4SIX+ VTOL

INTERNATIONAL ARMOUR™

www.armour.gr

4SIX VTOL+

Small VTOL UAV

4SIX VTOL+

IAS2030-H16
Super Bird EPP bundle system
Airframe complete
RP02 flight controller
H16-Pro GCS
30 km telemetry & video link
Battery VTOL x 1, cruise x 1
Charge

IA4S7000
Li-ion 18650 battery
4S 7000mAh
Max discharge 20A
Weight 400g
67*74*38mm
XT60 connector
Used for 4SIX+

4S 1550mah
TATTU Li-Po battery
4S1P 14.8V 1550mAh
14.8V LI-PO battery
75C discharge
Weight 170g
34*29*72mm
XT60 connector

Improving on the material with super EPP which far surpassed the traditional EPS and EPO commonly used in hobby products today.

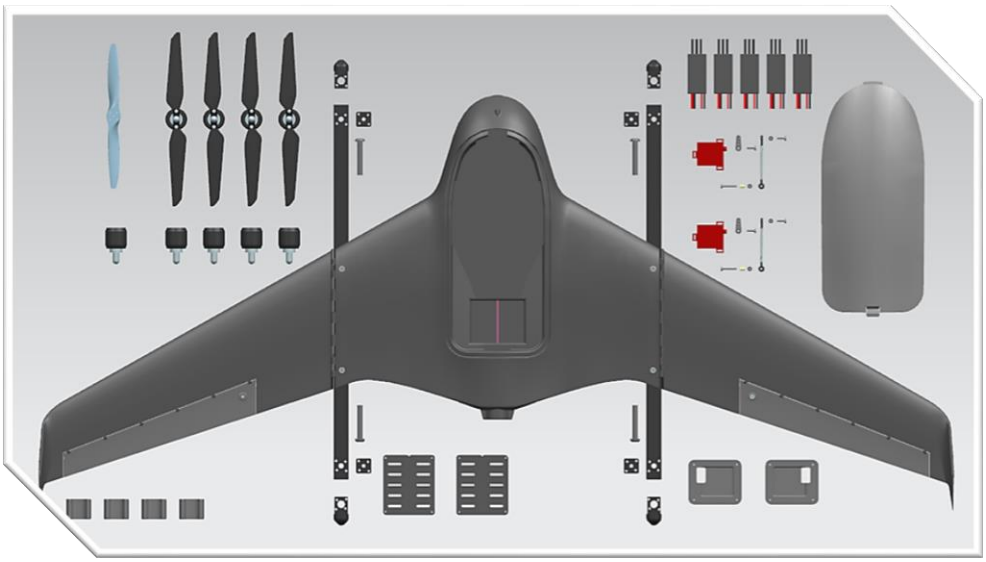
Its superior aerodynamic characteristics have been refined and evolved by birds for thousands of years. We started development of the flying wing design back in 2012 and the successful test flight happened in 2014.

So we have a lot more experience in flying wings than many others.

Now we has added a special feature to this design which even the B-2 and most birds are no match for – vertical take-off, vertical landing, and hovering.
It means that has quad-rotor and fixed wing from just one airframe.

Micro IIIS High resolution Thermal Camera Module

SR2000 905nm LRF Module



2.6Kg
MTOW

Camera & LRF
LRF & Thermal Camera

1200mm
Wing Span

30Km
Telemetry & Video Link

Up to 90 Min
Endurance
(at MTOW<2.6kg)

