LiGrip O2 Product User Manual

Preface

Purpose of the User Manual

This user manual details the operational procedures for the LiGrip O2, including assembly, data collection, and processing.

Scope of Application

This manual applies to the LiGrip O2 device, covering three LiDAR configurations and two antenna configurations.

LiDAR: XT16, XT32, XT32M

Antenna: Standard configuration includes a helix antenna(left), with an optional survey antenna available(right).

Safety Instructions

Precautions: Please pay close attention to the following points during operation. Read carefully. Failure to follow the required procedures may result in: device damage, data loss, data inaccuracies, or system failure.

Disclaimer of Liability

Before operating the Device, please read this user manual carefully. Doing so will help you use the product more effectively. The company assumes no responsibility for any losses resulting from operating this product without adhering to the requirements of the user manual, or from improper operation due to misinterpretation of the instructions. The company is committed to continuously improving product functionality and performance, enhancing service quality, and reserves the right to modify the contents of the user manual without prior notice.

We have verified the consistency between the contents described in the printed materials and the hardware and software; however, deviations may still occur. The images in the user manual are for reference only. In the event of any discrepancies with the actual product, the actual product shall prevail.

Your Suggestions

If you have any suggestions or comments regarding this manual, please contact us. Your feedback will greatly enhance the quality of our documentation.

1. Product Structure

1. 1. Structural Diagram

1. 2. Packing List

 O2 Main Unit	 Smart Battery	 base stand
 Charger (including power cable and adapter)	 USB drive	 Protective Cover
 Mobile phone holder and screws	 Packing Box	 Data Cable

1. 3. Device Indicator Overview

Power Indicator Light	
Power Indicator Light (Button)	Used to control power on/off and display power status.
Not Lit	Device is not powered.
Green Fast Flash	Device is powering on/off.
Green Ever Bright	Device is in power-on state.
Red Ever Bright	Device not activated.

Data Collection Status Indicator Light	
Data Collection Status Indicator Light (Button)	Used to control collection and indicate device activation and collection status.
Not Lit	Device is not powered.
Red Ever Bright	Memory below 5%.
Green Ever Bright	Device is ready.
Green Fast Flash	Initializing or in GCP collection.
Green Slow Flash	Collecting data

2. Control Software Download and Login

2. 1. Software Download

APP requirements for mobile phone/tablet:

Android version: System version 8.0 or above; memory greater than 6 GB.

Apple version: System version iOS 12 or above; processor A10 or above.

Before data collection, please ensure that the APP is updated to the latest version. You can upgrade online through the 'Version Upgrade' function.

Account registration, project management, coordinate system settings, RTK settings, and real-time pointcloud browsing should be performed through the **GreenValley APP**.

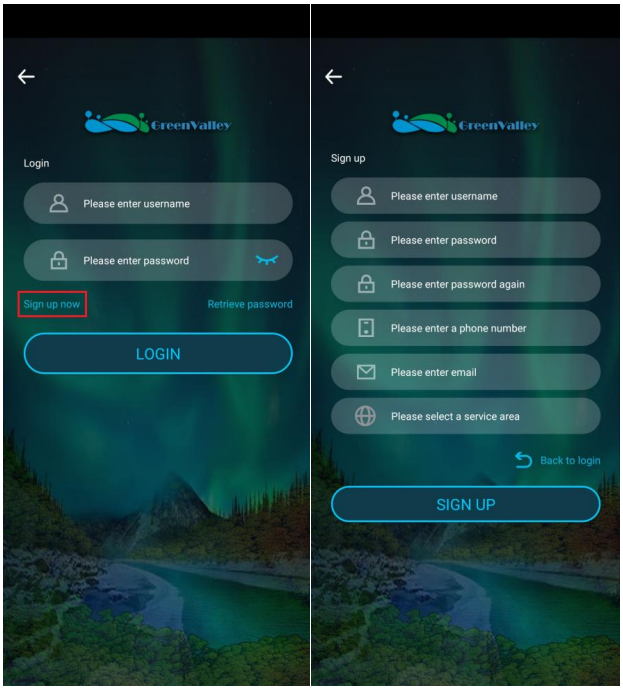
Download link: https://licloud.greenvalleyintl.com/api/v1/softwares/147/package

Alternatively, scan the QR code below to download (left: iOS, right: Android).

2. 2. Registration and Login

Please register and activate your account using your email address.When logging into the APP for the first time, click 'Register Now' on the login screen and enter your email address, username, password, and other required information to complete registration.

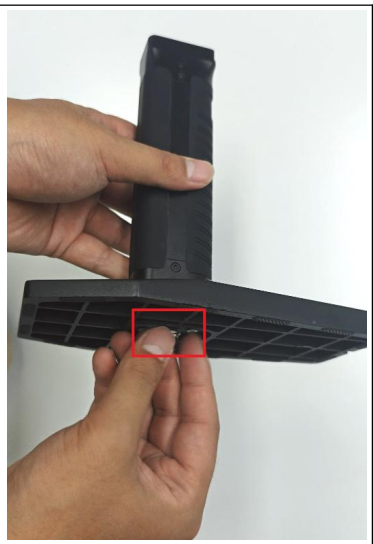
Please ensure that your email address is entered correctly. If you forget your password, you can retrieve it via email.



3. Device Installation and Removal

3. 1. Installation

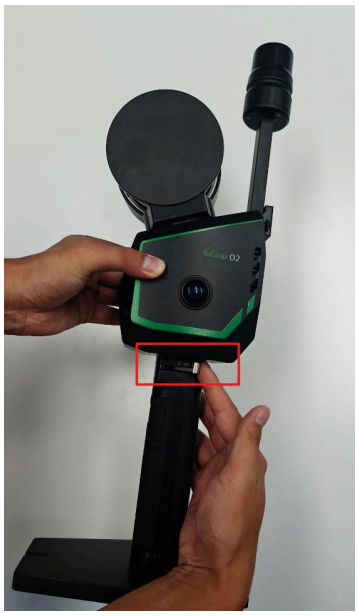
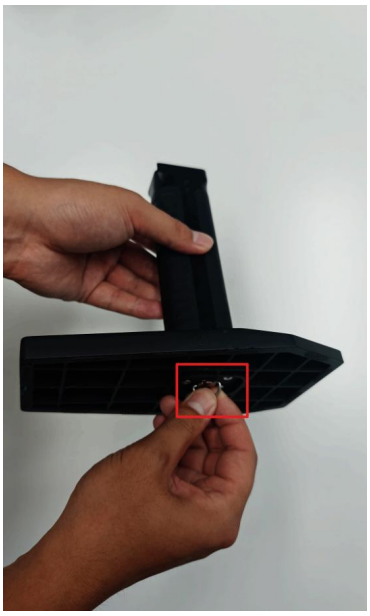
After unpacking, take out the Device Main Body, Battery, and base stand. Proceed with installation as follows:

		
① Align the base stand with the battery positioning hole.	② Tighten the screw at the bottom of the base stand.	③ Open the locking handle.

		
④ Insert the handle battery.	⑤ Secure the locking handle.	⑥ Device assembly complete.

3. 2. Disassembly

The antenna does not need to be disassembled. Refer to the following steps for disassembly

		
① Open the locking handle.	② Press the anti-drop button and slide out the battery.	③ Loosen the base stand screw and remove the battery.

4. Device Power On/Off

4. 1. Power On

Press and hold the power button until the power button flashes, then release. The device will

power-on automatically. Startup is complete when both the power indicator and the collection status indicator light are green and ever bright.

Press and hold the power button

Green light flashing

Power indicator and collection indicator ever bright

If the device is not activated or available memory is less than 5%, the collection indicator light will be red and ever bright.

4. 2. Power Off

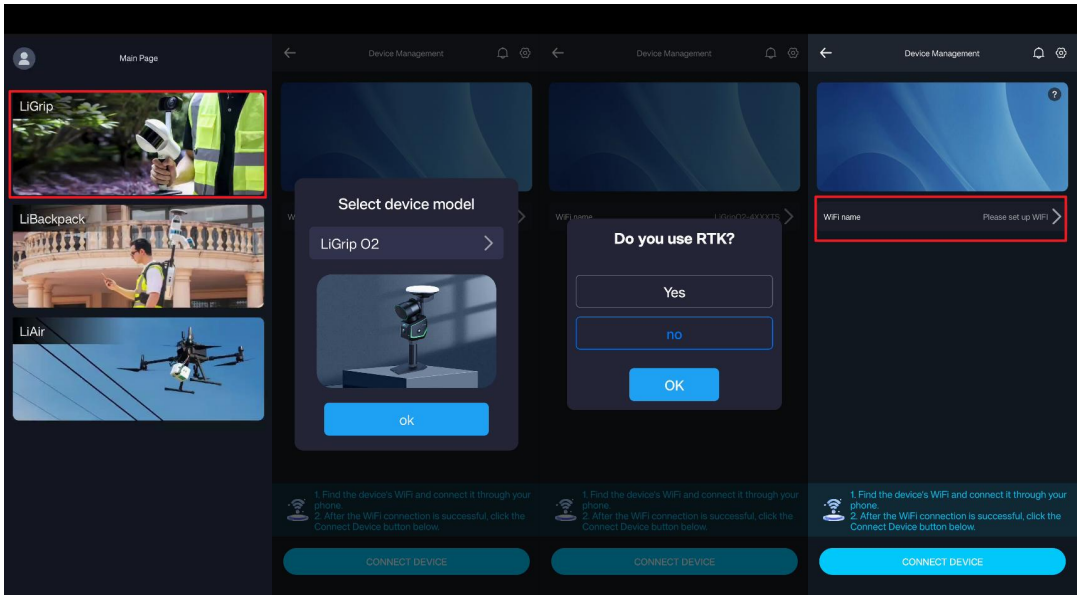
Press and hold the power button until the indicator light flashes rapidly, then release. Wait for the device to power off automatically.

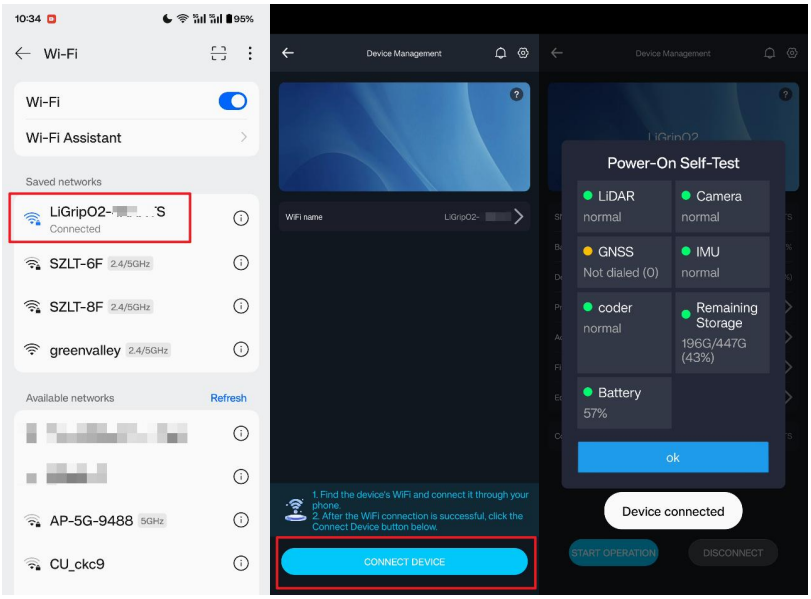
5. Device Connection and Activation

The device supports two connection modes: ① via device Wi-Fi; ② via AP hotspot.
If RTK is required, the AP hotspot connection must be used; if RTK is not required, either connection method is acceptable.
When connecting and selecting the O2 device, the APP will display a dialog box asking, 'Do you use RTK?'. Selecting 'Yes' will proceed with the AP hotspot connection method, while selecting 'No' will proceed with the Wi-Fi connection method.

5. 1. Control via Device Wi-Fi

① Power on the device, open the GreenValley APP, and select LiGrip on the main page.
② Select LiGrip O2 as the device model.
③ When prompted whether to use RTK, select 'No.'
④ Connect to the device's Wi-Fi. The Wi-Fi name is LiGrip O2-**** (last four digits of the SN), and the password is: greenvalley.
⑤ After connecting to Wi-Fi, return to the APP and select 'Connect Device.'





5. 2. Connect via AP hotspot

① Power on the device, open the GreenValley APP, and select LiGrip on the main page.

② Select LiGrip O2 as the device model.

③ When prompted whether to use RTK, select Yes.

④ Connect to the device's Wi-Fi. The Wi-Fi name is LiGrip O2-**** (last four digits of the SN), and the password is: greenvalley.

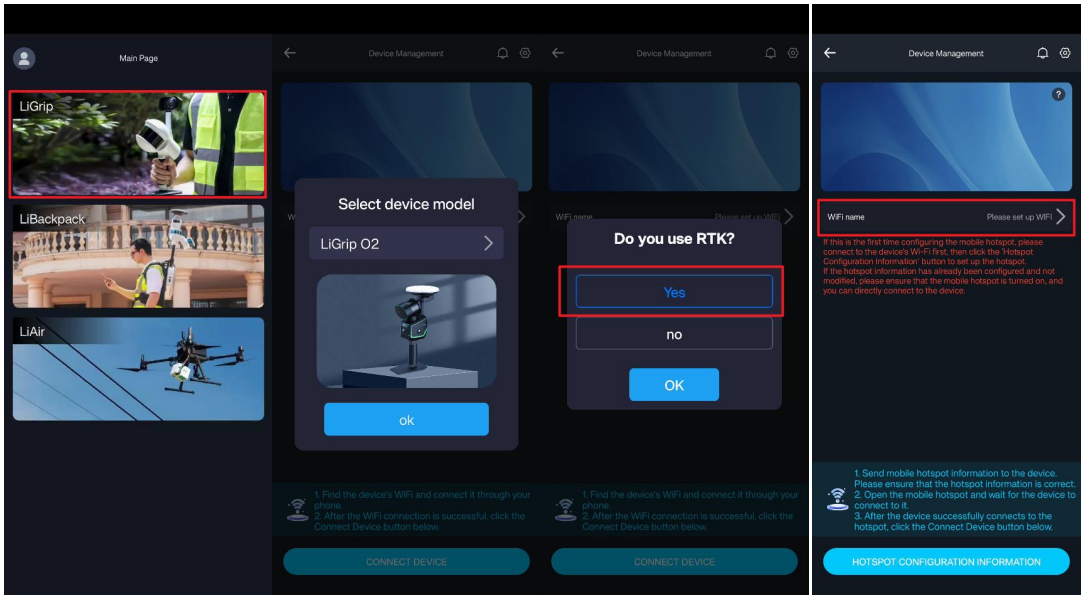
⑤ After connecting to Wi-Fi, return to the APP, configure, and send the Mobile hotspot information to the Device.

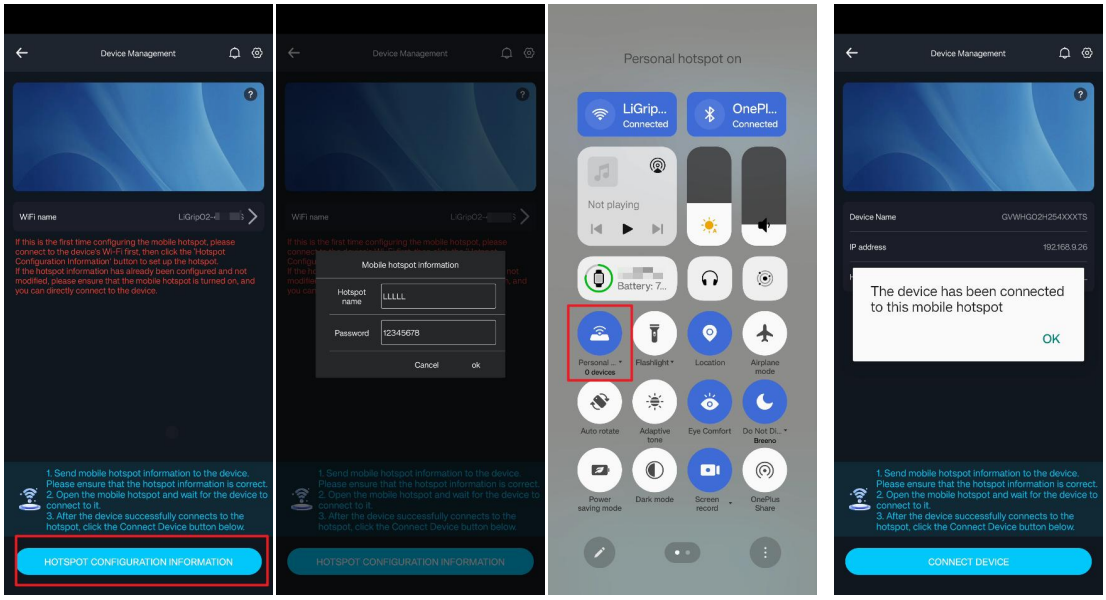
⑥ Enable the Mobile hotspot and wait for the Device to automatically connect to it.

⑦ Once the hotspot is successfully connected, select Connect Device to complete the connection.

If prompted to disable the mobile data network, please follow the instructions. After the device is successfully connected, you may re-enable the mobile network.

Hotspot configuration is only required during the initial AP hotspot connection. Subsequently, if the hotspot or the phone used for connection is not changed, reconfiguration is not needed. After enabling the Mobile hotspot, you can enter the APP to automatically connect to the Device.





Common connection issues:

1. Device Wi-Fi does not appear:

① Device is connected to another phone: Please check if any nearby phones have their hotspots enabled and are connected to the Device. Disable the hotspot on the connected phone and restart the device to connect.

② If the Device is accidentally connected to a public network: After powering on the Device, press the power Button three times to clear the Device connection records and release the

Device Wi-Fi. Once released, you may reconnect.

2. Device Unable to connect to Mobile hotspot:

① Please verify that the hotspot name and password are configured correctly.

② After correct configuration and successful transmission, for iOS systems, open the hotspot in the mobile hotspot interface and wait until the hotspot is successfully connected before exiting the hotspot interface and returning to the GreenValley APP.

③ When using an AP hotspot connection on iOS systems, please enable 'Maximum Compatibility' for the hotspot.

3. The Device can successfully connect to the Mobile hotspot, but the mobile phone fails to connect to the Device:

① Wait a few seconds, then try reconnecting to the Device.

② Return to the previous menu or exit the APP, then reconnect (there is no need to

configure the hotspot again).

