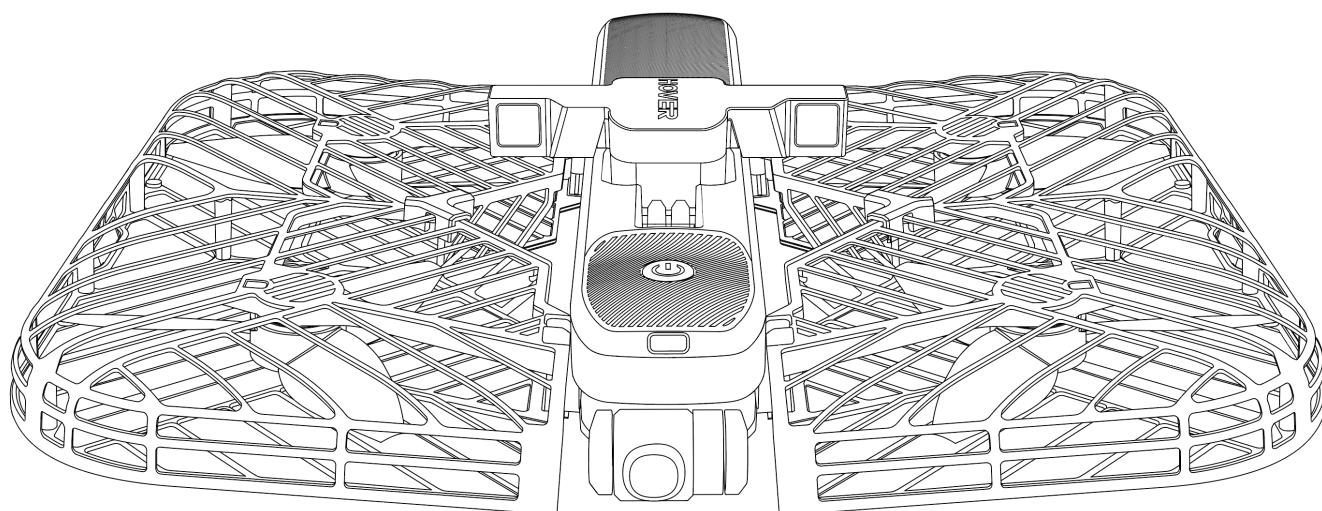


HOVER²

User Manual V1.0



2019.12

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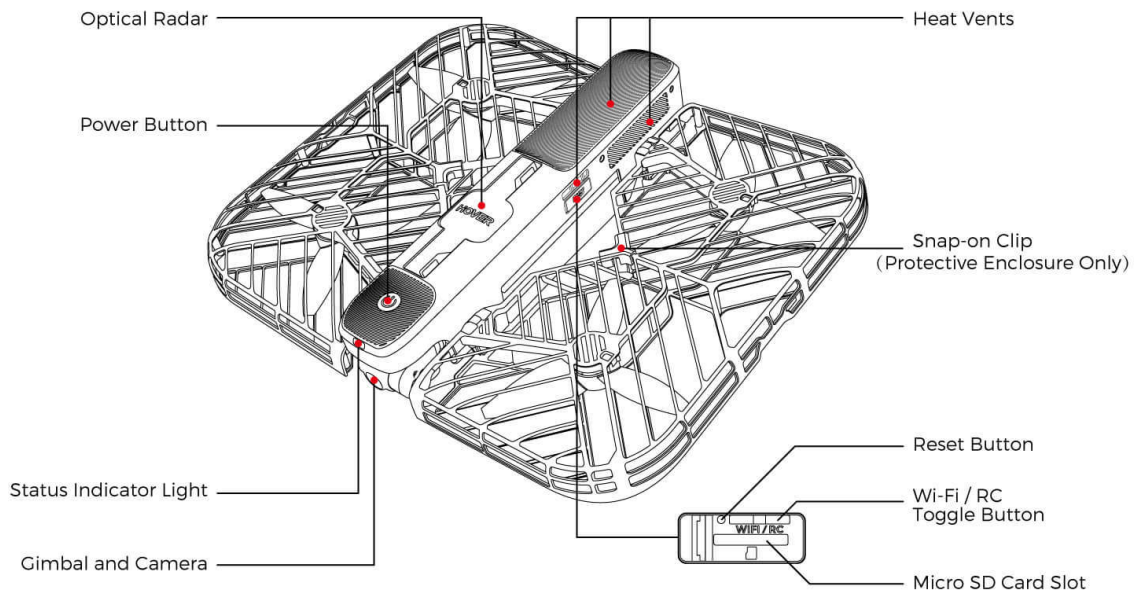
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1 Hover 2

