

[PREX9-Q16] User's Manual

Please read it before using it for safety reasons.

This manual contains minimal information that is very important for safe use of the product, so please be aware of it and use it. The manufacturer shall not be responsible for accidents caused by non-compliance with the instructions or other problems with the delivered gas.

Naver modify the product.

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1. 드론 기본 숙지사항

The PREX9-Q16 consists of Body for flight, a Landing gear, a Battery to provide power, and a Radio.





A typical agricultural drone uses an electrically powered motor, which rotates the propeller to fly, and adjusts the number of rotations of each motor to move in the desired direction and speed. To implement this flight, the main body is built by combining the motor and propeller, various sensors for positioning and attitude of the flight, and a flight control system for controlling the speed of the motor. Many wires are built into the main body because they are needed for electric power and electrical signals with flight

Lithium polymer batteries for agricultural drones should be used in consideration of durability, ease of use, safety depending on the surrounding environment, and efficiency based on weight volume. Since batteries are affected by their performance depending on the environment, care should be taken when storing and using them. Damaged batteries should be disposed of immediately as they pose a risk of fire or explosion.

The primary role of the transmitter is to fly the drone in the desired direction, speed, and position, and signal the Flight Control Unit (FC) through the receiver to perform the necessary tasks. Some radios and receivers also receive and display information about the status of drones from drones, and in the case of drones with cameras, they also receive video signals and deliver them to connected mobile devices. Agricultural drone radio can control for pesticide spraying

The spraying device consists of a water tank for pesticide, a pump for pesticide spraying, a tube and a nozzle through which the pesticide moves.

2. Safety precautions

A. Precautions for Aviation Agriculture

Aircraft pesticide spraying refers to spraying pesticides and chemicals in the air using aircraft. As a result, there are risks associated with aircraft operation and risks associated with pesticides in aircraft pesticide spraying.

Pesticides used in spraying aircraft pesticides are more concentrated than ordinary pesticides, so they are damaged even if they are relatively less contacted or inhaled, and because pesticides are sprayed in the air, they are widely sprayed by aircraft wind and natural wind. Therefore, it is necessary to maintain a sufficient distance (at least 15M) from people, animals, drinking water sources, etc. when spraying, taking into account the direction of the wind and the influence of the wind by the aircraft propeller.

Aircraft have complex electrical, electronic and mechanical properties and require proficient flight skills in operation and must be operated by a well-trained person. If you operate without essential education and training, you and others will suffer damage to your life and property. Ensure that flight control and maintenance are carried out by experienced qualifiers and that they do not work in a state of fatigue or ingestion of drugs or alcohol.

B. Flight Safety Matters

A brief summary of what needs to be checked for flight safety is as follows:

- 1. make a flight plan after confirming whether it is a flightable area
- 2. check the drone and battery,
- Check the operation status of the drone before taking off, and then check the flight response status to the operation after taking off
- 4. Check the drone and battery conditions and operation results after the flight.

In particular, you can prevent accidents by thoroughly preparing in advance and checking the aircraft before flying.

Check the surrounding obstacles such as high-rise buildings, steel structures, tall trees, utility poles, and wires, and fly in places that do not interfere with flight. Control is often difficult due to magnetic field and radio interference, so you should check the degree of magnetic field and radio interference before flying near high voltage lines, transmission towers, base stations, etc. Most of the accidents of agricultural drones are those that crash into obstacles because they do not look closely at the obstacles around them and do not pay enough attention to flight control. In addition, there are cases where drone control is not possible due to problems with GPS signals due to the surrounding magnetic fields or the concentration of high-rise buildings.

You should not fly in bad weather conditions such as rain, strong winds, fog, etc., fly only after sunrise and before sunset when visual identification is possible, and do not fly at night when it is difficult to identify.

Ensure that co-pilots or visual monitors are deployed to observe the drone's flight trajectory and surroundings, control vehicle or human movement to prevent accidents, identify and install identification tags at key points if necessary.

Even after the flight, abnormalities may be caused by the flight environment and its own vibration.

Post-flight inspection:

First, check the fixing and heating conditions of the motor and propeller, and stop using it and repair it if you smell overheating or burning.

