

# ■ CW-15 UAV MANUAL

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## Foreword

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## Safety Precautions

This product is a kind of special control item, which can only be used safely after being familiar with it for a period of time and can only be operated after gaining certain professional knowledge. Incorrect operation may cause product damage, property loss, personal injury or even death, thus the operator shall bear corresponding responsibilities. In order to better use this equipment and ensure your safety, please read the relevant manual carefully or consult the manufacturer before use. Do not use unofficially provided or recommended parts. Official guidance shall be followed for the operation and use of this product.



### Tips:

The product owner shall meet the local regulatory requirements before use.

The application for liftoff of all aircraft shall be submitted to the air traffic control department for approval.

If there are important protection targets or unclear targets in the planned flight area, in addition to reporting to the air traffic control, the flight shall also be reported to the local security area for approval.

The flight area must be surveyed to ensure that there are no obstacles in the flight path.

All operators are able to operate the whole system skillfully and pass the examination. Otherwise, they shall not operate the UAS without authorization.



### Prohibitions:

Flight is prohibited over airports, railways, motorways, flammable & explosive warehouses (factories), dangerous goods warehouses (factories), power stations, high voltage lines, military facilities, densely populated areas, and no-fly zones specified by relevant departments.

There may be strong shearing winds between buildings or mountain creeks, thus flight in such situations is forbidden. All operators shall be in good condition, energetic and concentrated. It is forbidden to operate the UAV in sick, emotional or fatigued conditions.

All operators are prohibited from drinking alcohol the night before the flight and before the end of the flight.

The following behaviors are not allowed. Otherwise, CHENGDU JOUAV FUSION TECH CO.,LTD will not bear the responsibility for after-sales service.

Flight in the airspace without the permission of the Air Traffic Control Department or the flight plan is not reported.

Flight in extreme weather (thunderstorm, typhoon, heavy rain, dense fog, etc.).

Continuous flight through clouds, rain and fog resulting in system failure.

Flight whose route planning does not comply with safety specifications.

Flying forcibly without following normal operation steps, or ignoring some check items.

Use of product beyond the safe service life.

Flight in military restricted zones, clearance zones, occupied airspace, densely populated areas and buildings.

Unauthorized modification of the main structure of the aircraft or adjustment of equipment position and flight beyond the center of gravity.

Replacing equipment and accessories with the unofficially provided or recommended ones.

Privately changing and adjusting avionics system and control parameters.

Cracking and changing the ground base station system.

Operation or use by personnel who fail to pass the manufacturer's training certification, or the training is unqualified.

For details of safety regulations, please refer to the *CW-15 UAV SAFETY PRECAUTIONS*

### Emergency Application

For emergency applications, please refer to the *CW-15 UAV EMERGENCY MANUAL*

### Version Information

This Manual is applicable to the CW-15 DA PENG UAV. CHENGDU JOUAV FUSION TECH CO.,LTD reserves all the rights of the final interpretation of this document and all the documents related to this product. When there is any update, the after-sales service department will push relevant information in a

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Prohibitions



Tips



Reminder



Annotation

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# PART 1 Standard

## Operation Flow

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1. System Introduction
2. Operation Flow

# 1. System Introduction

## Functional Characteristics

The CW-15 DA PENG UAV long-endurance electric small VTOL fixed wing UAS is the result of the second disruptive innovation by JOUAV Ltd. in the field of fixed wing with the comprehensive upgrade in terms of flight safety, avionics system, overall performance and operating experience.

CW-15 It adopts all-digital bus avionics technology, greatly improving the reliability, anti-interference capability, expansion capability of the system. Critical sensor module adopts multi-redundancy design to ensure all nodes are capable of fault management, automatic recovery and automatic updating. Besides, it improves the usability of aircraft and supports one-key intelligent preflight check, cloud upgrading and intelligent management.

### Active Safety Technology during Flight

- Ground-imitation flight based on high-precision digital 3D map

The CW-15 UAV supports the ground imitation flight based on high-accuracy digital 3D map. With this function, CW-15 can adapt to more terrains, automatically generate height variable routes as per the surveying area and maintain a consistent ground resolution to realize better data effects.

### Aviation-class Reliability

- Multi-sensor redundancy technology

IMU, GNSS and barometer and other important sensors are redundantly backed up, and each node has error management capability as well as automatic recovery and update capability.

- Control, distribution and reconstruction technology

The overall aircraft adopts a bus-based servo actuator system. The flight control system acquires the status information of each actuation unit in real-time. In case any of these actuation units incurs defects, the flight control system will automatically carry out control distribution and reconstruction for the actuation units of the whole aircraft to assure flight safety.

- Full digital bus avionics technology

The CW-15 is equipped with a full-digital bus avionics technology that has a high communication rate, great anti-interference capability and expansion capability and is highly reliable and compatible.

- Full closed loop health monitoring and management technology

Based on the advantages of the full-digital bus avionics technology, the system can monitor the status of on-board avionics module, servo actuation system and smart batteries in real-time and achieve full closed-loop control to guarantee the high-reliability application of the system.

- Aviation-grade mechatronics connection technology

It adopts mechatronics connection technology with independent intellectual property right to ensure the high connection reliability between parts and largely promote the convenience of user operation.

#### Usability Upgrade of Fixed Wing UAV

- Automated preflight check

Thanks to the brand new avionics system and the online inspection of distributed avionics system networking of CW-15, the UAV can complete all preflight check items at the ground base station by pressing one button, free of complex traditional flight inspection steps.

