

Friday, April 19, 2019



# EMO Formation UAV User Guide

V1.0.0

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## Reading tips

### Symbol description



**CAUTION**



**TIPS**



**CAUTION** is intended to remind the do's and don'ts during use. Losses may be caused if operations are not performed as required.



**TIPS** is intended to facilitate a better experience on product functions and performances during use

### Use suggestions

This is a professional outdoor unmanned aerial vehicle (UAV) formation performance product, which raises high requirements on the use method and environment. In order to help you quickly understand the basic use methods and precautions of this product, improve the

use efficiency and lower use risks, please read this EMO User Guide carefully.

## **Product overview**

The functional characteristics of EMO and aircraft part names will be briefly described in this chapter.

### **Product introduction**

EMO is a portable, easy-to-use and rapidly deployable UAV for outdoor formation performance. Thanks to the comprehensive improvement in aspects of endurance, weight, flight safety, lighting effect, flight positioning and wind resistance, users are enabled to conveniently complete the UAV formation performance by operating the upper computer.

### **Functional highlights**

Centimeter-level positioning: the most advanced RTK centimeter-level positioning technology was adopted.

5.8G Wifi: 5.8G Wifi was used for networking communication, facilitating communication to be worry-free in complex network environment.

Actions and postures: double redundant sensing system, combined with its own algorithm, makes the dance posture more performable and controllable.

Weight: the fuselage is light and compact without batteries. The total weight of fuselage and protective cover is only 250g.

Battery and battery life:

The 4S battery could last up to 33 minutes

Lighting: 0-22W adjustable high-brightness color LED lamp, automatically adjusting its brightness according to the ambient temperature. Two different lampshade specifications are provided for customers to choose.

Upper computer: a supporting upper computer specially developed for EMO formation performance, through which users can operate and complete UAV formation performance.

Safety: locked-rotor protection, low power protection, fail-safe protection and physical protection.

Expandability: adapt to the charging base for ground performance and battery life charging function; Capable of excellent cooperation between air and ground light show.

Automatic numbering: UAVs only need to be placed according to the position map of dance steps, and then one-click numbering can be realized. This could eliminate the tedious procedures of placing numbers.

Aerial pause: the aerial UAV can be controlled by the ground host computer to pause at a specific position, and can restart and go around at a desired time.

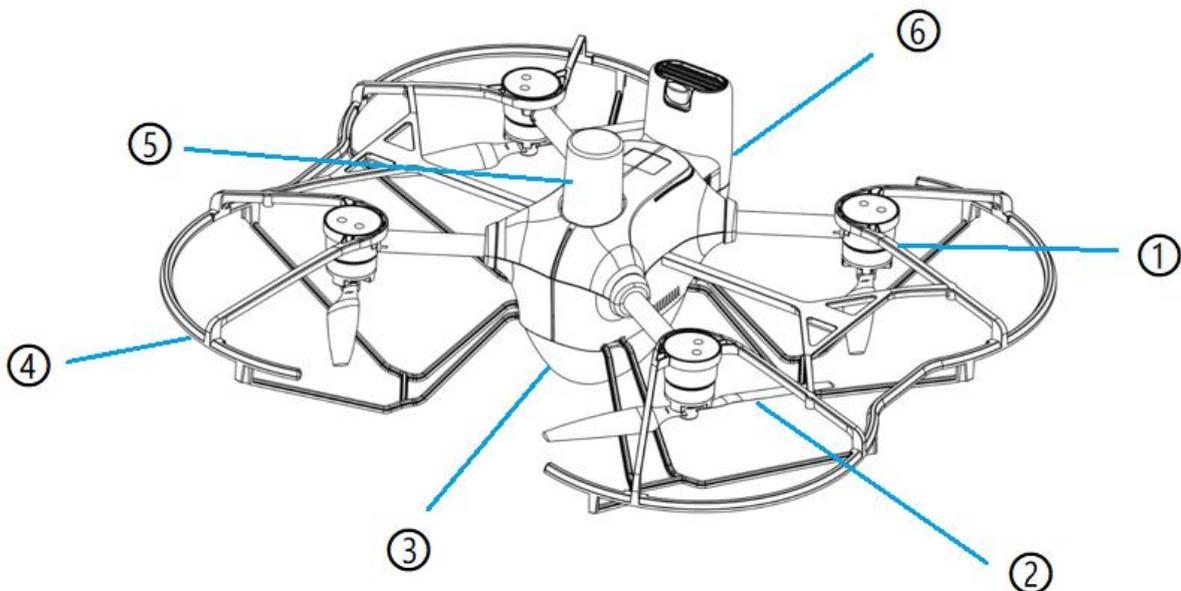
Automatic position covering technology: make up positions where there are no aerial UAVs.

