DJI TERRA

User Manual

v2.1 2019.09

Content

Disclaimer

Read this disclaimer and the terms in DJI TERRA™ (hereinafter referred to as "product") carefully before using this product. By using this product, you hereby agree to this disclaimer and the Terms of Use and signify that you have read it fully. Please install and use this product in strict accordance with the User Manual. SZ DJI TECHNOLOGY CO., LTD. and its affiliated companies assume no liability for damage(s) or injuries incurred directly or indirectly from using this product improperly.

This disclaimer is produced in various languages. In the event of variance among different versions, the Chinese version shall prevail when the product in question is purchased in China, and the English version shall prevail when the product in question is purchased in any other region.

Warning

1. Ensure your flight area is safe before each flight.
2. Be sure to maintain a visual line of sight (VLOS) to your aircraft at all times.
3. The aircraft will continue its mission, meaning Failsafe RTH will not be triggered, if the remote controller signal is lost during the mission.
4. When the GNSS signal is strong and the RTH button is pressed and held during a mission, the aircraft will stop the mission immediately and begin RTH. Users can resume the mission if required.
5. When there is only sufficient battery power for RTH during a mission, the remote controller will alert for a few moments, the aircraft will pause the mission, and begin RTH. After replacing the battery, the mission can resume from the paused point
6. When using an aircraft with obstacle avoidance function, check that the Sensing System is operational in the current surroundings. If it is not, disable it in DJI Terra (go to ⚙ > ●)))), or flight may be adversely affected.
7. All of the altitude values in DJI Terra are relative to the altitude of the takeoff point. In the same mission, the altitude above sea level for the same point during the mission will vary if taking off at different altitudes.

Introduction

DJI Terra is a PC software designed to improve mission performance efficiency for industrial applications including — but not limited to — agricultural plant protection, search and rescue, and firefighting. It can control a DJI aircraft* to fly along a planned 2D or 3D route and provides functions such as 2D map reconstruction, 3D model reconstruction, field planning, and more.

* Support for DJI devices will be added as testing and development continues. Visit the DJI Terra product page on dji.com for a complete list. https://www.dji.com/dji-terra

DJI Terra has three versions: Basic, Advanced, and Pro. To purchase DJI Terra, visit the DJI Online Store or the official DJI website. After purchasing, activate licenses and bind devices using DJI Terra. For more information, refer to "More Functions" on p.24.

Basic version includes functions such as real-time 2D mapping, 2D map reconstruction (for field and fruit tree scenes), and agriculture applications.

Advanced version includes all the functions of Basic version with additional functions such as importing KML files, 2D map reconstruction (for urban scenes), and outpurt cordinate system settings.

Pro version includes all the functions from Advanced version with additional functions such as 3D model reconstruction, 3D Mission Planning, and GCP management.

NOTE: The Basic version is only available in China.

Download and Launch

DJI Terra is supported on Windows 7 (64-bit) or later.

Your computer should meet certain hardware requirements for optimal use of some of the advanced functions such as reconstruction.

Hardware	Real-time 2D Mapping	2D Map Reconstruction / 3D Model Reconstruction / 3D Point Cloud
CPU	i5 or later	
GPU	NVIDIA graphics card is recommended	GeForce GTX TITAN X, GeForce RTX 2080 Ti GeForce GTX 1080 Ti, GeForce GTX 1080 GeForce GTX 1070 Ti, GeForce GTX 1070 GeForce GTX 1060, GeForce GTX 1050 Ti GeForce GTX 970, GeForce GTX 960 Other NVIDIA graphics cards with a compute capability of no less than 3.0
VRAM	No less than 4GB	No less than 4GB
RAM	No less than 8GB	No less than 16GB
HDD	50GB Free (basic requirement) or SSD+50GB Free (better)	

NOTE:

- The requirements for 2D map reconstruction / 3D model reconstruction / 3D point cloud are equally applicable to real-time 2D mapping. There are no mandatory requirements on the graphics card for real-time 2D mapping. However, using a low-performance computer for real-time 2D mapping may result in delayed performance. If using an NVIDIA graphics card, the processing speed will be faster.
- It is recommended to use the graphics cards listed above. If using other models, please contact DJI Support before use.
- Make sure that the graphics card driver is up-to-date regardless of the models.

1. Visit the DJI Terra product page on dji.com using your computer to download and install the software.
2. Launch DJI Terra and log in with your DJI account.

DJI devices must be activated before using DJI Terra.

Connect the Remote Controller and Aircraft

Using Phantom 4 RTK / Phantom 4 Pro V2.0 / Phantom 4 Pro+ V2.0

Connect the remote controller to the computer using a USB-C cable (for the Phantom 4 RTK) or Micro USB cable (for the Phantom 4 Pro V2.0 / Phantom 4 Pro+ V2.0), then power on the remote controller and aircraft. The location and status information of the aircraft will display on DJI Terra.

- When using the Phantom 4 Pro V2.0, make sure to connect the remote controller to the computer first and then power it on. Otherwise, DJI Terra cannot recognize the device.
- Currently, the Phantom 4 RTK (SDK) remote controller (which refers to the Phantom 4 RTK remote controller without a display device) is not supported by DJI Terra.

Using Other Devices

1. Switch remote controller communication mode to PC mode.
   a. Power on the remote controller. Make sure the flight mode is P-mode. Then, connect the remote controller (Micro USB port) to PC (USB port) via a Micro USB cable.
   b. Launch DJI Terra, enter > , choose “Switch to PC Mode.” The status LED of the remote controller will blink red (blink green if the aircraft is connected), indicating that the remote controller is in PC mode. Restart the remote controller to enable PC mode.
2. Remove the Micro USB cable. Connect the remote controller (USB port) to PC (USB port) via an A male to A male USB cable, then power on the aircraft. The location and status information of the aircraft will display in DJI Terra.

If you want to use DJI GO 4 or other apps on a mobile device connected to the USB port on the remote controller, be sure to switch the remote controller communication mode to App mode in DJI Terra. The switching procedure is similar to the one above. The only difference is choosing “App Mode.”

Mission Type

Waypoints

Set a waypoint flight path, then define waypoint actions for each waypoint.

Mapping

DJI Terra automatically generates efficient flight paths after user has set their required flight area and camera parameters. The aircraft will then follow this route throughout its mission. Real-time 2D mapping or real-time 3D point cloud (of low accuracy) during a mission can be enabled. After the mission is complete, users can also import the original images into DJI Terra for 2D map reconstruction or 3D model reconstruction (of high accuracy).

Oblique

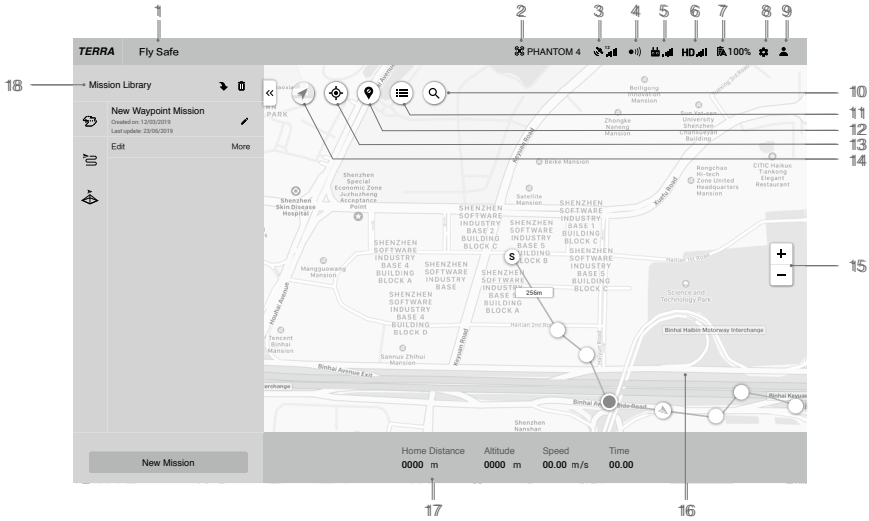
This function automatically generates five flight paths after users have set their required flight area and parameters. These include a single flight path with a gimbal pitch angle of -90°, indicating a downward facing direction. Subsequently, this is followed by four flight paths with a customizable gimbal pitch of more than -90° to capture photos from multiple angles such as forward, backward, leftward, and rightward. After the mission is complete, users can import the original images onto DJI Terra for 3D model reconstruction of different resolutions.

Corridor

DJI Terra automatically generates corridor flight area and several independent flight paths after the user has set the corridor points, expansion distance, and flight band cutting distance. After the mission is complete, users can import the original images into DJI Terra for 2D map or 3D model reconstruction.

Interface Introduction

Main Screen



1. System Status Bar

   Fly Safe : Indicates the aircraft flight status and displays various warning messages.

2. Aircraft Connection Status

   : Shows the current connection status between DJI Terra and the aircraft.

3. GNSS signal Strength

   : Shows the current GNSS signal strength and number of connected satellites.

4. Obstacle Avoidance System Status

   : Shows if the obstacle avoidance system is functioning properly.

5. Remote Controller Signal Strength

   : Shows the strength of the remote controller signal.

6. HD Video Link Signal Strength

   HD : Shows the strength of the HD video downlink connection between the aircraft and remote controller.

7. Aircraft Battery Level

   100% : Shows the current battery level.

8. Settings

   Click to enter the Settings menu.

   : Flight Controller Settings — Includes RTH altitude, flight distance limit, altitude limit, etc.

   : Gimbal and Camera Settings — Includes, photo quality, metering mode, etc.

   : Remote Controller Settings — Includes customizing Button C1 and C2, selecting stick mode, and switching the remote controller communication mode between PC mode and app mode.

   : Obstacle Avoidance Settings — Enable or disable the obstacle avoidance function.

   : General Settings — Includes length unit, area unit, language, cache directory, etc.

9. Account Information

: Log into/out of your account, activate license(s), check the unlocking license(s), version number, read the privacy policy, and configure privacy data settings.

10. Search

: Input names to search on the map.

