

Richen Power

Y25

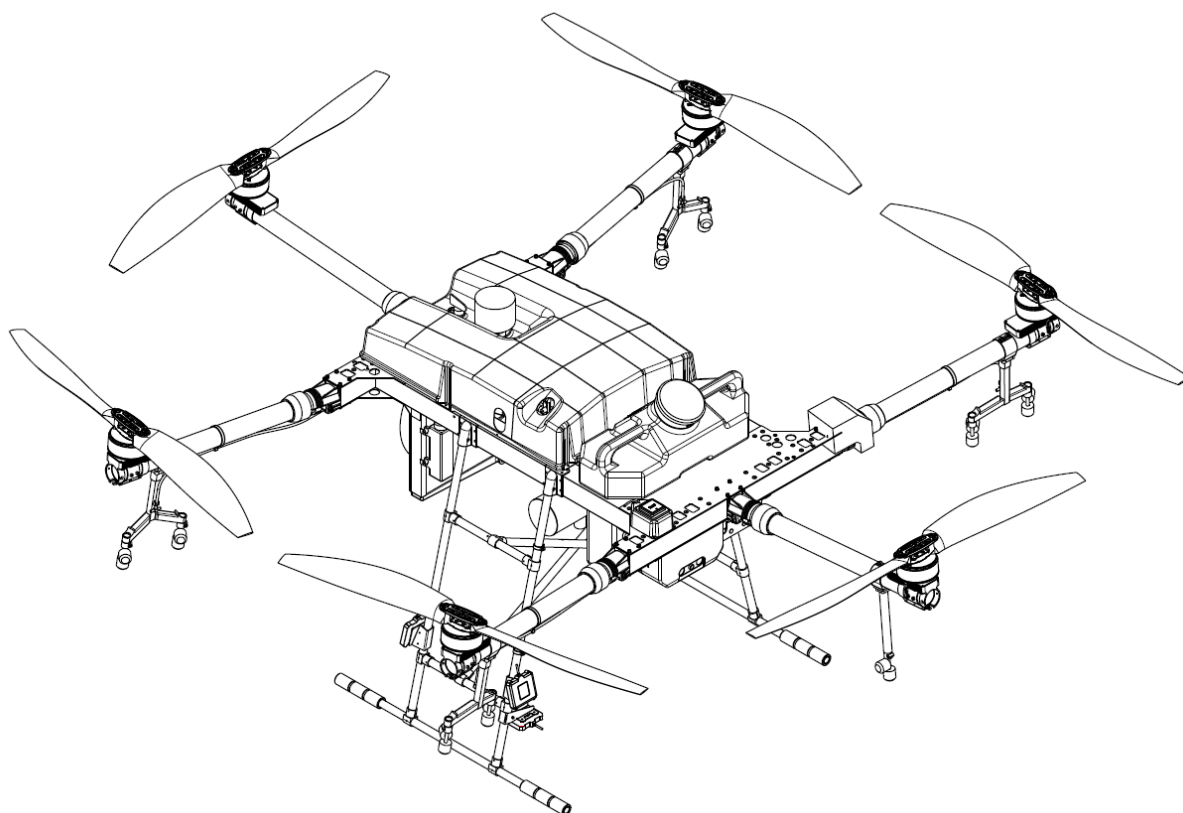
Hybrid Agricultural Drone

3WWYZ-23A

user manual

V2.0

2021.02



Searching for Keywords

Searching for keywords such as “fuel” and “App” to find a topic. If you are using Adobe Reader to read this document, press Ctrl+F on Windows or Command+F on Mac to begin a search.

Navigating to a topic

View a complete list of topics in the table of contents. Click on a topic to navigate to that section.

Print this document

This document supports high resolution printing.

Information

1. Lipo battery is integrated. Take necessary precautions when handling the battery to ensure your own safety. Richenpower assumes no liability for damage or injury incurred directly or indirectly from misusing battery.
2. In this document, the altitude limits of 20 m means the altitude between the aircraft and the surface of the objects below it when the altitude stabilization function of the radar module is enabled. If the function is disabled, the altitude limit means the altitude between the aircraft and the takeoff point.

Using This Manual

Legend



Important



Hints and tips



Reference

Before Flight

The following documents have been produced to help you safely operate and make full use of your aircraft:

1. In the box
2. User Manual

Check the listed parts refer to In the Box and read the disclaimer and safety guidelines before flight. Refer to the User Manual for more information on use and maintenance.

Downloading User Manual and Smart Phone App (Android)

<https://www.richenpower.com/download>

Safety

1. Pesticide Usage

- Avoid the use of powder pesticides as much as possible as they may reduce the service life of the spraying system.
- Pesticides are poisonous and pose serious risks to safety. Only use them in strict accordance with their specifications.
- Residue on the equipment caused by splashes or spills when pouring and mixing the pesticide can irritate your skin. Make sure to clean the equipment after mixing.
- Use clean water to mix the pesticide and filter the mixed liquid before pouring into the spray tank to avoid blocking the strainer. Clear any blockage before using the equipment.
- Make sure to stay in an upwind area when spraying pesticide to avoid bodily harm.
- Wear protective clothing to prevent direct body contact with the pesticide. Rinse your hands and skin after handling pesticides. Clean the aircraft and remote controller after applying the pesticide.
- Effective use of pesticides depends on pesticide density, spray rate, spray distance, aircraft speed, wind speed, wind direction, temperature, and humidity. Consider all factors when using pesticides, but DO NOT compromise the safety of people, animals, or the environment in doing so.
- DO NOT contaminate rivers and sources of drinking water.



Y25 is not a toy and is not suitable for children under the age of 18.

Note that the Safety section only provides a quick overview of the safety tips. Make sure you read and understand this document and the user manual.

2. Operation

- Stay away from the rotating propellers and motors.
- The takeoff weight must not exceed 82.5 kg when using near sea level. Note that when using at a higher sea level, the takeoff weight capacity will be reduced.
- Maintain a visual line of sight (VLOS) of your aircraft at all times.
- DO NOT use the Combination Stick Command (CSC) or other methods to stop the motors when the aircraft is airborne unless in an emergency situation.
- DO NOT answer incoming calls during flight. DO NOT fly under the influence of alcohol or drugs.
- If there is a low battery warning, land the aircraft immediately at a safe location.

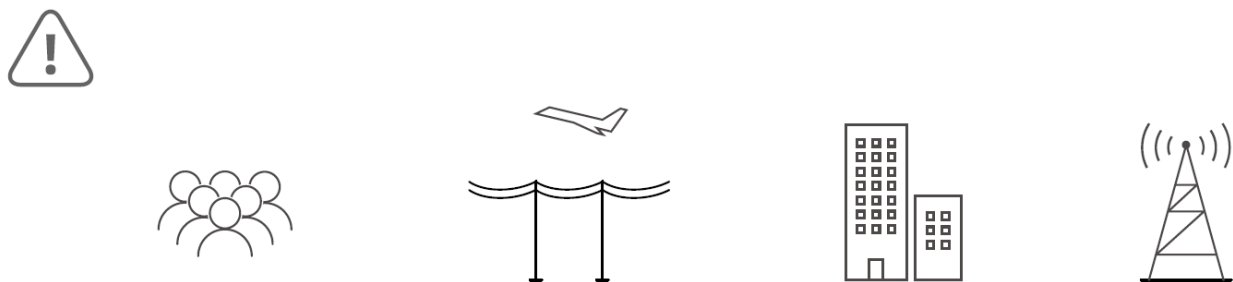
3. Maintenance and Upkeep

- DO NOT use aged, chipped, or broken propellers.

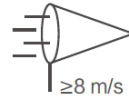
- To avoid damaging the landing gear, remove or empty the spray tank and fuel tank during transportation or when not in use.
- Recommended storage temperature (when the spray tank, flow meter, pumps, and hoses are empty): between -20° and 40°C (-4° and 104°F).
- Clean the aircraft immediately after spraying. Inspect the aircraft regularly. Refer to the Product Care section of User Manual for more information about maintenance guidelines.

4. Observe Local Laws and Regulations

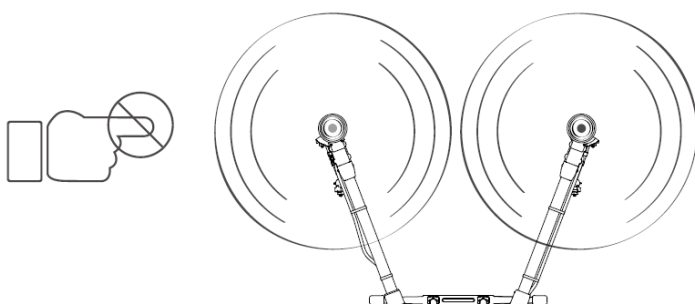
- You can find a list of GEO zones at <https://www.dji.com/flysafe>. Not that the GEO zones are not a replacement for local government regulations or good judgment.
- Avoid flying at altitudes above 20m (65ft). The altitude limit of 30 m means the altitude between the aircraft and the surface of the objects below it when the altitude stabilization function of the radar module is enabled. If the function is disabled. The altitude limit means the altitude between the aircraft and the takeoff point.



Avoid flying over or near crowds, high voltage power lines, or bodies of water. Strong electromagnetic sources such as power lines, base stations, and tall buildings may affect the onboard compass.



DO NOT use the aircraft in adverse weather conditions such as winds exceeding 28 kph (17 mph), heavy rain (precipitation rate exceeding 25 mm (0.98 in) in 12 hours), fog, snow, lightning, tornadoes, or hurricanes.



Stay away from the rotating propellers and motors.



GEO Zones

Learn more at:
<http://www.dji.com/flysafe>

Maintenance

Proper maintenance is necessary to keep the aircraft in order. Inspect and maintain the aircraft regularly. Incorrect maintenance can shorten the life of the aircraft and even lead to crash.

1.Frame

- Please check before each flight and replace the deformed or damaged propeller. Deformed, cracked, broken propellers should be replaced.
- Check the propellers with your hands before each flight, whether they rotate smoothly without noises.
- Always empty the fuel tank when not in duty or during transport.
- Recommended storage temperature (when the spray tank, flow meter, pumps, and hoses are empty): between -20° and 40°C (-4° and 104°F).
- Clean the aircraft immediately after spraying. Inspect the aircraft regularly. Use a wet towel to clean the propellers, motors, and drone frame. Do not wash with high-pressure water. Use a toothbrush to dispose of clogged spray nozzles. If

herbicides and others that cause phytotoxicity, soak the medicine box and spray system with detergent for 12 hours and clean with clean water.



- Engine and frame require Overhaul every 300 hours (hours to service displayed on App screen). Contact your dealer.

Maintenance	Every 50 hours	Every 100 hours	Every 300 hours
Air intake filter	Replacement	Replacement	Replacement
Spark plug	----	Replacement	Replacement
Fuel filter	----	Replacement	Replacement
Engine & drone overhaul	----	----	Overhaul

2. Hybrid engine

- Use AG Drone 2 stroke Oil from your dealer or order YAMALUBE TC-W3 2 stroke in your market. Mix #92 E92 regular or above automotive gasoline with oil at ratio of gas: oil 40:1. The fuel mixer helps mixing. Use other oil, wrong gasoline, or wrong mix ratio may damage the engine. And it is out of warranty.
- Every 50 hours replace air intake filter. Every 100 hours replace sparks and fuel filter. Hours to service displays on App screen. Operation under dusty environment will shorten the service cycle. Replace the air intake filter immediately if there is visible soil or dust on the filter. Same for the spark plugs and fuel filter.
- Storage. Empty the Spray tank and Fuel tank. Clean the Spray system with clean water. Start the engine every three-month (3) to maintain the battery automatically.

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Preparing the Aircraft

In the Box

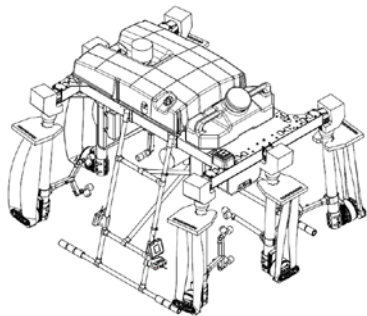
Y25 Hybrid Agricultural Drone

Check the listed parts refer to In the Box and read the disclaimer and safety guidelines before flight.