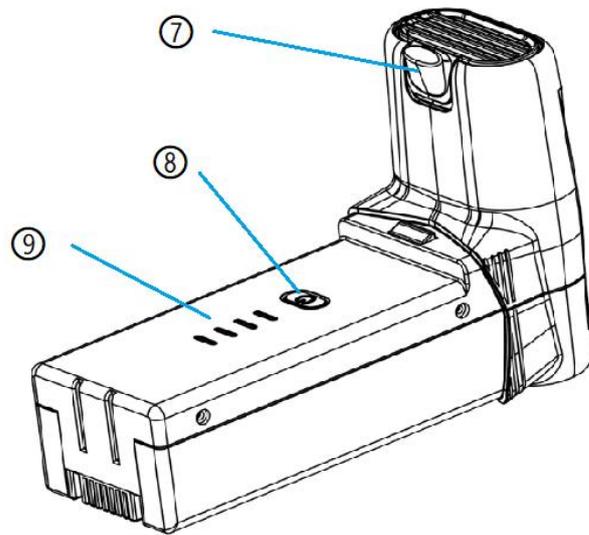
**Specifications and parameters:**

Specifications		EMO +
Weight		510g
Wheelbase		232mm
Drone dimensions		318*350*136mm
Motor specification		1808
Blade		5528
Lampshade dimensions		123*87*37mm
Classification of wind resistance		Fresh breeze
Positioning mode		RTK
Accuracy		±0.2m
Battery	Capacity	3350mA
	Voltage	14.54V
	Type	4S smart battery
	Weight	230g
	Low temperature	/
Duration of flight		33min
Suggested performance duration		10-25min
Maximum horizontal flight speed		10m/s
Maximum ascending		6m/s

flight speed	
Maximum descending flight speed	3m/s
Maximum flight altitude	300m
Maximum flight distance	800-1000m
Light power	0-22W, adjustable
Maximum luminous flux	>840lm
Minimum flight spacing	1.5m
Communication mode	5.8G WIFI
Working temperature	-20~50°C
IMU	Double-IMU
Magnetometer	Double-magnetometer
Performance aircraft spacing	1.5m

### Aircraft part names





- ① Motor
- ② Blade
- ③ Lampshade
- ④ Protective cover
- ⑤ RTK antenna
- ⑥ Battery compartment
- ⑦ Battery compartment locking device
- ⑧ Battery switch
- ⑨ Battery level indicator

# Overview of aircraft usage

EMO is mainly composed of flight system, positioning system, communication system, power supply system and lighting system. In this chapter, the use of aircraft and its auxiliary systems and related functions will be introduced in detail.

## Battery switch and power indicator

### Battery switch

#### 1. Battery on

Click the battery switch to turn it on. The power indicator lights up for 5 seconds and then goes out.

(1) After turning on, the battery is detected to have been connected with the airplane, the battery remains on, and the power indicator is normally on according to the definition of power indicator.

#### 2. Battery off

(1) When the battery is on, press and hold the battery on/off key until the power indicator goes out

(2) In the battery-on state, if it is unable to detect the connection between the battery and the aircraft, the battery will automatically turned off after 90 seconds. Press this button again to activate it and to power on.

### Battery level indicator

Definition of battery level indicator: the color of battery level indicator is green

Charging: (The charging box was adopted for one-to-many charging, and the use of charging box is explained separately)

Capacity	LED1	LED2	LED3	LED4
0-30%	Flashing	Off	Off	Off
30-60%	ON	Flashing	Off	Off
60-90%	ON	ON	Flashing	Off
90-100%	ON	ON	ON	Flashing
Charging completed	ON	ON	ON	ON
Abnormal charging	Flashing	Flashing	Flashing	Flashing

#### Discharging

Capacity	LED1	LED2	LED3	LED4
100-90%	ON	ON	ON	ON
90-60%	ON	ON	ON	Off
60-30%	ON	ON	Off	Off
30-5%	ON	Off	Off	Off

<5%	Flashing	Off	Off	Off
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## Aircraft startup/shutdown instructions

Startup: Insert the aircraft battery into the aircraft battery compartment after it is turned on (please insert the battery into battery compartment within 30 seconds after it is turned on, otherwise the battery will be turned off automatically), a sound of aircraft startup will be given, and the light will be turn on, indicating the successful startup.