- Magnetic compass in-flight calibration

This function is used to replace the ground calibration process of the magnetic compass, which can be calibrated automatically by the aircraft in flight based on the GPS heading.

- OTA firmware update

The firmware matching and pushing is carried out through cloud services to complete online downloading, online updating, etc. to realize easy management on operation.

- High altitude performance

Through the consistent optimization, analysis and testing of the power system, it guarantees high operation efficiency in low-altitude regions while assuring excellent performance in high-altitude operation. It can take off and land in regions with an altitude of 4,500m at least and has a service ceiling no less than 6,500m.

- Ultra-long flight endurance

Through pneumatic optimization, power system optimization, customized high-energy-density cell and multiple other methods, the system's endurance is further improved. The aircraft can operate over 3 hours continuously under standard load namely 2kg, realizing an endurance over 20% greater than that of the previous generation.

- Heating drain pitot

The CW-15 UAV is equipped with a heating drain pitot to guarantee safe flight in plateaus, high humidity, low temperature and light rain.

- Smart Battery

The CW-15 UAV is equipped with the latest CB100S series smart batteries and corresponding smart chargers. In addition to the health management system, the smart batteries support the self-heating function that automatically enables at low temperature to guarantee flight safety.

- Ultra-high waterproofness

CW-15 UAV has a waterproof coating on the surface and the whole aircraft is treated by sealing treatment to guarantee smooth flight in light rain.

- Electromagnetic compatibility

CW-15 UAV has a radiated susceptibility and thus can easily cope with flight in complex electromagnetic environments.

#### Open System Structure

- Independent and powerful application processing platform
- Modular bus-based SDK application development platform

An open system structure and a unified application control development interface are provided to support the customized load application development by users.

- Standard data protocol

On-board and ground-side systems support standard data protocols as well as customized data protocols of users.

- Supporting the integration and secondary development of multiple mission payloads

CW-15 UAV supports orthographic camera, stitching camera, hyperspectral camera, multispectral camera, atmospheric pressure sensor, aeromagnetic and multiple other mission devices while also supporting secondary development.

- UAV cloud control

It supports management based on work orders and automatically monitors the progress. It can carry out remote intervention on the flight of the aircraft as per the authentication authority, including the emergency return, flight termination, etc. It supports automatic updating, remote upgrading, remote diagnosis, engineering sharing, engineering synchronization, engineering

summary and query, etc. It is capable of active service push notifications.

## Performance

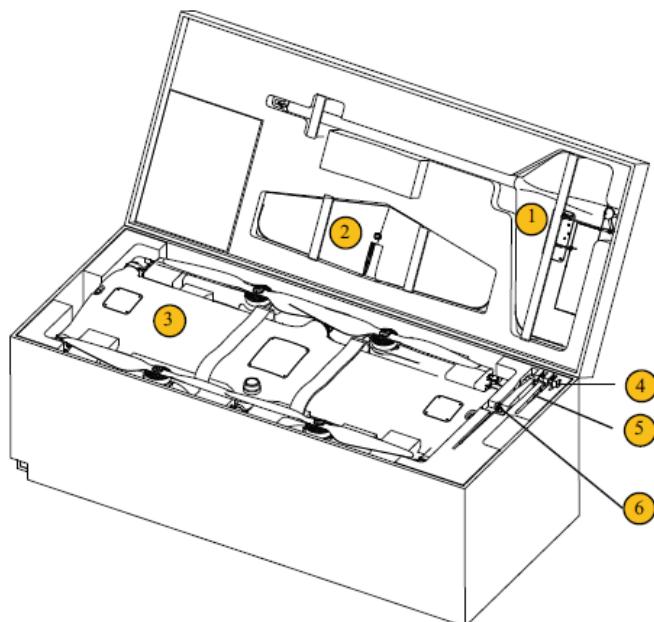
### Basic Performance Parameters

Index items	Indexes	Remarks
MTOW	17kg	
Minimum cruising airspeed	58km/h(16m/s)	Indicated airspeed (sea level)
Economic cruise airspeed	61.2km/h(17m/s)	Indicated airspeed (sea level)
Maximum cruising airspeed	110km/h(31m/s)	Indicated airspeed (sea level)
Flight duration	120min <sup>®</sup>	Under the condition of cruising altitude of 1000m above sea level
Endurance mileage	120km	Under the condition of cruising altitude of 1000m above sea level
Takeoff altitude	≥4500m	

<sup>®</sup> indicates the maximum battery life of the platform with the MG120E.

The data is measured at an air temperature of 20°C with a relative humidity of 90% and a cruising altitude of 1100m above sea level under breeze condition.

## List of Articles



### Articles inside Packing Case

A total of 6 items are included in the packing case cover and central wing layer:  
1 Vertical tail    2 Horizontal tail    3 Central wing    4 Receiver antenna  
5 2.4G glue stick antenna    6 Whip antenna

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## 2. Operation Flow

## Preparations

### Mission Planning

The takeoff and landing routes and mission routes shall be planned in advance. For details, see the software use section.

Among which, when planning the takeoff and landing route, the takeoff and landing area shall be sure to be flat, stable and free of obstacles, and the aircraft will not pass over the heads of people when taking off and landing along the route. The whole route for takeoff and landing shall not pass over any tall obstacles, and there shall be enough safe distance from buildings, trees, towers, and mountains, etc. After the takeoff and landing route planning is completed, be sure to check the altitude of the takeoff and landing route. When planning mission routes, cross routes and concave polygon areas cannot be planned.