1.1 Introduction

Hover 2 is a safe, portable, and easy-to-use drone. Equipped with an original optical radar system, it can detect the surrounding environment during flight and realize 360-degree real-time obstacle avoidance. The two-axis mechanical gimbal camera combined with electronic stabilization technology enables stable shooting of 4K video and 12-megapixel photos. Three control methods can meet different needs: aerial photography, one-handed control, intelligent flight. A variety of intelligent modes make it easy to take cinematic shots.



1 Hover 2

1.2 Drone Indicator Lights

Press and hold the power button for about 2s to turn on Hover 2. After you turn it on, you can see three lights on the drone: power light, status indicator light, and tail indicator light. The power light indicates the power on / off status of the drone. When the drone is turned on, the power light is solid white.

The tail indicator light is used to indicate the tail direction of the drone. When flying, the tail indicator light is solid red;

The status indicator light indicates the current status of the drone. Please refer to the following instructions for details.

Status indicator light

Normal status:

Blink alternating red, yellow and green continuously: System self-test

Slowly blink red: Ready to self-timer shooting

Quickly blink red: During recording / 1s before self-timer shooting

Light off: Device connected / Reset successfully / Taking a picture

Slowly blink blue: Upgrading firmware/ Resetting

Abnormal status:

Solid yellow: No device connected

Slowly blink yellow: Low battery

Quickly blink yellow: Critically low battery

Solid Red: Critical error

1 Hover 2

1.3 Gimbal and Camera

Gimbal

Hover 2 uses an integrated two-axis gimbal camera, combined with EIS technology, to shoot high-quality and stable images during the flight. The gimbal's tilt control range is -90° to $+22^{\circ}$. During the shooting, the gimbal's control wheel can be used to adjust the gimbal's tilt angle.

Camera

The camera has a 1/2.3" CMOS and the effective pixels is 12MP. The camera shoots up to 4k video and 12 MP photo, and supports shooting modes such as single shot and self-timer shooting. Camera shots can be previewed in real time through the App or Palm Pilot.

Camera storage

The drone has internal 3GB storage space and is equipped with a microSD card slot to support external microSD cards. When the drone detects that a microSD card is inserted, the videos and pictures will be stored on the SD card preferentially.

Tips:

1. After the drone is turned on, please place the drone horizontally and make sure that no foreign objects get stuck in the gimbal, otherwise the temperature of the gimbal may be too high and the camera may be damaged.
2. During the use of the drone, please avoid the collision of the gimbal camera.
3. Flying in a low temperature, foggy, sandy environment may cause the gimbal abnormal. Please choose a suitable flying environment.
4. The microSD card is not equipped by default. If necessary, please prepare it by yourself.

1 Hover 2

1.4 Optical Radar and Obstacle Avoidance

Optical Radar

Hover 2 is equipped with an original rotary vision radar system, combined with advanced obstacle avoidance algorithms such as SLAM (instant positioning and map construction), VIO (visual inertial odometer), and path planning, which can detect the surrounding environment during flight and achieve 360-degree obstacle avoidance in real time. During the flight, the optical radar will automatically rotate and adjust the detection direction according to the flight behavior. The detection distance can reach 10m.

After popping up the optical radar, it will automatically detect obstacles during the flight to help the drone avoid obstacles. Please note that the detection range of the optical radar is limited. If the obstacle is outside of the detection range, the drone cannot automatically avoid it. Please fly with caution.

Obstacle Avoidance

Obstacle avoidance requires the optical radar and the switch of obstacle avoidance to be both turned on. If one of them is closed, obstacle avoidance will not work. You can see the switch of the obstacle avoidance on App or Palm Pilot. If the obstacle avoidance works, the drone will automatically hover and wait for the user to operate when detected an obstacle.

