GreenValley International

LiGrip H300 Product Manual

(Version B.00）

Preface

Product Manual Use

This user manual describes the assembly, data collection, processing, and other operational procedures of the LiGrip H300 (Version B.00)and its backpack kit.

Scope of Application

Applicable to LiGrip H300 (Version B.00) products.

Safety Technical Tips

Cautions: The places that need your attention when you operate, please read it carefully. If you don't follow the requirements, it may cause equipment damage, data loss, incorrect data, system crashes and so on.

Disclaimer

Before operating the device, please be sure to read this user manual carefully. This will help you use the product better. Our company is not responsible for any losses caused by operating the product without following the instructions in the manual or by misinterpreting the requirements of the manual. Our company is committed to continuously improving product features and performance, enhancing service quality, and reserves the right to change the contents of the user manual without prior notice.

We have checked the consistency of the content described in the printed materials with the hardware and software, but deviations may still exist. The images in the user manual are for reference only. If there is any discrepancy with the actual product, please refer to the actual product.

Camera settings are pre-set by us and should never be changed on your own except for special acquisition needs, otherwise, there may be no video files, wrong color attached, no color attached, etc.

Your Suggestions

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

1. Product Structure

1. 1. Product Composition

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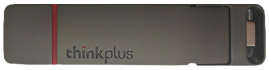
9 

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1. **Handheld device main unit *1**

For LiDAR, IMU, and video file data.

2. **Handheld device battery compartment*1**

For storing LiDAR, IMU, and GNSS data and sending control commands.

3. **Back strap*1**

For carrying the battery compartment.

4. **Main unit power cable*1**

For powering the main unit and transmitting data during collection.

5. **Data transmission cable*1**

For copying the raw radar, IMU, and GNSS data collected.

6. **B58 battery*2**

For powering the entire unit.

7. **Laser scanner protective cover*1**

To protect the LiDAR device.

8. **Battery charger*1**

For charging the B58 batteries.

9. **USB flash drive*1**

For the data transfer in case of copying.

10. **Transport case*1**

For storing and transporting equipment.

11. **Backpack kit (optional)**

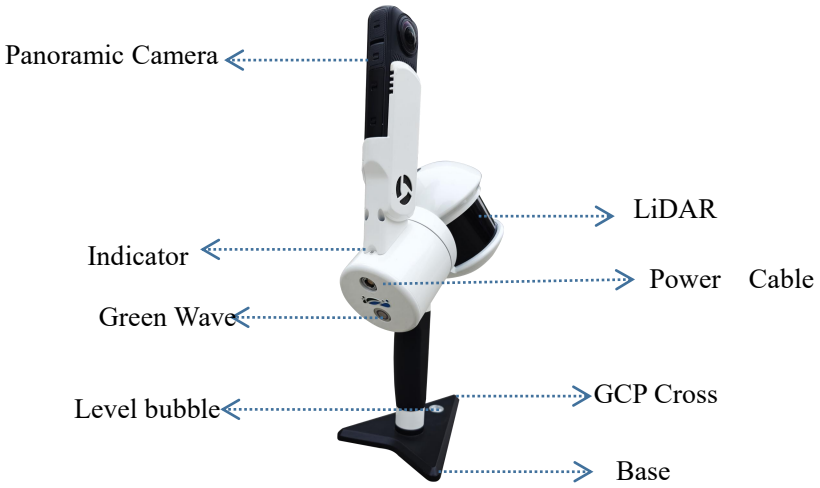
Backpack kit with its own GNSS device.

12. **RTK module (optional)**

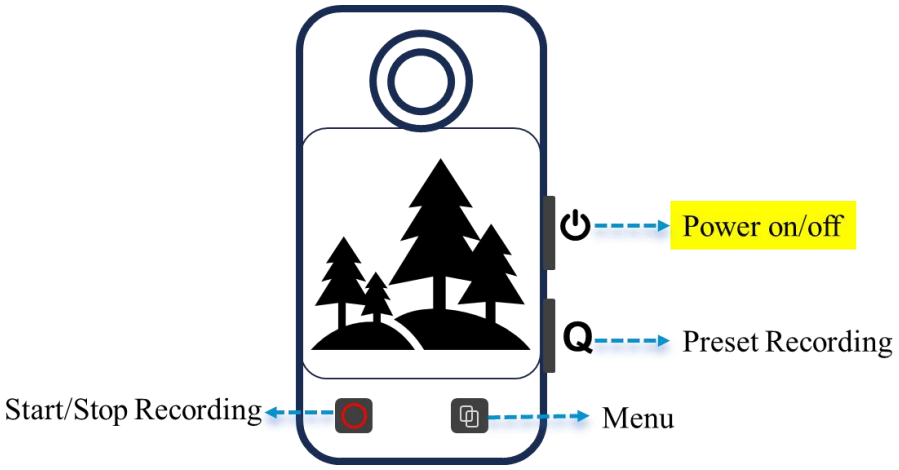
Support real-time RTK-SLAM scanning.

1. 2. Component Description

1. 2. 1. Product Components

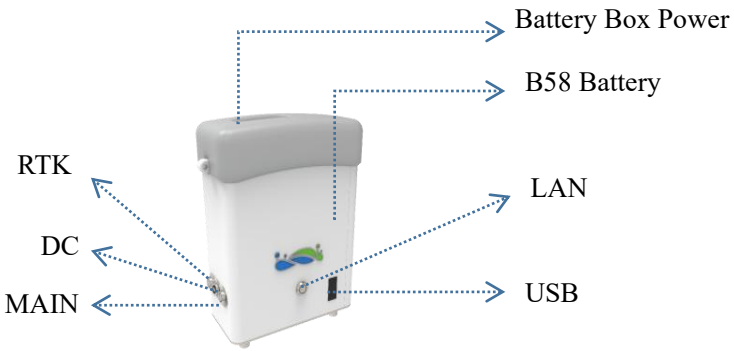


1. 2. 2. Introduction to Panoramic Camera Buttons

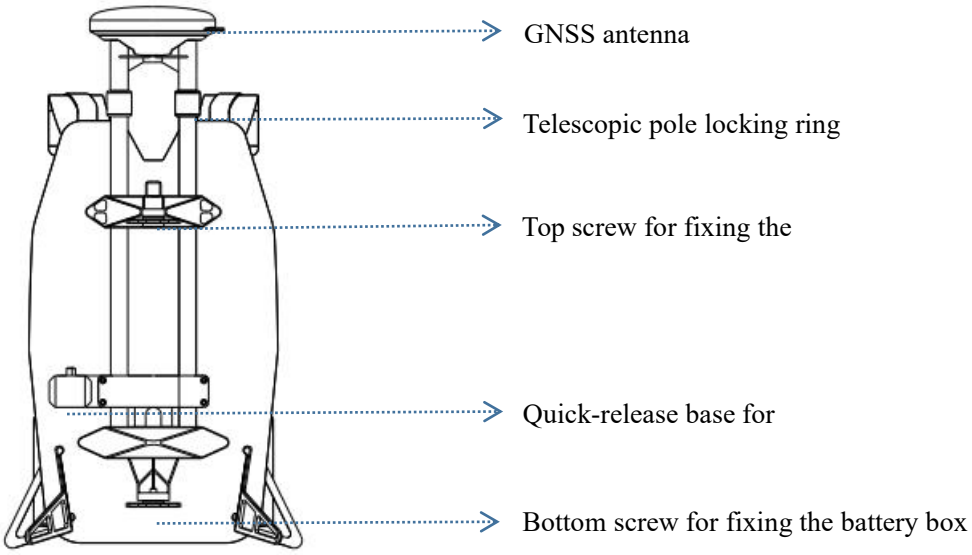


After the camera is turned on, there is no need to manually set the camera mode and start/end recording. The camera will automatically record and stop with the LiDAR.

1. 2. 3. Battery Box Components



1. 2. 4. Backpack Kit



2. Device Installation

2. 1. H300 Handheld Mode Assembly

2. 1. 1. Battery Installation

Insert the power button into the battery towards the outer power hole direction.

2. 1. 2. Host Power Cable Installation

Connect one end of the host power cable to the handheld end and the other end to the MAIN port of the battery box; align the red dots and insert until you hear a click, indicating a successful connection.

2. 1. 3. Attach the Strap and Remove the Protective Cover

Fix both sides of the strap to the battery box clips; remove the protective cover of the laser.

When connecting the strap and removing the protective cover, please ensure to hold the host device steadily.

The H300 handheld mode assembly is complete, as shown below:

2. 2. Backpack Mode Assembly

When installing the backpack kit, it is best to have two people install it together to ensure the safety of the device.

2. 2. 1. Extend the Telescopic Pole

The telescopic pole must be fully extended and the locking ring tightened. If it is not fully extended, it will result in inaccurate measurements.

2. 2. 2. Battery Box Installation

Align the bottom of the battery box with the screws at the bottom of the backpack kit and tighten.

2. 2. 3. Removing the Base Stand

Loosen the screws at the bottom of the base stand and remove the base stand.

2. 2. 4. Fix the Host

Fix the H300 host in the top slot and tighten the screws.

2. 2. 5. Install the GNSS Module

Slide the plug at the bottom of the GNSS module to the right side of the base of the backpack kit until you hear a click, indicating it is locked. To remove it, press the raised latch and slide it to the left.

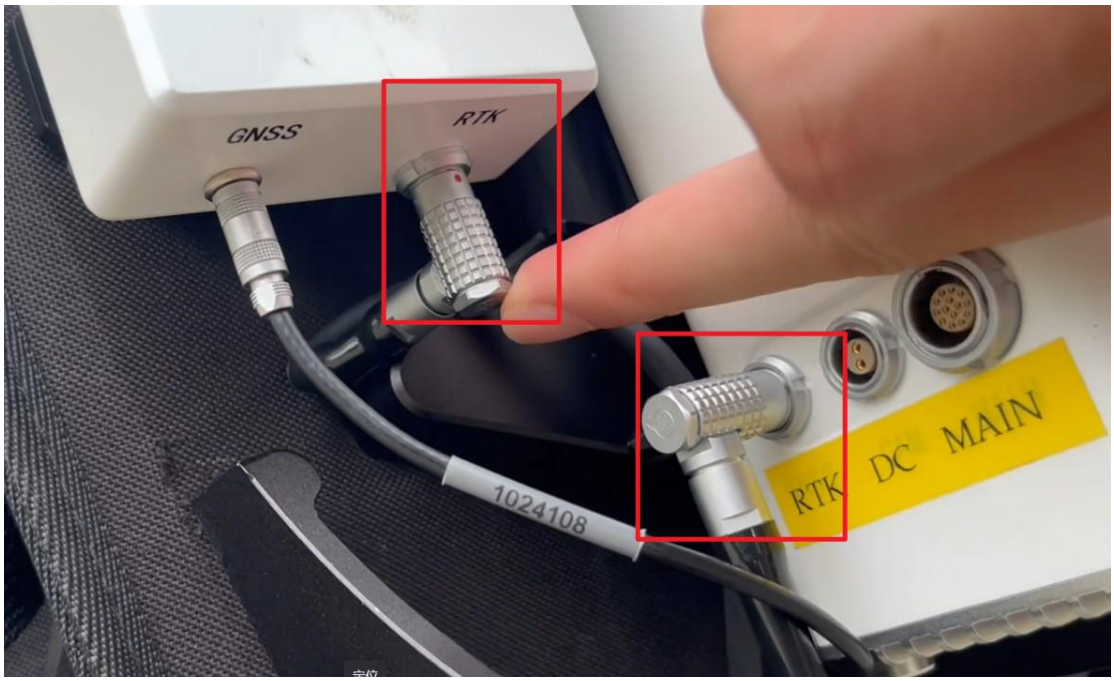
2. 2. 6. Cable Connection

（1）GNSS Feeder Cable

Connect the GNSS feeder cable to the GNSS port at the bottom of the GNSS module.

（2）RTK Connection Cable

Insert the cable into the RTK port of the battery box and the GNSS module respectively.



（3）Power Cable

Connect the power cable to the MAIN port of the H300 host device and the battery box.

The backpack kit installation is completed as follows:

3. Device Power On/Off

3. 1. Device Power On

3. 1. 1. Host Power On

Short press the battery for 1s, then long press for 2s to power on. The device indicator light on the handheld part will flash quickly and then turn to ever bright, indicating normal power on.

Indicator Light Flashing

Green Always On

3. 1. 2. Camera Power On

Short press the black button on the camera, the camera screen will turn on and stay bright, and the camera indicator light will turn light blue.

3. 2. Device Shutdown

To shut down the device via the APP, click 'Shutdown' on the APP. Once the APP shows the connection is disconnected, short press and then long press the battery power button. The battery

indicator light will turn off, indicating the device has shut down.

If the device is not connected through the APP, you can directly short-press and then long-press the battery to shut it down.

The camera does not need to be manually turned off. It will automatically shut down once the device stops supplying power.

4. Registration and Activation

4. 1. Software Download

APP Requirements for Phone/Tablet:

Android Version: System version 8.0 and above; Memory greater than 6 GB.

Apple Version: System version iOS12 and above; Processor A10 and above.

Ensure the APP is up to date before data collection, you can upgrade online through the 'Version Upgrade' button.

Device registration, project management, coordinate system settings, RTK configuration, and real-time point cloud browsing must be done through the GreenValley APP.

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

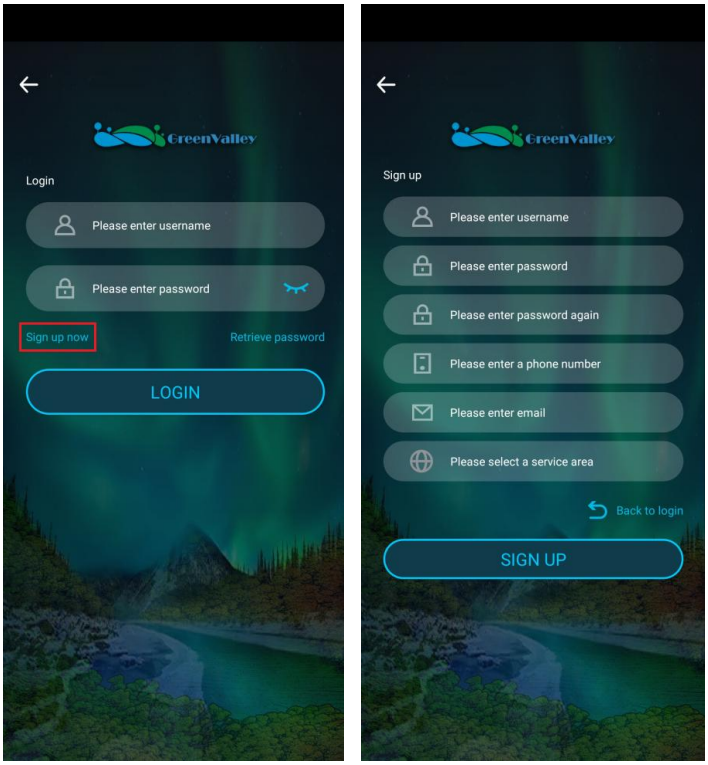
Or scan the QR codes below to download (Left: iOS, Right: Android)

4. 2. Registration and Login

Register and activate using email.

When logging into the APP for the first time, click 'Sign up Now' on the login screen and enter basic information such as email, username, and password to complete the registration.

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



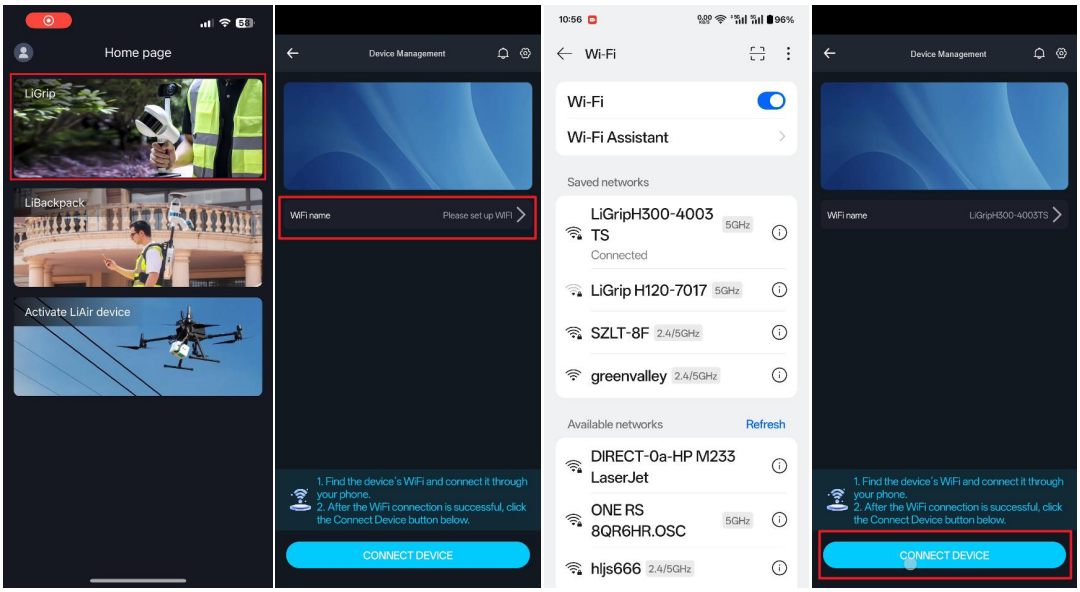
4. 3. Device Activation

4. 3. 1. Connect the Device

（1）Select equipment model

After the device is powered on and the APP is opened, select LiGrip and connect the device to WiFi.