#### Safety Warning

The base station shall be placed in a location with relatively high terrain to obtain the best wireless transmission effect.

Keep away from vehicles and shelters to prevent them from blocking the radio signal transmission and attenuating the radio transmission distance.

### Aircraft Preparation

1. Remove the dust cover on the wing and the mission bay, and insert the central wing belly connector into the top connector on the mission bay.
2. Hold the root of the rotor arm and push it down to the bottom of the rotating hinge, turn the rotor arm until the connector fits, and lift it up, then the knob will automatically turn to the locking position.
3. Insert the square and round carbon tubes of the wing into the corresponding mating holes on the central wing, and connect and lock the hasp on the wing and the central wing respectively.
4. Insert the plug at the front end of the vertical tail into the base at the tail of the central wing, and then insert the carbon tube into the fixing seat at the tail of the central wing and lock it tight. Insert the horizontal tail into the end of the vertical tail and tighten the screw.

5. Remove the front-pull parts, first insert the connector into the socket at the front end of the central wing, then press the locking spring pin, and at the same time, insert the carbon tube into the front end of the central wing until the spring pin pops out.

6. Push the smart battery into the battery bay until it is locked by the locks on both sides.

For assembly diagrams, please refer to the UAV operation flow

## Check

### Check after Airframe Assembly

Airframe part: The fuselage and wing surface are free from damage or deformation, wing and horizontal tail screw holes are perfect, all bay covers and hinges are not damaged, and screws on the servo and pull rod shall be tight without looseness.

Pitot: pitot shall be free from looseness, damage, bending or blocking.

Aircraft assembly: The left and right rotor arm shall be correctly installed (rotor arm and wing marks shall be in the same color and rotor motors on both sides shall tilt inward), bay cover shall be properly locked, rotor arm and horizontal tail screws can be fastened properly, wing fastening lock screws shall be tightened.

Control surface: Aileron control surface, tail control surface of aircraft shall be free from damage, mounting seats of all shearing gears shall be fastened, connecting rods on the servo and control surface shall be tightly combined.

Rotor power: The rotor arm shall be free from damage, rotor motor shall be fastened, propeller shall be tightly mounted in perfect conditions.

Electric inside cabin: Rotor power line and interface in bay shall be free from damage, and payload shall be tightly assembled.

Equipment outside the cabin: antennas outside the cabin shall be confirmed to be fastened and deployed normally.

### UAV Power-on Check

Aircraft telemetry data: Check the commander software to confirm that the flight telemetry data has been transmitted normally, and the data can be

transmitted to the aircraft uplink (request parameter operation) at the same time.

Remote control status: Check the remote control status of the commander software for whether it is in attitude mode.

Sensor self-check: Check whether the sensor self-check information of the commander software passes correctly. If it fails, leave it to stand for another minute, or restart the power of the UAV.

Aircraft attitude: Check the horizon attitude display status of the commander software and confirm that it is consistent with the current attitude of the aircraft.

Aircraft position on the map: Check whether the position of the aircraft on the map in the software matches the actual geographic location. If the GPS positioning data is in disorder, contact technical personnel for troubleshooting.

Aircraft nose pointing on the map: Check whether the aircraft nose pointing on the commander software map is consistent with the actual geographic direction. It is used to quickly judge the heading information of the aircraft. An obvious inconsistency, if any, indicates that the heading data is calculated incorrectly and needs to be checked.

Controller parameters: Check and confirm that there is no abnormality in the simple controller parameter configuration.

Emergency parameters: Check and confirm that there is no abnormality in the configuration of emergency parameters, which have been modified according to the actual situation.

Mission route: Check that the mission route is correct and has been uploaded.

Landing route: Check and confirm that the landing route has been collected correctly and sent successfully.

## Takeoff

After the takeoff command is issued and the aircraft has left the ground, the operators need to pay close attention to the flight data and the flight status of the aircraft. Among them, the data and statuses that need special attention are as follows.

Rotor power: if the power battery is aged, with insufficient electricity, or the discharge capacity of the battery is weak due to low temperature, or the flight altitude is too high causing the power is insufficient, the aircraft will automatically

land on site. When the voltage of the power battery is found to be too low, and the power cannot ensure safety under the current environment by human judgment, the "Abort" command can also be used to land the aircraft immediately.

Airspeed: During rotor climbing, the airspeed shall be roughly equal to the current windward wind speed and relatively stable; if the airspeed is high (for example, it is greater than 10m/s, and the environmental wind is low) and continues to increase, the "Abort" command can be used to land the aircraft immediately.

Acceleration: during acceleration of the aircraft, if any abnormality is found by people, the "Abort" command can also be used to make a forced landing.

 Forced landing, refers to the process that the aircraft automatically converts to the multi-rotor mode and lands on site under some abnormal conditions.

Other: If the flight mission needs to be immediately aborted for other reasons while the rotor is in flight, the "Abort" command can be used to land the aircraft immediately.

## Mission

### Flight Status Monitoring

After the aircraft approaches the mission route, the maintenance crew/pilots can turn off the remote control. The ground base station operators shall keep observing the various data and statuses of the UAV, and report the important information such as airspeed, altitude, rotating speed and self-piloting mode to the maintenance crew, so as to respond quickly in case of abnormal conditions. During the flight, the data and statuses that need special attention are: rotating speed, throttle, altitude, vertical velocity, airspeed, ground speed, electricity, UAV attitude, and data link, etc.

