STONEX

STONEX® X70^{GO}

SLAM Laser Scanner

User Guide

(May 2026) - Ver.3.3 -Rev.0

GOapp v2.9.1

www.stonex.it

Contents

Changelog

GOapp	
Version 2.9.1	• Payload mode support for X200GO • Mountpoint download improvement
Version 2.8.10	• Improvements in the Geotag function • Improvement of GCPs compatibility with GOpost • X200GO Support
Version 2.8.4	• X40GO Support • New GUI design
Version 2.6.6	• Added screen rotation. • Added point size e X-ray modification. • Added button X-Whizz (only X70GO). • Added geotag button (only X70GO for now). • Changed logic for point cloud navigation.

Version 2.5.2	• Added x-whizz capture key (X70GO only). • Added geotag acquisition key. • Added point list key. • Improved tablet preview graphics. • Fixed minor bugs.
Version 2.2.6	• X70GO Management • SC600+ Status and Information Display • Other Minor Bugs
Version 2.0.10	• Fixed overheating warning problem. • Real-time display optimised. • Added firmware upgrade warning icon. • Optimised 3D view. • Fixed problem with project page. • Language integration of Spanish, French and Japanese.
Version 1.10.0	• Improved compatibility with the new version of the RTK antenna • Set the minimum number of characters for CORS account and password to 3 • Wi-Fi settings for Japan and Israel at 2.4GHz only.

1. Legal Notice

1.1 Copyrights and trademarks

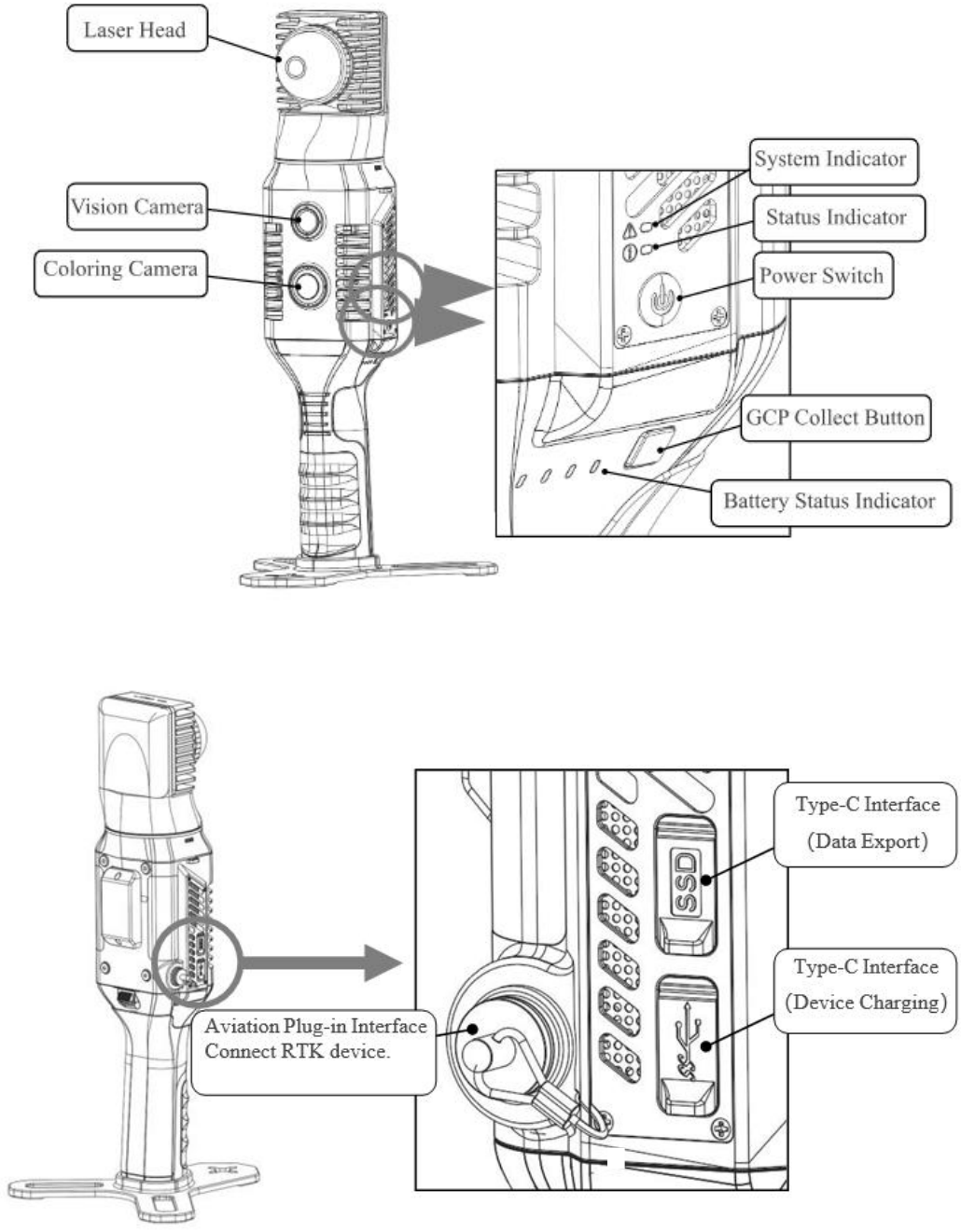
2 Introduction

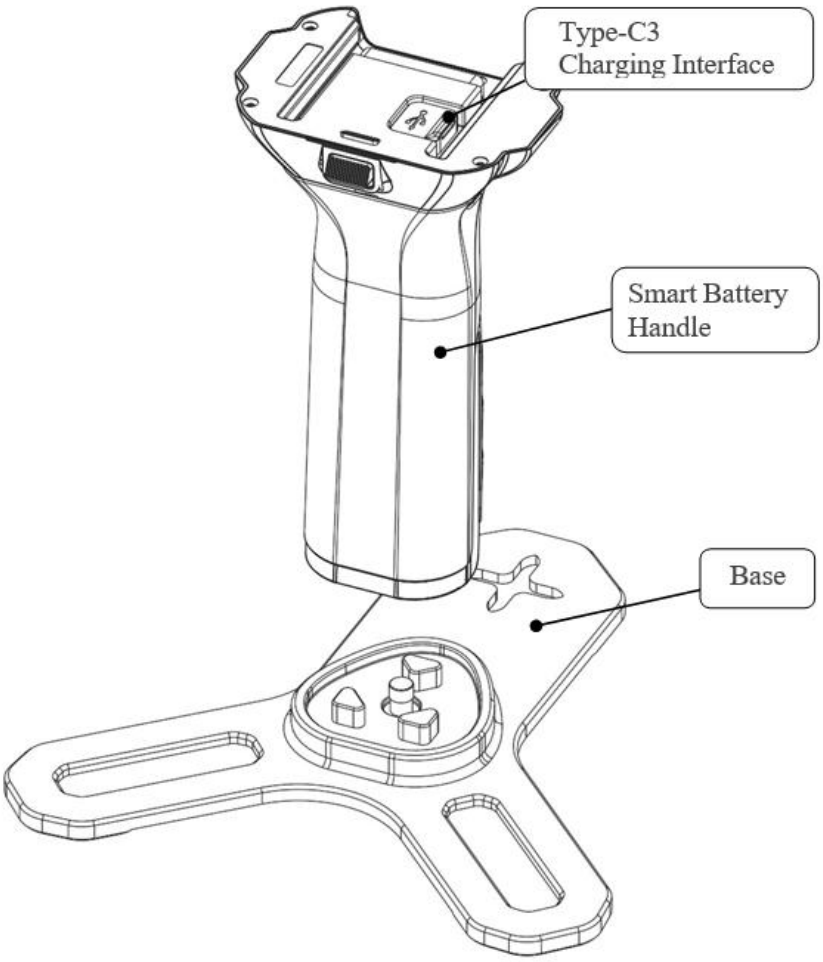
2.1 General

Thank you for purchasing the STONEX® X70GO 3D Laser Scanner.
This manual contains important safety instructions, as well as guidance on how to set up and operate the product. Please read it carefully before use to ensure optimal performance and safety.
By using this product, you acknowledge that you are a qualified user who has read, understood, and accepted the contents of this manual, including all warnings, cautions, and safety information.
In case of any discrepancies between the information provided in this manual and the actual product, the actual product specifications shall prevail. The Company reserves the right to modify or update this manual without prior notice.

The **X70GO** is a real-time 3D model reconstruction device that integrates an inertial navigation module, a high-performance computer, and a built-in storage system.
It features a 360° rotating head which, combined with a SLAM algorithm, generates high-precision point cloud data. A 12 MP visible-light camera provides texture information, while an additional visual camera enables enhanced real-time preview via the GOapp.
Mapping results are processed and generated directly within the scanner immediately after scanning.
With **X-WHIZZ mode**, you can combine mobile and stationary surveying. This mode allows you to quickly survey large areas using SLAM technology and then switch to stationary scanning for higher detail and greater accuracy.

2.2 Description of the system





2.3 Precautions for safety

1. Avoid Vibrations: When transporting the instrument, always keep it inside its protective case and minimize exposure to vibrations as much as possible.
2. Carrying the Instrument: Always hold the instrument securely by its handle when carrying it to prevent accidental drops or damage.
3. Check Battery Power: Before using the instrument, ensure that the battery is sufficiently charged.
4. High Temperature Conditions: Do not expose the instrument to high temperatures for extended periods, as this can negatively affect performance and potentially damage hardware components.
5. Sudden Temperature Changes: Sudden temperature changes can reduce the distance measurement range. For example, if the instrument is taken from a warm vehicle into a cold environment, allow it time to adjust to the surrounding temperature before use.
6. Instrument Noise: It is normal to hear operational sounds from the internal motors while the instrument is working. These noises do not affect its functionality.
7. Data Storage Responsibility: STONEX® is not liable for any data loss resulting from improper use or operation of the instrument.

2.4 Transport and shipping

TRANSPORT IN THE FIELD

When transporting the equipment in the field, always make sure to:

1. Carry the product in its original transport container, or
2. Carry the tripod with its legs splayed across your shoulder, always keeping the attached product upright.

TRANSPORT IN A ROAD VEHICLE

3. Never carry the product loose in a road vehicle, as it may be damaged by shock and vibration.
4. Always transport the product in its dedicated container and ensure it is securely fastened.

SHIPPING

5. When transporting the product by rail, air, or sea, always use the complete original STONEX® packaging, including the transport container and cardboard box, or an equivalent solution, to protect the instrument from shock and vibration.

SHIPPING AND TRANSPORT OF BATTERIES

6. When transporting or shipping batteries, the person responsible for the product must ensure compliance with all applicable national and international laws and regulations.
7. Before transporting or shipping the product, contact your local passenger or freight transport company for guidance on proper procedures and regulations.

FIELD ADJUSTAMENT

8. After transport, inspect the field adjustment parameters specified in this user manual before using the product.

2.5 Storage

1. Keep the device away from magnetic fields.

2 Protect it from falls.

3 Avoid any crushing or heavy pressure.

4 Keep it away from humid environments.

If the device will not be used for an extended period, store it in a safe, dry, and well-ventilated area, away from direct sunlight. The storage environment should have a relative humidity below 40% and a temperature between -20°C and +60°C to prevent condensation caused by excessive humidity. The recommended storage range is between +5°C and +28°C.

2.6 Cleaning and drying

- Never touch the cover glass with your fingers.
- Use only a clean, soft, lint-free cloth for cleaning.
- If necessary, moisten the cloth with water or pure alcohol. Do not use any other liquids.
- Keep all plugs clean and dry. Use compressed air or gently blow away any dirt lodged in the plugs of the connecting cables.

2.7 Definition of indication

To ensure the safety of the product, prevent injury to operators and others, and avoid property damage, this manual uses exclamation points within a triangle to highlight important WARNING and CAUTION notices.

The definitions of these indicators are provided below.
Please make sure you understand them before proceeding to read the main content of the manual.

	ATTENTION:	Ignoring this indication and performing the operation incorrectly could result in death or serious injury to the operator.
	CAUTION:	Ignoring this indication and performing the operation incorrectly could result in personal injury or property damage.

ATTENTION

1. Do not disassemble or attempt to modify the device. Fire, electric shock, or burns may result. Only STONEX® authorized distributors are permitted to perform disassembly or repairs.
2. Do not cover the charger during use, as this could lead to overheating and fire.
3. Do not use damaged power cables, sockets, or plugs. Doing so may result in fire or electric shock.
4. Do not use the battery or charger if they are wet. Fire or electric shock may occur.
5. Keep the instrument away from flammable gases or liquids, and do not use it in coal mines. An explosion could result.
6. Do not expose the battery to fire or high temperatures. This may cause an explosion or serious damage.
7. Use only power cables specified by STONEX®. Using unauthorized cables may result in fire.
8. If the product is exposed to a strong electrostatic discharge, performance may be temporarily affected—for example, it may turn on or off automatically.

CAUTION

1. Do not touch the instrument with wet hands. Electric shock may occur.
2. Do not stand or sit on the carrying case, and do not turn it over arbitrarily. The instrument could be damaged.
3. Do not drop the instrument or its carrying case.
4. Do not touch any liquid leaking from the instrument or battery. Harmful chemicals may cause burns or blisters.
5. Dropping the instrument may cause serious damage—handle it with care.
6. Be cautious when removing the scanner from its carrying case. Take special care to protect the rotating laser head.
7. Do not touch the protective cover of the laser emitting area with your hands.
8. During data collection, keep the scanner moving smoothly and avoid sudden or violent shaking.

2.8 Safety standards for lasers

The **STONEX® X70GO** series complies with the laser product classification defined in **IEC Standard 60825-1:2014**. According to this standard, the device is classified as a **Class 1 Laser Product**.

2.9 Device power supply

The X70GO scanner is equipped with an internally integrated, replaceable 3000mAh lithium battery, designed for safety and reliability. It operates at a working voltage of 10.8V, with each battery providing approximately 95 minutes of continuous use when powering the X70GO independently.

Under normal usage and proper maintenance, the battery supports a charge-discharge cycle life of at least 500 cycles.

Charging advice

1. Do not use non-standard power adapters to charge the battery.
2. If the battery is hot after operation, allow it to cool to room temperature before charging. The ambient temperature for charging must be between 5°C and 40°C.
3. Always charge the battery in an isolated area, away from flammable materials.
4. To avoid the risk of electric shock, do not open the charger without authorization.

Operation advice

1. The battery must be used within a temperature range of -10°C to +50°C. Low temperatures can reduce lithium-ion activity and discharge efficiency.
2. Ensure the device's connection port is dry and free of moisture before connecting or installing the battery.
3. Keep the Smart Battery Grip out of direct sunlight.
4. Using the battery in low-temperature environments (-10°C to +15°C) will reduce capacity and discharge voltage. It is recommended to preheat the battery to at least 15°C, preferably 20°C or above, before use.
5. Do not remove the battery directly from a powered-on device.
6. Low battery temperature will trigger protection and prevent charging.
7. Do not continue using batteries that are deformed due to a fall or impact.
8. If the battery falls into water, immediately remove it and place it in a safe, open area until it is completely dry. Do not reuse air-dried batteries—dispose of them properly following the instructions in this manual.
9. In the event of a battery fire, extinguish it immediately using water, water mist, sand, a fire blanket, dry powder, or a carbon dioxide fire extinguisher. Select the appropriate method based on the actual situation. Battery fires may lead to explosions.
10. Only use batteries officially provided by STONEX. To replace a battery, purchase directly from STONEX or an authorized dealer. STONEX is not responsible for accidents or equipment failure caused by third-party batteries.
11. Store the battery at a temperature between -20°C and +45°C, with 45% to 90% relative humidity (RH).
12. Do not use or charge batteries that are bulging, leaking, or damaged. Also avoid use if the battery emits a strange odor, becomes hot (over 60°C), or shows signs of deformation, discoloration, or other abnormalities. Contact STONEX after-sales service or an authorized agent for support.
13. Operate the battery in an environment where the temperature is between -10°C and +50°C. Temperatures above +50°C may cause fire or explosion, while temperatures below -10°C can severely damage the battery.
14. Do not disassemble or puncture the battery with sharp objects. This may result in leakage, fire, or explosion.
15. Do not strike, crush, or throw the battery. Avoid placing heavy objects on the battery or charger.
16. If the battery is dropped or subjected to external impact, stop using it immediately.

17. Do not expose the battery to heat sources such as microwaves or pressure cookers.
18. Do not place the battery's contacts on conductive surfaces (e.g., metal tables, jewelry, glasses).
19. Do not short-circuit the battery terminals using wires or other metal objects.
20. If the battery connector is dirty, wipe it with a clean, dry cloth. Failure to do so may cause poor contact, energy loss, or charging failure.

Transportation

Batteries should be placed in a secure container during transportation to prevent contact with liquids or impact with hard objects. Never immerse batteries in water or allow them to get wet. Exposure to water may cause chemical decomposition, leading to spontaneous combustion or even explosion.

