	To preview the scanned data / To start scan / To stop scan.
▣	Global markers optimization	To optimize the global markers.
▭	Project group	To create / open a project group. About the project group, please refer to Project Settings.
🧹	Delete your scan	To clean the current data to redo scan.
✦	Alignment	To align the data as you need, please refer to Alignment.
💾	Save your scan	To save the scanned data in the specified format locally.
△	Mesh optimization	To do mesh optimization and mesh processing. This function is recommended if you scan the mesh without scanning global markers first. This process will improve the overall accuracy of the mesh, but may take a longer time.
△	Mesh processing	To do mesh processing. This function is recommended if you scan the mesh with scanning global markers first.

Keyboard Shortcuts

Shortcut	Function
Hold down `Left Button` and move the cursor	To rotate the data
Hold down wheel button and move the cursor	To move the data
`⇧ Shift` + `Left Button`	To select an area
`^ Ctrl` + `Left Button`	To cancel the selection
`Middle Button`	To zoom in / out the data
`Space`	To apply all edits
`Delete`	To delete the selected data

Context Menu

Function	Description
Select all / Invert / Unselect / Delete selected data	The same as edit tools. You can use these functions by shortcuts.
Fitting view	To display the data at the center appropriately.
Connected domain / Select through / Select visible	The same as editing tools.
Switching the display type	To display the data in point, line, plane and line-plane.
Set rotate center	The rotation center can be set on the data by the left mouse button.
Reset rotate center	After reset, the center of rotation is at the data center.

Cutting Plane

Remove the base data from the whole scanned data by creating a cutting plane.

Creation

1. Click ![icon].
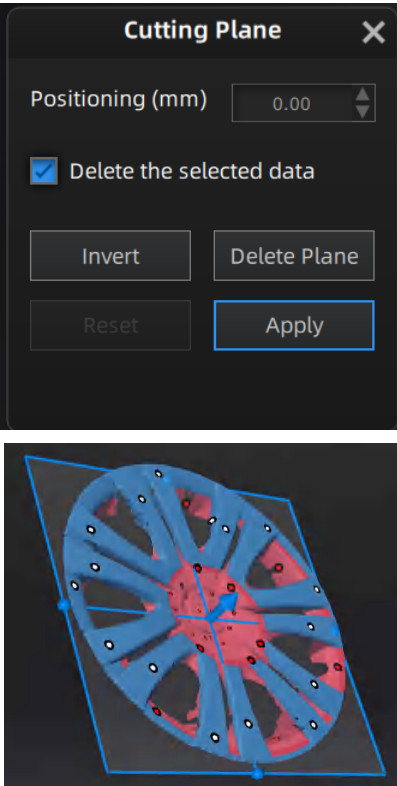
2. Select the creation method and follow the interface prompts to create a cutting plane.

Method	Instruction
Scan data fitting	The plane that the selected data are in will be the cutting plane.
Creating straight line	The plane that the straight line cuts through will be the cutting plane.
Markers	The plane that the markers (at least three) are in will be the cutting plane.

3. Click **Create Plane**.

Setting

Illustration	Instruction
	- Delete selected data / markers: Check the box and the data/markers to be deleted will turn red. Click **Apply** and the data/markers will be deleted. - You can not delete all data. - Please keep at least 3 or more markers on the front of the cutting plane. - Invert: To revert the selection. - Delete Plane: To delete the cutting plane and go back to Create cutting plane. - Reset: To reset all operations after creating the cutting plane. - Apply: To apply all edits. - Positioning: After creating the plane, fill in a number in the positioning box or drag the cutting plane normal arrow ![icon] to translate the cutting plane. - Rotate the cutting plane: Cutting plane can be rotated around an axis by dragging either ball ![icon].

Alignment

Through alignment, multiple scanned data are combined into a larger mesh, thereby effectively solving the problem of incomplete data collection at one time.

> ⚠️ **Caution**
>
> When more than two project files with scanned data are present in the project list, these projects can be aligned.