Altitude: during climbing of the fixed wing, the altitude of the UAV shall continue to increase, and the vertical velocity shall be positive; during the flight, the height of the UAV shall generally fluctuate around the target height, and the fluctuation range shall be generally within 10m. If the UAV continues to fall more than 20m while the throttle is fully pushed, it will automatically return to point 0. If the UAV is unable to maintain the altitude and falls below the minimum flight

altitude during flight, it will be forced to land automatically. If the flight protection altitude is ticked and set, the UAV will be forced to land automatically when it falls below the height.

Vertical velocity: during climbing of the fixed wing, the vertical velocity of the UAV shall be generally within 2m/s~6m/s. If the vertical velocity is kept near 0 or negative during the climbing, excluding that the theoretical climbing limit is reached, it is caused by insufficient power, and the aircraft shall return and land immediately. When the aircraft is flying horizontally, the vertical velocity shall fluctuate around 0.

Airspeed: For CW-15 standard version, the indicated cruising airspeed is 17m/s, and the indicated climbing airspeed is 15m/s. The airspeed value during flight shall be basically consistent with the airspeed corresponding to the current flight status.

The airspeed set in the autopilot is calculated based on the sea level and standard atmospheric pressure (indicated airspeed/IAS); the higher the actual flight altitude, the thinner the air, and the higher the speed required to provide the same lift force. The autopilot will calculate the height and change the command airspeed automatically. Therefore, the actual perceived airspeed, which is the true airspeed (true airspeed/TAS) of the current aircraft, will generally increase as the altitude rises. During monitoring, ensure that the telemetry airspeed value is basically consistent with the command airspeed value.

Ground speed: since airspeed is the speed of the UAV relative to the airflow, the ground speed varies with the wind speed. If the difference between airspeed and ground speed is greater than 15m/s, the wind speed in the air is too large, which will result in poor attitude of the UAV; if the wind is a crosswind, the nose of the UAV will point differently from the direction of flight. The above conditions will lead to poor quality of flight data and even affect the flight safety. Therefore, it is recommended to cancel the flight mission and return to land when the wind speed is too large.

GNSS status: Normally, the DGNSS status of the aircraft is NARROWINT\_RTK:1.0; if the data link is of poor quality, it is in other statuses. If the background of GNSS status is orange, and the backup GNSS is displayed to be enabled, the primary GNSS is lost and the backup GNSS is enabled, so the aircraft needs to return and land. If the background of GNSS status is red and the

number of satellites is 0, the GNSS is completely lost, and the aircraft shall return immediately.

#### Safety Warning

During flight, if the backup GNSS has been enabled, the differential positioning cannot be performed. Note that there may be a large deviation from the landing point.

**Power:** When the power supply is lower than 12V, the UAV shall return immediately. (When the autopilot battery is lower than the flight return voltage value for more than 10s, it will trigger low battery return and automatically return to 0 point)

**Attitude:** Normally, the UAV's maximum roll angle shall be 25°, and the maximum pitch angle shall be 15°. In case that any attitude angle exceeds the limits, the flight data in the status bar will give out red alarm.

**Data link:** In case of data link interruption, the RX value displayed in the lower right corner of CW Commander software will stop increasing. In case the data link interruption duration exceeds the set time, the aircraft will automatically return to point 0. If the total flight exceeds the setting and the aircraft is over 1km to point 0, the aircraft will automatically return to point 0 (shall be ticked and set). In case that the data link is still interrupted when the aircraft is within 2km to the landing point and the interruption lasts beyond the set time, the aircraft will automatically enter the landing route and land (shall be ticked and set).

## Landing

Before landing after completing a flight, the personnel at the ground base station shall contact the maintenance crew/pilot in prior and, in the following operation, will send key data to the maintenance crew/pilot, such as instructions, auto flight mode, height, target waypoint, and voltage, to help them identify the flight status.

Before landing, the maintenance crew/pilot shall confirm the remote controller is at the auto flight gear and the throttle is at the lowest gear, then turn on the remote controller. When turned on, the remote controller's throttle shall be set at the middle position to ensure safe takeover in case of abnormal status. Followed by that, the maintenance crew/pilot shall communicate with the personnel at the ground base station to confirm the remote control status is "RC

normal" and the throttle command is 50%.

Then, they shall re-confirm the landing direction is against the wind, the landing route is safe, and the status of the positioning GNSS is NARROWINT\_RTK:1.0 or NARROWINT: 1.0.

 In case of wind direction change before landing, you may hold Shift and left-click to drag the waypoint 797 to rotate the whole landing route.

#### Safety Warning

During landing, if the GNSS status is not NARROWINT\_RTK:1.0 or NARROWINT: 1.0, you may wait for it to recover. If the status cannot recover, you may directly land while being careful of the large deviation from the landing point and make sure there is no obstacle around the landing point.

After the landing command is issued and the aircraft enters the landing mode, the personnel at the ground base station shall continue reporting information like the aircraft's height, the supply voltage for rotors, and auto flight mode to assist the pilot in identifying the aircraft's flight status. Moreover, the following aspects shall be paid attention to during landing:

**Fixed-wing stage:** During landing, the aircraft will automatically implement forced landing if its height is lower than the landing height. If the aircraft keeps going around under an over-limit of lateral deviation, you may increase the over-limit of lateral deviation in the controller parameter.

**Hovering stage:** In the multi-rotor hovering stage, the aircraft will implement forced landing in 20s if it's less than 10m to the landing point, or in 1min if it's over 10m to the landing point. You may also use the "suspension" command to make the aircraft land immediately in case of any other abnormalities. When the aircraft is in the multi-rotor flight status and the remote controller takeover is in GNSS mode or attitude mode and then switched back to the auto drive mode, the aircraft will maintain the suspension status. Under such situations, you may continue using manual operation. In case no response is given within 20s, the aircraft will automatically land.