Maintenance

After each operation, the battery should be recharged promptly. Do not store the battery in a low-charge state for extended periods. If the battery will not be used for a long time, charge it to over 50% before storage. Perform a full charge and discharge maintenance cycle every 3 months to preserve battery health.

Battery storage

1. Store the battery out of the reach of children and pets.
2. Batteries should be stored in an explosion-proof container, in a cool and dry location. Avoid prolonged exposure to high temperatures and direct sunlight.
3. Do not place the battery near heat sources (such as furnaces or heaters), and never leave it inside a vehicle on hot days. Do not store the battery in environments exceeding 60°C. The ideal storage temperature is between 22°C and 28°C.
4. Avoid storing the battery in environments with frequent alternating high and low temperatures.
5. Do not store the battery in a fully charged transportation case if the battery temperature exceeds 45°C.
6. Prolonged storage of a low-charge battery can lead to over-discharge, which may permanently damage the battery.
7. Do not store batteries near sharp objects or puncture them in any way.
8. Prevent the battery from being dropped or subjected to impact.
9. Always store the battery in a dry environment.
10. Do not store the battery for long periods after it has been completely discharged. Doing so may cause irreversible damage due to over-discharge, rendering the battery unusable.

Battery disposal

3 Do not disassemble, strike, crush, or incinerate the battery. Avoid exposing the battery to high-temperature environments.

4 If the battery is bulging, damaged, or leaking, do not use it again. Dispose of it safely and promptly.

5 Always discharge the battery completely before disposing of it in a designated battery recycling bin. Batteries contain hazardous chemicals and must not be thrown in regular trash. Follow local regulations and guidelines for battery recycling and disposal.

6 If the battery cannot be fully discharged, do not dispose of it directly in the recycling bin. Instead, contact a certified battery recycling company for proper handling.

Battery specifications

Model	**SP30**
Charging interface	Type-C3 port
Input voltage	5-20 V
Output voltage	10.8 V
Battery capacity	3000 mAh
Standard	GB31241-2014S
Duration	95 min
Weight	About 400 g
Dimension	Length×Width×Height 85 mm×60 mm×144.5 mm

2.10 About User

1. The X70GO Scanner must be operated by trained personnel only. Always follow basic safety precautions to prevent injury or equipment damage during use.
2. Users must be qualified surveyors or have sufficient knowledge of surveying to understand and apply the instructions in this manual before operating, inspecting, or adjusting the device.
3. Do not operate the equipment if it shows visible defects or signs of damage. In such cases, follow the STONEX® service procedure to have the equipment repaired.
4. Use only components and accessories supplied or approved by the manufacturer.
5. Before operating the X70GO for the first time, read this manual thoroughly.
6. The equipment includes sensitive electrical components and mechanical parts. Do not pull, bend, or apply force to the data transmission cable.

7. Do not insert foreign objects into the data transmission ports. Keep the device out of the reach of children. Do not modify or disassemble the X70GO scanner under any circumstances without prior written authorisation from STONEX®—doing so will void the warranty.

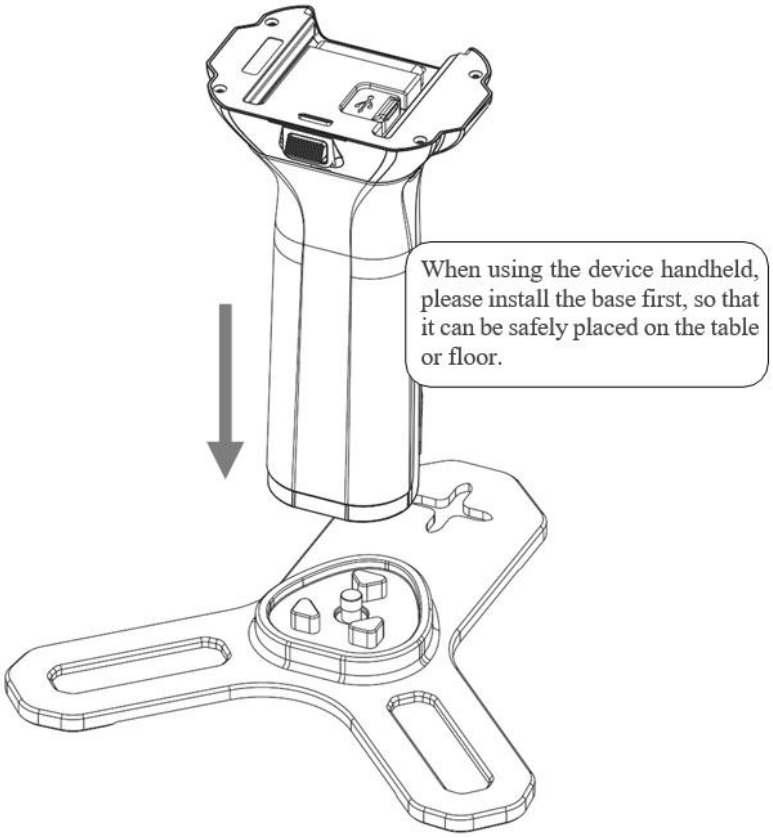
2.11 Exceptions from Responsibility

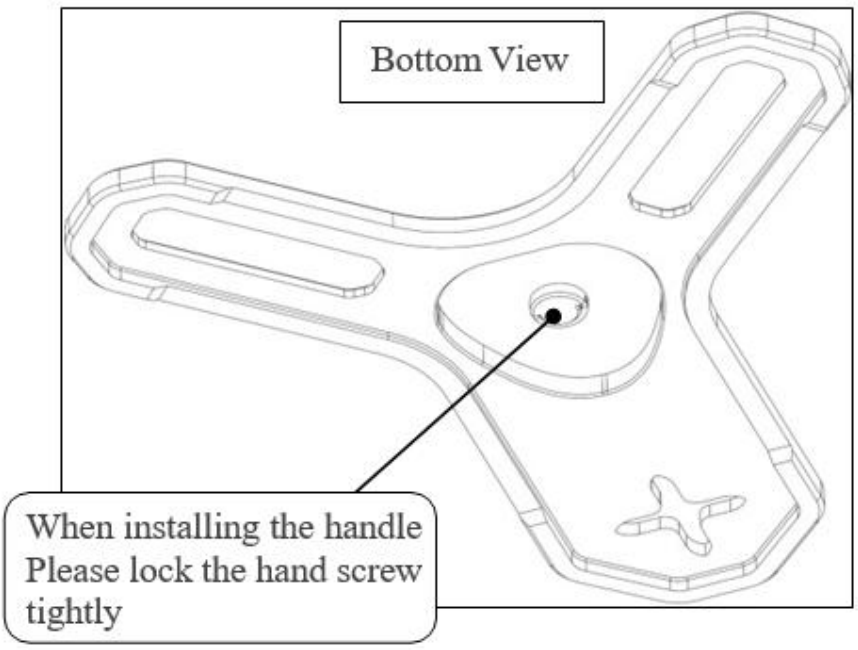
1. The user is expected to follow all operating instructions and regularly check the product's performance.
2. The manufacturer assumes no responsibility for any consequences resulting from improper, faulty, or intentional misuse of the product, including direct, indirect, or consequential damages and loss of profits.
3. The manufacturer is not liable for any consequential damage or loss of profits caused by natural disasters such as earthquakes, storms, floods, or similar events.
4. The manufacturer assumes no responsibility for any damage or loss of profits resulting from data modification, data loss, business interruption, or the inability to use the product.
5. The manufacturer is not responsible for any damage or loss of profits resulting from use that is not described in this user manual.
6. The manufacturer assumes no responsibility for damage caused by improper transportation or mishandling, including damage resulting from connections with incompatible products.

3. Setting up the STONEX® X70GO

3.1 Device assembly

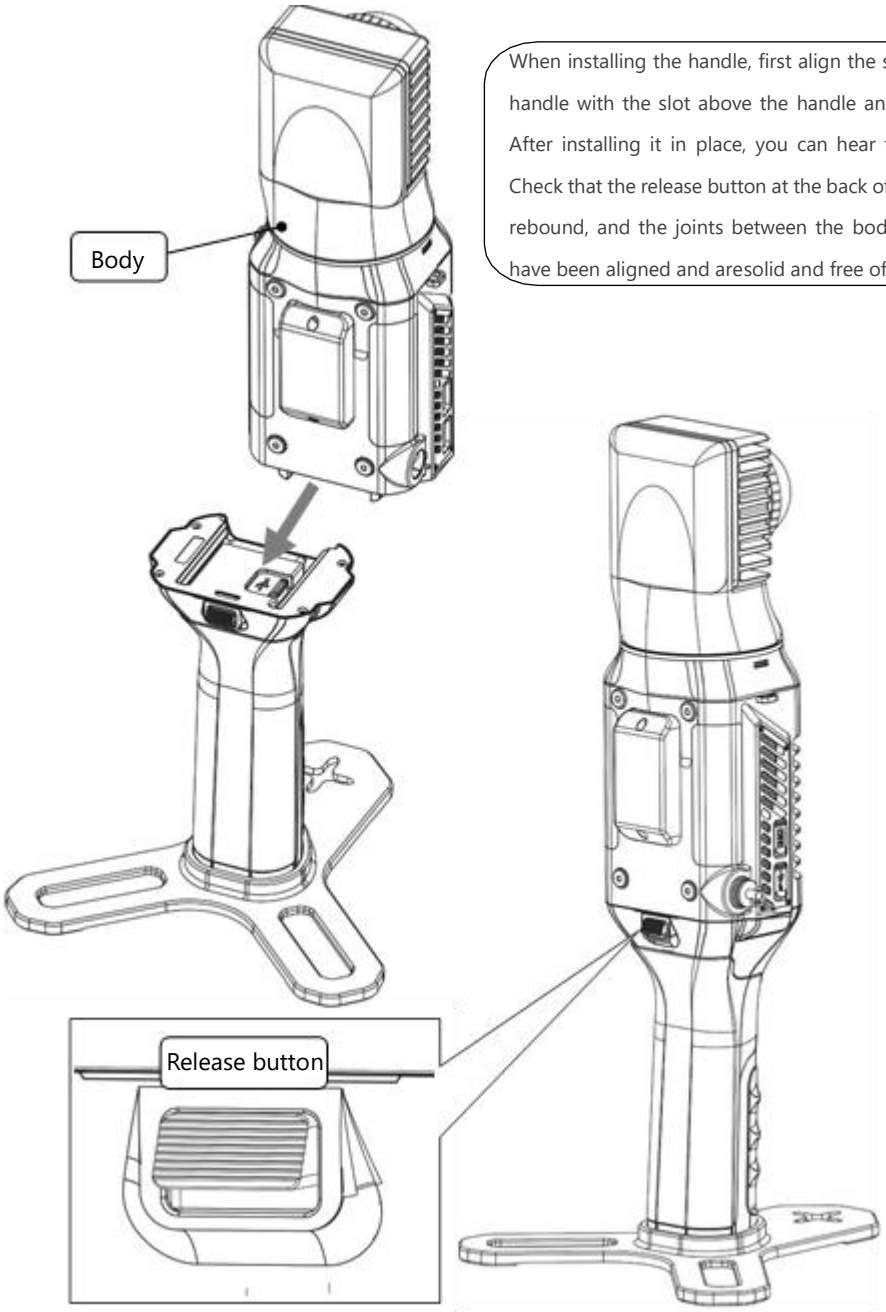
Mounting base



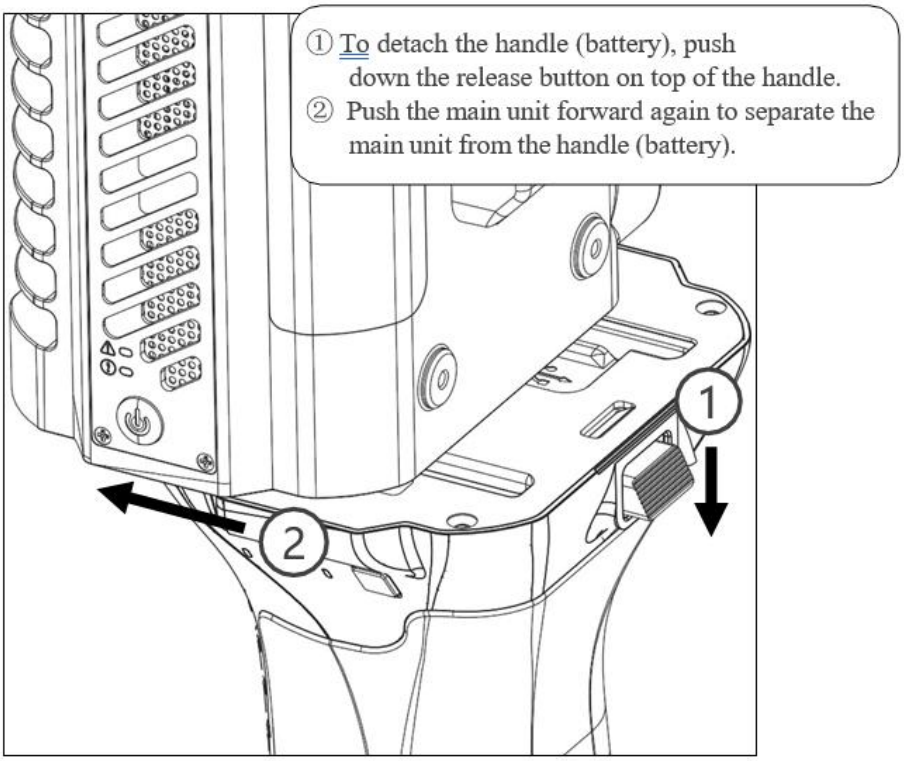


Assemble handle

When installing the handle, first align the sliderail under the handle with the slot above the handle and then push it in. After installing it in place, you can hear the "click" sound. Check that the release button at the back of the handleis fully rebound, and the joints between the body and the handle have been aligned and aresolid and free of looseness.



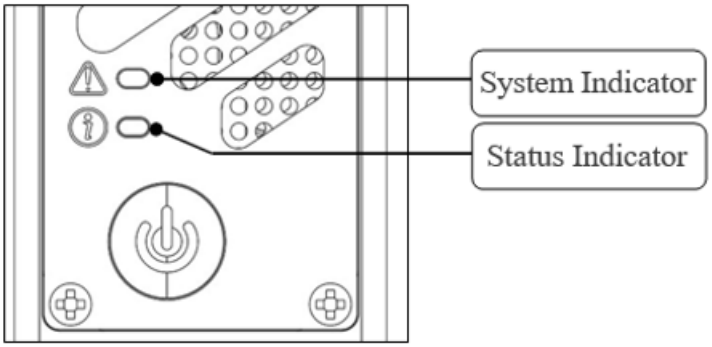
Detach handle



3.2 Led status

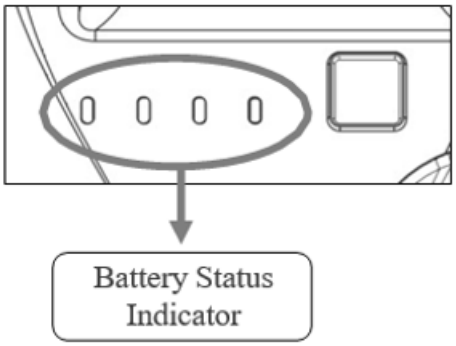
System information

The system provides both visual and audio signals to help the user understand its status.



	Led color	Indicator Status
System Indicator	Firmware upgrade	White light, on
	System not ready	Red light, flashing
	System ready	Blue light, on
Status Indicator	MCU Firmware upgrade	White light, flashing fast
	Device initialization	Red light, on
	Device ready	Green light, on
	Data collection in progress	Green light, flashing

	Sound	Sound description
Buzzer	One beep	Power ON
	One beep	Shutdown
	One beep every 10 seconds	Low battery
	One beep every second	Ultra-low battery
	One beep	GCP information collection
	One beep	Start data collection
	One beep	Real-slam point cloud saved



The battery status indicator displays the remaining battery percentage and provides information about the current charging or discharging state.