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

Mode	Description	Note
Auto Feature Alignment	1. Choose **Auto Feature Alignment**. 2. Select a project to be aligned in the fixed window and the floated window respectively. 3. Click **Apply** to align them.	Objects with repeated features, like a round or a ring, or with small size are not suitable for this mode.
Manual Feature Alignment	1. Choose **Manual Feature Alignment**. 2. Manually choose at least 3 common feature points on the data in the fixed window and the floated window respectively. 3. Click **Apply** to align them.	The chosen points should not be in a line.
By Markers	1. Choose **By Markers**. 2. Select a project to be aligned in the fixed window and the floated window respectively. 3. Click **Apply** to align them.	The two projects should have at least 3 markers in common.
Manual Markers Alignment	1. Choose **Manual Markers Alignment**. 2. Select a project to be aligned in the fixed window and the floated window respectively. 3. Manually choose at least 3 common markers on the data in the fixed window and the floated window respectively. 4. Click **Apply** to align them.	The chosen markers should not be in a line.

> 📋 **Note**
>
> Manual alignment serves as an alternative method of auto alignment. You can choose it when auto alignment fails.

FreeProbe Operation

Installation

1. Insert the battery into the slot at the bottom of the device.

2. Press the button on the left rhombic button to turn on. The indicator will turn cyan after powering on. For more button operations, please refer to FreeProbe's appearance.

Connection

1. Power on the probe and wait for its indicator to become cyan.

2. Run the FreeScan Trak software.

3. Select Probe Mode to open the third-party software.

> **📋 Note**
>
> - After selecting the probe mode, the third-party software opened in the software defaults to Polyworks Metrology Suite. If you need to change the opened third-party software, you can change it through the settings on the upper right side of the software.
>
> - The third-party software currently supported by the probe mode of this software is Polyworks Metrology Suite (2023) and Geomagic Control X (2023.1).

4. Connect to the probe in the third-party software and wait for the probe's indicator to become green.
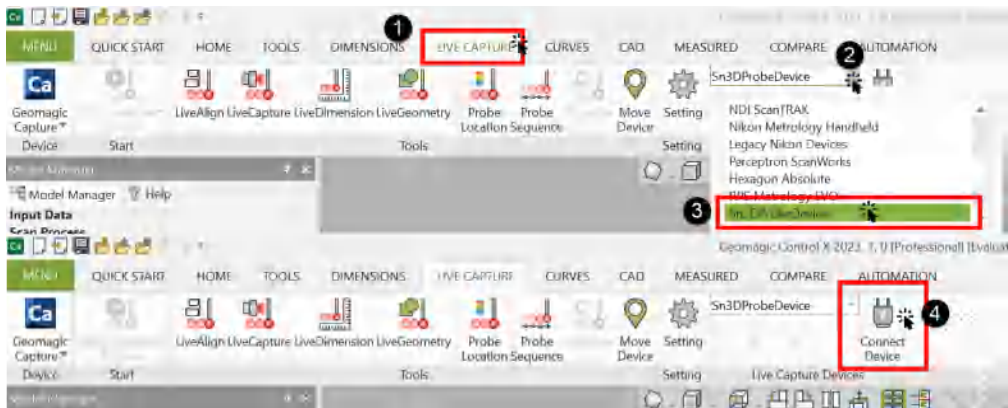
How to connect the probe in Geomagic Control X

How to connect the probe in Polyworks Metrology Suite

> **Note**
>
> - If the probe cannot connect successfully, please open **Network & Internet > Mobile Hotspot** and set the network band to 2.4 GHz.
>
> - If you are using a desktop computer, you can turn on the mobile hotspot by inserting a wireless network card. If the mobile hotspot cannot be turned on after inserting the wireless network card, please contact technical support.

Calibration

When the probe has not been used for a long time or its accuracy has decreased, please perform Probe Calibration before use.

Add Points & Measurement

Steps

1. Select **Trak Mode** to scan and finish mesh optimization.

2. Import the data into the third-party software.

   - Select the third-party software to be opened in ⚙ ▾ > **Probe Setting**. When starting the third-party software, the scanned model files will be automatically imported into the opened third-party software.