**Grounding:** When the aircraft is grounded and its rotors stop operation, switch to the lowest gear of remote control's throttle and then the attitude mode. When the plane is grounded, the rotor propellers will keep the idle operation. You may immediately lock them up by using the "suspension" command. You may also lock them up by operating lever in a toe-in way after the remote controller is

switched to manual mode.

## End of Mission

When the aircraft lands, disconnect the power supply and then turn off the remote control system. You may download the mission data and flight control data as needed.

## Post-flight Check

Pitot: Check that the pitot has been reequipped with cover protection.

Smart battery: Check the power. If it is low, please charge it in time.

Remote control power supply: After confirming that the power of the UAV is off, turn off the power of the remote control.

Blade: Check and make sure that there is no obvious damage to the blade; use a wrench to manually tighten the blade to prevent it from loosening after operation..

## Roll-up and Packing

### 1. Aircraft roll-up and packing

The roll-up and packing of the CW-15 UAV can be referred to the UAV operation flow.

### 2. Roll-up and packing of ground equipment

#### (1) Roll-up of control terminal

Turn off the power supply of the control terminal, disconnect the power line, close the cover of the control terminal and lock the pin.

#### (2) Roll-up of ground supporting equipment

For the roll-up of ground supporting equipment, please refer to the operation process of the ground supporting system to have the tripods and accessory case stored.

## Roll-up and Packing

### Aircraft roll-up and packing

The roll-up and packing of the CW-15 UAV can be referred to the UAV operation flow.

## Roll-up and packing of ground equipment

The roll-up and packing of the ground base station can be referred to the operation flow in PART 3.

Turn off the power supply of the control terminal, disconnect the power line, close the cover of the control terminal and lock the pin.

For the roll-up of supporting equipment, please refer to the operation flow of the supporting system to have the tripods and accessory case stored.

## **PART 2 UAV**

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1. Introduction
2. Use
3. Maintenance

## 1. Introduction

## Functions and Performances

The quad-rotor power system provides the power required for aircraft VTOL.

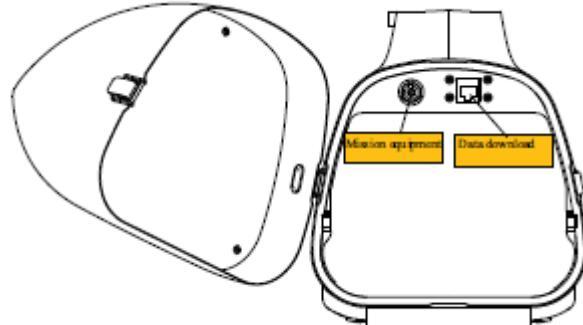
The front pull power system provides the power required for flight of the fixed wing.

The aircraft assembly can be disassembled into fuselage, central wing, left/right outer wing, left/right front rotor arm, left/right rear rotor arm, horizontal tail, front-pull parts, vertical tail and so on.

## Interface Specification

### Electrical Interface

The CW15 mission bay reserves the mission equipment interface and data download interface.

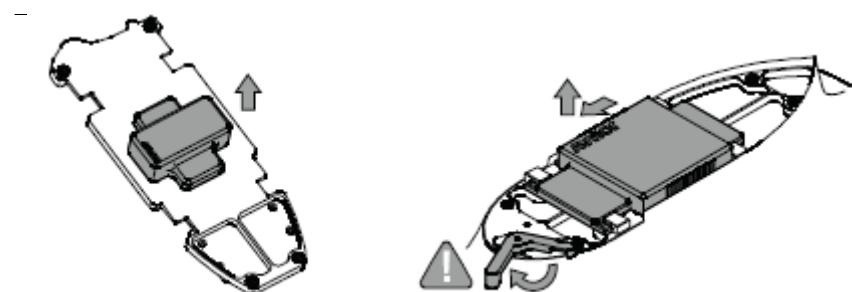


## 2. Use

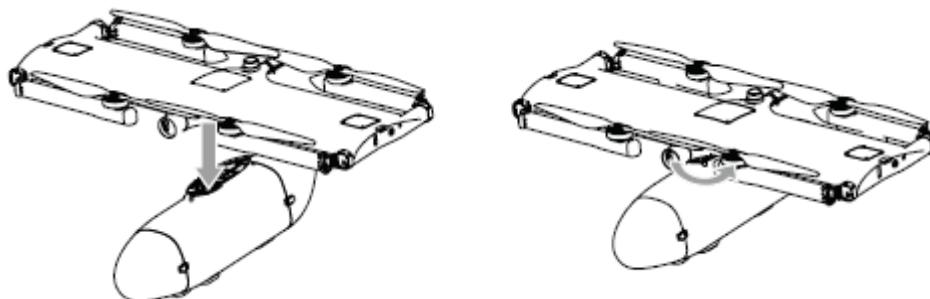
## UAV Deployment

### 1. Central Wing Assembly

Remove the dust cover on the central wing and the mission bay, and confirm that the locking handle of the mission bay is in the open position.



Insert the connector on the abdomen of the central wing into the connector on the upper part of the mission bay and slide it back so that the triangular arrow slides from the hollow circle to the black solid circle, and the locking handle automatically locks.