Battery LED Indicator Status List					
Status		**LED1**	**LED2**	**LED3**	**LED4**
Discharge Protection Status	Undervoltage	Flash(5Hz)	Slow Flash(1Hz)	Out	Out
	Discharge Low Temperature	Flash(5Hz)	Out	Slow Flash(1Hz)	Out
	Discharge Over Temperature	Flash(5Hz)	Out	Out	Slow Flash(1Hz)
	Discharge Overcurrent	Flash(5Hz)	Slow Flash(1Hz)	Slow Flash(1Hz)	Out
	Discharge Short Circuit	Flash(5Hz)	Slow Flash(1Hz)	Slow Flash(1Hz)	Slow Flash(1Hz)
Charge Protection Status	Overvoltage	Slow Flash(1Hz)	Out	Out	Flash(5Hz)
	Charging Low Temperature	Out	Slow Flash(1Hz)	Out	Flash(5Hz)
	Charging Over Temperature	Out	Out	Slow Flash(1Hz)	Flash(5Hz)
	Charging Overcurrent	Slow Flash(1Hz)	Slow Flash(1Hz)	Out	Flash(5Hz)

Power Indicator	0%~12%	Slow Flash(1Hz)	Out	Out	Out
	13%~24%	Always On	Out	Out	Out
	25%~37%	Always On	Slow Flash(1Hz)	Out	Out
	38%~49%	Always On	Always On	Out	Out
	50%~62%	Always On	Always On	Slow Flash(1Hz)	Out
	63%~74%	Always On	Always On	Always On	Out
	75%~87%	Always On	Always On	Always On	Slow Flash(1Hz)
	88%~100%	Always On	Always On	Always On	Always On

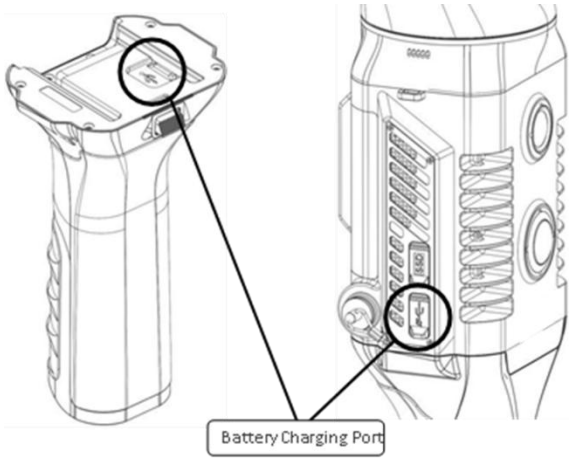
	Status	**LED1**	**LED2**	**LED3**	**LED4**
Charging Indicator	0%~24%	**LED1->LED4 Streaming LED Display**			
	25%~49%	Always On	**LED2->LED4 Streaming LED Display**		
	50%~74%	Always On	Always On	**LED3->LED4 Streaming LED Display**	
	>=75%	Always On	Always On	Always On	**Slow Flash(1Hz)**
	Full	Always On	Always On	Always On	Always On

Description: When you press the button to check the power level, the LED will remain lit for 6 seconds. During the first 3 seconds, it displays the current battery level. In the last 3 seconds, if the battery is functioning normally, it will continue to show the power level; otherwise, it will indicate a protection status.

3.3 Charging method

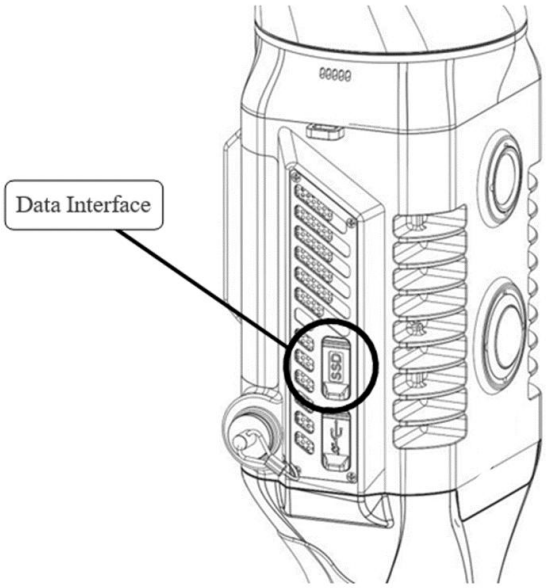
The X70GO battery can be charged using a Type-C cable connected to the charger. There are two charging modes:

- Mode 1: Connect the charger directly to the Type-C port on the X70GO grip to charge the battery.
- Mode 2: When the grip is attached to the X70GO body, connect the charger to the Type-C port located on the underside of the scanner body to charge the battery.



3.4 Data storage

The X70GO is equipped with a built-in 512 GB SSD for internal data storage. It can be connected to a PC via a Type-C data cable for data transfer.
The SSD interface (labelled with the SSD name) is accessible only when the scanner is powered off.



NOTE: The scanner body features two Type-C ports: the upper port is used for data transfer, while the lower port is designated for charging.

5 Operating the STONEX® X70GO

5.1 How to use X70GO without application

The **X70GO scanner** can operate independently, without requiring connection to other devices. For correct usage, follow the steps below:

1. **Powering On:** Press and hold the power button for a few seconds. Wait for the LiDAR head to begin rotating.
2. **Initialisation:** Place the scanner on a stable surface. Press the power button once. An audible signal will sound, and the **green LED will begin flashing**, indicating that the instrument is acquiring data correctly.
3. **Wait for Initialisation:** Allow the scanner to initialise for about **one minute**. Ensure that no people or objects are moving nearby during this time. After one minute, the scanner head will begin rotating and a second beep will confirm the **start of data acquisition**. You can now pick up the scanner and begin scanning.
4. **Acquiring a Control Point:** To acquire a control point, position the scanner over a known target or recognisable point. Remain stationary over the point for a few seconds and press the **side button on the handle** (not the power button) to save the position.
5. **Static Acquisition with X-WHIZZ:** To perform a static scan using **X-WHIZZ mode**, stop with the scanner facing the area of interest. Remain still for **15 to 80 seconds**—the longer the duration, the higher the point cloud density. Refer to **Chapter 5.2** for details. Press the **side button** to mark the moment from which an image will be extracted to colour the static cloud. If the button is not pressed, the last recorded instant will be used.
6. **Ending the Scan:** To stop the scan, press the **power button once**. The **green LED will stop flashing**, and the head will stop spinning, indicating that data acquisition has ended.

5.2 How to use X70GO with application: GO*app* installation

GOapp is the official mobile application for the X70GO scanner, compatible with Android devices running version 8.0 or above and iOS devices. The app enables essential operations such as project management, real-time point cloud display, image preview, firmware upgrades, and more.

To install GOapp on your device:

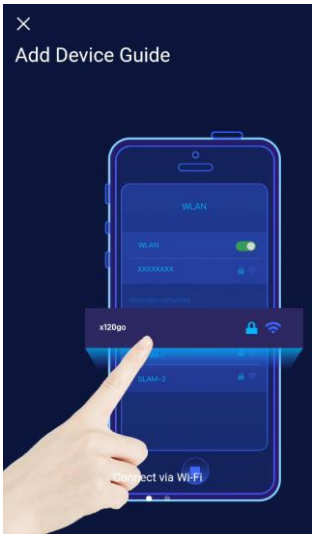
- Download the app to your device from the QR code or by searching for Stonex GOapp in the app store
- Follow the prompts to complete installation on your device.

5.3 Device binding

The first time you open GOapp, the following screen will appear. Tap the **Add Now** button to bind a new device.

To connect the **X70GO** to a tablet running **GOapp**, follow these steps:

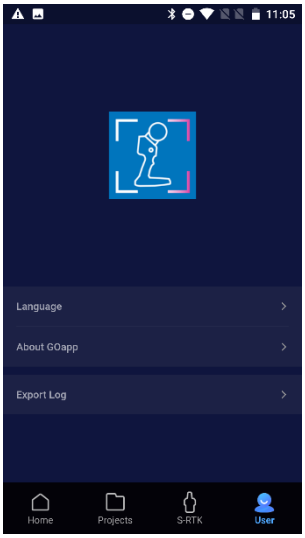
1. Ensure that **Wi-Fi** is enabled on your tablet.
2. Open the **GOapp** homepage.
3. Press and hold the **power button** on the **X70GO scanner** for **3 seconds** to power it on.
4. Wait approximately **one minute** for the scanner to initialize.
5. On your tablet or mobile device, go to the Wi-Fi settings and connect to the network named **"X70GO_xxxxx"**.
6. Enter the default password: **12345678**.
7. Once connected, the **X70GO scanner** will automatically appear on the **GOapp homepage**.



User settings

By tapping the **user icon**, you will access the **User Settings** page. From this page, you can change the application language by selecting **Language** (currently available: **English**, **Italian**, and **Chinese**), and view the installed application version by selecting **About GOapp**.

The **Export Log** function should be used **only if requested** by the **STONEX support team**.

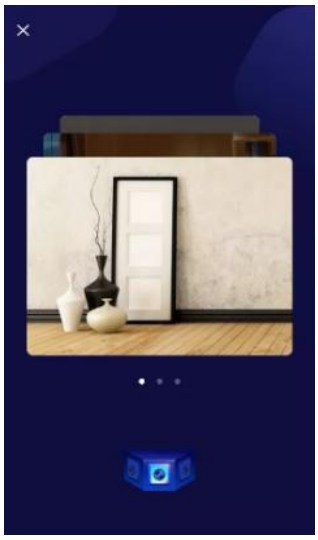


5.4 Equipment work

Connect the **X70GO scanner** to your mobile device via **Wi-Fi**. Once connected, tap the **online device** icon (indicated by a **green dot**) located in the upper right corner of the **GOapp** homepage.

After a successful connection, the device will automatically initialize. Once initialization is complete, tap **Start Work** to begin the scanning process.

You can also tap the **camera icon** to capture a set of images. In the preview interface, **swipe left or right** to switch between the preview images taken by the scanner's two cameras.



Device Status-Connection failed

If the device fails to connect, please check the connection status and troubleshoot step by step:

1. Ensure that the **X70GO's Wi-Fi** is properly connected to your mobile device.
2. Check the **LED status** on the X70GO to confirm the device is powered on and functioning correctly.
3. Exit the scanning interface and return to the **GOapp homepage**. Check whether a **green dot** appears on the connected device icon in the upper right corner.
4. Completely **close the GOapp**, clear it from your device's background apps, then **reopen GOapp** and attempt to reconnect to the X70GO.

If the connection still fails after performing the above steps, please **contact your local STONEX dealer** for further assistance.

Device status-out of communication range

When **GOapp** is disconnected from the **X70GO**, the device status will display the message: **"Not in**

communication range."

In this case, check the following:

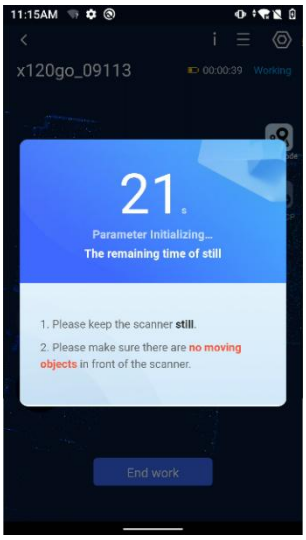
- Ensure that your mobile device is still connected to the **X70GO's Wi-Fi network**.
- Verify that the **distance between the mobile device and the scanner** is not too great, which could cause a weak or lost Wi-Fi signal.

Device status - Device activation failed

If a **"Device Activation Failed"** message appears, connect your controller (phone or tablet) to the **internet** and reopen the **GOapp**. This will allow the application to perform **time synchronization**, which is required for successful device activation.

Parameter initializing

After tapping **Start Work**, leave the scanner stationary for approximately **one minute** to allow the laser parameters to initialize properly. During this time, ensure that **no objects or people are moving** in front of the scanner.

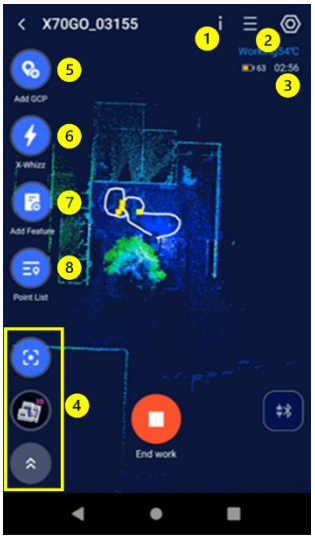


Working page

After connecting to the **X70GO** via **GOapp**, the application will enter the **standby page**. By pressing the **power button** on the instrument, the system will automatically switch to the **working page** and begin displaying **real-time laser scanning data**.

The interface includes the following elements:

1. **Equipment Information**
2. **Settings**
3. **Working Time, Temperature, and Battery Percentage**
4. **2D/3D Display Toggle**
5. **Add a GCP (Ground Control Point)**
6. **X-Whizz Mode Activation**
7. **Add Feature**
8. **Point List**



Click the *End work* button to stop the acquisition.

Working-real-time 3D scanning display

When the **GOapp** is on the **standby interface**, briefly press the **power button** on the **X70GO device** to start the operation. The app will automatically switch to the **3D scanning display interface**.

Working-View status information

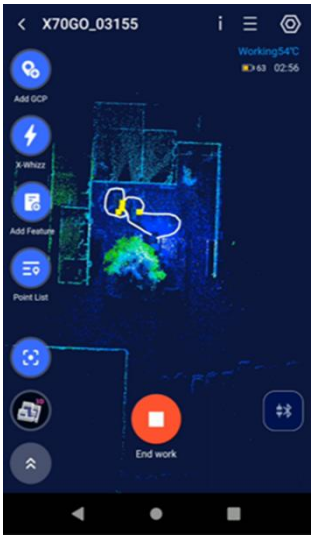
During the operation of the **X70GO**, tap the **"Equipment Information"** button located in the upper right corner of the working interface to view the current **basic status**, **motor status**, and **error status** information.

Add GCP

When you reach a **control point**, such as one marked by a target, align the **center of the target** with the **crosshair visible at the base of the instrument**.

Once aligned, tap the **Add GCP** icon to save the location as a **Ground Control Point (GCP)**. Upon successful acquisition, a confirmation message will appear. Each saved GCP will also be represented along the motion track

by a **yellow square**, with one square displayed for each acquired point.



X-Whizz mode

To activate **X-Whizz mode**, stop at your desired position and press the corresponding button. An **80-second countdown** will begin. During this time, you can choose to either:

- **Save the image** to be used for colouring the static point cloud (mandatory, otherwise the static scan will not be saved)
- **End the static scan early** before the countdown finishes.

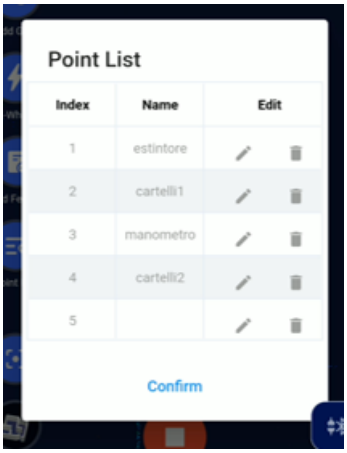
Add feature: geotag

Tap **Add Feature** to capture an image and save it as a **geotagged point**. You can assign a **custom name** to the image before saving it. After clicking **Confirm**, the image will be saved.

Please note that the picture is taken using the **top camera**, so ensure that the desired object is properly framed by that camera before capturing the image.

Point list

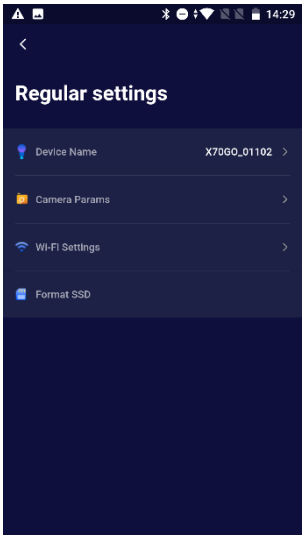
Tapping the **Point List** button opens a list displaying all saved points—including **GCPs**, **geotags**, and **static scans**—in the order they were recorded. From this list, you can also **edit the names** of the saved points.



5.5 Settings

Click the **Settings** button in the upper right corner of the working interface to access the settings menu. Then tap **Regular Settings** to enter the configuration screen, where you can:

- Set the **device name**
- Adjust **camera parameters**
- Configure **Wi-Fi settings**
- **Format** the internal memory



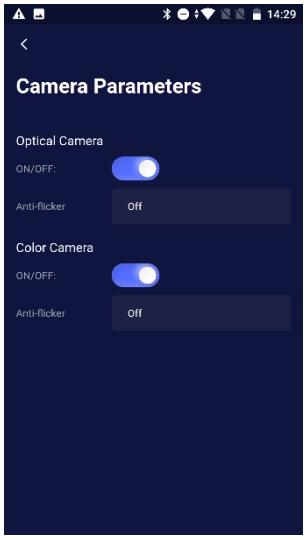
Modify device name

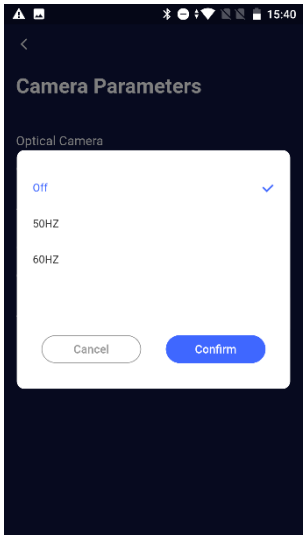
To modify the device name, tap on **Device Name**. In the pop-up dialog box labeled **"Modify Device Name"**, enter the new name, then click **Confirm** to apply the change.