In Omni-Follow mode, the drone will try to fly over the obstacles;

During the returning, the drone will try to fly over the obstacles and then continue to return.

Tips:

1. Please note that the earlier drone firmware only supports obstacle avoidance in Manual Control mode. The drone cannot avoid obstacles in the Omni-Follow, TrackShots mode and process of return to home. Please fly carefully!
2. To ensure a good flight experience, please turn on the optical radar and switch on the obstacle avoidance before flying.
3. If the lighting conditions are not satisfied, for example, the light is too strong or too dark, the optical radar cannot detect obstacles;
4. Optical radar cannot detect small or transparent obstacles, such as kite lines, glass, etc. Please pay attention to avoid;
5. Please use and turn off the optical radar correctly to avoid collision and keep the lens clean;
6. Please avoid using the optical radar in sand, dust and rain.

1 Hover 2

1.5 Intelligent Battery

Hover 2 Intelligent Battery is a battery of 2900 mAh capacity and 11.55V voltage. It has smart charge/discharge function. Before using the battery, please read this Manual and the <Intelligent Battery Safety Instructions> carefully, and strictly follow the instructions in the manuals. Zero Zero Technology has no liability for any accidents caused by the use of batteries beyond the conditions in above manuals.

Activate & wake up the battery

For the first time, please charge the Intelligent Battery to activate it. If the battery has not been used for a long time and its power is less than 10%, it will automatically switch to sleep mode to prevent over-discharge. You cannot check the battery power under sleep mode, please wake the battery up by charging it.

Install & remove battery

Install and remove the battery correctly. Please make sure the battery is installed before using the drone to avoid accidents caused by battery fall.

Charging

Please only use the authorized charger designated by Zero Zero Technology to charge the battery.

During the charging process, the battery level indicator lights will keep flashing to indicate the current battery level. If all indicators are turned off, it means battery is fully charged and the battery will automatically stop charging.

Battery will automatically stop charging to protect the battery cells under following conditions:

- 1) battery temperature is beyond range of 5°C ~ 40°C;
- 2) an excessive current is detected;
- 3) a short circuit is detected.
- 4) If any of described abnormalities occur, please disconnect the charger first, and then resume charging the battery after troubleshooting.

Tips:

1. At normal temperature (0°C to 40° C), the charging time for a single battery is about 1H.
2. The battery temperature is quite high after a flight. Please wait until battery temperature drop back to the normal range before charging.
3. You can charge up to four batteries by using the Charging Dock. Please contact us for more information.

1 Hover 2

1.5 Intelligent Battery

Check battery level

Shortly press the power button to check the current battery level.

Storage and transportation

If you need to store the battery for a long time, please avoid full or low power storage. It is recommended to keep the battery power around 60%, and recharge it every two months to extend the battery life.

If the battery needs to be transported, for safety purpose, please ensure that the temperature is within the range of $23 \pm 5^{\circ}\text{C}$ during transportation.

Precautions for use

Please ensure that the flying environment temperature is within 0°C to 40°C . If temperature is beyond this range, battery performance may be affected, which may affect Hover 2. In low temperature environments (-10°C to 5°C), battery capacity will significantly reduce and output power will be limited. It is recommended to warm battery up to at least 10°C before taking off. In cold environment, the battery life will be shortened, and Hover 2's wind resistance ability will also be weakened, so fly carefully.