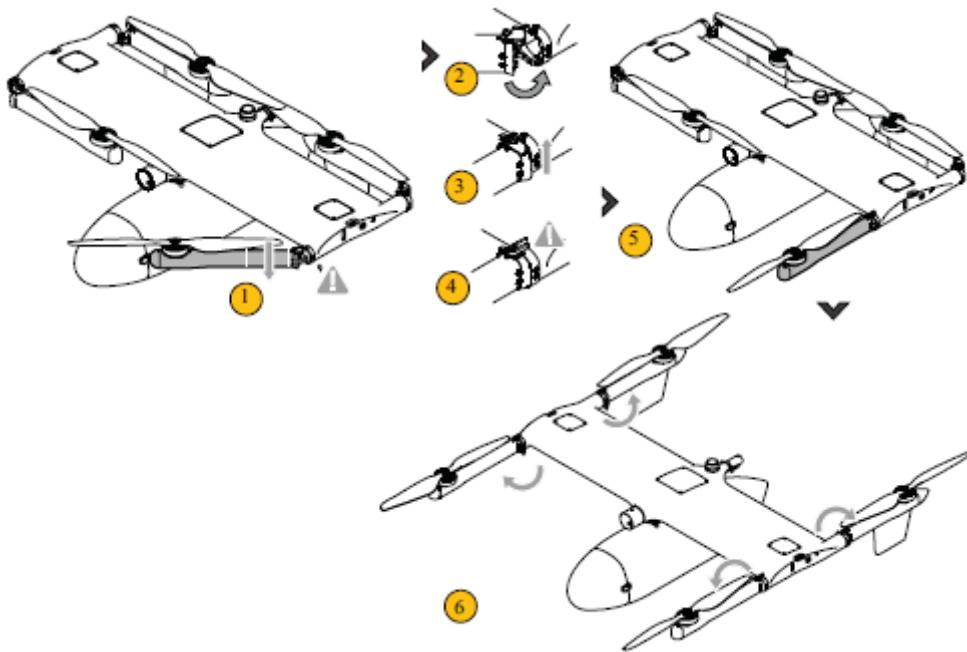


#### Safety Warning

Be careful not to pinch your hands or fingers on the rotor arm when folding the aircraft for storage.

## 2. Rotor Arm Deployment

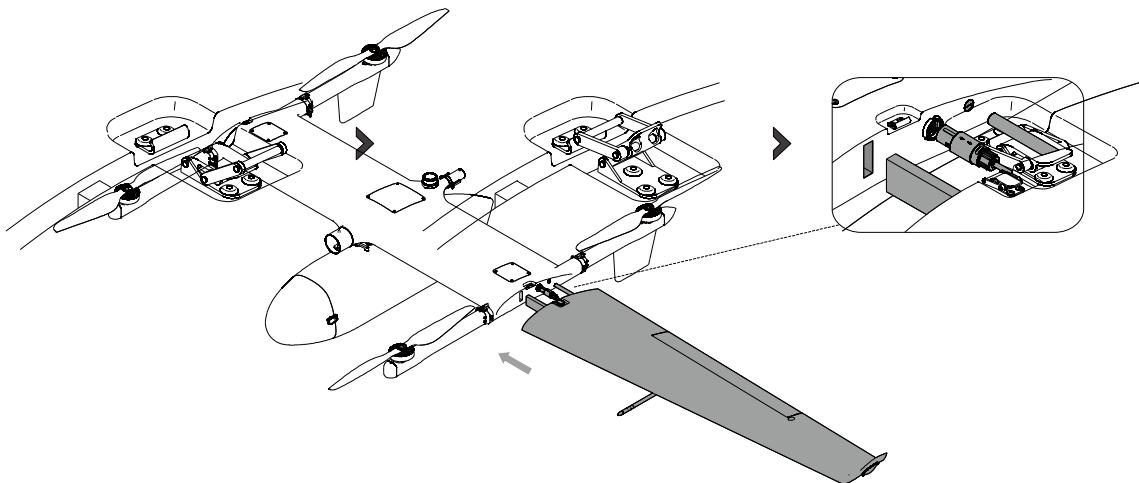
Hold the root of the rotor arm and push it down to the bottom of the rotating hinge, turn the rotor arm until the connector fits, and lift it up, then the knob will automatically turn to the locking position. Deploy the remaining rotor arms in the same way.



Please hold at the root of the rotor arm during operation to avoid damage to the rotor arm hinge.

### 3. Outer Wing Assembly

Insert the square and round carbon tubes of the left outer wing into the corresponding mating holes on the left side of the central wing, and complete the insertion of the connectors at the same time;



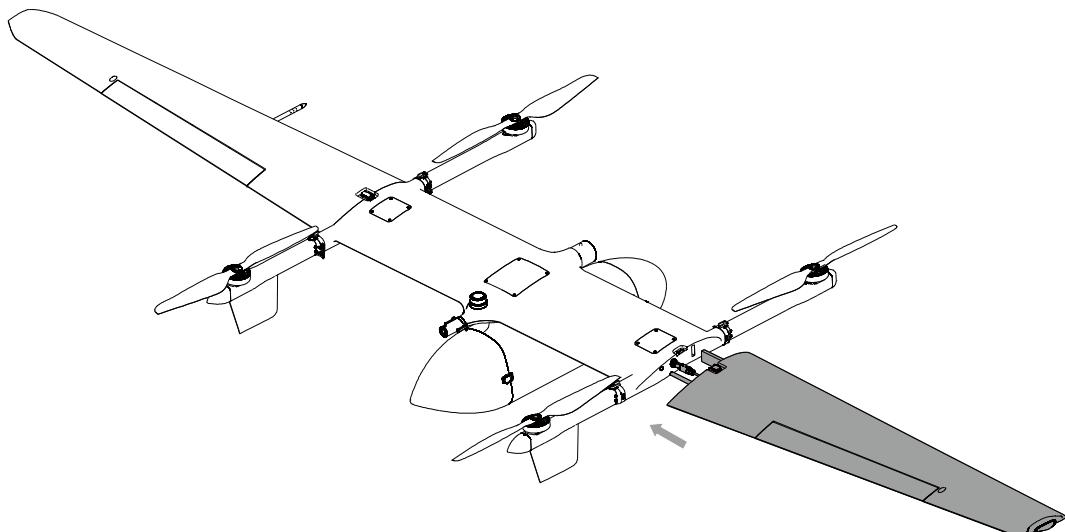
Connect the hasp on the left outer wing and the central wing and then lock it.  
Assemble the right outer wing in the same way.