Shut down: unplug the battery directly to shut down.

Restart: It can be restarted by the upper computer or unplugging the battery.

## 飞机校准与灯语 Aircraft calibration and lamp signal

### I. Non-calibration status lights

1. After inserting USB and connecting successfully, the white light flashes at high frequency for 2 seconds. (All lights can be interrupted, and they will return to their original state after flashing for 2 seconds)
2. When the battery level is less than 5%, it flashes red
3. Hardware failures such as IMU, barometer or magnetometer: white, blue and purple flash.
4. Server is not connected: the white light is normally on
5. Upgrading the flight control and transmitting the dance steps: the purple light is normally on (in case the communication is occupied in the process of upgrading or transmitting, the instructions of the upper computer may not be processed)
6. Automatic numbering
  - 6.1) Activate the automatic numbering function, calibrate the No. 0 aircraft, on which the red, green and blue lights alternate rapidly. When the numbering is completed over 90%, the server will send a light control instruction, commanding the same light color to be displayed in the same row or in the same row and lighting red, green, and the secondary shift control will be performed on the lights in the same row or in the same row (to prevent dead lights, the rows and columns are of the same color)
  - 6.2) Series numbers that are not within the specified range of dance steps (i.e., the number of aircrafts are more than the number of dance steps): orange-red (RGB: 255, 61, 0) lights will be normally on.
  - 6.3) After automatic numbering is stopped, all lights return to their original state.
- \* Note: In the process of number matching, if the first, second, third, fourth and fifth lights with high priority appear in an aircraft, the automatic numbering lamp signal will be lit according to the lights with high priority.
7. Manually modify the serial number (including matching the serial number through USB), and the blue color is normally on for 4 seconds after successful matching.
8. When the upper computer selects the aircraft, the orange-red (RGB: 255, 61, 0) light flashes; when the selection is closed, the light goes off; if there is an instruction from the upper computer, it will light up according to the instruction.
9. Prepare for take-off: the forest green is normally on.
10. Countdown to take-off: the indigo is normally on.

11. During the flight of dance steps, only the lights of dance steps shall be executed, and no other light control instructions shall be executed.

12. In the dance flight, when the battery level is low, the lights are turned off and the plane lands. If the aircraft positioning is abnormal, the lights will be turned off and the aircraft will land.

13. If there are duplicate aircraft numbers, the orange-red (RGB: 255, 61, 0) lights are normally on.

14. Aircraft positioning status:

Fix: green light is normally on

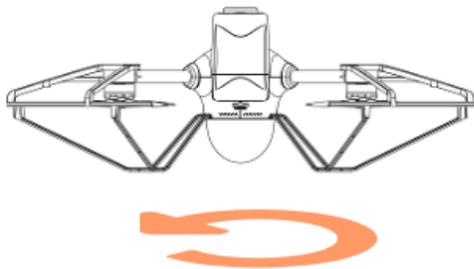
Float: yellow light is normally on

GPS: purple light flashes

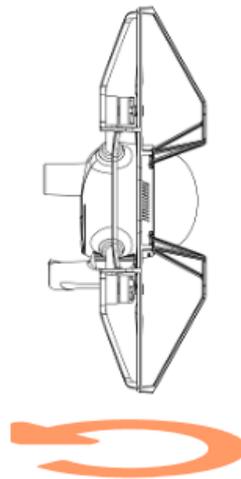
II. Calibration status (note: when entering a calibration status, it will be no longer controlled by external lights)

A. Calibration magnetometer

Send the magnetic calibration instruction through the upper computer, and rotate the aircraft as shown in the following figures:



Vertical calibration



Horizontal calibration

1. Horizontal calibration: the blue light is normally on. Rotate the aircraft horizontally as shown above until the blue light flashes.

2. Vertical calibration: the blue light flashes. Rotate the aircraft vertically as shown above until the exit blue light flashes.