200gr
Maximum Payload

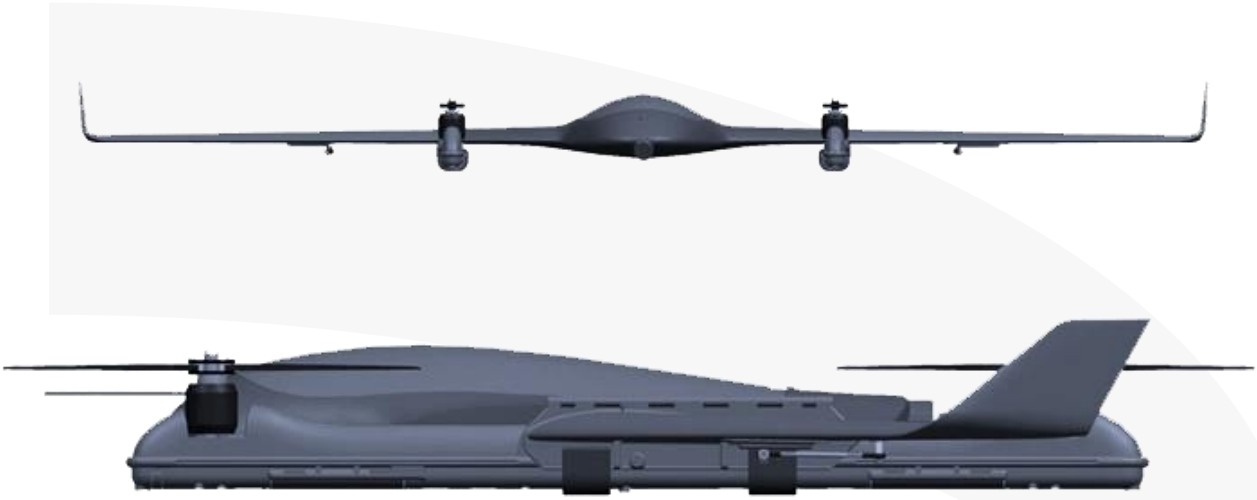
100Km/h
Max Speed

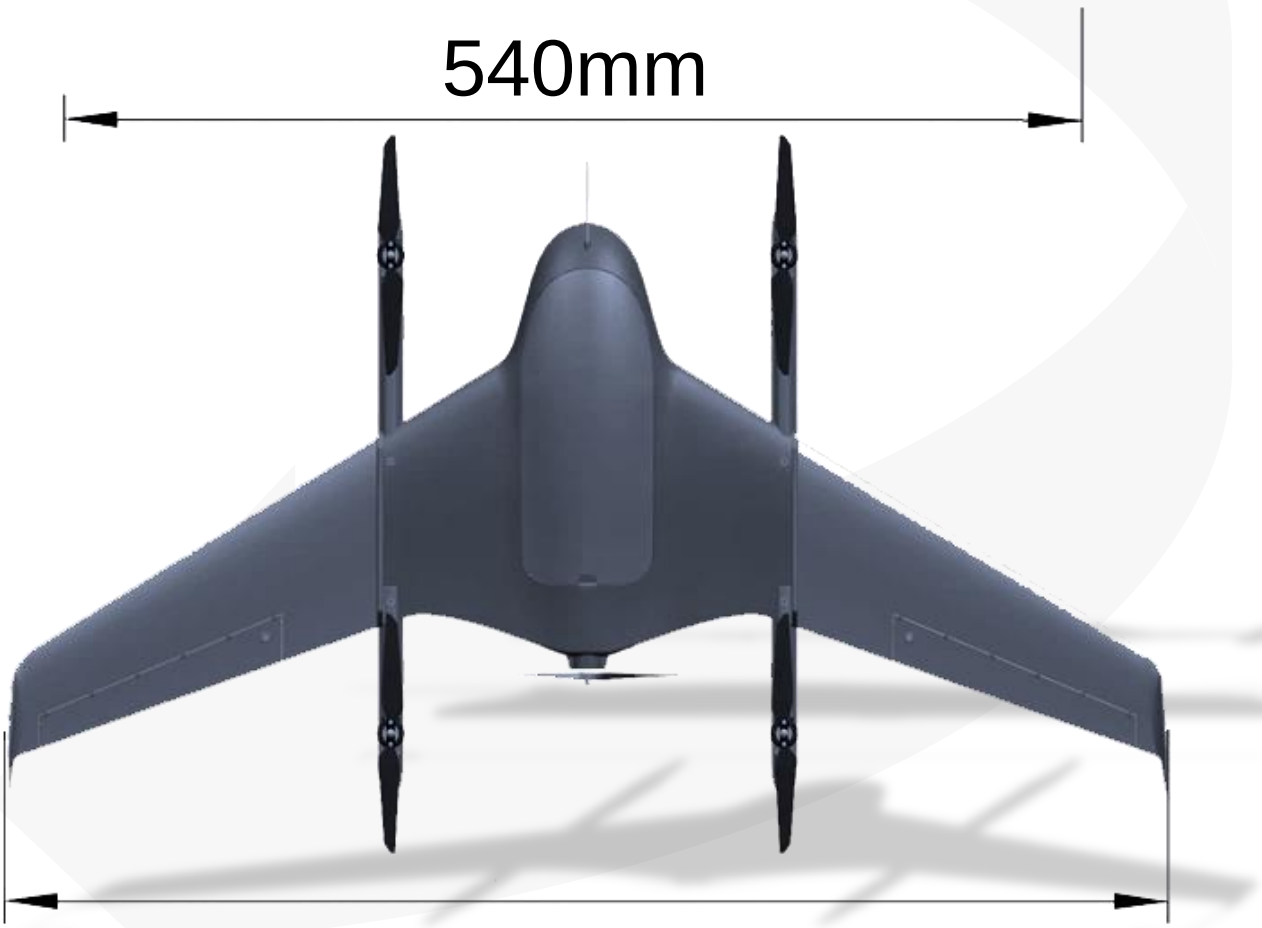
75Km/h
Cruise Speed

2.6Kg
Take off Weight
Including, flight controller, servo,
2-axis gimbal
Battery 18650 x 8 pcs
Li-Po x 1pc

1.1Kg
Empty Weight

4SIX VTOL+





4SIX+ is a composite vertical take-off and landing VTOL/UAV which is applies fixed wing combined with the quad-rotor complex fixed wing layout, which solves the problem of vertical take-off and landing in a simple and reliable way.

Its superior aerodynamic characteristics have been refined and evolved by birds for thousands of years. Sparkle Tech started development of the flying wing design back in 2012 and the successful test flight happened in 2014.

The VTOL solution successfully implement to the flying wing platform since 2016.

This is due to the four electric motor driven rotors like those of ordinary drones you see all the time. We all know that today there are millions of quad-rotor drones in use all over the world. So this design is fully mature and its reliability is beyond doubt.

Features

- Layout: Simple and reliable composite structure from the application of conventional flying wing and quad-rotor combination as the layout pattern。

- Practical and Efficient: Flying wing UAV with long endurance, high speed, long distance, and durable in structural.

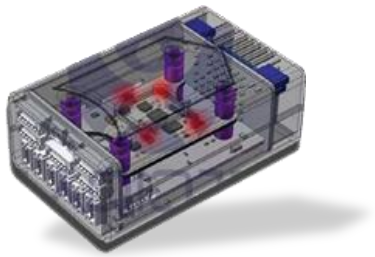
- Vertical Take-off and Landing: Equip with a vertical take-off and landing features can significantly reduce requirements on landing space.

- Low Cost of use: Do not require any complex cumbersome launch and recovery equipment. Additional recovery sensors are also not necessary for this UAV. Vertical take-off and landing can minimize the possibility of damage to the fuselage and equipment on board.

- Easy to Operate: Applying integrated dedicated flight controller and navigation system, achieving fully autonomous flight.
Operators without professional training and operational experience could also operate the UAV by simply sending flight plans.

- Compact System: Do not require any complex auxiliary equipment. Along with simple transportation, expansion, maintenance, and withdrawal.