4. How can the Device be connected if the mobile phone or tablet does not have a 4G signal?

Some mobile phones or tablets cannot create a hotspot without a mobile network signal. In this situation, relay mode can be used to establish a connection.

Relay mode refers to using an intermediate Wi-Fi device (typically a portable Wi-Fi) as a bridge. Both the mobile phone and the Device connect to the intermediate Wi-Fi, allowing control of the Device. Please follow the steps below to connect.

① Turn on the portable Wi-Fi and configure the hotspot information. It is recommended to use a simple name and password for ease of entry.

② Power on the Device. Once the device has fully started, open the APP.

③ Connect the device to Wi-Fi and transmit the portable Wi-Fi hotspot information to the device.

④ After successful transmission, close the app.

⑤ Connect your mobile phone to the portable Wi-Fi and open the app. The app will display connected hotspots.

⑥ Once the connection is complete, the device can be operated via the relay Wi-Fi.

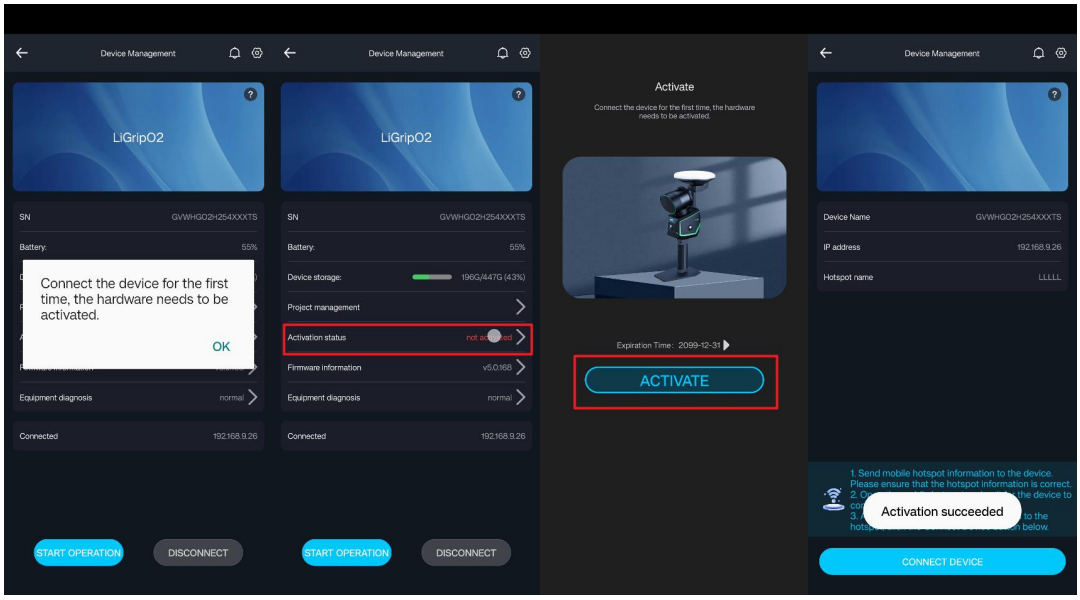
Tested and recommended mobile phones for normal operation:

Brand	Model	Operating System	Processor	Memory
Xiaomi	Redmi K70	Xiaomi Surge OS 1.0.9	Snapdragon 8Gen2	16GB
Huawei	Mate 60pro	HarmonyOS 4.2.0	Kirin 9000S	12GB
Samsung	Galaxy A54	Android13	Samsung Exynos 1380	8GB
OPPO	OnePlus 12	ColorOS15	Snapdragon 8 Gen 3	16GB
Vivo	iQOO Neo5 SE	OriginOS 4	Qualcomm Snapdragon 870	8GB
Apple	iPhone 13-17	iOS 18.4	Apple	4GB+

5. 3. Device Activation

When connecting to the device for the first time, the activation status bar will display 'Not Activated'. The device must be activated before it can be used.

Before activation, please connect to the device via AP hotspot and ensure that the mobile device can access the Internet. After connecting the device, click the activation status in the device management interface, then click 'Activate' to automatically activate the device.



6. GNSS Settings

This step is optional and may be performed according to actual operational requirements.

When configuring GNSS, please perform the configuration outdoors in an area with good satellite reception.

If absolute coordinates are not required for the data, or if a physical base station has already been established, you may skip the GNSS settings and proceed directly to the next step.

6. 1. Network CORS Settings (RTK Mode)

Click the settings button in the upper right corner of the app, select RTK link, and configure the RTK settings according to the parameters provided by your CORS service provider. Upon successful configuration, the system will display a confirmation message. At this stage, wait for the app to display a fixed solution, or move the device to a location where a fixed solution can be obtained.

RTK Settings:

(1) Data link: The default is the handheld terminal network.

(2) Communication protocol: The default is CORS.

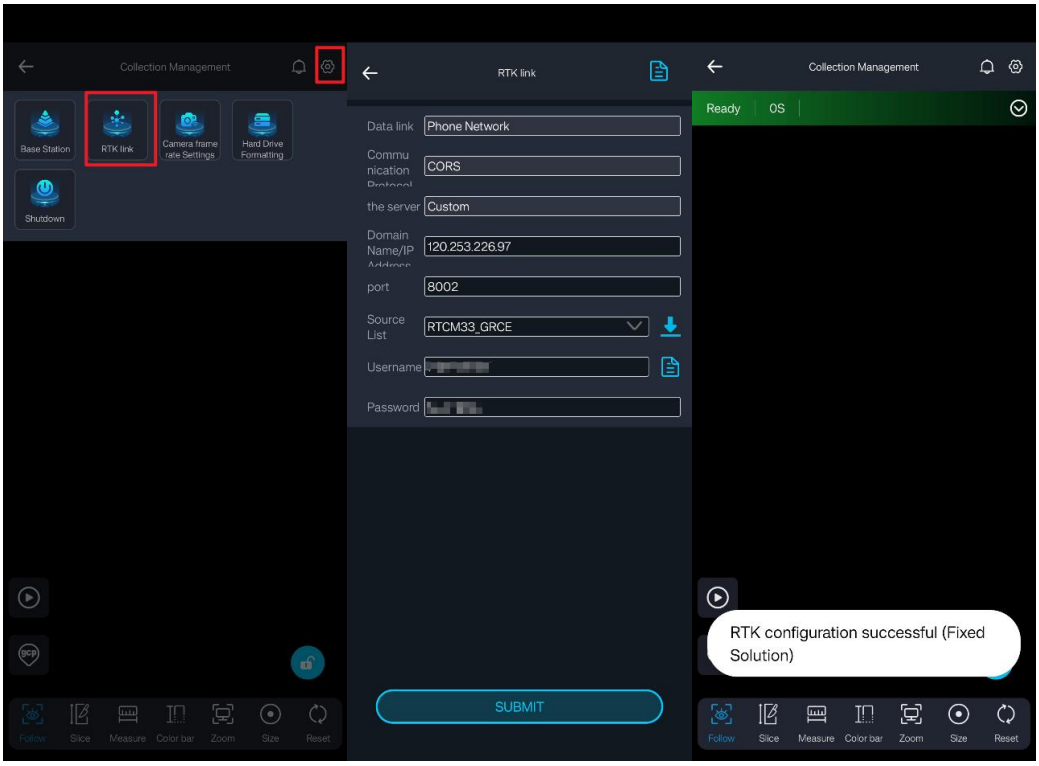
(3) Server: Support customization.

(4) Domain name/IP address: Refers to the domain name/IP address of the currently logged-in CORS account, which varies for different servers.

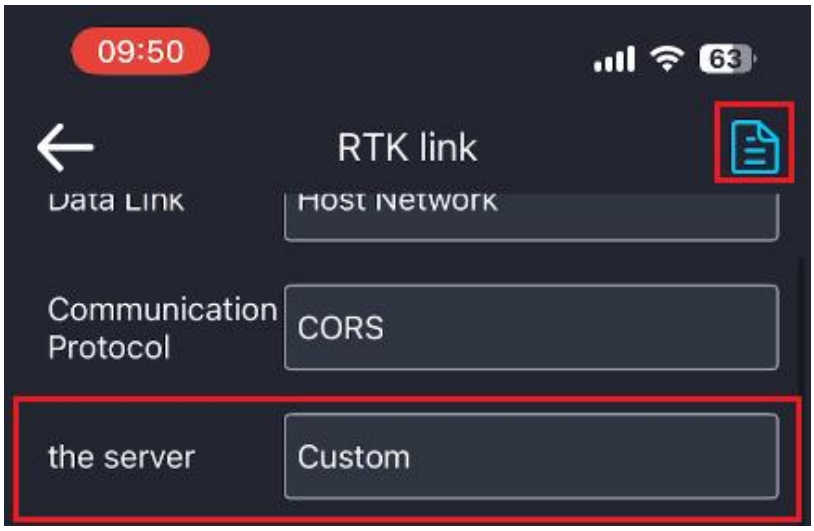
(5) Port: Users may select or input different ports according to the actual requirements of the coordinate system.

(6) Source list: Users may select or input different source lists according to various differential requirements or automatically download the source list using the download button.

(7) Username/Password: Refers to the CORS account and password for server login. (You can automatically fill in previously configured account and password information using the button on the right.)



For server selection set to **Custom** and successfully configured, during subsequent configurations, you may directly click  to access historical configuration records and select a previous configuration record for quick configuration.



6. 2. Network CORS Settings (RTK Mode)

7. Data Collection Procedure

Before starting data collection, please inspect and remove the LiDAR protective cover. If RTK or a base station is required, ensure all settings are configured in advance.

The O2 supports two collection modes: button-based collection and mobile app-based collection.

① App-based collection enables interactive operations such as real-time pointcloud display, RTK configuration, and project management.

② Button-based collection allows you to operate independently of a mobile device, providing greater flexibility.

	collection Method							Real-time pointcloud	
	Pure SLAM	GCP	RTK	PPK	Breakpoint Continuation Scan	RTK+SLAM (Pole Mode)	Open Area Collection	Display	Save
App collection (Recommended)	√	√	√	√	√	√	√	√	√
Button collection	√	√	×	√	×	×	√ (PPK)	×	√

7. 1. Use the APP to perform data collection.

7. 1. 1. Standard Data Collection Procedure.

（1）Initialization position selection.

The placement of the device prior to data collection, that is, the selection of the initialization position, must satisfy the conditions required for the initialization program to operate. This is essential for obtaining high-quality data.

① Choose a stable surface or platform to place the device.
② **Please keep the device stationary during initialization.**
③ Ensure there is no strong electromagnetic interference nearby.
④ Do not initialize facing moving objects, such as in areas with heavy pedestrian or vehicle traffic.
⑤ If the collection scene is a cave, the device should face the direction of advancement in the cave during initialization.
⑥ If the collection scene is not an open area, do not perform initialization in completely empty locations, such as plazas or playgrounds.
⑦ If the collection scene is an open area, or if GNSS operation is required, please perform Initialization in a location with strong GNSS satellite signals. It is recommended that the number

of satellites be ⩾20.

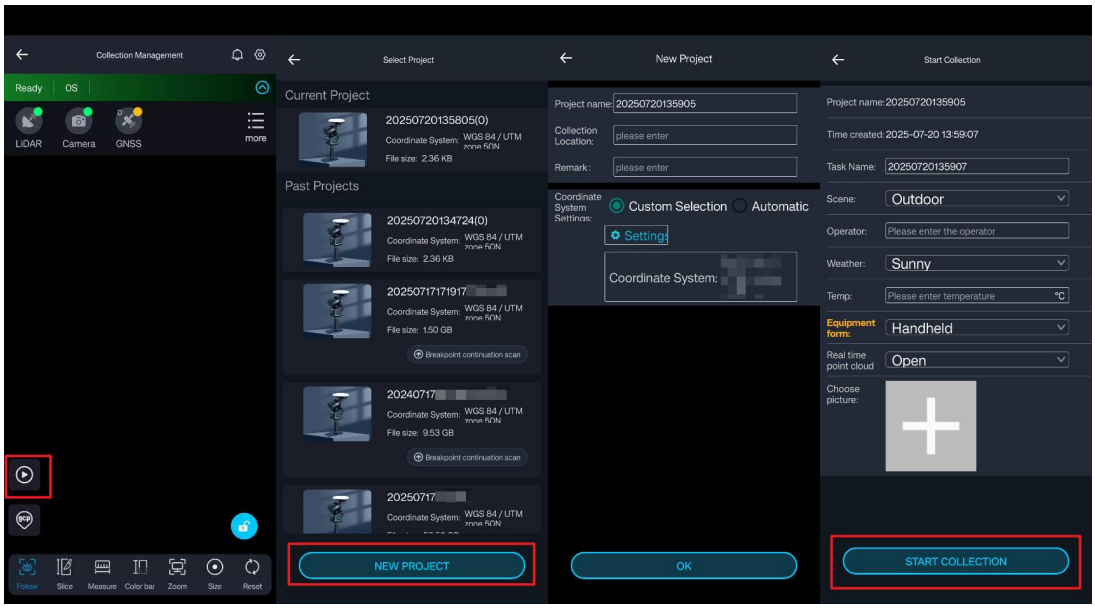
（2）New collection

After connecting the Device via the APP and configuring the RTK link, there are two methods to create a new collection. Click Start Operation to enter the data collection control interface. Click the collection Button, then select an existing Project or create a new Project.

① If you choose to create a new Project, enter the Project name, collection location, set the coordinate system, and configure other relevant parameters. Then select the newly created Project to initiate a new collection.

② If you select an existing Project, you may use the existing Project to create a new collection within it.

All collections will be saved under the selected Project; therefore, please ensure that you select the correct Project.



（1） Information about the collection task can include the task name, scene, operator, weather, temperature, device form, real-time point cloud, on-site photos, etc. Project name: Displays the project to which the current collection task belongs.

（2） Creation time: Displays the creation time of the current project.

（3） Task name: The system automatically generates a default task name. Users may modify the name of the current collection task; please avoid using space whenever possible.

（4） Scene: Select the collection environment for the current scene, including: outdoor, indoor, outdoor + indoor, or open area.

Scene selection affects the results and display of the real-time pointcloud. Please select the appropriate option.

Outdoor: Building areas, urban roads.

Indoor: Completely enclosed environments.

Outdoor + Indoor: Includes both outdoor and indoor environments.

Open Area: Completely open outdoor environments, such as grasslands, beaches, river channels, and suburban roads.

（5） Operator (optional): Record the current operator.

（6） Weather (optional): Record the current weather conditions.

（7） Temperature (optional): Record the current operating temperature.

（8） Device Configuration: Select the current device operating mode, including LiGrip or pole-mounted.

（9） collection Mode: RTK+SLAM or SLAM, applicable only to the pole-mounted configuration, RTK points can be collected or marking points can be made using a pole.

（10） Pole Height: Applicable only to the pole-mounted configuration.

（11） Real-time pointcloud: Enabled by default. Select whether to save the real-time pointcloud. Please enable real-time pointcloud during breakpoint rescan operations.

（12） Select image (optional): You may capture a photo of the current data collection environment to facilitate scene documentation.

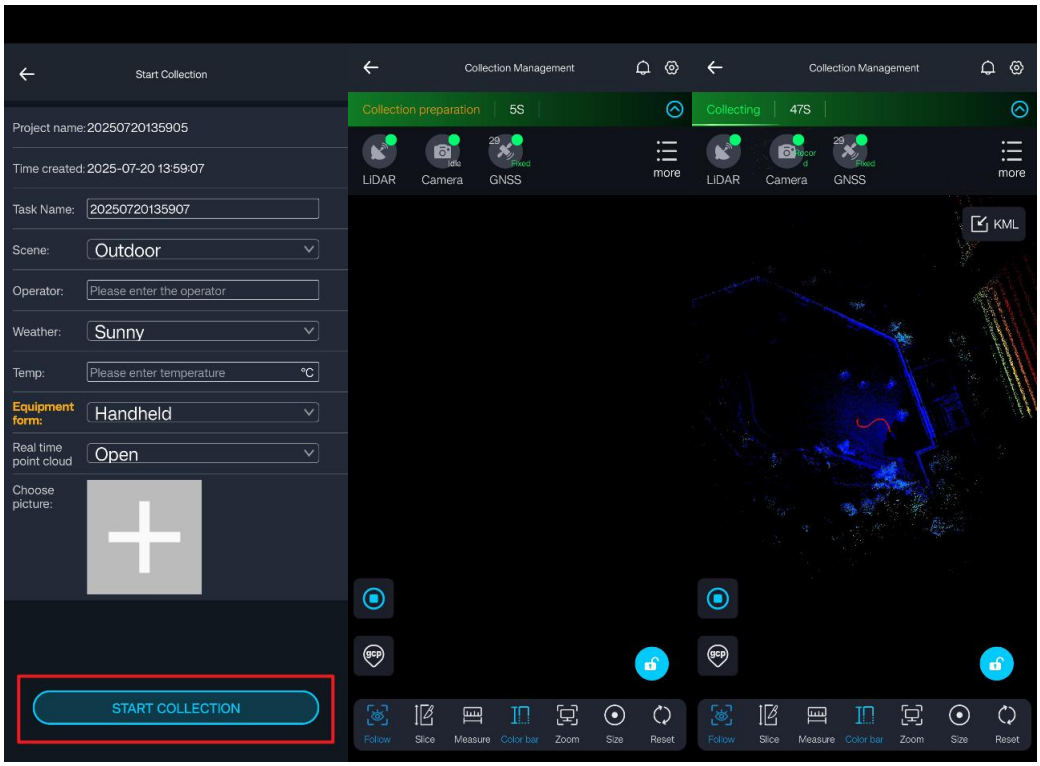
Except for the task name, all other fields are optional. Device configuration and parameters vary by device. The O2 supports both LiGrip and pole modes. When using a telescopic pole, please select pole mode; in all other cases, use LiGrip mode.

（3）Initialization

Initialization must be performed while the device is stationary.

After clicking Start collection in the previous step, the device enters the collection initialization state. The app will provide a voice prompt, and the collection status indicator light will be in a **fast flash** state.

Wait for the app device status to change from ' Preparing for collection ' to ' Acquiring Data '. When the app voice prompt states ' Device is acquiring data ' (status indicator slow flash), initialization is complete.