Y25 AG drone x1
With spray system, liquid tank and propellers

Remote controller x1
With 2 data wires

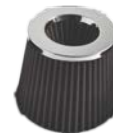
Start Box x1



Fuel mixer x1
5 liters capacity

Drone oil 2-stroke x1
1 liter

Air filter x1*



Spark plug x2*
wrench x1*

Fuel filter x1*
Tie-down strap x2

RTK Base x 1 (optional)
RTK Map x 1 (optional)
Tripod stand x 1 (optional)
Mapping rod x 1 (optional)



*alternative items

Downloading User Manual and Smart Phone App (Android)

<https://www.richenpower.com/download>

Very Important (Read before Use)

Flight Safety

1. Y25 is not a toy and is not suitable for children under the age of 18. The pilot must hold license.
2. The takeoff weight must not exceed 82.5 kg when using near sea level. Keep at least 20 meters distance to people, vehicles and power facilities during takeoff and landing.
3. Remote controller is default as 'Mode 2' (left throttle), make sure in App before takeoff.
4. Be sure to monitor the aircraft at all times and be ready to take over at any time. Chatting and making calls are strictly prohibited. Refill the pesticide and fuel after the aircraft landed.

How to avoid crash

1. Do not modify App settings.
2. Plan a field with by walking with remote controller instead of flying the aircraft or map plan.
3. When mark obstacles in a target field, the outlining areas of obstacles should be at least 5 meters away from obstacles. The red outline of obstacles must be inside the target field. After a flight route produced, make sure any route goes around the obstacle instead of through it. Y25's spray width is 10 to 12 meters. Therefore, closely bypass obstacles is not necessary. Always fly away from obstacles.
4. Reduce the AB route as much as possible.
5. Each propeller costs \$90 USD. Continue to use cracked and broken propellers will cause greater losses. Keeping away from obstacles is an effective way to protect the propeller.
6. When there are obstacles such as trees or telephone poles at the field boundary, set the field edge at least 8 meters away from the obstacle.
7. Practice has shown that repeated reading of the previous "Safety" and "Maintenance" sections and maintenance before and after each flight can effectively reduce crashes.
8. Always pay attention to the voltage, when the voltage continues to be lower than 46V, the amount of liquid should be reduced. The liquid load is also affected by the

altitude, the liquid load is 15 liters at an altitude of 1400 meters, and only 10 liters at an altitude of 2000 meters.

9. No obstacles will be Auto bypassed when returning home, obstacle avoidance radar and remote control stick will still work. Please always monitor the aircraft.

Open the Box

The aircraft is folded in box. Check to make sure the radar mounting bracket and the landing gear are properly secured.



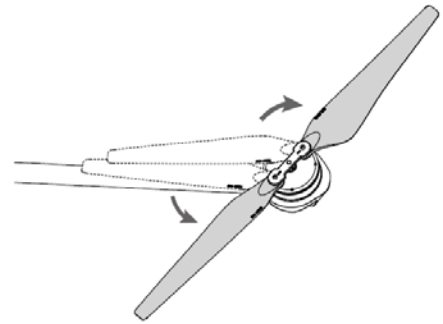
- Each drone you received has been tested for flight before shipping out to ensure normal use.
- All pipes and plugs are connected.
- Each engine has been run in and can be used directly.
- 'Horizontal Calibration' is required before first flight or after long distance transportation further than 600 kilometers (373 miles).

Unfold Arms

1. Unfold all arms and tighten the six arm sleeves.
2. Unfold propeller blades.



Check to make sure no blade cracked or damaged. A propeller with a crack on the leading edge or root has a risk of breaking during flight, resulting in a crash.



Prepare the Fuel

1. Fuel Mix. (Regular #92) Automotive gasoline to oil at ratio of 40:1. It is light red after mixing. Two-stroke oil must be used, otherwise the engine will be damaged. Please buy 'Two-stroke engine oil for drones' at dealer's.
2. Refill. The capacity of fuel tank is 3 liters.
3. The displays 'Fuel Level' on App.




Flight Operation

1. Before the first flight, please read the following instructions about the remote control and APP in detail.

2. Outline target field, obstacles. Mapping device is recommended to measure.

3. Login on App by tapping the upper left corner icon.

4. Switch on the aircraft and connect to App.


5. Tap  icon to select a field from list. And import the automatically produced flight routes to Y25 for operation.



6. Press to start ONLY when both LED is solid green or flashing green (picture above)

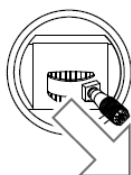
7. Monitor if any warning symbol is lighted on top of App. Confirm the number of satellites is greater than 25 3D or 13 RTK. Confirm the Terrain radar is on and height shows 0.3~0.4 meter. (RTK is centimeter positioning based on US GPS system out of China and Beidou system within China. Additional RTK BASE/MAP devices are required to work out of China.)

Make sure no warning sign displayed on screen.

Tap the  'Takeoff' button to automatically take off or manually start the motors by Combination Stick Command (CSC) in the remote control. The default take-off hover




OR




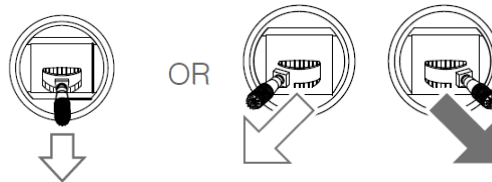
height is '1.5 meters' from the ground.

Starting the motor CSC

8. Switch the 'Flight Mode' to 'Route Planning', the aircraft enters the autonomous operation mode and pushes the throttle stick to the ideal flying height.

9. The aircraft hovers after the operation was completed. Press the 'Return'  button or tap 'Return' on the APP. The aircraft will rise 1 meter and return automatically. The obstacles avoid in flight route does NOT work during RTH (Return to Home), please pay attention to the aircraft at all times, and be prepared to switch 'Flight

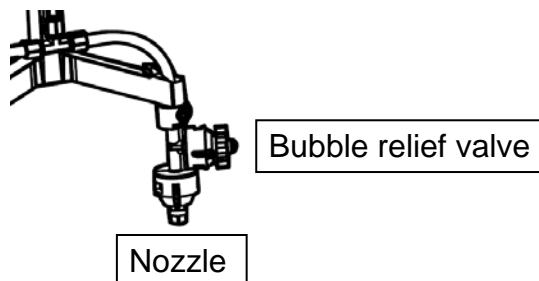
Mode' to 'Position Retention' for emergency stop. Operate the remote control to lift or move the aircraft left and right. After returned to the take-off point, the aircraft will hover, tap the 'landing'  button, the aircraft automatically landed and locked. You can also operate the remote control to land in 'Position Retention' mode. Pull the throttle all the way until the propeller stopped. When returning home during A-B route, the aircraft will return to point A



instead of the takeoff position.

Throttle Stick down (left stick in Mode 2) or Stopping the motor CSC

10. Approach the aircraft ONLY when propellers completely stopped. During the liquid tank replacement, the engine automatically enters the idle mode. Switch OFF is not necessary. After liquid tank replacement, make sure the sprinkler hoses are clear from bubbles. Discharge any bubbles as they may affect the performance of the sprinkler. Loosen the bubble relief valve and start the pump. Next, tighten the valve and the sprinkler will work properly.



- Before unlocking the aircraft, Login on App and internet connection are required.
- Effective use of pesticides depends on pesticide density, spray rate, spray distance, aircraft speed, wind speed, and wind direction. Consider all factors when using pesticides.
- The wind field of the aircraft is twice that of the ordinary one. To avoid damage, the recommended operation height is 2.5 ~ 3.5 meters above crops.

Remote Controller

Profile

The remote controller use 2.4GHz dual-band image transmission system, which has a maximum control distance of up to 1.24 mi (2 km). A smart phone or pad (Android Only) and internet connection are required. The remote controller is configurator and tested before shipping. Please do NOT modify the settings.



Stick mode: default (Mode2) and can be set to mode 1 in App.

Mode 2: the left stick serves as the throttle.

Mode 1: the right stick serves as the throttle.



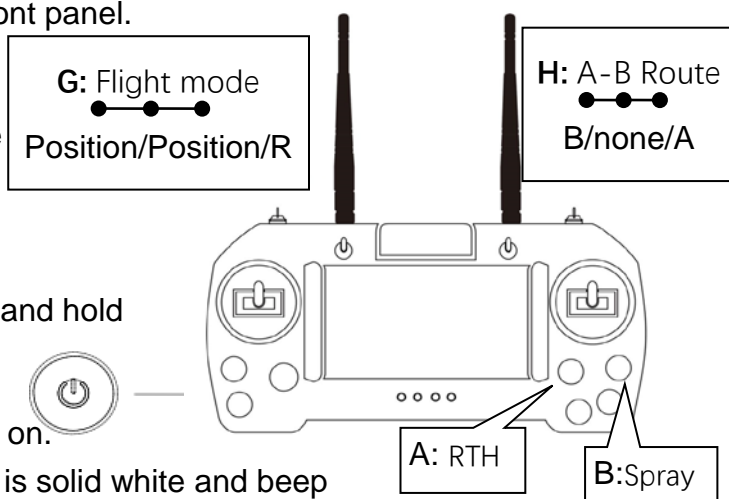
- Other RC devices may cause interference to the remote control signal.
- To avoid interference between operations, do not operate more than three aircrafts within a 50 m radius.

Use the Remote Controller

Turning the Remote Controller On and Off

The remote controller integrates a 4000mAh 1S chargeable battery. The battery level is indicated via the battery level LEDs on the front panel.

1. When the remote controller is turned off, press the Power button once to check the level LEDs. If the battery level is too low, recharge before use.
2. Press the Power button once, then press and hold to power on the remote controller.
3. The remote controller beeps when turned on. When linking is complete, the status LED is solid white and beep stops.
4. Repeat Step 2 to turn off the remote controller.



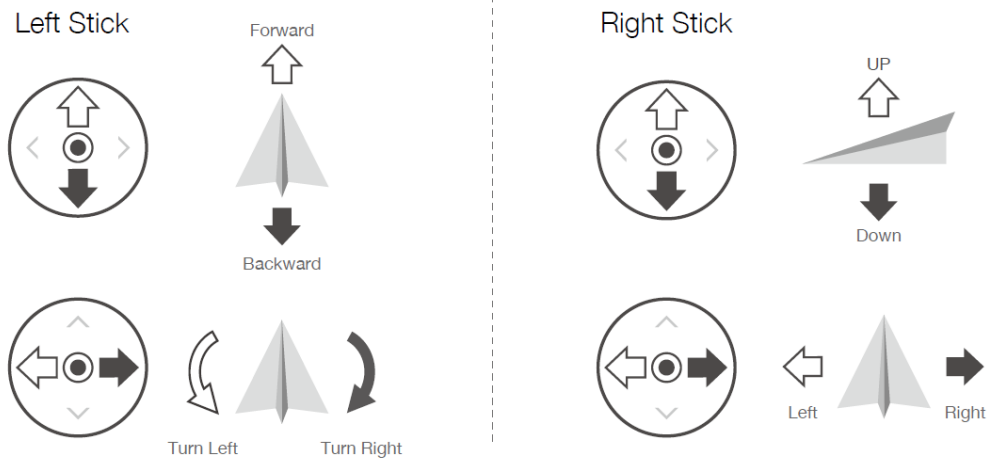
Charging the Remote Controller

Charge the battery with a standard micro USB 5v/1.5A wire. (E.g. phone or camera USB)

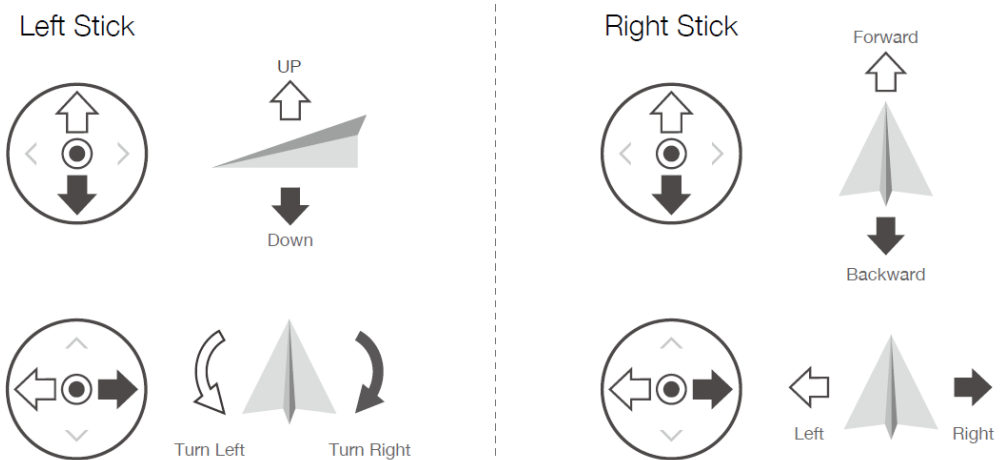
Operating the Aircraft

Control can be set to Mode 1 or Mode 2.