4SIX VTOL+



AUTOPILOT SYSTEM

Product Descriptions:

Dome of flight control is a vehicle controller hardware, through Ardupilot official code combined support, can be found in the official code and the firmware library QIOTEKZealotF427, PX4, INAV, BETAFLIGHT firmware at present.

The hardware main control system uses STM32F427VIT6 chip, and as an economic and practical scheme, IMU adopts the mainstream ICM20699+ICM20649 scheme, combined with shock absorption ball independent suspension structure system and temperature control system.

The barometer adopts MS5611+DPS310 dual barometer scheme, and the built-in compass adopts QMC5883.

The connector has independent 14-channel PMW GPIO and independent 4-channel high and low level IO control, which is suitable for multi-axis, helicopter, vehicle, ship, fixed wing and VTOL application scenarios with multiple interface requirements.

Peripheral interface has two independent ammeter power supply and current, dual-Voltage monitoring system, all interfaces use the mainstream GH1.25 interface, and design side double large LED system indicators.

Built-in OSD system, 1.5ABEC all the way, so that the controller is highly centralized, and the use of CNC aircraft aluminum shell technology, to adapt to the amateur industry and commercial application scenarios.

Quality Certificate:

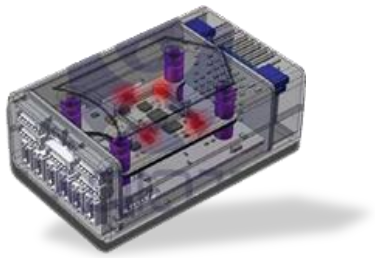

HTT TECHNOLOGY

Certificate of Conformity


HTT TECHNOLOGY

FCC SUPPLIER'S DECLARATION OF CONFORMITY

4SIX VTOL+



AUTOPILOT SYSTEM

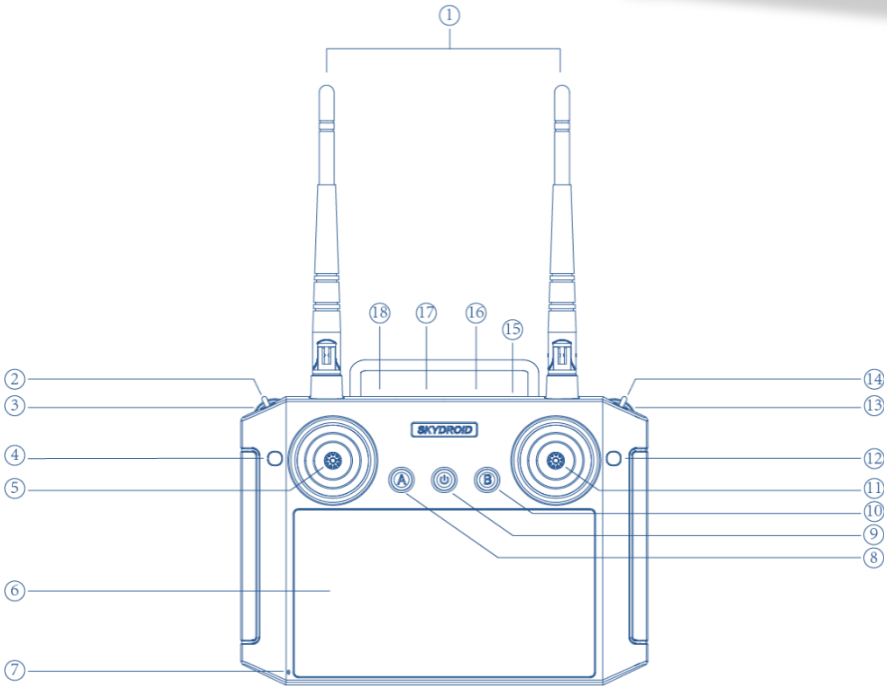
System features / Related Parameters:

MCU	
MCU	STM32F427VI(180Mhz 2M Flash)
SENSORT	
IMU	1 x ICM20689 1 x ICM20602 1 x ICM20649
Compass	IQMC5883
Baro	Ms5611 & DPS310
INTERFACE	
Uart	5 pcs
Telemetry	5 pcs
GPS	2 pcs
Debug	1 pcs
RC Signal	PPM/S.bus 1 pcs
RSSI	ADC(6.6V) or PWM 1pcs
I2C	4 pcs
CAN	1 pcs
ADC (6.6V)	2 pcs
PWM 14PWM+4Relay	
Safekey&Buzzer	1 pcs
Extral USB	1 pcs
Built-in Module	
OSD AT7456E	
BEC 6S/1.5A	
Power Interface	
Power(voltage & current monitoring)	2 pcs
Power for Servo/ Vottage monitoring	1 pcs
Weight&Size	
Size	42mm*65mm*25mm
Weight(Include CNC Case)	62g
Other Features	
internal Soft Rubber Damping Ball isolation for All interna IMUs	
internal heater for IMUs temperature control	

4SIX VTOL+

H12 Protable controller & GCS &Telemetry System

Ground control station has undergone a lot of optimization based on QGC, a better interactive interface, a larger controllable map field of viewing, the aircraft implements intelligent waypoint planning, automatic mission execution, automatic follow-up, and one-click home, highly provides working effectiveness in professional fields.