11. Self Mapping List

: Click to show a self mapping list. Choose a map or multi maps to display in the map view. Maps will not display if not chosen.

12. Show/Hide GEO Zones

: Click to show or hide the DJI GEO Zones on the map.

13. Positioning

: If the aircraft is connected, click the icon to center the map around the aircraft's location. If the aircraft is disconnected, the map will be centered around the current network location. If there is no available internet connection, it will be centered around the defaulted initial location or the location when quitting from the software.

14. Map Mode

: Tap to switch bettwen Regular Map and Satellite Map.

15. Map Zoom

Click +/- to zoom in or out of the map.

16. Map View

Displays the map. Scroll the scroll wheel on the computer mouse to zoom in/out. Press and hold the left button on the computer mouse to move the map.

17. Flight Telemetry

Home Distance: Horizontal distance from the Home Point.

Altitude: Vertical distance from the Home Point.

Speed: Movement speed across a horizontal distance.

Time: Aircraft operating time from motors started for the first time.

Photo Count (Downloaded/Captured): In a Mapping mission, this function displays the photo count downloaded from the aircraft to DJI Terra and the total number of photos captured. The photos will be downloaded to DJI Terra only if Real-Time 2D Mapping or Real-Time 3D Point Cloud is enabled. If it is disabled, by default the downloaded photo count is set to 0.

18. Mission Library

Missions will be assorted by types in mission library. Click each tag to display all missions of the corresponding type. Click the arrow « on the right of the library to collapse or expand it.

: Import — Click to import missions.

: Manage — Click to enter mission managing mode. Choose missions and delete them.

New Mission: Click to choose a mission type and create a new mission.

Click a mission to select it and:

: Edit — This icon can only be clicked before a mission starts. Click to enter mission editing mode and set parameters.

: Continue — If a mission is stopped and "Back to Mission List" is chosen in the prompted menu, this icon will appear when the same mission is selected in the mission library. Click to choose the next operation from the prompted menu.

: View — This icon will appear after a mission is completed. Click to view the parameters. NOTE: Parameters cannot be edited.

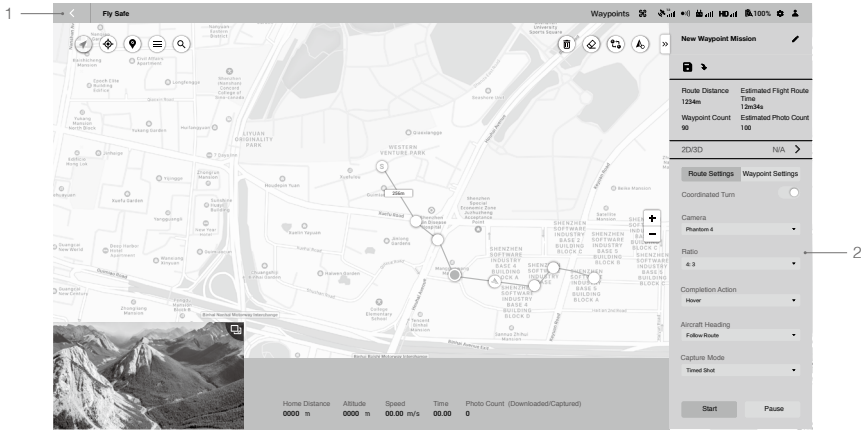
: Map — This icon will appear only in Mapping, Oblique, and Corridor missions. Click to enter the reconstruction page for 2D map reconstruction or 3D model reconstruction. For more information, refer to “More Functions” on p.24.

: Copy — Click to create a copy of this mission. The flight path and parameter settings will be the same.

: Open Folder — Click to open the folder where the current mission is located.

: Export — Click to export the mission with the current settings and its files such as photos, 2D maps, and 3D models. The exported file can be used to create a mission via “Import”. The mission name of the exported mission is the same as the one in DJI Terra. It will not be changed when importing it to create a mission even if the exported file’s name is changed.

Mission Editing View



1. Back

Click to return to the main screen.

2. Parameter List

This list includes the common screen elements below. The other settings vary according to different mission types. Refer to Parameter Setting Introduction for details.

« / » : Collapse / Expand — Click to collapse or expand the list.

Mission Name: Click the button on the right to edit the mission name.

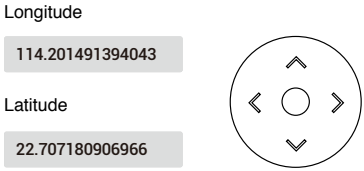
: Save — Click to save current seetings.

: KML Import — Click to import a KML file. The data in the KML file will be converted to waypoints or edge points and displayed on the map for planning. Refer to “Create a Mission” on p. 9 for details.

: Map — This icon will appear only in Mapping, Oblique, and Corridor missions. Click to enter the reconstruction page for 2D map reconstruction or 3D model reconstruction. For more information, refer to “More Functions” on p.24.

Mission Information: Information varies according to different mission types. These include: route distance, estimated flight route time, estimated total flight route time, waypoint count, cover area, estimated photo count, etc.

Sliders and -/+: Move to the left or right to adjust values. Click -/+ for fine-tuning.
Waypoint / Edge Point Edit:



Click the box to input values. Click the arrow keys on the right for fine tufing. Up and down adjust latitude while left and right adjust longitude.

Mission Button (aircraft connection is required):

a. Start: Click to start the mission after parameters are set.
b. Stop: During the mission, click to stop the mission. The aircraft hovers and records its location as a breakpoint and users can control the aircraft manually. Users can then choose an operation after stopping the mission from the prompted list in the software.
c. Pause / Continue: During a Waypoints mission, click to pause the mission, and the aircraft will hover. Users can control the aircraft to fly forward or backward along the flight path, but the aircraft heading cannot be controlled. Click “Continue,” and the aircraft continues the mission from its current position.

Create a Mission

1. New Mission

Create a mission via the following two methods:

a. Click the “New Mission” button on the lower left corner, choose the mission type, input the mission name, and then click “OK” to enter Mission Editing mode.
b. Click in the right section of the mission library to import a mission file from the computer. Click to select the imported mission and then click “Edit” to enter Mission Editing mode. The imported mission cannot be edited, if it has already been finished before export.

2. Plan Flight Path

For Waypoints missions, the flight path is the route consisting of the waypoints. The waypoint quantity should not exceed 99.

For Mapping missions or Oblique missions, DJI Terra automatically generates flight paths after the user has set their required flight area and parameters.

For Corridor missions, DJI Terra automatically creates a flight area extending from the center line and generates flight paths after the user has set their required corridor points and parameters.

Add points via the following methods:

a. Click on the map to add a point.
b. Fly the aircraft to the desired position and then click on the upper right corner to set the aircraft position as a point.
c. Click in the parameter list to import a KML file. The data in the file will be converted to points and displayed on the map. This is a premium function included in DJI Terra Advanced version and Pro version. Please purchase a license and then activate it before use. For more information related to purchase and activation, refer to “More Functions” on p.24.

For Waypoints missions, users can plan flight paths based on a 2D map, 3D model or point cloud generated in DJI Terra. Make sure that there is no waypoint added, then click ❯ on the right of the 2D/3D section in the parameter list, select a desired 2D map or 3D model, and click “Import.” The imported map or model will be displayed in the map view. Add waypoints based on the 2D map or 3D model using the above methods.

The functions for importing 2D maps or 3D models, flight path planning based on a 2D map, and flight path planning based on a 3D model (called “3D Mission Planning” in a Waypoints mission) are included in the DJI Terra Pro version. Please purchase a license and then activate it before use. For information related to purchase and activation, refer to “More Functions” on p.24.

During 3D mission planning, waypoints can only be added when the 3D model is displayed in top view. Click to switch to the top view automatically.

3. Edit Points

Click a point to select it and the selected point will turn from white to blue. Drag the point to change the area shape or flight path. In a Mapping mission or Oblique mission, click on the map, and a new point will be added between the two points. These points will be situated near the location you have clicked on.

Other operations can also be performed via the buttons below:

: Delete selected waypoint/edge point — Click a point to select it and it will turn to blue. Then click this button to delete it.

: Delete all waypoints/edge points — Click to delete all the waypoins or edge points in this mission.

: Switch start and endpoints — Click to swap the start and endpoints to reverse the flight path.

: Set your aircraft’s current position as a waypoint/edge point — Click to set the aircraft position as a waypoint or edge point.

During 3D Mission Planning, hold down the mouse wheel and drag to adjust the display view of the 3D model, and different icons will be displayed on the selected waypoint to indicate the directions in which this waypoint can be adjusted. indicates that the position in horizontal direction can be adjusted, and indicates that the position in vertical direction can be adjusted. Drag the waypoint in the corresponding direction to adjust its position. The image of viewing the model from the selected waypoint’s perspective is displayed on the lower right corner on the screen.

- Waypoint quantity in the generated flight path cannot exceed 99. The distance between two waypoints should be between 3 and 2000 m. The whole distance of the flight path cannot exceed 5000 m.
- Edge points of a flight area should not be too close. Otherwise, it will fail to generate flight path.
- The above requirements are also applicable when importing a KML file to plan a flight path.

4. Parameter Settings

   Set each item in the parameter list and click to save when complete. Refer to "Parameter Setting Introduction" on p.13 for more details.

Perform Mission

Start Mission

1. Select a mission in the mission library. Click "Edit" and then click "Start." A flight preparation list will appear.
2. Wait for the flight path to upload to the aircraft. Check and adjust the aircraft according to the list that appears until all items are green, indicating that takeoff is permitted. Items in yellow require adjustment, but the aircraft can take off without doing so. Only flying when all items are green is highly recommended.
3. Click "Start." The aircraft will fly along the pre-set flight path to perform the mission.
4. In a Mapping mission, if Real-Time 2D Mapping or Real-Time 3D Point Cloud is enabled, the real-time mapping result or 3D point cloud will display on the map during the mission as follows:
   a. The aircraft flies to the starting point of the flight path and start shooting.
   b. When photo count (shown in the flight telemetry at the bottom of the screen) is more than 10, the real-time mapping pictures or 3D point cloud will be shown at the corresponding position on the map. No picture display may be due to the map display level. Zoom in or out to view the result.
   c. As the mission progresses, the mapping result of the flight area will be shown on the map gradually.