   - After scanning and optimization in **Photogrammetry** or **Scan Global Markers**, you can click 🔴 in the right-side function bar to import the data into Polyworks.

3. Now you can use the probe to add feature points and do measurement in the opened third-party software.

> **Note**
>
> - Please exit the third-party software before continuing to use the FreeScan Trak software.
>
> - You can directly import the data to Polyworks for measurement when running the FreeScan Trak software with the device online.
>
> - To add feature points with the Probe, ensure its tip is within the range of the FreeTrak's camera and in the same plane as the camera. Gently poke at the object to be measured, and click the functional buttons.

Battery Specifications

- Battery type: Rechargeable lithium-ion battery

- Battery model: 14500 battery (AA size)

- Nominal voltage: 3.7 V

> **📋 Note**
>
> The device only comes with a probe charging case. Please prepare the batteries for the probe yourself according to the specifications mentioned above.

Cautions

Before using the battery and the probe charging case, please read the following safety precautions to prevent dangerous situations such as battery explosions.

> **⚠️ Caution**
>
> - Do not charge the battery for a long time.
> - Do not reverse the positive (+) and negative (-) terminals.
> - Do not directly solder the battery terminals.
> - Do not disassemble the battery and the charging case at will.
> - Do not put the battery into a fire or apply direct heat to it.
> - Do not place the battery in a microwave oven or pressurized container.
> - Do not use or store the battery near any source of heat such as a fire or heater.
> - Do not short-circuit the battery by connecting wires or other metal objects to the positive (+) and negative (-) terminals.
> - Do not connect the battery directly to wall outlets or car cigarette-lighter sockets.
> - Replace the damaged battery shell to prevent leak or fire accident.
> - Do not put any objects on the charging case when it's charging the battery, in order to keep good ventilation and heat dissipation.
> - Do not connect the charging case with power for a long time. Cut off the power after using the charging case to avoid safety hazards.
> - Store the battery and the charging case in an environment that is clean, dry, and free of inflammable materials like powder, liquid,and metal scraps.
> - Do not use the battery if it gives off an odor, generates heat, becomes discolored or deformed, or appears abnormal in any way. If such batteries are in use or being recharged, remove them from the device or charger immediately and discontinue use.

Post Processing

Mesh Processing

After the scan is completed, click or to enter the **Post-processing** > **Mesh processing** interface where you can optimize the scanned data.

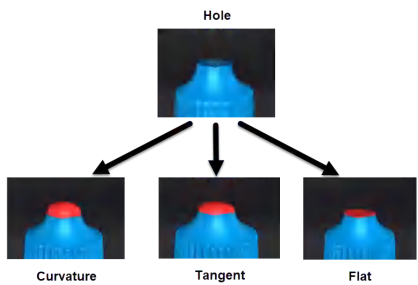| Item	Description	Note
Optimization	To optimize the data and reduce noises. A filter with high level may cause the data to lose some details.	• None: No optimization. • Standard: To optimize data slightly and preserves data characteristics. • Med: To reduce the noise on the surface of the scanned data. • High: To reduce the noise on the surface of the scanned data and make the data smoother.
Smooth	To denoise the data and make it smooth to improve the quality.	When **Optimization** is set to **None**, this function is not available.
Remove small floating parts	To remove small floating parts unrelated to the model.	Drag the slider or click the arrows to adjust the ratio of removing small floating parts. 0 means not to remove them.
Edge optimization	By checking it, the boundary data will be more complete and smoother after meshing.	/
Max triangles	To set a max plate number as an upper limit to simplify the data.	Input an appropriate number.
Fill small hole	To auto fill the small hole according to its perimeter.	The default perimeter equals to or is less than 10 mm. You can adjust it according to your requirements.
Remove spike	To remove spikes and unfold the single spike in the polygonal mesh.	/
Marker hole filling	To fill in holes in the surface of the object that are covered by markers and therefore are not scanned.	/
Recommended parameters	To use recommended optimized data when enabled.	/

Button	Description
Preview	• Click **Preview** to preview the effects after applying the settings. • If adjustments are needed, click to discard the current operation and reconfigure the parameters.
Confirm	Click **Confirm** for final confirmation.