Camera parameters

You can **enable or disable** the cameras and adjust the **camera frequency** to reduce image flickering. Switch between **50 Hz** and **60 Hz** depending on the type of lighting in the environment.

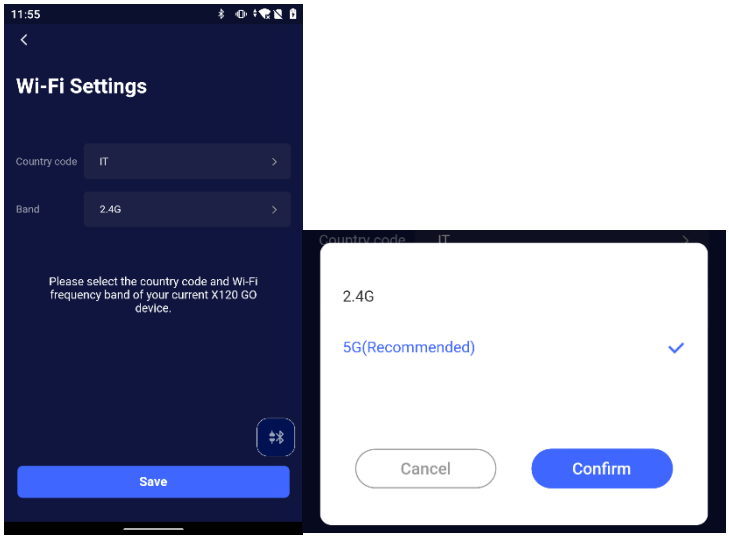
LED lights may cause unwanted shadows or flickering effects. To avoid this, it is recommended to take a **test image** before starting data acquisition. If you notice any anomalies, adjust the frequency accordingly.





Wi-Fi Settings

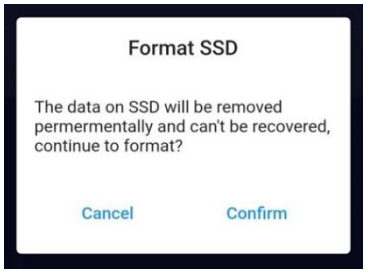
Click on **Wi-Fi Settings** to configure the **Country** and select the **available Wi-Fi frequency bands** for the device.



After selecting and confirming the settings, wait a few seconds for the changes to take effect.

Format SSD

Click **here** to format the scanner's **internal SSD**. *Note: This action will permanently delete all stored data.*



Delete equipment

To remove a device, click on the **Delete** option in the dialog box, then click **Confirm** to complete the deletion.

The **Delete Device** function allows you to remove devices that no longer need to appear on the **GOapp homepage**.

5.6 Firmware

A **firmware update** enhances the performance of the device firmware, drivers, processors, or other hardware components. It can also resolve issues present in previous versions.

On the **GOapp home screen**, an **arrow icon** indicates the availability of a firmware update:

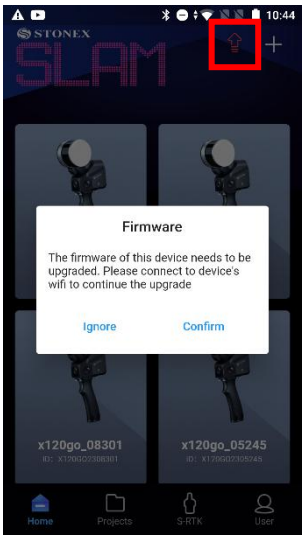
- If the icon is **highlighted**, a new firmware version is available for download.
- If the icon is **white**, no updates are currently available.

Automatic firmware upgrade reminder

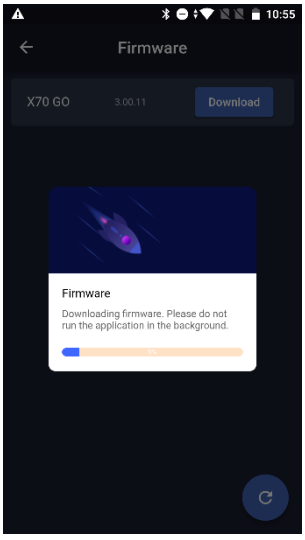
Each time you open the application, it automatically checks for the **latest firmware version** and compares it with the **current local firmware version**.

If the latest firmware has not yet been downloaded, a **pop-up window** on the home screen will prompt you to download it. This ensures you can proceed with the firmware update as soon as the device is connected.

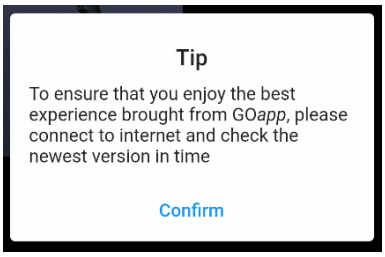
Additionally, the **arrow icon** on the home screen will turn **red** to indicate that a firmware update is available.



Click on the red arrow to check the firmware version to be downloaded.



To ensure you have the latest firmware version, open the GOapp before connecting to the scanner's Wi-Fi network. If the app is opened after connecting to the scanner, the following notification message will appear:



Latest firmware download

After confirming the firmware update from the **homepage pop-up window**, click **OK** to proceed to the **firmware download screen**. Then, tap **Download** to begin the download process.

During the download, **do not operate your mobile device**. Once the download is complete, click **OK** to exit the firmware upgrade window.

Firmware upgrade process

When the home page displays a pop-up prompting you to download the firmware, the firmware package will be downloaded locally. Follow the steps below to complete the update:

1. **Download the Firmware:**
   Open the app and log in to your account. In the pop-up window, click **"Download the latest firmware"** to begin the download. Once the download is complete, you may close the download page.
2. **Connect to X70GO:**
   Turn on the **X70GO** device and connect your mobile phone to the device's **Wi-Fi** network. Tap **Home** in the GOapp to access the device details. Then tap the **Settings** icon in the upper right corner and select **Firmware Upgrade**.
3. **Begin the Upgrade:**
   In the firmware upgrade interface, tap **"Firmware Upgrade"**, then tap **"Update"** to begin transmitting the firmware package to the X70GO.
   ⚠ **Important:** Do **not** operate your mobile phone or the X70GO during this process.
4. **Restart the Device:**
   After transmission is complete, click **OK**. Wait for approximately **35 seconds**, then manually restart the X70GO device.
   Check the **LED status** to confirm normal operation. When the LED returns to its standard state, the firmware update has been successfully completed, and the device is ready for use.

If the firmware package was not downloaded automatically from the home screen, follow these steps to complete the firmware update:

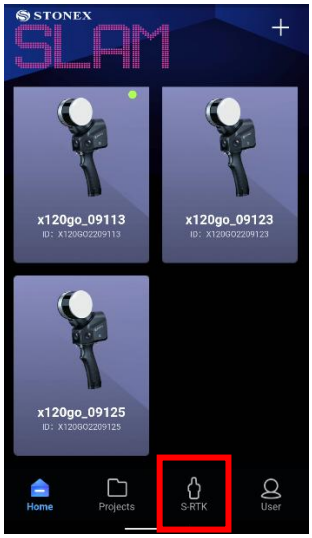
1. **Connect to X70GO:**
   Power on the **X70GO** device, connect your mobile phone to the device's **Wi-Fi**, then tap **Home** in GOapp to access the device details. Tap the **Settings** icon in the upper right corner.
2. **Prepare for Download:**
   When checking for a firmware upgrade, you will be prompted to **disconnect from the X70GO Wi-Fi** if

the latest firmware has not been downloaded. Disconnect the X70GO Wi-Fi, ensure your **mobile phone is connected to the internet**, and then tap **Firmware Upgrade** to start downloading the update.

3. **Reconnect and Return to Standby:**
   Once the download is complete, **reconnect** your phone to the **X70GO Wi-Fi**. Exit the firmware upgrade page, and from the **Home** screen, tap the device again to return to the **standby page**.
4. **Transmit Firmware to X70GO:**
   Tap **Settings** in the upper right corner of the standby page, then enter the **Firmware Upgrade** section. Tap **Firmware Upgrade** and then **Update** to begin transmitting the firmware package to the X70GO.
   ⚠️ **Important:** Do **not** operate your mobile phone or the X70GO device during the transmission.
5. **Complete the Update:**
   After the transmission is complete, tap **OK**. Wait approximately **35 seconds**, then **manually restart** the X70GO device.
   Check the **LED status**—once it returns to normal, the firmware update has been successfully completed, and the device is ready for use.

5.7 RTK70^{GO} function

Click the icon to enter the S-RTK page.



For a more detailed explanation of the steps in this section, please refer to **Chapter 8.**

6. Data collection

Device Power On

Press and hold the **power button** on the scanner for **3 seconds**. The laser head will begin rotating to perform a **self-test**. Wait until the following indicators confirm successful initialization:

- **System Indicator:** Solid **blue light**
- **Status Indicator:** Solid **green light**
- **Laser Head:** Stops rotating

At this point, the device has **started successfully** and is in **standby mode**.

⚠️ **Important:** Do **not** manually rotate the laser head after the self-test. Ensure the scanner is placed on a **flat and stable surface**.

Start collection

Before starting data collection, the **X70GO scanner must be calibrated**. Follow these guidelines:

- Place the scanner at a distance **greater than 40 cm** from the object to be measured. It should not be placed too far away either—keep it within a reasonable range.
- The scanner must be placed on a **stable, fixed surface** such as a secure floor or tabletop. **Do not hold it in your hand** during calibration.
- The **calibration phase lasts at least 60 seconds** and must be completed before starting motion-based acquisition.

To begin calibration:

1. **Short press** the **Start** button on the scanner.
2. The **status indicator** will begin **flashing green rapidly**, indicating that calibration is in progress.
3. The **laser head will remain stationary** during this phase. A **60-second countdown** will be visible in the mobile app.
4. After 60 seconds, the **status indicator** will switch to **slow flashing green**, and the **laser head will begin to rotate**, marking the start of **data acquisition**.

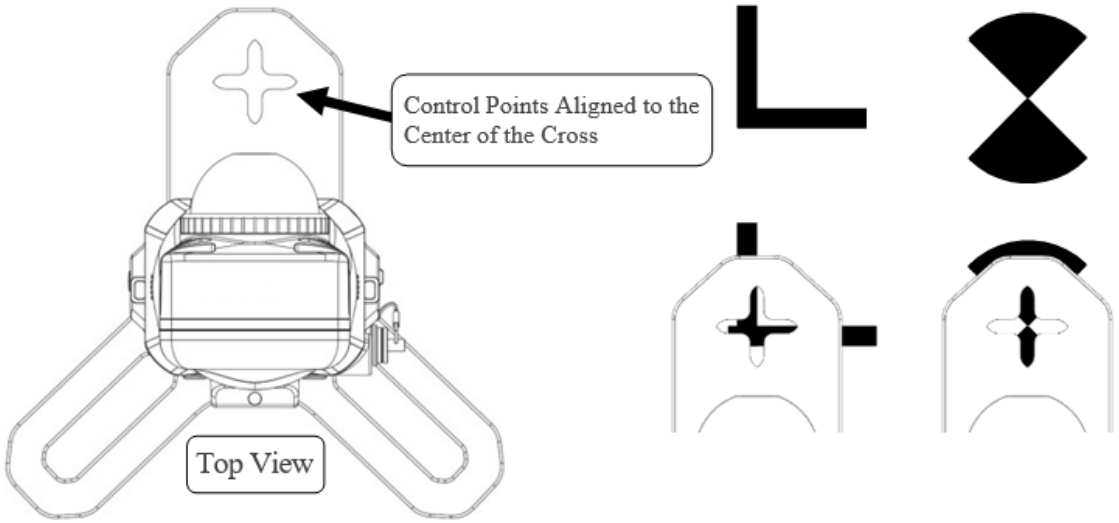
GCP collection

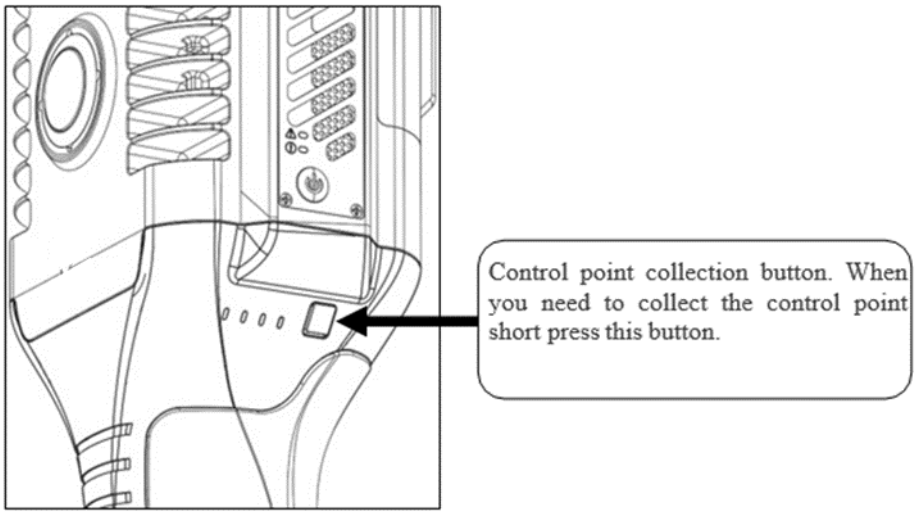
To collect a **control point**:

1. Align the **center crosshair** on the base of the device with the control point on the ground.
2. Press the **control point collection button** on the handle.
3. A **beep** will confirm that the control point has been successfully recorded.

If you're using the app, you can also tap **Add GCP** to save the control point.

Once the GCP is collected, you can continue scanning as normal.





Stop collection

To end data acquisition, **short press** the scanner's **ON/OFF button** or tap the corresponding button in the **GOapp**.

- The **status indicator** will **flash** while the point cloud data is being saved in real time.
- Once saving is complete, the **LED will turn solid green** and a **beep** will sound to confirm the operation.
- In **standby mode**, the **laser head stops rotating**.

Real-time mapping

If you wish to obtain the results from **Real-time Mapping**, ensure that the scanner completes the **mapping process** before powering off.

As a guideline, **wait approximately 1/25 of the total acquisition time** to allow the real-time point cloud data to be properly saved to the device's internal memory.

Only then should you **power off** the scanner to avoid data loss.

Scanning time	Waiting time for real time point cloud
5 minutes	12 seconds
10 minutes	24 seconds
15 minutes	36 seconds
20 minutes	48 seconds

25 minutes	1 minute

Device shutdown

To turn off the device, **press and hold** the **ON/OFF button** on the scanner.

Wait until both the **system indicator** and the **status indicator** turn **off completely** to ensure the device has shut down properly.

Data download

After completing data collection and powering off the scanner, connect the **X70GO** to your PC using the **data cable**.

Locate the folder named **"SN_XXXXX"**—this is automatically generated by the system after each data collection session.

Copy the folder to your PC.

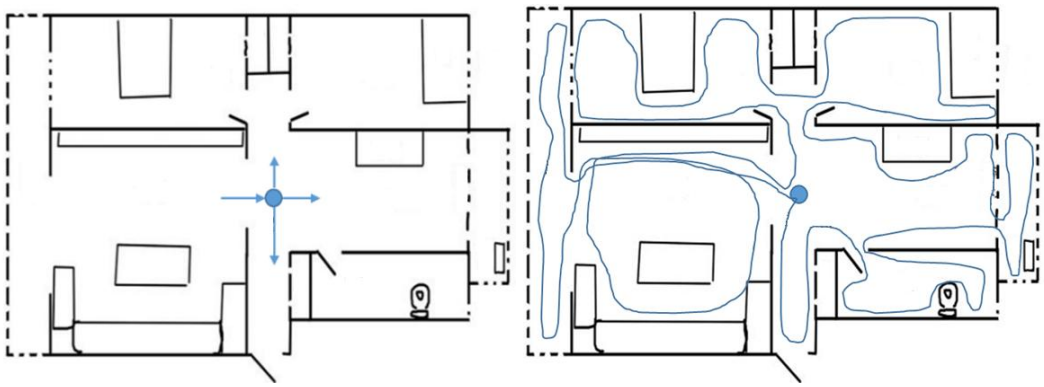
Each folder includes a **unique number at the end**, which indicates the **sequence of data acquisition**, making it easy to identify the order of your scans.

6.1 Data collections instructions

Indoor Environment

In indoor environments, it is recommended to select **multi-path locations**—areas where multiple paths intersect or overlap—as the **starting and ending points** of data collection.

After surveying the site, plan a **closed-loop route** that covers the entire survey area. This approach helps improve the accuracy and consistency of SLAM-based data alignment.



Outdoor Environment

In outdoor environments, it is important to not only identify **multi-path locations** and plan **closed-loop routes**, but also to ensure that the **target objects remain within the effective measurement range** of the scanner.