Second, check the drone's bolt loosening and armrests and the conditions of each part's fixation and damage, bending of the landing gear, and damage to the buffer sponge.

Third, check the GPS and receiver antenna security and wiring.

Fourth, check the condition of the sprayer, and finally, perform cleaning for the next use.

[Pre-flight Readiness Checklist]

	Contents	Check	Note
1	Have you received flight approval from the area where you are scheduled to fly?	□ ок	
2	Do you have a pilot's license?	□ ОК	
3	Are pilots and co-pilots in good physical condition for flight?	□ ок	
4	Is the weather condition available for flight?	□ ОК	
5	Are you wearing a safety helmet and safety equipment?	□ ОК	
6	Is the drone battery and radio battery fully charged?	□ ОК	

[Pre/Post Flight Drone Checklist]

	Dort	Contents	Check		Note
	Part	Contents		After	Note
1	Radio	Check external status	□ OK	□ок	
		Check operation status	□ OK	□ок	
		Check voltage status	□ OK	□ок	
2	Propeller	Check the propellers for fixed and external conditions	□ OK	□ок	
		Check for clearance, horizontal conditions between propellers	□ OK	□ок	
3	Mortor	Check fixed and external conditions	□ OK	□ок	
		Rotate to check for friction	□ OK	□ок	
		Check for overheating, burning odor	□ ОК	□ок	
4	Body	Check external conditions	□ок	□ок	
		Check bolt fixed	□ок	□ок	
		Check GPS antenna and receiver antenna fixed, wire status	□ ok	□ок	
		Check LED status light	□ OK	□ок	
		Check the status of the wires and connectors	□ OK	□ок	
5	Power	Check voltage status	□ OK	□ок	
		Check external status on power connection side	□ок	□ок	
		Check fixed for battery	□ OK	□ок	
6	Landing	Check landing gear bending, breakage, bolt fixation	□ ОК	□ок	
7	Spraying	Check the fixed condition of the pump and the water tank	□ ОК	□ок	
		Check nozzle and hose, fixed and external condition	□ок	□ок	

C. Precautions for battery storage and use

The PREX9-Q16 model uses two 6-cell 222V lithium polymer batteries as a set.

Lithium polymer batteries are more stable and durable than other batteries, but they have a risk of fire and explosion. Therefore, you should be aware of the precautions below and follow them.

✔ Precautions for Li-Po battery storage and use

1.	Pr	ecautions for use
		Measure battery voltage before flight and use at buffer voltage.
		After completing the flight, make sure to remove the battery from the drone and storage it.
		Do not drop the battery or cause a strong external impact.
		If the battery breaks or swells, stop using it immediately and discard it.
2.	Pr	ecautions for charging
		Be careful not to overcharge (4.2V when fully charged) and overdischarge (3.4V less).
		There is a risk of battery explosion during overcharging, so do not leave your seat during charging.
		Do not charge when the battery temperature rise status after the flight.
		If the voltage of each cell is not constant, adjust the voltage of each cell with precise charging.
3.	Pr	ecautions for storage
		Indoor storage is recommended, and if inevitably stored outdoors, avoid humid places and store them in
		places with good ventilation of 15 to 25 degrees.
		(Keep away from moisture, rain, heat, and direct sunlight when storing)
		Store the voltage at 50-60% during long-term storage.
		Measure the voltage at least once a month and charge and discharge it to maintain the recommended
		voltage.