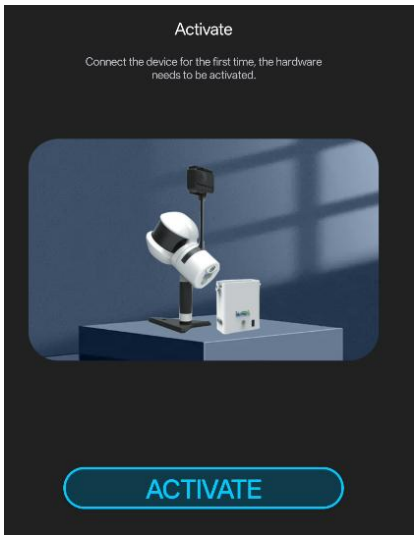
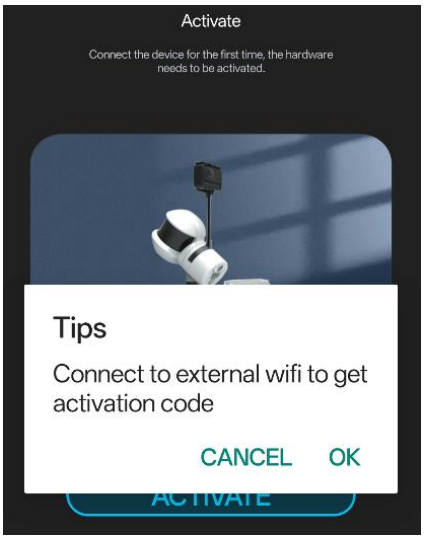
（2）Connecting the device's WiFi

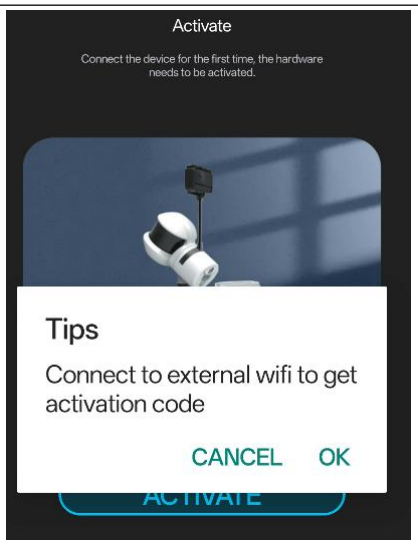
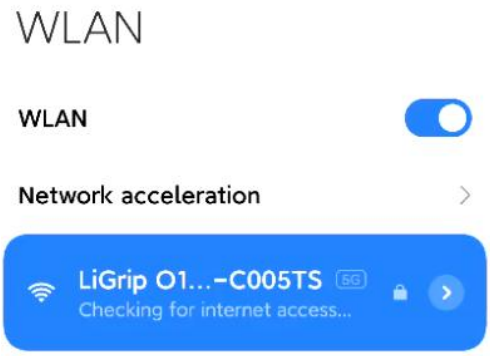
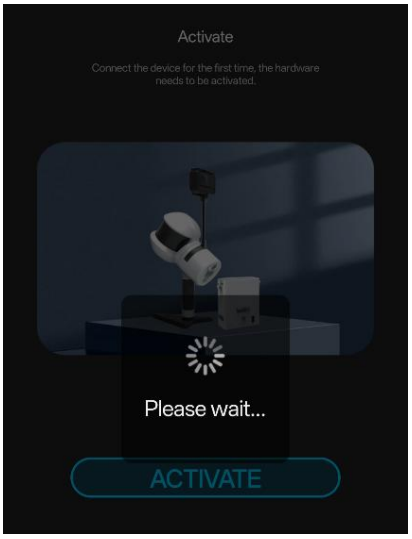
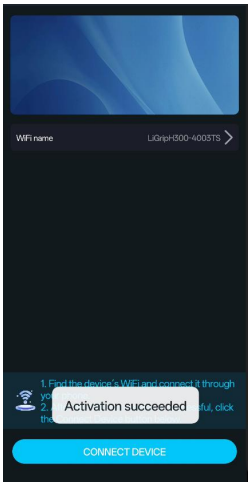


Device WiFi: LiGrip H300-** (last four digits of SN)　　Password: greenvalley**

4. 3. 2. Activate Device

When you connect the device for the first time, the activation status bar will show unactivated, you can click the activation status to activate it. After the APP pops up the activation window, follow the prompts to operate and activate it.

	
Activation screen	Prompt to switch WiFi, click OK

	
Disconnect the device's WiFi	Connect to the Internet and return to the APP interface
	
Upload activation code, OK	Connect the device's WiFi
	
Activating	Activation status shows activated, device can be rebooted

5. Status and Meaning of the Data Collection Indicator Light

5. 1. Device Status Indicator Light

Indicator Light	Display Status	Meaning
Device status	Green fast flash	The device is initializing, collecting Ground Control Points (GCPs), or saving data.
	Green slow flash	The device is collecting data.
	Green Ever Bright	The device is ready.
	Red Ever Bright	The device is inactive or less than 5% of current available memory.

5. 2. RTK Light Status and Explanation

Indicator Light	Display Status	Meaning
RTK	Green fast flash	The device is initializing or searching for satellites.
	Green slow flash	Unfixed solution
	Green Ever Bright	Fixed solution
4G	Green Ever Bright	4G Network Normal
POW	Green Ever Bright	RTK module power supply is normal

6. Selection of Initialization Position

A better initialization position can meet the requirements for the normal operation of the initialization program of the device and is a prerequisite for obtaining better data.

6. 1. When Working with the RTK Module

(1) Place the device on stable ground or a platform.

(2) Ensure a good satellite search environment with a recommended satellite count of ≥20; for RTK positioning, a fixed solution (RTK light ever bright) is required, with both horizontal and vertical standard deviations less than 0.05.

(3) Avoid areas with strong electromagnetic interference.

(4) Do not initialize in areas with high pedestrian or vehicular traffic.

(5) Avoid initializing in empty areas, such as squares or sports fields.

6. 2. When Operating without an RTK Module

(1) Place the device on stable ground or a platform. For indoor operations, place the device on the floor.

(2) Avoid initializing in doorways or areas with high pedestrian/vehicle traffic.

(3) Avoid initializing in empty areas, such as squares or sports fields.

(4) When initializing in a mine, position the device in the direction of the mine's progression.

Please ensure the device remains stationary during initialization.

7. Start Data Collection

Check that the laser protective cover is removed before starting acquisition.

7. 1. LiGrip Mode Data Collection

7. 1. 1. Use the APP for Data Collection (Recommended)

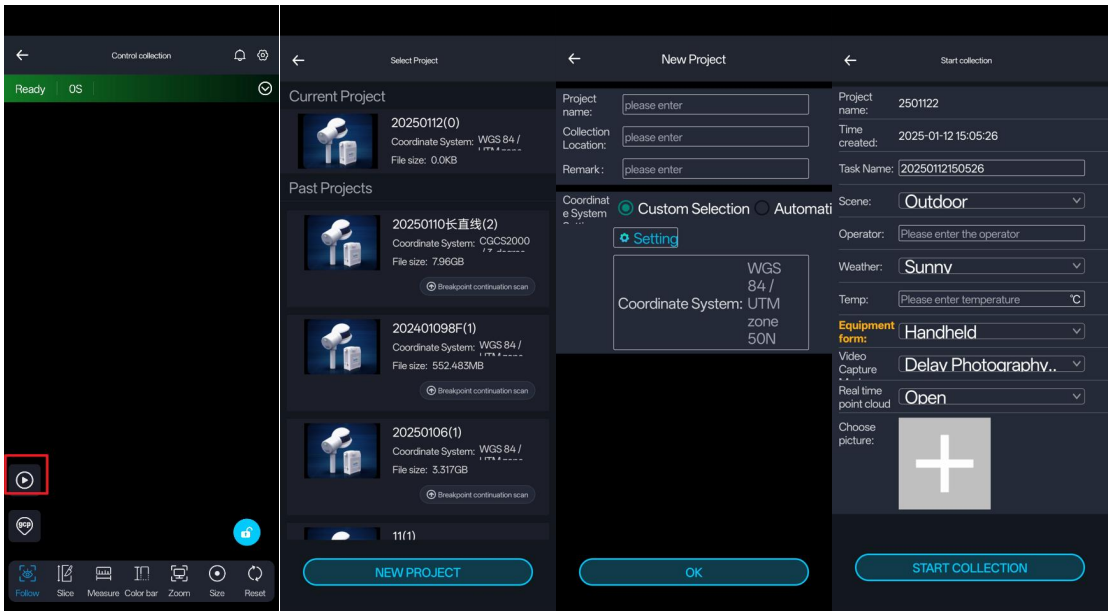
（1）New Acquisition

After connecting the device through the APP, there are two ways to create a new task. Click Start Collection, select an existing historical project, or create a new project.

① If you choose to create a new project, fill in the project name, and collection location, and set parameters such as the coordinate system. Then select the newly created project to create a new task.

② If you select a historical project, you can use an already created project and then establish a task.

Tasks will be saved under the selected project, so please ensure you choose the correct project.



Task information can include the task name, scene, weather, temperature, and on-site photos of the current task.

（1） Project Name: Displays the project to which the current collection task belongs;

（2） Creation Time: Displays the time when the current project was created;

（3） Mission Name: The system generates a default task name, allowing users to modify the name of the current collection task. Please try to avoid spaces;

（4） Scene: Select the collection environment of the current scene, including outdoor, indoor, cave, and tunnel;

（5） Operator (optional): Records the current operator;

（6） Weather (optional): Records the current weather conditions;

（7） Temp (optional): Records the current temperature;

（8） Equipment form: Select the mode of the device during operation, including handheld, backpack, airborne, car;

（9） Video Collection Mode: Devices with external cameras need to choose between delay photography mode or video for image collection;

（10） Real-time Point cloud: Off by default, choose whether to save the real-time point cloud or not; the real-time point cloud must be turned on for the breakpoint renewal operation;

（11） Choose picture (Optional): You can take a picture of the current collection environment to facilitate subsequent data analysis.

Camera mode defaults to time-lapse mode, time-lapse mode is recommended to work within

60 minutes.

Video recording mode acquisition time is recommended to control within 30 minutes.

Except for the task name, all other fields are optional; Device morphology and parameters vary from device to device.

（2）Initialization

After clicking start data collection, the device enters initialization. The APP provides a voice prompt, and the data collection status indicator light will be in a **fast flash** state;

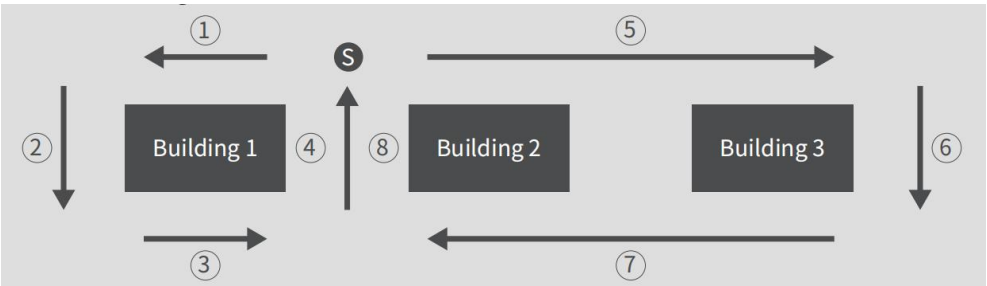
Wait for the APP device status to change from 'Preparing for collection' to 'Collecting', and when the APP voice prompts 'The device is collecting' (status light flashing slowly), the initialization is complete.

During initialization, it is important to remain still. Please refer to Chapter 6 for initialization guidelines.

（3）Start Data Collection

After initialization is complete, slowly pick up the device to collect data. Click on real-time point cloud to observe real-time point cloud status, trajectory, device status, etc.

Due to the cumulative error of SLAM without GNSS, a close loop is required. Therefore, please plan your route according to the following principles.



As shown in the figure above, start from S, then perform close-loop operations as much as possible (follow the sequence of the numbers in the figure), and finally return to the original point (repeat the path for 5-10 meters).

Note: If the APP interface prompts ' Current card speed is too low, do you want to stop collecting? ', it is recommended to stop collecting, back up the data, and format the SD card before proceeding.

（4）GCP Collection (Optional step)

If absolute coordinates are not required, this step can be skipped.

For cases where close-loop is not possible, or absolute coordinates need to be introduced,

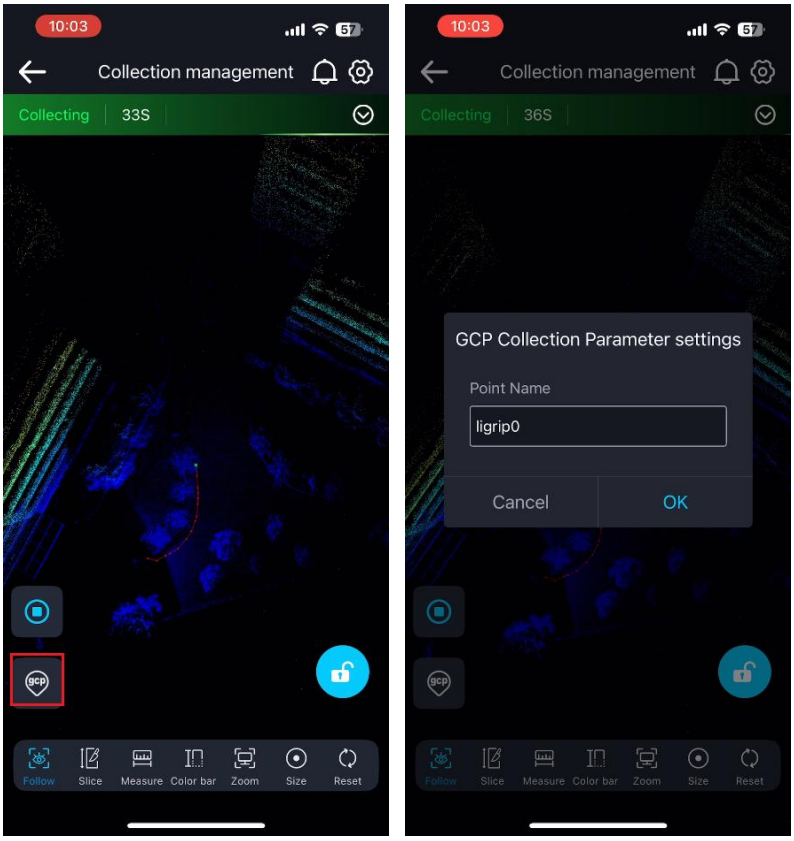
GCP collection is required to introduce coordinate positions or eliminate accumulated errors.

Slowly squat down, and align the GCP pointer with the position that needs GCP collection.

Click the GCP collection button on the APP screen (the name of the GCP can be changed, the default is LiGrip *, * is a number that increases automatically with each GCP collection), at this time the device status light will **fast flash**.

Note: When collecting GCPs, please keep the device stationary and ensure no people are gathered around to avoid affecting the accuracy of the GCP collection.

Wait until the APP indicates the end of the GCP collection, or the status light changes to **slow flash**, indicating the end of the collection.

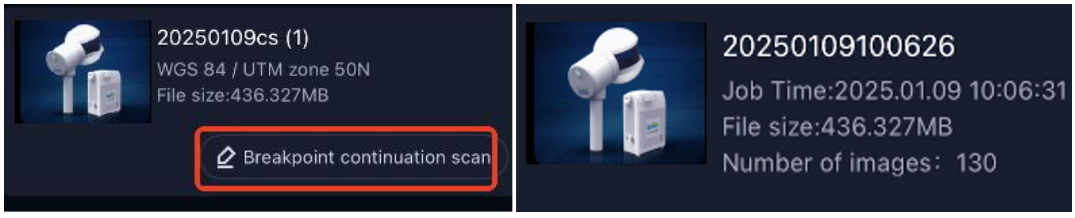


（5）Breakpoint Continuation Scan (Optional step)

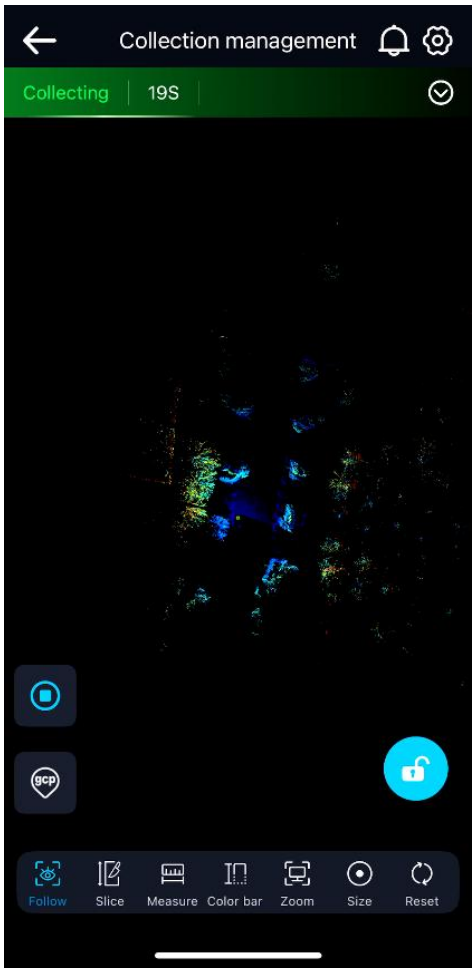
When collecting without GNSS, a breakpoint continuation scan can keep the spatial data consistent between different flights. Breakpoint continuation scan can be performed on collection tasks with the real-time point cloud.