Mode 1


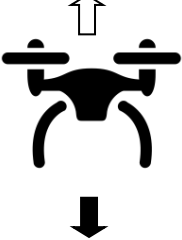





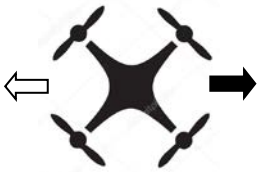


Mode 2



For example, the following description uses Mode 2:


Remote Controller (Mode 2)	Aircraft	Remarks
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		<p>Throttle Stick: move the left stick vertically to control the elevation of the aircraft.</p> <p>Push up to ascend and push down to descend. Use the left stick to take off when the motors are spinning at an idle speed. The aircraft hovers in place if the stick is in the center position. The further the stick is pushed away from the center position, the faster the aircraft changes elevation.</p>
		<p>Yaw Stick: move the left stick horizontally to control the heading of the aircraft.</p> <p>Push left to rotate the aircraft counterclockwise and push right to rotate clockwise. The aircraft hovers in place if the stick is in the center position. The further the stick is pushed away from the center position, the faster the aircraft rotates.</p>
		<p>Pitch Stick: move the right stick vertically to control the pitch of the aircraft.</p> <p>Push up to fly forwards and press down to fly backwards. The aircraft hovers in place if the stick is in the center position. Push the stick further for a larger pitch angle and faster flight.</p>
		<p>Roll Stick: move right control stick horizontally to control the roll of the aircraft.</p> <p>Push the stick left to fly left and right to fly right. The aircraft hovers in place if the stick is in the central position. Push the stick further for a larger roll angle and faster flight.</p>

Spray Operation

Complete an operation remotely via the flight mode/ stop switch, spray button, Return (RTH) button and A/B switch.

1 Flight mode/ stop switch

During Route or A-B Route operation, switch Flight mode can stop the current operation. The aircraft hovers in place and records a Breakpoint. The pilot can operate the aircraft manually. The Breakpoint shows as a red dot on App. Tap  Route on App to resume the operation from returning to the breakpoint. Tap Resume at right side of screen to continue the operation, the Route or A-B Route will continue. Select one Executing tag from three Resume Operation Route (1. Returning to the breakpoint, 2. Returning to a perpendicular line, or 3. Go to the next route line). Switch during Returning home, the aircraft hovers in place. The pilot can operate the aircraft manually.

The current flight mode is displayed on the upper left corner of App.

2 Spray Rate

Monitor and adjust the current spray rate* through the App.

*Spray rate may vary according to the nozzle model and viscosity of the liquid.

3 Spray Button

In Position Retention Mode or on the ground, press to start or stop spraying. Note: 'spray rate with speed' must be off in App when you need the aircraft hover and spray.

4 A/B Switch

In Position Retention Mode, switch to the right to record Point A and to the left to record Point B. The point A and B will be displayed on App.

Return (RTH) Button

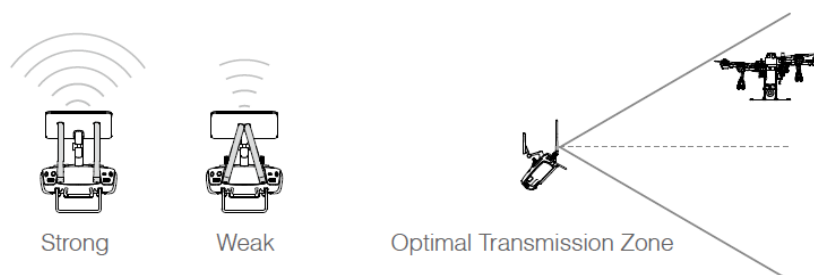
Press the Return (RTH) Button on remote controller to bring the aircraft back to the last recorded home point. The LED of the RTH button is on during RTH. Users can control the aircraft during the RTH. Press the button again to cancel RTH and regain control of the aircraft.

Circumvent Obstacles during RTH

The aircraft can detect obstacles while Obstacle Avoidance is active in forward or backward direction according to the direction of flight. The aircraft will decelerate and then stop and hover if there is an obstacle within 20 m. If the aircraft comes within 6 m of the obstacle while decelerating, the aircraft stops, flies backward to a distance of approximately 6 m from the obstacle, and hover. The aircraft exits RTH procedure and waits for further commands. The user press the Pitch Stick (right stick for Mode 2), the aircraft moves backward. Then the user regain the control of aircraft.

Optimal Transmission Zone

Optimal Transmission Zone



The strength of the remote controller signal is affected by the position of the antennas. The recommended position is perpendicular to the ground. Try to keep the aircraft inside the optimal transmission zone. If the signal is weak, adjust the antennas or fly the aircraft closer.

Linking the Remote Controller




The remote controller is linked to the aircraft by default. Linking is only required when using a new remote controller for the first time.

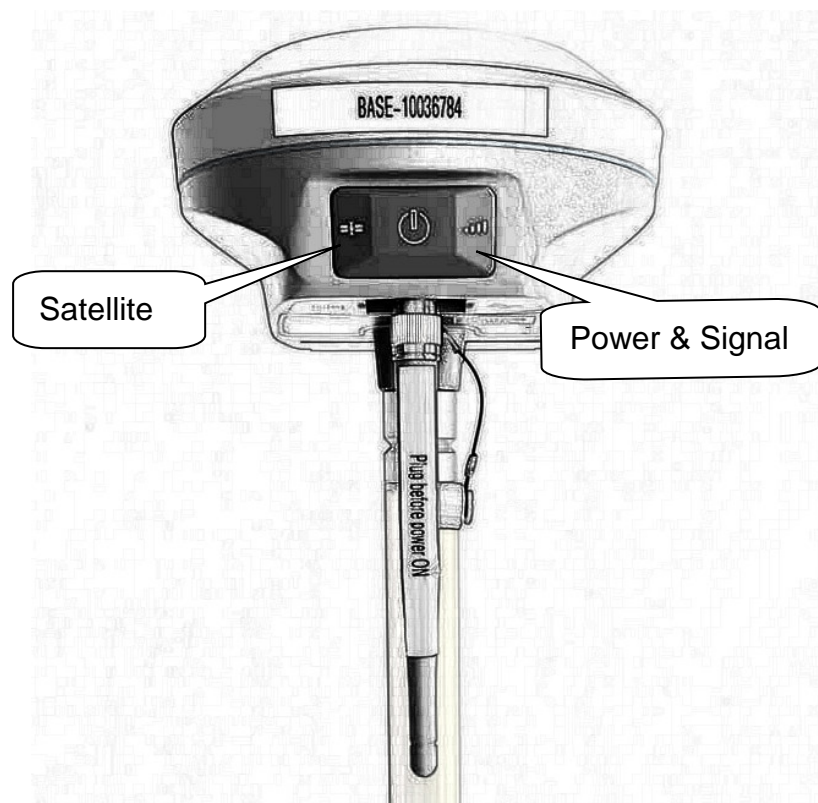
RTK (optional)

RTK is centimeter positioning based on US GPS system out of China and Beidou system within China. Without the RTK, Y25 works with default GPS system with 5 to 10 meters (10 to 16 feet) positioning accuracy. To achieve centimeter positioning accuracy, additional




RTK BASE/MAP devices are required to work out of China. The BASE device works as a position information receiver. BASE is fixed and placed on tripod stand. The MAP works as a mapping device. MAP is mobile and placed on mapping rod.

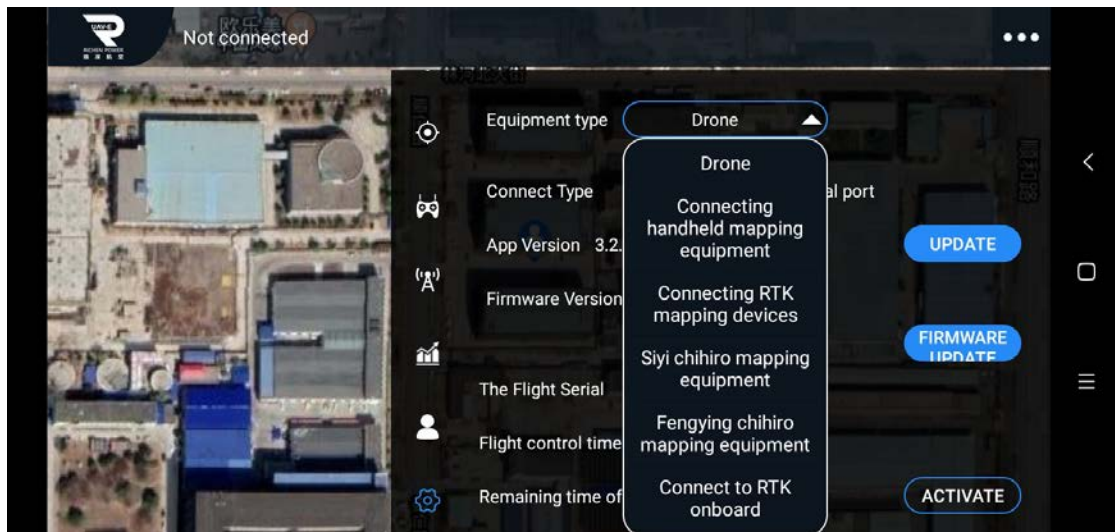
The aircraft needs to work together with the RTK BASE to achieve high accuracy positioning. Every time when the field is changed. The BASE needs to be fixed through App as the following instruction:


Place the BASE on tripod stand firmly. Plug the antenna.  Switch it on. The satellite light  is solid green after it connected to enough satellites. The signal light  is flashing red when it broadcasting.

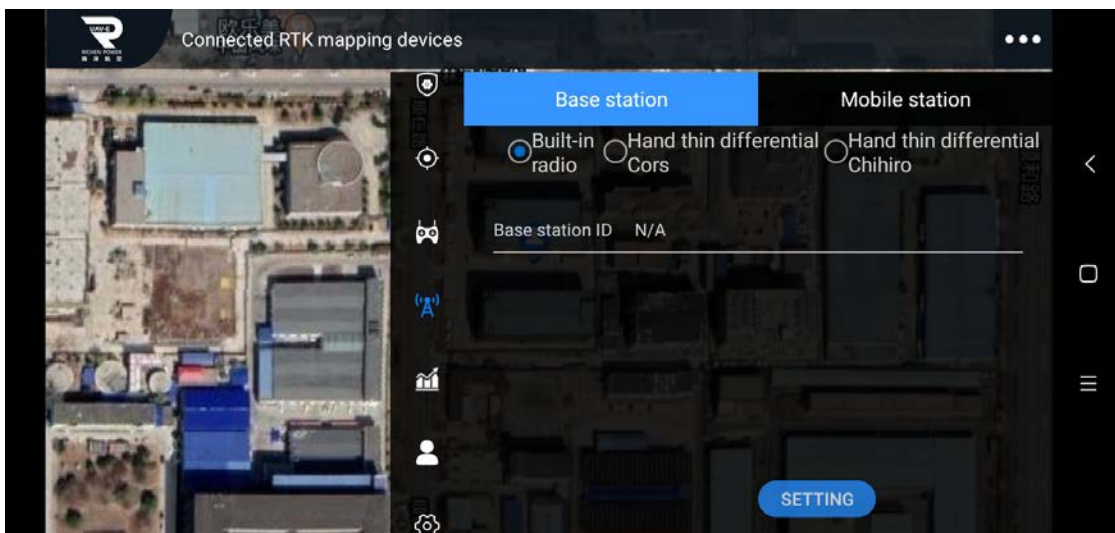



Keep the BASE stay fixed during flight. Once the location changed, the signal light is OFF. Fix the location through App.