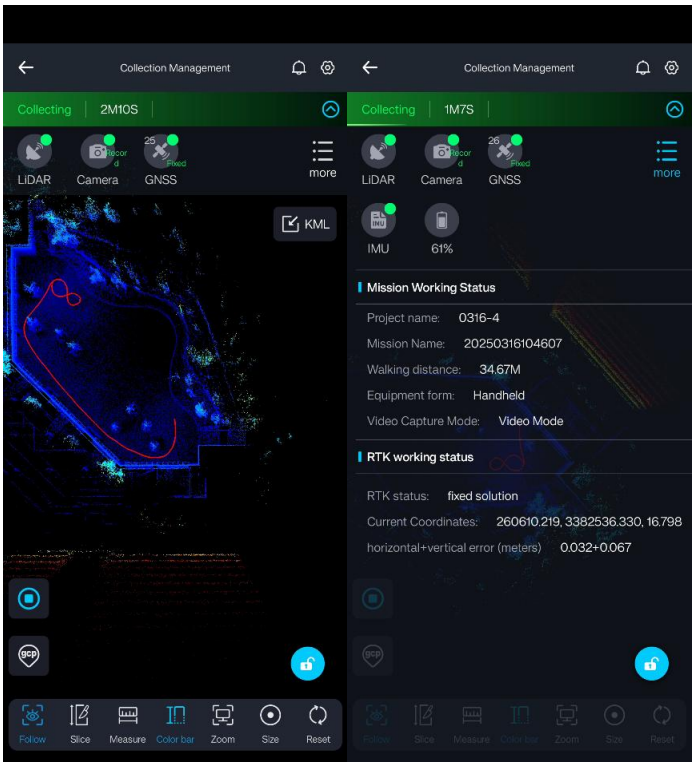
（4）Start data collection.

Maintain a normal walking speed during data collection. In environments with poor lighting or significant changes in illumination, reduce your walking speed appropriately.

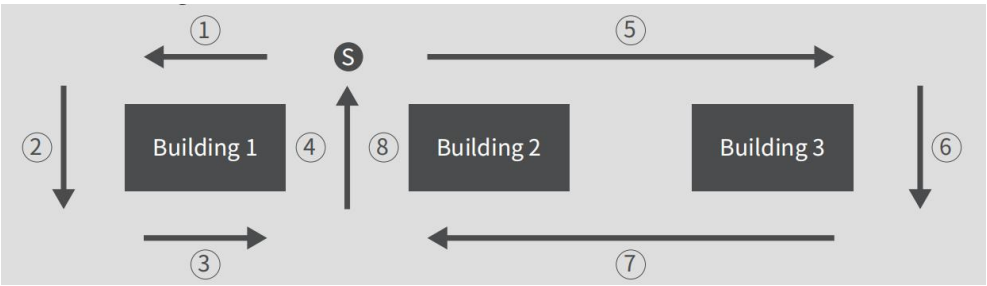
There are two scenarios depending on whether 'Open area' was selected during project creation.

Non-open area: When creating the project, select a non-open area (indoor, outdoor, or indoor + outdoor) as the scene.

After initialization is complete, slowly pick up the device and begin data collection along the pre-planned route.



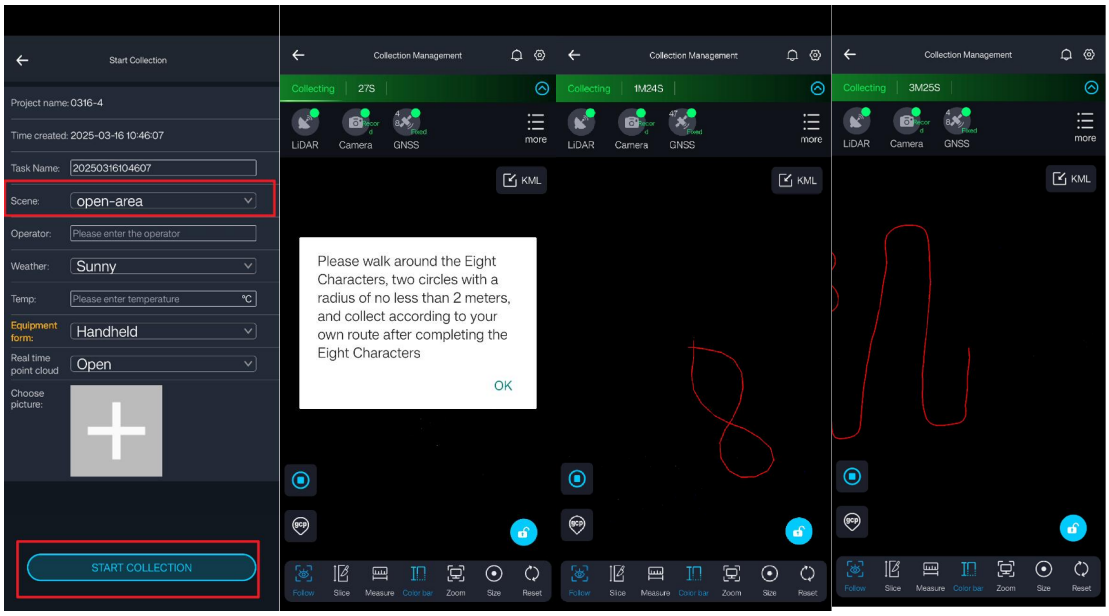
When operating without GNSS or in environments with poor GNSS signal, SLAM error accumulation requires close-loop operation. Therefore, plan your route according to the following principles.



As illustrated above, begin at point S, then perform a close-loop operation as extensively as possible (following the sequence of the numbered points in the diagram), and finally return to the original point (repeat the path for 5 – 10 meters).

Open area: When creating a project scene during data collection, select 'Open area'.

After initialization is complete, follow the software prompts to perform a figure of eight (two circles with a radius of no less than 2 meters). Upon completion, proceed with data collection along the pre-planned route.



In open area scenarios, the app displays only the GNSS trajectory.

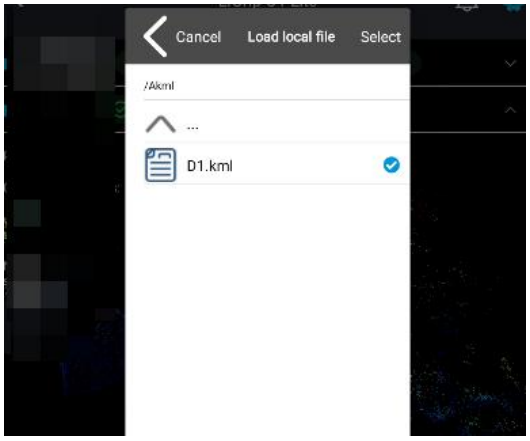
（5）Import KML (optional operation)

Optional when configuring RTK and performing operations.

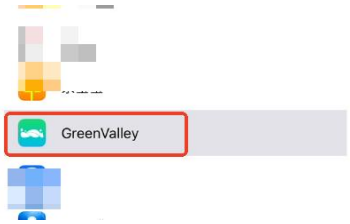
When there is an RTK fixed solution, after walking a certain distance during normal collection, an import KML icon 

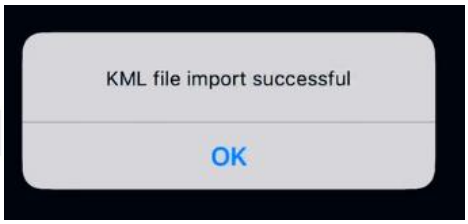
will appear on the right side of the collection control interface.

For Android: You need to select the KML file from the local phone file directory.



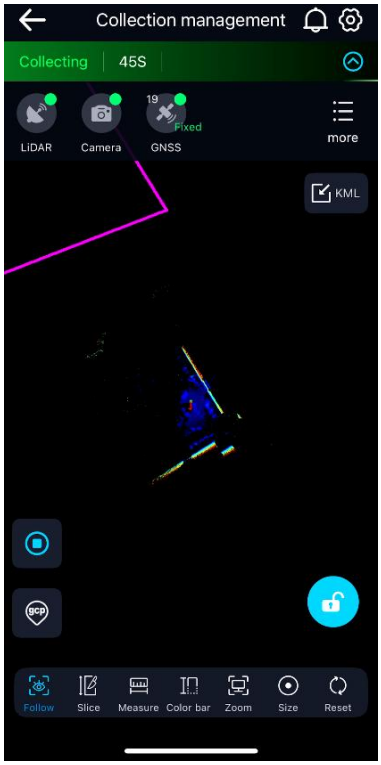
For iOS system: Before importing a KML file, you should open KML at any location, choose "open with GreenValley", and import it into the GreenValley APP.





Then you need to select the KML file from the GreenValley APP.

During the import process, the system will reset the point cloud display, and after the reset is complete, the point cloud and KML file will be displayed again.



（6）GCP collection (optional operation)

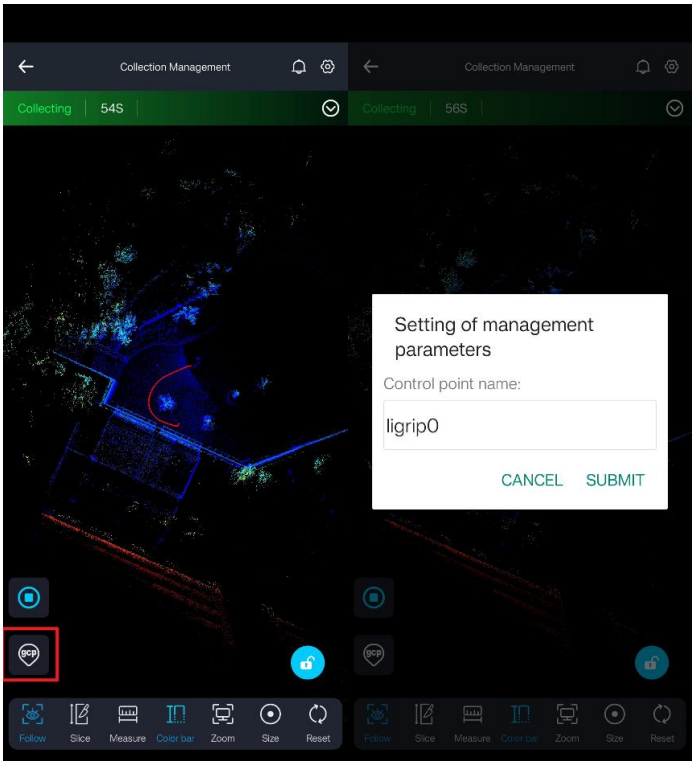
This is optional when GNSS is not configured, but you wish to introduce absolute coordinates to the data via GCP.

If close-loop is not possible, or if absolute coordinates need to be introduced, GCP Collection is required to substitute coordinate positions or eliminate accumulated errors.

① When moving to the GCP Collection position, squat down slowly. Align the GCP pointer with the required GCP Collection location.

Caution: During GCP Collection, do not allow personnel to gather nearby to avoid affecting the accuracy of the GCP Collection.

② Tap the GCP Collection button on the APP screen (the name of the GCP Collection can be modified; the default is LiGrip *, where * is a number that automatically increments with each GCP Collection). After 3 seconds, the Device enters GCP Collection status, and the Data collection status indicator will fast flash. Wait until the APP indicates that GCP Collection is complete, and the status indicator changes to slow flash; the GCP Collection is then finished.



Caution: Please keep the Device stationary during GCP Collection.

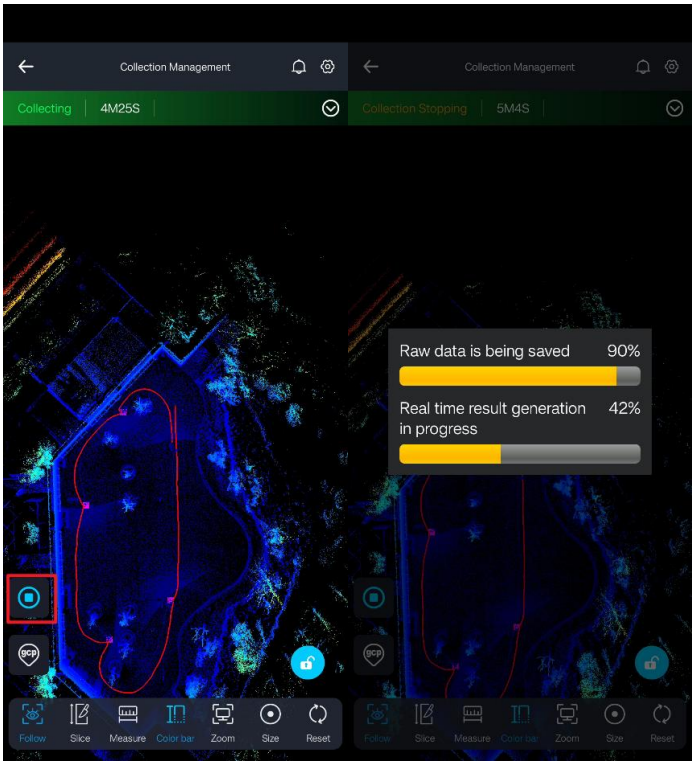
（7）End Data collection

Whether to perform a figure of eight depends on whether the Data collection scenario is Open mode.

Non-Open Area Mode: If the data collection scenario is Non-Open Area Mode, a figure of eight is not required.

Open mode: If the Data collection scenario is Open mode, please perform a figure of eight as required at the start of Open mode.

When it is about to finish, please place the device on the ground or on a platform. Press the stop collection button (the status indicator will change to **fast flash**). After the progress bar is completed, proceed to the next data collection.



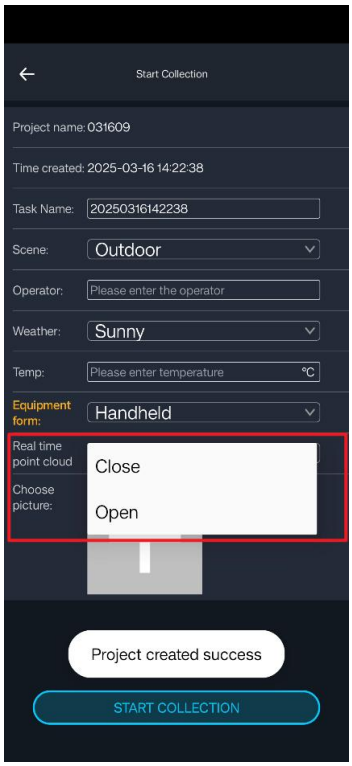
7. 1. 2. Other Data Collection Functions

（1）Breakpoint continuation scan (optional operation)

When GNSS data collection is unavailable, breakpoint rescan allows spatial continuity between different sessions.

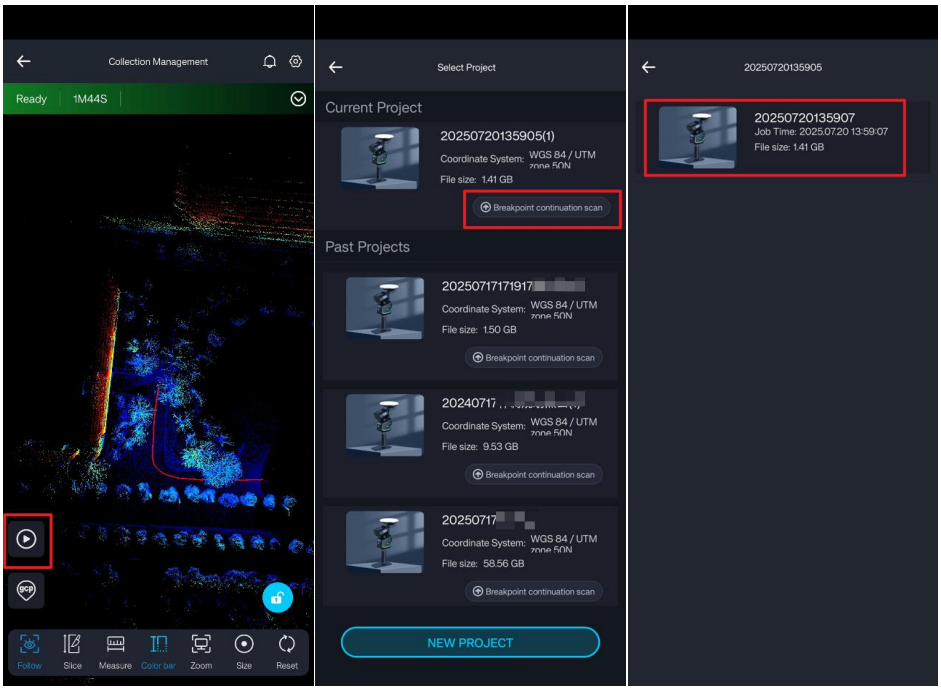
For the first task of resuming scanning, a collection project can be normally created. When starting a new collection task, real-time point cloud must be enabled.

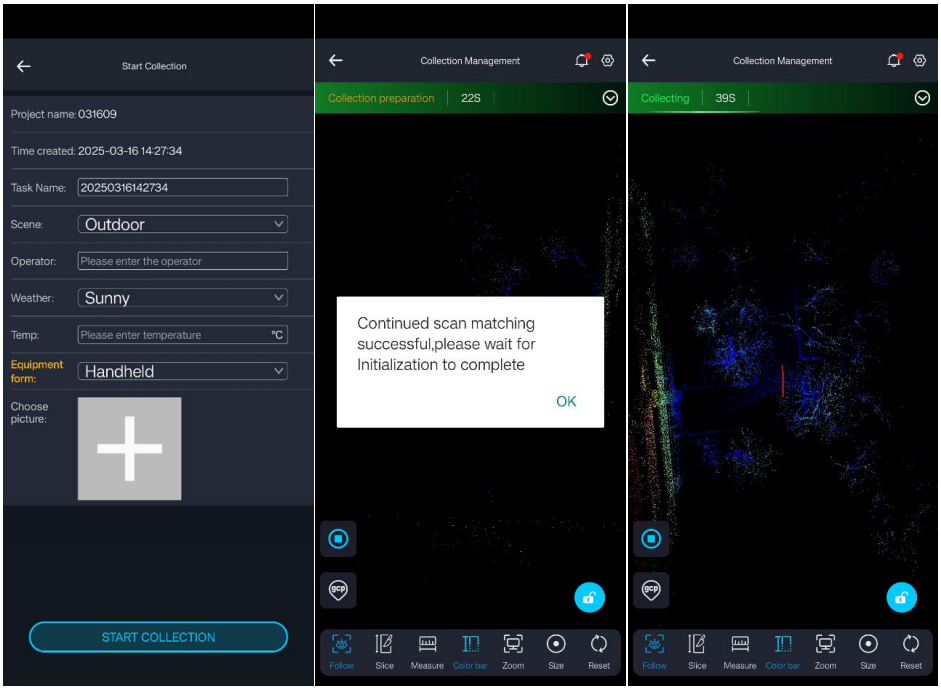
After selecting the task to resume scanning, subsequent tasks will automatically enable real-time point cloud without user selection.