Stop Mission

During a mission, click the "Stop" button on the screen and the aircraft will hover in place and record the current position as a breakpoint. The aircraft can then be flown freely and a menu will pop up with additional control options. In a Mapping mission, the pop-up menu display will vary depending on whether "Real-Time 2D Mapping" or "Real-Time 3D Point Cloud" is enabled.

Real-Time 2D Mapping or Real-Time 3D Point Cloud Enabled

Click the "Stop" button, and there will be a prompt indicating that real-time 2D mapping or 3D point cloud or real-time 3D point cloud is paused. Click "OK", and then choose from the options below.
Resume from break point: The aircraft will continue the mission from the recorded breakpoint.
End Current Mission and Start Image Processing: The aircraft will stop the current mission, and DJI Terra will start post-processing for the captured photos to reconstruct a 2D map or 3D point cloud.
Cancel Mission: The aircraft will stop the mission. DJI Terra will not process the photos.

Real-Time 2D Mapping or Real-Time 3D Point Cloud Disabled

Click the "Stop" button, and then choose from the options below.
Save waypoint route info and mission status: DJI Terra will save the breakpoint information and exit from the current mission.

Cancel Mission: The aircraft will stop and exit from the current mission. The mission cannot be continued.

If “Save waypoint route info and mission status” is chosen, users can select from the list below as required after connecting the aircraft and entering the same mission again:

Resume from break point: The aircraft will continue the mission from the recorded breakpoint.

Resume from previous waypoint: The aircraft will continue the mission from the previous waypoint before the recorded breakpoint.

Resume from next waypoint: The aircraft will continue the mission from the next waypoint after the recorded breakpoint.

Restart: The aircraft will fly to the start point and restart the mission.

Cancel Mission: DJI Terra will clear the recorded breakpoint information in the current mission and exit from the mission.

Back to Mission List: Back to the mission library. To check this menu again, select the required mission and click “Continue”.

Special Cases

1. During any mission, the aircraft will exit from its mission and enter a normal flight mode if positioning is not available due to a weak GNSS signal. Users can choose to continue the mission if the signal is strong. When continuing, the aircraft will continue from its last recorded point.
2. Smart Low-Battery Level: When there is only sufficient battery level for RTH, an audio prompt will emit from the remote controller. After a few seconds, the aircraft will stop the mission and begin RTH. Users can cancel the RTH by pressing the Smart RTH button on the remote controller. The mission can be continued and the aircraft will continue the mission from the point where recording stopped after replacing battery.
3. Low Battery Level / Critically Low Battery Level: When the battery level is lower than the Low Battery value pre-set in the app*, an audio prompt will sound from the remote controller. When the battery level is lower than the Critically Low Battery value pre-set in the app, an audio prompt will sound from the remote controller. The aircraft will stop the mission and land automatically. The mission can be continued and the aircraft will continue the mission from the point where recording stopped after replacing battery.

   * App refers to all the apps used with the aircraft, for example DJI GO 4.

Mission Complete

After finishing a mission, the aircraft will perform the pre-set “Completion Action.” The aircraft can be controlled freely afterward.

For a Mapping mission:

If Real-Time 2D Mapping or Real-Time 3D Point Cloud is enabled, DJI Terra will enter post-processing stage after mission completion to process the captured photos again for mapping result of higher accuracy with more zoom levels. After post-processing completion, users can zoom in to view the more accurate result.

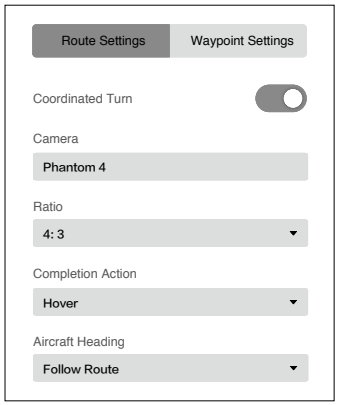
If the option is disabled, after mission completion, users can use the Reconstruction function to process the captured phots for reconstruction. Refer to “Reconstruction” on p. 25 for details.

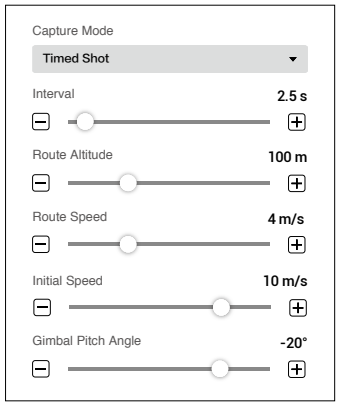
Parameter Setting Introduction

Select a mission in the mission library. Click “Edit” to enter mission editing mode for parameter settings.

Waypoints Settings

Route Settings





1. Coordinated Turn

   If enabled, the aircraft will fly on a smooth curve when passing a waypoint. Set a “Turn Radius” in “Waypoint Settings.” However, be aware that only Waypoint Actions on the start and endpoints will be performed, while the Waypoint Actions on other points will not.

   If disabled, the aircraft will fly to a waypoint and perform Waypoint Actions. If no Waypoint Actions are set on a waypoint, the aircraft will stop at the waypoint, adjust its heading and fly to the next waypoint.

2. Camera

   DJI Terra can recognize the camera model of the aircraft. Unless otherwise specified, users don’t need to set it.

3. Ratio

   Refers to the ratio of the width and height of the photos captured during the mission.

4. Completion Action

   Aircraft action after mission complete.

   Hover: The aircraft will hover at the final waypoint after mission completion. Then users can then control the aircraft directly.

   Return to Home: If the aircraft altitude is higher than this pre-set value, it will return to home at its mission completion altitude. If the aircraft altitude is lower than the pre-set value it will ascend to the RTH altitude after mission completion before returning to home. The RTH altitude can be set in Flight Controller Settings.

   Land in Place: The aircraft will land at the final waypoint and stop motors automatically after mission completion.

Return and Hover: The aircraft will return to the starting point of the flight path and hover after the mission is complete. The altitude when returning to the starting point is the same as RTH altitude.

⚠ Make sure that the endpoint of the flight path is suitable for landing when completion action is set to “Land in Place” to avoid potential flight accidents.

5. Aircraft Heading

Aircraft heading when performing the mission.

Follow Route: The aircraft’s nose is always aligned to the direction of the next two waypoints.

Set Waypoint Separately: Set aircraft heading at each waypoint in “Waypoint Settings”.

6. Capture Mode

Waypoint Hovering Shot: The aircraft will hover and capture at each waypoint. In this mode, shooting is stable, but the time required will be long. The number of waypoints required may be large, which will also make mission times longer.

Timed Shot: The aircraft will capture in a fixed time interval as it flies along the path. The aircraft will not hover during capturing unless there is a waypoint action. Users can set the time interval. In this mode, operation is fast. However, short exposure times are required.

7. Interval

This setting will appear when capture mode is set to Timed Shot.

8. Route Altitude

The relative altitude between the aircraft and the takeoff point during flight. This can be set from 0 to 500 m. You can also set the altitude of each waypoint in “Waypoint Settings”.

During 3D mission planning, the altitude at each waypoint is the relative altitude between the aircraft and the scene in the 3D model below the corresponding waypoint.

9. Route Speed

The flight speed when flying along a waypoint flight path.

10. Initial Speed

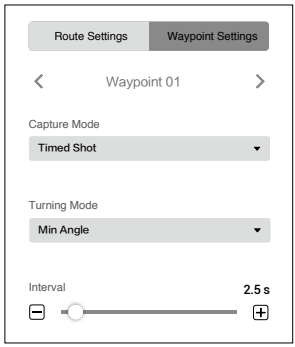
Flight speed when not flying along the waypoint-determined flight path. This includes the flight speed from the aircraft position to the starting point of the flight path when starting a mission, or returning speed after mission completion.

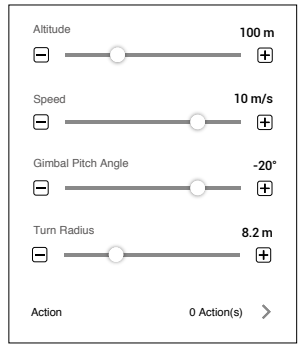
11. Gimbal Pitch Angle

The gimbal pitch angle at the selected waypoint. Pitch angle can range from -90° to 0°, with downward represented by -90° and forward represented by 0°.

If capture mode, route speed, or gimbal pitch angle are set in “Route Settings,” the capture mode, speed, or gimbal pitch angle setting in “Waypoint Settings” will automatically change to the same as the one in “Route Settings.”

Waypoint Settings





Select a waypoint (it will turn blue when selected) then set waypoint parameters. Click ❮ or ❯ to switch to the previous or next waypoint. The keyboard shortcut “Ctrl+ ← ” or “Ctrl+ → ” can also be used to switch accordingly.

1. Capture Mode

   Waypoint Hovering Shot: The aircraft will hover and capture at the selected waypoint.

   Time Shot: The aircraft will capture in a fixed time interval as it flies from the selected waypoint to the next waypoint. The aircraft will not hover during capturing. Users can set the time interval.

2. Turning Mode

   The aircraft rotation direction when flying to the next waypoint. This option will be available only if “Set Waypoint Separately” is set for “Aircraft Heading” in “Route Settings”. “Min Angle” and “Max Angle” respectively indicate that the aircraft will rotate in the direction with a min or max rotation angle to adjust its heading to the pre-set value of the next waypoint.

3. Interval

   This setting will appear when capture mode is set to Timed Shot.

4. Altitude

   Set the relative altitude of each waypoint between the aircraft and the takeoff point. The range can be set from -120 m to 500 m with a negative value lower than the takeoff point and a positive value higher than the takeoff point. When the altitude of the start point is set to a negative value, indicating that the start point is lower than the takeoff point, make sure to click ⓘ for the setting, read and comply with the warning message: To ensure flight safety, when the altitude of the first waypoint is lower than the takeoff point altitude, fly the aircraft to an obstacle-free environment before starting the flight mission.