The real-time point cloud must be turned on for the first point cloud acquisition of a renewal sweep, otherwise the renewal sweep match cannot be made. After selecting the task to continue scanning, the real-time point cloud will be turned on automatically for the subsequent tasks without user selection.

In the case of two consecutive stops in a breakpoint continuation scan, the starting point of the next stop should preferably be the endpoint of the previous stop, allowing for some deviation, but the distance between the two points should not exceed 2 meters, and the difference in the angle of equipment orientation should not exceed 15 degrees.

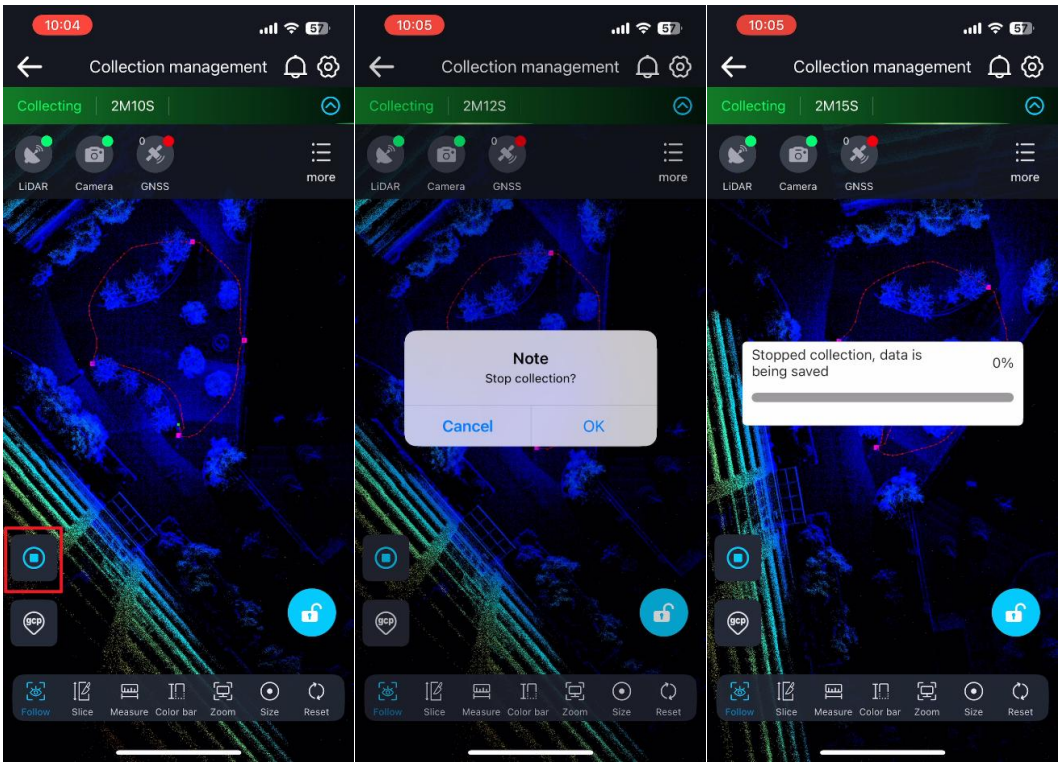


After selecting the project that needs continuation scanning, wait for the APP voice "**Continued scan matching successful, continuing scanning**", and when the status bar changes to " **Collecting** ", normal collection can proceed.



（6）End Data Collection

Place the device on the ground or platform. Press and hold the data collection button on the host until the status light changes to **fast flash**, then release. The indicator light will fast flash and then stay ever bright, indicating that the data has been saved. You can proceed with the next data collection or turn off the device.



After pressing the stop data collection button, you can move the device as soon as a progress bar appears and wait for the data to be saved.

7. 1. 2. Button-Based Data Collection

（1）New Collection

Press and hold the host button until it fast flashes, then release, keeping the device strictly stationary. At this point, the default is to create the new project at the internal time of the device.

（2）Initialization

Initialization and handheld mode use the APP for data collection in the same way.

（3）Start Data Collection

Starting data collection is similar to handheld mode using the APP, except that you cannot view real-time point cloud and device status.

（4）GCP Collection (Optional step)

GCP collection is similar to handheld mode using the APP, but you need to press the data collection button on the host device to collect GCPs. After pressing and releasing the data collection button, wait a few seconds. The indicator light will change from slow flash to fast flash and then back to slow flash, indicating a successful GCP collection.

（5）End Data Collection

Place the device on the ground or platform. Press and hold the data collection button on the host until the status light changes to **fast flash**, then release. The indicator light will fast flash and then stay ever bright, indicating that the data has been saved. You can proceed with the next data collection or turn off the device.

7. 2. Backpack Kit Data Collection

7. 2. 1. GNSS Configuration

Any GNSS configuration needs to be performed outdoors where there are satellites. If RTK and virtual base station services are not required, and a physical base station has been set up, you can start operations directly without any GNSS configuration.

（1）Network CORS settings (RTK mode)

Click the settings button in the upper right corner of the APP, select the RTK link, and then configure according to the RTK configuration parameters provided by the CORS service provider.

After successful configuration, the system will prompt configuration success. At this time, wait for the APP to display the fixed solution, or move the handheld to find a position that can be fixed.

RTK Configuration:

(1) Data Link: Default is the host network.

(2) Communication Protocol: Default is CORS.

(3) The server: Custom.

(4) PIN code: Some SIM cards have a PIN code lock. You need to contact the operator who provided your SIM card and fill it in here.

(5) APN Settings: Custom.

(6) Custom (APN): Optional. If the SIM card requires an APN account to access the internet, it needs to be configured according to the APN provided by the carrier.

(7) Username (APN): Optional. If the SIM card requires an APN account to access the internet, it needs to be configured according to the APN provided by the carrier.

(8) Password (APN): Optional. If the SIM card requires an APN account to access the internet, it needs to be configured according to the APN provided by the carrier.

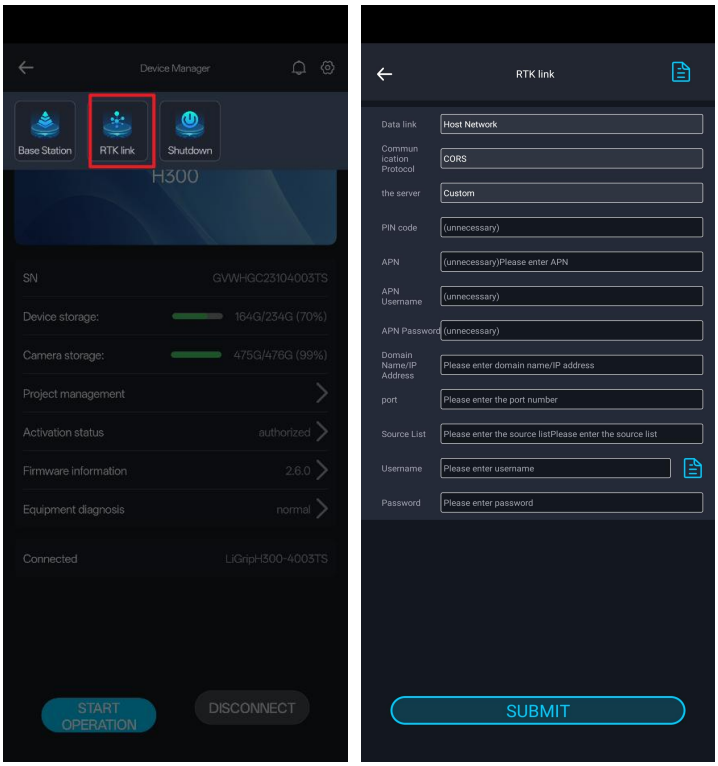
(9) Domain/IP address: Refers to the domain/IP address of the currently logged-in CORS account. The domain/IP address varies for different servers.

(10) Port: Users can select/input different ports based on the actual coordinate system requirements.

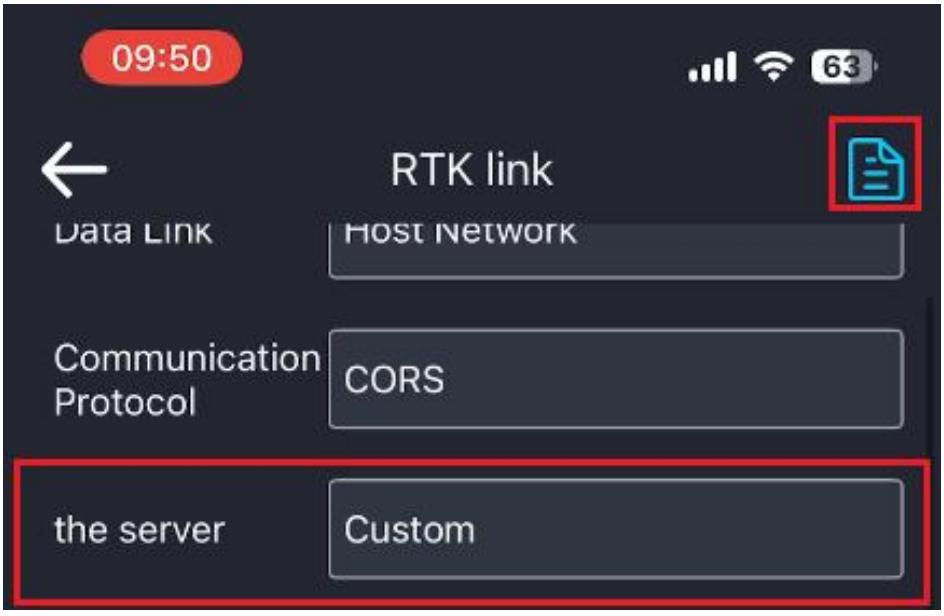
(11) Source list: Users can select/input different source lists based on different differential requirements, or they can automatically download the source list  .

Note: The source list can only be downloaded after entering the IP and port number.

(12) Username/Password: Refers to the CORS account and password for logging into the server. You can also choose previously configured accounts and passwords  .



For the server to choose the customized and successful configuration, the next time you configure again, you can directly call the history of the configuration record, and select the previous configuration record to complete the fast configuration.



（2）Physical base station setup (PPK mode)

For physical base station setup, please refer to the base station product manual. When setting up a physical base station, GNSS configuration is not required, and data collection can proceed directly.

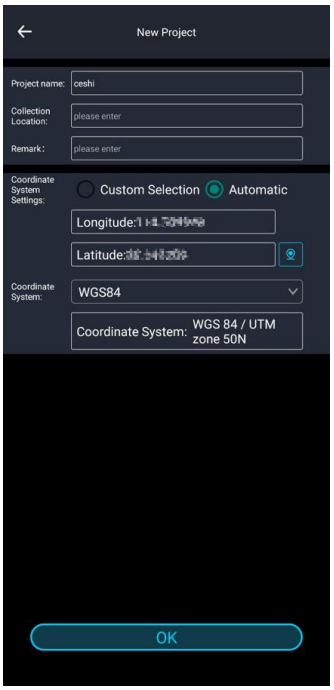
Note that the phase center of some base stations and the measurement mark not at the same height.

7. 2. 2. Data Collection Using the APP

When using the backpack kit for data collection, it is recommended to use the APP for data collection.

（1）New Acquisition

After configuring GNSS, creating a new task is the same as using the APP for handheld mode data collection, with the difference being that in RTK mode, you can select the data coordinate system when creating a new project.



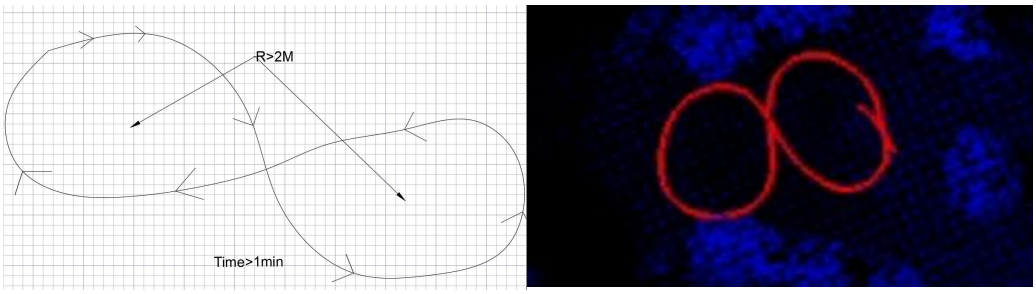
（2）Initialization

Initialization and usage are the same as using the APP for handheld mode data collection.

（3）Figure Eight and Start Data Collection

Similar to using the APP for handheld mode data collection, the difference is that initialization requires a figure of eight, and there is no need to pay attention to the close-loop.

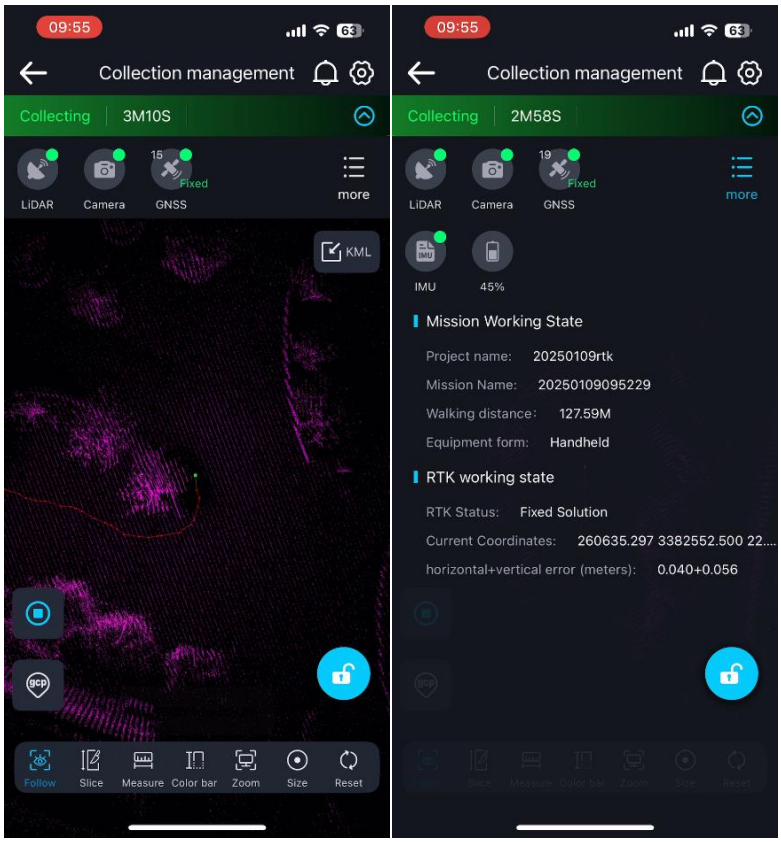
After initialization is complete, you can slowly pick up the device and prepare to perform a figure of eight (two circles with a radius of no less than 2 meters). Start data collection after completing the figure of eight.



RTK mode: During the data collection process, pay attention to the fixed solution status of RTK. If it cannot be fixed, please wait for the fixed solution or move to the next position where it can be fixed.

PPK mode: During the data collection process, there is no need to constantly monitor the fixed solution status of RTK.

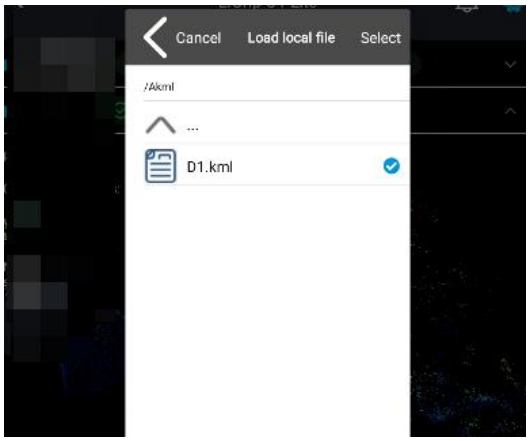
Click on real-time point cloud to observe the real-time point cloud status, trajectory, RTK status, device status, etc.



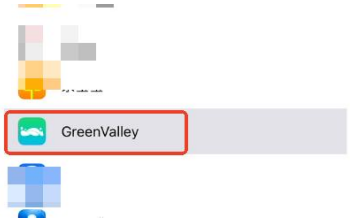
（4）Import KML (Optional step)

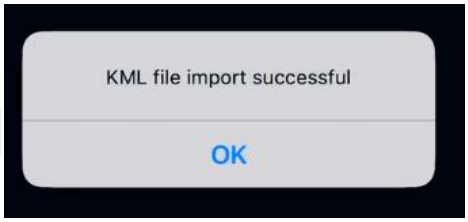
When there is an RTK fixed solution, after walking a certain distance during normal collection, an import KML icon will appear on the right side of the collection control interface.