- a) Connect the BASE to phone. Tap  icon, and  system setting, set Connect Type to 'bluetooth'. Set Equipment type as Connecting RTK mapping devices. Tap 'not connect' on left top screen, select the BASE blue tooth number on the device (eg.10036784). If the device is not found, tap  refresh.



- b) Tap RTK  icon to set the new BASE location. Select 'Base station' and tap 'SETTING'. The BASE device is moved to a new location.



- c) Tap  system setting, set Equipment type as 'Drone'. Connect to your drone. The

12,3D GNSS icon shows RTK instead of 3D. In RTK mode, the minimum stallite number before takeoff is 13.

RTK LED Status

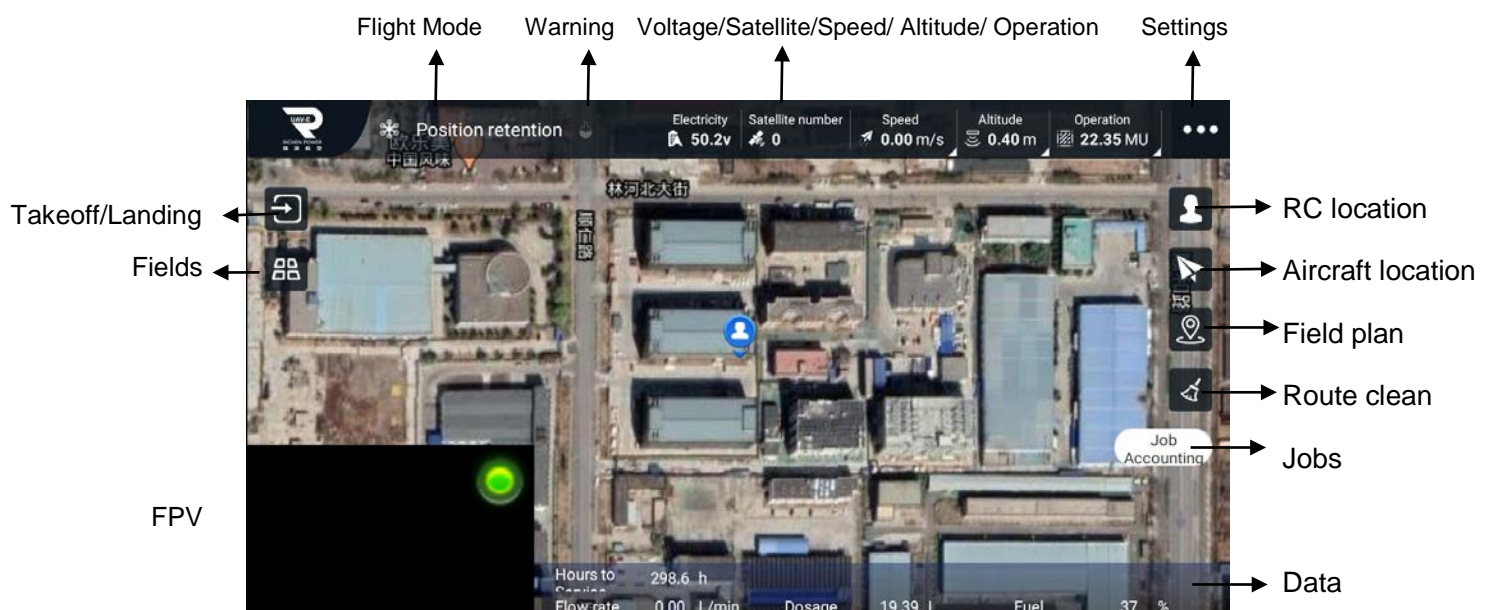
	LED	Status
Power	Yellow	normal
	Solid red	50% battery
	Flashing red	25% battery
Satellite	Solid green	Enough satellites
	Flashing green	Searching satellites
Signal	Falshing red	Sending & receiving data
	Off	Disconnected
Power, satellite and signal	All flashing	System resetting

App

App is designed for agricultural applications and is able to display the system status and configure various settings. After planning a field via the intelligent operation planning system of the App, the aircraft can operate automatically following the pre-planned flight route.

APP Screen

1. App Screen



Login or register for the first time. The motors would not start without login.


2. Flight Mode

Displays Position retention (GNSS) or Route Mode.

3. GNSS (Satellite number)

: this icon shows the number of satellites connected. It should be greater than 20.

4. Control and Image Transmission Signal Strength


: if this icon is red in Warning area, the remote controller is disconnected.


5. Obstacle Avoidance Function Status

Shows information on the detected obstacles when the obstacle avoidance function of the radar module is enabled. Information regarding obstacles detected in front of the aircraft appears on the top of the screen. The obstacle detected at the rear of the aircraft is displayed at the bottom of the screen. Red, orange, and gray bars indicate the distance of obstacles. The value indicates the distance between the aircraft and the nearest obstacles.




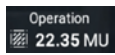
6. Field and Operation

: Fields. The users can create, find and edit fields.

: ①Plan Area – shows the total plan area value when planning fields or Route operations via the intelligent operation planning system. Plan Area = Field Area – Obstacle Area – Collision Avoidance Safety Margin zone.

②Sprayed Area – shows the value of the area already sprayed during Route or A/B Route.

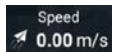
: (Red) Obstacle Area – shows the area value of the obstacles measured when planning fields for Route operations.



Operation 22.35 MU: shows land already covered. 15 MU = 1 Hectare. Tap this icon can set spray flow rate and line spacing distance. The standard spray flow rate is 1.0 liter per MU. The standard line spacing distance is 10 meters. **NOTE: for a route operation, the line spacing distance and speed can ONLY be set before route upload. The spray flow rate can be set anytime.**



Altitude 0.40 m: Height – when the altitude stabilization function of the radar module is enabled, this icon shows the preset height between the aircraft and the object underneath the aircraft. Tap the icon or push the throttle stick (left stick in Mode 2) to adjust the height.



Speed 0.00 m/s: Speed – this icon shows the preset flight speed during Route and A/B route. Tap to adjust the speed. **NOTE: for a route operation, the speed can ONLY be set before route upload.**

7. Settings



Tap this icon for more settings of operation and remote controller.



Agricultural setting – tap to adjust A/B route, Position retention parameter, Flow meter and Pump parameters.



Safety setting – tap to adjust battery, drug, flight limitation and Remote controller parameters.



Calibration – tap to calibrate IMU and Spray flow meter.



Remote Controller calibration – tap to calibrate and set remote controller mode and buttons.



RTK BASE/MAP devices setting.



Job accounting



System setting – tap to set communication, FPV, and advanced settings. Versions are shown there.




Tap the **Speed, Height, and Operation** icon to adjust speed, height, spray flow rate per

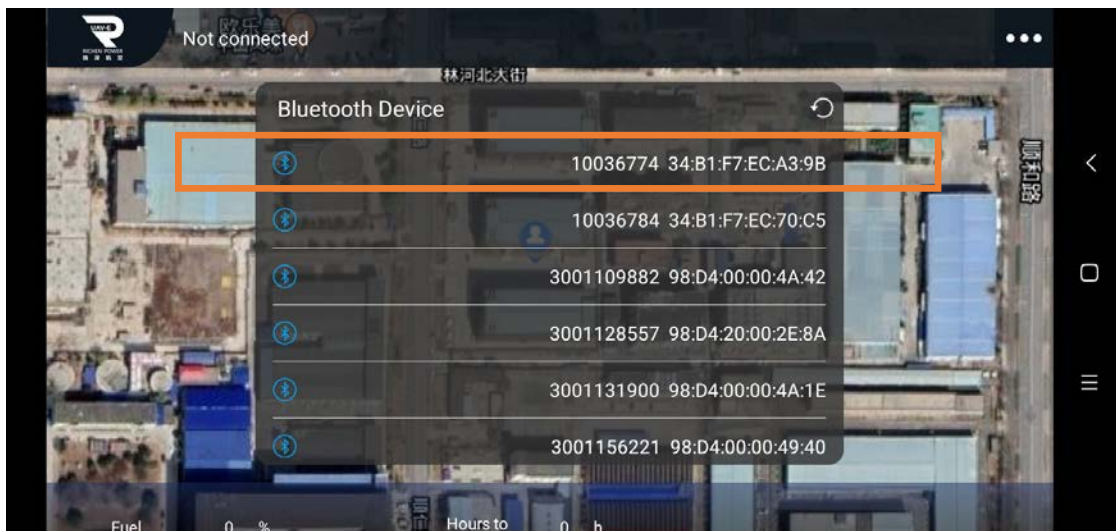
MU, line spacing distance and line changing method. The **spray flow rate is adjustable** only when **flow speed is enabled** in agricultural setting. NOTE: for a route operation, the line spacing distance and speed can ONLY be set before route upload. The spray flow rate can be set anytime.


Plan a Field

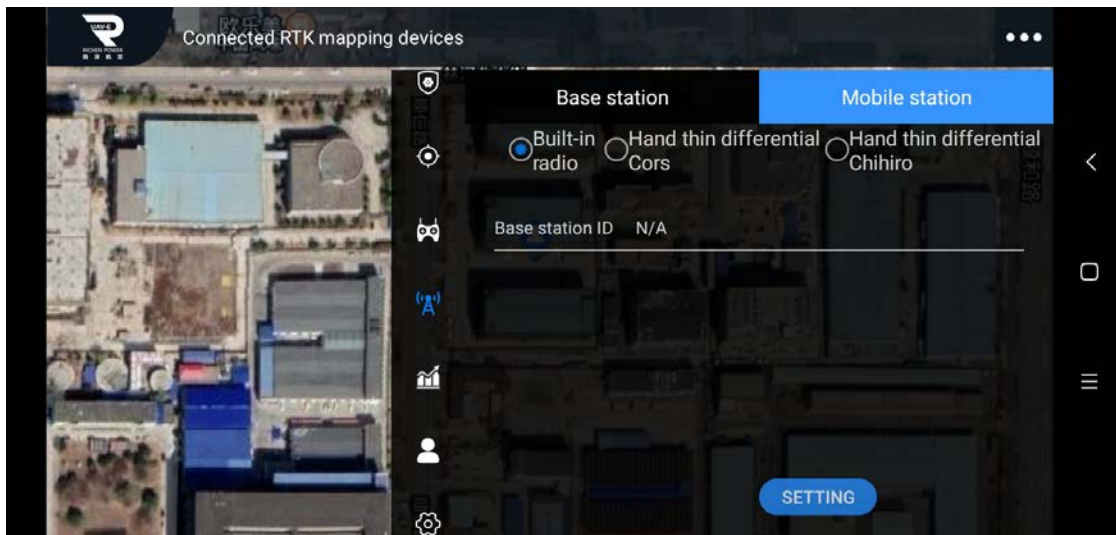
1. Plan a field



Two ways to plan a field, MAP take or Equipment take. MAP take is much easier by pick waypoint onscreen. It depends purely on phone's integrated GPS. The position deviation is sometimes bigger than 10 meters. To achieve centimeter positioning accuracy, we strongly recommend Equipment take with RTK MAP device.

- a) Connect MAP device. Tap  icon, and  system setting. Set Equipment type as Connecting RTK mapping devices. Tap 'not connect' on left top screen, select the MAP blue tooth number on the device (eg.10036774). If the device is not found, tap  refresh.