#### Safety Warning

Prevent the airframe from bumping and getting damaged due to imbalance between the left and right sides when assembling/disassembling the outer wings.

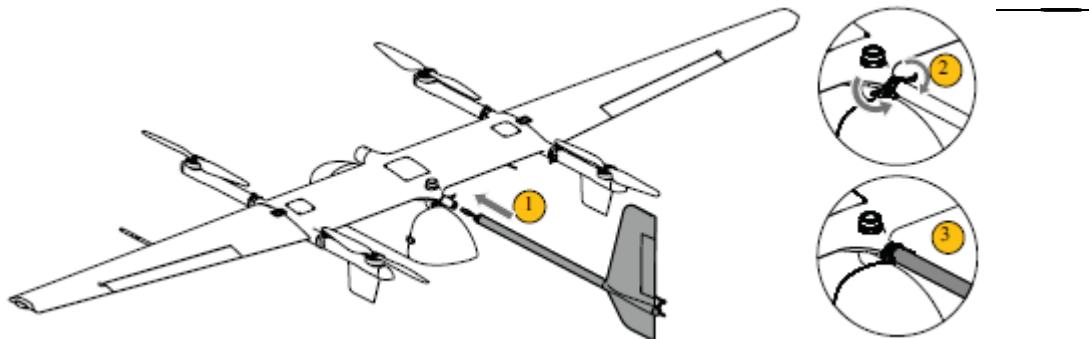
Prevent the connector cable from being damaged by pulling when disassembling the outer wings.

Note that the cooperation between the arm and the central wing follows the marking rule of "red on the left and green on the right"!

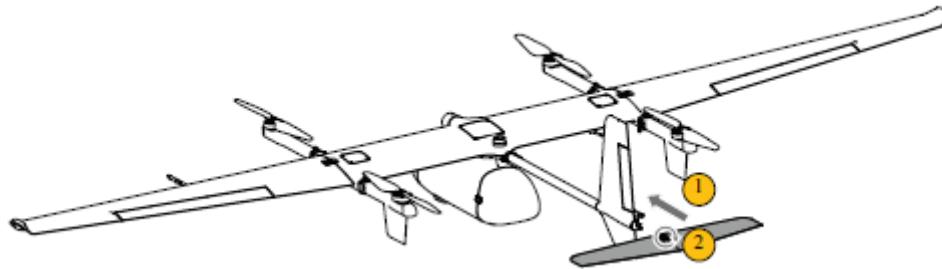


#### 4 . Vertical Tail Assembly

Insert the plug at the front end of the vertical tail into the socket at the tail of the central wing, and then insert the carbon tube into the fixing seat at the tail of the central wing. Rotate the handles on both sides until the vertical tail carbon tube is locked.

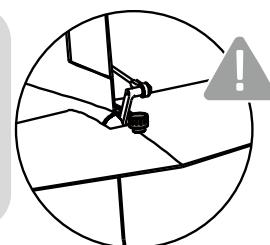


Insert the horizontal tail into the end of the vertical tail and tighten the thumb screw.



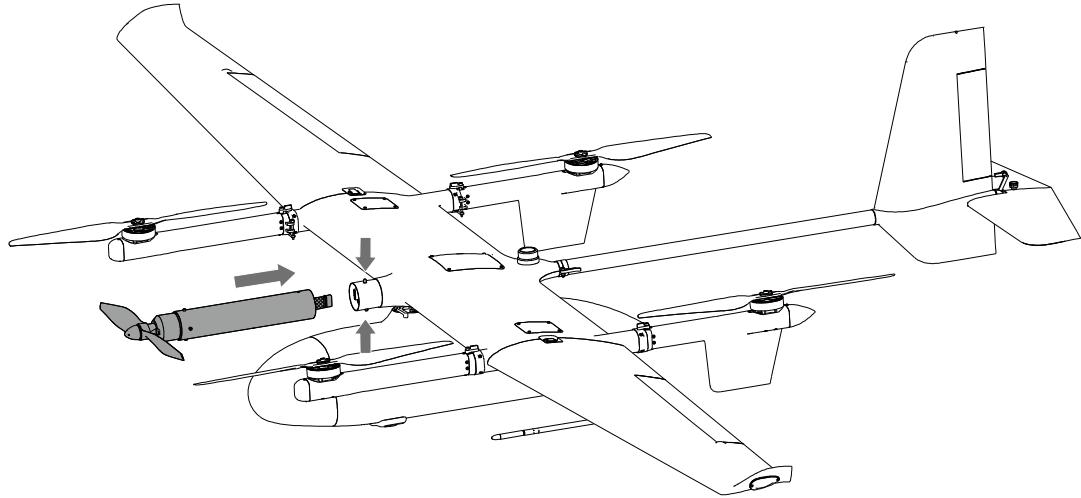
#### Safety Warning

Please ensure that the horizontal tail is fully inserted and the thumb screw is tightened; otherwise, flight safety will be affected.