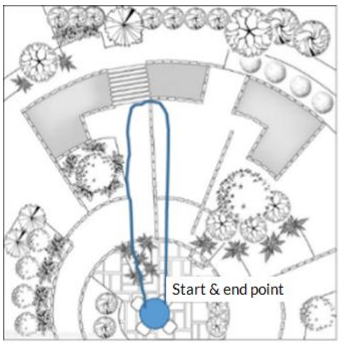
Keep in mind that the **reflectivity of ground surfaces** can vary, which affects the maximum measurable distance.

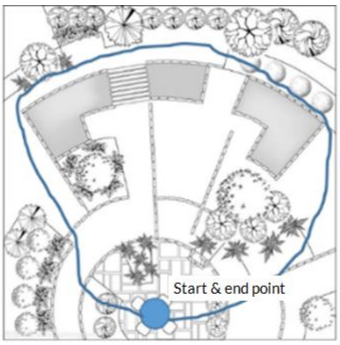
Always verify that the objects being scanned fall within the **scanner's optimal range** to ensure accurate and complete data capture.

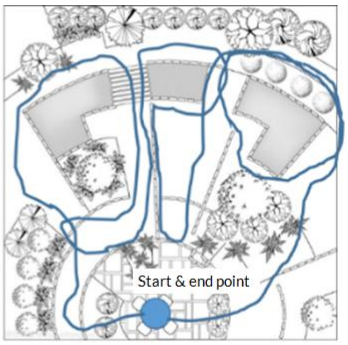
Note: A **multipath location** is a point that can be accessed from **multiple directions**, allowing the scanner to improve trajectory alignment and loop closure during SLAM processing.

Closed routes

- **Slender U-Shaped Route:**
  This type of route forms a narrow U-shape and **barely meets accuracy requirements**. If possible, users are advised **to avoid** this route due to limited loop closure.
- **Single O-Shaped Route:**
  This route forms a complete **O-shape**, creating a **basic closed loop** without redundancy. It provides **good accuracy** and represents the **minimum standard** for route planning.
- **Multiple O-Shaped Loops (Multi O-Route):**
  This route consists of **several interconnected O-shaped loops**, forming multiple closed paths. It ensures the **highest data processing accuracy** and is considered the **optimal route planning strategy** for SLAM-based scanning.







Typical surroundings data collection considerations

The **X70GO scanner** captures point cloud data within a **360° × 59° field of view**. Point density **decreases** as the **measurement distance increases**.

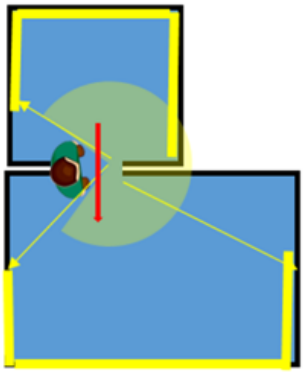
To ensure optimal data quality during acquisition:

- Keep the device **stable** and **avoid sudden or violent movements**.
- Prevent **non-target objects** such as **pedestrians or vehicles** from obstructing the scanner's field of view for extended periods.
- Ensuring a clear line of sight helps maintain the **integrity and completeness** of the point cloud data.

Precautions when passing through the door

When using the hand-held scanner to pass through **indoor doorways**, follow these recommendations to ensure data quality:

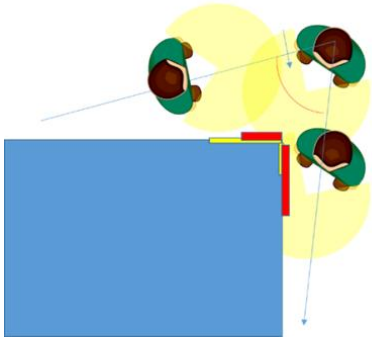
- Move **slowly and sideways** through the door to keep the scanner as **stable** as possible.
- Ensure the door is **fully open** whenever possible.
- If the door is **closed**, approach it slowly, **turn the scanner to face the door**, and use your **free hand** to open it.
- While passing through, be mindful of the **scanner's field of view** and try to capture as much of the **scene beyond the door** as possible **before exiting the room**.
- When **closing the door**, avoid allowing the scanner to capture the **motion of the door**, as this may lead to **data calculation errors** during processing.



Attention when turning corners

When using the hand-held scanner to navigate corners, **avoid making sharp or fast turns**. Proper **route planning** should account for corners in advance to ensure **smooth and continuous data collection**.

To enhance **data processing accuracy**, aim to capture as much **overlapping point cloud data** as possible **before and after the turn**. This overlap helps the system maintain **trajectory alignment** and ensures consistent, high-quality scan results.



Precautions for large-scale data acquisition

When collecting **large-scale data** with the scanner, it is recommended to **divide the survey area** into smaller sections. This approach improves **data processing efficiency**, enhances **calculation accuracy**, and simplifies **area management**.

- Break the larger area into **multiple smaller survey zones**.
- Each individual survey zone should have a **planned data collection time of 25–30 minutes**.
- Ensure an **overlap of at least 30%** between adjacent zones to maintain continuity and support accurate alignment during data processing.

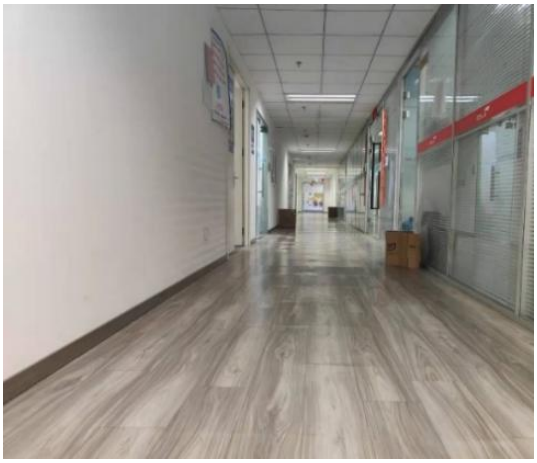
Suggestions for scanning long corridors (Tunnels)

In areas with **rich textures and structural features**, the scanner typically achieves **high-quality data calculation results**. However, in **feature-poor or uniform environments**, additional measures are needed to ensure accuracy:

- Manually place **feature markers** approximately **1 meter in diameter every 10 meters**, or
- Add **objects with complex geometry**, such as **chairs or stools**, to increase environmental variation and improve SLAM alignment.

To further enhance accuracy:

- Pay attention to the **laser's incident angle** during scanning.
- Walk along the **centerline of corridors or tunnels** to maintain a consistent scanning angle.
- **Avoid unnecessary in-place rotations**, as they can lead to poor incident angles due to object occlusion and may cause errors in data calculation.



6.2 Static acquisition with X-WHIZZ

The **X70GO** supports data collection in **static mode**, known as **X-WHIZZ.**
This feature allows you to capture high-precision static scans alongside the standard SLAM data acquisition. Using X-WHIZZ improves the accuracy of specific locations within your dataset and enhances colorization quality in the final result by capturing more detailed information at selected positions.

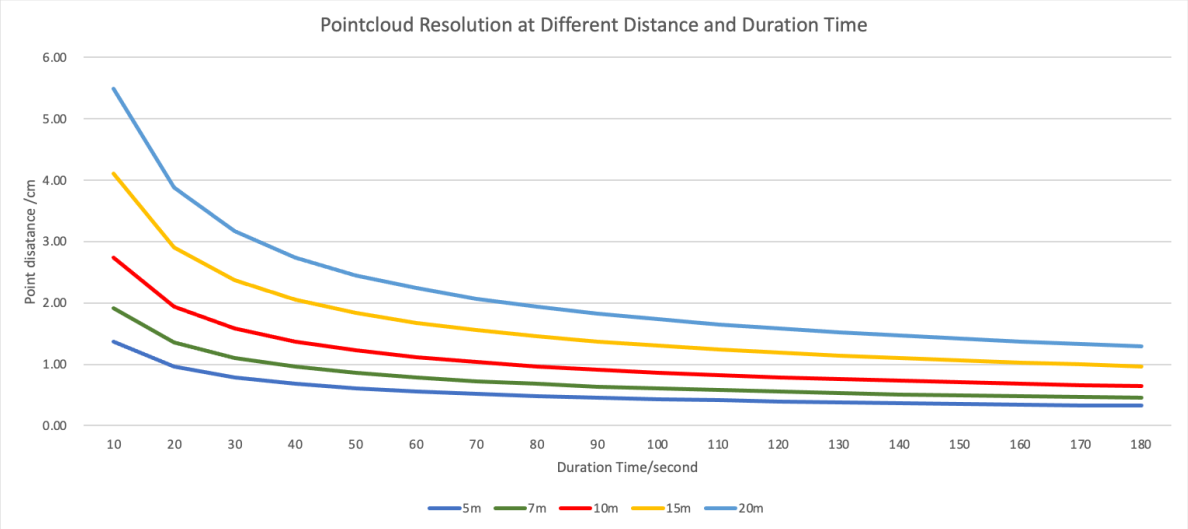
Data collection

To perform a **static acquisition** using **X-WHIZZ**, you must **stop and keep the scanner stationary** for a minimum of **10 seconds**. For optimal results, we recommend remaining stationary for **max. 80 seconds**.

When you reach the desired position for static scanning:

- Place the scanner on a **flat and stable surface**, or use the dedicated **STONEX monopod** for improved stability.
- For the best results, position the scanner at a distance of approximately **10 meters** from the target object.

This setup ensures maximum detail and improved colorization in the final point cloud.



To perform a static scan with **X-WHIZZ**:

- **Point the scanner** toward the object you want to capture.
- **Remain stationary** for **at least 1 minute**.
- If you're using the app, tap the **X-WHIZZ** button to start a countdown timer. You can **exit this mode at any time** if needed.

📌 During static scanning, the operator can **stay behind the scanner**, but no objects or people must pass **in front** of the device, as this could compromise data quality.

To apply **color** to the **static point cloud**, you need to select the **image frame** that will be used for colorization. To do this, tap the **corresponding button** in the application to **save the desired frame** during the static scan.

This image will then be used to accurately color the static point cloud data.

If you are **not using the application**, press the **GCP button** on the scanner to **save the desired frame** for colorizing the static point cloud. Before processing in GOpost, remember to open the ".fmmark" raw file and edit the type of point as "2" in correspondence of the point you want to generate your static scan.

At the end of a **static acquisition**, simply **pick up the scanner** and continue with normal **SLAM-based data collection**.

You can perform **multiple static acquisitions** within the same scanning session. If capturing the **same area from different positions**, it is recommended to maintain **some overlap** between static scans to ensure better alignment.
However, it is also possible to perform static acquisitions in **different parts of the same environment**, depending on your data collection needs.

6.3 Data Processing

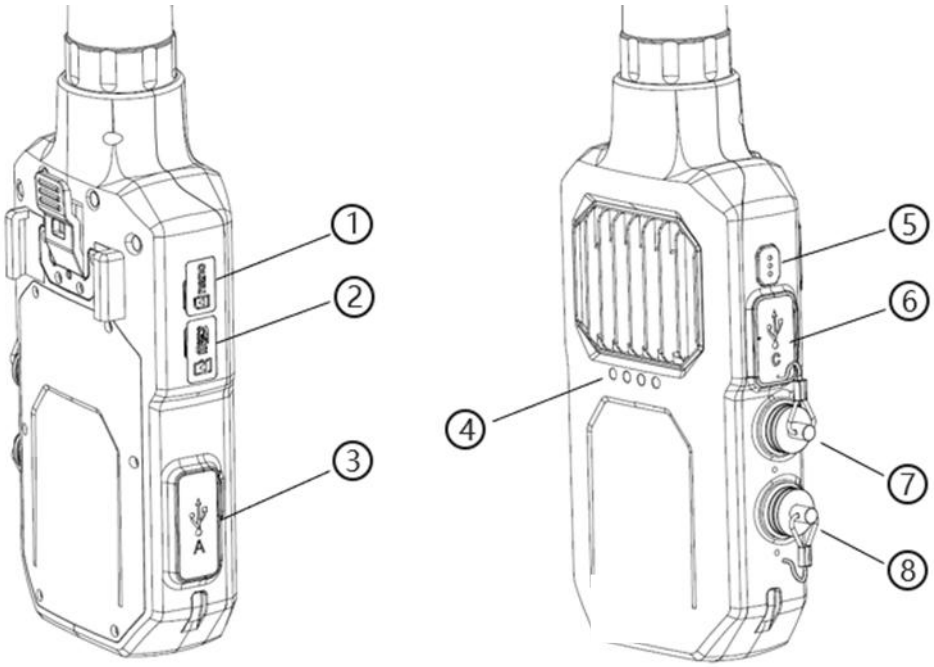
Post-processing of **X70GO** data is carried out using the **GOpost** software. This tool is used to:

- **Reprocess the data** to improve the quality of the real-time point cloud
- **Apply colorization** to the point cloud using captured images

For detailed instructions and advanced features, please refer to the **GOpost user manual**.