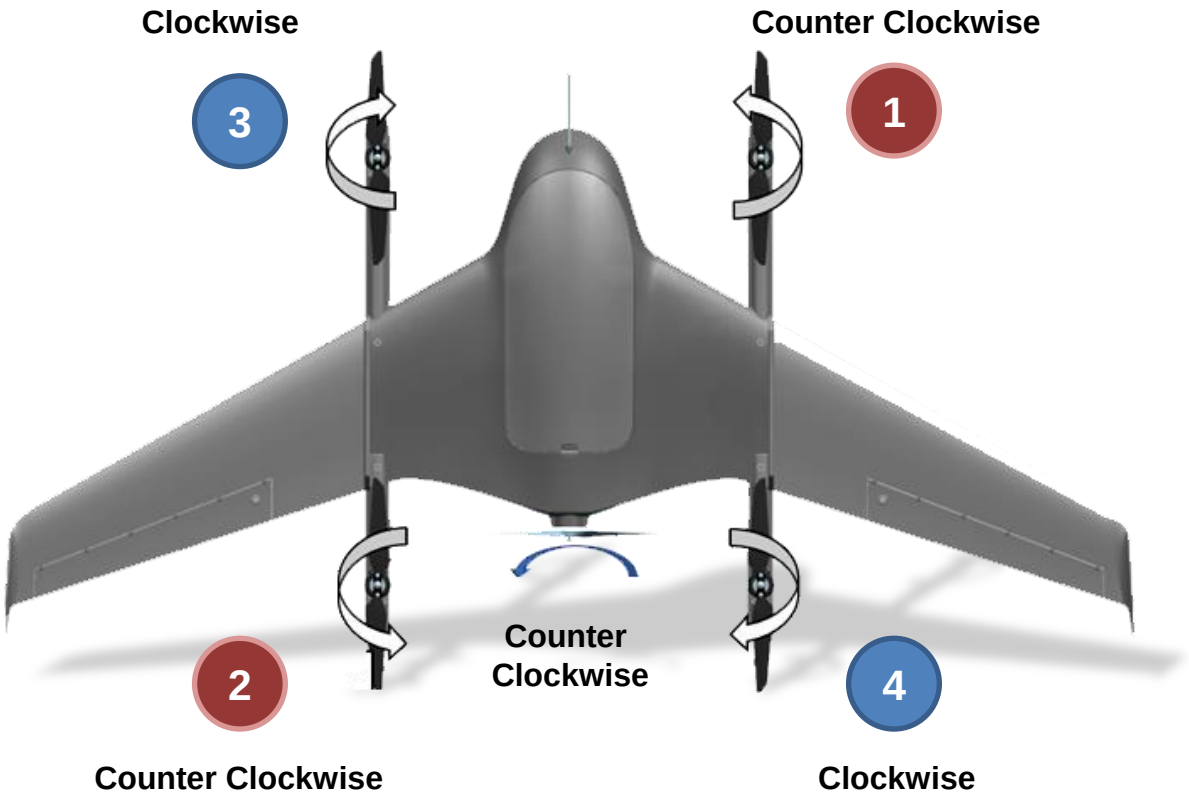


No	Functions	No	Functions
1	2.4G , 3dB Antenna	10	Return to Home (channel 8)
2	Mode switch : Auto – Loitor – Quad hovering	11	Control stick (Channel 1 & 2)
3	Channel 11 (Dial G)	12	Channel 10 (Button D)
4	Channel 9 (Button C)	13	Gimbal moving Up & Down (Channel 12)
5	Control stick (Channel 3 & 4)	14	Channel 6 (3 position switch)
6	5.5” LCD screen	15	Speaker
7	Microphone	16	SIM card slot
8	Fixed wing cruise (Channel 7)	17	Charging port (Type C)
9	Power Switch	18	USB cable connect to PC (PPM output)

4SIX VTOL+	
Item	Data
Takeoff weight	2600 g
Beaufort wind scale	<7.9 m/s
Max Endurance	70 min
Hovering time(VTOL)	130 s
Max speed	25 m/s
Distance of fixed wing to Quad motor while RTL	30 m
Transition time to fixed wing	5 s
Min loiter radius	90 m
Max rolling angle	25 °
Max climbing angle	15 °
Max decending angle	-15 °
Max climbing speed	3 m/s
Min air speed	17 m/s
Cruise speed	18 m/s
Max air speed	23 m/s
Stall speed	< 16 m/s
Optimal cruise speed	18 m/s
Fully charged voltage (4S)	16.8 V
Low voltage RTL	12.4 V

Propellers Installation

SB2030



Propulsion Propeller : 8 x 4e

Propeller 3 : 8.5 x 7

Propeller 1 : 8.5 x 7

Propeller 2 : 8.5 x 7

Propeller 4 : 8.5 x 7

Properly install the quad motor propeller. Please bear in mind the difference rotating direction.

Due to the limitation of the external packaging volume, the quad propellers may not installed on the quad motor when the UAV is shipped.

4SIX VTOL+

SR2000 905nm LRF Module

This product is based on a 905nm semiconductor laser, which is SWaP for long measuring distance. Application areas include handheld rangefinders, micro UAVs, rangefinder scopes, etc.
It has U art (TTL_3.3V) data transmission interface and provides upper computer software and communication protocol command set, which is convenient for secondary development by users

Measurement Range: 5~2000m
Measurement Accuracy: ±1m
Measurement Frequency: 1~4Hz
Laser Wavelength: 905nm
Divergence angles: ~6mrad
Transmit FOV: Φ10×7.5mm
Receive FOV: Φ15×10mm
Interface: Uart (TTL_3.3V）
Weight :10±0.5g
Dimensions: ＜25×26×13mm
Operating Temperature: -20~＋60℃
Storage Temperature: -30~＋60℃
Vibration: 800G，1ms
Power Supply :DC 3~5V
Power Consumption: ≤2w
Baud Rate: 9600/14400/19200/38400/57600/115200(Default)

Up to 1200m

Human: 1.7x0.5m
Vehicle: 2.3x2.3m
UAV: 0.2x0.3m

MICRO III 640 with 13mm (Fixed)

Wavelength: 8-14μm LWIR
Detector Type: Vox @ 12μm
Resolution: 640x512 (384x256 option)
Data Interface: RS232/RS422
Operating temperature: -40℃ ~ 75 ℃

Up to 400m

Up to 1200m

Human: 1.8*0.8m
Vehicle: 2.3*4.6m
Distance: Detection (3 pixel)

CAUTION OF SAFETY

Ground Station Inspection

For your safety, please unplug all power source or supply when proceeding ground station software inspection.