For two consecutive stations during breakpoint re-scan, it is recommended that the starting point of the next station coincides with the end point of the previous station. Some deviation is permitted, but the distance between the two points must not exceed 2 meters, and the device orientation angle difference must not exceed 15 degrees.

Create a new task for subsequent scanning. When creating a project, you may select a project that supports continued scanning and choose the task to be continued for data collection. Wait for the APP to prompt ' **Continued scan matching successful** '. When the status bar changes to ' **Acquiring Data** ', you may proceed with standard data collection.





（2）Telescopic pole data collection

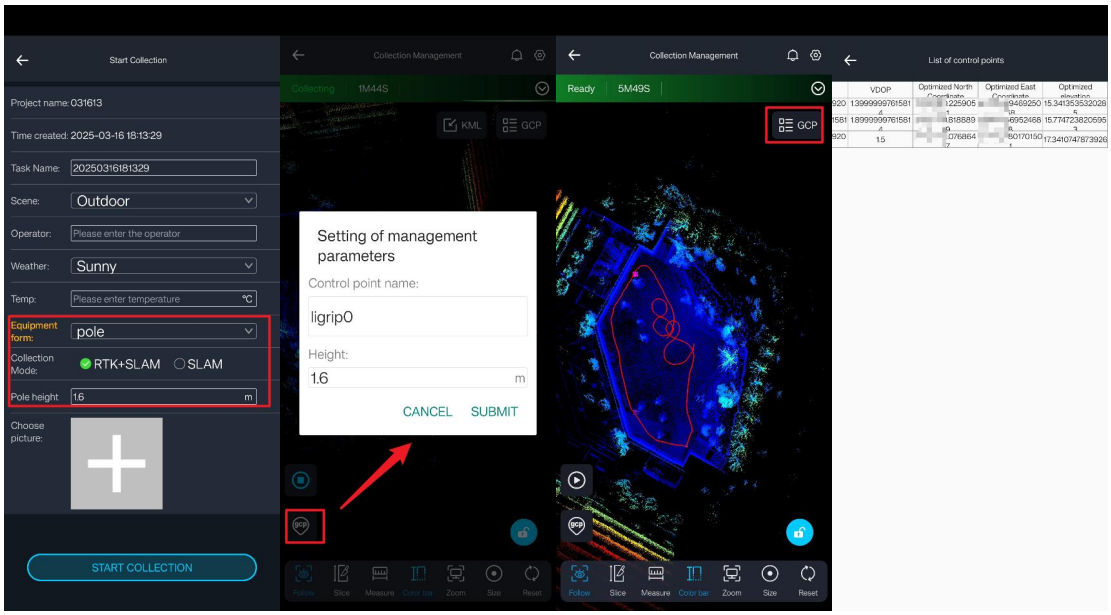
For telescopic pole installation, please refer to Chapter 12: Other Optional Accessories.

When using the telescopic pole for data collection, both RTK+SLAM mode and SLAM mode are supported.

RTK+SLAM mode requires prior RTK settings (for RTK settings, please refer to Chapter 6: GNSS Settings). In RTK+SLAM mode, the device can be used as a traditional RTK device and can also be introduced indoors via SLAM, enabling real-time collection of indoor and outdoor control points with absolute coordinates. Post-processing may also be performed to obtain control point coordinates with higher accuracy.

Select SLAM mode to perform GCP Collection at various inclinations or heights using the telescopic pole.

The project creation process for data acquired with the telescopic pole is essentially the same as the standard collection process; only the differences are described here.



7. 2. Data Collection Using the Button

When using the button for data collection, since there are no prompts or status displays from the app, it is necessary to carefully observe the device's status indicator. For indicator status details, please refer to Chapter 1: Status Indicator Introduction.

7. 2. 1. New collection

（1）GNSS configuration (Optional Operation)

RTK cannot be configured when using button collection. If GNSS processing is required for the data, the physical base station should be set up in advance.

（2）Initialization position selection.

Refer to the initialization position selection when using the app for data collection.

（3）New collection

Press and hold the collection button until it fast flashes, then release to easily create a project.

At this time, the project name is assigned based on the current time. Do not move the device during initialization.

（4）Initialization

Do not move the device during initialization. Wait for the collection Status Indicator Light to change from fast flash to slow flash.

（5）Start Data Collection.

Please refer to the APP for data collection procedures.

（6）GCP Collection (optional operation)

For GCP Collection, press the collection Button once. The device status indicator will switch to **fast flash**. When the status indicator changes to **slow flash**, GCP Collection is complete.

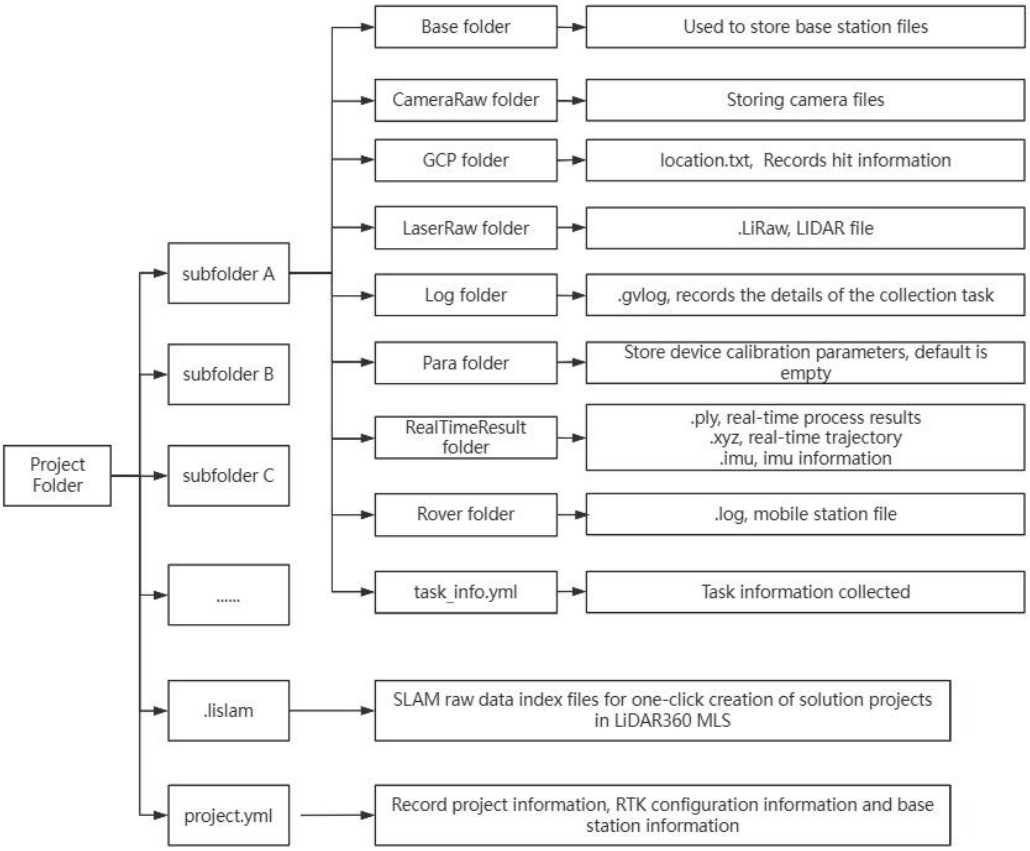
（7）End data collection

Press and hold the collection Button until it fast flashes, then release. Wait for the status indicator to light up, indicating that the project has been saved.

8. Data Transmission

8. 1. Project Data Structure

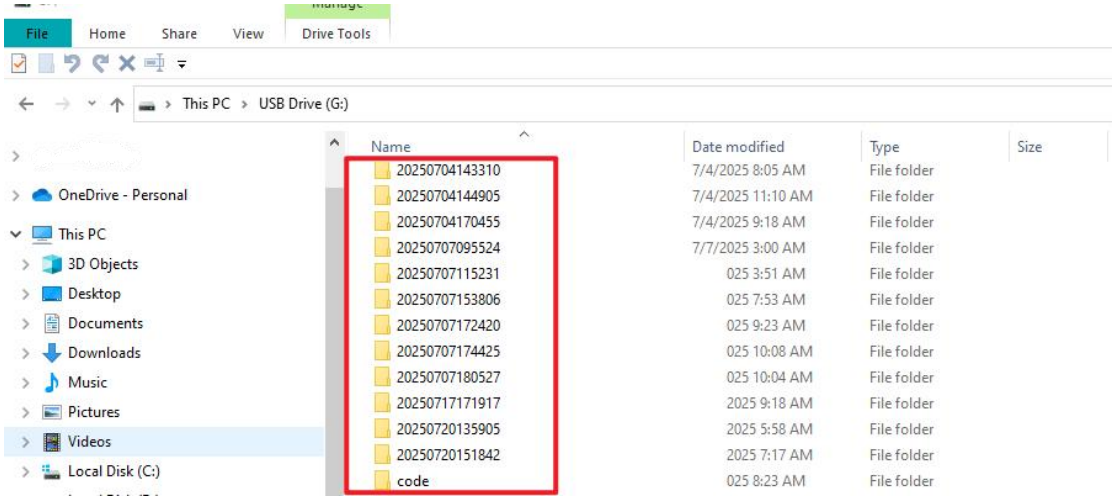
The project folder contains multiple acquired task folders, as well as the project.json file and .lislam file. The task folder contains the Base folder, CameraRaw folder (for storing .bin camera files), RealTimeResult folder, and other folders, as well as files such as mission.json and file size. Refer to the diagram below for the detailed folder structure and descriptions.



8. 2. Copying via data cable

After powering on the device, use a Type-C data cable to copy data. Connect one end of the data cable to the device's Type-C port and the other end to the computer. The computer will automatically recognize the device's internal storage, allowing you to copy data to the computer as required.

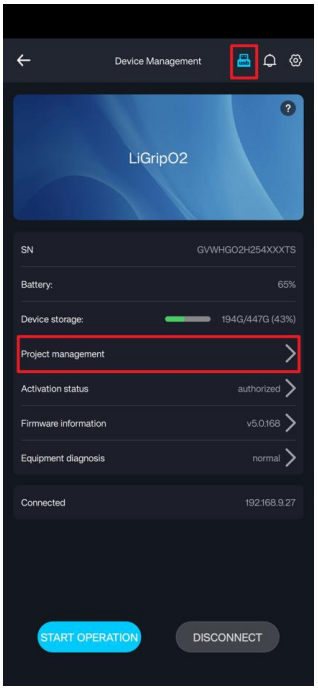
Data cable transmission only permits data export; writing data into the device is not allowed.



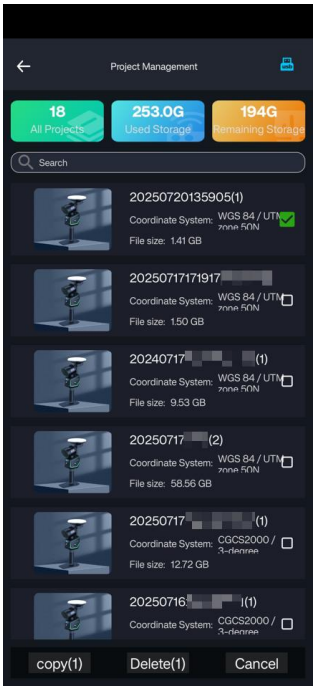
8. 3. Copying via Type-C USB drive

After powering on the device, insert a Type-C USB drive or external hard drive into the main unit's Type-C port. Use the GreenValley APP to connect to Wi-Fi and enter the Project management interface. Click **Device management**- **Project management**, select one or more projects from the project list, and copy the selected project(s) to the USB drive. After the copying is complete and the APP displays ' **Project copied successfully** ', remove the card reader.

Insert the USB drive while the device is powered on.

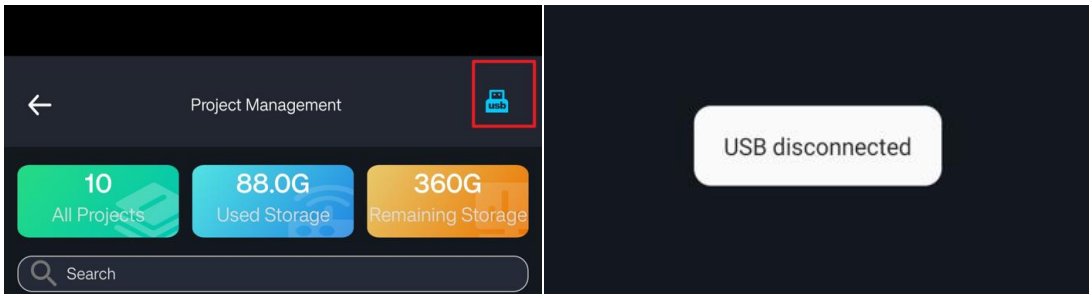


Select Project management.



Long press to select the project and copy.

To safely eject the removable storage device, click the USB icon and wait for the system to confirm success.



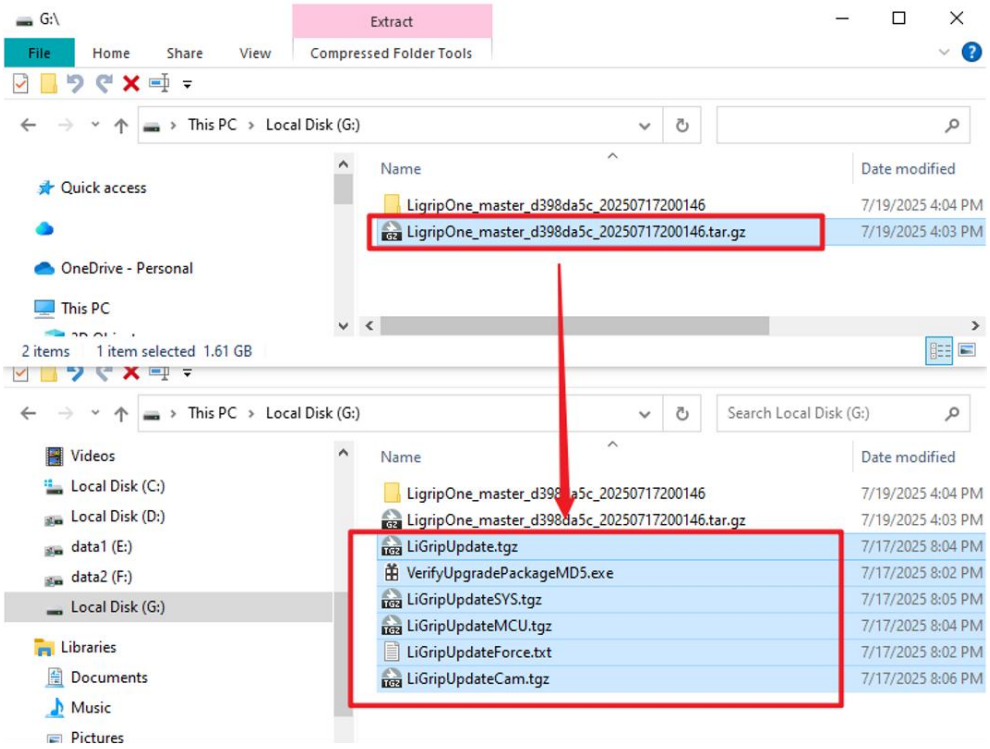
9. Firmware Upgrade

Keep the APP version up to date. Ensure the device has at least 30% battery before performing a firmware upgrade. **Firmware upgrade** supports **system offline upgrade** and **camera calibration parameter upgrade**.

9. 1. System Offline Upgrade.

（1）Obtain the latest firmware package from technical support or after-sales service, and proceed with the subsequent steps under the technical guidance of after-sales or technical support.

（2）Extract the firmware package, **and copy the extracted contents to the root directory of the USB drive**.



（3）Insert the USB drive into the Device while it is powered off, then press and hold the Device power Button to turn it on.

（4）The device will automatically upgrade. During the upgrade process, the LiDAR may rotate, and the indicator lights may flash; these are normal occurrences. Do not power off the Device during this process. The entire upgrade process may take 5 to 10 minutes. Wait until the Device

indicator light is Ever Bright, indicating that the upgrade is complete.

（5）After both indicator lights are Ever Bright, press and hold the power button until the device powers off. Then remove the USB drive and restart the device.

9. 2. Camera Calibration Parameter Upgrade

For camera calibration parameter upgrades, please refer to the LiDAR360 MLS User Guide.

10. SLAM process

Please use LiDAR 360 MLS software version 8.2.2 or above for the SLAM process.

The following process is for reference only. For hardware requirements and detailed instructions regarding the SLAM process software, please refer to the LiDAR360 MLS User Guide.

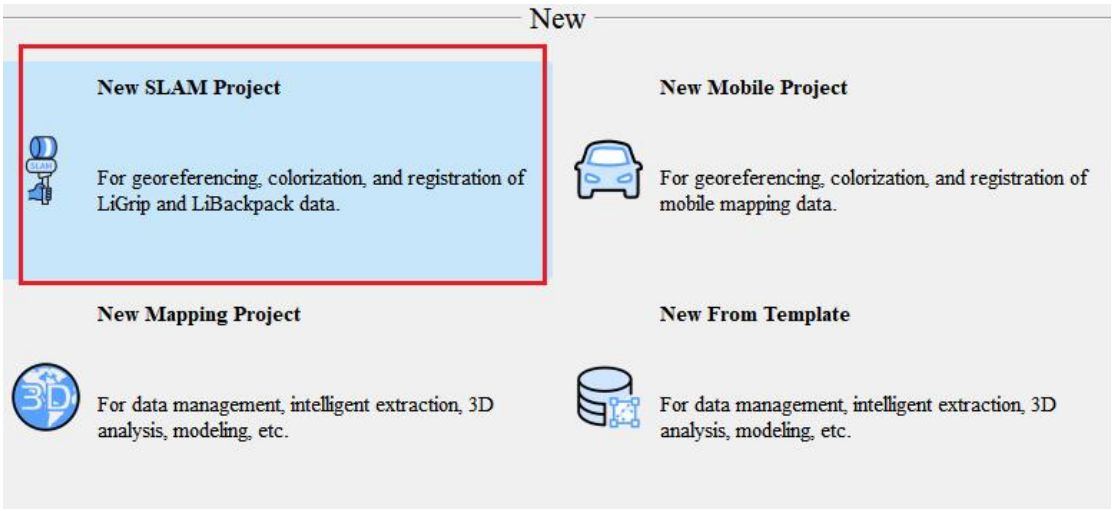
10. 1. Perform the SLAM process with one click via lislam.