   During 3D mission planning, the altitude at each waypoint is the relative altitude between the aircraft and the scene in the 3D model below the corresponding waypoint.

5. Speed

   The aircraft will ascend/descend to the flight speed set here when flying to the selected waypoint and then contitues flying at this speed. The range can be set from 0.2 to 13 m/s.

6. Gimbal Pitch Angle

The gimbal pitch angle at the selected waypoint. Pitch angle can range from -90° to 0°, with downward represented by -90° and forward represented by 0°. The gimbal will tilt gradually to the angle pre-set at the next waypoint if the values at the two consecutive waypoints are different.

7. Turn Radius

This is the aircraft's turn radius when flying past a waypoint. Radius can range from 0.2 to 1000 m. This option will be available only if "Coordinated Turn" is enabled in "Route Settings". Note that the "Turn Radius" setting is unavailable for start and stop points, and the sum of the turn radius of two neighboring waypoints should not exceed the distance between the two waypoints.

8. Action

Click to enter. Up to 15 actions can be added. Delete actions or re-order them.

Add Actions: Click to add. Actions will be performed in the order they are added unless re-ordered.

a. Hover: The aircraft will hover at the waypoint. Set hovering time from 0 to 30000 ms.
b. Capture: Capture on arrival at a waypoint. Note that Capture cannot be performed if the camera is recording.
c. Start Recording: Start recording on arrival at a waypoint.
d. Stop Recording: Stop recording on arrival at a waypoint.
e. Aircraft Heading: Adjust the aircraft heading on arrival at a waypoint. North is 0° with a negative value representing clockwise and the range is -180° to 180°.
f. Gimbal Pitch: Adjust the gimbal pitch angle on arrival at this waypoint. Pitch angle can range from -90° to 0°, with downward represented by -90° and forward represented by 0°. If "Gimbal Pitch Angle" is set as a value in "Waypoint Settings", the aircraft will fly to the waypoint with the defined Gimbal Pitch Angle then adjust it according to the Gimbal Pitch settings defined when adding an Action for the current waypoint.

Delete Action: Click on the right side of the desired action to delete it.

Re-Order: Click and hold on the left side of the desired action, drag it to the desired position and release.

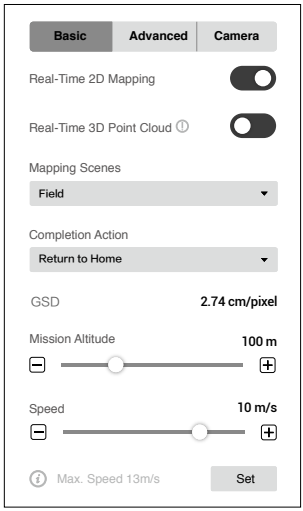
⚠
- DO NOT add Start Recording after Capture. Otherwise recording cannot be started.
- DO NOT add Capture after Stop Recording. Otherwise a picture cannot be captured.

Mapping / Oblique Settings

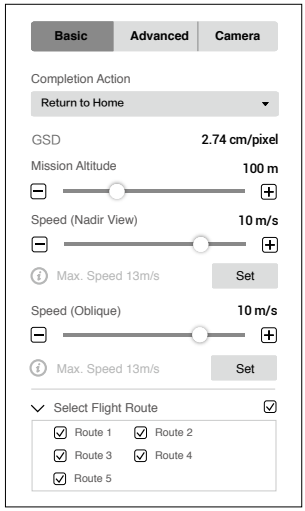
The settings for Mapping and Oblique missions are similar. Unless otherwise specified, the descriptions below are compatible with both types of missions.

For Oblique missions, parameters such as overlap ratio and speed can be set separately for the nadir view flight path and oblique flight paths. During mission settings, click the numbers 1 to 5 in the map view to preview each flight path. 1 refers to the nadir view flight path, and 2 to 5 refer to the four oblique flight paths respectively.

Basic Settings



Mapping



Oblique

1. Real-Time 2D Mapping (for Mapping only)
   This is a premium function. Please purchase a license and then activate it before use. For more information, refer to "More Functions" on p.24.
   If enabled, DJI Terra will process the photos captured during a mission and display the mapping results on the map in real time. However, the results will be less accurate. Users can import the original photos into DJI Terra after the mission is complete for mapping with higher accuracy.
   If disabled, there will not be any real-time results.
2. Real-Time 3D Point Cloud (for Mapping only)
   This is a premium function. Please purchase a license and then activate it before use. For more information, refer to "More Functions" on p.24.
   If enabled, DJI Terra will process the photos captured during a mission and display the 3D point cloud results on the map in real time. Users can import the original photos into DJI Terra after the mission is complete for 3D model reconstruction with higher accuracy.
   If disabled, there will not be any real-time results.

Real-time 3D point cloud is only available when using the Phantom 4 RTK, Phantom 4 Pro V2.0+ or Phantom 4 Pro V2.0 aircraft. The real-time 2D mapping and real-time 3D point cloud cannot be enabled simultaneously.

3. Mapping Scenes (for Mapping only)
   Choose mapping scenes such as field and urban according to application requirements. It is recommended to choose field in open areas where objects have a minor difference in height. Use urban for surroundings with more buildings. The urban option is included in DJI Terra Advanced and Pro versions. Please purchase a license and then activate it before use. For more information, refer to "More Functions" on p.24.

4. Completion Action
   Aircraft action after mission complete.
   Hover: The aircraft will hover at the final waypoint after mission completion. Then users can then control the aircraft directly.
   Return to Home: If the aircraft altitude is higher than this pre-set value, it will return to home at its mission completion altitude. If the aircraft altitude is lower than the pre-set value it will ascend to the RTH altitude after mission completion before returning to home. The RTH altitude can be set in Flight Controller Settings.
   Land in Place: The aircraft will land at the final waypoint and stop motors automatically after mission completion.

⚠ Make sure that the end poit of the flight path is suitablefor landing when completion action is set to "Land in Place" to avoid potential flight accidents.

5. GSD
   Ground Sample Distance. This value is the actual ground distance represented by each pixel in the original image captured, and is automatically calculated by DJI Terra based on the flying altitude and camera model.

6. Mission Altitude
   The relative altitude between the aircraft and the area being mapped.

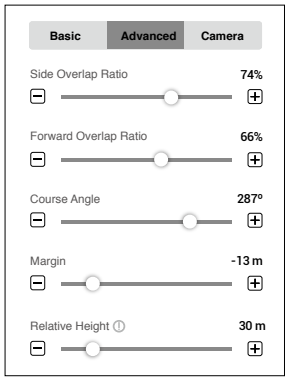
7. Speed / Speed (Nadir View) / Speed (Oblique)
   The flight speed of the aircraft during mission. When flying out of the flight path such as flying from the current position to the starting point when mission starts, or flying back after mission completion, the flight speed will be 13 m/s, which cannot be customized.
   For Oblique missions, "Speed (Nadir View)" refers to the speed at which the aircraft is flying along the nadir view flight path. "Speed (Oblique)" refers to the speed at which the aircraft is flying along the oblique flight paths.

8. Max Speed
   DJI Terra will calculate a maximum flight speed at which images meeting mapping requirements can be captured according to the altitude, camera model, and advanced settings. Click "Set" to set the flight speed to this max speed.

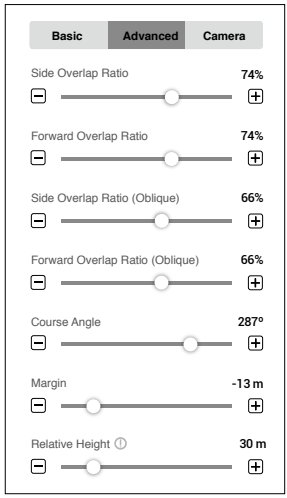
9. Select Flight Route
   Check the corresponding box to select the desired flight route. The unchecked flight route will not be executed.

For Oblique missions, if required, users can adjust the location of the start point for each flight route after planning the routes. Click the start point or end point to switch the two.

Advanced Settings



Mapping

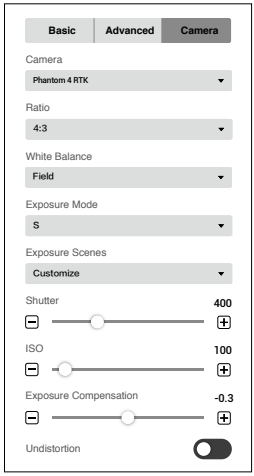


Oblique

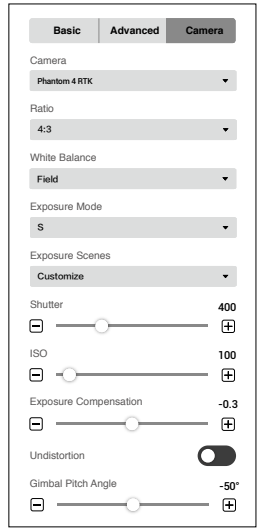
1. Side Overlap Ratio / Side Overlap Ratio (Oblique)
   The overlap ratio of two pictures on two parallel main paths. The range can be set from 10% to 90%.
   For Oblique missions, “Side Overlap Ratio” refers to the overlap ratio for the nadir view flight path, and “Side Overlap Ratio (Oblique)” refers to the overlap ratio for the oblique flight paths.
2. Forward Overlap Ratio / Forward Overlap Ratio (Oblique)
   The overlap ratio of two consecutive pictures captured along the same main path. The range can be set from 10% to 90%.
   For Oblique missions, “Forward Overlap Ratio” refers to the overlap ratio for the nadir view flight path, and “Forward Overlap Ratio (Oblique)” refers to the overlap ratio for the oblique flight paths.
3. Course Angle
   The angle of the main path. North is 0°, with a positive value when it is clockwise. The range can be set from 1° to 360°.
4. Margin
   Expand (positive value) or narrow (negative value) the area margin for control over the area of flight. The range can be set from -30 to +30m.
5. Relative Height
   The relative height between the takeoff point and the area being mapped. The range can be set from -120 m to 120 m. NOTE: Make sure to set the correct relative height. Otherwise, the overlap ratios will be affected which may have a negative effect on the mapping results.