This is due to parts of the inspection criteria may drive the motor or the engine.

(1) **Remote Control Checking:** This checking mainly confirms the remote control corresponding to the joystick and the plane system is consistent.

The user shaking the ailerons, elevators, throttle, steering, and the hand switching function to joysticks and switches are also the criteria of this checking.

Besides, the operator is responsible to the inspector the pre-flight check page long with its corresponding channel status, which ensures the actual action of the remote control is consistent with the inspection page.

Otherwise, corresponding adjustments need to be made on the remote controller.

(2) **Posture Checking:** Manually changing the posture of the UAV, compare with the direction indicated by horizon instrument whether consistent or not.

(3) **Magnetic Compass Calibration:** Accuracy of the magnetic compass will directly affect the flight quality of the UAV. If the difference of the magnetic compass is greater than 30°, system re-boot or re-calibration is required.

(4) **Flight Plan Inspection:** Request the long-range flight plan of the UAV to confirm whether the task route is reasonable or not. And to confirm whether the landing route is set and reasonable.

After completing those inspections listed above, the operator can now connect the power supply to proceed with follow-up inspections.

(5) **Proceed** avionics equipment power, power supply, GPS status checking.
Also, check the main power of the avionics equipment, steering gear power and power supply are appropriate or not.

(6) **Servo Control Surface Inspection:** Give instructions through the ground station to check the aileron, elevator and rudder surface deflection and whether the rotation direction of the rotor is consistent with the instructions.
If they are the same, then proceed to the next inspection; if not, the operator needs to re-examine the cable connection.

CAUTION OF SAFETY

7) **Airspeed sensor Inspection:** Accuracy of dynamic pressure is directly related to the safety of the UAV, which should be treated seriously.

a) Check the pitot tube is smooth or not: check whether a rapid increase in dynamic pressure (generally should be greater than 15Pa) through a thumb press to the airspeed tube. Once released, the dynamic pressure is reduced to/near 0, or near wind speed if under windy conditions.

b) Blow the pitot tube directly with the mouth is strictly forbidden, since the water vapour may condense into the airspeed tube, which will block the pitot tube. Besides, blowing the airspeed tube with the mouth will generate a huge pressure, which may damage the dynamometer.

Proceed the pre-flight checking before every flight

Daily Maintenance

(1) The operator must clean the UAV body after every flight, ensure that the UAV body is without any material residue which prevents the UAV structure from chemical corrosion.

(2) The Engine intake and exhaust tube should be closed after every flight, to avoid debris destructing the engine structure.

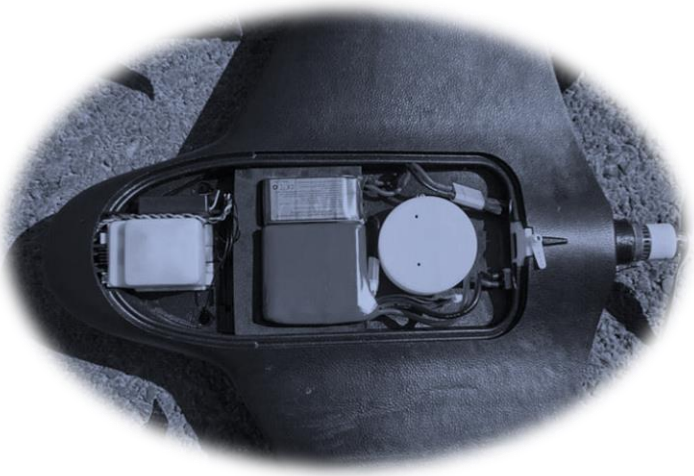
(3) The UAV storage environment should be dry in all time, since the humid environment may affect the autopilot instrument sensor measurements.