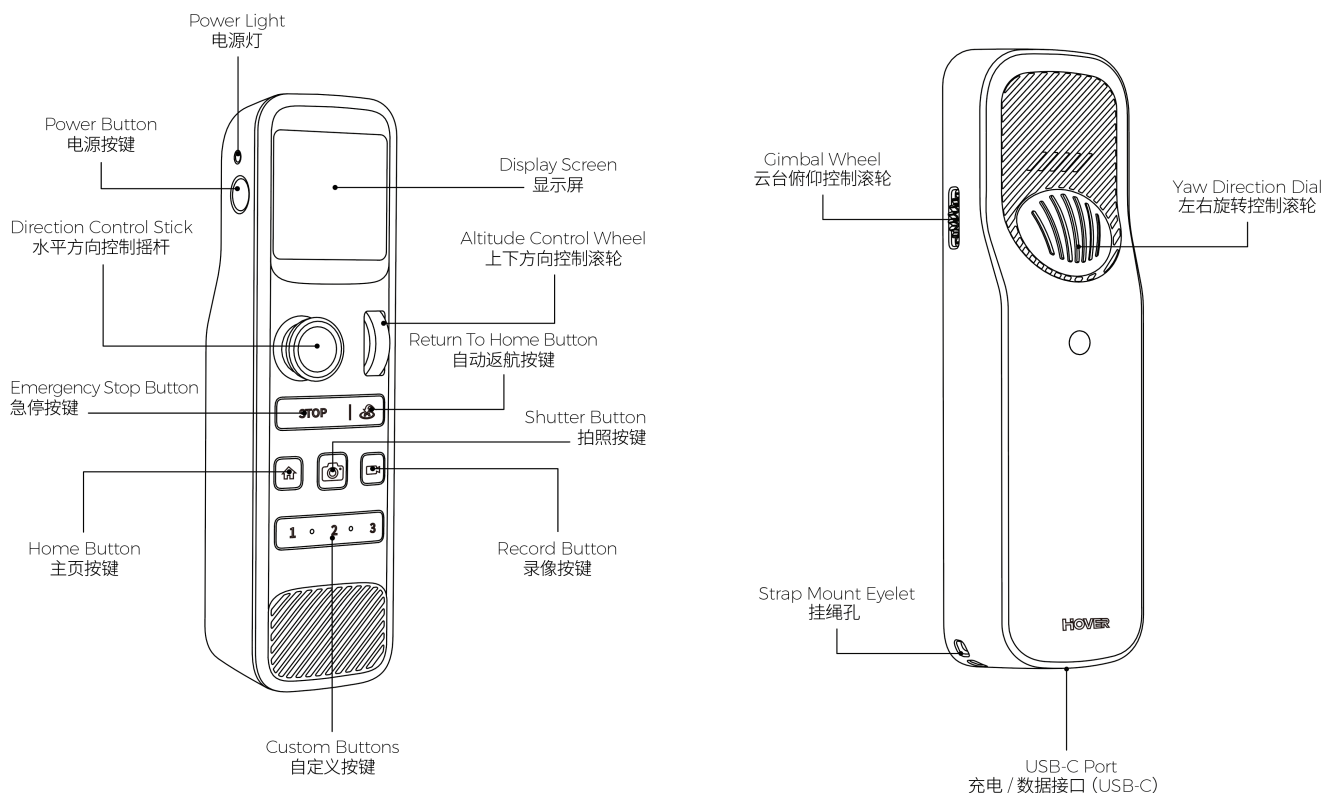
Tips: You can check current battery temperature via the App.

2 Remote control equipments

2.1 Palm Pilot

Palm Pilot supports automatic pairing and connecting to Hover 2. Its portable size and unique design make it possible to control Hover 2 with single hand. Its build-in display screen allows the live stream easily viewable.

To ensure flight safety, when using Palm Pilot to control Hover 2, flight is restricted to a height of 50 meters, and distance of 120 meters.



Charge

It is recommended to check the remaining battery level of Palm Pilot before using.

Keep pressing power button for 2s to turn on Palm Pilot, the display screen will show its current battery level. Please charge Palm Pilot when its battery level is low, in order to avoid low-power shutdown and loss control of Hover 2.

To charge Palm Pilot, please only use the standard USB-C cable to connect with Hover 2 charger. The user is solely responsible for any problems caused by the use of non-Zero Zero official chargers.

Under normal circumstances, it takes about 2.5H to fully charge Palm Pilot.

2 Remote control equipments

2.1 Palm Pilot

Button Features

Power Button: Keep pressing for about 2s to turn on or turn off the Palm Pilot. After powered on, shortly press power button will lock this device. While locking, other buttons won't work. Palm Pilot can be unlocked by shortly press the power button again.

Display Screen: Displays the Hover 2 status, and the functions menu and the Camera View.

Camera Button: Shortly press once to take a single photo.

Record Button: Shortly press once to start or stop recording.

Home Button: Shortly press to return the home page.

Custom Buttons: Only work in Omni-Follow and TrackShots Mode. Shortly press the buttons can switch to the selected sub-modes, and long press can customize the sub-mode corresponding to the button.