Users can adjust the overlap ratios, altitude, and gimbal pitch angle (for Oblique mission only) according to actual situations. Reduce overlap ratio accordingly for areas with less terrain fluctuations. Increase overlap ratio accordingly for areas with more terrain fluctuations. However, it is recommended to set a side overlap ratio of no less than 60% and a forward overlap ratio of no less than 65%. For objects that require highly detailed results, create multiple missions to cover more perspectives of the desired area or object.

Camera Settings



Mapping

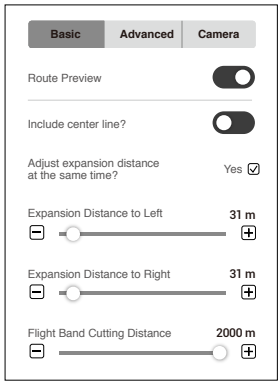


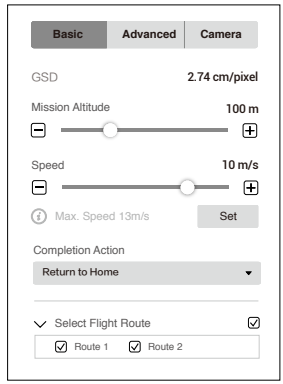
Oblique

1. Camera
   DJI Terra can recognize the camera model of the aircraft. Unless otherwise specified, users don't need to set it.
2. Ratio
   Set the photo ratio of the photos captured during the mission. 4:3 is recommended.
3. Balance
   Field is set by default. Users can select other options according to the application.
4. Exposure Mode
   Choose from Auto or S (shutter priority). If S is set, choose from Sunny, Cloudy, Low light, and Customize for the Exposure Scenes setting. If Customize is set, users can adjust shutter, ISO, and exposure compensation.
5. Undistortion
   This option will appear when using the Phantom 4 RTK. It is disabled by default. If enabled, the software can automatically correct the distortion when capturing, but the quality of the photos captured may be lower than the photo quality when this option is disabled. It is recommended to disable this option when original photos are needed for post processing.

6. Gimbal Pitch Angle (for Oblique only)
   The gimbal pitch angle at which the aircraft is flying along the oblique flight path. The range for the gimbal pitch angle can be set from -85° to -40°.

Corridor Settings





Basic Settings

1. Route Preview
   When enabled, the flight route generated according to the current settings can be previewed on the map. During route preview, users cannot edit the corridor points on the center line.
2. Include center line
   To set if the center line will be included the flight paths generated. The center line refers to the line consisting of the corridor points added when planning the Corridor mission.
3. Adjust expansion distance at the same time
   To set if expansion distance for both sides will be adjusted at the same time. If yes, the expansion distance for one side will follow the adjustment for the other side. If no, each expansion distance can be adjusted separately.
4. Expansion Distance to Left/Right
   To adjust the expansion distance to left or right for the corridor flight area. Left or right refer to the left or right side of the center line when the front direction is defined by the line from one of the corridor points pointing to its previous point.
5. Flight Band Cutting Distance
   DJI Terra will divide corridor flight areas with a long center line into multiple segments according to this flight band cutting distance. Each segment has a sub mission with an independent flight route. Users can check the corresponding box in the Select Flight Route setting at the bottom of the screen to select the desired flight route before performing the mission. Click the area of each sub mission to view the mission information. For each sub mission, a starting point, end point, and several white points will be displayed on the map. Click one of these points to set it as the starting point of the sub mission flight route.

6. GSD

Ground Sample Distance. This value is the actual ground distance represented by each pixel in the original image captured, and is automatically calculated by DJI Terra based on the flying altitude and camera model.

7. Mission Altitude

The relative altitude between the aircraft and the area being mapped.

8. Speed

The flight speed of the aircraft during mission. When flying out of the flight path such as flying from the current position to the starting point when mission starts, or flying back after mission completion, the flight speed will be 13 m/s, which cannot be customized.

9. Max Speed

DJI Terra will calculate a maximum flight speed at which images meeting mapping requirements can be captured according to the altitude, camera model, and advanced settings. Click “Set” to set the flight speed to this max speed.

10. Completion Action

Aircraft action after mission complete.

Hover: The aircraft will hover at the final waypoint after mission completion. Then users can then control the aircraft directly.

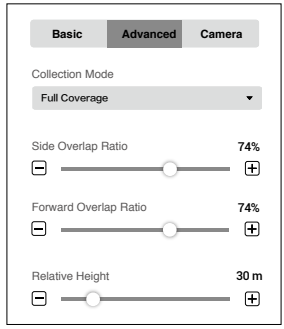
Return to Home: If the aircraft altitude is higher than this pre-set value, it will return to home at its mission completion altitude. If the aircraft altitude is lower than the pre-set value it will ascend to the RTH altitude after mission completion before returning to home. The RTH altitude can be set in Flight Controller Settings.

Land in Place: The aircraft will land at the final waypoint and stop motors automatically after mission completion.

11. Select Flight Route

Check the corresponding box to select the desired flight route. The unchecked flight route will not be executed.

Advanced Settings



1. Collection Mode

The image capture area varies by modes, which also affects the generated flight route.

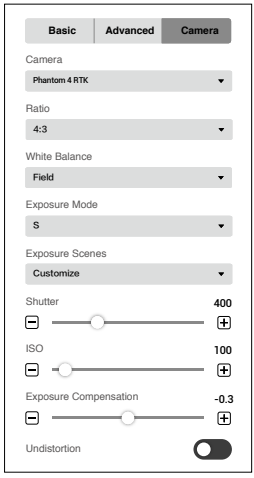
Full Coverage: An additional route will be added on both left and right edges of the corridor flight area when generating the flight route.
High Efficiency: The generated flight route can only cover the corridor flight area.

2. Side Overlap Ratio
   The overlap ratio of two pictures on two parallel main paths. The range can be set from 10% to 90%.

3. Forward Overlap Ratio
   The overlap ratio of two consecutive pictures captured along the same main path. The range can be set from 10% to 90%.

4. Relative Height
   The relative height between the takeoff point and the area being mapped. The range can be set from -120 m to 120 m. NOTE: Make sure to set the correct relative height. Otherwise, the overlap ratios will be affected which may have a negative effect on the mapping results.

Camera Settings



1. Camera
   DJI Terra can recognize the camera model of the aircraft. Unless otherwise specified, users don't need to set it.

2. Ratio
   Set the photo ratio of the photos captured during the mission. 4:3 is recommended.

3. Balance
   Field is set by default. Users can select other options according to the application.

4. Exposure Mode
   Choose from Auto or S (shutter priority). If S is set, choose from Sunny, Cloudy, Low light, and Customize for the Exposure Scenes setting. If Customize is set, users can adjust shutter, ISO, and exposure compensation.

5. Undistortion
   This option will appear when using the Phantom 4 RTK. It is disabled by default. If enabled, the software can automatically correct the distortion when capturing, but the quality of the photos captured may be lower than the photo quality when this option is disabled. It is recommended to disable this option when original photos are needed for post processing.

6. Gimbal Pitch Angle
   The gimbal pitch angle at which the aircraft is flying along the oblique flight path. The range for the gimbal pitch angle can be set from -85° to -40°.

More Functions

KML files can be imported onto DJI Terra to add waypoints or edge points of a flight area. In a Waypoints mission, 2D / 3D Mission Planning based on an existing or newly created reconstruction is available. For Mapping missions, there are various functions available such as Real-Time 2D Mapping, 2D Map Reconstruction (for field, fruit tree, and urban scenes), Agricultural Application, Real-Time 3D Point Cloud, Output Coordinate System Selection, 3D Model Reconstruction, and GCP Management. For Oblique missions, users can create flight missions resulting in more detailed 3D models. For Corridor missions, 2D Map Reconstruction and 3D Model Reconstruction are also available.

See the table below which provides an overview of DJI Terra's more advanced features and funcrions.

Features	Advanced	Pro
Real-time 2D Mapping	√	√
Agricultural application	√	√
KML file import	√	√
2D Reconstruction (Field)	√	√
2D Reconstruction (Urban)	√	√
Output Coordinate System	√	√
3D Reconstruction		√
3D Mission planning		√
GCP		√

Purchase Licenses

Users can purchase licenses for DJI Terra Advanced or Pro version on the product page on the official DJI website. DJI will send the activation code via an email once purchased successfully. See the details below. Launch DJI Terra >  > Activated License(s) > Buy New License(s). Users will be redirected to the official DJI website to get the details about the functions of different versions. Users can also be redirected to the official DJI website by clicking the corresponding button where Real-Time 2D Mapping, Real-Time 3D Point Cloud, Reconstrctun, Output Coordinate System, GCP Management, Agriculture, KML File Import, or 2D/3D function is required.

To purchase DJI Terra Advanced or Pro, visit the DJI Terra product page at https://www.dji.com/dji-terra . Input your information on the contact form, and then wait for a DJI authorized dealer to respond to your request.

Activate Licenses and Bind Devices

To use the licenses with the desired DJI accounts and on the desired computers, license activation and device binding are required. Activate licenses in DJI Terra or via an activation link. Each license can be bound to up to three computers. Contact DJI Support to unbind the license if needed.

1. Enter the activation page via the two methods below:
   DJI Terra: Launch DJI Terra > > Activated License(s) > Activate a New License. A window prompt will appear.
   Activation Link: Visit https://license.dji.com/en
2. Input the activation code you received and the desired DJI account that you want to use the license with, then click “Activate.”
3. After successful activation, view the ID, expiry time, and device binding status of the license. If activating the license via the link, re-enter the Activated License(s) page to view the information.
4. Click “Device Binding” and then click “Bind” to bind the license to the current computer used. “Bound” will be displayed next to the license of the corresponding ID in Activated License(s).