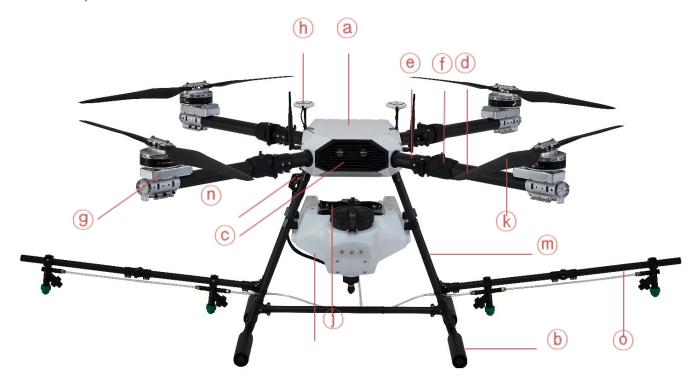
3. [PREX9-Q16]User's guide

A. Drone specifications and names of parts

1) Drone specifications

No.	Part	Contents		
1	Type name / Manufacturer			
Ċ	/ Country of Manufacture			
2	Model name	PREX9-Q16		
3	Purpose	Agriculture Drone		
4	Size	1080*1080*720 (mm)		
5	Power system	Motor : 9616 Brushless Motor		
Ľ	- circl eyelem	Hobbywing X9 PRO G2		
6	Propeller	34inch (3411)		
7	Speed limit	Cruising speed : 3~5m/sec		
		Max speed : 7m/sec		
8	Max take-off weight	35.0kg		
9	Empty weight	18kg		
4.0	Radio	Operating frequency: 2,400MHz ~ 2,483MHz		
10		Number of Operating Channel: 7		
		Max radius: 1km		
11	Flight Controller	K3A-PRO		
12	Maxi Operational Height	30m		
13	Angle of rotation	30°		
14	Flying Range	2.4km		
15	Flight time	Empty weight: 20min		
		- Limit wind: 5m/s		
16	Flight restrictions	- Limit rain: 3mm/h ੀ ਹੈ		
		- Limit temperature: 0°C ∼ 60°C		

1) 각 부의 명칭



- (a) Canopy: Protection against foreign substances
- **(b)** Landing Foot: Protect against impact during takeoff and landing
- © Front Grill / Camera Bracket: Bracket to secure the camera and camera protection grill
- d Motor mount: Arm to which the motor is mounted
- (e) Armrest mount: Arm connecting the main body to the motor mount
- f Arm joints/folding parts: Folding structure enhancement of easily moving and storage
- ® Motor: A power unit that receives energy from the battery and converts it into rotational energy
- (h) GPS Bracket: Bracket for GPS
- i) Water tank: A container for agricultural pesticides
- (j) Battery Plate: Carbon Plate for Mounting and Securing the Battery
- **(k)** Propellers: Propellers that rotate under rotational force from the motor
- m Landing gear: the lower part of the body connecting the main body to the landing foot
- n AS150-U plug holder: Plug holder that secures AS150-U extend cable to landing skid
- © Expansion nozzle set: nozzle set for dispensing agricultural pesticides

- etc.





You need to be familiar with the names of each part to accurately communicate the symptoms in the event of an AS situation.

B. Radio specifications and name of parts

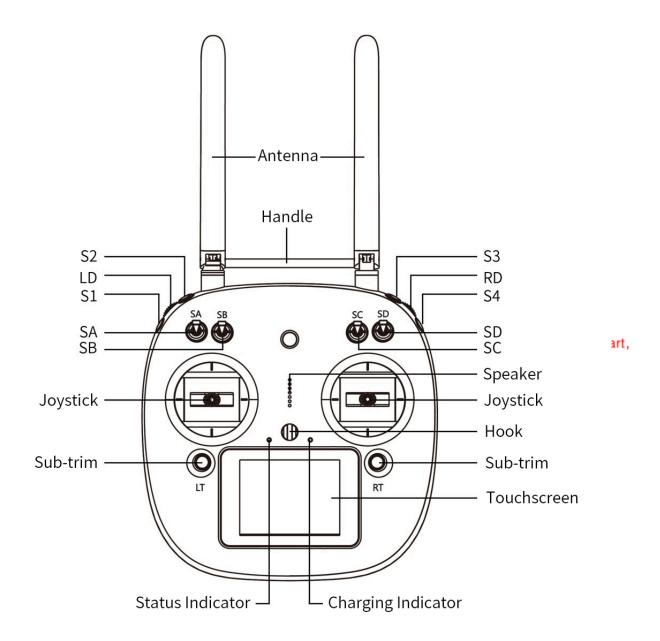
1) Radio specifications

No	Part	Contents
1	Type name / Manufacturer / Country of Manufacture	Radio / Siyi / China
2	Model name	VD32
3	Size	194.5*172.5*114(mm)
4	Weight	610g
5	Operation temperature	0°C ~ 55°C
6	Power	Built-in 8000 mAh Li-Po 1S 3.7V Charging Port : Micro-USB (5V/2A)
7	Available channels	16 channels
8	Operation Channels	Number of Operation channels: 7 channels
9	Max radius	2 km
10	Recommended radius	1 km