Return to Home(RTH) Button: Shortly press the button will activate RTH, shortly press the button again will exit RTH. Before use this function, please pay attention to the current home point and home altitude, and avoid use this function in inappropriate scenarios, which may cause unnecessary accidents.

Emergency Stop Button: 1) In any situation you think Hover 2 need a Stop, please shortly press the STOP button to let Hover 2 hover at current spot; 2) Long press STOP button will let Hover 2 land to ground; 3) In Omni-Follow and TrackShots Mode, shortly press STOP button will exit the mode.

Gimbal Wheel: Controls the tilt direction of gimbal.

Direction Control Stick: 1) Control Hover 2's forward/backward movement and left/right movement; 2) Move the stick towards four directions to switch the options displayed on the screen, and shortly press the stick to confirm the selected option.

2 Remote control equipments

2.1 Palm Pilot

Button Features

Yaw Direction Dial: Control the drone to rotate clockwise / counterclockwise.

Altitude Control Wheel: 1) push up for about 2s to make the drone take off from the ground; 2) After taking off, push up and down to control the altitude of the drone; 3) Continuously push down to make the drone land on the ground.

Connect with Hover 2

Turn on both Palm Pilot and Hover 2, then Palm Pilot will automatically search and connect to Hover 2's Wi-Fi. Please make sure Hover 2 is in Wi-Fi mode (press and hold the RC / Wi-Fi toggle button for 4s until hearing two beeps).

Control Hover 2

After connection, the controller can command Hover 2 to take off, land or perform other behaviors.

Takeoff:

After select the preferred Mode and enter the Camera View, push up the Altitude Control Wheel for about 2s, the drone will automatically take off and hover at one meter height.

Landing:

Push the Altitude Control Wheel down until the drone lands on the ground.

Control Flight:

Use the Direction Control Stick to control the drone to fly left / right / forwards / backwards; Use the Yaw Direction Dial to control the drone to rotate clockwise / counterclockwise; Use the Altitude Control Wheel to control the drone to fly up and down.

Tips:

1. The more the stick is pushed away from the center position, the faster the drone will change its behavior. Always push the stick gently to prevent sudden and unexpected changes.
2. Keep the Palm Pilot away from magnetic materials to avoid it being affected by magnetic interference.

2 Remote control equipments

2.1 Hover 2 App

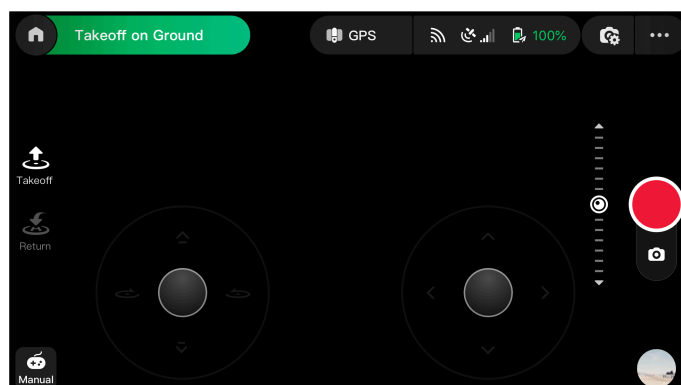
With the Hover 2 App, you can connect and control the drone, preview camera shots, view albums, quickly share, set various parameters, and browse selected content. Before using, you need to register with your mobile phone number or email account. After registering and logging in, you can connect to the drone's Wi-Fi to control the drone's flight and shooting.

To ensure flight safety, when using Hover 2 App to control Hover 2, flight is restricted to a height of 50 meters, and distance of 80 meters.

Camera View Interface

After connecting the drone, you can enter the camera view interface.

- a. Home button: Click to return to the home page.
- b. Takeoff / Land button: After clicking and confirming, the drone will takeoff / land.
- c. Home: Click and confirm, and then the home will be triggered. The drone will automatically fly back to the home point and land.
- d. Mode Switch: Click to switch the flight mode.
- e. Virtual Joystick: Slide it around to control the drone to fly.
- f. Virtual Gimbal Controller: Controls the tilt of gimbal.
- g. Playback: Preview and manage the pictures and videos currently taken.
- h. Photo / Video Switch Button: Click to switch to photo mode or video mode.
- i. Photo / Video Button: Click to start/stop shooting.
- j. Connection Signal: Show the strength of the connection signal between the drone and the mobile phone.
- k. GPS Signal: Indicate the strength of the GPS signal in current environment.
- l. Battery Level: Displays the current battery level.
- m. Camera Settings: Set camera shooting parameters.
- n. General Settings: Set flight control parameters and check battery information.