Reconstruction

After a Mapping, Oblique, or Corridor mission is complete, users can use the Reconstruction function with the original photos captured by the aircraft to obtain a high-precision 2D map or 3D model. After a model has been produced, users have the option to add annotation and perform a variety of measurements. For Mapping and Corridor missions, both 2D reconstruction and 3D reconstruction are achievable, and agriculture-specific functions can be done based on a 2D map. For Oblique missions, only 3D reconstruction is available. If the imported photos include a PPK result file from the Cloud PPK Service of the Phantom 4 RTK, this PPK file can be used for 2D or 3D reconstructions at a higher accuracy. If the imported photos are captured using the P4 Multispectral, you can reconstruct 2D multispectral maps.

Using the PPK Result Files

Use PPK result files from the Cloud PPK Service of the Phantom 4 RTK only.

1. Name the result file from Phantom 4 RTK’s Cloud PPK Service as “result.csv”, and store it in the same folder as the photos you want to import.
2. Follow the instructions in 2D or 3D reconstruction to import the photos.
3. In the pop-up window, select Yes to use the positioning information in the PPK result file for reconstruction, and select No to use the GPS positioning information included in the photos for reconstruction.
4. Refer to the section below for the remaining instructions on reconstruction.

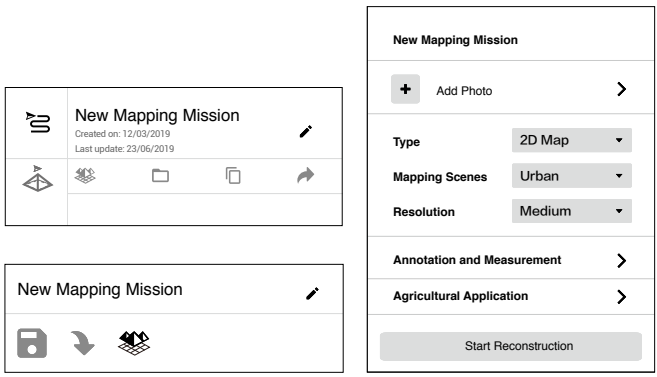
2D Reconstruction

If “Real-Time 2D Mapping” is disabled during a mission, the user can perform 2D map reconstruction after the aircraft has completed its mission. If “Real-Time 2D Mapping” is enabled, 2D map reconstruction cannot be performed in the corresponding mapping mission. Users should create a new Mapping mission to perform map reconstruction.

Reconstruction Procedure

1. Click the desired mission on the mission library. Then enter the reconstruction page through one of the following methods:

a. Click .
b. Click to enter Mission Editing View, and then click in the parameter list.



2. Click . Select photos corresponding to the Mapping mission to add photos.

⚠ It is recommended to select at least six photos on two main paths for reconstruction.

3. After import, the icon will appear on the upper right corner of the map view. Click to turn it blue indicating that capture location display is enabled. The corresponding location of the photos captured will be displayed on the map as a dot. Click on the right to manage the photos. The photos are grouped by the folders they are located. Expand the list to view and manage photos.
   If capture location display is enabled, click the name of the photo to turn it blue and the corresponding dot on the map will turn orange. Similarly, when you click the dot on the map, its corresponding photo name in the list will turn blue.
   Double-click a photo to view in a large size and zoom in or out.
   Click “Manage,” select photos and then click “Delete” to delete photos. Click “Cancel” to exit management.
   Click to return to the reconstruction page.
4. Select “2D Map” as the reconstruction type.
5. Select the desired mapping scene. Field is suitable for open areas with objects of small height difference such as farmland, Urban is suitable for areas with more buildings, and Fruit Tree is suitable for areas with objects of large height difference such as orchard.
   If Fruit Tree is selected, DJI Terra will recognize in the reconstruction result to mark different areas such as fruit trees, buildings, and ground. After reconstruction, in Agriculture page, users can add boundary points of a flight area and calibration point(s) in the Fruit Tree tag and DJI Terra can automatically generate a flight path according to the recognition results. For more information, refer to “Agricultural Application” on p. 29.
6. Select the desired resolution. High refers to the original resolution, Medium refers to 1/2 of the original resolution (i.e. the length and width are both 1/2 of the original photo), and Low refers to 1/3 of the original resolution (i.e. the length and width are both 1/3 of the original photo). For example, if the original photo resolution is 6000x6000, the high resolution is the same, while the medium resolution is 3000x3000, and the low resolution is 2000x2000.

7. Set the output coordinate system and manage GCPs if required. Refer to the section below for details.
8. Click “Start Reconstruction,” a pop-up window will appear to ask if a user wants to copy the photos to the mission folder. If a user chooses to save a copy, the added photos will be copied to the current mission folder and they will be included in the mission file when exporting a mission. If the user does not save a copy, the added photos will not be copied and will not be included when exporting a mission. Then click “Continue” to start reconstruction. The progress bar at the bottom will show the mapping progress. Click “Stop” to stop mapping, and the progress will be saved.
9. Multiple reconstruction missions can be started. Before the first mission finishes, other missions will be lined up and processed in order.
10. After mapping, the result will be shown in the map view. Zoom in or out to view the map at different levels. Annotation and measurement and agriculture applications are also available.
11. Click “Quality Report” to view and save a report in html format. The report includes reconstruction result overview, RTK status, camera calibration information and process information. Refer to the document How to Read a DJI Terra Quality Report for 2D Maps on the official DJI website for details.

File Format and Storage Path of 2D Maps

The 2D map reconstruction result is raster data in GeoTIFF format which can be used in third party software compatible with GeoTIFF format.

The default storage path of the 2D map files is as below. This cache directory can be changed in Settings.

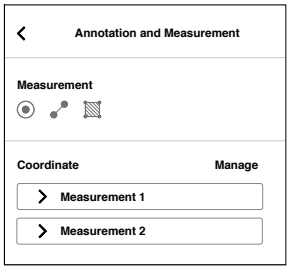
C:\Users\<computer name>\Documents\DJI\DJI Terra\<DJI account name>\<mission code>\map\result.tif

In the reconstruction page, users can open the current mission folder using the keyboard shortcut “Ctrl+Alt+F”.

- If PC GS Pro has been used on your computer, after DJI Terra has been installed, the cache directory will still be as follows:
  C:\Users\<computer name>\Documents\DJI\Groundstation\Missions\<DJI account name>
- The mission code is the number generated by the software automatically when a mission is created. It cannot be changed by users.

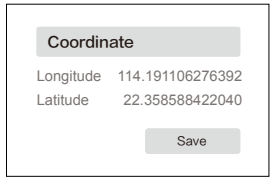
Annotation and Measurement

Click > on the right of Annotation and Measurement bar to enter the page. Users can add coordinates, measure distance and area.



Coordinate

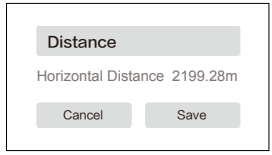
1. Click ◉ to enter Coordinate Adding mode.
2. Click on the map to add a coordinate. Drag to adjust its position. Click 🗑 on top to delete the coordinate. The box below the coordinate shows the name, longitude, and latitude, indicating that the coordinate is in editing status. Click the text box of the name to input the name, then click “Save” to exit editing.



3. The coordinate list displays the added coordinates. Click ⌄ to expand the information to view the longitude and latitude and change the name.
4. Make sure that there is no coordinate in editing status. Click “Manage,” and select coordinates (the outer box of the coordinate will turn blue when selected) to export or delete them.

Distance

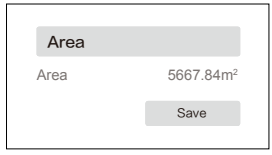
1. Click to enter distance measurement mode.
2. Click the left mouse button on the map to add measurement points. Drag to adjust the position. The selected point is red, while the unselected point is gray. Click 🗑 on top to delete the selected point. Click ◇ to delete all the points in this measurement. Click the right mouse button to end measurement. The box below the line shows the name and horizontal distance. Click the text box of the name to input the name, then click “Save” to exit editing. A distance measurement is in editing status when the measurement is not ended or saved. To exit editing status, end the measurement and save.



3. The process to view and manage distance measurements is the same as the one used for coordinates.

Area

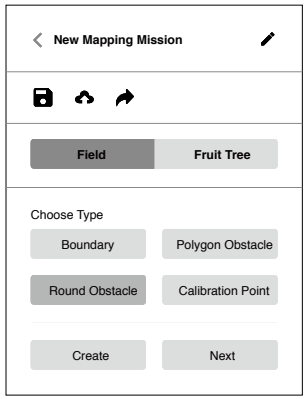
1. Click to enter area measurement mode.
2. As with distance measurement, the procedure to add measurement points for area is similar. The only difference is that there are three measurements points required before ending the measurement, which is achievable by clicking the right mouse button.



Agricultural Application

Click > on the right of Agricultural Application bar to enter the page. Users can plan operations for fields or fruit trees on the 2D map. Planning includes Boundary, Polygon Obstacle, Round Obstacle, and Calibration Point.

Field



Boundary

1. Click “Boundary” and click the desired positions on the map to add edge points for the field.
2. After adding edge points for one field, click “Create” to add edge points for the next field.
3. Click “Next” to switch between different fields.
4. Click a point shown on the map to select it, drag to adjust its position, click to delete it, and click to clear information of all types.
5. The panel will display the number and area of the current field and the number, longitude, and latitude of the current edge point. Users can adjust the edge point position via typing longitude and latitude values and using the arrow keys.

Polygon Obstacle

1. Click “Polygon Obstacle” and click the desired positions on the map to add edge points for the field.
2. After adding edge points for one obstacle, click “Create” to add edge points for the next obstacle.
3. Click “Next” to switch between different obstacles.
4. Click a point shown on the map to select it, drag to adjust its position, click to delete it, and click to clear information of all types.
5. The panel will display the number and area of the current obstacle zone and the number, longitude, and latitude of the current obstacle edge point. Users can adjust the edge point position via typing longitude and latitude values and using the arrow keys.