Do not manually modify the project data structure or file names of lislam. If the project data structure has been altered, please restore it or create a new project using the Project Wizard.

10. 1. 1. Create SLAM Process Project

（1）Create a new SLAM process project

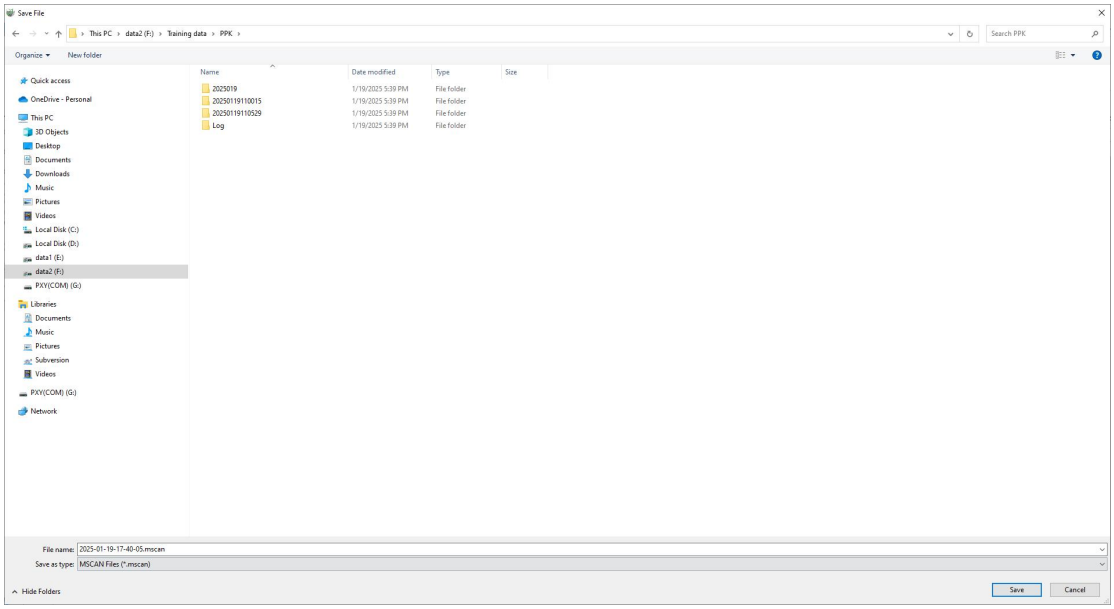
Click 'New SLAM Process Project' in the MLS interface, or create a SLAM Process Project from 'File' – 'New SLAM Process Project'.



（2）Select the project save path.

Select the project save path. The software will create an msacn project using the current time.

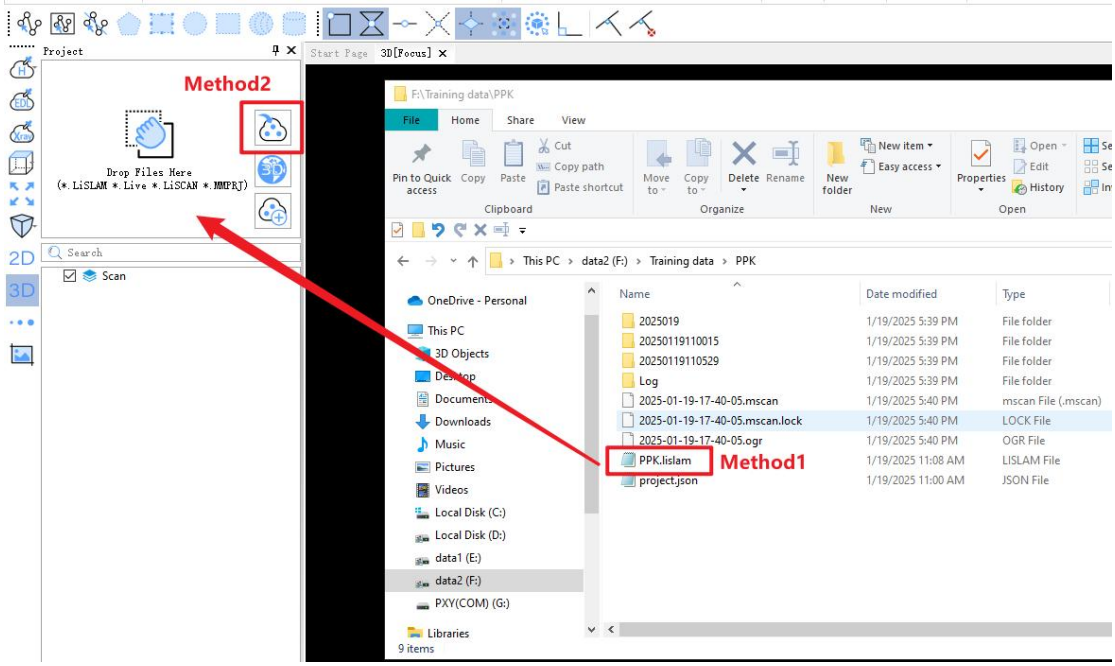
mscan is a collection that can contain multiple independent data collection projects.



10. 1. 2. Add lislam Project index file

（1）Import lislam file

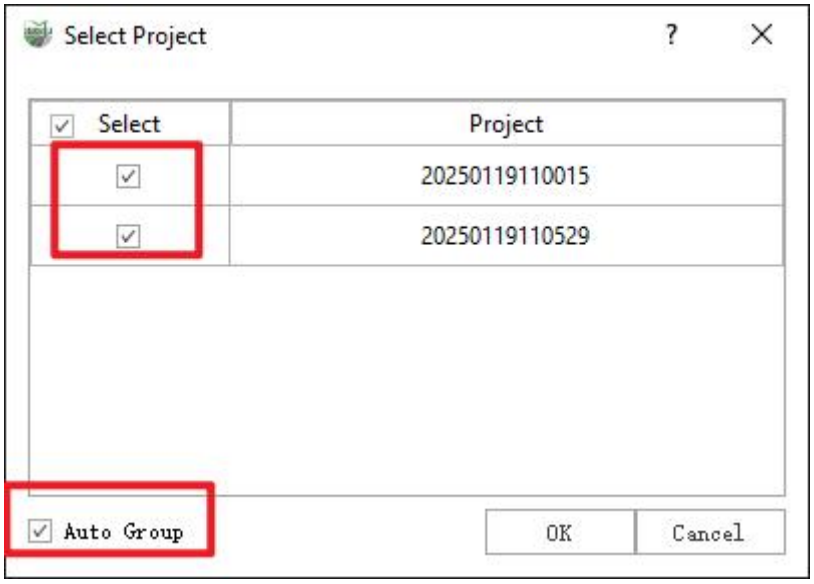
You can drag the Data collection Project index file xxx.lislam into the Project window, or click the 'Add  ' Button to select the Project index file.



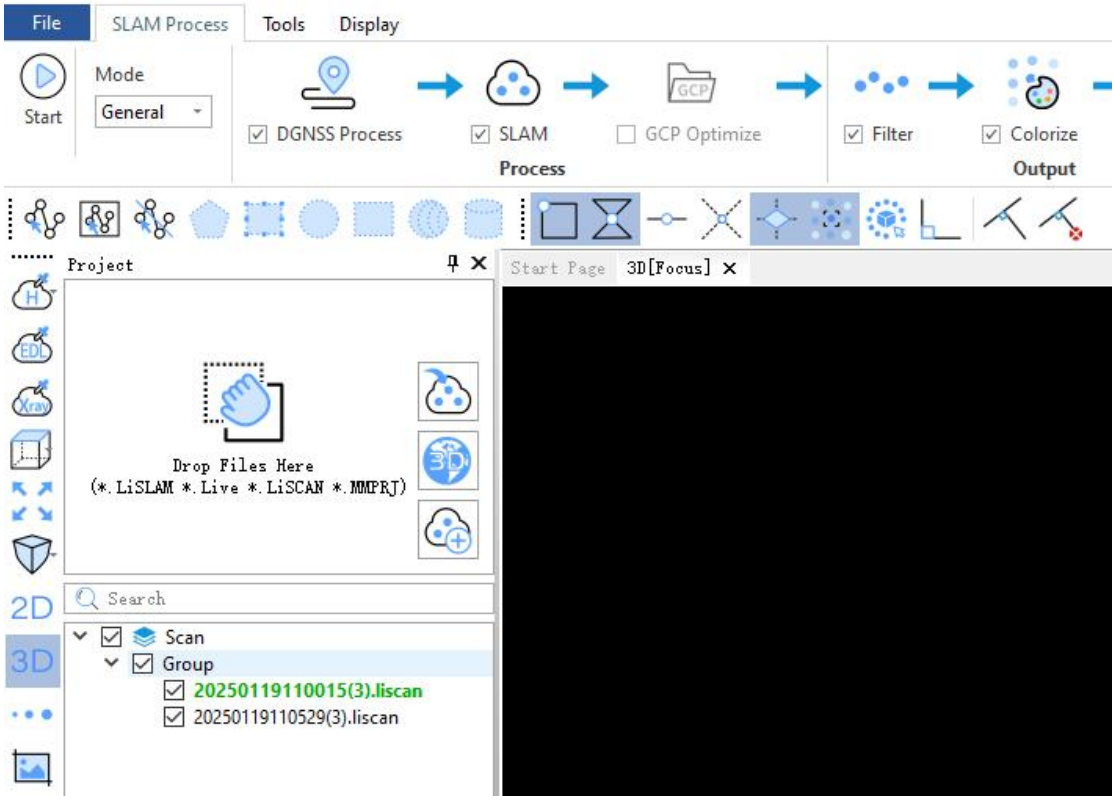
（2）Select the project and settings group to import

If the index contains multiple sub-projects, you may select the project to import and

automatically create a group. After grouping, the Projects will be placed in the same group upon completion.



Automatically grouped Projects:



10. 1. 3. GNSS settings (optional)

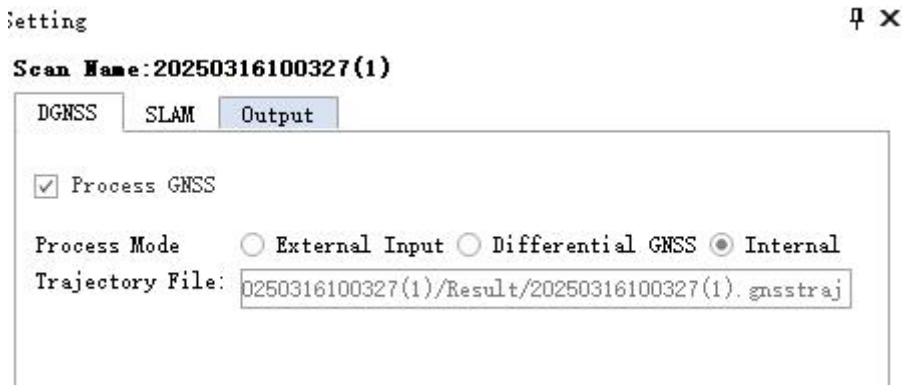
There are differences according to the three operation modes: **Pure SLAM**, **RTK-SLAM**, and **PPK-SLAM**.

Pure SLAM: No additional settings required; you may proceed directly to subsequent data processing.

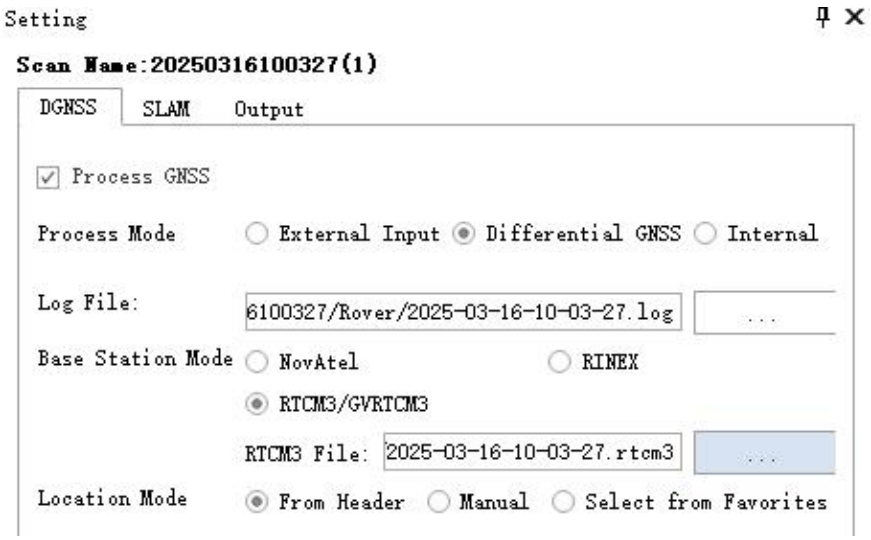
RTK-SLAM: No additional settings are required; subsequent data processing can be performed directly. The field data collection scenario settings differ depending on whether Open mode or

Non-Open Area Mode is selected.

Non-Open Area Mode: If the engineering scenario during field data collection is set to non-open modes such as indoor, outdoor, or a combination of both, the software will automatically read and apply the RTK file stored in the Rover path and convert it into an internal trajectory.



Open Mode: If the project scenario is set to Open Mode during field data collection, the software will automatically read the rover log and the RTCM3 file in the base path (or specify base station file).

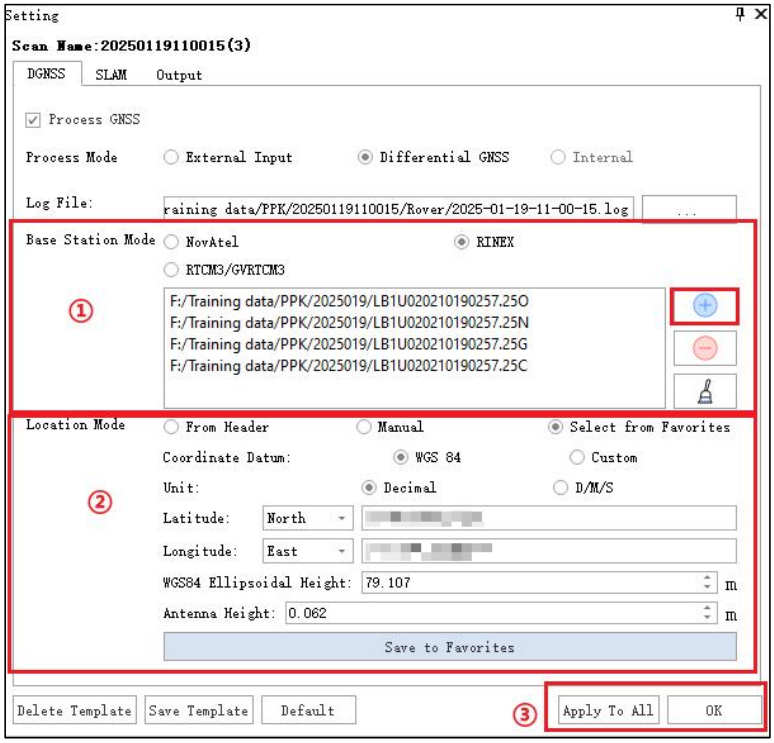


PPK-SLAM: Base station file configuration is required. The software will automatically read the rover file and configure the base station data as follows:

① Select the base station mode and import the base station file. The formats for different base station modes vary slightly; the following figure uses RNIEX as an example.

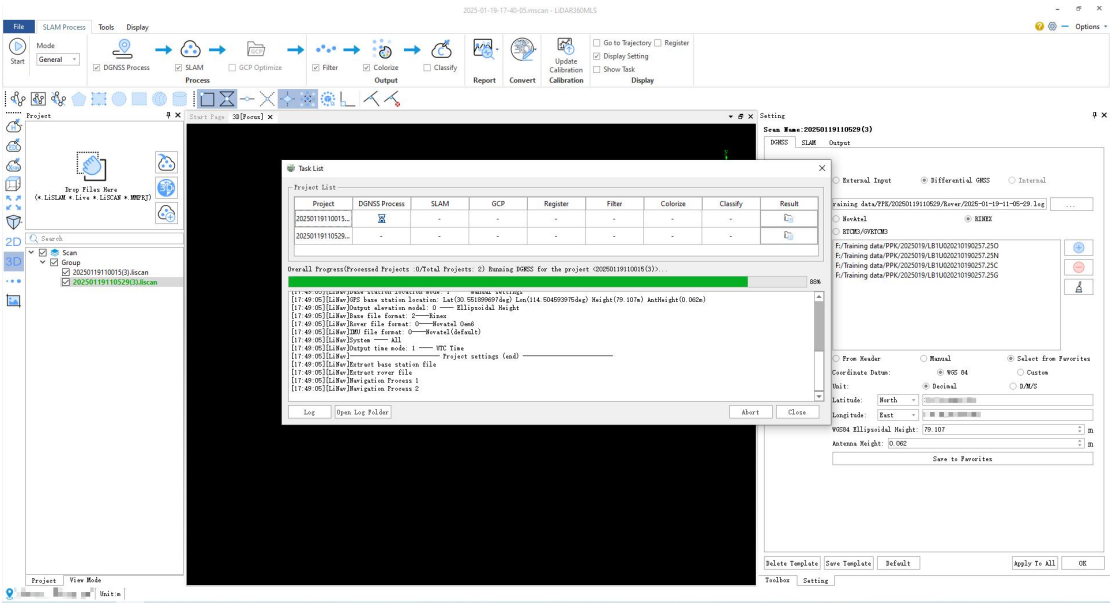
② Configure the positioning mode of the base station. You may either parse it from the data header or manually enter the base station coordinates.

③ Click "**OK**" to save. The current base station settings apply only to the active project. If multiple projects share a single base station, click "**Apply to All**".



10. 1. 4. Start SLAM Process

After configuring the SLAM Process Project, click the "**Start**" button in the upper left corner to initiate the SLAM process.