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



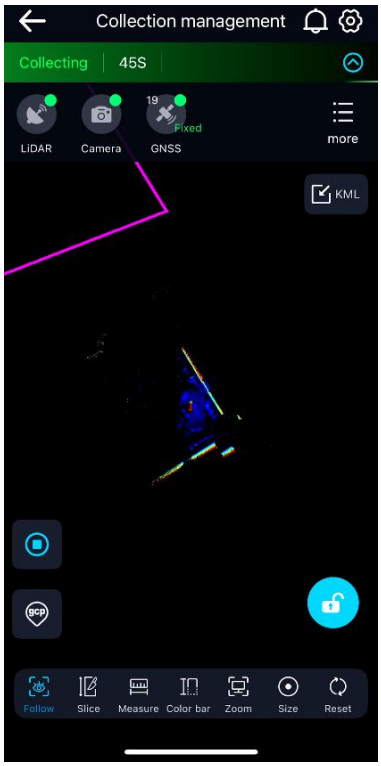
For the IOS system: Before importing a KML file, you should open KML at any location, and choose to open with GreenValley to import the KML file into the GreenValley APP.





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.



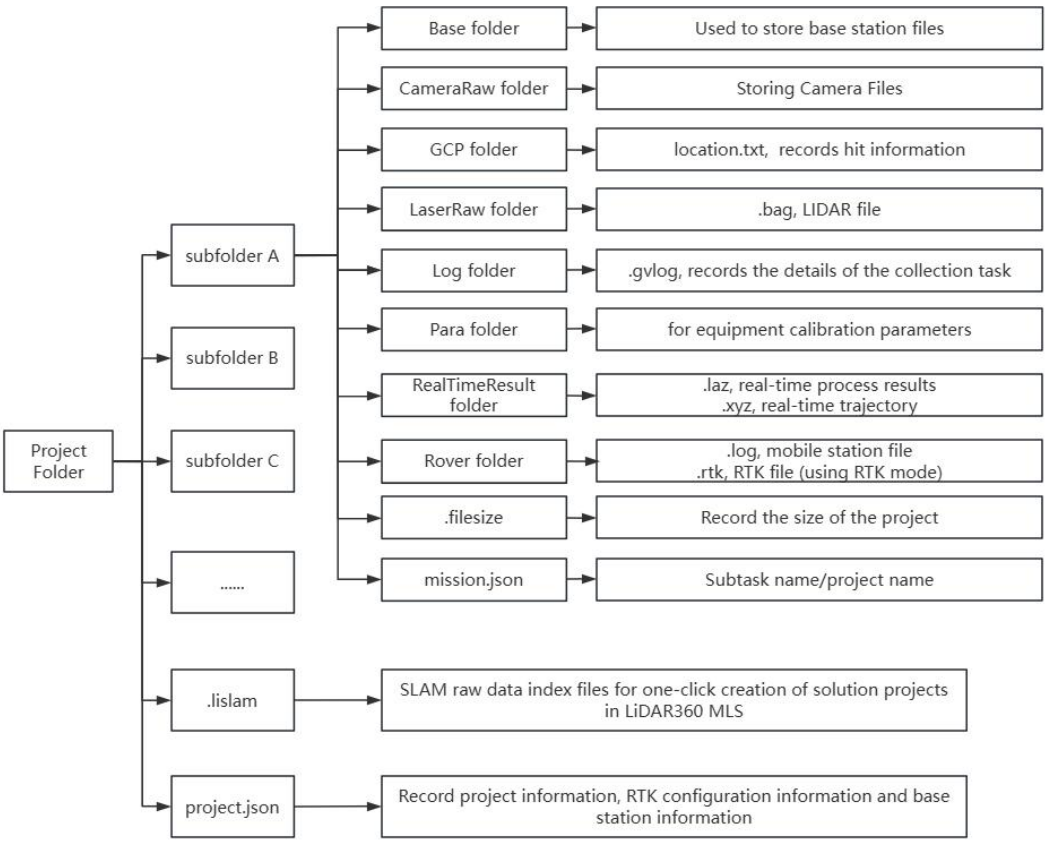
（5）End Data Collection

Ending data collection is similar to ending the handheld mode, but requires performing a figure of eight, consistent with the initial figure of eight requirements.

8. Data Transfer

8. 1. Project Data Structure

The project folder contains multiple collected task folders, as well as project.json and .lislam files; Among them, the task folders include the Base folder, CameraRaw folder, RealTimeResult folder, and other folders, as well as mission.json, .filesize, and other files. Refer to the diagram below for specific folder structure and descriptions.

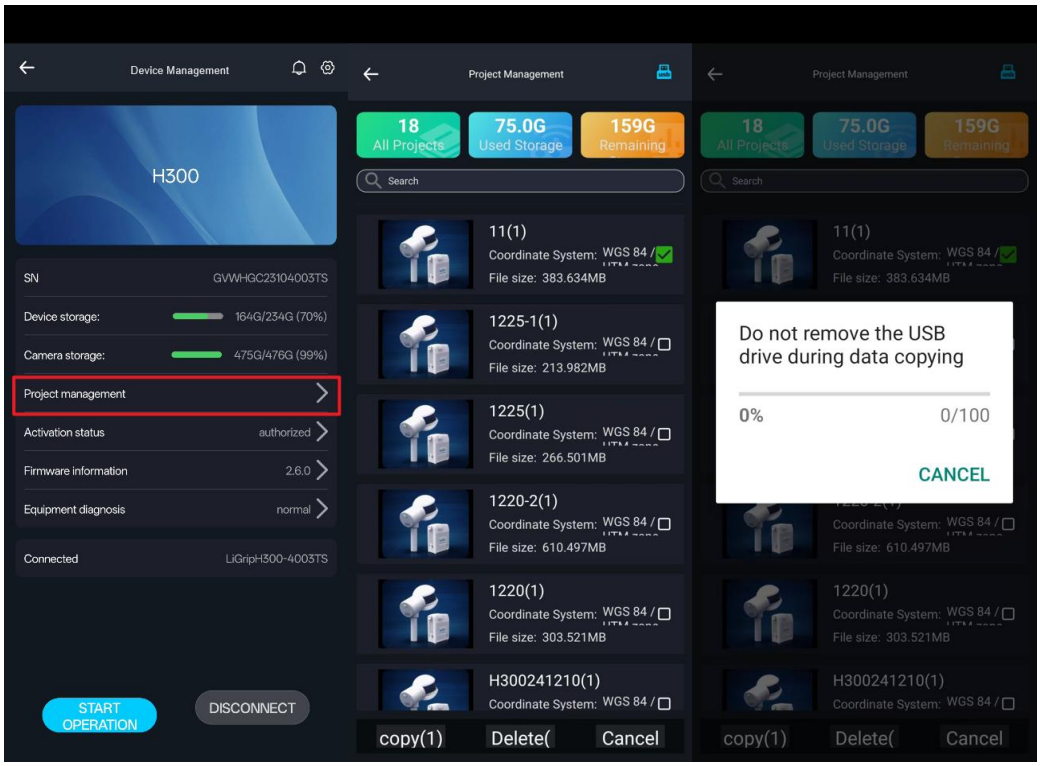


The project data structure is related to the device firmware version. For details, please contact after-sales or technical support.

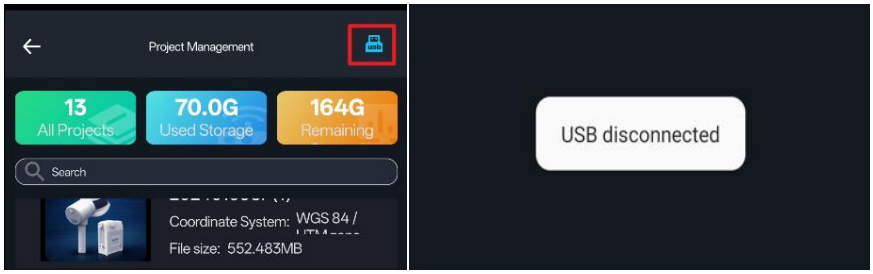
8. 2. Host File Copy

8. 2. 1. Host Data Copy Based on APP (Recommended)

First of all, plug the USB flash disk into the USB port of the device host, click Device Management-Project Management, select one or more projects in the project list, and copy the data to the USB flash disk. There will be a progress bar in the process of copying, wait for the completion of the progress bar, after the completion of copying, it will show "Project Copy Complete", click OK, and then pull out the USB flash drive.



If you want to safely eject the mobile storage device, click the USB icon and wait for the system to prompt success.



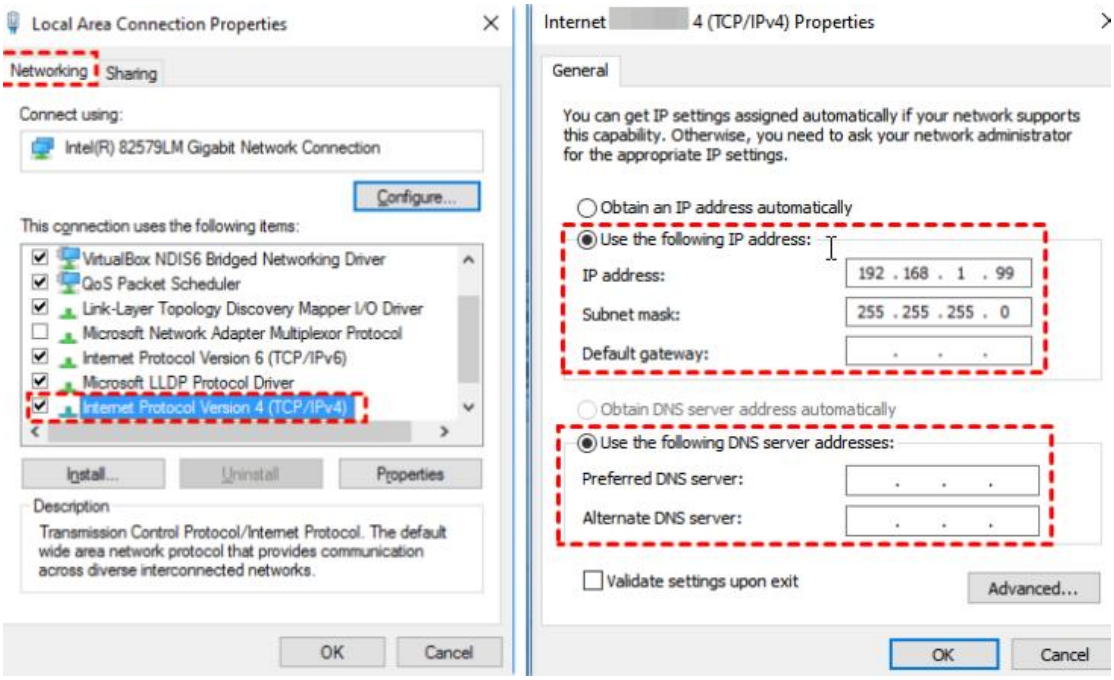
For more detailed APP project copy operation procedures, please refer to the GreenValley APP User Manual.

8. 2. 2. Host Data Copy Based on Ethernet Cable

Insert the battery into the battery box to power it on. Connect the Raymo end of the data transmission cable to the LAN port on the top of the battery box, and the Ethernet port to the computer.

IP Address: 192.168.1.99 Subnet Mask: 255.255.255.0

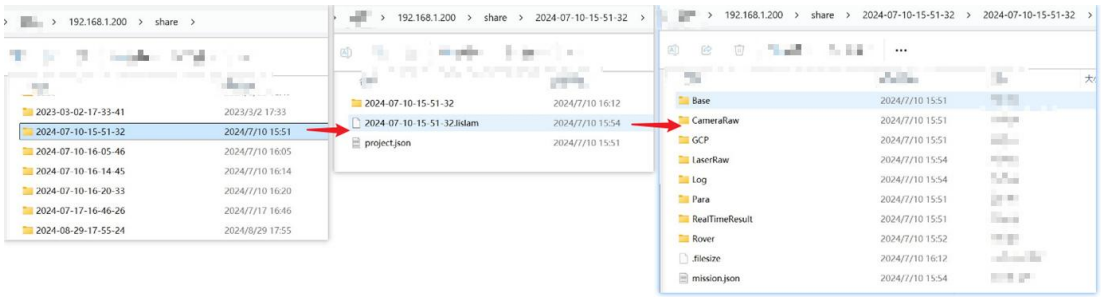
Enter the URL "\\192.168.1.200" in the computer network to access the internal storage space of the device. Open the "share" folder, navigate to the custom project directory or the folder named by date, and copy all the files inside to complete the data export.



If you need to enter a username and password, enter the following information:

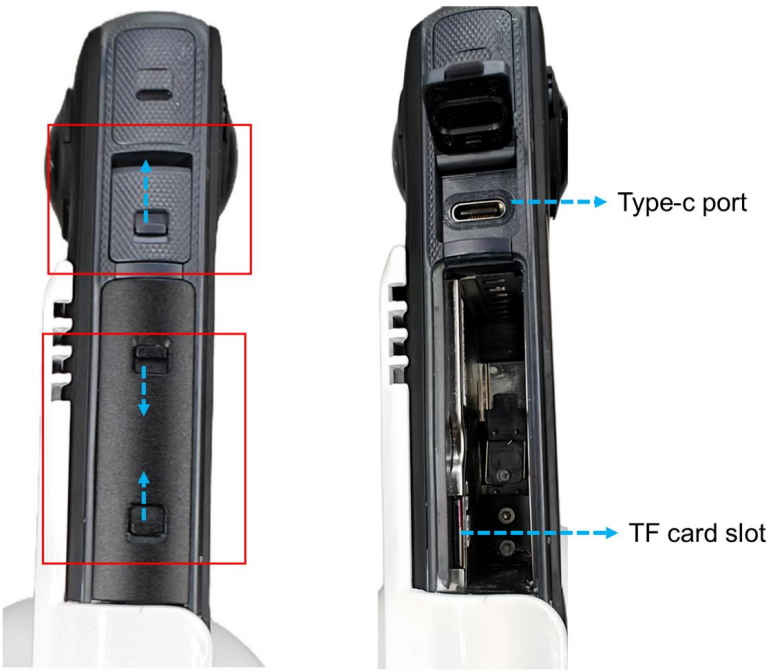
Username: share

Password: 111111



8. 3. Camera File Copy

8. 3. 1. Getting Camera Storage



There are two methods to read camera files. As shown in the picture:

Method one: Press the snap upward to open the Type-c card slot and connect the computer with a Type-c cable. Then select the USB flash drive mode on the camera screen.

Method two: Press up and down on the VoidCell snap respectively, press the TF card in order to eject it and read the camera files in the TF card through the card reader.

8. 3. 2. General Copy Method

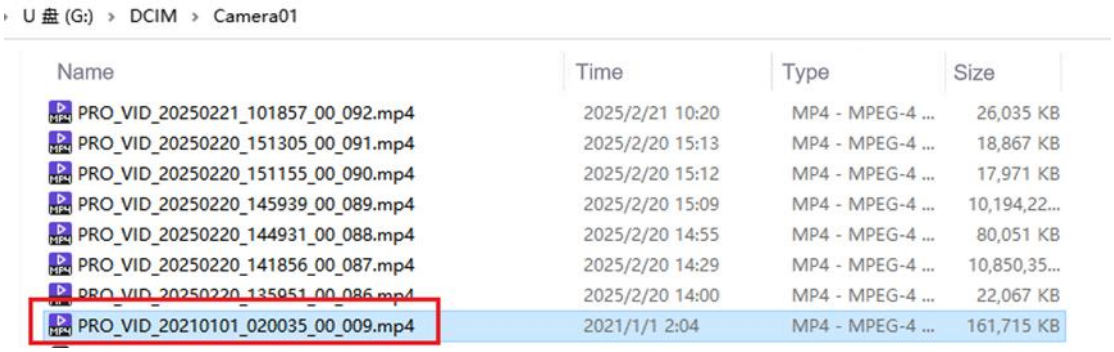
（1）Camera Video Correspondence

Open the mission.json file in the copied project data directory, which contains information about the sub-project folders and the corresponding video file names for each sub-project file.

```
{
    "mission_name": "20250221112935",
    "project_name":
    "mission_properties": {
        "collect_weather": "sunshine",
        "collect_environment": "outdoor",
        "collect_person": "null",
        "camera_mode": "timelapse",
        "collect_picture": "",
        "collect_mode": "hand",
        "pickpoint_num": 0,
        "collect_temp": "15",
        "realtime_pointcloud_open": 0,
        "video_url": [
            "[/DCIM/Camera01/PRO_VID_20210101_020035_00_009.mp4]"
        ],
        "video_size": 164,
        "pic_num": 0,
        "collect_address": "",
        "collect_timezone": "Asia/Shanghai",
        "collect_time": "2025-02-21-11-29-35"
    }
}
```


（2）Camera Copy

Use a TypeC-USB cable, connect one end to the TypeC port of the camera and the other end to the USB port of the computer, turn on the battery power, and the camera will be in USB drive mode. Copy the corresponding video files.