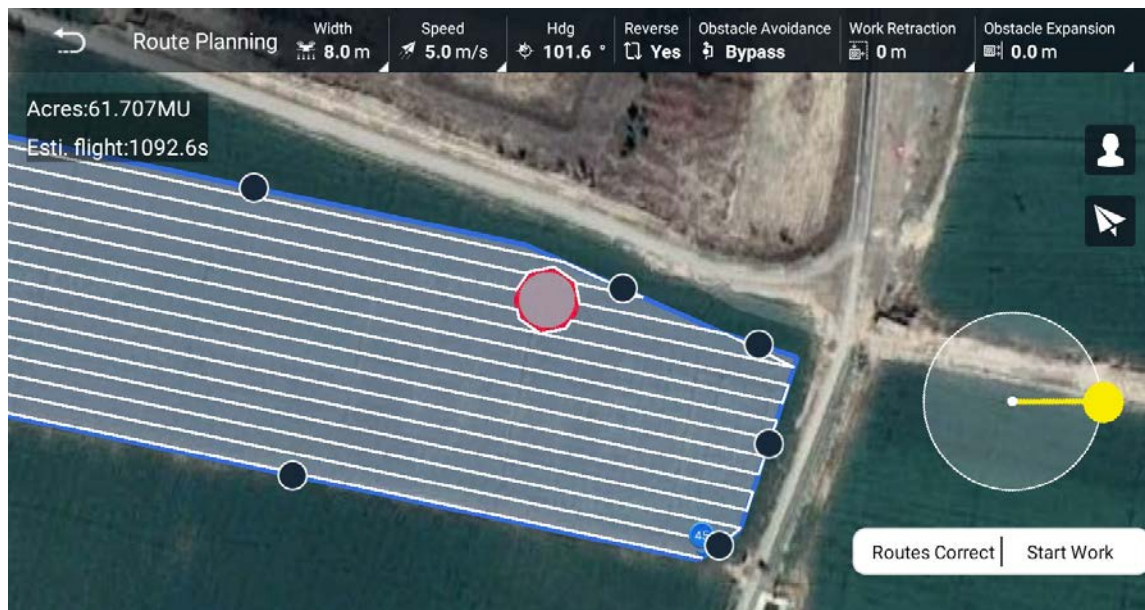
- b) Tap RTK  icon, select 'MAP station' and tap 'SETTING'. The MAP device's signal light is flashing red and is ready for mapping.



- c) Tap  icon, select 'Equipment take' and give a name to the field. The Satellite icon  on top right of screen will display RTK. Handhold the MAP device to outline the field.

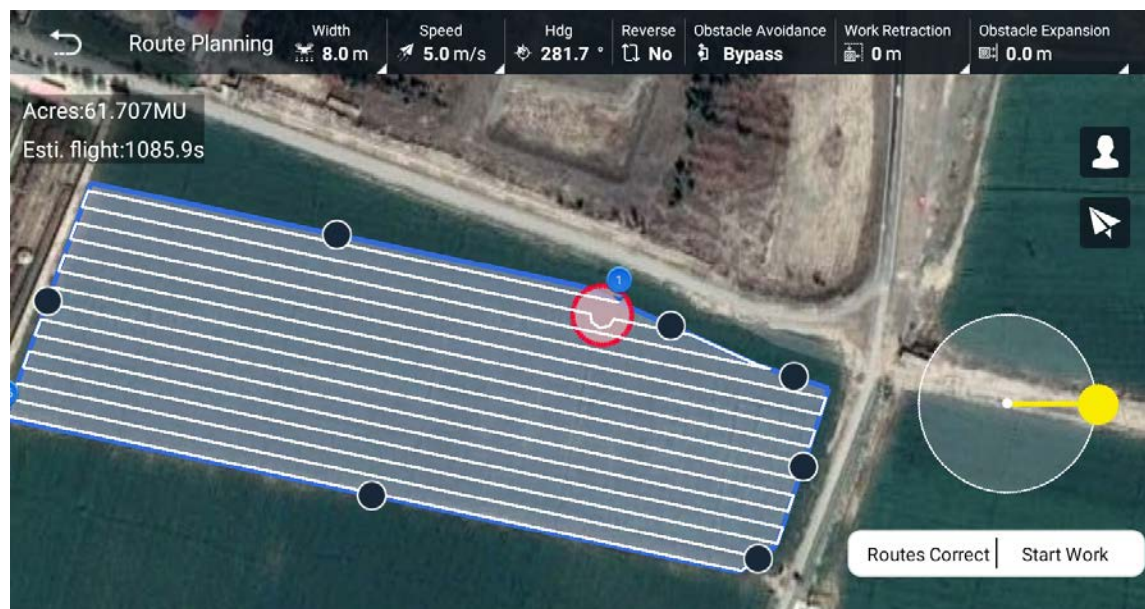


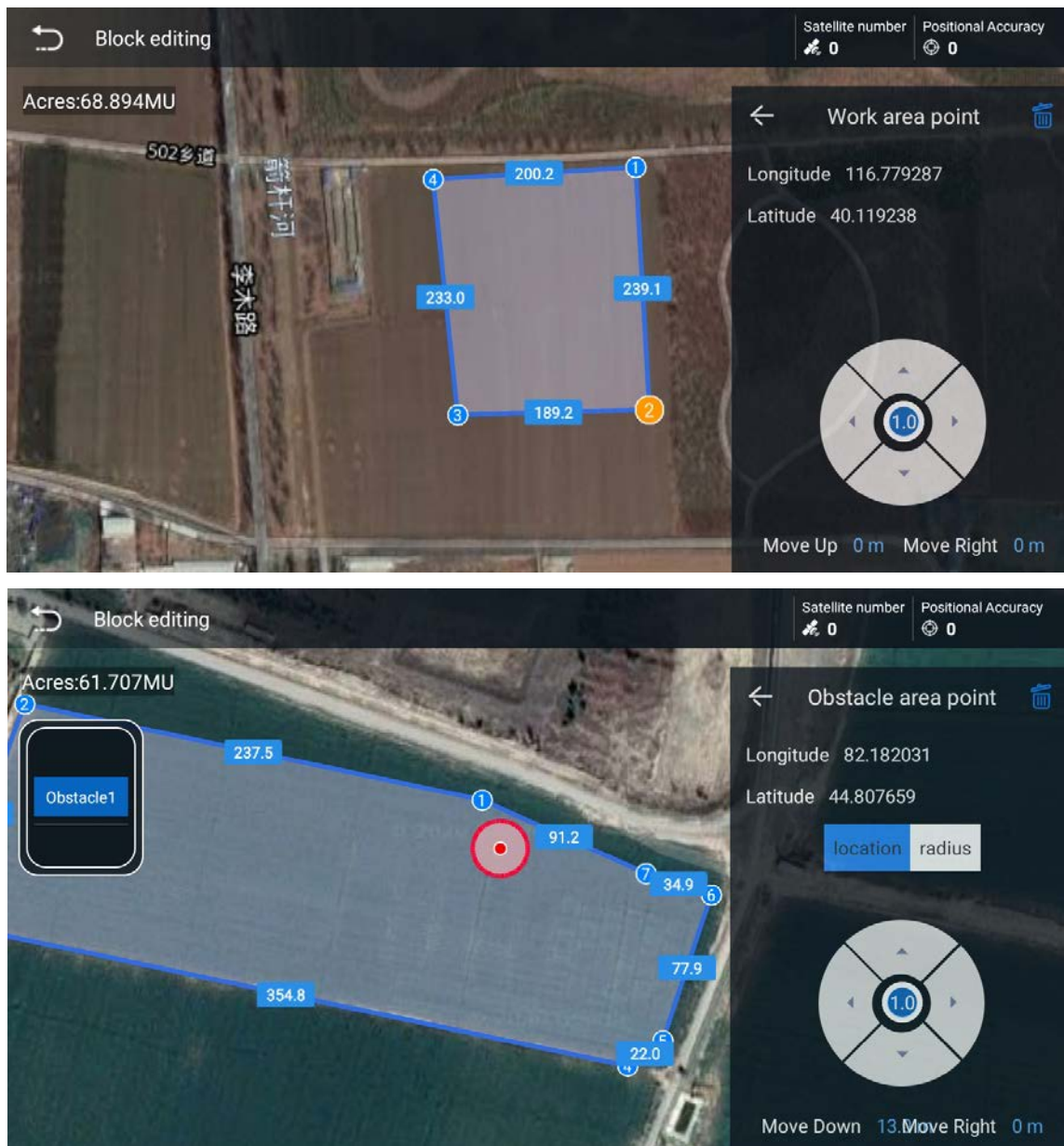
- d) During field planning, two kind of Points can be planned, that is **Zone Point** and **Obstacles Point**. Tap the  icon to locate the user and tap the Zone Points icon to add a Zone Point. The minimum number of Zone Point is three. Obstacles Point shall be added in two shapes of Obstacles, **Polygon** or **Round** can be added.



2. Points Edit

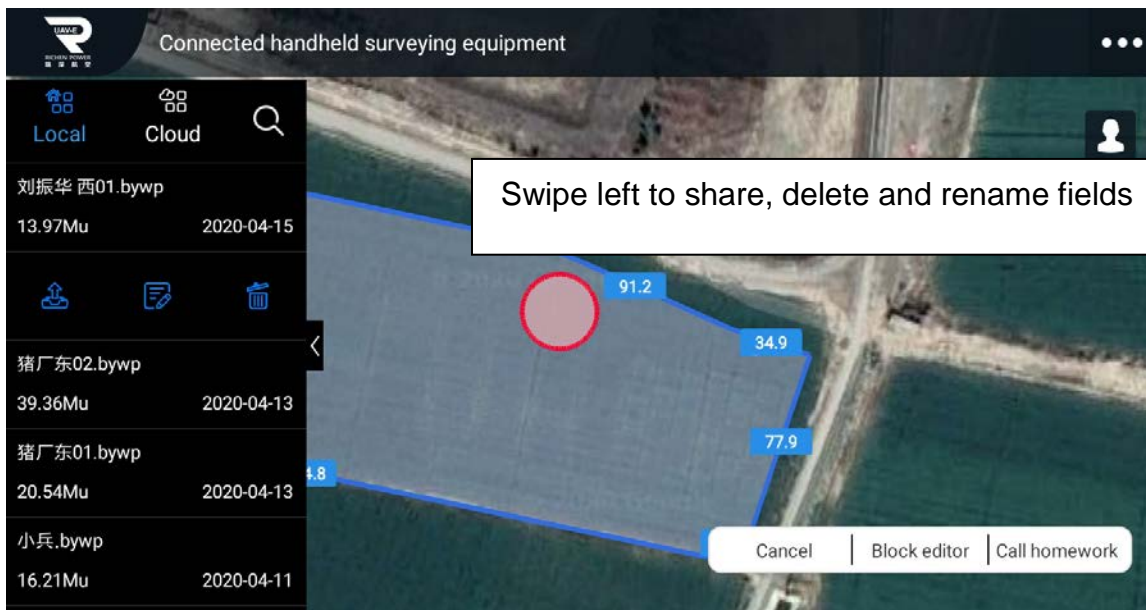
Tap Block editor and any Zone Points or Obstacles Points to move or delete it. The location and size of Obstacles Points are also editable. Tap save after edit. **NOTES: obstacles must within the field (Example in above picture). Otherwise the route produced automatically will go through the obstacle. Crash may occur. (Bad Obstacles Example in below picture) Move and keep all obstacles within the target field.**





3. Share your Field

Planned field can be found in Local. Swipe left to share, delete and rename fields. Once the field is shared, it is kept in Cloud archives. All users under same AG group can use the field.



4. Search for a filed field

Tap the search icon and find a field with a key word.