Mesh Optimization

After the model data is meshed, the software automatically switches to the **Post-processing** interface.

Alternatively, you can directly click the navigation bar to enter the post-processing interface. Click to select the file for post-processing; or directly drag the file in STL, OBJ, PLY format into the post-processing interface.

Mesh Optimization

Item	Description	Note
Simplification	To simplify the data by reducing the number of triangles. Drag the slider or click the arrows to adjust the ratio. The default is 0.	The simplification will not be iterated.
Mesh Optimization	To optimize the quality of the data. Drag the slider or click the arrows to adjust the ratio. The default is 0.	/
Smooth	To denoise the data and make it smooth to improve the quality. Drag the slider or click the arrows to adjust the ratio. The default is 0.	/
Remove Small Floating Parts	To remove small floating parts in the scanned data. Drag the slider or click the arrows to adjust the ratio. 0 means no removal.	The removal will not be iterated.
Auto Hole Filling	To auto fill holes whose perimeter is less than the input value after the selection of type.	Types:
Manual Hole Filling	To fill the hole manually by clicking the edge of the hole after the selection of type. The edge of the hole to be filled is displayed green, and that of the chosen hole is displayed red.	/
Cutting Plane Tool	To adjustment the coordinate of the data with a custom plane as the bottom.	/

> ⚠️ **Caution**
>
> After post-processed, the data will not be saved automatically. Please save your data in time.

Bottom Panel
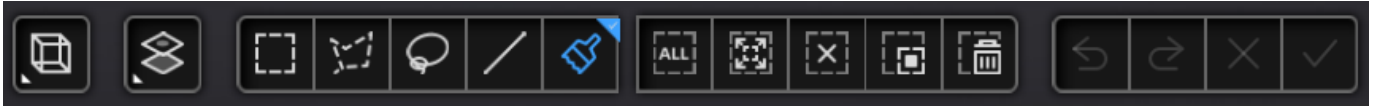
See more details in Data Editing.

Right Panel

Icon	Function	Description
	Open File	To open a file (STL, OBJ, PLY format) for post-processing.
	Save Your Scan	To save the scanned data in a specified format to a specified location.
	Share You Scan	To share the model with your Sketchfab ↗ account.
	Third-party Software	To open the project with third-party software.

Measurement

Measurement

When you complete the mesh optimization, it will automatically enter the measurement interface, or you can directly click on the corresponding position in the navigation bar to switch to the measurement interface to import data. Then you can perform operations such as creating features, alignment, and measurements here.

> 📋 **Note**
>
> - On the **Measurement** interface, you can use multi view.
> - On the **Measurement** interface, you can operate by right mouse button and shortcuts.

Additionally, it also supports clicking in the right-side function bar to import models (including third-party 3D models).

> **Note**
>
> - Support opening files in the type of STL, OBJ and PLY.
> - Support dragging the model file into the software interface.