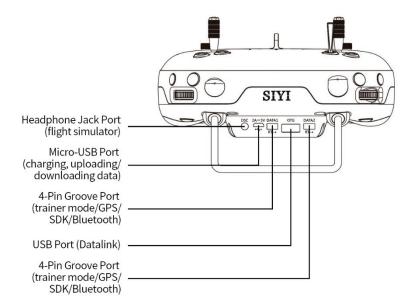
11	Operation frequency	2.4Ghz
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2) Name of Parts

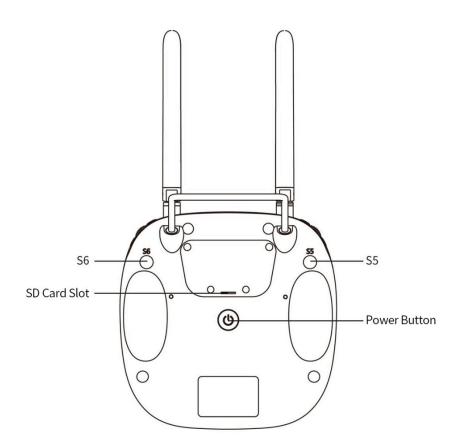
Front



20)	SA	Flight Mode switch
	SD	AB set switch



Back



C. Flight operation and aircraft pesticide spraying precautions

1) Pre-flight checks and preparations

Prepare drone batteries, radio batteries, and safety supplies for the flight in advance and wear comfortable clothes and safety equipment necessary for the flight.

Identify the location of people, livestock, and obstacles within the flight area, position the drone in a flat and wide area, and then unfolding the arms to tighten the joints and spread the propeller.



Drone Safety Check

	Check contents		
a	Arm joint/folding part status		
Ф	Landing fixed status		
©	Motor fixed and rotated status		
d	Propeller fixed and broken status		

Check the condition of the drone and radio according to the 'Pre-flight Drone Checklist'.

Turn on the radio first, connect the battery to the drone, and check the LED status light.



When connecting a battery to a drone, it must be inserted deeply at once to prevent sparks caused by contact resistance. If the connector feels loose, stop using it immediately and replace it.

Check the sensor status of the drone before flying and perform calibration if necessary. If there is an error in the sensor because the sensor is not checked before the flight, an unintended maneuver will occur during the flight.

Check Basic status

	Function	Check contents	Note
1	Flight Mode	Check change Mode	Check drone LED status light
2	Flight voltage	Check full charge voltage	N/A
3	GPS	GPS more than 16 signals	HDOP 1.0 in less than recommended



Flying with GPS signals out of normal range can lead to accidents caused by drone instability.

X Calibration

For drones that have not been in use for a long time, perform compass calibration by default. To do the calibration, turn on the radio and drone and switch the mode change switch (ATTI, GPS, AB mode) on the radio about five times quickly, and the LED status of the drone changes to yellow. Ensure that the status light is yellow, and with the drone leveled at least 1 meter above the ground, rotate approximately 2 turns clockwise around the center of the drone, the LED status light changes to green. When the status light is confirmed to be green, the front part of the drone is set to be perpendicular to the ground and rotates clockwise until the LED status light flashes alternately in red, yellow, and green order around the center of the drone. This state is the completion of the calibration. After the calibration is completed, the drone can be safely located at the takeoff and landing site, and the LED light can be checked to flash the green light, and the flight can begin.