7. RTK70GO

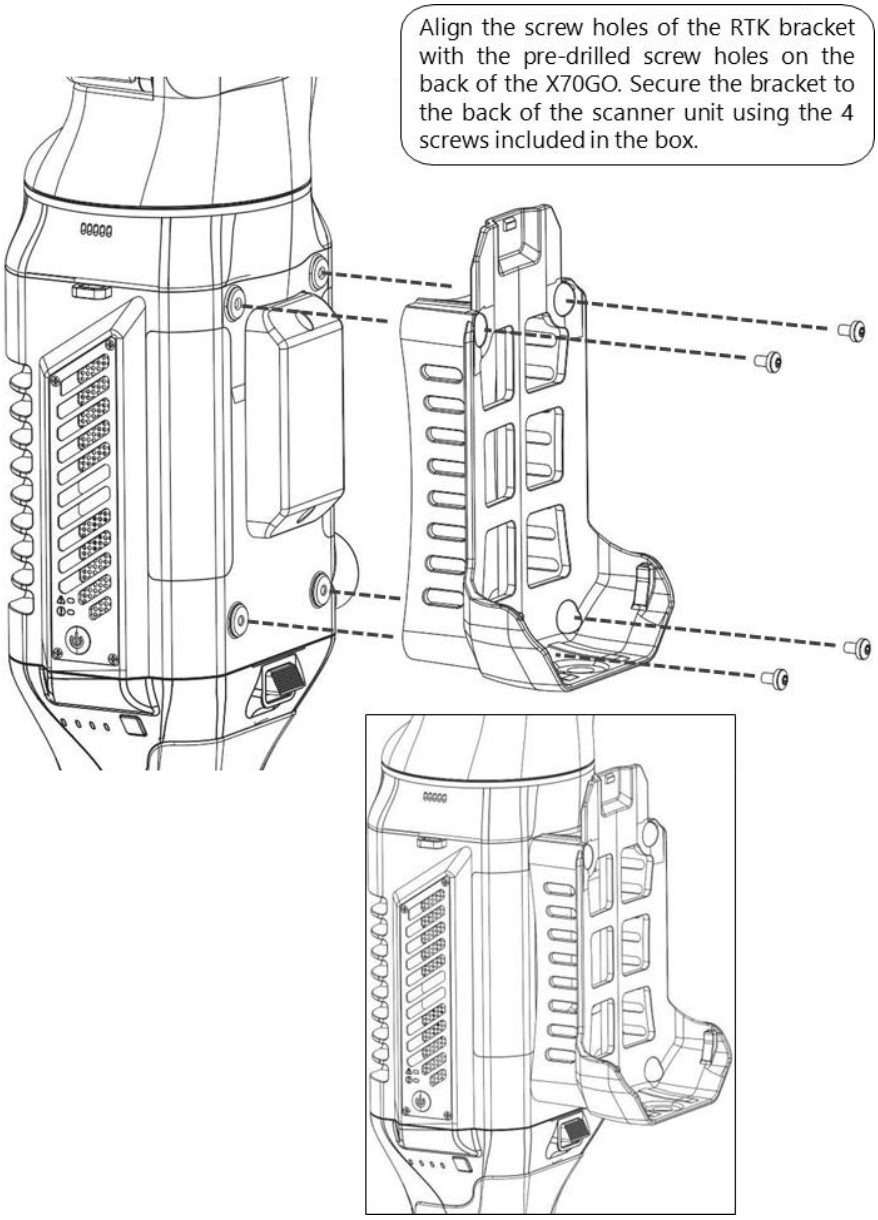
7.1 RTK device information



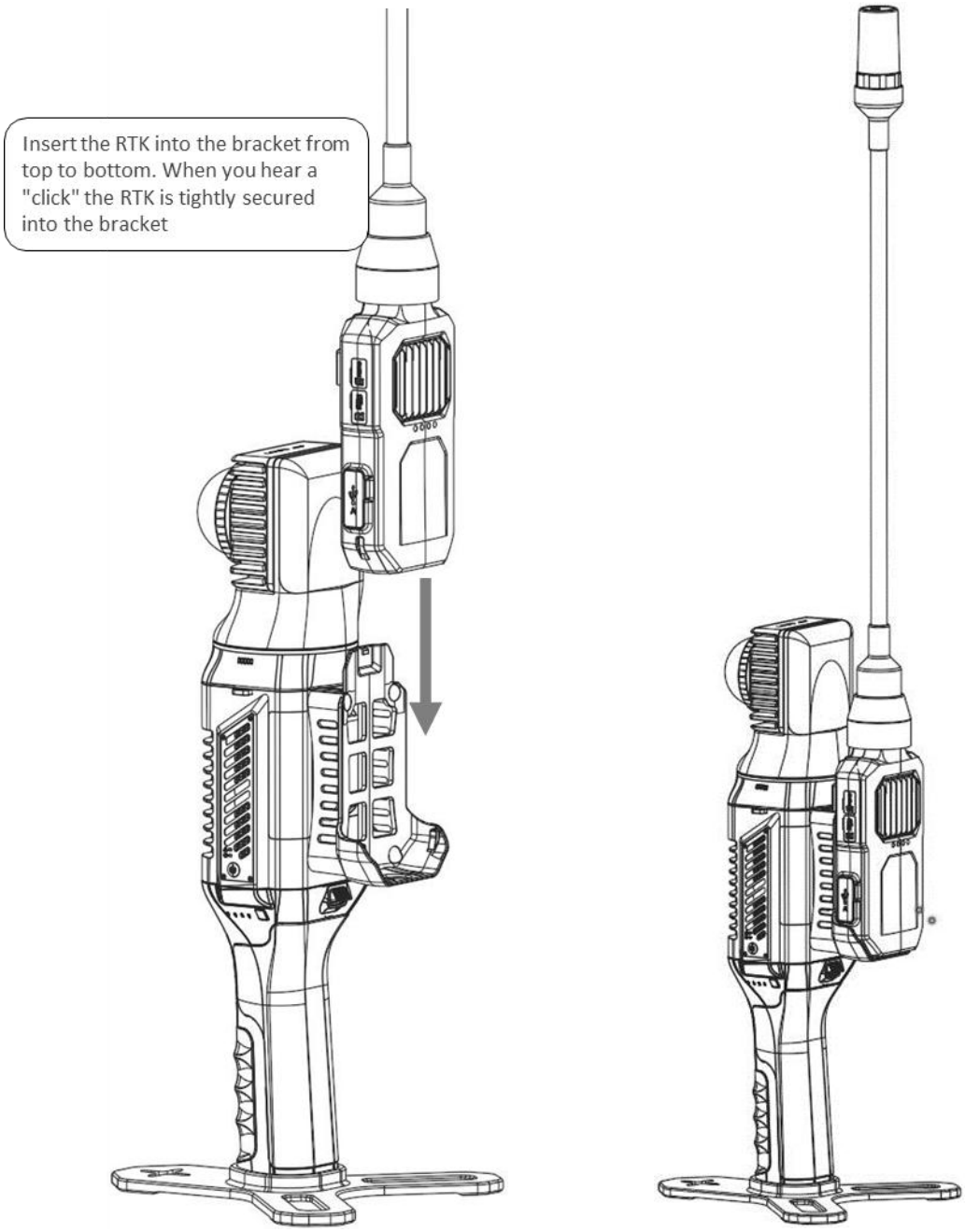
1. Nano-SIM slot
2. Micro-SD slot
3. USB-A interface
4. Status led
5. Programmable function button
6. Type-C (20V)
7. Power socket-1
8. Power socket-2

Assembly instructions

Step 1



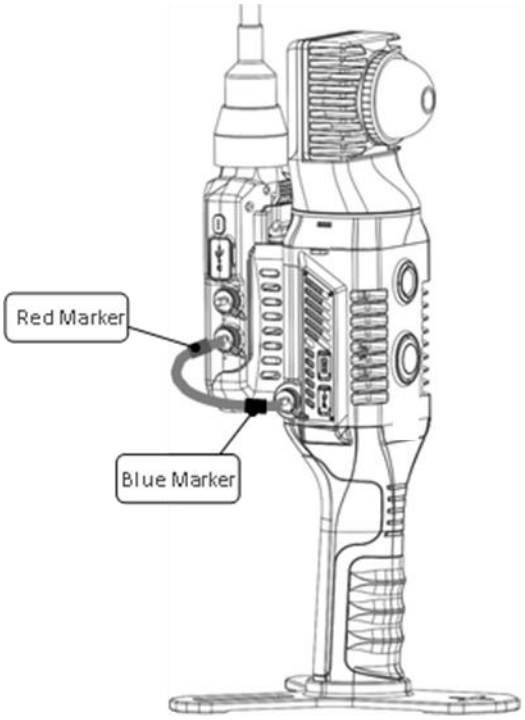
Step 2


Insert the RTK into the bracket from top to bottom. When you hear a "click" the RTK is tightly secured into the bracket

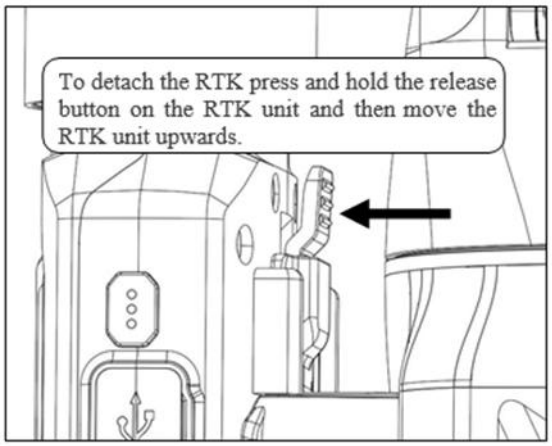
Step 3

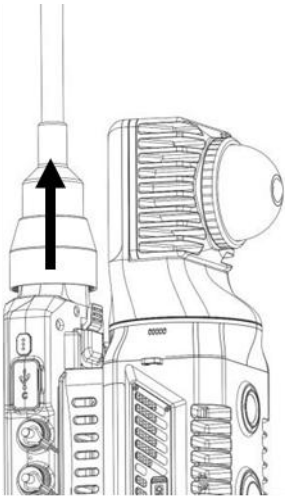
Connect X70GO with RTK using the aviation plug cable.

Pay attention to the difference of the aviation cable ports when connecting, the aviation cable since has anti-reverse insertion design. The blue end of the aviation cable is connected to the X70GO aviation port, and the red end of the aviation cable is connected to the RTK aviation port. Pay attention to the red/blue markings of the aviation cable port and the red/blue markings of the aviation port of the device are aligned before inserting it.



Detach

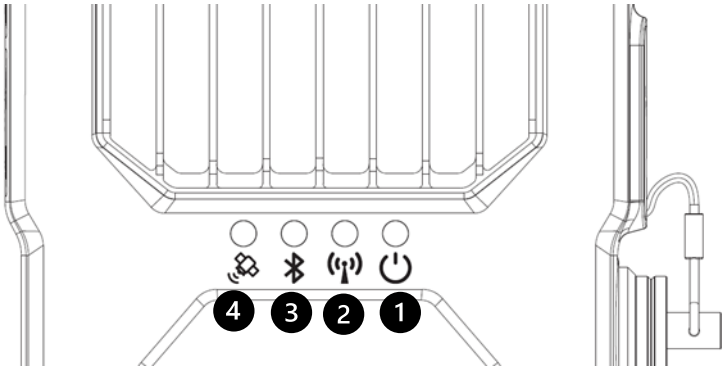




Led status

The four LEDs refer to:

1. Power supply.
2. Internet connection.
3. Bluetooth.
4. GNSS quality signal.



	Working Status	Status indicator
POWER SUPPLY	SD card not installed	Red light flashing
	System working correctly	Green light flashing
	SD card write error	Blue light flashing
INTERNET CONNECTION	Not ready to connect	Red light flashing
	SIM card read successfully	Green light flashing
	Connected to 4G network	Green light still
	Firmware upgrading	White light flashing
BLUETOOTH	Ready to connection	Red light flashing
	Bluetooth disconnected	Red light still
	Bluetooth connected	Green light still
GNSS signal	Searching satellite	Red light flashing
	Single positioning	Red light still
	Pseudo-range positioning	Yellow light flashing
	Float positioning	Green light flashing
	Fixed positioning	Green light flashing faster

7.2 Firmware upgrade

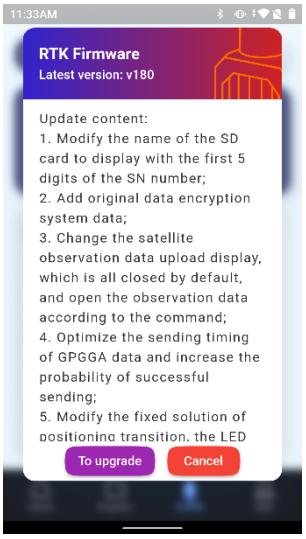
There are two methods available for updating the firmware: **online upgrade** and **offline upgrade**.

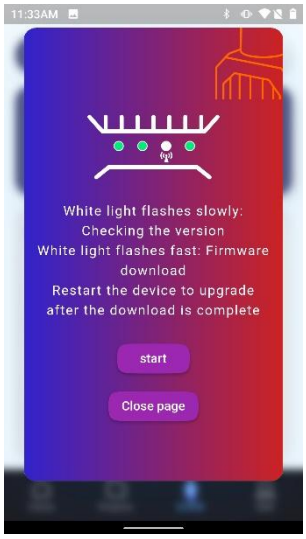
Offline upgrades should only be performed **if specifically recommended by STONEX**.

Online upgrade

Open the **GOapp** and navigate to the **RTK page**.

Connect the device via **Bluetooth**. If a **new firmware version** is available, the **firmware upgrade page** will automatically pop up.





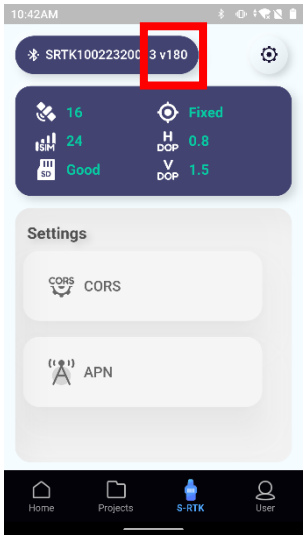
Review the **update details**, then click the **"To Upgrade"** button followed by **"Start"**.

- The **Internet connection LED** will begin to **blink white**—first slowly, then rapidly. This process may take a few minutes.
- Once the LED turns **solid green**, the upgrade is complete.
- **Restart the device** to finalize the firmware update.

Offline upgrade

If an **offline upgrade** is required, **STONEX** will provide the user with a firmware file with the **".fm"** extension. Follow the steps below to complete the upgrade:

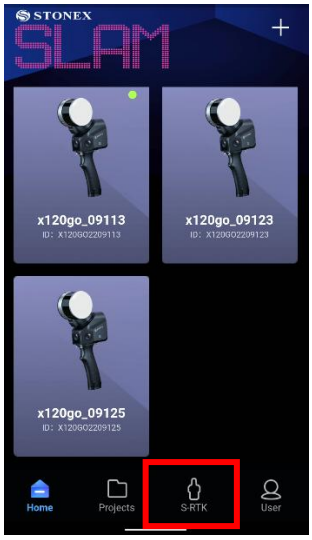
1. **Copy** the .fm file to the **SD card** of the RTK device, placing it inside the **"Firmware" folder**.
2. **Prepare the device** and **turn it on**. All the LEDs will begin **flashing green simultaneously**, indicating that the upgrade process has started.
3. When the LEDs begin to **blink red**, **restart the device**.
4. Reconnect to the device using **GOapp**, and check the **firmware version** on the **RTK main page** to confirm the upgrade was successful.



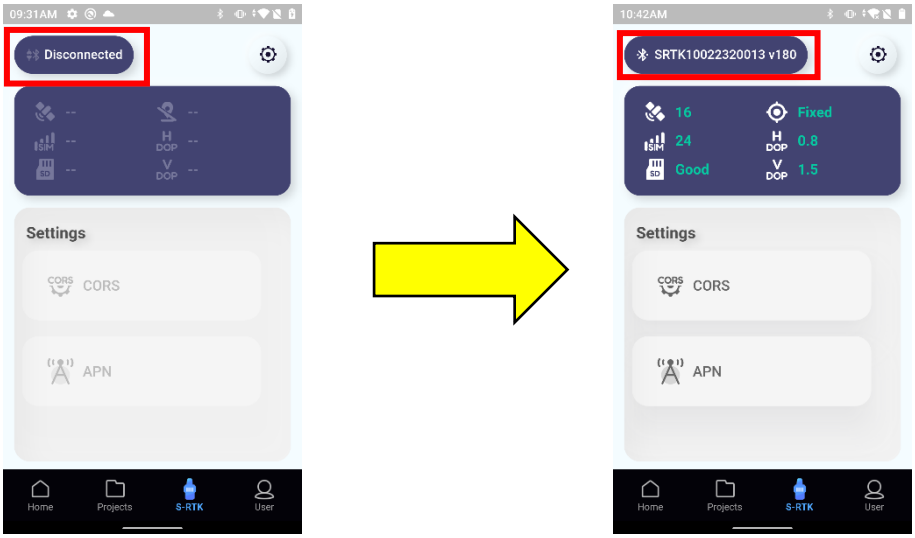
If the **upgrade process fails**, try **formatting the SD card**, then **repeat all the steps** described above.

7.3 RTK configuration with GO*app*

1. **Turn on the X70GO** and connect the **RTK antenna** using the provided cable. The indicator lights will begin to **flash red**, signaling that the antenna is initializing.
2. Enable **Bluetooth** on your **tablet or smartphone** to allow connection to the RTK device.
3. Connect the **scanner to your tablet or smartphone via Wi-Fi**. As the connections are established successfully, the indicator lights will begin to **turn green**.
4. Open the **GOapp** and tap the **RTK icon** to begin configuration or monitoring.



Once you open the **RTK page** in **GOapp**, the app will attempt to connect to the RTK device via **Bluetooth**.
If the connection is successful, the **status** will change from **"Disconnected"** to **"Connected"**.
If the connection does **not occur automatically**, tap on **"Disconnected"** to manually search for available devices.
Once the connection is established, **all RTK functions and icons** will become available for use.

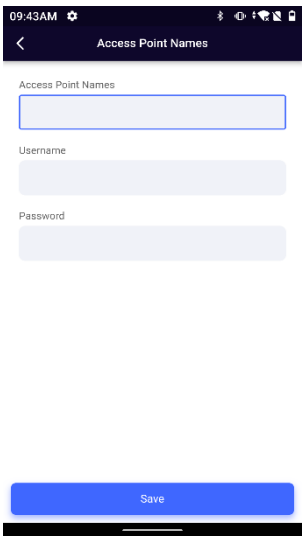


Start by tapping the **APN icon**. In this section, you need to enter the **SIM card information** to enable network communication.

- Enter the **Access Point Name (APN)**.
- If required by your mobile network provider, also enter the **username** and **password** associated with the SIM card.

⚠️ **Important:** Do **not** use a SIM card that requires a **PIN code**.

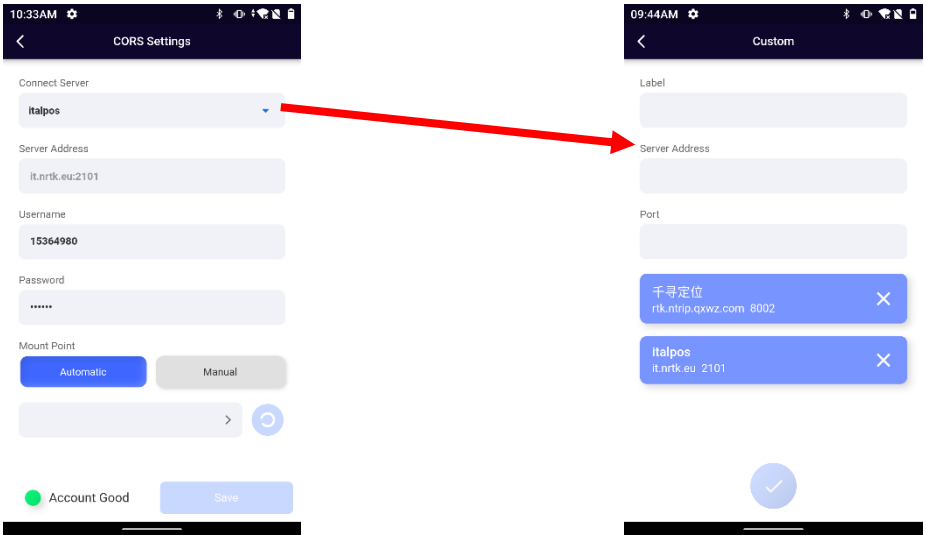
Once all the information has been entered, tap **Save** to store the settings.



Next, tap the **CORS icon** to enter the settings for the correction service used in **RTK positioning**.

1. Click **Connect Server** to open the server configuration page.
2. Enter the details of the **CORS server** you want to connect to, including the **IP address**, **port**, and **mount point** if required.
3. After establishing the connection, enter your **username** and **password** provided by the CORS service.