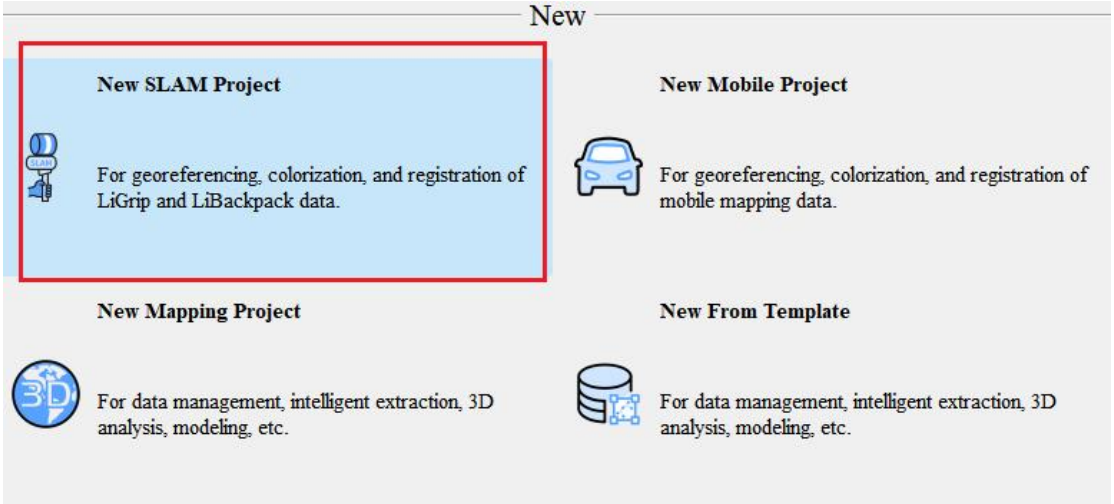
Once the program has been completed, the data processing results will be available.

10. 2. Create Using Project Wizard

10. 2. 1. Create SLAM Process Project

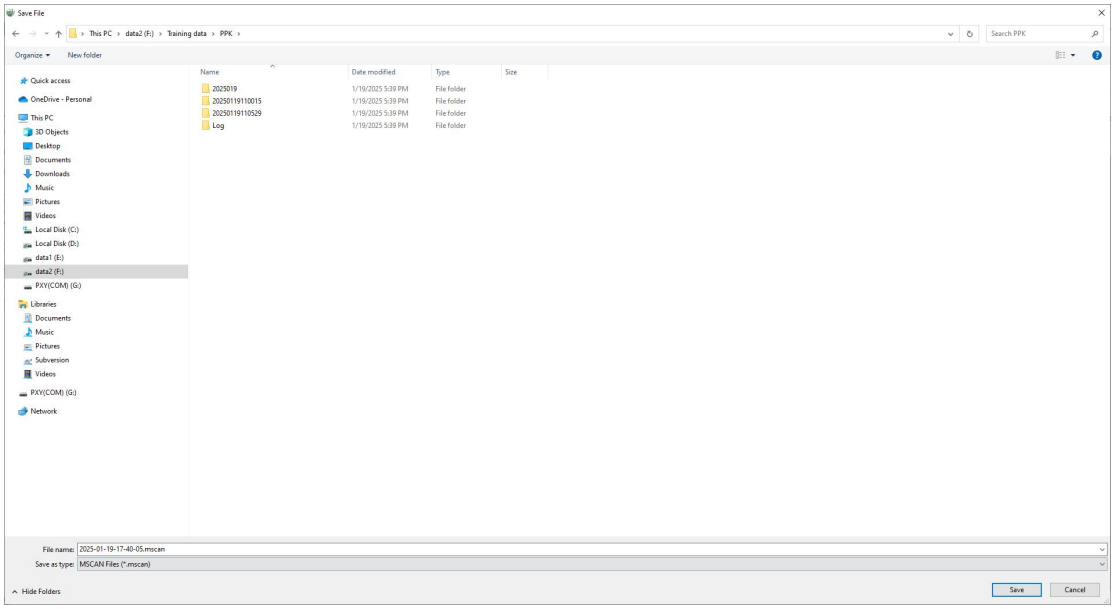
（1）Create a new SLAM Process Project

Click "**New SLAM Process Project**" in the MLS interface, or create a SLAM Process Project from "**File**" – "**New SLAM Process Project**".



（2）Select the project save path.

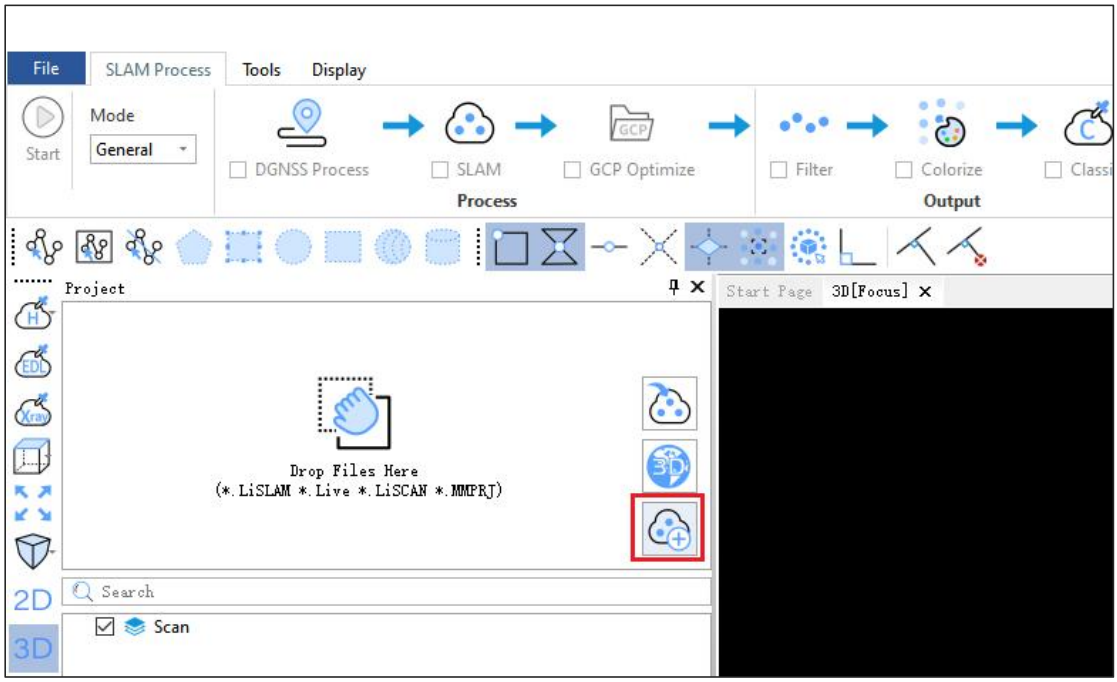
Select the project save path. The software will create an mscan project using the current timestamp.

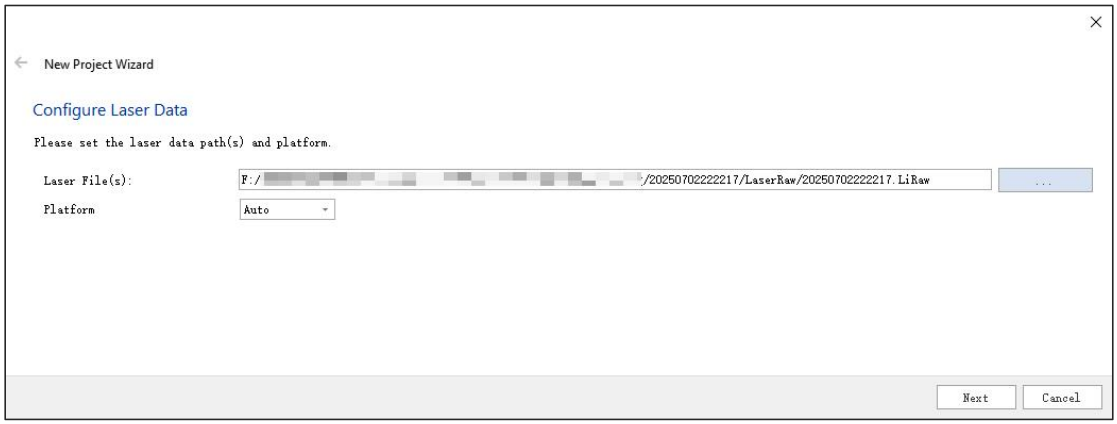


10. 2. 2. Configure Process Data

（1）Configure LiDAR File

Click Configure the LiDAR file. By default, the LiDAR file is located in the LaserRaw folder of the Project. The platform can select it automatically or manually. Click **Next.**

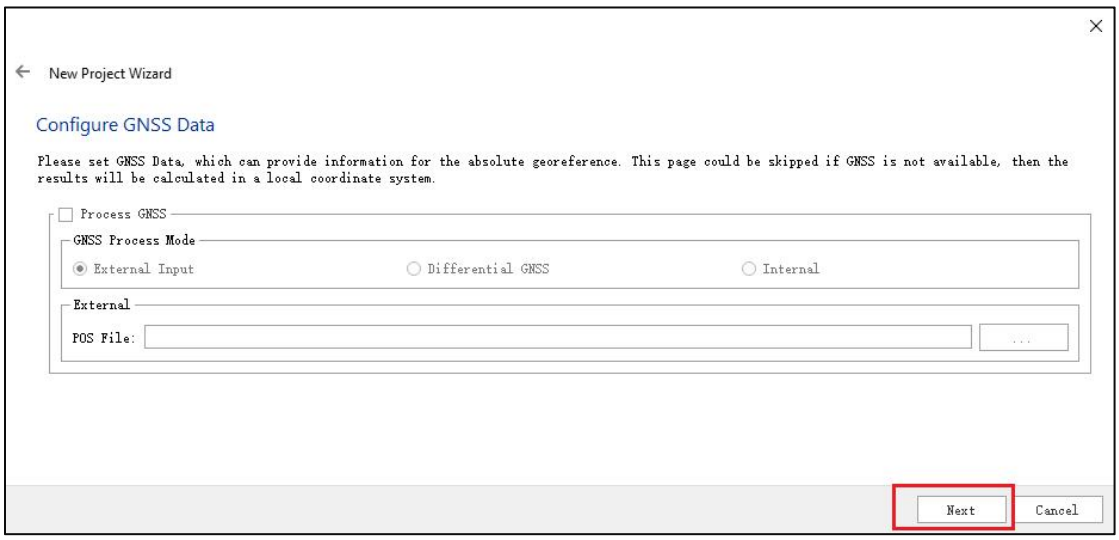




（2）Configure GNSS Data and Coordinate System

There are three scenarios for configuring GNSS and coordinate systems: **Pure SLAM, RTK-SLAM, and PPK-SLAM**.

Pure SLAM: Pure SLAM processing does not require configuration of GNSS or coordinate system. Skip this step and click **Next.**

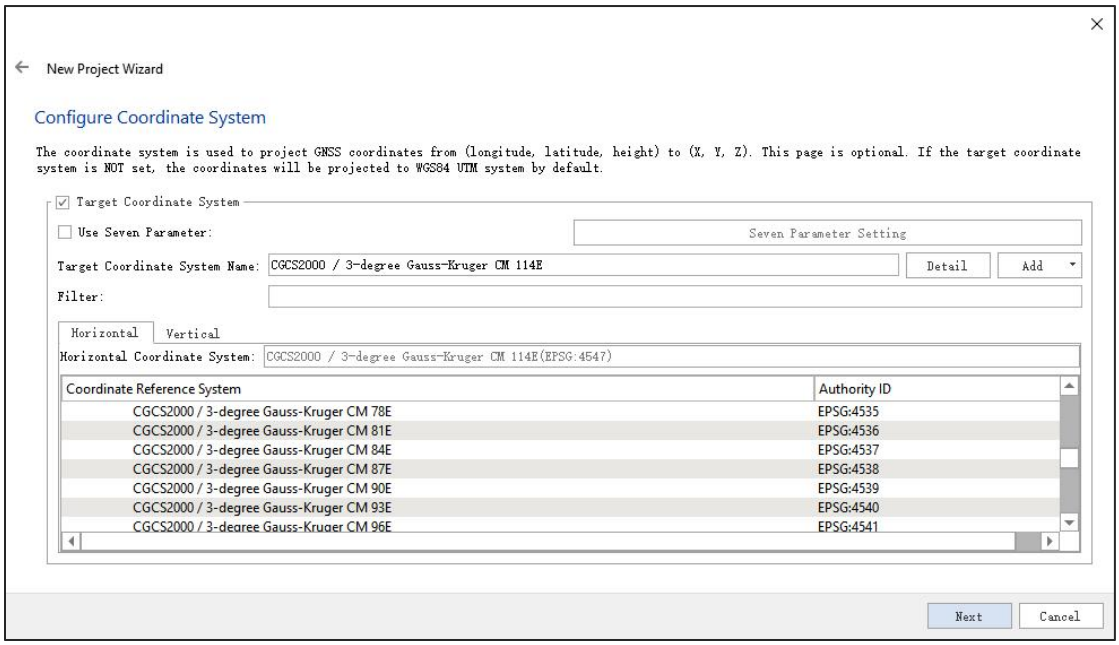


RTK-SLAM: For RTK-SLAM, the field data collection scenario depends on whether it is an open or non-open area.

Non-Open Area Mode: If the engineering scenario during field data collection is set to non-open modes such as indoor, outdoor, or a combination of both.

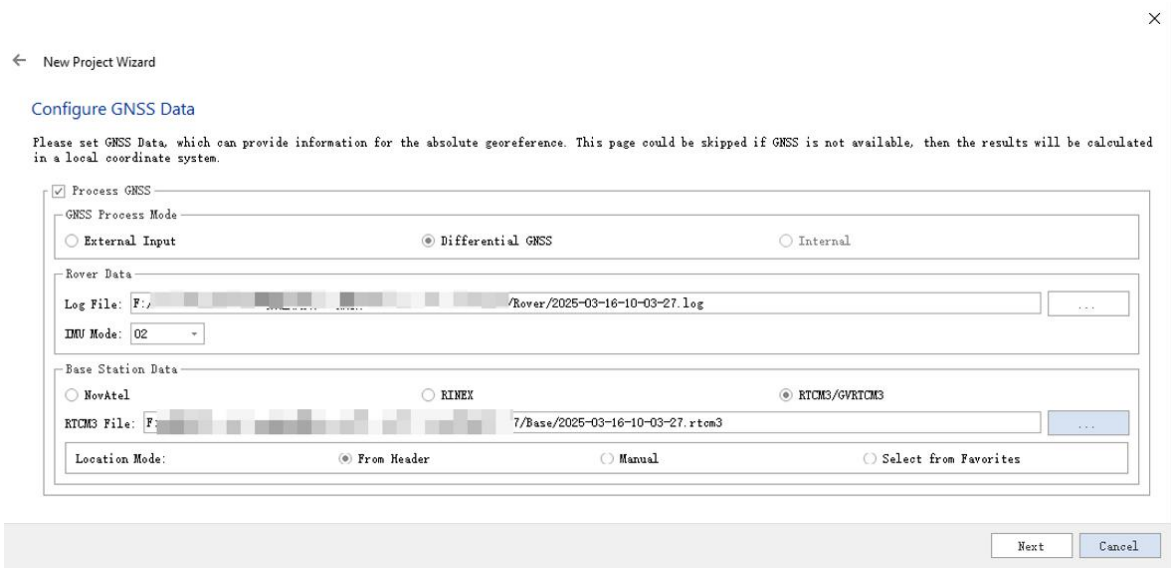
Select '**Process GNSS**', choose '**External Input**', and select the POS file, which is located by default in the Project's Rover directory. Click **Next.**

In RTK-SLAM mode, manual configuration of the Target Coordinate System Name is typically unnecessary. The software will use the coordinate system embedded in the RTK file. You may proceed by clicking **Next.**

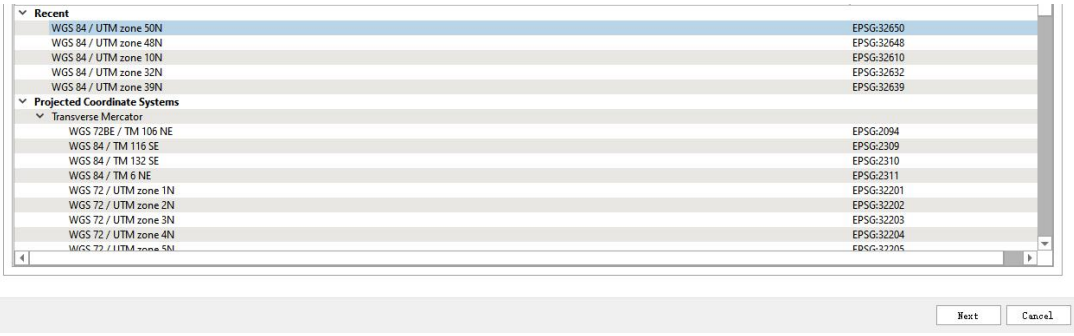


Open mode: Set the field data collection project scenario to Open Area.

Select ' **Process GNSS** ', choose ' **Differential GNSS** ', and select the log file. The log file is located by default in the Project's Rover folder. After importing the Rover log, the IMU mode selection will appear. Please select O2 according to the device model. Next, select and import the RTCM3 file for the base station data. The RTCM3 file is located by default in the Project's base folder. Then click **Next.**



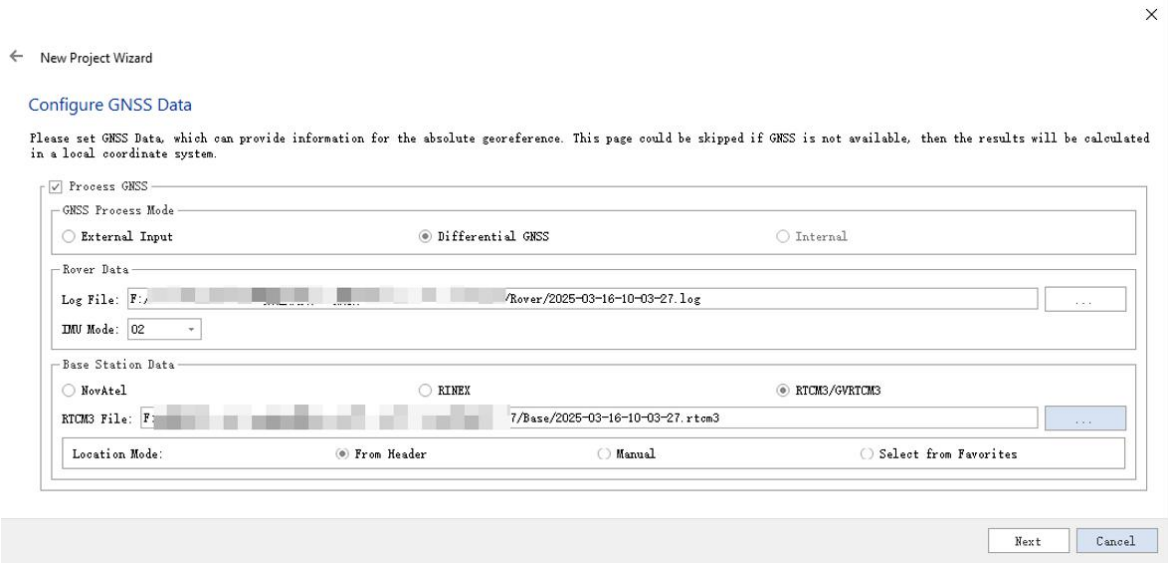
Configure the coordinate system and select the Target Coordinate System Name. You can quickly select a coordinate system by entering keywords in the "**Filtering**" field. If not configured, the default is the Project coordinate system used during data collection. After selecting the coordinate system, click **Next**.