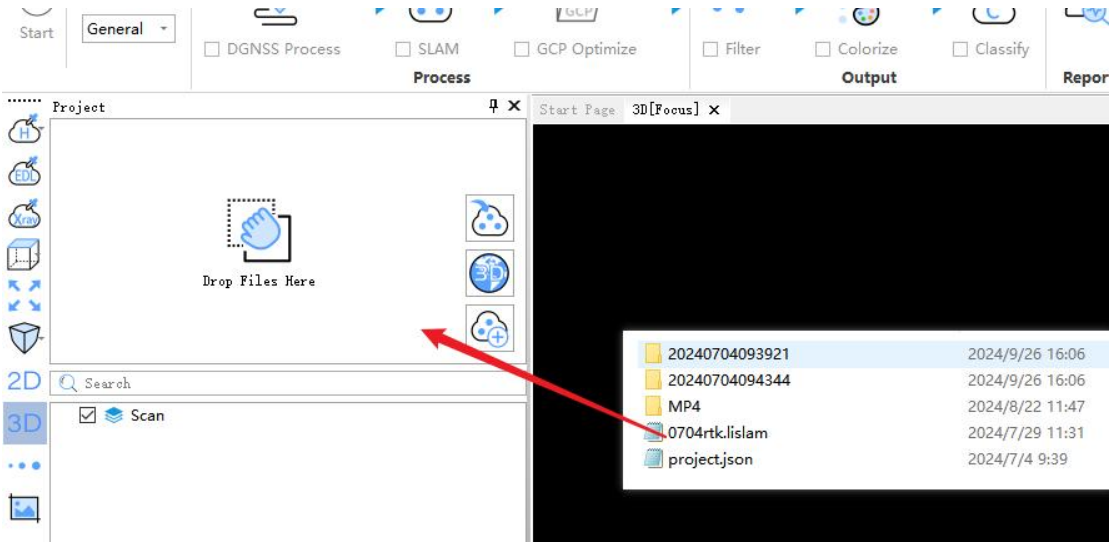
Note: The mission.json file in the sub-project folder records the video file names corresponding to the project!

8. 3. 3. Automated Copy by Processing Software

When creating a new SLAM project through .lislam, LiDAR360MLS 8.0 will automatically copy the camera files to the corresponding project folder by selecting the storage card or local path where the camera files are located.

（1）Open .lislam Project

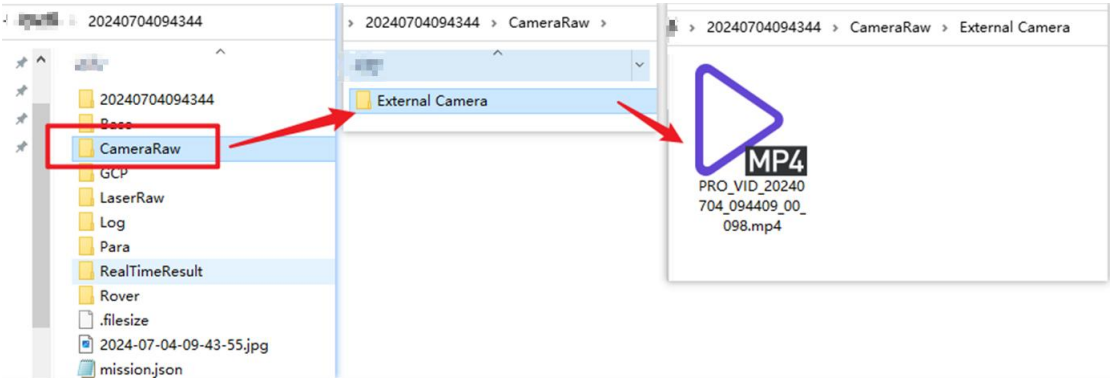
Open or drag .lislam into the new project window



（2）Select Camera File Path

Select the directory where the original camera files are located on the local or storage card.

The software will automatically copy the processing tasks corresponding to the data collection project into the CameraRaw folder.



Support for .lislam is related to the device firmware version. Please consult technical support or after-sales service.

8. 4. Base Station File Copy (If PPK mode operation)

8. 4. 1. Physical Base Station File Copy

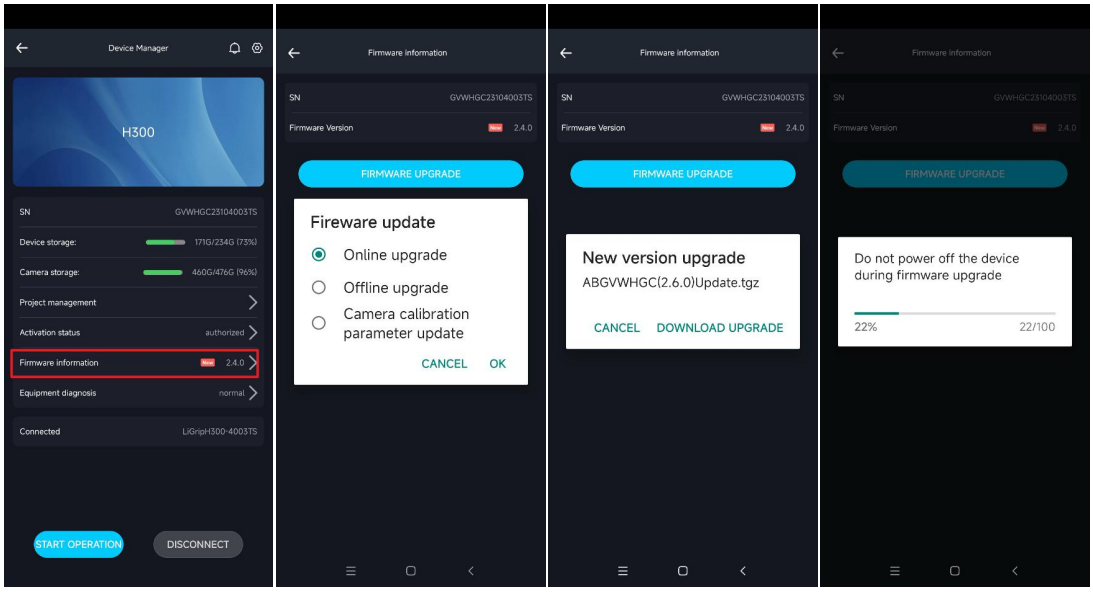
Connect the physical base station device using a data cable to download base station data (PPK mode).

9. Firmware Upgrade

Keep the APP version up to date. Firmware upgrades require the device to have at least 30% battery. **Firmware upgrade** supports **online upgrades**, **offline upgrades**, and **camera calibration parameter upgrades**.

9. 1. Online Upgrade

(1) Make sure your cell phone/tablet can access the Internet via 4G/5G or other WiFi;
(2) Turn on the device, and use GreenValley APP to connect to the device's WiFi, the device status shows a green light (except satellite);
(3) Return to the device management interface, click "Firmware information" and select "Online Upgrade". According to the software prompts, switch to a 4G/5G network or WiFi network with Internet access. Click "Firmware Upgrade" again, and the software will download the firmware automatically;
(4) After downloading, click "Upgrade". According to the software prompts, switch the network, connect to the device's WiFi, and return to the APP to upload the firmware;
(5) After uploading, the APP prompts "whether to update the firmware immediately", click "Yes", the device will be upgraded;
(6) During the upgrade process, don't turn off the power. After the APP prompts the upgrade is complete, manually power off and restart the device, the whole upgrade process is finished.



9. 2. USB Offline Upgrade

(1) Get the latest firmware package with technical support or after-sale, and perform the following steps under the technical guidance of after-sale or technical support;

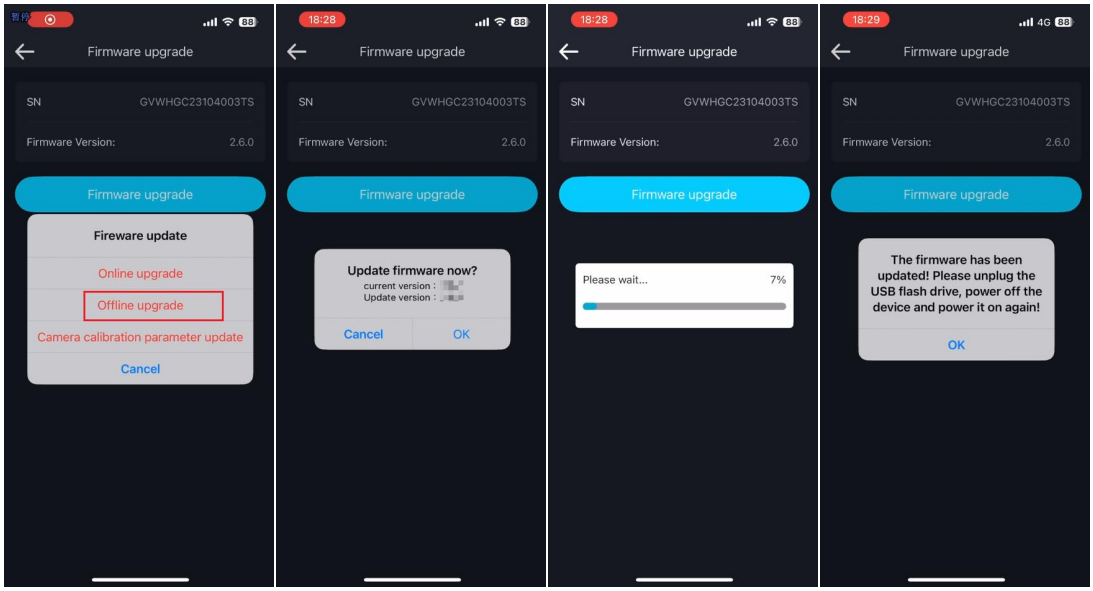
(2) Put the firmware package into the root directory of the USB flash drive;

(3) The device is powered on, use GreenValley APP to connect to the device WiFi, and the status of the device laser, inertial guide, and camera shows green;

(4) Insert the USB flash drive (note that it is inserted after the device power-on is completed);

(5) In the device management interface, click "Firmware information" and select "Offline Upgrade". Follow the software prompts to upgrade the firmware;

(6) Don't turn off the power during the upgrade process. After the APP prompts the upgrade is complete, manually power off and restart the device, the whole upgrade process is finished.



9. 3. Camera Calibration Parameter Upgrade

Please refer to the LiDAR360MLS product manual for camera calibration parameter upgrades.

For detailed instructions on using the LiDAR360MLS software, please refer to the "LiDAR360MLS-UserGuide".

Please refer to the "Handheld General Problem FAQ" for equipment operation precautions and problem explanation and handling.

10. SLAM Process

Use the latest version of LiDAR360MLS 8.0 or above for data processing; for hardware requirements of the processing software, please refer to the LiDAR360MLS software operation manual.

The following processing steps are for reference only. For a detailed introduction and usage of the processing software, please refer to the LiDAR360MLS product manual.

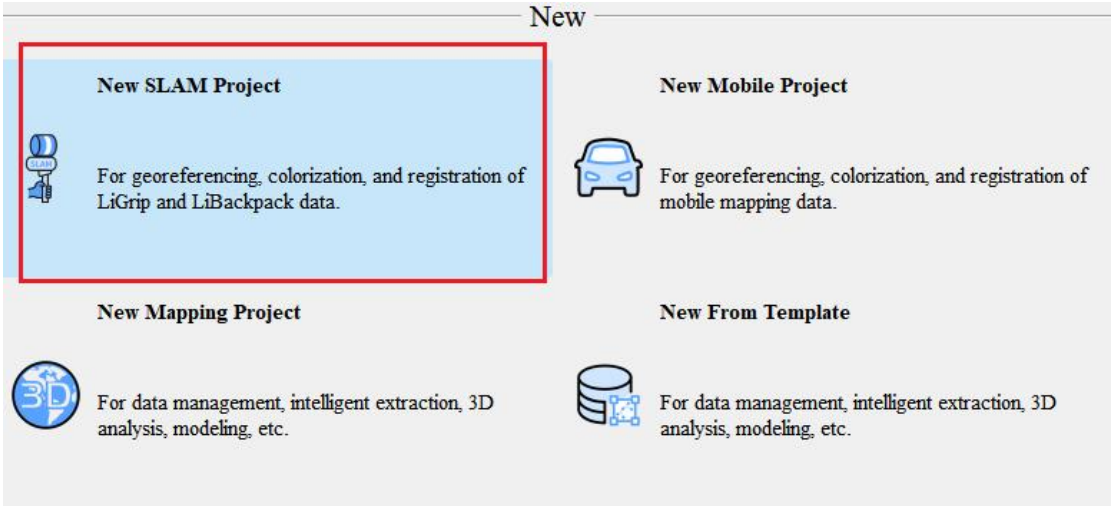
10. 1. One-click Processing

One-click processing supports LiGrip H300 firmware version 2.6 and later, if the firmware version is before 2.6, please use the project wizard to create a new project.

10. 1. 1. Create a New SLAM Project

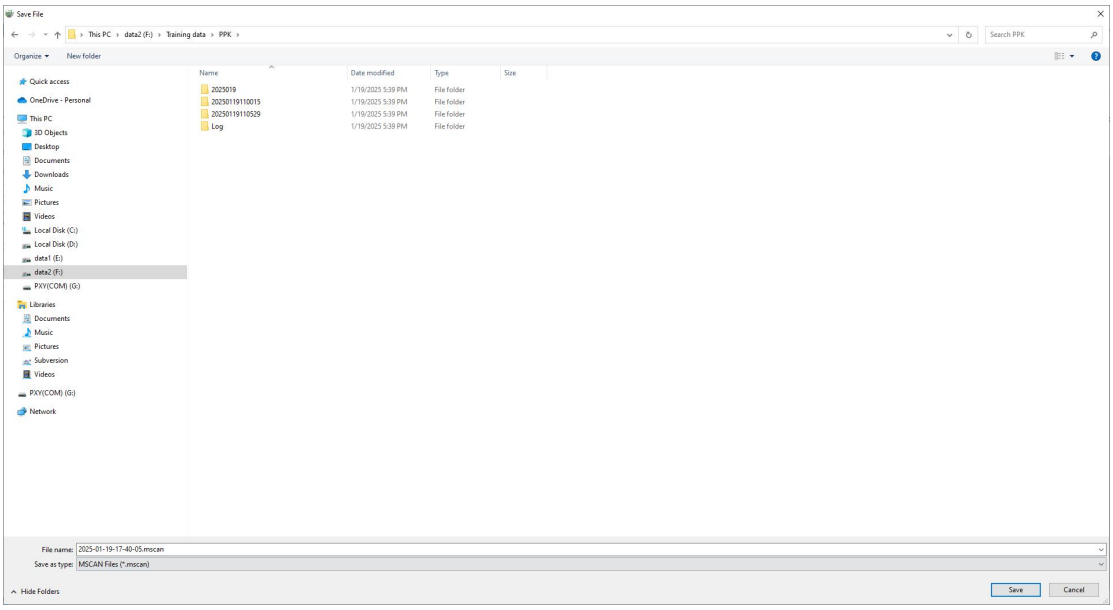
（1）New SLAM project

Click on the MLS interface to create a new SLAM processing project. Alternatively, go to 'File' - 'New SLAM Processing Project'.



（2）Select the Project Save Path

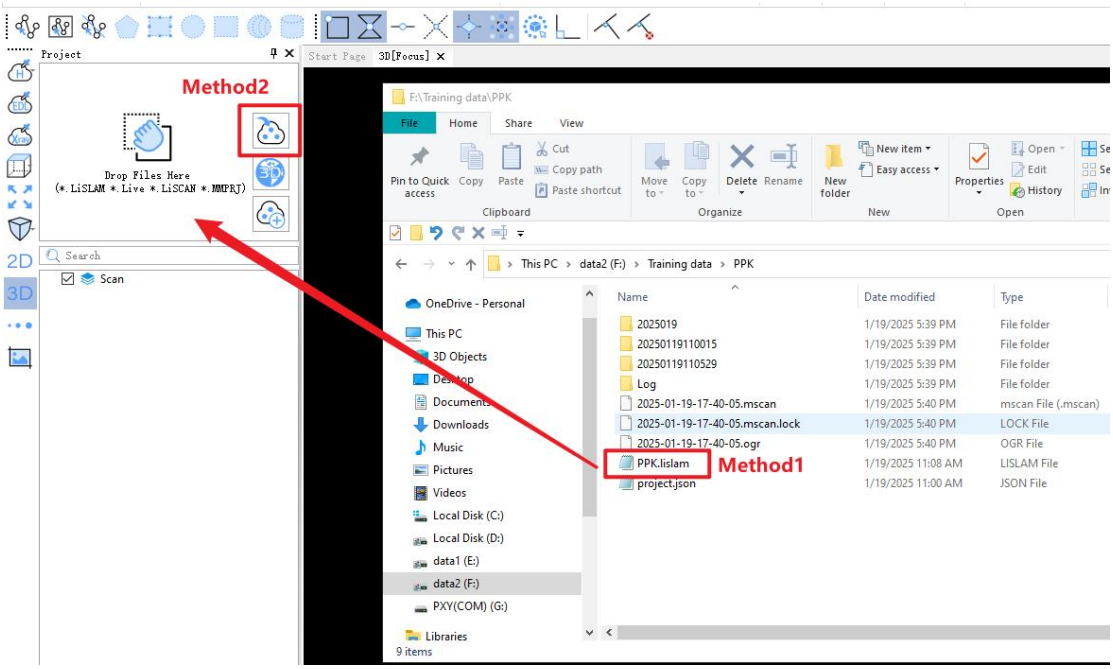
Select the project save path and the software will create the .msacn project with the current time.