2 Remote control equipments

2.1 Hover 2 App

Discovery

You can browse the videos and photos shared by other users, or you can share the photos you have taken.

Album

View and manage your videos and photos.

Download management: View and manage the videos and photos that were downloaded to your phone.

All: View and manage all videos and photos on your phone which were captured by Hover 2.

Drone: View and manage videos and photos stored on the drone (including the SD card). The videos and photos shot with Palm Pilot can be downloaded here. After download, you can view and manage them in [All].

Me

Personal information: View personal registration information.

Storage management: View or clear the internal storage of the drone and the SD card.

Wi-Fi frequency channel: You can choose 2.4G or 5G.

Help and Feedback: Support uploading flight logs to report problems.

About: Check current App version and device information.

3 Flight

3.1 Preparation before flight

Download and install the Hover 2 App or charge your Palm Pilot

You can try to search for "Hover 2" in the app store, or the official website to download the App.

Please use iOS 10.0 (or above) or Android 6.0 (or above).

Prepare Hover 2

Please follow the steps below to prepare Hover 2.

- a. Check the battery power and make sure the battery power is sufficient before installing the battery.
- b. Unfold the drone, and press Optical Radar to make it pop out.
- c. Make sure that the gimbal, lens, propellers, and protective enclosure are all clean and no foreign objects.
- d. Turn on the drone: Press and hold the power button for 2 seconds until the power light starts to flash. Once it's finished booting up, you will hear a sound.

Connect Hover 2

Before using the Hover 2 App or Palm Pilot to connect the drone, please make sure the drone is in Wi-Fi mode (press and hold the RC / Wi-Fi toggle button on the drone for 4s until you hear two beeps).

If you use Hover 2 App to connect, please follow the instructions on the App to connect the drone.

If you use Palm Pilot to connect, please turn on the drone and Palm Pilot. Palm Pilot will automatically search and connect the drone's Wi-Fi.

3 Flight

3.2 Takeoff, Land, Return

Takeoff

Before taking off, please confirm that the takeoff environment is suitable, and pay attention to the self-check prompts on the App or Palm Pilot. Click the takeoff button on the App and confirm or push Altitude Control Wheel on Palm Pilot for about 2s, the drone will automatically take off to 1m height. It is recommended to wait for a strong GPS signal before taking off.

Land

When the drone is connected to Hover 2 App, You can click the land button on the App and confirm to land.

When the drone is connected to Palm Pilot, you can pull down Altitude Control Wheel or press and hold the “STOP” button to trigger the landing. After triggering the landing, the drone will automatically land on the ground and turn off the motor on its own. Please select a suitable site for landing.

During the automatic landing, you can click the “✗” button in the App to exit the landing.


During the flight, when the battery power is only enough to complete the landing, a low-power automatic landing will be triggered. During the automatic landing, you can use the joystick to adjust the position and speed of the drone in order to land the drone on the ground safely. To avoid landing automatically on a dangerous area, please fly back the drone in time when the battery is low.

3 Flight

3.2 Takeoff, Land, Return

Return to Home

The Return to Home (RTH) function can be initiated by tapping the return icon in the Hover 2 App or pressing the return button on the Palm Pilot. If the GPS signal is strong, RTH can be used to bring the drone back to the Home Point.

RTH can be exited by tapping the “” button in the Hover 2 App or by pressing the RTH button on the Palm Pilot. To ensure flight safety, it is important to understand the return rules.