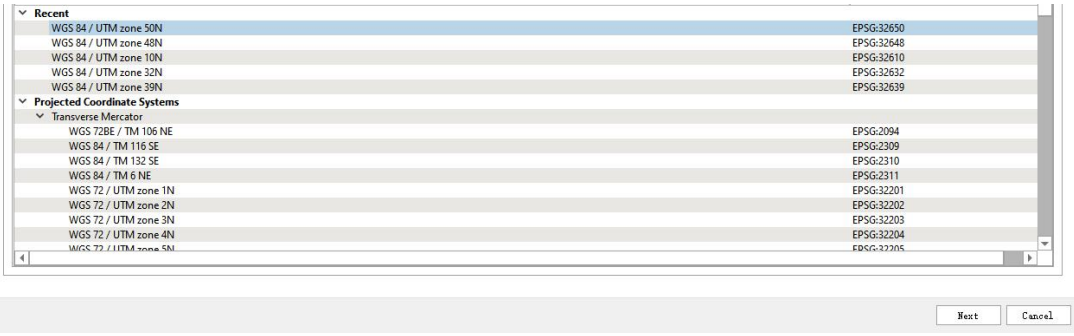
PPK-SLAM: Before PPK processing, you must prepare base station data.

Select "Process GNSS" and choose "differential GNSS". Select the log file, which by default is located in the Project's Rover folder. Select the base station file, configure the base station coordinates, and click Next.

If the field scenario is set to Open mode, after importing the Rover log, please select the correct IMU mode according to the device type.

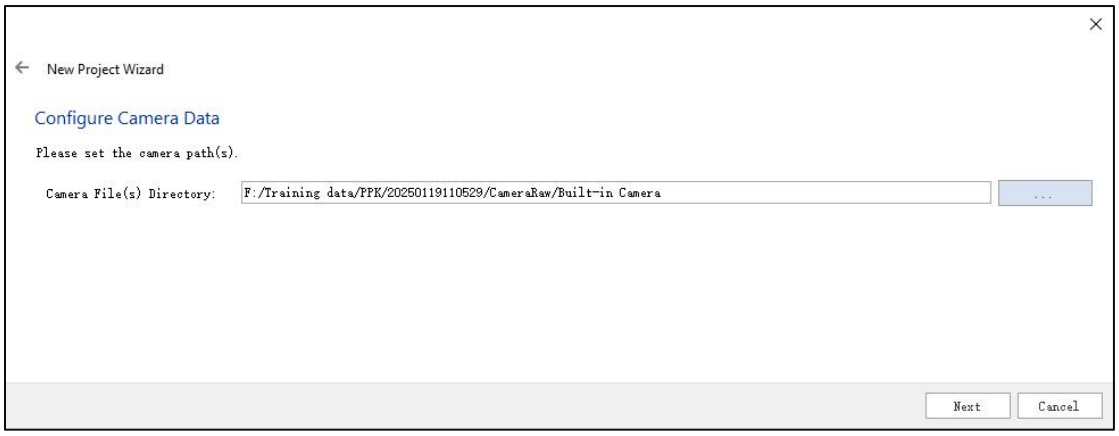


Configure the coordinate system and select the Target Coordinate System Name. You may use "**Filtering**" to enter keywords for quick selection. After selecting the coordinate system, click **Next**.



（3）Configure camera file

Select the file path where the camera is located. By default, LiGrip O2 uses the Project's CameraRaw/Built-in Camera folder. Then click **Next**.



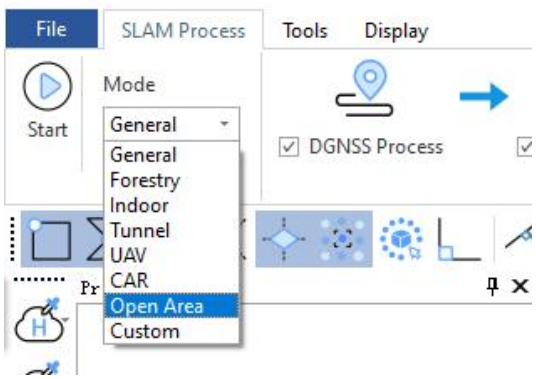
（4）Configure project path

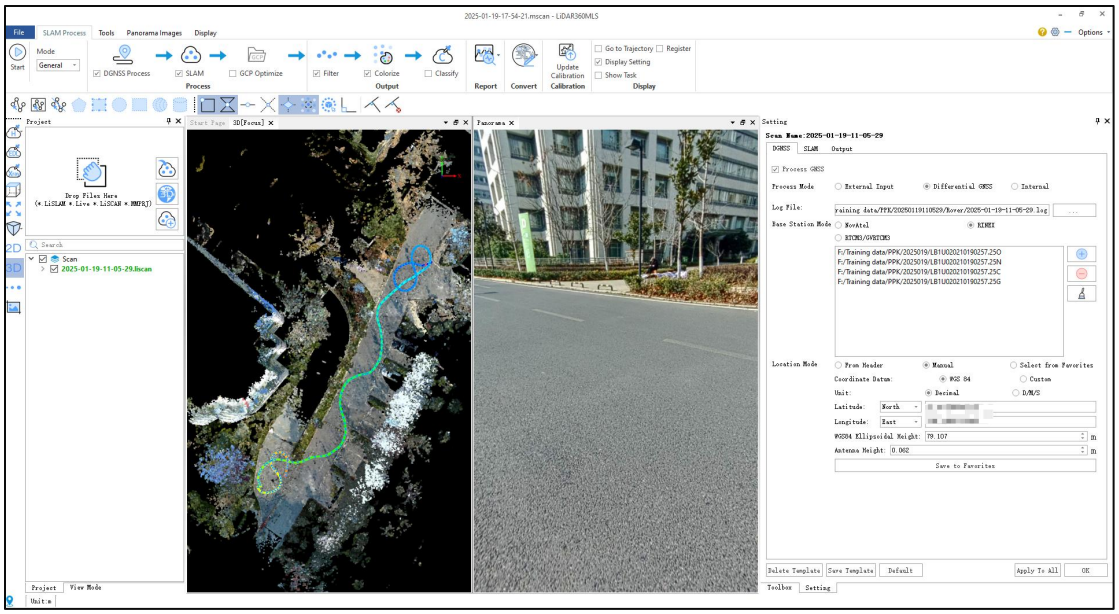
Configure the folder and file name for project saving. The default settings are usually sufficient. Click **Finish**.

10. 2. 3. Start SLAM Process

After entering the main interface, click the "**Start**" button. Wait for the program to complete, and the final Pointcloud data results will be generated.

If Open mode is selected during field data collection, the processing mode should also be set to Open.





10. 3. Batch process

There are two methods for adding projects in batch process, each corresponding to the two project creation methods described above:

① A single lislam index can contain multiple sub-projects, or multiple lislam indexes can be added according to the steps in 10.1. All added projects will be displayed in the directory tree on the left.

② Projects can be created sequentially using the project wizard as described in 10.2. All created projects will be displayed in the directory tree on the left.

Both methods can be used in combination for batch processing. Once all projects to be batch processed have been added, click Start Process to begin.

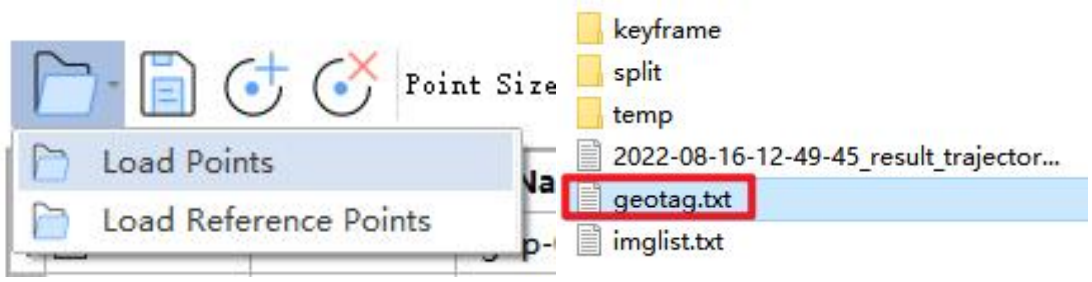
The mode in the SLAM processing workflow applies only to the activated project, while the selected processing and output workflows apply to all batch processed data. Therefore, when performing batch processing, ensure that the workflow is selected according to the process that needs to be executed most frequently in the data.

10. 4. SLAM process with control points (GCP)

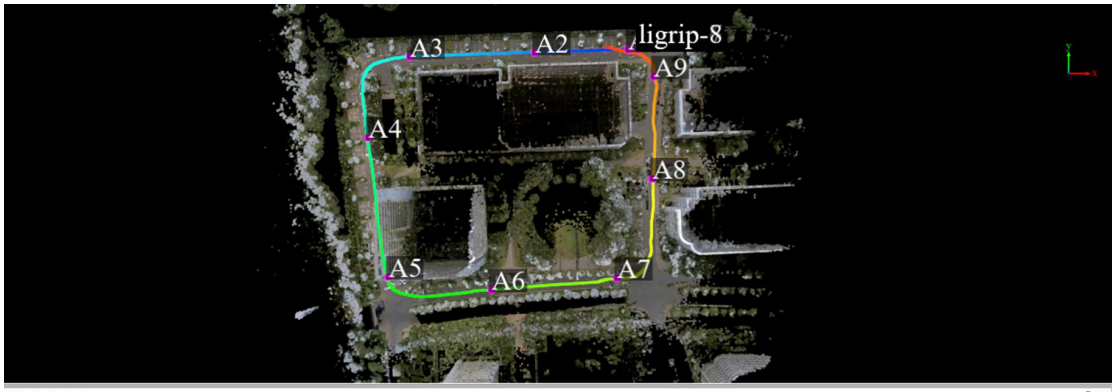
Please complete the SLAM process in advance to obtain the processed project.

10. 4. 1. Enable GCP function

Click GCP Optimization on the interface.  In the Point pairs registration interface, the software will automatically load the points to be registered, or you may manually select geotag.txt or another file containing the points to be registered.



After opening, the interface will be displayed as follows:



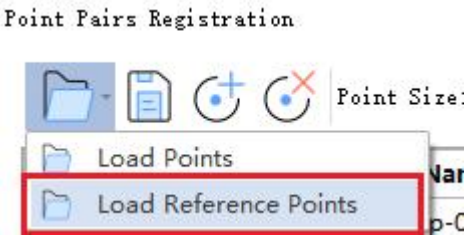
Point Pairs Registration

Point Size: 10

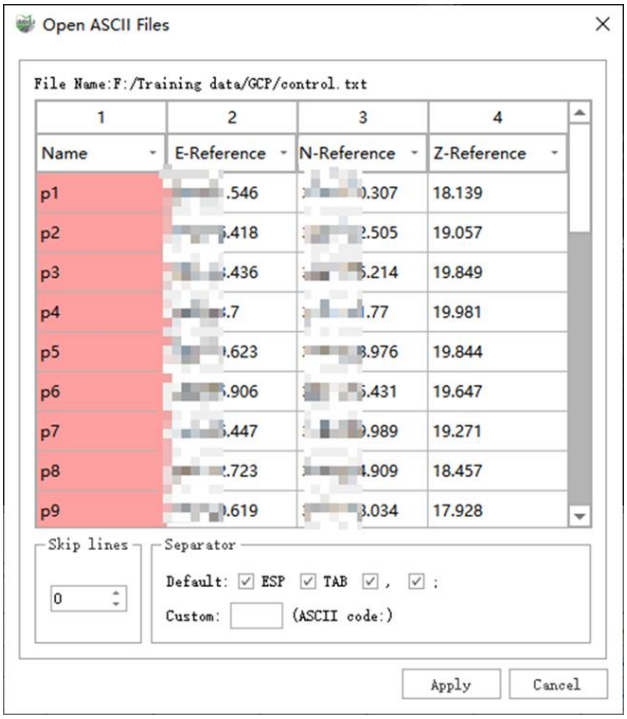
	Selected	ID	Name	E-[Reference]	N-[Reference]	Z-[Reference]	X-[Alignment]	Y-[Alignment]	Z-[Alignment]	Error	Dx	Dy	Dz
1	☑	1	ligrip-0	0.000	0.000	0.000	-4.880	-0.197	-0.114	0.000000	0.000000	0.000000	0.000000
2	☑	2	ligrip-1	0.000	0.000	0.000	-49.501	-1.653	-0.053	0.000000	0.000000	0.000000	0.000000
3	☑	3	ligrip-2	0.000	0.000	0.000	-109.457	-3.598	-0.394	0.000000	0.000000	0.000000	0.000000
4	☑	4	ligrip-3	0.000	0.000	0.000	-129.474	-42.298	-0.702	0.000000	0.000000	0.000000	0.000000
5	☑	5	ligrip-4	0.000	0.000	0.000	-119.831	-109.136	-0.855	0.000000	0.000000	0.000000	0.000000
6	☑	6	ligrip-5	0.000	0.000	0.000	-70.376	-115.127	-0.274	0.000000	0.000000	0.000000	0.000000
7	☑	7	ligrip-6	0.000	0.000	0.000	-10.269	-109.405	0.457	0.000000	0.000000	0.000000	0.000000
8	☑	8	ligrip-7	0.000	0.000	0.000	6.736	-61.979	0.171	0.000000	0.000000	0.000000	0.000000
9	☑	9	ligrip-8	0.000	0.000	0.000	7.332	-13.114	-0.199	0.000000	0.000000	0.000000	0.000000

10. 4. 2. Load Reference Points

In the Point pairs registration interface, click "**Load Reference Points**".



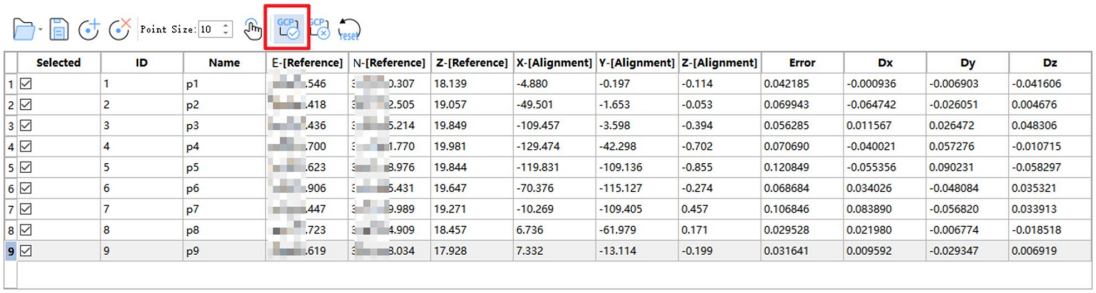
Configure the columns corresponding to NEZ, then click "**Apply**".



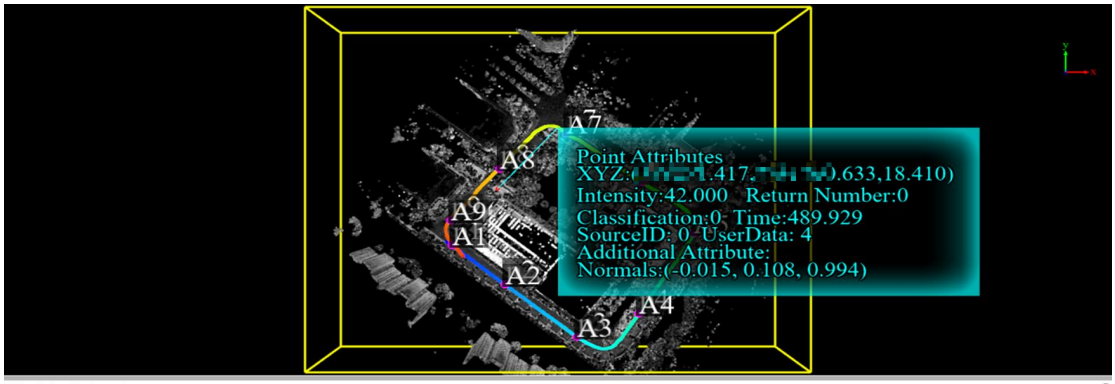
10. 4. 3. Apply GCP Transformation

Click 

Apply GCP



	Selected	ID	Name	E-[Reference]	N-[Reference]	Z-[Reference]	X-[Alignment]	Y-[Alignment]	Z-[Alignment]	Error	Dx	Dy	Dz
1	☑	1	p1	.546	0.307	18.139	-4.880	-0.197	-0.114	0.042185	-0.000936	-0.006903	-0.041606
2	☑	2	p2	.418	2.505	19.057	-49.501	-1.653	-0.053	0.069943	-0.064742	-0.026051	0.004676
3	☑	3	p3	.436	5.214	19.849	-109.457	-3.598	-0.394	0.056285	0.011567	0.026472	0.048306
4	☑	4	p4	.700	1.770	19.981	-129.474	-42.298	-0.702	0.070690	-0.040021	0.057276	-0.010715
5	☑	5	p5	.623	8.976	19.844	-119.831	-109.136	-0.855	0.120849	-0.055356	0.090231	-0.058297
6	☑	6	p6	.906	5.431	19.647	-70.376	-115.127	-0.274	0.068684	0.034026	-0.048084	0.035321
7	☑	7	p7	.447	9.989	19.271	-10.269	-109.405	0.457	0.106846	0.083890	-0.056820	0.033913
8	☑	8	p8	.723	4.909	18.457	6.736	-61.979	0.171	0.029528	0.021980	-0.006774	-0.018518
9	☑	9	p9	.619	8.034	17.928	7.332	-13.114	-0.199	0.031641	0.009592	-0.029347	0.006919



Point Pairs Registration

Point Size: 10

	Selected	ID	Name	E-[Reference]	N-[Reference]	Z-[Reference]	X-[Alignment]	Y-[Alignment]	Z-[Alignment]	Error	Dx	Dy	Dz
1	☑	1	p1	.546	.307	18.139	.547	.309	18.136	0.000000	0.000000	0.000000	0.000000
2	☑	2	p2	.418	.505	19.057	.419	.504	19.054	0.000000	0.000000	0.000000	0.000000
3	☑	3	p3	.436	.214	19.849	.435	.213	19.848	0.000000	0.000000	0.000000	0.000000
4	☑	4	p4	.700	.770	19.981	.701	.769	19.982	0.000000	0.000000	0.000000	0.000000
5	☑	5	p5	.623	.976	19.844	.624	.976	19.844	0.000000	0.000000	0.000000	0.000000
6	☑	6	p6	.906	.431	19.647	.906	.432	19.646	0.000000	0.000000	0.000000	0.000000
7	☑	7	p7	.447	.989	19.271	.445	.989	19.271	0.000000	0.000000	0.000000	0.000000
8	☑	8	p8	.723	.909	18.457	.724	.908	18.457	0.000000	0.000000	0.000000	0.000000
9	☑	9	p9	.619	.034	17.928	.617	.034	17.935	0.000000	0.000000	0.000000	0.000000

10. 4. 4. GCP Restore (optional step)

If the result after GCP transformation is unsatisfactory, or if the control points were entered incorrectly, you may click 

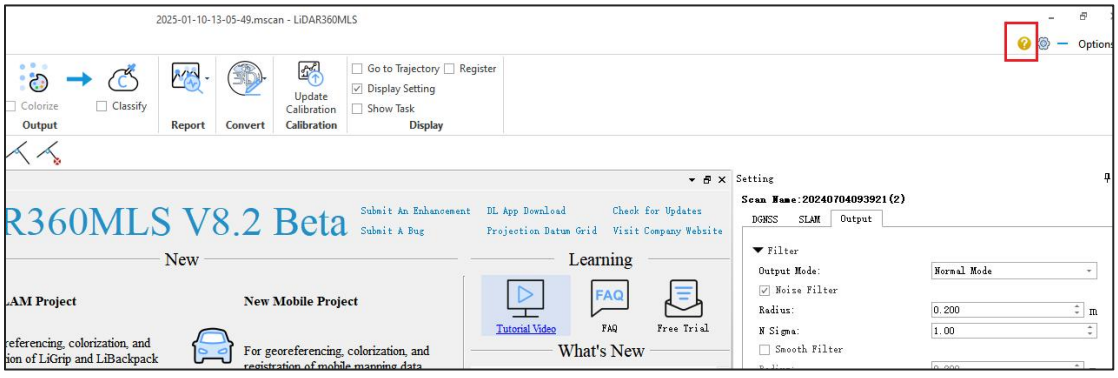
to restore the pointcloud to its original state.