Round Obstacle

1. Click “Round Obstacle” and click the desired position on the map. Then a dot will appear on the map. Drag it to adjust the radius of the round obstacle.

2. Click another position on the map to add a new round obstacle.
3. Click a round obstacle to select it, drag the circular area to adjust the obstacle position, click to delete it, and click to clear information of all types.
4. The panel will display the number, area, and radius of the current obstacle and the longitude and latitude of its center. Users can adjust the radius via typing a value and adjust the center position via typing longitude and latitude values and using the arrow keys.

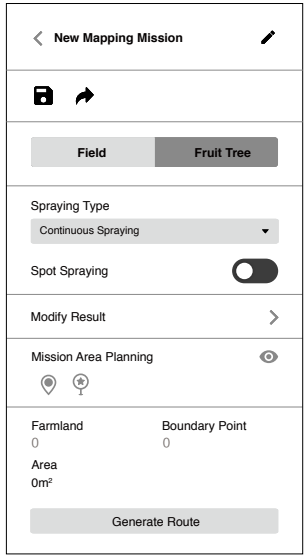
Calibration Point

1. Click “Calibration Point” and click the desired position on the map to add a calibration point. Users can add several calibration points.
2. Drag a calibration point to adjust its position, click to delete it, and click to clear information of all types.
3. The panel will display the number, longitude, and latitude of the current calibration point. Users can adjust the calibration point position via typing longitude and latitude values and using the arrow keys.

Planning Complete

1. Click to save the mission.
2. Click and the mission will be uploaded to DJI Agriculture Management Platform. Agras aircraft users can download the mission from the platform to the DJI MG app.
3. Click and the mission will be exported to the microSD card in the remote controller connected to the computer. Insert the card into the Agras remote controller and import the mission in the prompted menu in DJI MG.

Fruit Tree



1. Select Spraying Type. When using an Agras aircraft to perform the flight mission generated by DJI Terra, the aircraft will spray according to the selected type. Continuous spraying refers to spraying when flying within a recognized fruit tree area. Spot spraying refers to spraying only when flying to the tree crown center of the recognized fruit tree area.
2. If Display Result is enabled, recognition for different areas such as fruit trees, buildings, ground, water and poles will be displayed on the map.
3. Click Modify Result to modify the recognition result manually. Operation varies for different spraying types.
   - When continuous spraying is selected, use the corresponding brush for each type of area to paint on the map to modify the recognition result.
   - When spot spraying is selected, circles will be displayed on the map to mark the tree crown centers. Click to edit them. Click the recognized tree crown center to select it, then click to delete. Click on the map to add a tree crown center marker.
4. Click and to add boundary points and calibration points in the area that includes fruit trees. Click the icon or to show or hide the planned farmland and calibration points.
5. Click “Generate Route.” DJI Terra will automatically generate a route for fruit tree operations. Users can enable or disable route display and obstacle sensing, and configure route altitude, route width, and route angle.
6. Click to save the operation. Click and the operation will be exported to the microSD card in the remote controller connected to the computer. Insert the card into the Agras remote controller and import the operation in the prompted menu on the DJI MG app.

2D Multispectral Map Reconstruction

2D multispectral map reconstruction is only supported when using photos captured by the P4 Multispectral. The reconstruction procedure is similar to that of 2D reconstruction. “2D Multispectral Map” should be selected as the reconstruction type. Users can view the supported vegetation index outputs. Annotations and measurements can be done the same way you would after a 2D reconstruction.

Vegetation Index Outputs

DJI Terra supports 5 types of vegetation indices: NDVI, LCI, GNDVI, OSAVI, and NDRE, each requiring photos from different spectral bands. DJI Terra will display the indices that can be calculated according to the imported photos. There will be notifications under output index if any photos are missing in the required band. After reconstruction, click the buttons for different indices to view the results.

Even if only one photo is missing from a required band for the desired vegetation index, it is considered that the information of that whole band is missing. Users can view which photos are missing in the required band in the photo list.

File Format and Storage Path of 2D Multispectral Maps

The 2D multispectral map reconstruction results are raster data in the GeoTIFF format which can be used in third party software compatible with GeoTIFF format. The results include multispectral index maps for each index, 2D orthographic maps in RGB and for each of the spectral bands. The default storage path of the 2D multispectral map files can be found below. In the reconstruction page, users can open the current mission folder using the keyboard shortcut “Ctrl+Alt+F”. This cache directory can be changed in Settings.

The default storage path of the multispectral index maps is C:\Users\<computer name>\Documents\DJI\DJI Terra\<DJI account name>\<mission code>\map\index_map

The default storage path of the 2D orthographic maps in RGB and for each of the spectral bands is C:\Users\<computer name>\Documents\DJI\DJI Terra\<DJI account name>\<mission code>\map The result.tif file is the RGB 2D orthographic map. The result_XXX.tif file is the 2D orthographic map for the spectral band corresponding to “XXX” in the file name.

3D Reconstruction

3D reconstruction is available for Mapping, Oblique, and Corridor missions, and the procedure and result are completely the same. If “Real-Time 3D Point Cloud” is disabled during a mission, the user can perform 3D reconstruction after the aircraft has completed its mission. If “Real-Time 3D Point Cloud” is enabled, 3D reconstruction cannot be performed in the corresponding mission. Users should create a new mission to perform 3D reconstruction.

Reconstruction Procedure

1. The method to enter the reconstruction page and add photos is similar to that used for 2D reconstruction.
   3D reconstruction occupies more computer resources. To ensure smooth 3D reconstruction processes by adding an adequate amount of photos, refer to the number of photos corresponding to the following computer configurations.

Graphic Card	RAM	Max Photo Amount	Photo Resolution
GeForce GTX 1050Ti with a VRAM of 4GB	16GB	1600	4864x3648
	32GB	3200	
	48GB	4800	
	64GB	6400	
	128GB	12800	

2. When performing 3D reconstruction on a Mapping or Corridor mission, set the reconstruction type to “3D Model”.
3. Select the desired resolution. High refers to the original resolution, Medium refers to 1/2 of the original resolution (i.e. the length and width are both 1/2 of the original photo), and Low refers to 1/3 of the original resolution (i.e. the length and width are both 1/4 of the original photo). For example, if the original photo resolution is 6000x6000, the high resolution is the same, while the medium resolution is 3000x3000, and the low resolution is 1500x1500.
4. Select mapping scenarios. Normal works for most scenarios, including oblique and nadir view. Circle is suitable for scenarios where images are captured by flying around vertical structures or assets such as a communications towers, power towers, or wind turbines.
5. Model option: If enabled, a 3D model will be generated. The default format for the LOD model is b3dm. Users can set to other formats. OSGB refers to the osgb format for the LOD model. OBJ refers to the obj format for non-LOD models. PLY refers to the ply format for non-LOD models. If the model option is disabled, no model files will be generated.

6. Point cloud option: If enabled, a 3D point cloud will be generated. The default format for the point cloud is pnts. If LAS is selected, the point cloud output will also include a file in the las format.

To run the reconstruction, it is required to enable at least one of the options for model or point cloud.

7. Click “Start Reconstruction,” a pop-up window will appear to ask if users want to copy the photos to the mission folder. If a user chooses to save a copy, the added photos will be copied to the current mission folder and they will be included in the mission file when exporting a mission. If a user does not save a copy, the added photos will not be copied and will not be included when exporting a mission. Then click “Continue” to start reconstruction. The progress bar at the bottom will show the mapping progress. Click “Stop” to stop modeling, and the progress will be saved. If a user selects to continue after stopping a modeling session, DJI Terra will track back slightly from the saved progress and then continue modeling.
8. Multiple reconstruction missions can be started. Before the first mission finishes, other missions will be lined up and processed in order.
9. After modeling, users can translate and rotate the model, and zoom in or out to view it from different angles.
   There will be three icons on the right screen and the model can be viewed at different settings.
   2D : Shows the orthographic projection of the 3D model. In this view, hold down the left mouse button and drag to translate model.
   / : Displays the 3D model in top view or front view. In any of the two views, hold down the left mouse button and drag to translate the model, scroll the mouse wheel or hold down the right mouse button and drag to zoom in or out, and hold down the mouse wheel and drag to rotate.
10. Click “Quality Report” to view and save a report in html format. The report includes an overview of the reconstruction result, RTK status, camera calibration information and process information. Refer to the document How to Read a DJI Terra Quality Report for 3D Models on the official DJI website for details.

File Format and Storage Path of 3D Models

DJI Terra can output 3D models in the following formats:

1. Texture mesh file in ply and obj formats.
2. LOD (Level of Detail) model file in b3dm and osgb formats. Format conversion is not supported.

The default storage path of the 3D model files is as follows:
C:\Users\<computer name>\Documents\DJI\DJI Terra\<DJI account name>\<mission code>\models\pc\0
In the reconstruction page, users can open the current mission folder using the keyboard shortcut “Ctrl+Alt+F”.
NOTE: This cache directory can be changed in Settings.

- If PC GS Pro has been used on your computer, after DJI Terra has been installed, the cache directory will still be as follows:
  C:\Users\<computer name>\Documents\DJI\Groundstation\Missions\<DJI account name>
- The mission code is the number generated by the software automatically when a mission is created. It cannot be changed by users.

Annotation and Measurement

Click > on the right of Annotation and Measurement bar to enter the page. Users can add coordinates, measure distance, area and volume based on a specified coordinate system. For example, when using the photos captured by a Phantom 4 RTK aircraft in WGS84 coordinate system, the altitude involved in Annotation and Measurement refers to the ellipsoidal height. If using other coordinate systems, the altitude corresponds to the elevation in the coordinate system that the photos use.

The method to add coordinates, measure distance and area is similar to the one in 2D reconstruction, but the data included is different. When measuring the volume, it is required to select the base plane. The following is a description of the data of coordinate, distance, area and volume in 3D reconstruction.

Coordinate: The three-dimensional coordinate of the added coordinate point, including longitude, latitude and altitude. The altitude corresponds to the elevation in the coordinate system that the photos use.