10. 1. 2. Adding .lislam Project Index Files

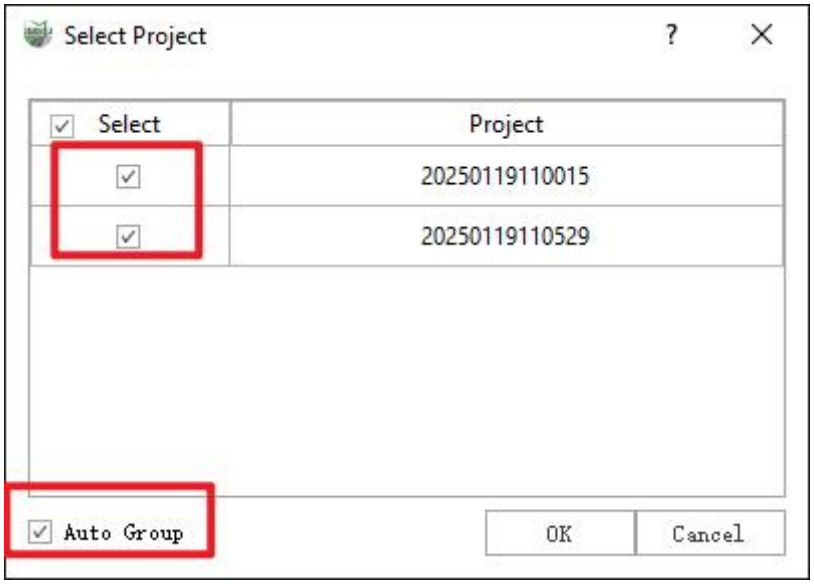
（1）Import .lislam File

Drag the collect project index file xxx.lislam to the project window, or click the '**Add**' button to select the project index file.

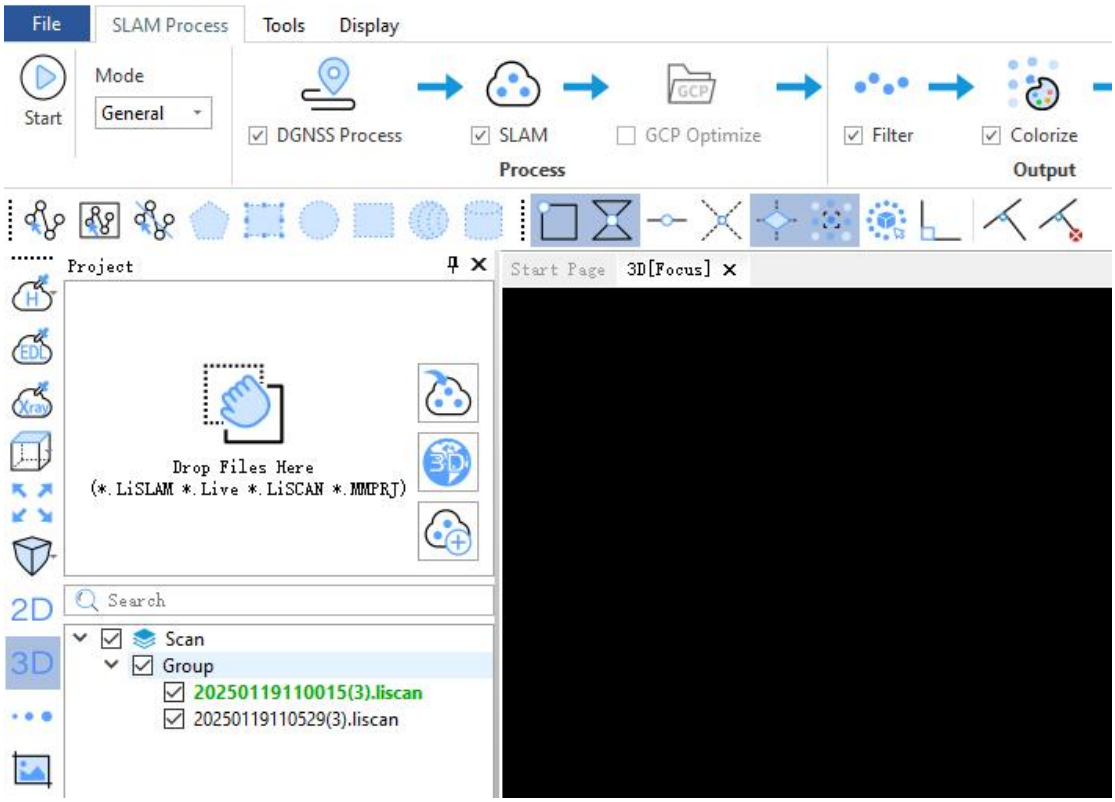


（2）Select the imported project and configure it into groups

If there are multiple sub-projects in the index, you can select the project to import and automatically create a combination, and the projects created as a group will be in the same group when the addition is completed.



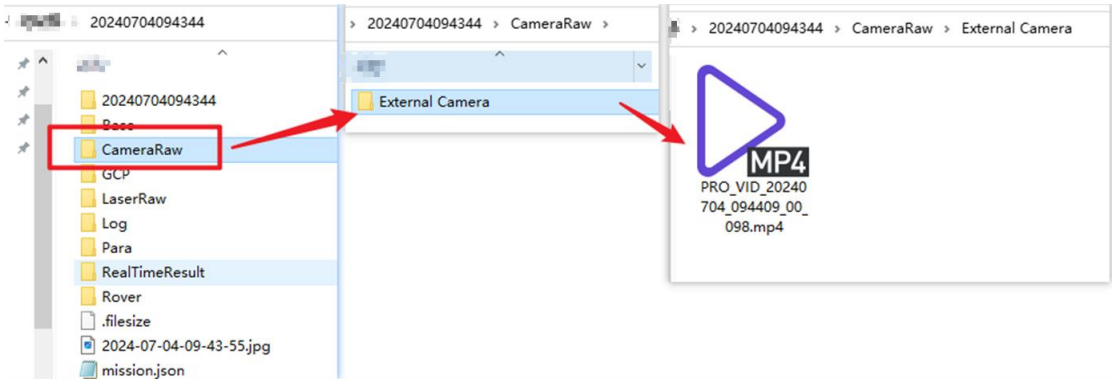
Automatic grouping of works:



（3）Select the Camera File Path

If the data is collected by external camera devices, you can also select the storage path of the camera files (camera memory card or other paths where the project video is stored), and the software will automatically copy the camera files to the **CameraRaw/External Camera** folder in the capture project.

The path to the camera after copying:



10. 1. 3. GNSS Configuration (Optional Operation)

It varies according to the three operation modes: pure SLAM, RTK-SLAM, and PPK-SLAM.

Pure SLAM: No additional configuration is required and subsequent data processing can be performed directly;

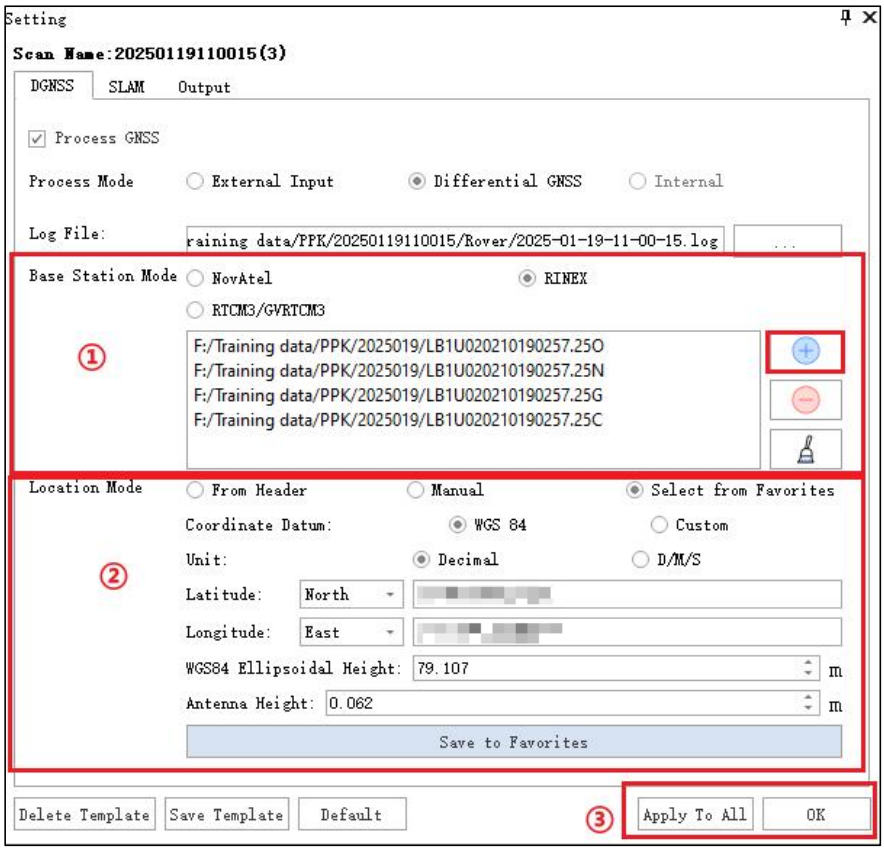
RTK-SLAM: No additional configuration is required and subsequent data processing can be performed directly. The software will automatically read and apply the POS file of RTK stored under the Rover path;

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

① Select the base station mode and import the base station file, the format of different base station modes may vary, take RNIEX as an example;

② Configure the positioning mode of the base station, you can enter the coordinates of the base station from the data header or manually;|

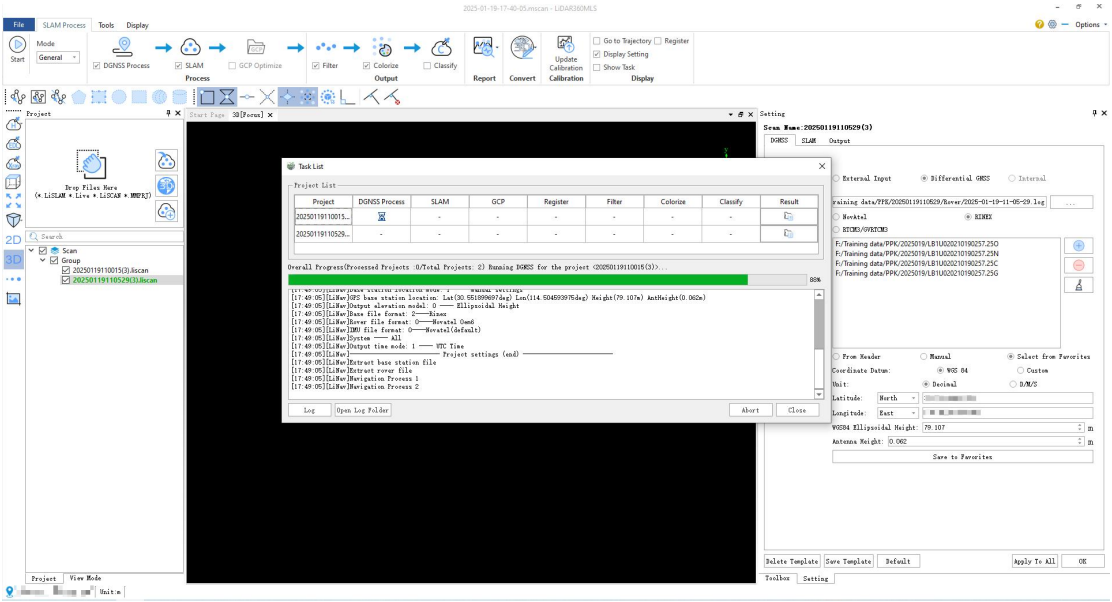
③Click '**OK**' to save, the current configuration is only effective for the activated project, if multiple projects share a base station, you can click '**Apply to All**'.



10. 1. 4. Start Processing

After configuring the processing project, click the '**Start**' button in the upper left corner, and the software will start processing data.

At the end of the program run, the data processing results are available.

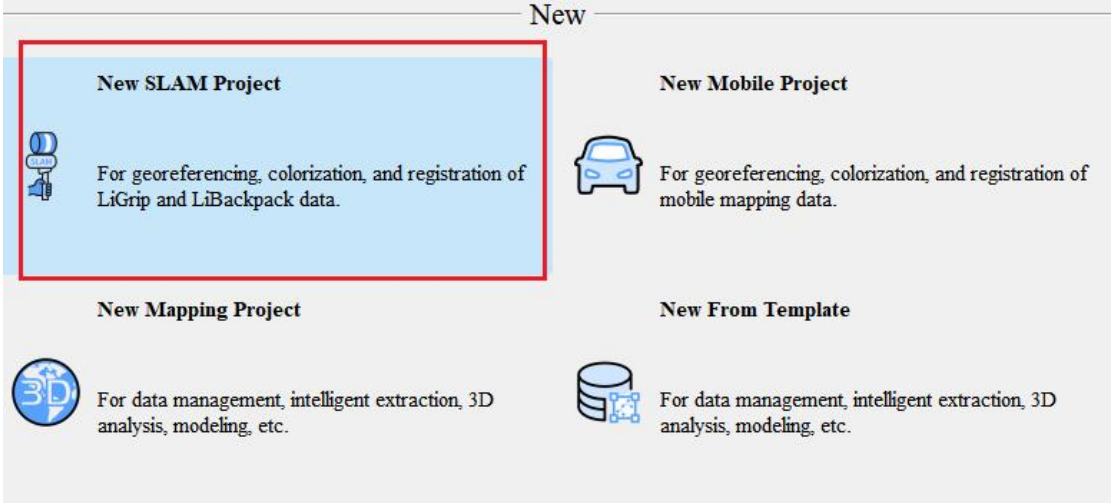


10. 2. Using the Project Wizard to Create a New Project

10. 2. 1. Create a New SLAM Project

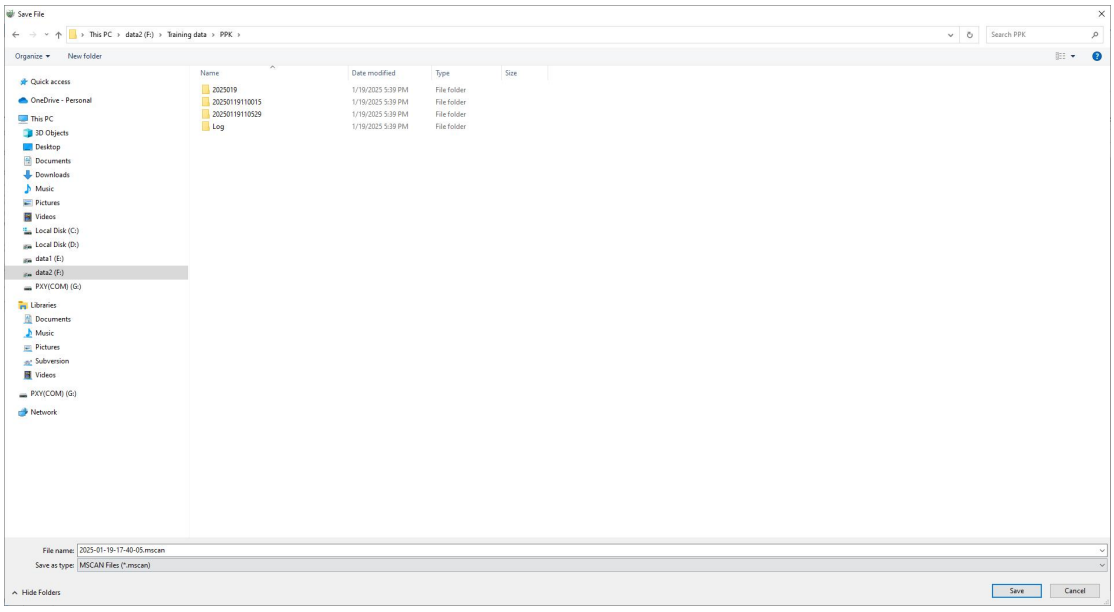
（1）New SLAM Project

Click on the MLS interface to create a new SLAM project. Alternatively, go to **'File'** - **'New SLAM Project'**.



（2）Select the Project Save Path

Select the project save path and the software will create the .msacn project with the current time.