(4) The pitot tube must be covered by the hood after every flight and usual storage, to avoid debris blocking the pitot tube, resulting in error in airspeed measurements.

Battery Maintenance

(1) The lithium / Li-ion battery should be charged to 3.8~3.9V while in storage.

(2) When operating in winter or high-altitude area, the operator should pay attention to the battery insulation treatments, since low temperature may affect the performance of the battery.



Mission Planning

Flight plan could be planned in the ground station according to the mission requirement.

UAV can perform variety of actions as indicated by the flight plan at certain coordinate.

Operators can amend the flight plan based on the actual situation.

Contingency Plans

Reasonable contingency plans should be planned near the ground station, where its altitude ought to be the same with the normal operation altitude.

When the UAV is out of service, like its data link is interrupted, or the GPS could not receive any satellite signal, then UAV can return to a safe location.

Carefully survey the landing site, determine the appropriate direction for landing from measurement, such as conditions permit.

Also, operators should allocate 2 to 3 spare landing point, once the landing conditions change, select the most appropriate landing point for landing according to the actual situation.

UAV Assembly

4SIX+ structure is simple and durable, do not require any complex auxiliary equipment, along with its easy set up, convenient transportation, maintenance, and withdrawal.

During daily storage and transportation, the UAV can be stored in a box/case, which can be assembled for flight.

Acknowledgement

This product is a professional aviation tool, where wrong operations may lead to damage to the goods or casualties.

User must bear the corresponding criminal responsibility caused by this product.

For proper usage and your safety, please read the instructions carefully before using or consult the manufacturer.

Precautions

Air Traffic Control: Subject to the country that you will use the 4SIX+, appropriate approval of the Air Traffic Management Bureau (ATMB) of Civil Aviation Administration must be obtained and strictly to abide by national laws and regulations.

Flight Area: If the use of the 4SIX+ is for Civilian proposes, and subject to the country laws, It is prohibited to fly over the no-fly zone delineated by the public security department, including airports, railways, flammable and explosive materials storages (factories), dangerous goods stores (factories), power stations, high voltage lines, military facilities, personnel-intensive areas, and public security departments.
If any important protection or ambiguous target exists in the intended flight area, it is necessary to report to the local authorities for approval.

Geographic Environment: The flight area must be surveyed to ensure that the flight path is out of obstructions.
Flights in mountain or between buildings are prohibited since the product may experience strongly change the shear wind.

Personnel Situation: All staffs and operators must be in good condition, with energy and concentration. Operators with sickness, emotional or fatigue state are not allowed to operate the unmanned aircraft.
From the night before the flight until the end of the flight, all operators are prohibited from alcohol.

APPENDIX 1

Pre-flight Checking List

Ground Station _____ Maintenance _____ Flight Date _____

Flight Environment			
Weather_____	□	Wind Speed_____ Wind Direction_____	□ □
UAV Inspection			
Are the connecting screws secure?	□	Is the wing locking pin secure?	□
Hover motor/propeller is good?	□	Is the motor mount secure?	□
Are the servo control surfaces being intact?	□	Is cruise fly propeller intact?	□
Is the centre of gravity normal?	□	Oil Level _____	□
Ground Station Inspection（without power）			
Whether the output of the remote control correct?	□	Whether the posture is correct?	□
Magnetic compass calibrated?	□	Whether the flight plan is correct?	□
Magnetic Compass Inspection?			□
Ground Station Inspection（with power）			
Main Power_____V Autopilot Power_____V Hovering Power Supply_____V			□
No. of GPS satellite:_____	□		
Whether the manual radio control command correct?	□	Whether the hovering propeller and motor is oriented in the correct?	□
		Will the airspeed increase when pressing the pitot tube?	□
	□		□
	□		□

INTERNATIONAL ARMOUR
www.armour.gr