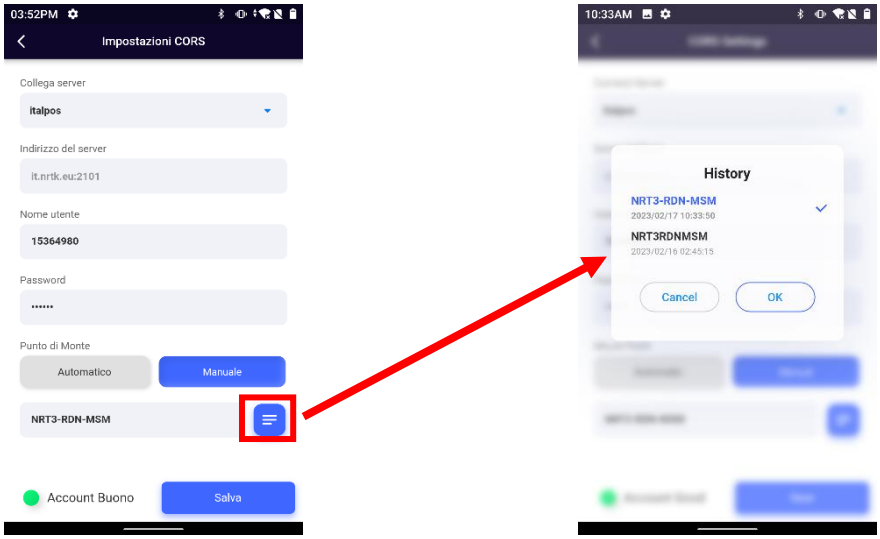
This setup enables the device to receive real-time corrections for enhanced positioning accuracy.



You can choose the **mount point** either **automatically** or **manually**:

- **Automatic Selection:**
  Leave the setting on **Automatic**, then tap the **grey bar** to initiate an **automatic search** for available mount points. Select the desired mount point from the list and tap **Save**.
- **Manual Selection:**
  If you prefer to set the mount point manually, switch to **Manual** mode. Tap the **grey bar** and **enter the name** of the desired mount point. Once confirmed, tap **Save**.

To view the **history of previously connected mount points**, tap the **blue square** icon.

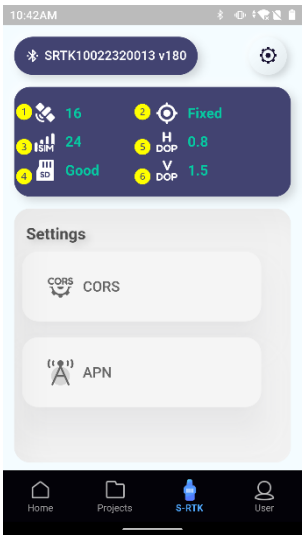


Once the **APN** and **CORS** settings are configured, the device will connect and begin receiving **RTK corrections** for accurate positioning.

The app will **remember your last connection settings**, so you don't need to re-enter them each time. However, it is important to **check and confirm the correct Mount Point** before each use. Tap **Save** to ensure corrections are received.

On the main **RTK page**, you can view **real-time information about positioning quality**, including correction

status and signal strength.



1. Number of satellite visible
2. Positioning status
3. SIM status
4. SD-card status
5. H-DOP value
6. V-DOP value

In addition to the **LED color indicators**, the **positioning status** is also represented by **specific icons** within the application interface.

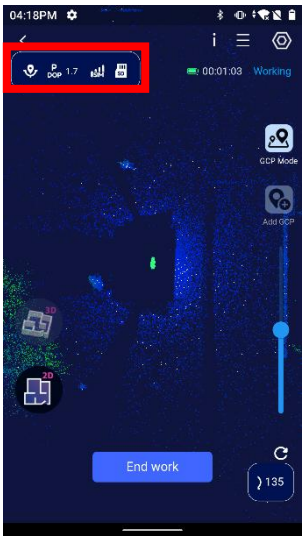
	No fix
	Single solution
	Float solution
	Fixed solution
	Other

At the **top right** of the screen, click the **gear icon** to open the **Settings menu**. From here, you can:

- **Enable or disable** the display of the **mobile status bar**
- **Enable or disable voice notifications** for positioning quality

By enabling the **mobile status bar**, you can monitor **positioning quality in real time**, even while scanning. The status bar displays the following information **from left to right**:

1. **Positioning status** (refer to the previous table for icon meanings)
2. **P-DOP** (Position Dilution of Precision)
3. **SIM card status**
4. **SD card status**



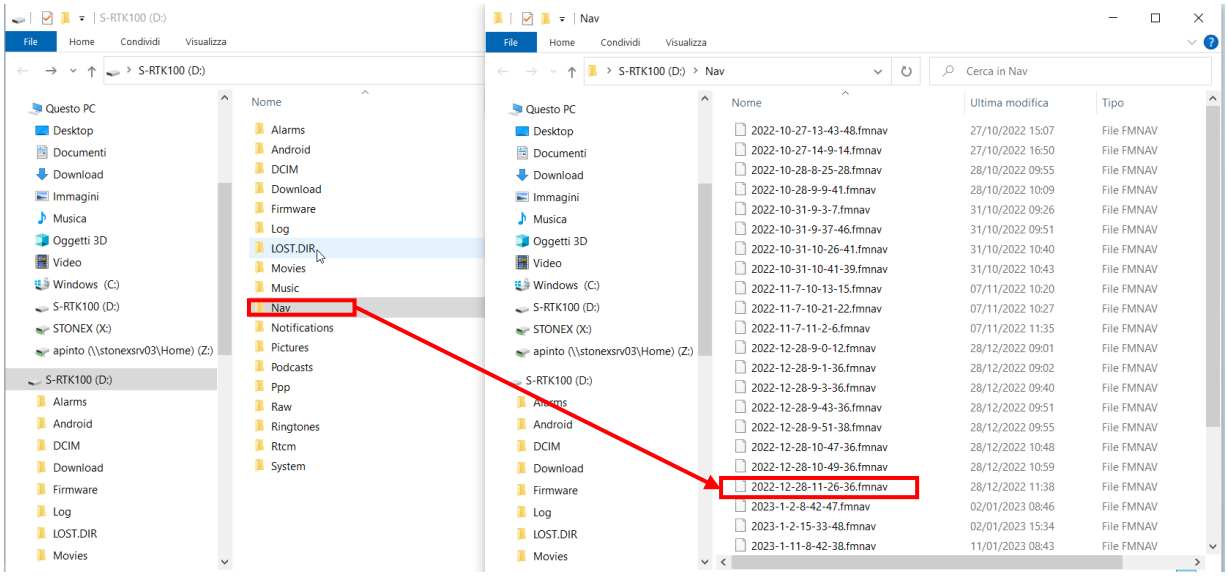
Once your **positioning status** is **FIXED**, navigate to the **scan page** of your **X70GO** device and begin scanning as usual. The **positioning data** will be **automatically saved** to the **SD card** in the **RTK device** during the scan.

7.4 GO*post* postprocessing

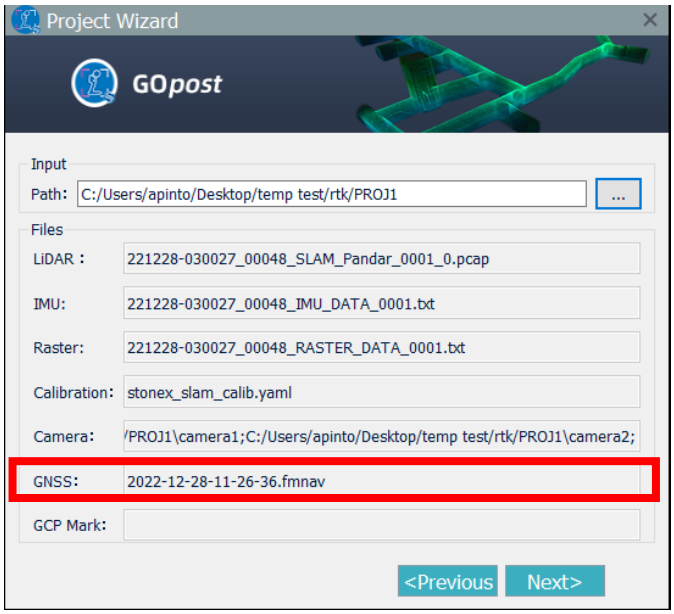
After completing your scan, **remove the SD card** from the **RTK device** and insert it into your **PC** to access the positioning data related to your project.

1. Open the **Nav** folder on the SD card.
2. Locate the file with the extension **.fmnav**—this file contains the **RTK positioning information**.

3. Files are named using the format:
   YEAR-MONTH-DAY-HOUR-MINUTE-SECOND
   For example: 2022-12-28-11-26-00.fmnav
4. Identify and **copy the .fmnav file** that corresponds to the **same date and time** as your scan.
5. Paste this file into the **project folder** containing the scan data to be processed.



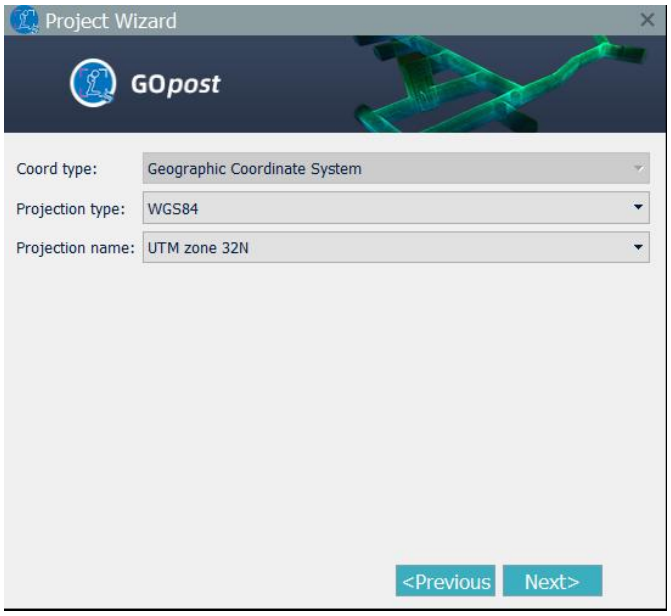
1. Open **GOpost** and click **New** to create a new project.
2. Enter a **project name** and choose the **save path**.
3. Select the **input path** where your scan data is located.
4. In the **GNSS section** of the input screen, ensure that the **.fmnav file** is present. This file is essential for processing RTK positioning data.



After setting the input path, click **Next**. The software will prompt you to select the **coordinate type** and **reference system**.

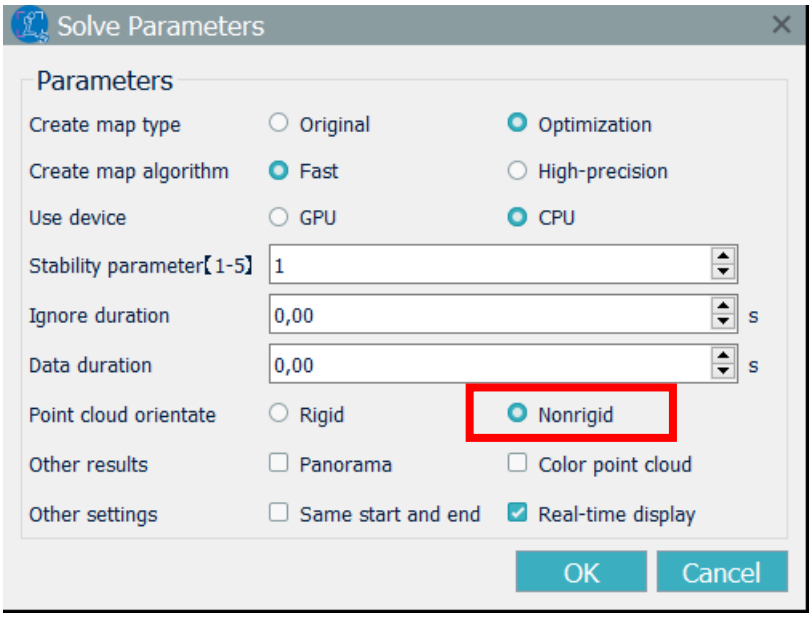
In most cases, **GOpost will automatically detect** the correct settings.

If the information is correct, simply click **Next** to proceed.



At this stage, you can proceed to process the data using either the **One-Click Solve** or the **Step-by-Step** procedure, as with any standard project.

💡 **Tip:** To make the best use of the **RTK positioning data**, it is recommended to select the **Non-Rigid Body** method during the **orientation phase**. This approach allows for better alignment and accuracy when integrating GNSS information.



After processing, the **point cloud** located in the **GCP subfolder** of the project — as well as all subsequent outputs,

such as the **textured point cloud** — will be **oriented according to the reference system** defined by the **RTK data**. This ensures that your final results are georeferenced and accurately aligned within the chosen coordinate system.

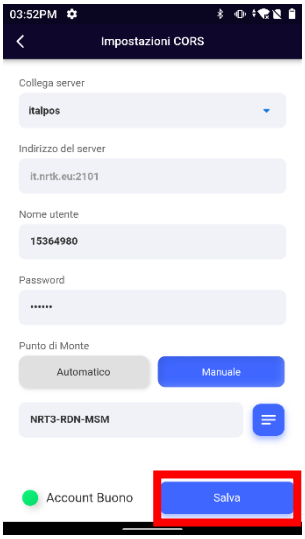
7.5 Rules for data acquisition

To ensure accurate orientation and optimal use of RTK data, follow these recommendations:

1. **Pre-Scan Check:**
   Before starting a scan, connect the **tablet to the RTK antenna via Bluetooth** and check the **signal quality**.
   Wait until the **positioning status reaches FIXED** and remains stable for at least **one minute**.

Only data acquired in **FIXED solution** will be used for accurate orientation.

2. **During Scanning:**
   Ensure that at least **50% of the total scan duration** is recorded in **FIXED solution**. Monitor the signal status throughout the acquisition.
3. **Mixed Environment Acquisition (Indoor/Outdoor):**
   If scanning includes both **indoor and outdoor areas**, make sure that **at least 50%** of the scan is performed **outdoors** with **strong FIXED signal**.
   Capture data outdoors **before entering** and **after exiting** areas without RTK signal. This helps the software accurately **reconstruct the trajectory** and align the point cloud.
4. **Reacquiring Signal After Loss:**
   If you spend an extended time in areas with **poor or no RTK signal**, check the **RTK status screen** once back outdoors.
   If the positioning does not return to FIXED immediately, go to the **CORS settings**, reselect and **re-save the mount point** to re-establish the correction signal.



8. External panoramic camera

The **X70GO** scanner is compatible with video data captured by the **Insta360 X4/X4air/X5 and DJI osmo** camera. This integration enables:

- **Colorization of point clouds** using **spherical images** from the Insta360 (as an alternative to the internal cameras).
- Generation of **360° panoramic images** that can be **measured and explored** using **GOpost software.**

To use the Insta360 cameras with the scanner:

1. Attach the **panoramic camera holder** to the **rear of the scanner**, aligning it with the **four mounting holes** on the frame.
2. Mount the Insta360 camera on top of the holder and **secure it using the appropriate screw**.

⚠ **Important:** Make sure to position the camera so that the **video screen faces the same direction as the scanner's USB ports**.

To use the DJI osmo camera with the scanner:

1. Attach the **panoramic camera holder** to the **rear of the scanner**, aligning it with the **four mounting holes** on the frame.
2. Mount the OSMO adapter on the pano bracket.
3. Mount the **OSMO camera** onto the adapter and **secure it with the appropriate screw.**

⚠ **Important:** Make sure to position the camera so that the **video screen faces the same direction as the scanner's USB ports**.

Insta360 camera should be controlled via the **Insta360 mobile application**, which can be downloaded from the official **Insta360 website**.

Set the camera's video recording settings as follows:

- **Mode:** Timeshift
- **Resolution:** 5.7K
- **Frame Rate:** 30 fps
- **Speed:** 10×

DJI OSMO should be controlled via the **OSMO mobile application**, which can be downloaded from the official **DJI website.**

Set the camera's video recording settings as follows:

- **Settings:** Panoramic video
- **Resolution:** 6 K
- **Frame Rate:** 30 fps
- **Visualization:** Standard (deawrp)

At this point, you can begin operating the **panoramic camera**. Field instructions are the same for both cameras.

First, **turn on the pano camera**, then **immediately turn on the X70GO scanner**.

At this point, **connect the tablet to the scanner**.

Note: The **panoramic camera** can also be used **without the GOapp**.

1. **Start video recording** on the panoramic camera.
2. Then, **start the scanner** to begin the scanning session.

This ensures proper synchronisation between the video and scan data for accurate colourisation and spherical image generation in post-processing.