Precautions for Calibration

Do not keep magnetic objects during calibration. If the Earth's magnetic field reading is greater than 5, it is likely to fall due to an abnormal maneuver of the drone due to a sensor error. Before calibration, check whether the earth magnetic field index is below 4 through the Ready-to-Fly app and perform calibration. If there are iron structures, wires, etc. nearby, or if there is a possibility of magnetic field interference due to bridges, large buildings, or solar activities, there is a high possibility of calibration errors, which increases the possibility of abnormal maneuvering of drones. If the calibration failure persists or a sensor error condition is detected on the mobile device, do not force the flight.

2) 시동 후 비행 전 점검

Make sure that there are no people or obstacles around the drone more than 15 meters away from the drone, arming in GPS mode, check that the propeller and motor are rotating smoothly, and if there is abnormal noise or vibration, disarming immediately and check. If there is no problem with arming and rotating the motor, disarming and make sure the motor stops well.

After completing the ground inspection for the flight, put the agriculture pesticide in the water tank and activate the spraying system to verify that the spraying device works properly.

If there is no abnormality in the ground check, arming, and check if the drone is hovering well without radio operating in GPS flight mode after ascend slowly, and if the drone reacts as soon as it is operated by moving the control key little by little. If the overall integrity is confirmed, start the flight for the operation.

3) Flight Preparation and Operation

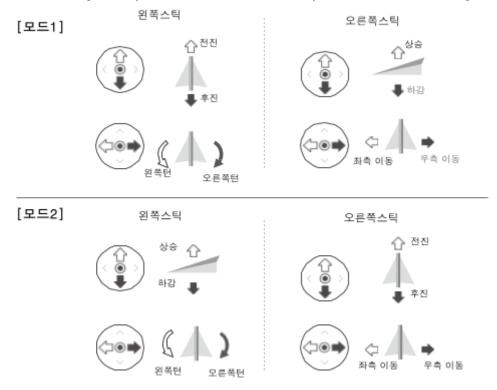
- After completing the drone and radio checks, check the work area and establish a flight plan after checking the airspace available for flight, the location of obstacles, livestock, private houses, people, wind direction and weather, satellite reception, and surrounding magnetic field indices.
- Establishing an optimal work plan is paramount for safe and efficient work to be done quickly. Completely discuss and share flight plans and work plans with your pre-work colleagues to organize roles, communication methods and plans before work. At this time, we will discuss countermeasures in case of an emergency.
- Prepare batteries, pesticides, etc. for work in advance.
- Check the safety items required for the work, wear work clothes and safety equipment, and start the work.
- Always make sure safety is a top priority when working, and frequently share opinions and information with your colleagues for the most efficient work.
- Aircraft pesticide work requires high intensity of concentration and physical strength, and you should pay
 attention to fatigue management to take proper rest and work to prevent accidents caused by reduced
 concentration.
- It is also important to exchange opinions with clients when working. Friction with the client can be a pressure when controlling the flight and thus compromising flight safety, so accept it within the limits permitted by the law, but if it is not possible, try to maintain a smooth relationship with the client by explaining the reason.

D. Flight Control

1) Select Flight Mode

The default flight mode for the flight controller is 'Mode 2'. If necessary, the user can set the flight mode on the radio.

Radio setting \rightarrow System \rightarrow General Stts \rightarrow Joystk : You can set the flight mode in the item.



E. Radio manipulation

1) Arming and take off

If the drone is bound to the radio, check if the flight mode is GPS mode and move the radio stick diagonally in the middle direction as shown in the picture. This will start and the propeller will spin.

Check the propeller's rotation and the drone's LED status, vibration and response status, and if there is no problem, slowly raise the throttle stick up to take off.



2) Landing and disarming

After moving the drone above the landing area, with the fuselage hovering



stably, slowly lower the throttle stick down, gradually land, and when the landing skid touches the landing area, the throttle is fully lowered vertically to wait for the propeller to stop completely. After moving the drone above the landing site, with the gas stably hovering, slowly lower the and slowly land, and when the landing skid touches the landing site, lower the and wait for the propeller to stop completely. This will disarming. To avoid drone breakage and accidents, the landing should be done slowly and gently and the throttle stick should remain vertically lowered until the propeller has stopped completely.

In fact, many accidents occur during the start, take-off, and landing process, so you should take your time and relax when taking off and landing drones.