When connected with Hover 2 App, the drone will automatically set its launched position as the Home Point if a strong GPS signal is acquired. Before returning, you can set your phone's current position as the new home point. Depending on the distance between Hover 2 and Home Point, the drone will perform different return behavior, which are listed below:

- a. If Hover 2 is $\leq 5\text{m}$ away from Home Point, it lands directly.
- b. If Hover 2 is $> 5\text{m}$ and $\leq 20\text{m}$ away from Home Point, it will return at current altitude. If its current altitude is less than 2.5m, Hover 2 will return at the altitude of 2.5m.
- c. If Hover 2 is $> 20\text{m}$ away from Home Point. If the current altitude of the drone is greater than or equal to the set return altitude, the drone will return to the current altitude; if the current altitude is less than the set return altitude, the drone will first rise to the set return altitude, and return to home.

When connected with Palm Pilot, the home point is fixed to the Palm Pilot position. Depending on the current flight altitude,

- a. the drone will return at current altitude, when its current altitude is $> 2.5\text{m}$.
- b. the drone will return at the altitude of 2.5m, when its current altitude is $\leq 2.5\text{m}$.

Tips:

- 1、The drone's flight height is calculated from takeoff point and is not equal to the altitude.
- 2、Hover 2 with earlier firmware versions cannot avoid obstacles during return. Please use it with caution.
- 3、The RTH function can be used only if the Home Point is recorded.
- 4、Hover 2 cannot actively avoid the obstacles which are above the drone.
- 5、During RTH, you cannot control the drone's orientation and fly direction.
- 6、During the automatic landing, you can push down the stick to accelerate landing.

3 Flight


3.3 Flight Mode

In addition to the manual control mode, the Hover 2 supports a variety of intelligent flight modes, which you can switch freely through the App or Palm Pilot.

If Omni-Follow mode is selected, the drone will follow a certain distance from the target and record automatically. During the following process, the user can still control the drone.

If TrackShots mode is selected, the drone will automatically fly according to the selected path and record.

Steps for using

- a. After connection, please control the drone to take off and point the camera to the target person.
- b. Enter the Camera View on the App or Palm Pilot, and select Omni-Follow / TrackShots mode, the drone will automatically identify and mark the target that can be tracked.
- c. Click to select the target, the drone will lock the target.
- d. Select the Omni-Follow / TrackShots sub-mode and click Start. The drone will automatically start the mission.
- e. Exit: Click the “” button in the App or click the "STOP" button on Palm Pilot. After exiting the tracking, the drone will hover at the current position.

Tips:

1. In Surge mode, the drone will automatically fly backwards about 35m away and 40m high. Please make sure there are no obstacles on the flight path.
2. Earlier firmware versions of the drone cannot avoid obstacles in Omni-Follow and TrackShots mode. To ensure flight safety, be sure to choose an open and unobstructed environment for flight.
3. Please choose to use this function under the environment of strong GPS signal and good light conditions.
4. Please always be careful to avoid obstacles, especially small objects (such as kite lines) or transparent objects (such as glass).
5. To ensure a good shooting experience, always ensure that the target is in the Camera View and not blocked by other people or other objects.
6. Please consciously abide by the provisions of local laws and privacy regulations.

3 Flight

3.3 Flight Limits and Environment Requirements

Please read this manual and Disclaimer and Safety Instructions carefully before using Hover 2. Beginners are advised to conduct the necessary flight training or exercises and browse related instructional videos.

Flight Limits

Hover 2 complies with the ICAO and national air traffic control regulations for airspace control and drone management regulations. In order to ensure the safe use of drones, flight restriction is enabled by default to limit the maximum flight altitude and distance of the drone. After the drone is powered on and taken off, it will automatically obtain local flight restriction information, and hover automatically when it reaches the specified maximum altitude or distance. Drone cannot take off in no-fly zones such as airports.

You can use the Hover 2 App to customize the flying height and distance within the local flying limits. When the GPS signal is strong, the drone is affected by both the altitude limitation of the special area and the user-defined height and distance. When the GPS signal is weak, the drone is affected by the user-defined height and distance. When the drone reaches the restricted boundary, it will automatically decelerate and hover. To ensure flight safety, please control the drone to leave this area as soon as possible.