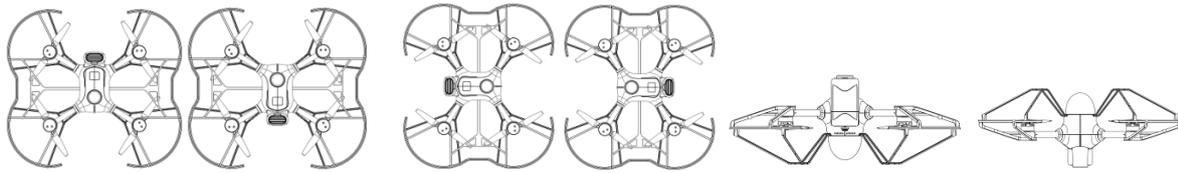
3. Calibration succeeded: return to the original lighting status.

4. Calibration failure: it will be always in the calibration status. For example, if the vertical calibration is unsuccessful, the blue light flashes until it receives the calibration exit instruction.

B. 校准 IMU

B. IMU calibration

Send the IMU calibration instruction through the upper computer, and then put the six planes of the aircraft horizontally and statically as shown in the following figures:



1. When the previous one is detected to be uncalibrated, the yellow light is normally on (the green light is normally on after calibration is completed); When the previous one is detected to be calibrated, the green light is normally on;
2. When the previous data acquisition is finished, the motor sounds (at the same time, the green light is normally on). After the data acquisition of all six planes is completed, and the motor will send out a sound prompt of self-inspection.
3. If the final calibration is successful, the green light flashes for three seconds. If the final calibration fails, the red light flashes for three seconds.

## Propeller replacement

The new propeller blades must rotate in the same direction as the original propeller blades. Attention should be paid to clockwise and counterclockwise directions.

Pay attention to whether the propeller screws are loose or not, so as to avoid the danger caused by blade falling off in flight. Every 10 hours of accumulated flight, the blades must be checked and reinforced.



※ Pay attention to whether the propeller fixing screws are loose, so as to avoid the danger caused by the propeller falling off in flight. Check with a screwdriver every 10 hours of flight, and tighten the loose screws at the same time.

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## Battery charging

Please use the special charging box provided by HighGreat for charging. Refer to the charging box instruction for the use of the charging box.

## Disclaimer

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Thank you for purchasing the products of Shenzhen HighGreat Innovation Technology Development Co., Ltd. (hereinafter referred to as "HighGreat"). This product is a specially controlled item, and it is forbidden for minors under the age of 18 to use it. For your better use of this product and your safety, please read this disclaimer carefully before use. Once this product is used, it will be regarded as recognition and acceptance of all contents of this statement!

This product is a kind of UAV developed by HighGreat and specially designed for formation performance, supporting outdoor flight within the scope of law and safety. It is necessary to fully understand local laws and regulations before flying. In the process of using products and supporting software, users promise to be responsible for their actions and all the consequences arising therefrom. The user promises to use the product and supporting software only for legitimate purposes, and agrees to abide by these terms and any relevant policies or guidelines that may be formulated by HighGreat.

High Great reserves the right to update this disclaimer. To obtain the latest disclaimer, please visit <http://www.hg-fly.com>, the official website of High Great. Any updates may be made without prior notice.

The disclaimers may have slight differences between versions in different languages. The Chinese version shall prevail, while other language versions are for reference only.

The final interpretation right of this disclaimer belongs to Shenzhen HighGreat Innovation Technology Development Co., Ltd.

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For more product details, please visit the following website to download the user manual

<http://www.hg-fly.com/service-support.php>

Any updates will be made without prior notice.

## **Exclusion clauses**

In case of direct or indirect personal injury or property loss caused by the following reasons when using this product, HighGreat will not be liable for compensation and legal liability.

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1. Failure to carefully read the instruction manual and the information officially published by HighGreat in official website; and all the installations and operations due to failure to follow these instructions.

2. Operation by the an operator who is under poor physical conditions or poor mental conditions such as drinking, drug abuse, drug anesthesia, head ache, fatigue and nausea.

3. Any compensation for mental damage caused by the accident.

4. Improper maintenance, unauthorized disassembly, maintenance and modification, or replacement of parts that are not provided by HighGreat.

5. Unauthorized modifying codes of the supporting APP or aircraft software.

6. Flying in strong interference areas such as magnetic field interference area and radio interference area.

7. Flying at high altitude, rain and snow, extremely cold weather and other inappropriate weather.

8. Flying in no-fly zones, public safety places, above crowds or dangerous areas, and other prohibited areas.

9. Operator's operation error or subjective judgment error.

10. Improper storage, such as being subjected to strong impact or extrusion, or being placed in an inappropriate environment (e.g. water ingress, fire).