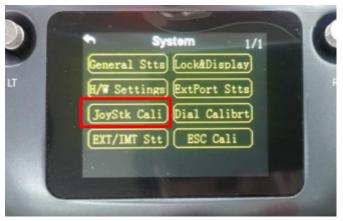
3) Radio stick calibration

If you feel that the movement of the radio stick and the response of the drone are different even though it is judged that external factors such as wind do not work when controlling the drone, try controlling stick calibration.

Radio setting → System → JoyStk Cali









Touch Next and wait with the stick centered.





When the top screen appears, push the radio stick to the limit one by one and slowly turn it around 3 to 4 times.











Once you've rotated the stick enough, touch the finish on the screen.





To verify that the calibration is good, you can see the values from 100 to -100 when you push the radio stick up, down, left, and right.

If you have successfully performed radio stick calibration, but you do not believe that the drone's flight response is not properly carried out as per the manipulation of the radio stick, do not force it to fly, and get the drone and radio checked through your purchased dealer.

F. FC LED staus light definition

The drone's flight control system transmits the drone's status to the pilot through LEDs attached to the rear of the drone. Therefore, the pilot should observe the LEDs attached to the rear of the drone to determine if there is any abnormality.

Indication of Flying Mode	Status Indicator		Priority Level
Attitude(ATT-STA, ATT-ALT)	green indicator blinks once		Low
GPS mode(angle, speed)	green indicate	or blinks twice	Low
Function mode(circling, patrol and agriculture etc)	green indicator b	olinks three times	Low
Start of intelligence direction	green indicator	blinks four times	Low
Self-driving mode(ground station control, return-to-home)	green indicato	r blinks quickly	Medium
Indication of GPS	Status Indicator		Priority Level
Disconnection of GPS or GPS didn't receive the satellite	red indicator blinks three times		Low
Poor GPS signal	red indicator blinks twice		Low
Ordinary GPS signal	red indicator blinks once		Low
Strong GPS signal	No blink of red indicator		Low
RTK positioning		yello	ow indicator blinks once
Indication of Low Voltage Alarm	Status Indicator		Priority Level
Level one alarm	yellow indicator blinks three times		Low
Level two alarm	yellow indicatorblinks quickly		High

Indication of double-faced calibration	Status Indicator		Priority Level
Horizontal calibration	Yellow indicator is solidon		Medium
Vertical calibration	Green indica	ator is solidon	Medium
Calibration failure	Red indicate	or is solid on	Medium
Calibration success	5	Alternating bli	nk among red, green and yellow indicators
Indication of spherical calibration	Status I	ndicator	Priority Level
Being calibrated		among red, green v indicators	Medium
Calibration success	The indicator re	eturns to normal	Medium
Indication of accelerometer Calibration	Status I	ndicator	Priority Level
Being calibrated	Alternating blink among red, green and yellow indicators		Medium
Calibration success	The green indicator is solidon		Medium
Indication of Abnormal status	Status Indicator		Priority Level
Lost control of remote controller	Quick blink of red indicator		High
Compass is disturbed/ abnormal	Alternating blink between green and yellow indicators		High
GPS loses the signal	Alternating blink betweengreen and redindicators		High
IMU vibration is too fierce/ abnormal	Alternating blink betweenred and yellow indicators		High
Indication of Other Status	Status Indicator		Priority Level
Initialization of power up	Alternating blink among red, green and yellow indicators		High
Unlock	Alternating blink among red, green and yellow indicators		High
Unlock failure	Red indicator is normally on		High

G. Radio LED status light definition

The VD32 radio has two LED status lights, the right LED is the charge status light and the left LED is the radio status light. Each status light displays the radio's operational status with three colors and flashes.

- Right LED status light (Charge status)

Red lighting-up: Controller battery charging

Green lighting-up: Controller battery fully charged

- Left Status light (radio Receiver Status light)

Blinking green: Radio normally/good connection.

Red 2 blinks: Antenna error.

Red 3 blinks: Wireless initialization failed.

Red 4 blinks: Gimbal calibration required.

Red continuous blinking: Controller firmware mismatch.

Red slow blinking: disconnected from drone.