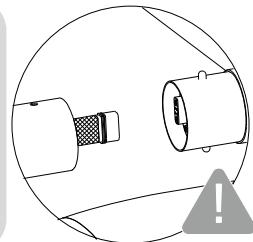
#### 5. Assembly of Front Pull Motor Part

First insert the connector into the socket at the front end of the central wing, then press the locking spring pin, and at the same time, insert the carbon tube into the front end of the central wing until the spring pin pops out.



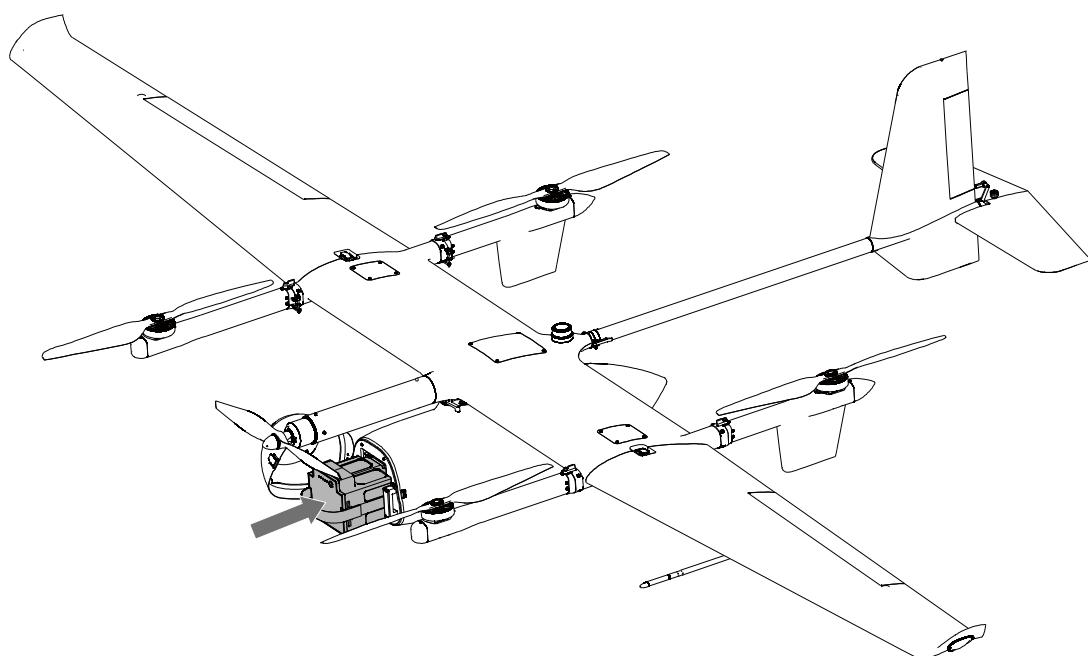
#### Safety Warning

Please make sure that the connector is fully inserted, and the upper and lower ends of the spring pin are ejected; otherwise, the flight safety will be affected.



#### 6. Battery Assembly

Push the smart battery into the battery bay until it is locked by the locks on both sides.





### Safety Warning

The aircraft will be powered on after the smart battery is assembled.

After the aircraft is powered on, do not unplug/insert components such as wings and tailpipes, otherwise the corresponding CAN equipment may be damaged!

## UAV Roll-up

1. Open the battery compartment cover, and pull the battery straps to both sides of the battery compartment to take out the smart battery and store it properly to prevent it from bumping.
2. According to the reverse operation of deployment, remove the front-pull parts, vertical tail and horizontal tail, left and right outer wings in turn, fold the rotor arms and unlock the central wing and the bridge wing of the fuselage.
3. Remove the ground base station and prepare for packing.

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## 3. Maintenance

## Airframe Maintenance

After every flight, it is required to clean the fuselage to keep the airframe free of stains and residual foreign matters so as to protect the aircraft from chemical corrosion.

After each flight and during general storage, the pitot shall be covered by pitot cover to prevent foreign matters from entering.

At the end of each flight and during normal storage, it is necessary to cover the rotor propeller with propeller protection sleeves to avoid damage.

The aircraft shall be stored in a dry environment to avoid the adverse influences of humidity on the measurement accuracy of autopilot sensors.

## Battery Maintenance

For the battery storage environment, the ambient humidity shall be  $60\pm15\%$  and the temperature shall be  $-20^{\circ}\text{C}\sim45^{\circ}\text{C}$ .

Handle the battery with care. Do not perform dangerous operations such as puncture or beating.

When used in summer, the battery should be kept away from the hot area to ensure that the maximum temperature of the battery does not exceed  $50^{\circ}\text{C}$ ; in winter and flying at high altitude, the battery needs to be heated before use to ensure that the temperature of the battery before takeoff is not lower than  $20^{\circ}\text{C}$ .

When the discharge capacity of the battery is obviously weakened (the capacity is reduced to 80% of the original and cannot be discharged at high current), it is recommended to scrap it, and there are potential risks in continuing to use it.

This product requires professional installation based on the following reasons:

1. This device will not be sold to the general public; it will be sold to dealers only.
2. This device requires controlled installation location by professional installers.
3. This device requires professional configuration for use.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

#### FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.