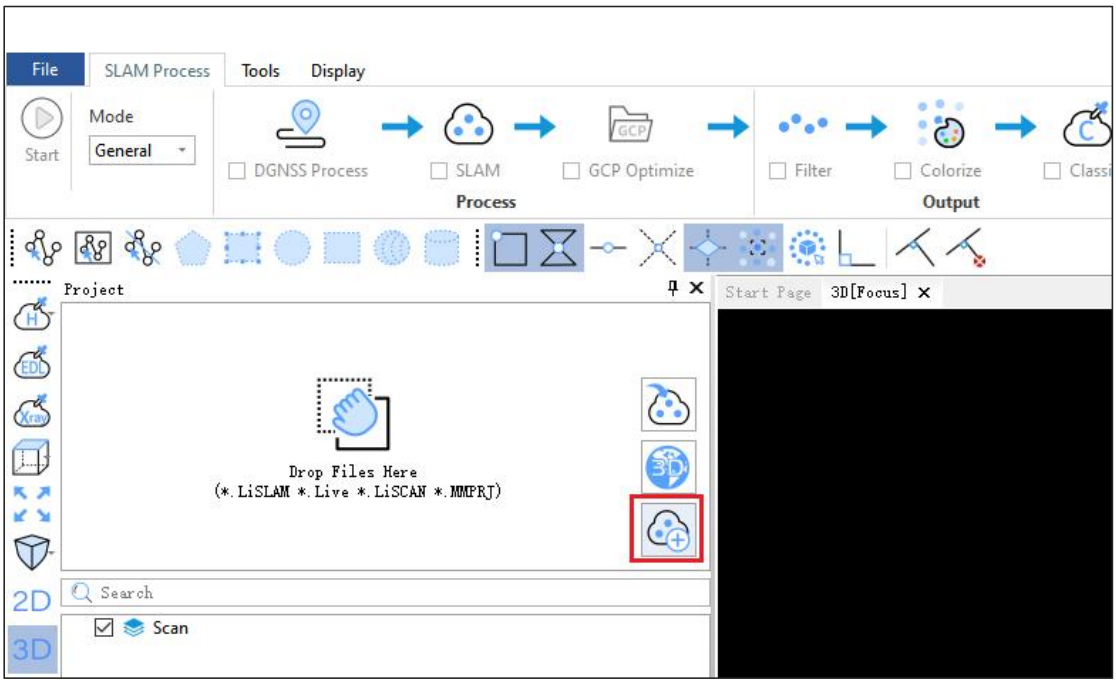


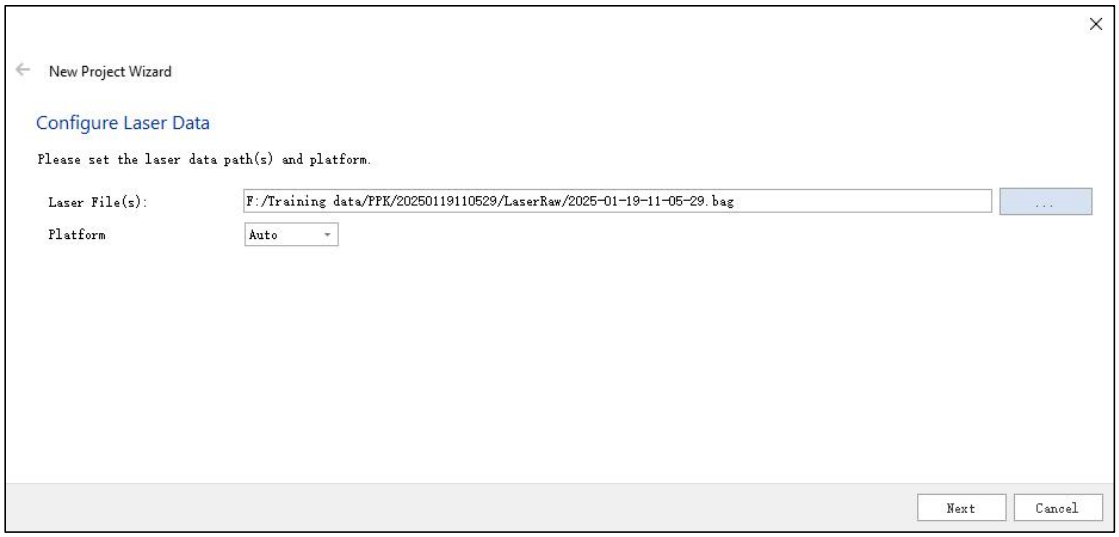
10. 2. 2. Configuring Project Data

（1）Configure Laser Data

Click  to configure the laser file, the laser file is in the LaserRaw folder of the project by

default, the platform can default or be manually selected, then click **'Next'.**



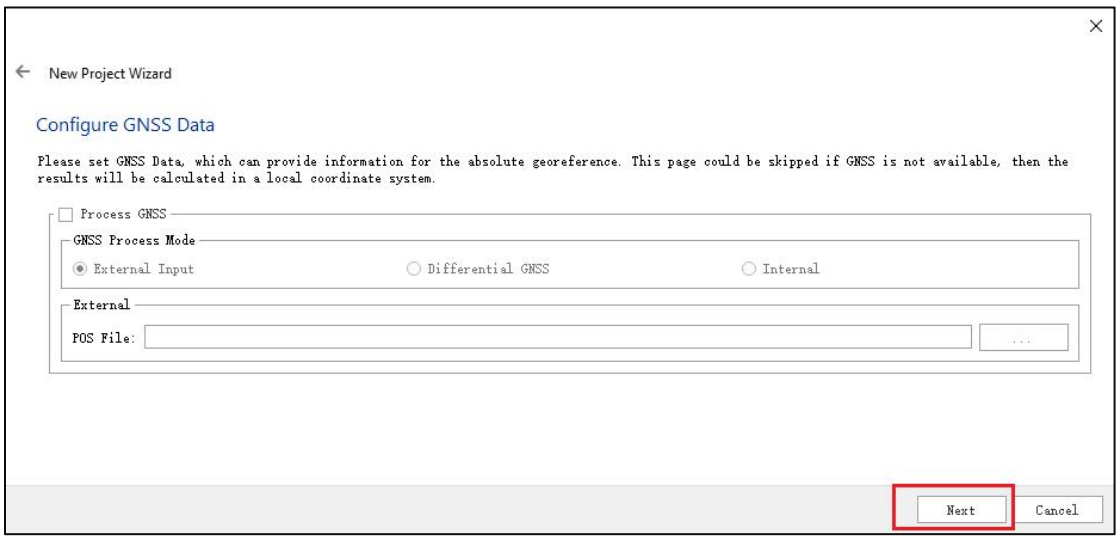


（2）Configure GNSS Data and Coordinate System

There are three scenarios for configuring GNSS and coordinate systems①pure SLAM, ② RTK-SLAM, and③PPK-SLAM.

①pure SLAM

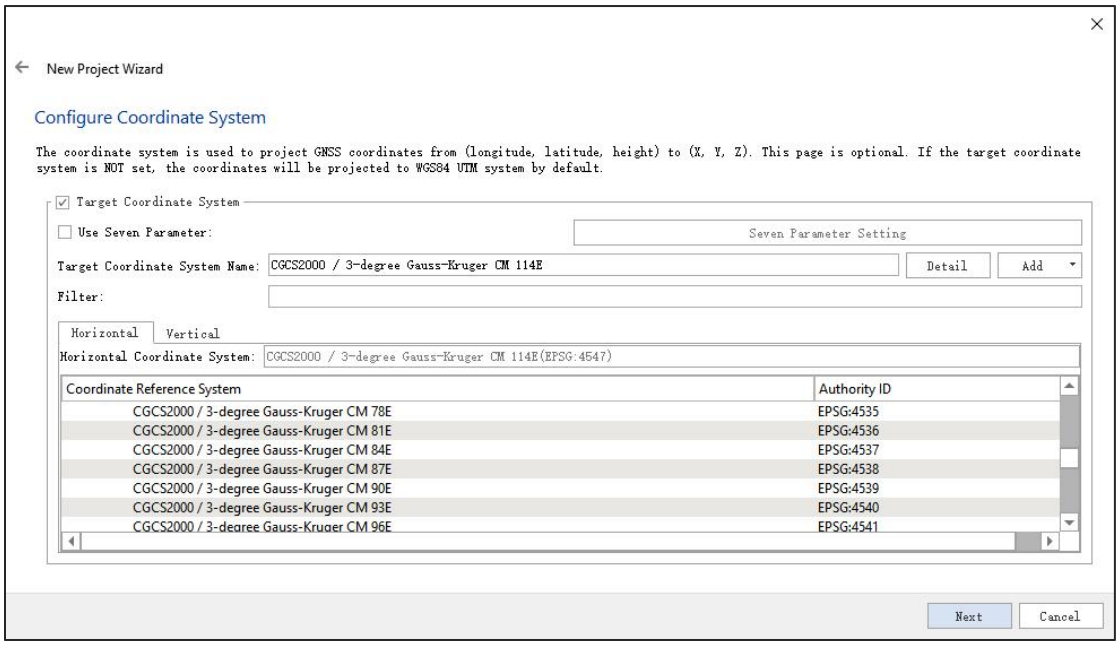
Pure SLAM processing does not involve this step, the software will skip it directly.



②RTK-SLAM

Check 'Process GNSS', select 'External Input', choose the POS file, which is in the Rover path of the project by default, and click '**Next'**.

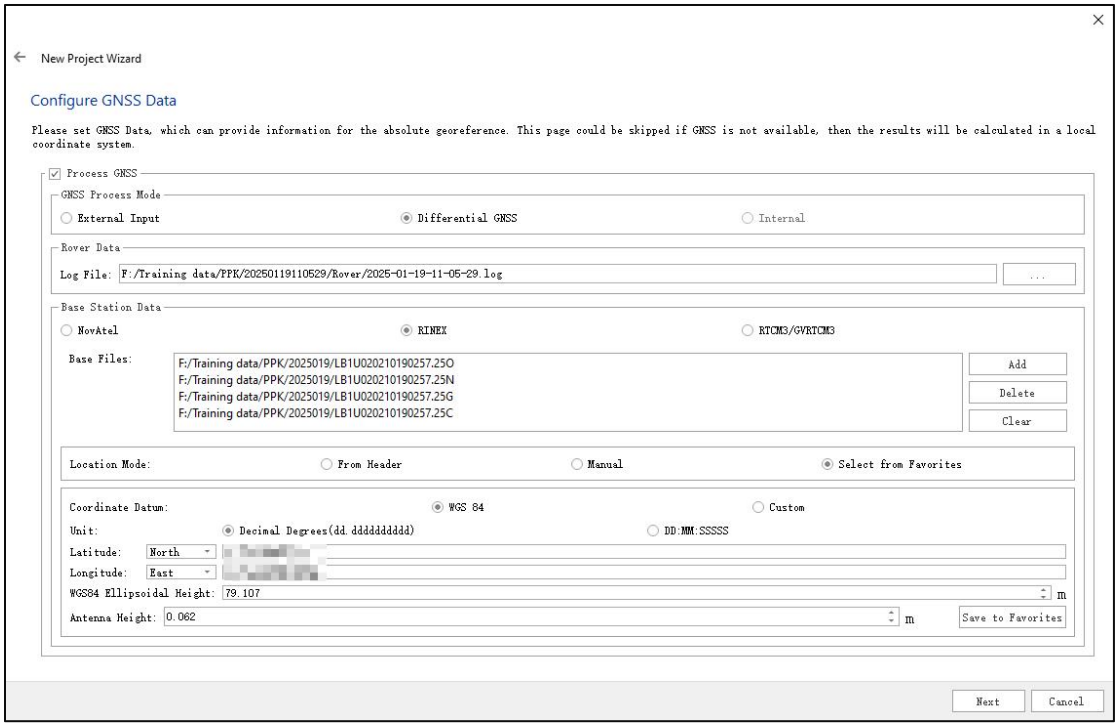
RTK-SLAM mode usually eliminates the need to manually configure the target coordinate system; the software uses the coordinate system built into the RTK file.



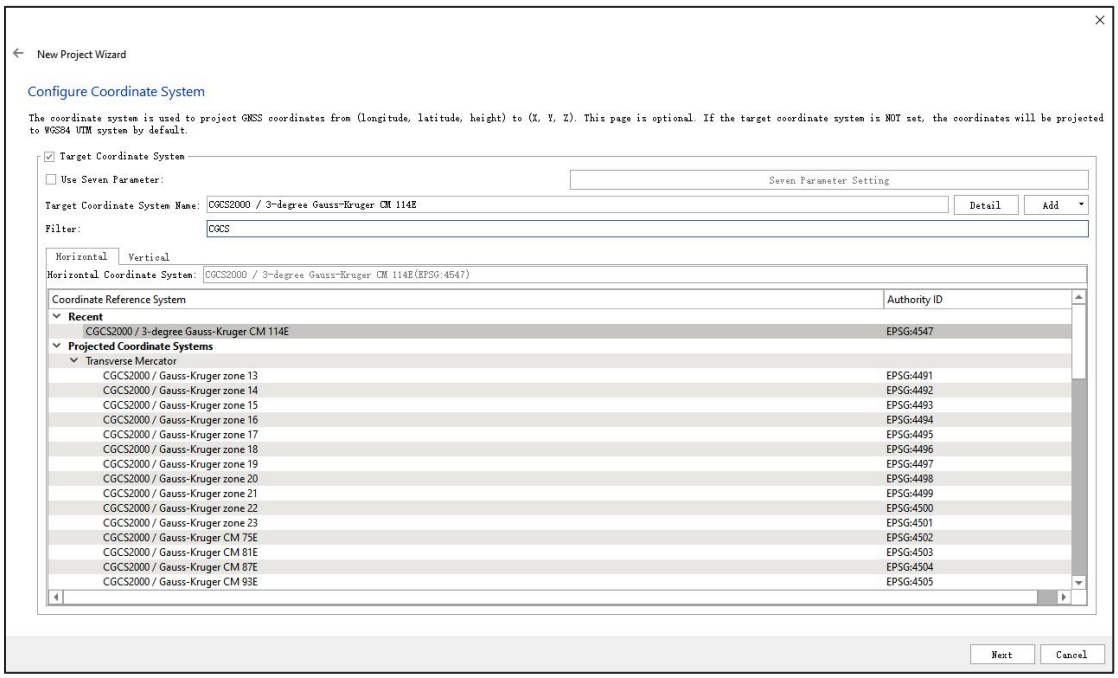
③PPK-SLAM

Before PPK solving, you need to prepare the base station data (usually in RINEX format), here is a demonstration of the self-base station.

Check 'Process GNSS', select 'Differential GNSS', select the log file, which is in the Rover folder of the project by default, select the RINEX file, configure the coordinates of the base station, and click **'Next'**.

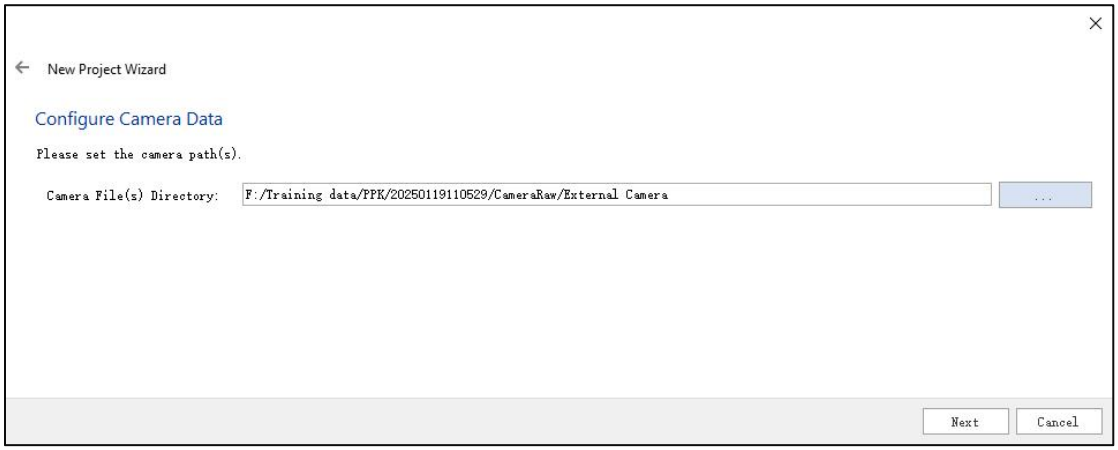


Configure the coordinate system, and select the target coordinate system, you can enter keywords through the "Filter" to quickly select the coordinate system, and click **'Next'**.



（3）Configure Camera Data

Select the file path where the camera is located. If an automatic camera file copy has been performed, the camera file path defaults to the CameraRaw/External Camera folder of the project. Then click **'Next'**.

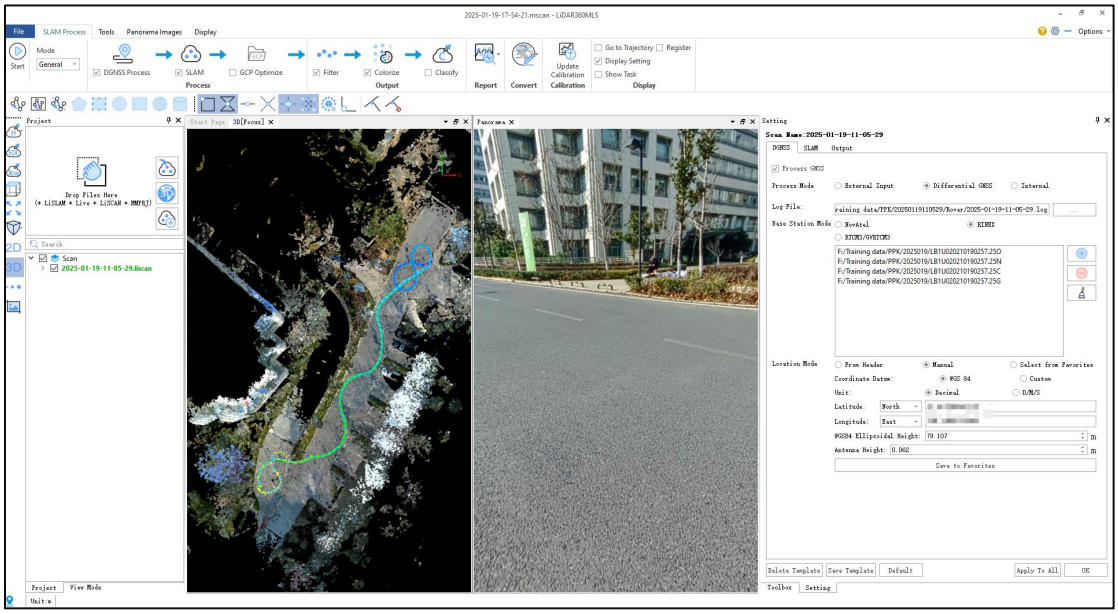


（4）Configure Project Location

Configure the project folder and project file name, you can directly use the default, and click **'Finish'**.

10. 2. 3. Start Processing

After entering the main interface, click the '**Start**' button. Wait for the program to finish running, and you will obtain the final point cloud data results.



10. 3. Batch Processing

There are two ways to add projects in batch processing, corresponding to the above two ways of solver project creation:

① A single lislam index can contain multiple sub-projects or multiple lislam indexes can be added according to the steps in 10.1, and all the added projects will be displayed in the left catalog tree;

② Create projects sequentially through the project wizard according to the steps in 10.2, and all the created projects will be displayed in the catalog tree on the left side.