11. Cuts and scrapes of the users due to improper use of the propeller in static or flying state.

12. Battery damage due to improper use, or unable to work normally due to contact with sharp objects or external force.

13. Equipment damage caused by user's improper operation.

14. Aircraft or other article damages due to squeezing or external force during carrying.

15. There are obvious signs or prompts indicating that the aircraft or battery is abnormal, however, the operator fails to check before flight or fails to notice during flight, resulting in the abnormality not being discovered, or the abnormality has been discovered but continues to be used.

16. Bad operation of the aircraft itself caused by natural wear, corrosion and aging of lines.

17. Damages caused by infringement of any data, audio or video data obtained by the operator using the aircraft and supporting software.

18. Any indirect losses and legal liabilities caused by equipment, accessories or software problems.

19. The operator fails to comply with local laws and regulations.
20. Other damages that do not fall within the scope of HighGreat's responsibility.
21. After content iteration of software, the latest electronic operation guidelines shall prevail, and the updated related content may not be notified.

## **Warning**

1. This product meets the requirements of FCC: Part 15 for Class B digital products, mainly in two aspects: (1) This product does not cause harmful interference; (2) The product can withstand harmful interference that may lead to abnormal operation of the product. In addition, this product meets the basic requirements specified in 1999/5/EC and other relevant directives. It is strictly forbidden to modify or change this product without permission, so as to avoid harmful interference during work. The manufacturer is not responsible for any problems caused by unauthorized modification or change.
2. Make sure to use special batteries and charging equipment provided by HighGreat, otherwise there may be explosion danger. Also, please correctly dispose of the used battery according to the instructions. The Type-C port of the device can only be connected with devices with specified communication port, and it is forbidden to connect it to some other devices.
3. Keep the aircraft in line of sight for control when flying. When you need to touch the aircraft with your hands or other objects, pay special attention not to touch the propeller. In addition to the above, it is necessary to ensure that the aircraft always keeps a certain distance from people, obstacles and water surface.
4. It is recommended that customers conduct test flight before the flight show. When conducting test flight, full evaluation shall be made on whether the flight environment is available. HighGreat does not assume any responsibility for the loss of personnel or goods that are not caused by product quality problems.
5. The battery may be at a high temperature after use, and immediate contact may cause burns. Please do not contact it directly. HighGreat does not assume any responsibility for burns and scratches caused by not using according to the instructions.
6. Make sure you have a clear understanding of the types of flight activities (such as entertainment, public affairs or business). Be sure to obtain the permit issued by the relevant

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department before flying. If necessary, local legal workers may be consulted for a detailed definition of flight activity categories. Note that in some regions and countries, it is forbidden to use aircraft for any form of commercial activities.

7. Do not use this product for the following activities (including but not limited to):

- Defamation, harassment, abuse, threat, stalking, or otherwise infringing upon the legitimate rights of others, such as the right to privacy and publicity.
- Used for any undesirable or illegal purposes, such as unauthorized investigation and investigation, espionage, military activities, etc.
- Violating any laws, administrative regulations, public order and good customs in the region where the products are used.

The copyrights of this product and manual belong to HighGreat. No organization or individual may copy, reproduce or publish it in any form without written permission. If it is quoted or published, the source shall be indicated, and it shall not be quoted, abridged or modified in a way contrary to the original intention of the manual.

To learn more about this product, please visit the following website

Please note that the product is shipped without battery

## Warranty card

### Warranty Card

#### Purchase Information

Serial No. \_\_\_\_\_ Purchase Date \_\_\_\_\_  
Dealer \_\_\_\_\_ Telephone \_\_\_\_\_  
Address \_\_\_\_\_  
User Name \_\_\_\_\_ Telephone \_\_\_\_\_  
Address \_\_\_\_\_

#### Maintenance Records

Repair Date	Fault and Repair Conditions

In need of maintenance service, please contact your dealer, or contact HIGHGREAT customer service in the following ways:

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Manufacture: Shenzhen HighGreat Innovation Technology Development Co., Ltd.  
Address: 2/F, Building 6, Yuanlingzi Industrial Zone, Hengping Road, Yuanshan Street, Longgang District, Shenzhen

E-mail :

TEL:400-888-9686



**WeChat official account**



**Official website**

## FCC WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.