Create Features

Click and a **Create Feature** window will pop up on the left.
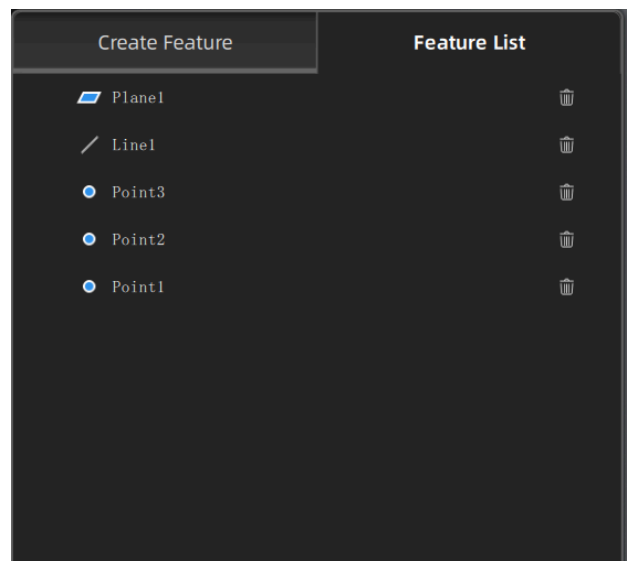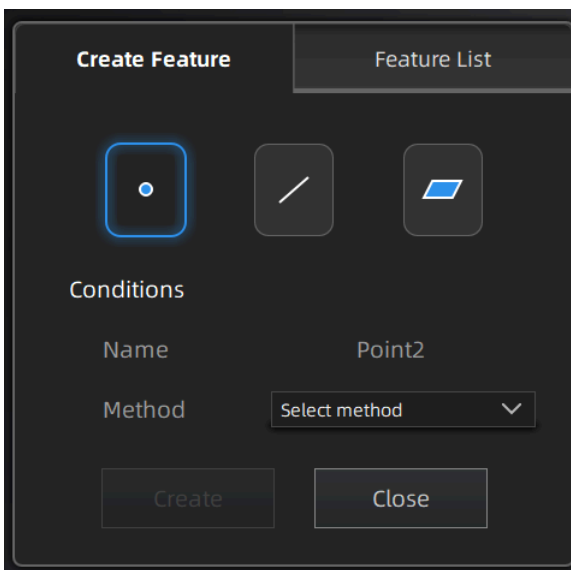
> **Note**
>
> You can switch to **Feature List** to check the created features; you can also click to delete features.

Point

Creation Method	Description	Note
Selected Points	1. Click on the data to select a point. 2. Click **Create** to create a point.	/
Line-Plane Intersection	1. Click the existing feature lines or choose lines in the drop-down list. 2. Click the existing feature planes or choose planes in the drop-down list. 3. Click **Create** to create a feature point which is the intersection between the non-parallel line and plane.	• The feature line can't be in the feature plane. • The feature line can't be parallel with the feature plane.

Line

Creation Method	Description	Note
Point-Point	1. Click the data or existing feature points to select the point. 2. Click **Create** to create a line.	You can tick the checkbox before **From** or **To** and re-select the feature points.
Plane-Plane Intersection	1. Click existing feature planes or choose planes in the drop-down list. 2. After selecting two planes, click **Create** to create an intersection of two non-parallel planes.	• Create two feature planes in advance. • The feature planes can't be parallel to each other.

Plane

Creation Method	Description	Note
3 Points Fit	1. Click the data or existing feature points to select the point. 2. Click **Create** to create a plane.	• The three points can't be in a line. • You can tick the checkbox before the three points and re-select the point.
Point-Line Fit	1. Click existing feature lines or choose lines in the drop-down list. 2. Click the data or existing feature points to select the point. 3. Click **Create** to create a plane.	The point can't be in the line.
Best Fit	When there are selected data, click **Create** to create a plane that has the smallest deviation from the selected area. 📋 **Note** You can use editing tools or shortcuts to select the data.	/

Align

Use this mode to modify the alignment of the data to the global coordinate. This action is useful for post processing or reverse engineering.

Click ⊕ to enter the alignment interface. Click it again to exit.

> ⚠️ **Caution**
>
> • The shape and accuracy of the model will not be changed by the alignment.
>
> • After the alignment and exiting, the changes are irreversible so you can only reset the model by reloading the original file.