The two methods can be used in combination for batch processing at the same time. When the project to be batch processed is added, click Start Processing.

The modes in the SLAM solver processing flow are only for active projects, while the

selected processing and output flows are for all batch data.

10. 4. Data Processing with Control Points (GCP)

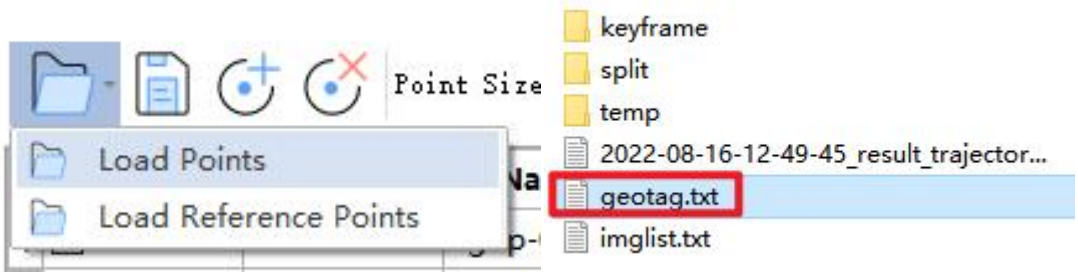
10. 4. 1. Completing SLAM Data Processing

Refer to 10.1 or 10.2 for SLAM data processing, and obtain the processed project.

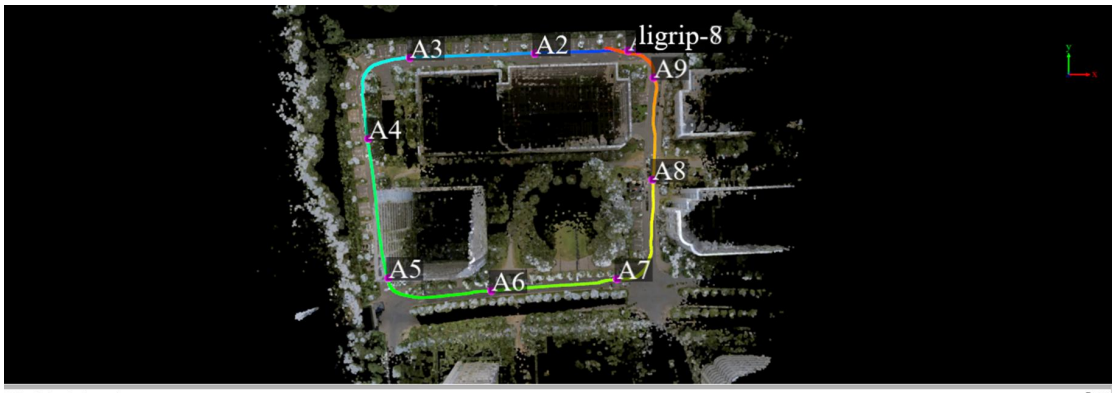
10. 4. 2. GCP Settings

（1）Turn on the GCP function

Click **'GCP'** on the interface, in the point-to-point alignment interface, the software will automatically load the points to be aligned, you can also manually select geotag.txt or other points to be aligned file.



The interface displayed after opening is as follows:



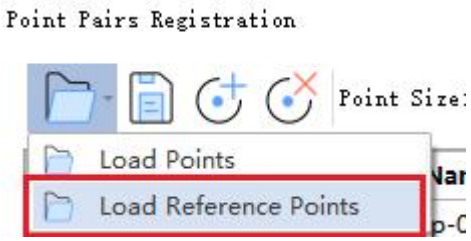
Point Pairs Registration

Point Size: 10

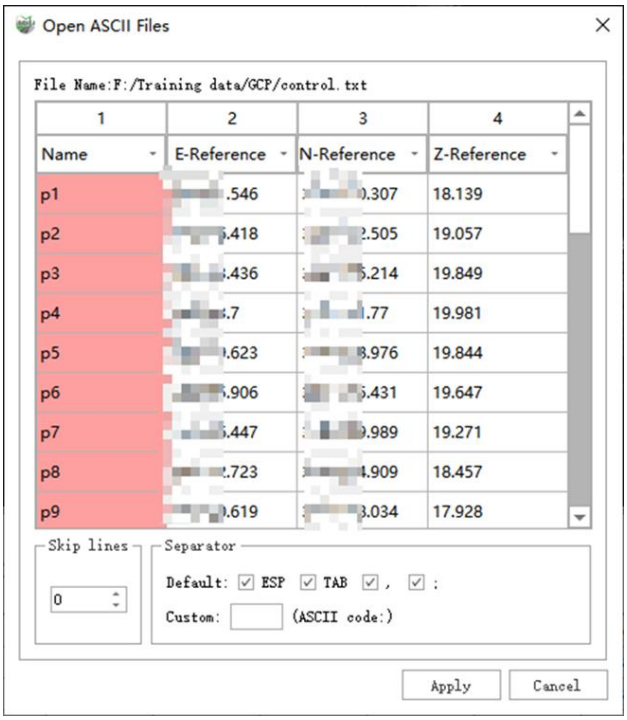
	Selected	ID	Name	E-[Reference]	N-[Reference]	Z-[Reference]	X-[Alignment]	Y-[Alignment]	Z-[Alignment]	Error	Dx	Dy	Dz
1	☑	1	ligrip-0	0.000	0.000	0.000	-4.880	-0.197	-0.114	0.000000	0.000000	0.000000	0.000000
2	☑	2	ligrip-1	0.000	0.000	0.000	-49.501	-1.653	-0.053	0.000000	0.000000	0.000000	0.000000
3	☑	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

（2）Loading reference points

In the point pairs registration interface, click to load reference points.

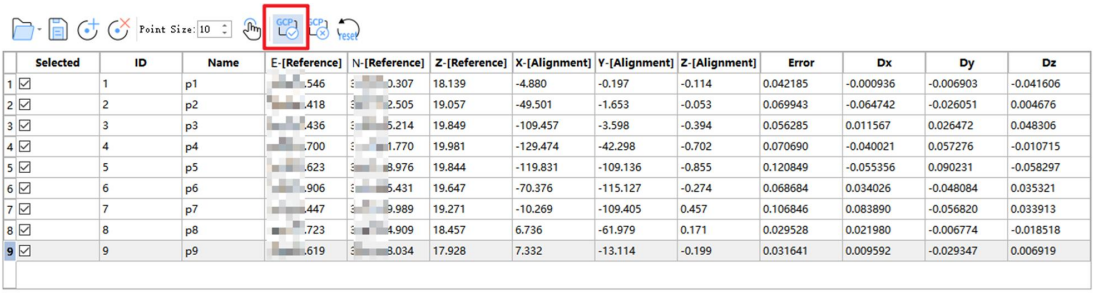


Configure the columns corresponding to N, E and Z, Click '**Apply**'.

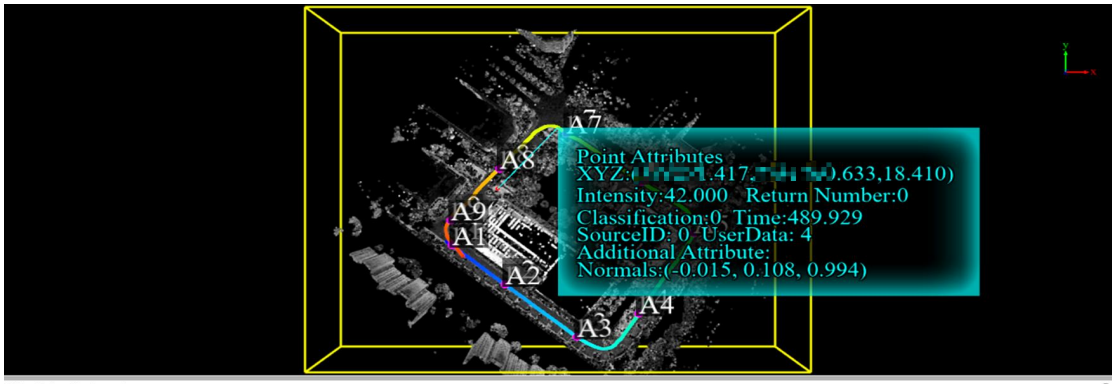


（3）Applying the GCP transform

Click  to apply GCP transformation.



	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	3.034	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

（4）GCP reduction (optional step)

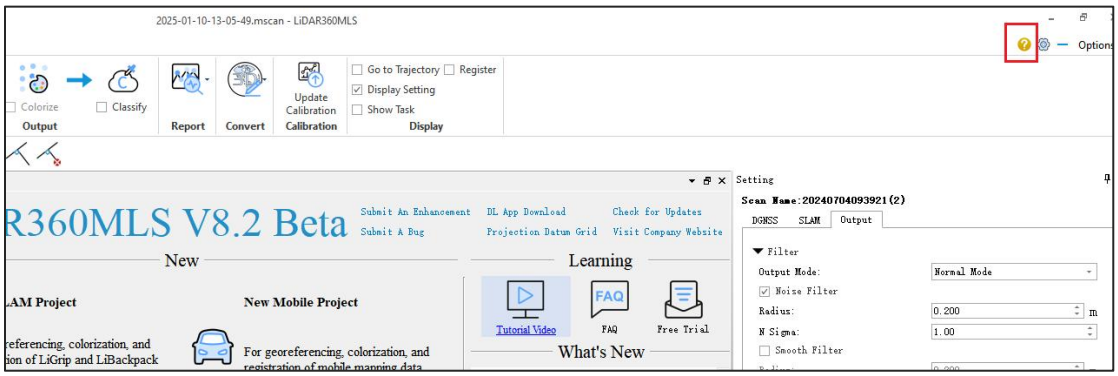
If the GCP conversion is not satisfactory, or if the control points have been entered incorrectly, you can click Reset to restore the point cloud to its original state.

11. Other Tools

For data export, accuracy check, point cloud extraction, merging, and other functions, please refer to the LiDAR360MLS product manual.

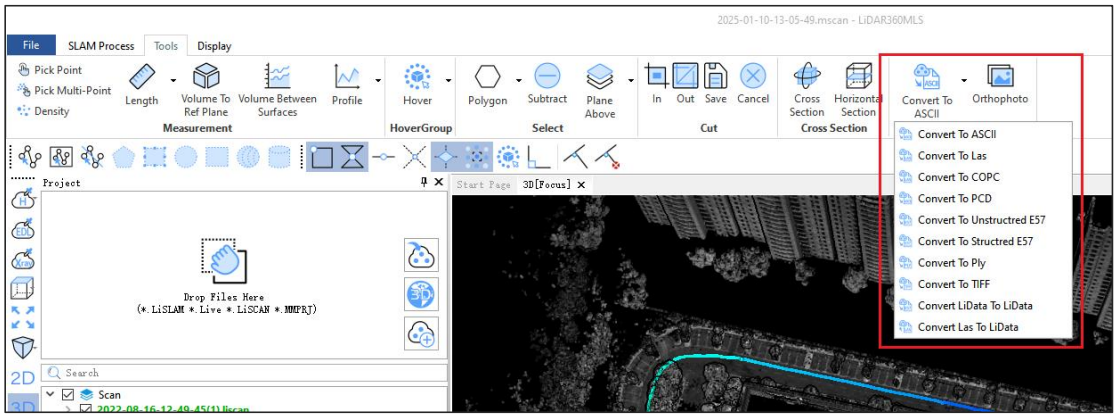
11. 1. Opening the LiDAR360MLS Manual

After opening the software, click on the help button in the upper right corner.



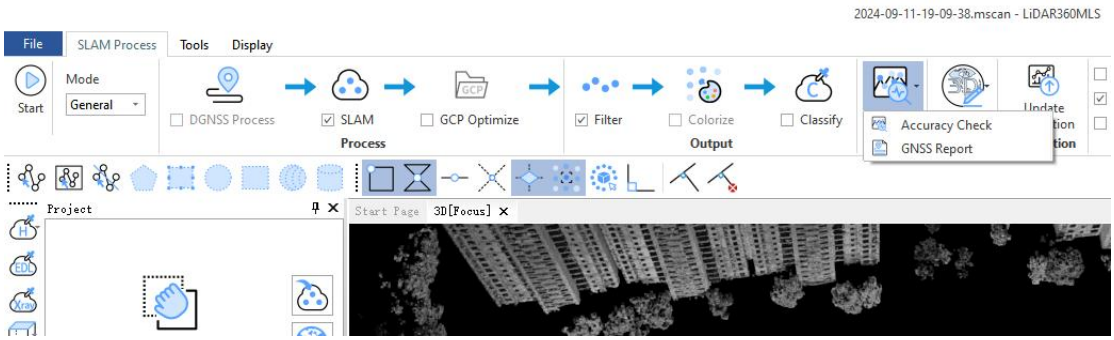
11. 2. Data Export

In the tools tab, the export function can export point clouds in formats such as ASCII, Las, COPC, PCD, E57, Ply, TIFF, etc.



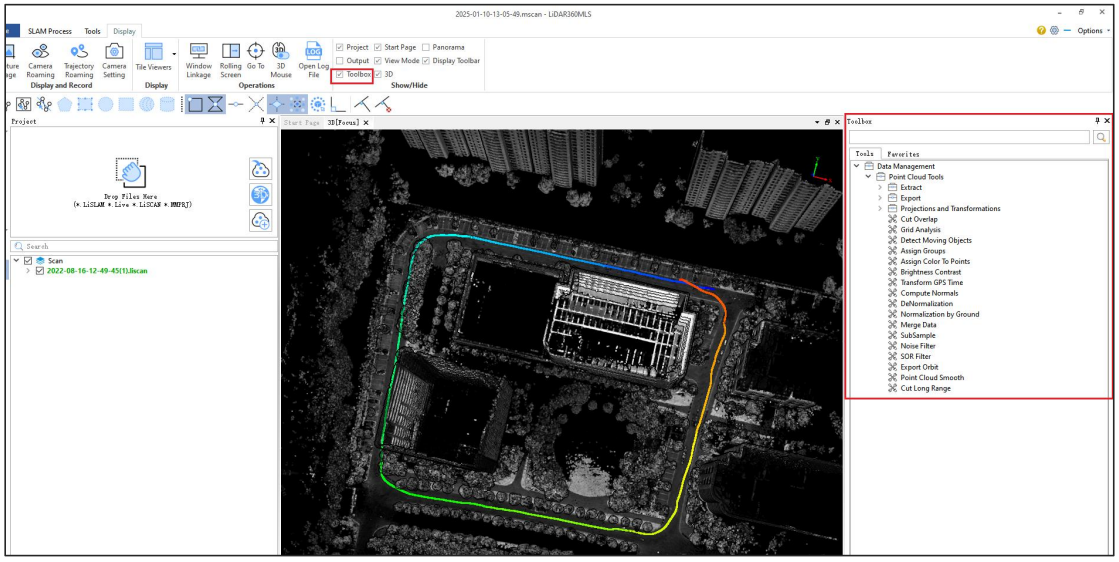
11. 3. Accuracy Check

The accuracy check function can check the absolute accuracy of the data by importing check points.



11. 4. Toolbox

The toolbox includes point cloud extraction, export, projection, coordinate transformation, and other point cloud tools.



12. Description of Other Accessories

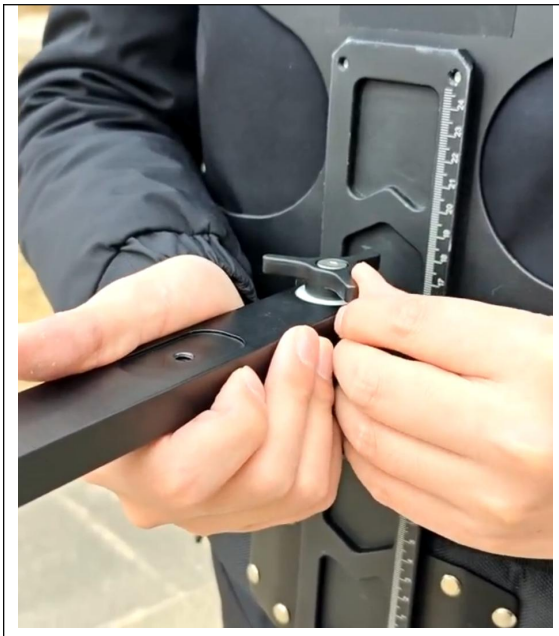
12. 1. Frontpack Kit

The undershirt of the labor-saving kit can fix the equipment and cell phone, and the angle of up-down, left-right and right-right is adjustable, which completely frees the hands and realizes flexible operation.

Installation steps:

A. Wear the kit and fasten all the buckles properly.

B. Open the support device latch, corresponding to the slot from the top into the support device, and slide to the appropriate position to fix the latch.



C. After freely adjusting the direction of the support device, you can tighten the support device fixing screws.

D. Install the cell phone holder against the hole and tighten the knob (if you don't need the cell phone holder, you may not install it).

E. Remove the device base.

F. After putting on the host device, align the battery with the limit hole of the support bracket and tighten the screws to fix it.

12. 2. Vehicle Kit

Can be mounted on the front or rear of the car for laser point cloud data acquisition. For details, please refer to the manual of Vehicle Kit.

12. 3. Airborne Kit

Can be mounted on a UAV for laser point cloud data acquisition. For details, please refer to the manual of Airborne Kit.