Environment Requirements

1. Do not fly in bad weather, such as extreme weather such as rain, snow, haze, thunder, wind, hail, sand and so on.
2. Do not fly near high-voltage lines, communication base stations or transmission towers to avoid interference with remote control signals.
3. Please fly in an open and unobstructed environment, away from buildings, people, animals and electromagnetic interference areas.
4. If flying above 2000 meters above sea level, aircraft performance may be affected. Please fly with caution.
5. Do not fly under poor GPS signals and large ground height differences (such as flying out of windows on high floors), as the positioning function may be abnormal and affect flight safety.
6. When flying at night, make sure the GPS signal is good.

4 Other

4.1 Firmware Updates

In order to make better use of the drone, when there is a new firmware version, please use the FlyKit App on the computer to upgrade the drone and Palm Pilot's firmware in time.

Upgrade with FlyKit

FlyKit can upgrade the firmware version of the drone and Palm Pilot. Please visit Zero Zero official website to download and install the latest FlyKit software to your computer, and follow the prompts to upgrade.

Tips:

1. Before upgrading, please make sure that the device has sufficient power.
2. An internet connection is required to obtain the latest firmware version. Please ensure that the computer can access the internet.
3. During the upgrade, please follow the prompts and do not disconnect the device.
4. After the firmware upgraded, flight control parameters may be reset. Please check them before flight.
5. Before upgrading, please make a backup of your data.

4 Other

4.2 Calibrate the Compass

To ensure flight safety, when it is detected that the compass needs to be calibrated, the Hover 2 App or Palm Pilot will remind you. Please follow the prompts to calibrate in time. Calibration entry:

- a. Hover 2 App: Setting ~ Calibrate Sensors ~ Calibrate Compass;
- b. Palm Pilot: Camera View tips ~ Click “Calibrate”.

Tips:

1. When the flight spot has a large migration (for example, more than 50 kilometers from the location of the last flight), please make sure to calibrate the compass before the flight.
2. When the drone has not been used for a long time, be sure to calibrate the compass before flying.
3. Please choose a proper calibration environment and keep away from strong magnetic fields.
4. During the calibration process, please do not carry ferromagnetic items with you, and ensure that the drone is more than 1.5m above the ground.
5. If you choose to fly indoors, you don't need to calibrate the compass.

4 Other

4.3 Key Specs

Drone	Folded: 230 x 45 x 172 mm (length x width x height) Weight: 490 g Max Hovering Time: Up to 23 min Max Wind Scale Resistance: Grade 5 Operating Temperature: 0 °C ~ 40 °C Operating Frequency: 2.4 GHz; 5 GHz GNSS: GPS + GLONASS Storage: Internal Storage 3 GB Max Capacity of External microSD Card 128 GB
Camera	Sensor: 1/2.3" CMOS; Effective Pixels: 12 MP Lens: FOV About 77°; Equivalent Focal Length 28mm; f/2.2 Still Photography Modes: Single Shot; Self-Timer Shooting Photo Format: JPEG; RAW (DNG); RAW+JPEG Max Image Size: 12 MP Video Format: MP4 ISO: Video: 100 ~ 1600 (Auto) , 100 ~ 1600 (Manual) Photo: 100 ~ 1600 (Auto) , 100 ~ 3200 (Manual) Video Resolution: 4K: 3840×2160 @ 30 fps 2.7K: 2720×1530 @ 30/60 fps 1080p: 1920×1080 @ 30/60/120 fps 720p: 1280×720 @ 30/60/120 fps
Gimbal	Stabilization: 2-axis gimbal and EIS (Digital Stabilization) User Control Range (Pitch) : 22° ~ -90°
Obstacle Avoidance	Detectable Obstacle: Furthest detectable distance 10 m; Max obstacle avoidance speed: ≤ 4 m/s
Palm Pilot	Max Control Distance: 120 m Battery Time: 85 min
Intelligent Battery	Capacity: 2900 mAh Voltage: 11.55 V Energy: 33.49 Wh Weight: 160 g Operating Temperature: 0 °C ~ 40 °C
Charger	Output: 13.2 V ~ 4 A; 5 V ~ 2 A Power: ~ 52 W Charger Input: 100 V ~ 240 V, 50 Hz ~ 60 Hz

4 Other

4.4 About Us

Please visit the Zero Zero official website for the latest after-sales warranty information: zerozerorobotics.com

If you need help, please contact us: support@zerozero.cn

Please get the latest version of the user manual through the Zero Zero official website: zerozerorobotics.com/support/downloads

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