Precise Alignment
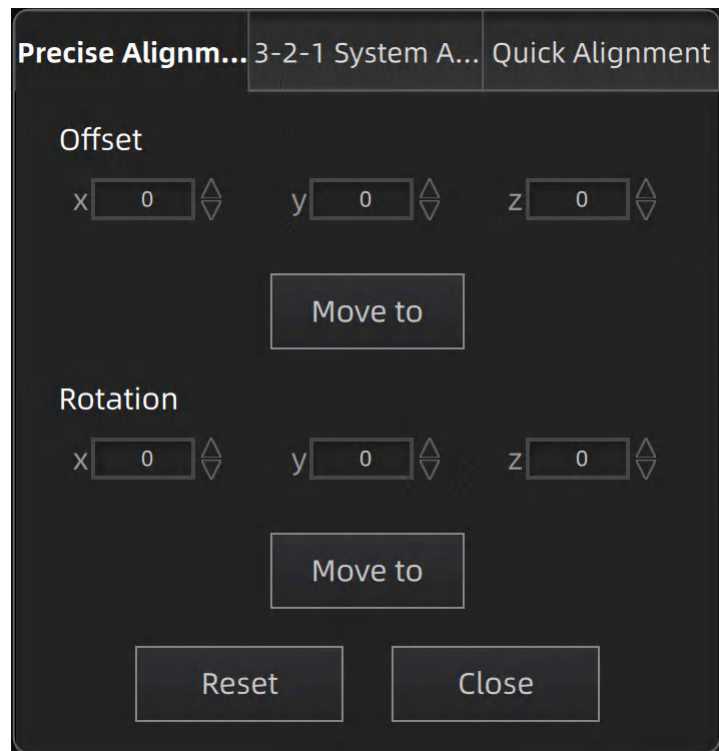
Click **Move to** to align the model center with the input coordinates, and the axis direction is adjusted to match the input rotation angle.

The coordinate system displayed on the interface is the global coordinate system, in which the direction of the red line is the positive direction of X-axis, green is the positive direction of Y-axis and blue is the positive direction of Z-axis.

Click **Reset** to cancel all the transformation in the exact alignment interface.

Click **Close** to save the results and exit.

3-2-1 System Alignment

3-2-1 system alignment aligns data by selecting the point, line and plane. Before alignment, 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+.
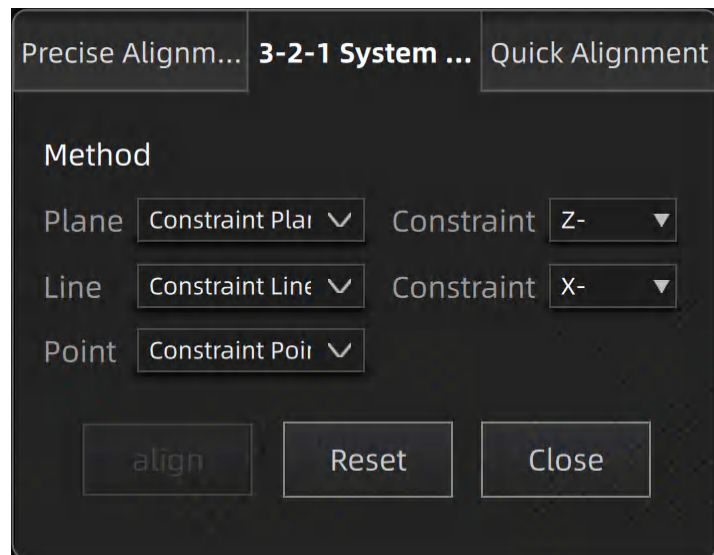
- Select a feature surface in the plane drop-down menu, and select an axis in the corresponding constraint drop-down menu of the plane. The arrow on the plane corner indicates the positive direction of the plane, and the selected axis direction will be consistent with the plane direction.

- 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).

Click **Align** to start the coordinates transformation. When the lines are perpendicular to the plane, the transformation fails, so the alignment fails.

Click **Reset** to cancel all the transformation in the 3-2-1 system alignment interface.

Click **Close** to save the results and exit.