Distance: The horizontal distance is the length of the horizontal projection of the line segment between the two added measurement points, the vertical distance is the height difference between the two points, and the straight distance refers to the spatial distance between the two points, i.e., the length of the line segment between two points. If a polyline is added, the straight distance is the sum of the straight distances for each segment.

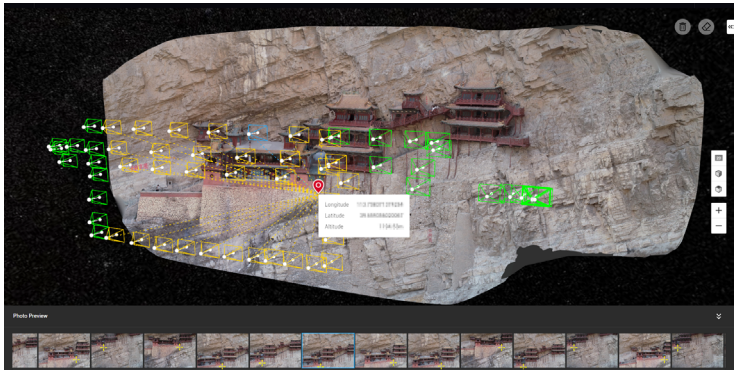
Area: Refers to the projected area of the polygon area formed by the added measurement points along the elevation direction.

Volume: When projecting the polygon area formed by the added measurement points along the elevation direction, a polyhedron is produced. With reference to the specified base plane, the volume refers to the cut and fill volume of the model. The portion above the base plane (the direction in which the elevation is increased) is the cut, and the portion below the base plane (the direction in which the elevation is reduced) is the fill. There are two options for the base plane, the Mean Plane and the Lowest Point.

- Mean Plane: A plane (possibly an inclined plane) fitted with multiple measurement points as the reference plane.
- Lowest Point: Use the plane of the lowest elevation point among the measurement points as the base plane.

The Annotation and Measurement of the 3D model also includes the function to display the camera pose when adding coordinates.

1. Enable “Camera Pose” and the green patterns indicates the camera pose when the photo was captured.
2. Click ◉ to enter Coordinate Adding mode.
3. Click on the model to select a point. The camera pose display of the photos including the selected point will turn yellow, and a photo preview from the camera's perspective will be displayed at the bottom of the screen.



4. The yellow cross in the preview photo indicates the position of the point on the model in the photo. Click the photo, and the corresponding camera pose display will turn blue. Double-click the photo to view in a large size and zoom in or out.

Output Coordinate System Settings

When generating 2D or 3D reconstructions, users can set the output coordinate system after importing images. The coordinates in the reconstruction result will be converted to the designated coordinate system.

Click ❯ on the right of Output Coordinate System Settings bar to enter the settings page. If the images imported do not include GPS information, the output coordinate system will be automatically set to “Any Coordinate System” defined by DJI Terra. If the images include GPS information, the output coordinate system will be automatically set to “Known Coordinate System” and converted to a projected coordinate system in WGS 84. Users can select other known coordinate systems and set the altitude. Follow the instructions below.

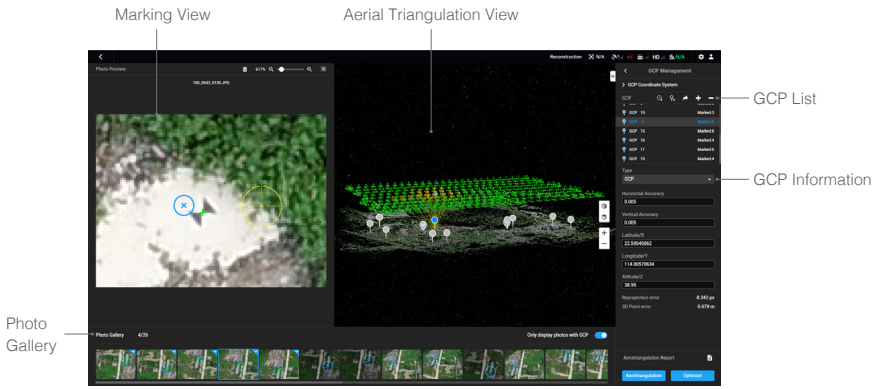
1. Known Coordinate System Settings
   There are two methods to set the known coordinate system, importing a PRJ file and searching in DJI Terra.
   Importing a PRJ file: Search and download the .prj file for the desired coordinate system on the website https://spatialreference.org. Then click “Import PRJ” in DJI Terra to import.
   Searching in DJI Terra: Click “Search”, input the coordinate system name or authorization code, select the desired coordinate system in the searching results. Then click “Apply”.
2. Altitude Settings
   DJI Terra supports Default (ellipsoid height), EGM96, EGM2008, NAVD88, NAVD88 (ftUS), NAVD88 (ft).

GCP Management

Ground Control Points (GCPs) are marked points on the ground with known coordinates and are clearly visible in an image. GCPs can be obtained using photogrammetry methods such as GPS-RTK or a total station. GCPs are used to optimize the result of aerial triangulation. There are also check points that are used to check for the absolute accuracy of aerial triangulation.

When generating 2D or 3D reconstructions, users can import GCPs after importing images to help increase the robustness and accuracy of aerial triangulation, check the accuracy of the aerial triangulation against actual measurements, and convert the aerial triangulation result into the one in the GCP's coordinate system. Note that the positioning and pose of the camera should be included in the added images.

Click ❯ on the right of GCP Management bar to enter the page. The page includes GCP list, GCP information, photo gallery, aerial triangulation view, and marking view. The marking view will appear on the left of the aerial triangulation view after an image is selected in the photo gallery, as shown below. Users can add GCPs, mark points, and conduct aerial triangulation calculation and optimization.



Aerial Triangulation

In the GCP management page, DJI Terra will process the added images, and the camera positioning and attitude information will be shown on the map when complete. Click "Aerotriangulation" at the bottom of the screen to start aerial triangulation calculation. The result will be shown on the screen when complete, including camera positioning and attitude and aerial triangulation points.

GCP Coordinate System

Click > on the left of GCP Coordinate System bar to set the GCP coordinate system by following the same instructions as the ones for output coordinate system configuration.

Optimization

Import a GCP file and mark points on the images to optimize the aerial triangulation.

Importing GCP Files

1. Preparing GCP Files
   The GCP data in the file should be in this order: point name, latitude/X/E, longitude/Y/N, height/Z/U, horizontal accuracy, vertical accuracy. Accuracy data is optional. Each column is separated with a space or a tab. The example is as shown below. Note that in the projected coordinate system, X represents the East, and Y represents the North.

Name	Latitude	Longitude	Height
1	22.0	113.0	1.0
2	22.5	113.5	2.0
a	23.0	114.0	3.0
b	23.5	114.5	4.0

2. Importing GCPs
   Click , and select the desired GCP file to import it. Users can also import GCPs with marked points by clicking . After importing, the GCPs will be shown in both the aerial triangulation view and GCP list.

You can only import GCP files in the json format that are exported in DJI Terra when using to import GCPs.

3. Editing GCPs
   Click to select a GCP. It will turn blue in the aerial triangulation view and GCP list when selected. The camera position of the images that contain the selected GCP will turn yellow. The blue cross on the thumbnail in the photo gallery represents the GCP's projected result on the image. When "Only display photos with GCP" is enabled, only the images on which the current GCP can be projected and images including marking points will be displayed.
   Press and hold the Ctrl key on the keyboard and click the GCPs to select multiple GCPs. Click − to delete the selected GCPs.
   Click + to add a GCP. Set the GCP as a control point or a check point , and input its horizontal accuracy, vertical accuracy, and coordinates in the coordinate system the GCPs are in.

Marking

1. Select a GCP, and click one of the images including the selected GCP in the photo gallery. The marking view will display on the left of the aerial triangulation view. The blue cross in the marking view represents the GCP's projected result on the image.

2. In the marking view, hold the left button on the mouse to drag the image, scroll to zoom in and out. Click on the image using the yellow cross to mark the GCP's actual location in the image. The marked point is displayed in the marking view and photo gallery with a green cross, and there will be a check mark on the upper right corner of the image in the photo gallery, indicating that this is an image with a marked point.
3. Delete marked points: Select the images with marked points in the photo gallery, and press the Delete key on the keyboard or click on the top of the marking view.
4. Export GCP file: Click to export a json file including GCPs and marked points, which can be applied to other missions including the same images with marked points.
5. For the same GCP, the blue cross location will be updated according to the marked point location after each marking from the third image on. The reprojection error and 3D point error will also be updated.

To ensure the robustness of the post aerial triangulation optimization, it is recommended to mark at least four images for each GCP and make sure that the GCPs with marked points are as evenly distributed as possible in the mapping area. The recommended number of GCPs is no less than four (the type of the point should be set to GCP). Check points can be set according to the demand of the mission.

Optimization

1. After marking points, click "Optimize" at the bottom of the screen for aerial triangulation optimization. The aerial triangulation display will be updated when complete.
2. Select one of the GCPs to view the reprojection error and 3D point error after aerial triangulation optimization in the GCP information section. If the 3D point error is too large, adjust the marked points and repeat optimization until the error meets your requirements.

Aerial triangulation optimization can be done repeatedly. Remember to click "Optimize" to update the aerial triangulation result once you adjust the marked points, change the coordinate system, and edit the GCPs. If optimization is not run after adjustment, when you back to the reconstruction page, the reconstruction will be done using the previous aerial triangulation result.

View and Export Logs

DJI Terra will generate a log file when performing a mission. If there is a software error or the software crashes during a mission, users can have access to the corresponding log file in the storage path below according to the time the mission was performed. Then export it and send to DJI Support for analysis.

C:\Users\<computer name>\AppData\Roaming\DJI Terra\log

Users can open the log storage directory using the keyboard shortcut "Ctrl+Alt+L" after launching DJI Terra.

This content is subject to change.

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If you have any questions about this document, please contact DJI by sending a message to DocSupport@dji.com.