After the **initialization period** (approximately one minute), and **before starting the main scan**, perform the following steps to assist with **camera calibration during post-processing**:

1. Rotate the **scanner and camera** together from **right to left**, repeating the motion **three times**.
2. Walk **some meters in a straight line**.
3. Then, **repeat the right-to-left rotation** sequence once more.

This procedure helps the post-processing software to **accurately calibrate** the panoramic camera's position relative to the scanner, improving overall alignment and colorization results.

During the **first minute of scanning**, keep the **scanner on your right side**, ensuring that the operator is visible **only in the left lens** of the panoramic camera.
After the first minute, you may **switch sides** if needed, but you must **always remain visible in only one lens**. This helps maintain a consistent image stitching and prevents calibration issues during post-processing.

When the scan is complete, first **stop the scanner**, then **stop the panoramic camera**.
After both devices are powered down, **download the video data** from the camera to your computer.
For details on how to process the panoramic video for colourisation and spherical image generation, please refer to **Chapter 4 of the GOpost manual**.

9. 3D Gaussian Splatting with Stonex SLAM and Pano Camera

Acquisition

1. Camera Setup for 3DGS Acquisition

Accurate data acquisition with a 360° camera for 3DGS generation begins with proper camera configuration. This section outlines the recommended recording and exposure settings for optimal results.

1.1 Recording Options

Insta360

Set the camera to the following recording parameters for optimal compatibility with SLAM-based 3DGS workflows:

Recording Mode	Timeshift
Resolution	5.7K
Frame Rate	30 fps
Speed	10x

To configure these, swipe from right to left on the camera screen to access the settings menu. Use the following options:

- **Exposure:** Auto
- **Color Profile:** Standard

DJI OSMO

Recording Mode	Panoramic video
Resolution	6 K
Frame Rate	30 fps
Visualization	Standard (dewarp)

1.2 Manual Exposure for Enhanced Reconstruction

To further improve the quality of your 3DGS reconstruction, you can manually configure advanced exposure settings on the panoramic camera. While this step is optional, it is recommended for users familiar with basic camera exposure principles.

a. Choose an Appropriate ISO Setting

Avoid ISO values above 800. If unsure, refer to the ISO value corresponding to a 1/100s shutter speed under auto exposure.

Recommended ISO Settings:

- Outdoor, full daylight: ISO 100
- Bright indoor: ISO 200
- Normal indoor: ISO 400

- Dim indoor: ISO 800

b. In mixed lighting, prioritise darker areas when selecting ISO.

c. Set Fixed ISO and Auto Shutter for consistent results.

d. To verify ISO, record a short video and review it:

- If overexposed → reduce ISO.
- If too dark → increase ISO.

e. These ISO values are general recommendations and may be adjusted depending on the scene.

---

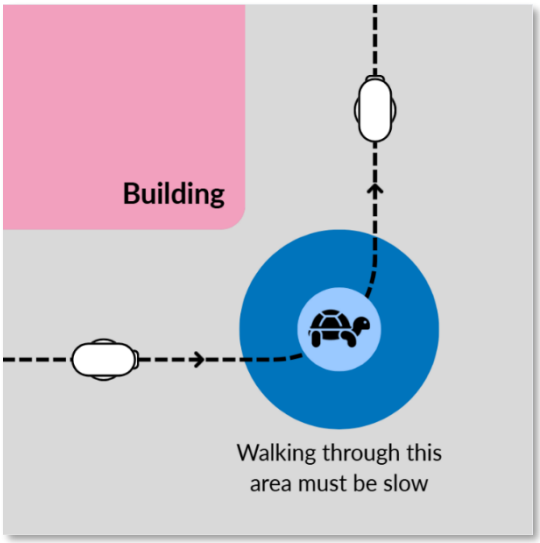
2. Acquisition Techniques for 3DGS Reconstruction

Adapt your acquisition strategy based on the environment, key objects, and occlusions. The following best practices ensure clean, complete, and usable data.

2.1 Turning Corners and Narrow Alleys

- Move **very slowly** while turning.
- Keep the camera vertical, lenses facing left/right.
- The trajectory must be smooth to help SLAM stay aligned.

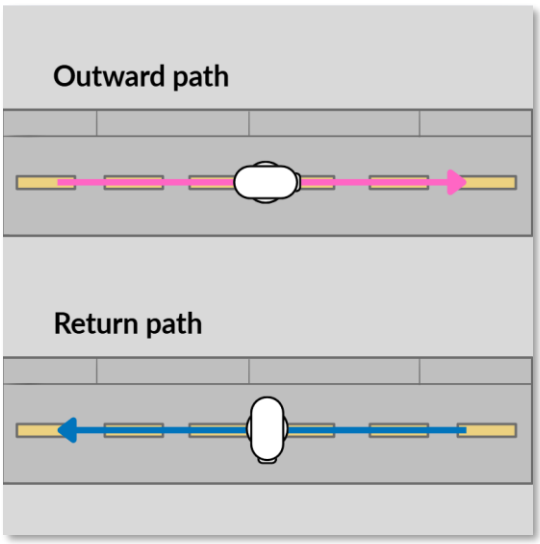
Avoid abrupt/irregular motion or pauses in rotation.



2.2 Straight Path (Corridors/Roadways)

- Walk forward with camera above head, lenses facing sideways.
- Return on the same path, but ensure **one lens points toward the trajectory**.

This minimises “floating” artefacts in the model centre.

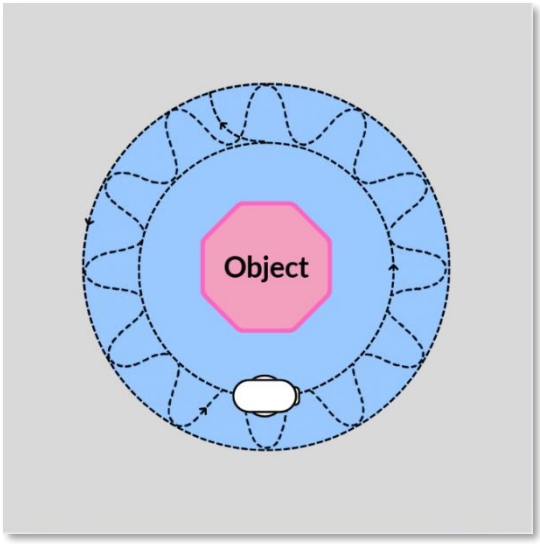


2.3 Surround Shot (Object-Focused Circular Acquisition)

When scanning objects like statues or machines:

- One lens must always face the object.
- Perform three loops:
    1. Close circle
    2. Wider circle
    3. Serpentine or spiral between the two

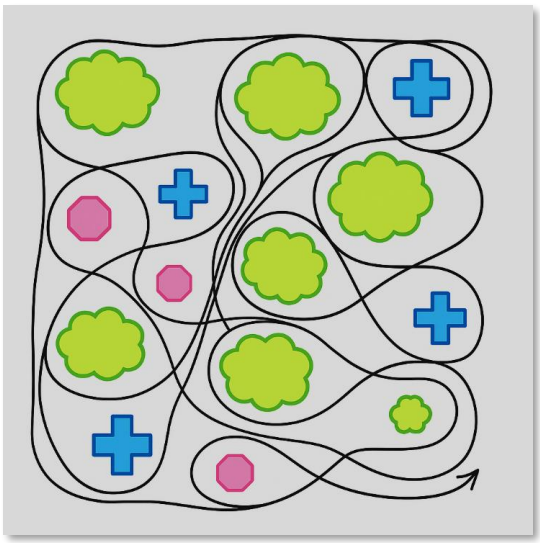
Keep camera orientation consistent through all passes.



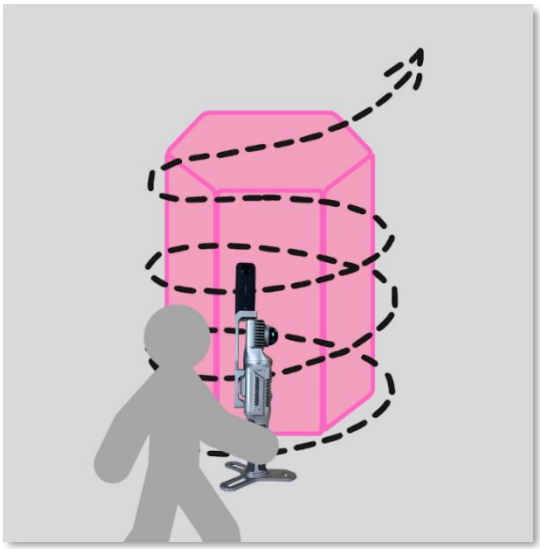
2.4 Saturation or Serpentine Acquisition

Used for interiors, furniture-rich rooms, or occluded zones:

- Walk in **serpentine lines** to cover all angles.



- For detailed zones, add **spiral motion** to maximise coverage and texture quality



Boosts image overlap and enhances photogrammetry/SLAM matching.

2.5 Signs, Posters, Text Panels (S-shape Movement)

For flat, readable surfaces (e.g., posters, boards):

- The lens must face directly toward the object.
- Move in a **slow S-shaped path** to capture multiple perspectives.

Avoid staying still: motion is key to generating depth.

2.6 Orientation Tips

- Start from **textured areas**.
- Avoid moving objects and screens.
- For individual objects:
    - Approach slowly,
    - Circle with constant lens orientation,
    - Then continue forward.

2.7 Room Entry and Exit

- Enter **sideways**, keeping one lens inside the room.
- Hold the camera **overhead** to reduce operator visibility.
- Stop briefly (stationary) if needed for SLAM stabilisation.

Slow and smooth transitions prevent registration loss.

2.8 Moving Speed

- General: < 1 m/s
- Indoors, corners, low light: < 0.5 m/s

Common sensitive areas:

- Narrow hallways
- Dark interiors
- Doorways
- Turning/rotation points

Standing still doesn't help if the device isn't completely stable.

For details on how to process 3DGS data, please refer to **Chapter 5 of the GOpost manual**.

10. Frame Backpack

a. Assembly instructions

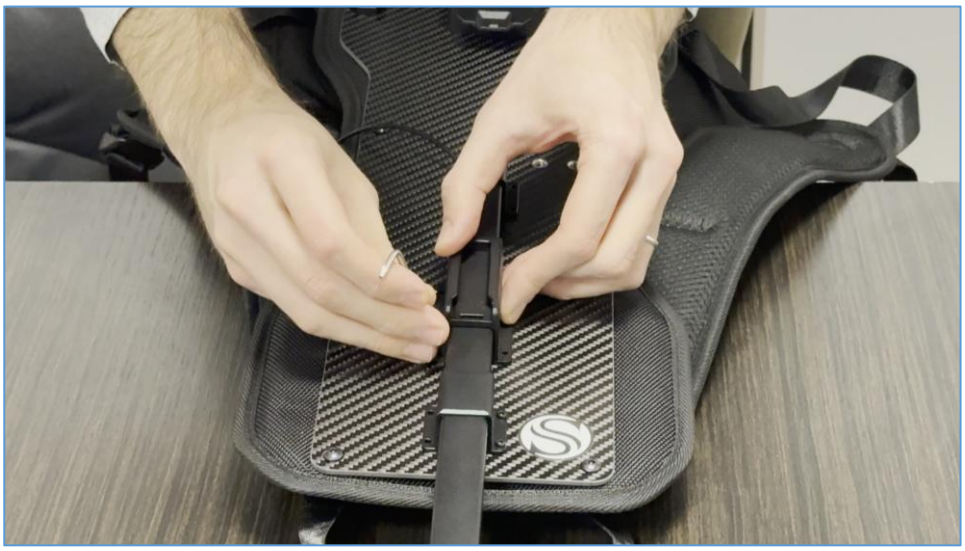
Mount the **quick-release connector** onto your **X70GO scanner**.

Mount the **standing supports** on the **lower part of the backpack**.

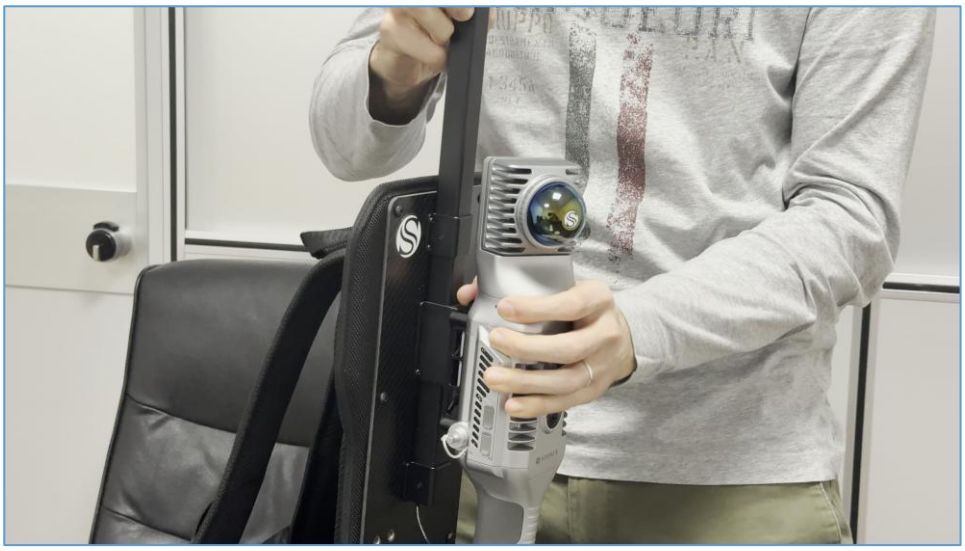
Mount the **RTK holder** in its **designated position** on the backpack.

Proceed to mount the **antenna pole** onto the RTK holder.

Place the **sliding rail** in its **corresponding position** on the backpack frame.



Screw the **RTK module** onto the **antenna cable**, then **slide the scanner** into the **mounted rail**.



Plug the **connection cable** into both the **scanner** and the **RTK module**.

Finally, **mount the antenna** onto the antenna pole and **connect it to the cable**.

11. Technical data

a. Bundle components

N	PART NAME	QUANTITY
1	Scanner	1
2	Handle battery	1
3	Scanner base bracket for GCP	1
4	Battery chargers EU/US	1
5	USB License key for GO*post*	1

12. Appendix

a. X70GO technical features

LIDAR	
Max Range	70 m @ 80%
Min Range	0.1 m
Scanning Point Frequency	200.000 pts/s
Field Of View	Horizontal 360° Vertical 360°
Laser class	1
Frame Rate	10 Hz

COLOR CAMERA	
Pixel	12 million
Cameras FOV	210° (Diagonal)
Focal length	1.26 mm
Resolution	4000 x 3000 pixel
Shutter	Rolling
Sensor size	2.54 cm
Pixel size	1.55 µm

VISUAL CAMERA	
Pixel	12 million
Cameras FOV	100°
Focal length	3.24 mm
Resolution	4000 x 3000 pixel
Sensor size	2.54 cm
Pixel size	1.55 µm

SYSTEM	
Relative accuracy	6 mm[1]
Control point support	Ground and wall
Operative mode	Realtime visualization with GOapp (Android 8 or above)
Data storage	512 GB SSD
Communication	Wi-fi, USB type-C, LEMO
Post-processing	GOpost software[2]

ELECTRICAL SPECIFICATION	
Power consumption	20 W
System supply voltage	20 V
Operating time	1.5 h (single bettery)
Battery input voltage	5-20 V

Battery output voltage	10.8 V
Battery capacity	3000 mAh

PHYSICAL SPECIFICATION

Weight	925 g (Without battery) 1450 g (With battery)
Size	364.5 mm x 173.8 mm x 170 mm
Operating temperature	-20°C to +50°C (-4°F to 122°F)
Operating humidity	<95%
Waterproof/Dustproof	IP54

[1] environment dependent

[2] Any CPU, any NVIDIA GPU

i. RTK70GO technical features

RECEIVER	
Satellite signals tracked	GPS L1, L2
	GLONASS L1, L2
	GALILEO E1, E5b
	BDS B1, B2
Single point positioning (RMS)	Horizontal: 1.5m Vertical: 3.0m
DGPS (RMS)	Horizontal: 0.4m Vertical: 0.8m
RTK (RMS)	Horizontal: 1cm+1ppm Vertical: 1.5cm+1ppm
Data update rate	20Hz
Time accuracy	20ns
Speed accuracy (RMS)	0.03 m/s

INTERNAL MODEM	
Network	LTE FDD: B1/B3/B5/B8 LTE TDD: B34/B38/B39/B40/B41 GSM: 900/1800MHz

SYSTEM	
Storage	Micro SD
Communication	Bluetooth

POWER SUPPLY	
Type-C USB	20V
Aviation socket	12V-20V

PHYSICAL SPECIFICATION	
Weight	203 g
Size	196mm×80mm×39mm
Operating temperature	-20° C to +50° C (-4° F to 122° F)
Storage temperature	-20° C to +55° C (-4° F to 131° F)
Waterproof/Dustproof	IP54

ANTENNA	
Size	27.5mm×56mm
Weight	15.3 g
Optional	SA65 for backpack

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