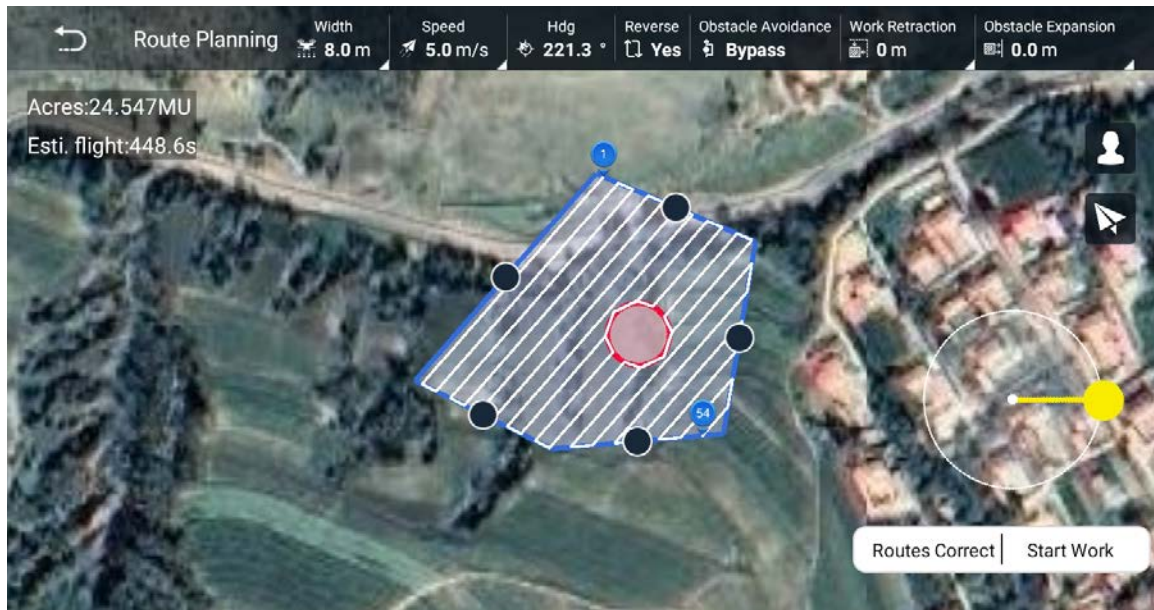
Route Plan

1. Connect a drone

Tap icon, system setting, set Connect Type to 'Bluetooth'. Set Equipment type as Drone. Link the Bluetooth device at your phone settings. The link password is "1234".

2. Call homework

Select a target field from list. Tap 'Call homework' to produce routes.



3. Heading direction: tag any edge of the field, the heading direction will be the same of the selected edge.

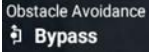
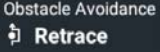
4. Select the start way point: the number ① is the start way point ⑤④ is the ending way point. Tag the Reverse icon to change the start way point.

5. Work Retraction/ Obstacle Expansion: is to adjust the overall size of work field and obstacles. The maximum adjust size is 5 meters. Work Retraction could be retraction of any single edge or all edges of work field.

6. Route Correction: is a tool to correct positioning error. Place the aircraft in the new starting way point, heading to the route. Tap the Route Correct icon, the route will move to where the aircraft is. Tap the Start Work icon, the new routes will be uploaded to the aircraft. The maximum movement through Route Correct is 10 meters.

7. Plan a flight route to circumvent obstacles

Choose circumvent obstacles method from Bypass or Retrace by tap the Obstacle

Avoidance icon  or .



A-B Route operation mode is recommended for large, rectangular spray areas. In A-B Route operation mode, the aircraft travels along a pre-planned route. Operation resumption, breakpoint, altitude stabilization, and obstacle avoidance are available in this mode. Use the app to adjust operation efficiency, which affects the flying speed and spray flow rate.

The aircraft travels along a planned square zig-zag route after recording turning points A and B. Under optimal wording conditions, the obstacle avoidance and altitude stabilization functions are available and the aircraft maintains the same distance from the corps. The flight speed and length of the dotted lines, called line spacing, can be adjusted any time in App.



Operation Procedure



- Maintain VLOS of the aircraft at all times
- Make sure that the GNSS signal is strong. Otherwise, A-B Route operation mode may be unreliable.
- Make sure to inspect operation environments before flying.

Switch the Flight mode to 'Position retention' when a strong GNSS signal is present and the onscreen display of Satellite number is greater than 20 3D or RTK. Fly the aircraft to a safe height.

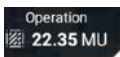
1. Record Point A and B in order

Fly the aircraft to the starting point. Switch A-B switch right to depict as Point A. The App indicates Point A is recorded.

Fly the aircraft to the turning point. Switch A-B switch left to depict as Point B. The App indicates Point B is recorded and an A-B route is produced in white color.



- Point A and B cannot be recorded if the spray tank is empty.
- Make sure to record Point A first, and the Point B, and ensure that the distance between Point A and B is greater than 1 meter.
- Update Point B by flying the aircraft to a new position record. Note that if Point A is updated, Point B must be too.
- For optimal performance, it is recommended to keep the direction of Point A and B parallel to one side of the rectangular spray area.

-  tap the Operation icon to set flow rate per acre (15 acre = 15 MU = 1 Hectare) , line spacing and Speed. And the settings are adjustable during operation. The altitude is set by Throttle Stick (left stick in Mode 2).

2. Select the Route Direction

After Point A and B are recorded, switch Flight Mode to Route or tap  Route icon on

App. App speaks Route started. Push the Roll Stick horizontally to L left or R right.

3. Configuring the Aircraft Altitude

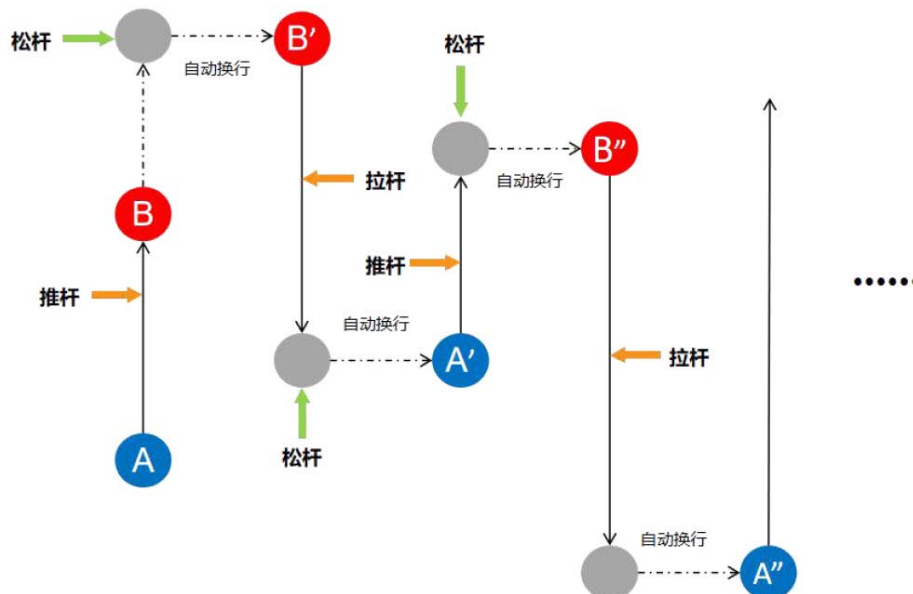
Adjust the Throttle Stick (left stick in Mode 2) to change the altitude between aircraft and corps when altitude stabilizer is enabled.



- When push the Roll stick to control the aircraft during A-B Route, the aircraft automatically switches to Manual operation (Position retention) mode, completes the corresponding flight behavior, and then hovers. To resume the operation, tap Resume onscreen. The aircraft resumes flying from the breakpoint along the operation route. Refer to the Resumption for more information.
- When obstacles are detected and circumvent is off, the aircraft will hover. Use the control sticks to avoid obstacles.

A-B Route adjustment

A-B Routes can be adjusted manually. During A-B Route, push or pull the Pitch Stick to prolong or shorten the AB route.



- During A-B Route, push or pull the Pitch Stick to prolong or shorten the AB route.
The aircraft starts to turn when the Pitch Stick loosened.
- New A or B Points are produced and displayed onscreen.
- A-B adjustment is not available during obstacle avoidance.

Operation Resumption

When exiting a Route or an A-B Route operation, the aircraft records a breakpoint. The Operation Resumption function allows you to pause an operation temporarily to refill the spray tank, fuel or avoid obstacles manually.

Recording a Breakpoint

Users can record the location of an aircraft as a breakpoint. If GNSS signal is strong, exit a Route or A-B Route operation through one of the following methods to record a breakpoint.

1. Fuel is low;
2. Initialize Return to Home RTH;
3. Toggle the Flight Mode Switch;
4. Push the roll stick in any direction on the remote controller;
5. Obstacles detected. The aircraft brakes and enters obstacle avoidance mode or hovers;
6. Radar module error detected when obstacle avoidance function is enabled.
7. The aircraft reaches its distance or altitude limit;
8. Empty spray tank;
9. If the GNSS signal is weak, the aircraft enters Attitude mode and exits the Route or A-B Route operation. The last position where there was a strong GNSS signal is recorded as a breakpoint.



- Make sure that the GNSS signal is strong when using the Operation Resumption function. Otherwise, the aircraft cannot record and return to the breakpoint.
 - The breakpoint is updated as long as it meets one of the above conditions.
-

Resuming Operation

1. Exit a Route or A-B Route operation through one of the above methods. The aircraft records the current location as the breakpoint.

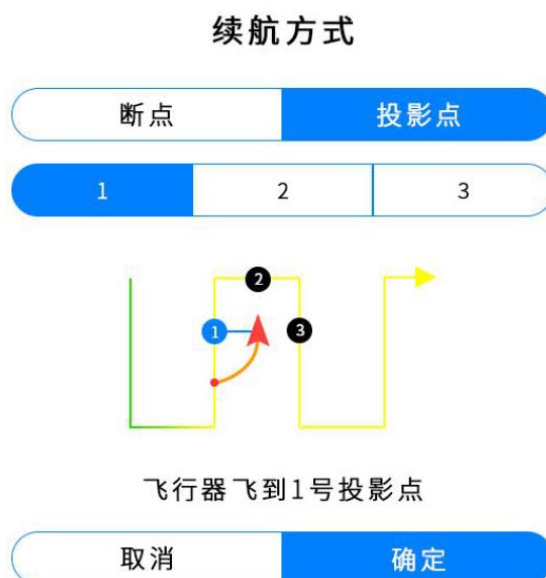
2. Fly the aircraft to a safe location after operating the aircraft or removing the conditions for recording a breakpoint.

3. Tap Resume at right side of App screen.

4. Return Route

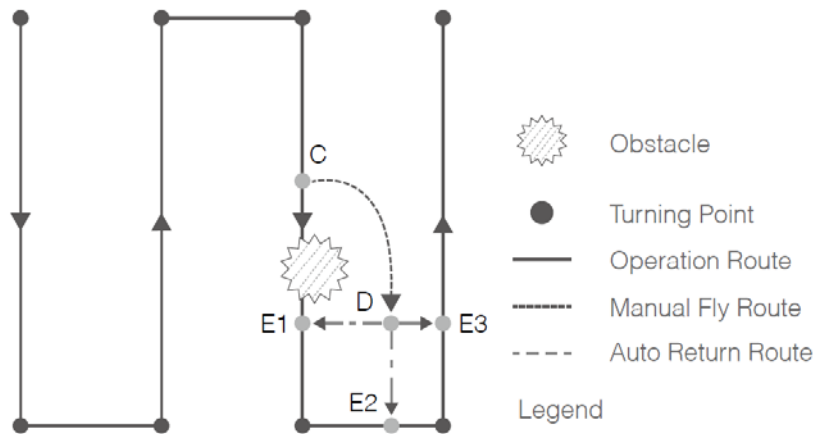
When aircraft locates within the work field, the user can select one from three return route methods: 1. Fly to nearest junction by following a perpendicular line, 2. Fly to the line spacing, and 3. Fly to the next Route line.

When the aircraft locates out of the work field, it will return to the breakpoint. NOTE: if it's 100 meters away from breakpoint, Return Route does not work. The function is available only when Resumption Button appears on screen.



5. Push the Control sticks to control the aircraft forward, backward, or sideways, the aircraft automatically switches the current mode to 'Position retention" mode (Manual mode).