Quick Alignment

The coordinate frame is displayed on the model when the model is rotated to the expected angle.
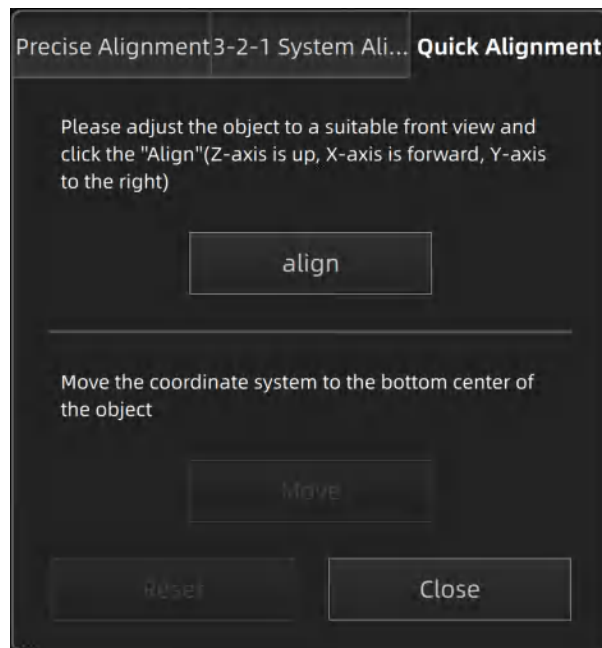
Click **Align** to move the coordinate frame to the center of the object, and the position of the coordinate frame is that the Z axis is parallel to the screen and faces upward, the X axis is perpendicular to the screen and the Y axis is parallel to the screen and faces to the right.

Click **Move** to move the coordinate frame to the center of the bottom of the object.

Click **Reset** to restore the coordinate frame to its original state (before opening the function).

Click **Close** to apply the adjusted coordinate frame and exit.

> 📋 **Note**
>
> If you are not satisfied with the alignment result this time, you can re-adjust the model and perform it again.

Measurement Tools

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

Click to enter the measurement interface and the menu is displayed. Click it again to exit.

Measurement	Description	Note
Distance	Calculate the straight-line distance between two points on the surface of the model. • **Total** is the 3D distance. • **X**, **Y** and **Z** are the projection of the segment to the respective planes.	Click on the surface of the model to pick two points, the calculation will be done automatically.
Surface Area	Calculate the surface area value (unit: mm²).	You can use editing tools or shortcuts to select data. Click **Calculate** to display the surface area of the selected area; click **Close** to exit.
Volume	Calculate the volume of the **watertight data** (unit: mm³).	It shows the volume in mm³ and the coordinates of the bounding box. 📋 **Note:** It is only available for **watertight mesh**.

Save and Export

Save Data

You can save the scanned data.

Click 💾, select the save path and the file format, and enter the file name.

Format	Data Type	Saved as	Application
ASC (whole scan)	Optimized point cloud	Scan.asc	• Data checking • Quick export and no need for post-operation • Use other software to post-possess the data
STL	Mesh	Scan.stl	• 3D printing • Reverse engineering • Compatible with most post-processing software
PLY	Mesh	Scan.ply	• Compact size • Easy for editing
OBJ	Mesh	Scan.obj Scan.jpg Scan.mtl	Compatible with most post-processing software
3MF	Mesh	Scan.3mf	• Compact size • Compatible with Microsoft 3D printing software
P3	Global markers	Scan.p3	• Reuse the markers' position • Contain the cutting plane
ASC (global markers)	Global markers	Scan_markers_project.asc	• Reuse the markers' position • Contain the cutting plane
TXT	Global markers	Scan.txt	• Reuse the markers' position • Contain the cutting plane

Data Sharing

You can upload the mesh to Sketchfab.

Click to upload mesh models to Sketchfab, where the title, username and password are required to be provided. You can register an account on the Sketchfab ↗ to view the shared models.

> **📋 Note**
>
> The files uploaded are in .stl format.

Third-party Software

You can import scanned mesh into the third-party software.

> **📋 Note**
>
> You can go to the upper right corner ⚙ > ⊞ **3rd-Party**, check the third-party software to be called up and select the calling path. Only the checked third-party software will be displayed in the third-party software list of the Photogrammetry, Post-Processing and Measurement interfaces.

Third-party Software	Use for
Cx Geomagic Control X (2023)	Metrology
Dx Geomagic Design X (2020)	Reverse Engineering
Ge Geomagic Essentials (2023)	Mesh Editing
Polyworks Metrology Suite (2023)	Metrology

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