11. Other Tools

For functions such as data export, accuracy verification, pointcloud extraction, and merging, please refer to the LiDAR360 MLS Product Manual.

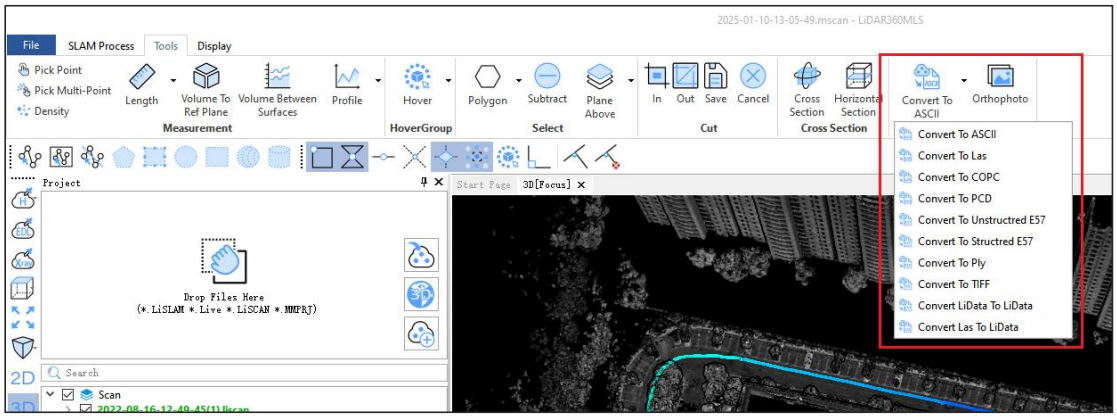
11. 1. Open LiDAR360 MLS Manual

After launching the software, click the Help button in the upper right corner.  Button.



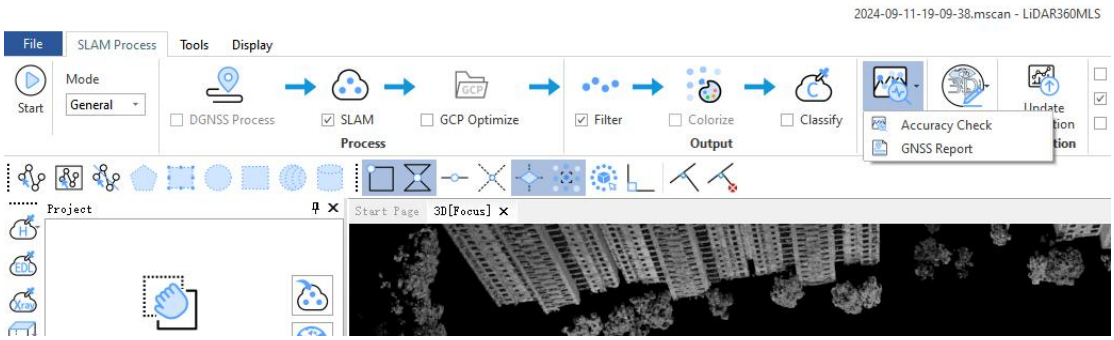
11. 2. Data Export

In the Tools tab, the export function allows pointclouds to be exported in formats such as ASCII, LAS, COPC, PCD, E57, PLY, and TIFF.



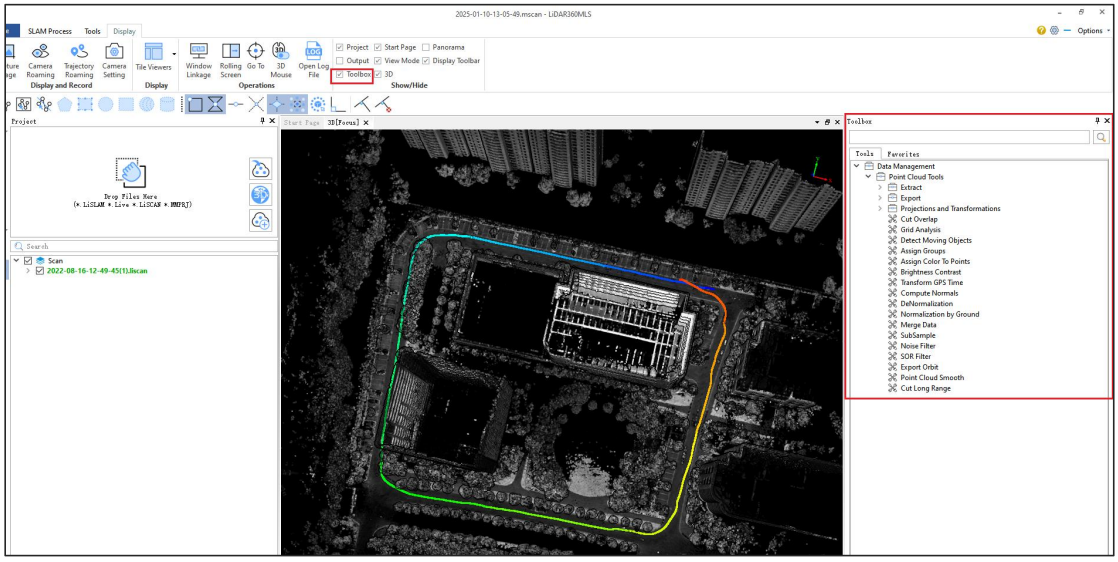
11. 3. Accuracy Verification

The accuracy verification function enables users to assess the absolute accuracy of the data by importing check points.



11. 4. Toolbox

The toolbox includes pointcloud extraction, export, projection and coordinate transformation, as well as other pointcloud tools.



12. Description of Other Optional Accessories

12. 1. Telescopic Pole Adapter

LiGrip O2 is mounted to the telescopic pole via the telescopic pole adapter, supporting data collection and GCP Collection in pole mode.

When using the telescopic pole, ensure that you select the telescopic pole mode when creating a collection task.

12. 1. 1. Telescopic Pole Kit Installation

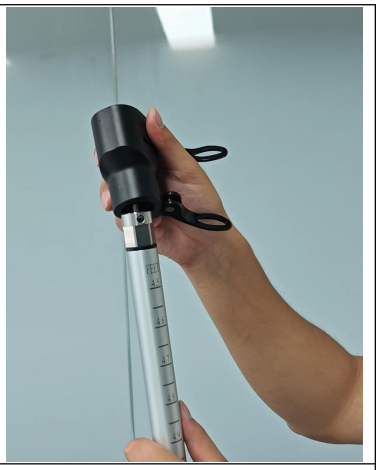
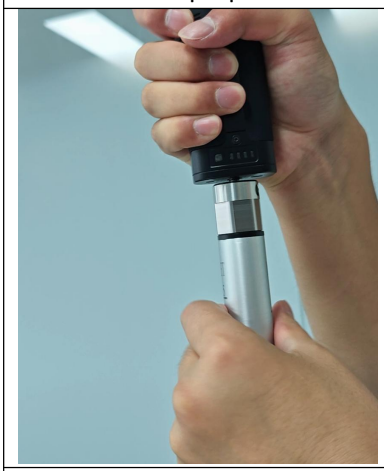
① Extend the telescopic pole to the desired position and lock it securely.

② Install the connector and tighten it firmly.

③ Install the battery clamp by sliding it onto the telescopic pole from top to bottom, with the narrow end facing downward and the wide end facing upward.

④ Remove the device base stand, align the screw hole at the bottom of the battery with the adapter, and tighten securely.

⑤ Use the clamp to secure both the battery and the telescopic pole.

		
① Adjust the height of the telescopic pole.	② Tighten the adapter nut.	③ Insert the battery fixing clamp.
		
④ Install the handle battery.	⑤ Secure the battery clamp.	Installation complete.

12. 1. 2. Telescopic Pole Kit Disassembly.

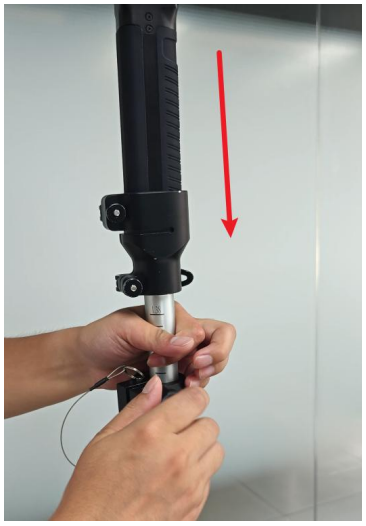
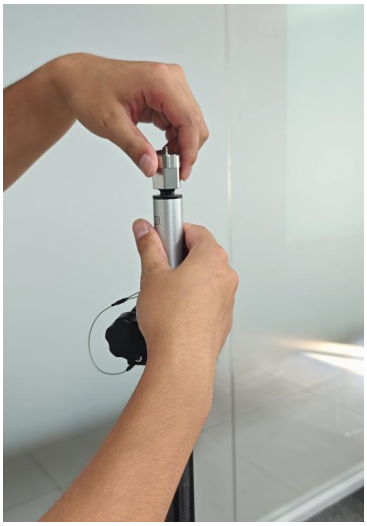
① Shorten the extension pole (do not shorten to the minimum length), then tighten to secure.

② Release the battery clamp latch to loosen the clamp.

③ Loosen the screw at the interface between the battery and the telescopic pole, then remove the battery and device.

④ Slide upward to remove the battery clamp.

⑤ Loosen and remove the adapter nut.

<table>
<tr><td>  </td><td> 
</td><td>  </td></tr>
<tr><td>① Shorten the telescopic pole.</td><td>② Loosen the battery clamp.</td><td>③ Loosen and remove the battery and device.</td></tr>
<tr><td colspan="2">  </td><td>  </td></tr>
<tr><td colspan="2">④ Remove the battery clamp.</td><td>⑤ Remove the adapter.</td></tr>
</table>

12. 2. Frontpack kit

The Frontpack kit vest can secure both the device and mobile phone, with adjustable angles in all directions to enable flexible operation.

The Frontpack kit is intended solely for Frontpack data collection. No additional configuration is required during data collection; however, please ensure the device remains stationary during initialization.

12. 2. 1. Frontpack Kit Installation

① Wear the Frontpack kit vest and fasten all latches.
② Open the support device latch, slide the corresponding slot into the support device from above, and secure the latch once it is in the appropriate position.
③ Tighten the support device fixing screw to prevent horizontal movement.
④ Align the battery with the positioning hole on the support bracket and tighten the screw to secure it.
⑤ Align the holes to install the mobile phone holder and tighten the knob (omit this step if the mobile phone holder is not required).

		
① Wear the Frontpack kit vest.	② Secure the support device.	③ Secure the horizontal nut.
		
④ Install the handle battery.	⑤ Install the mobile phone holder.	Installation complete.

12. 2. 2. Frontpack Kit Disassembly.

① Loosen the device battery fixing knob and remove the device.
② Loosen the mobile phone holder knob and remove the mobile phone holder.
③ Lift the latch upward and slide out the support rod.
④ Release all vest locks and remove the vest.

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>① Loosen the knob and remove the device.</td><td>② Remove the mobile phone holder.</td><td>③ Remove the support rod.</td></tr>
<tr><td colspan="3">  </td></tr>
<tr><td colspan="3">④ Open all latches and remove the vest.</td></tr>
</table>

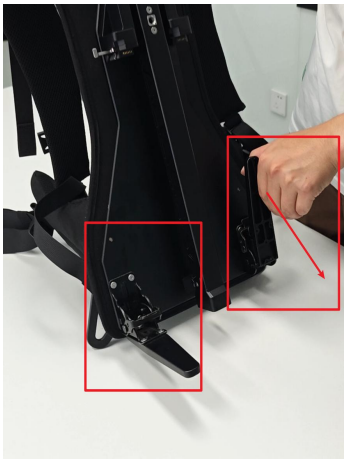
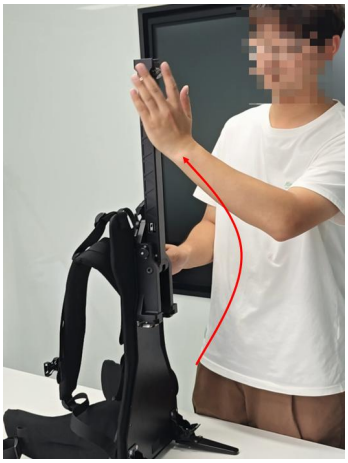
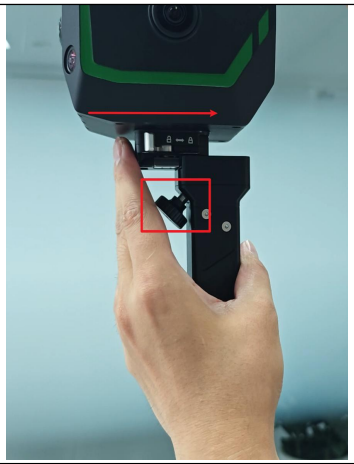
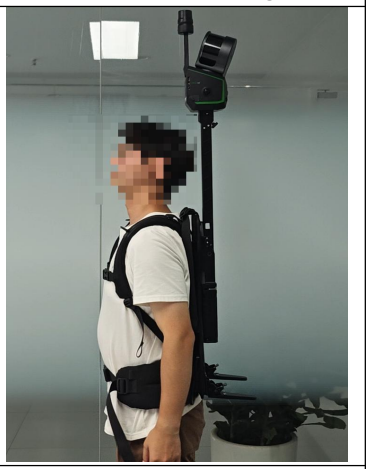
12. 3. Backpack kit

The backpack kit supports extended device backpack data collection and dual-battery power supply.

The Backpack kit is for backpack data collection only. No additional setup is required during data collection; however, please ensure the device remains stationary during initialization.

12. 3. 1. Backpack Kit Installation

① Unfold the support legs on both the left and right sides at the bottom of the kit.
② Extend the folding rod until it is vertical.
③ Rotate the knob to secure the folding rod.
④ Open the battery locking handle, install the battery, and close the locking handle.
⑤ Install the Device Main Body, secure the locking handle, and then tighten the fixing knob.

		
① Unfold the base.	② Extend the folding rod.	③ Secure the folding rod.
		
④ Install the battery.	⑤ Install the Device.	Assembly complete.

12. 3. 2. Backpack Kit Disassembly.

① Unscrew the device fixing knob and open the main unit fixing wrench.

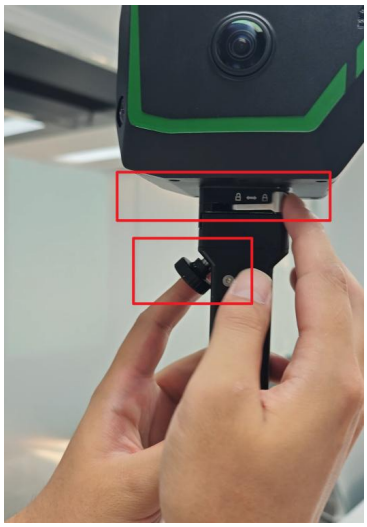
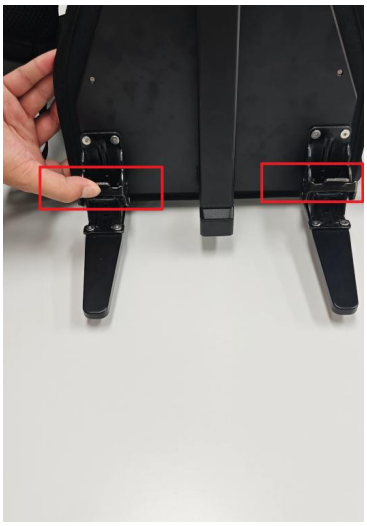
② Press the anti-drop button and slide out the device (ensure the device is held securely).

③ Open the battery securing wrench, press the battery retention button, and sequentially remove both batteries.

④ Loosen the folding rod fixing knob.

⑤ Release the folding rod locking latch and lower the folding rod.

⑥ Sequentially lift the left and right base wrenches upward to retract the base.

		
① Loosen the knob and securing wrench.	② Slide out the device.	③ Remove the batteries.
		
④ Loosen the folding rod knob.	⑤ Retract the folding rod.	⑥ Lift the wrench upward to retract the base.