Manual Obstacle Avoidance



1. Existing a Route or A-B Route operation

In both modes, when using the control sticks to control the aircraft forward, backward, or sideways, the aircraft automatically switches the current mode to ‘Position retention” mode (Manual mode), completes the corresponding flight behavior and hovers.



When pushing the control sticks to exit the operation, the aircraft requires a braking distance. Make sure that there is a safe distance between the aircraft and any obstacles.

2. Avoiding an Obstacle

After switching to Manual mode ‘Position retention”, users can control the aircraft to avoid the obstacle from point C to D.

3. Resuming Operation

Tap Resume on App screen. If the aircraft is in the work field, there will be a prompt in App. Select between breakpoint or project point.





- Make sure the aircraft has completely avoided the obstacle before resuming operation.
- In the event of an emergency, make sure that the aircraft is operating normally and fly the aircraft manually to a safe area to resume operation.



- Repeat the instructions above to
-

Manual Operation Mode

Switch Flight mode to left, App displays 'Position retention' on left upper corner. In the mode, the user can control all the movement of the aircraft, spray liquid via the spray button of the remote controller. Spraying flow rate is according to the flight speed in default setting. Spraying stops when hovering. Tap App  icon,  Agricultural setting 'Pump parameter settings' and switch off the spray flow rate with speed. It will spray with constant flow rate nomater hovering or cruising. **NOTE: Manual operation mode is ideal when the operating area is small.**

Radar

Profile

In optimal operating environment, the radar module can predict the distance between the aircraft and corps or other surface in forward, rear, and downward directions to fly at a constant distance to ensure even spraying and terrain following capability. The Radar can also detect obstacles 30 meters away from the aircraft. The radar module adopts digital beam forming technology, which supports 3D point cloud imaging that effectively senses the environment and helps to circumvent obstacles in both Route and A-B Route modes. In addition, radar module limits the descent speed of the aircraft according to the distance between the aircraft and ground, to provide a smooth landing. In Manual operations, the radar module can also measure the spraying distance above corps, but the aircraft is not able to fly at a constant spraying distance. The obstacle avoidance function can be used in any mode.

Detection Range

The detection range of the radar module is -50 to +50 degree in horizontal and 0 to 10 degree in vertical. Note that the aircraft cannot sense obstacles that are not within the detection range. Fly with caution.



The effective horizontal detection range varies depending on the size and material of the obstacle. The effective horizontal detection range is approximately -38 to +38

degree.

Obstacle Avoidance Function Usage

Obstacle avoidance is used in the following two scenarios:

1. The aircraft begins to decelerate when it detects an obstacle 15 meters away and hovers in place when 6 meters away from the obstacle. Users can not accelerate in the direction of the obstacle, but can fly in a direction away from the obstacle.
2. The aircraft immediately brakes and hovers if it detects an obstacle nearby. Users cannot control the aircraft when it is braking.

When the aircraft is hovering, it is in Obstacle Avoidance mode. Users can fly in a direction away from the obstacle to exit Obstacle Avoidance mode and regain full control of the aircraft.



Obstacle avoidance during RTH is different from above descriptions. Refer to Obstacle Avoidance During RTH for more information.

Altitude Stabilization Function Usage

1. Make sure that you have enabled the altitude stabilization function of the radar module in App Agricultural settings.
2. Enter the desired operation mode, and configure the desired spray distance above crops.
3. If the operating environment is ideal, the aircraft flies above the crops at the preset height. Push the Throttle Stick (left stick for Mode 2) to adjust the height any time under any flight mode.



- In manual operation mode, users have complete control of the aircraft. Pay attention to the flying speed and direction when operating. Be aware of the surrounding environment and avoid the blind spots of the radar module.
 - Obstacle Avoidance is adversely affected when aircraft pitch exceeds 15° . Fly with caution. Obstacle Avoidance is disabled when distance between aircraft and
-

corps is less than 0.8 meter.

- Do not set flight speed over 5 m/s when distance between aircraft and corps is greater than 2 meters. The maximum flight speed is 7 m/s. Operate with extra caution when flying over inclined surfaces. Recommended maximum inclination of different aircraft speeds: 10° at 1 m/s, 6° at 3 m/s, and 3° at 5m/s.
 - Maintain full control of the aircraft at all times. DO NOT rely solely on App. Keep the aircraft within VLOS at all times. Use your sound discretion to operate the aircraft manually to avoid obstacles.
 - Comply with local radio transmission laws and regulations.
 - The radar module can only function properly in flat landscapes. It cannot function is sloping landscapes with inclination more than 10° or in landscapes with sudden changes in elevation.
 - The sensitivity of the radar module may be reduced when operating several aircraft within a short distance. Operate with caution.
 - Before use, make sure that the radar module is clean and the outer protective cover is not cracked, chipped, sunken or misshapen.
 - Do NOT attempt to disassemble any part of the radar module that has already been mounted prior to shipping.
 - The radar module is a precision instrument. DO NOT squeeze, tap, or hit the radar module.
-



- If the radar module frequently detects obstacles incorrectly, first check to make sure the mounting bracket and the aircraft landing gear are properly secured. Second, perform the IMU calibration. If the radar module still does not work, contact Richen power Support or your dealer.
 - Keep the protective cover of the radar module clean. Clean the surface with a soft damp cloth and air dry before using again.
-

Empty Tank

Profile

A prompt appears in App and the aircraft hovers in place when the spray tank is empty. A prompt low fuel appears in App and the aircraft Returns to Home RTH instead of hovering when the fuel tank is fast empty (1/5).

Usage

1. When an empty Spray tank warning appears in the App, the sprinklers automatically turn off.
2. Make sure that the aircraft is in Manual operation mode. Land the aircraft and stop the motors. Refill the spray tank and tightly secure the cover.
3. Take off in Manual operation (Position retention) and fly the aircraft to a safe position. Enter the desired mode to continue the operation.

Operation Environment

Operation Environment

1. DO NOT use the aircraft to spray in winds exceeding 8 m/s, heavy rain (precipitation rate exceeding 25 mm (0.98 in) in 12 hours), snow, or fog.
2. Only fly in open areas. Tall buildings and steel structures may affect the accuracy of the compass and the GNSS signal.
3. Pay attention to utility poles, power lines, and other obstacles. DO NOT fly near or above water, people, or animals.
4. Avoid flying in areas with high level of electromagnetism, including mobile phone base stations and radio transmission towers.
5. The recommended maximum operation altitude is 2 km (6,560 ft) above sea level. However, the load must be reduced. The maximum load is 10 liters at 2 km (6,560 ft), 15 liters at 1.5 km (4,920 ft). Reduce the load when voltage is continuously lower than 46 V.
6. Make sure that there is a strong GNSS signal and the RTK antennas are unobstructed during operation.
7. DO NOT operate the aircraft in doors.

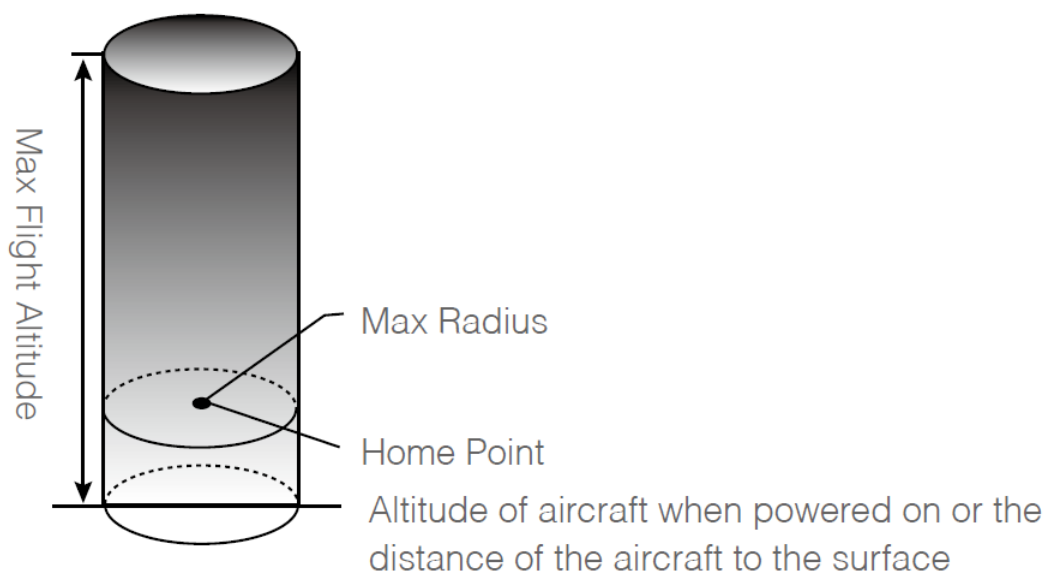
Flight Limits and GEO Zones

Unmanned aerial vehicle (UAV) operators should abide by the regulations from self-regulatory organizations such as the International Civil Aviation Organization, the Federal Aviation Administration, and their local aviation authorities. For safety reasons, flight limits are enabled by default to help users operate this aircraft safely and legally. Users can set flight limits on height and distance.

When operating with a strong GNSS signal, the height and distance limits and GEO Zones work together to monitor flight. With a weak GNSS signal, only the height limit prevents the aircraft from going above 20 meters.

Maximum Height and Radius Limits

Users can change the maximum height and radius limits in App. Once completed, the aircraft flight is restricted to a cylindrical area that is determined by these settings. The tables below show the details of these limits.



With a strong GNSS signal

Flight Limits

Max Height	Flight altitude must be below the preset height
Max Radius	Flight distance must be within the max radius

With a weak GNSS signal

Flight Limits

Max Height	Flight altitude must be below the preset height
Max Radius	No limit.



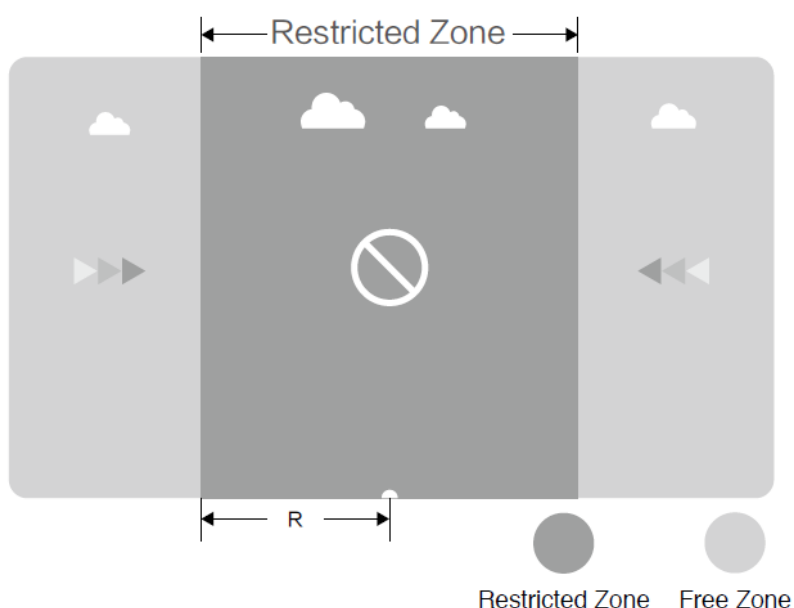
- If the aircraft flies into a Restricted Zone, it can still be controlled, but the aircraft can only fly in a backward direction.
- If the aircraft loses GNSS signal and flies out of the max radius but regains GNSS signal later, it will fly back within range automatically.


GEO Zones

GEO Zones are divided into different categories. All GEO Zones are listed on website at (<http://www.dji.com/flysafe/no-fly>)

GEO Zones are explained below (GNSS required):

Depending on the local regulation, a certain radius around a marker forms as Restricted Zone, inside of which takeoff and flight are prohibited.



With a weak GNSS signal		
Area	Restriction	Aircraft Status Indicators
Restricted Zone 	Motors will not start If the aircraft loses GNSS signal and enters a Restricted Zone but regains GNSS signal later, the aircraft will enter semi-automatic descent and land.	Red flashing
No Flight Restrictions	Users can fly their aircraft freely	None

Semi-automatic descent: All stick commands except the throttle stick command are available during descent and landing. Motors automatically stop after landing.