Fast red blinking: Binding with drone.

H. Select flight mode and operation method

The flight mode can be switched to the SA switch on the upper left side of the control. A total of three flight modes are available, and the flight methods for each mode are as follows.

- GPS Mode: The mode used when GPS signals are good is also called position control mode. It is a flight mode in which the drone receives a GPS signal to control its position, and it is the most often used mode because the drone does not flow due to wind and inertia, making it easy to control it in the desired location and path. Once pre-flight preparation and inspection have been completed, the drone are landed in a safe place after flying along the route according to the flight plan.

Atti Mode: A flight mode that is available when GPS mode flight is difficult due to ambient conditions or air conditions, including poor GPS signals, also known as posture control mode. Although the altitude and posture are maintained, the drone flows under the influence of wind and inertia, so you should carefully and smoothly operate the radio stick while observing the drone's movement path and movement. It is not easy to fly along the route according to the flight plan, especially because it is heavily influenced by weather and wind, so experienced pilots must fly in weather conditions that are easy to fly.

Automatic flight mode (AB mode): A mode in which the drone registers points A and B based on the technology of receiving GPS signals to recognize its location, allowing the drone to perform automatic flight and automatic control operations on a specified path. Basically, if the GPS signal is not good or the location of the drone is difficult to determine, and if there is an obstacle in the vicinity, it should not be used because there is a risk of an accident. Move to GPS flight mode to the start of the operation in the area you wish to control, then lower the SD switch one level down to record the start point of the flight path (point A). Use the S2 switch to operate the dispersion device and control the amount of dispersion using the LD dial. Fly in GPS mode to the point where you want to start the first U-flight (point B), then lower the SD switch to the bottom to record point. When the SA switch is lowered to the bottom and the Aileron stick is moved to the left or right, the drone will start automatic parallel flight at constant speed and at constant intervals in the direction of the stick and repeat parallel flight until the flight mode is changed. After completing the automatic flight within the work area, change to GPS flight mode and move the SD switch up and down 4 to 5 times to initialize the AB point (point) setting and land the aircraft in a safe place. In automatic flight mode (AB mode), you must change to GPS mode immediately in the event of an emergency.

I. Tips for dealing with emergencies

In spite of GPS or automatic flight mode, the aircraft may flow in an undesired direction or may be shaken by a minor collision somewhere, in which case the flight mode switch (SA switch) is switched to Atti mode to start the maneuver, move it to a safe place and landing. If the aircraft is operated abnormally differently from the intended purpose, always consider life protection as a top priority and make emergency operation.

In the event of abnormal/disconnected signals between the control and the aircraft during flight, the product is set to attempt an automatic landing from its current location at the factory default value. In this case, you will need to shout out the situation around you, reboot the controls, try connecting to the aircraft again, and attempt to make an emergency landing as soon as you connect. If the connection fails, the aircraft will land at the location regardless of the condition of the landing site.

If the battery power is insufficient to sustain the flight, the drone will send a primary low voltage warning signal with the status light flashing rapidly three times amber. In this situation The pilot moves the drone to a safe take-off and landing area, lands it, and then replaces the battery. If the first low voltage warning continues to fly and battery power is severely insufficient to continue the flight, the drone will continue to flash the status light yellow quickly, send a second low voltage warning, fly down immediately land regardless of landing area condition. Therefore, in the event of a low voltage warning, move quickly to a safe take-off and landing area to ensure safe landing.

4. Inspection and maintenance

i. The drone has built-in FC and expensive sensors, so avoid humid places and store them at 15 to 25 degrees Celsius.

(Keep away from dust, moisture, rain, heat, direct sunlight and vibration when storing)

- ii. Store the GPS and receiver antennas carefully to avoid impact.
- iii. Secure the propeller with a propeller sponge to prevent damage to the propeller during transportation.
- iv. When storing, wash the pesticides in the pump and nozzle, dry them completely, and store them.
- v. In the event of sparks and soot in the battery gender between power connections, check the anti-terminal and replace the battery gender with a new one.
- vi. Clean frequently. If you feel anything wrong, please contact your buyer immediately.