- When operating in Restricted Zones, the aircraft status indicators blink red slowly and continue for five seconds, and then the switch to the current aircraft status for twelve seconds. If the aircraft is still in the restricted zone at that point, it switches to blinking red slowly for five seconds again and so on.
- DO NOT fly near airport, highways, railway stations. Railway lines, city centers, or other busy areas. Make sure the aircraft is visible at all times.

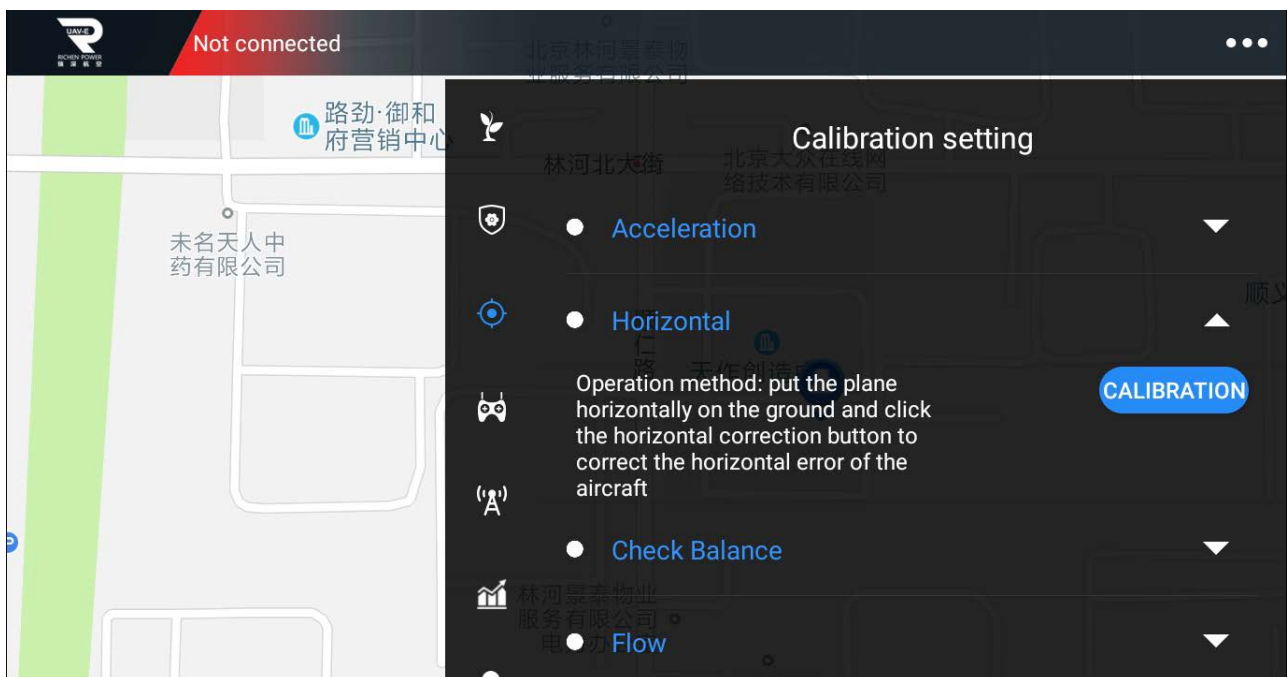
Calibration

Calibrating the IMU Horizontal

‘Horizontal Calibration’ is required before first flight or after long distance transportation further than 600 kilometers (373 miles).

Place the aircraft horizontally on the ground, switch power ON. Connect to the ground station APP, and tap the blue ‘CALIBRATION’ button for ‘horizontal calibration’ to correct the plane's IMU horizontal error.

Note: If the plane is placed on a sloped ground, the aircraft's flight posture will also be tilted after calibration. Please recalibrate on a horizontal ground.



Calibrating the Compass

The compass is already calibrated before shipping. Calibration is not required even at the first time use. When the App prompt Calibration or in any cases of 'When to recalibrate' states, it is necessary to calibrate the compass. The calibration result affects the flight safety. The aircraft may malfunction if the compass is not calibrated when required. DO NOT carry ferromagnetic materials with you during calibration such as keys or mobile phones.



- DO NOT calibrate your compass where there is a chance of strong magnetic interference. This includes areas where there are utility poles or walls with steel reinforcements.
 - DO NOT carry ferromagnetic materials with you during calibration such as keys or mobile phones.
 - After calibrating successfully, the compass may be abnormal when you place the aircraft on ground. This may be because of underground magnetic interference underground. Move the aircraft to another location and try again.
 - DO NOT calibrate indoors.
-

How to calibrate

Calibrate the compass when prompted by the App. It is recommended to calibrate the compass with an empty spray tank and fuel tank.



1. Toggle 'Flight Mode' switch quickly more than 6 times. The LED is red & blue flashing. Start to calibrate.
2. Hold the aircraft horizontally and rotate it 360° around a vertical axis. The LED is solid green when horizontal calibration is done.
3. Hold the aircraft nose down, and the LED is red & green flashing. Start to vertical calibrate.
4. Rotate it 360° keeping nose down. The LED is solid blue. Calibration is completed.
5. Switch power off and on the aircraft.

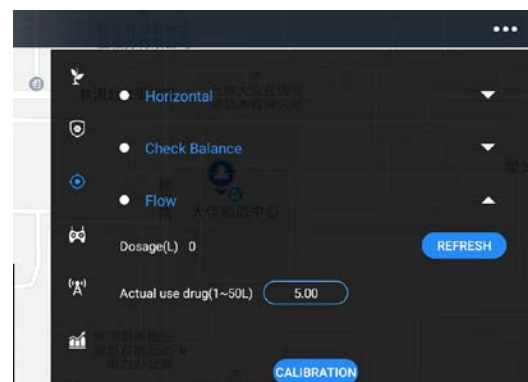
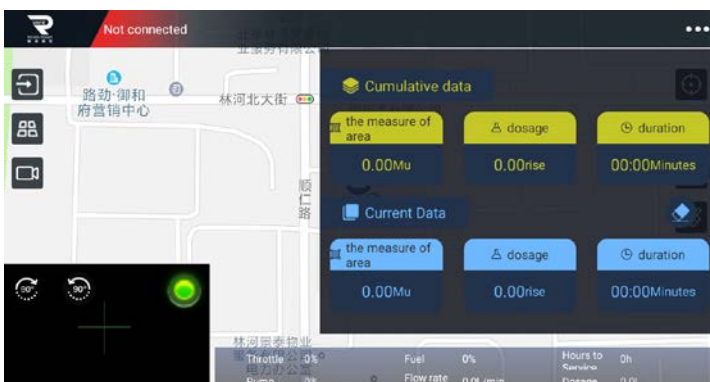
When to recalibrate

1. App prompts warning message and requires calibration;
2. Significant changes in the latitude of the operation field, for example, the first time use in Southern Hemisphere or around the equator;
3. Flight controller or GPS antenna replaced;
4. The aircraft cannot fly along the route.

Calibrating the Spraying System

The spraying system is already calibrated before shipping.

1. Preparation before calibration: if there are any bubbles in the hoses, discharge them before calibration. Loosen all the manual relief valves and press the spray button on the remote controller until the bubbles in the hoses have been fully discharged. If there are no bubbles, proceed with calibration.
- ① Fill the spray tank with approximately 5 to 10 liters of water.
- ② Tap 'Job Accounting' icon on right side of screen, tap 'Current Data' and 'DELETE' icon
- ③ Tap  icon, then  Agricultural settings, Flow meter. Press Spray button on Remote controller to spray 5 liters water out.
- ④ Tap 'REFRESH' icon to display how many liters sprayed. Type in the actual amount 5.00 then tap the 'CALIBRATION' icon.
- ⑤ Test the flow meter by deleting saved data of step ② and spraying again. Tap



'REFRESH' icon to display if expected amount is displaced.

When to Recalibrate

1. Installing a different nozzle model.
2. Using a liquid of a different viscosity.
3. The error between the actual value and the theoretical value of the complete area is more than 15%.

Appendix

Specifications

Total Weight (Excluding fuel) (kg)	59.2
Max Takeoff Weight (kg)	82.0 (sea level)
Max Hovering Time (hours)	0.5
GNSS+D-RTK Dual Positioning System Hovering Accuracy (cm) GNSS* GPS+GLONASS+BEIDOU	D-RTK Enabled: horizontal & vertical \pm 10 (when Beidou available) D-RTK Disabled: Horizontal \pm 60 vertical \pm 30 radar modular enabled \pm 10
Dimensions (L x W x H) (mm)	1350 x 960 x 998 (Frame arms folded)
Diagonal Wheelbase (mm)	2250
Number of Arms	6
Max Operating Speed (m/s)	7
Max Flying Speed (m/s)	10
Fuel Consumption (liter/ hour)	6
Operating Temperature (° C)	-20 ~ 40
Max Service Ceiling Above Sea Level (m)	2000
Press to Start (IGS system)	yes
Gasoline	Regular92 or E92 or above
FPV Camera	FOV Horizontal 98° Vertical78° Resolution1080x960
Liquid Tank Volume (liter)	Standard 20; Max 23
Liquid Tank Payload (kg)	Standard 20; Max 25
Number of Nozzle	8

Nozzle Model	Teejet XR11001VS (Droplet Size 130~250 μ m)
Max Spray Flow (liter/min)	3.6
Spray Width (m)	10~12 m (8 nozzles, at a height of 2.5~3.5 m above crops)
Terrain Follow Radar	Altitude detection range 1 - 30 m; Stabilization working range 1.5 - 15 m; Max slope in Mountain mode 35°

* Hovering time acquired at sea level win speeds lower than 3 m/s

LED Indicators Description

Blinking Patterns	Description
Purple-red flashing	Self-checking
LED off	LED defect or firmware updating
Any color solid on	Computer system crash, restart it
Red-white flashing	Initiating
Red-yellow-blue-green flashing	Compass calibration required
Red-blue-green flashing	Calibration started
Yellow flashing	Remote controller disconnected, low voltage, or empty spray tank
Yellow flashing quickly	Too low voltage, auto descent and land
Solid red	Log SD card failure
Red-yellow flashing	GPS failure
Blue or green flashing	Without or with GPS, motors locked
Blue or green solid	Without or with GPS, motors unlocked and started
Green flashing	GNSS high precision positioning

Hybrid System LED Indicator Description

Blinking Patterns	Description
Solid green	In order, press to start the engine
Red flashing	Overload, low voltage, coolant too hot, or generator failure, land to inspect
Red-green flashing	Time to service, contact your dealer

List of Hazards and solutions

#	Hazards	Consequence	Severity	Solutions
1	Modification, disassemble by users	Short-circuit chip burned and other damage, circuit false connection	Middle	Implemented by vendors
2	Long time placed in low temperature, strong acid, alkali or other harsh environment	Battery failure	Low	Remove the battery and store in doors
3	Fly in harsh environments, such as strong winds, heavy rain, dust, etc.	Crash	High	Flying and operating follow user manual
4	Take off above the safe take-off weight	Crash	High	Flying and operating follow user manual (82 kgs)
5	Forced flight in the event of aging or damage to components	Crash	High	Flying and operating follow user manual maintenance
6	Change or tear off label	Out of warranty	Low	DO NOT change or tear off label
7	Fuel run out during flight	Engine damage	Middle	Monitor fuel level on App
8	Air intake filter dirty without clean/replacement	Engine power reduced and low voltage	Middle	Flying and operating follow user manual maintenance

9	Spark plug without replacement in time	Engine power reduced and low voltage	Middle	Follow user manual maintenance
10	Carburetor clogged	Engine power reduced and low voltage	Middle	Follow user manual maintenance clean or replace fuel filter
11	Spray system nozzle without cleaning	Spraying malfunction	Low	Follow user manual maintenance
12	Pesticides residue on drone frame	Wires and motor corrosion	Middle	Follow user manual maintenance

Contact us

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